WSH 2028

A Healthy Workforce in Safe Workplaces;
A Country Renowned for Best Practices in
Workplace Safety and Health

WSHCOUNCIL
Tripartite Alliance for
Workplace Safety and Health

MINISTRY OF
MANPOWER

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1 April 2019

Mrs. Josephine Teo
Minister for Manpower
Second Minister for Home Affairs

Dear Minister,

On behalf of the WSH 2028 Tripartite Strategies Committee, it is my pleasure to submit our report containing recommendations on Singapore's national WSH strategies for the next decade.

Singapore has steadily reduced its workplace fatality rate since the enactment of the WSH Act in 2006. But we should never be complacent, and must challenge ourselves to make conditions even safer and healthier for our workers.

In 2017, the Prime Minister announced a target to reduce and sustain Singapore's workplace fatality rate at less than 1.0 per 100,000 workers by 2028, in line with that for the safest countries in the world. In April 2018, our Committee was convened by the Ministry of Manpower, to recommend ways to raise Singapore's WSH standards to be amongst the best in the world.

The Committee's members were from the Government, industry and unions, to forge tripartite consensus on the recommendations. Members of the Committee's workgroups included representatives from training providers, voluntary welfare organisations, insurance companies, healthcare institutions, and institutes of higher learning to provide diverse representation of views from across the WSH ecosystem. The Committee was also guided by a Tripartite Advisory Panel comprising Minister of State for Manpower Mr. Zaqy Mohamad, National Trades Union Congress President Ms. Mary Liew and Singapore National Employers Federation President Dr. Robert Yap.

Over the past year, the Committee consulted close to 3,000 individuals, representing a wide range of stakeholders. These included international WSH experts, employers, union leaders, workers, trade associations, training providers, and members of the public. We deeply appreciate all who shared their views with us, whose insights have helped to shape the WSH 2028 recommendations.

Two important shifts the Committee aims to bring about, which I believe are essential for Singapore to be amongst the world's best in WSH, are:

I. Removing any misconception that WSH is a cost, and replacing it with the conviction that good WSH is good for business; and
II. Correcting the fallacy that companies cannot influence their employees' health, and instead entrenching the belief that employers can and should create work environments conducive for good health.

This report provides our recommendations to achieve these key shifts. We hope that they provide a strong foundation for new breakthroughs in WSH. The Committee is grateful for the opportunity to foster a healthy workforce in safe workplaces for Singapore. We are pleased to present our report for the Government's consideration.

Yours sincerely,

JOHN NG

Chairperson, WSH 2028 Tripartite Strategies Committee

3 April 2019

Dear John

Singapore has made good progress in Workplace Safety and Health (WSH). Benchmarked against OECD countries, our three-year average fatality rate has improved from 18th place in 2010 to 7th in 2018. This has been the result of persistent tripartite efforts to strengthen WSH culture and practices.

Looking to the future, our aspiration is for Singapore businesses to be world-leading practitioners in WSH. This is an important and meaningful endeavour that reflects the value we place on the well-being of our people.

To achieve the WSH 2028 goals, I agree with the Committee that business interests need to be closely aligned with WSH, so that management teams are intrinsically motivated to make their workplaces safer and healthier. It is equally important to prevent workplace injuries and improve workers' health. My Ministry will support businesses that have these twin emphases.

I am pleased to accept the Committee's recommendations, which are comprehensive and thoughtful. I would also like to place on record my deep appreciation for your commitment and leadership that will ultimately enhance the protection of our workers' safety and health. The Government looks forward to working closely with our tripartite partners in implementing the WSH 2028 recommendations.

Yours sincerely,

JOSEPHINE TEO

EXECUTIVE **SUMMARY**

INTRODUCTION

1. Singapore has made significant progress in our workplace safety and health (WSH) outcomes.

2. Our workplace fatal injury rate declined by more than 75% over the past 14 years: from 4.9 per 100,000 workers in 2004 to 1.2 per 100,000 workers in 2018 – the lowest level recorded in history. This was the result of concerted tripartite efforts to strengthen WSH regulations, develop capabilities, raise awareness and deepen industry ownership of WSH, which were guided by the national WSH strategies developed in 2005 (WSH 2015) and 2008 (WSH 2018).

3. We aim to do better. To guide our efforts in the next decade, we developed a new vision.

WSH 2028 Vision

A Healthy Workforce in Safe Workplaces;
A Country Renowned for Best Practices
in Workplace Safety and Health

4. The WSH 2028 vision acknowledges that both workplace safety and workforce health are of equal importance, and reaffirms our aspiration to be a global leader in WSH practices. It guides our efforts in the prevention of workplace injury and occupational disease (OD), and the promotion of workforce health. Our rallying call is Vision Zero, where stakeholders are committed to preventing all forms of injury and ill-health at work.

5. To realise this vision, MOM established the WSH 2028 Tripartite Strategies Committee to recommend a set of 10-year WSH strategies. The Committee comprised representatives from the Government, industry, unions; and partner organisations such as training providers, voluntary welfare organisations, insurance companies, healthcare institutions, and institutes of higher learning.

Strategic Outcomes

6. The Committee identified four strategic outcomes to track progress in attaining the WSH 2028 vision.

Strategic Outcome 1: Sustained Reduction in Workplace Injury Rates

7. We aim to reduce Singapore's workplace fatal injury rate by 30% on a sustained basis: from a 3-year average of 1.4 per 100,000

workers in 2018 to below 1.0 per 100,000 workers within the next 10 years. Only four countries in the Organisation for Economic Co-operation and Development (OECD) have achieved this. It is also important to reduce major injuries at the workplace as they reflect wider attitudes towards safety. Our aim is a similar 30% reduction from a three-year average of 17.2 per 100,000 workers to below 12.0 per 100,000 workers.

Strategic Outcome 2: Minimise Hazards that Lead to Occupational Disease

8. As some ODs may only emerge after years of exposure, prevailing OD rates are lagging indicators. A leading indicator of OD incidence is whether workers are sufficiently protected against exposure to toxic substances and excessive noise. Protection can be achieved in two main ways: (i) by upstream controls that remove or isolate the hazard from workers; or if that is not possible, (ii) by reducing workers' exposure to the hazard to an acceptable level through other control measures, such as the use of personal protective equipment. The Committee encourages more companies to remove hazards upstream. To this end, the Committee recommends improving the current 46% of workplaces under MOM's surveillance that adopt upstream noise and chemical risk controls to more than 75% by 2028.

Strategic Outcome 3: Promotion of Good Workforce Health

9. There have been more workplace accidents linked to dizziness or loss of consciousness that stem from poorly-managed chronic conditions such as diabetes, hypertension (high blood pressure) and hyperlipidaemia (high LDL cholesterol). Ill-health and poor health management impacts safety. The Committee has decided that a target should be set, unlike previously where there was none, for at least 50% of employees to have access to employer-initiated health promotion activities. At the same time, risk assessments should include consideration that ill-health could lead to accidents. In high-risk industries, such enhanced risk assessment should cover at least 75% of those in safety-sensitive jobs, up from 51% in 2017.

Strategic Outcome 4: Pervasive Adoption of the Vision Zero Culture

10. A progressive and pervasive WSH culture, with companies intrinsically motivated to prevent accidents and keep their workforce healthy, is essential to sustaining low rates of workplace injuries and ill-health. While it is difficult to measure WSH culture directly, it is possible to assess the strength of a company's WSH culture by looking at its practices. By 2028, the

adoption of progressive practices that reflect the Vision Zero culture should cover at least 75% of employees in high-risk industries, up from about 60% in 2017.

Strategies

11. Three broad strategies have been identified to attain the strategic outcomes.

Strategy 1: Strengthen WSH Ownership

12. The Committee believes that the level of ownership for WSH by all stakeholders has to move beyond "basic" to be global-leading for sustained improvements in WSH.

13. The following summarises the Committee's recommendations to realise its aspiration for 2028: that every company is intrinsically motivated to care for their workers' safety and health, and there is mutual trust and joint responsibility by all stakeholders to embrace ownership for WSH.

1.1 Make WSH More Salient in Business Decisions

- Publish every company's WSH performance in terms of workplace fatality and major injury rates, normalised by workforce size and industry to facilitate meaningful comparison.
- Share work injury compensation claims data with insurance industry, so that premiums can be differentiated according to the WSH performance of a firm.
- All public-sector developers to adopt harmonised criteria to disqualify unsafe construction firms.
- Share list of disqualified construction firms with private developers.
- Provide incentives for supply chain leaders, such as main contractors and shipyards, to invest to improve WSH capability of their suppliers.
- Allow leading enterprises to certify their in-house WSH training as fulfilling government-mandated training requirements and to offer them to supply chain partners.

1.2 Align Company Directors and Top Management to WSH Ownership

- Introduce an Approved Code of Practice on WSH duties of company directors.
- Introduce an Approved Code of Practice on WSH duties of principals to their contractors.

1.3 Strengthen WSH Ownership of Workers

- Labour Movement's Collective Agreements and MOUs with companies to institutionalise:
  - WSH Committee comprising workers and management.
  - System to report and learn from near-misses.
  - System to empower workers to stop work in unsafe conditions.
  - Joint worker-management teams to conduct internal WSH inspections and implement control measures.

- Build in-house WSH expertise in every union.
- Mobilise Migrant Workers' Centre to educate foreign workers on progressive WSH practices.

Strategy 2: Enhance Focus on Workplace Health

14. It is not sufficient to focus solely on injury prevention. A healthy workforce is the outcome of a safe workplace. At the same time, a healthy workforce is also a contributor to safety. This encompasses both the prevention of ODs and the promotion of workforce health.

15. The Committee recommends the following:

2.1 Expand Occupational Disease Prevention Efforts

- Encourage adoption of upstream measures to prevent ODs.
- Expand the WSH Act's list of reportable ODs.
- Raise capabilities of medical community to detect and report ODs.
- Increase health hazard surveillance to more workplaces.

2.2 Build Companies' Capabilities to Promote Workforce Health

- Develop guidelines on job adaptations that employers can take to support workers in managing their chronic diseases.
- Increase companies' access to Total WSH Services.
- Upskill WSH professionals in workforce health.
- Raise awareness of measures to promote workers' mental health.

Strategy 3: Promote Technology-Enabled WSH

16. By the year 2028, Singapore will have made much progress towards its vision to be a Smart Nation. There is thus immense potential for the practice of WSH itself to be transformed through technology.

17. The Committee recommends the following:

3.1 Develop a WSH Technology Ecosystem to Deepen Industry Capability

- Develop a WSH technology roadmap to identify emerging technologies with greatest impact to solve WSH problems.
- Set up a WSH innovation and technology network coordinated by MOM to mobilise research institutions, leading technology companies and experts to develop WSH solutions.
- MOM to continue implementing the WSH Technology Challenge to catalyse development of innovative solutions for difficult WSH problems.
- Provide rapid follow-on support for successful solutions from the WSH Technology Challenge to accelerate industry adoption.
- Catalyse the supply and adoption of WSH monitoring services to strengthen

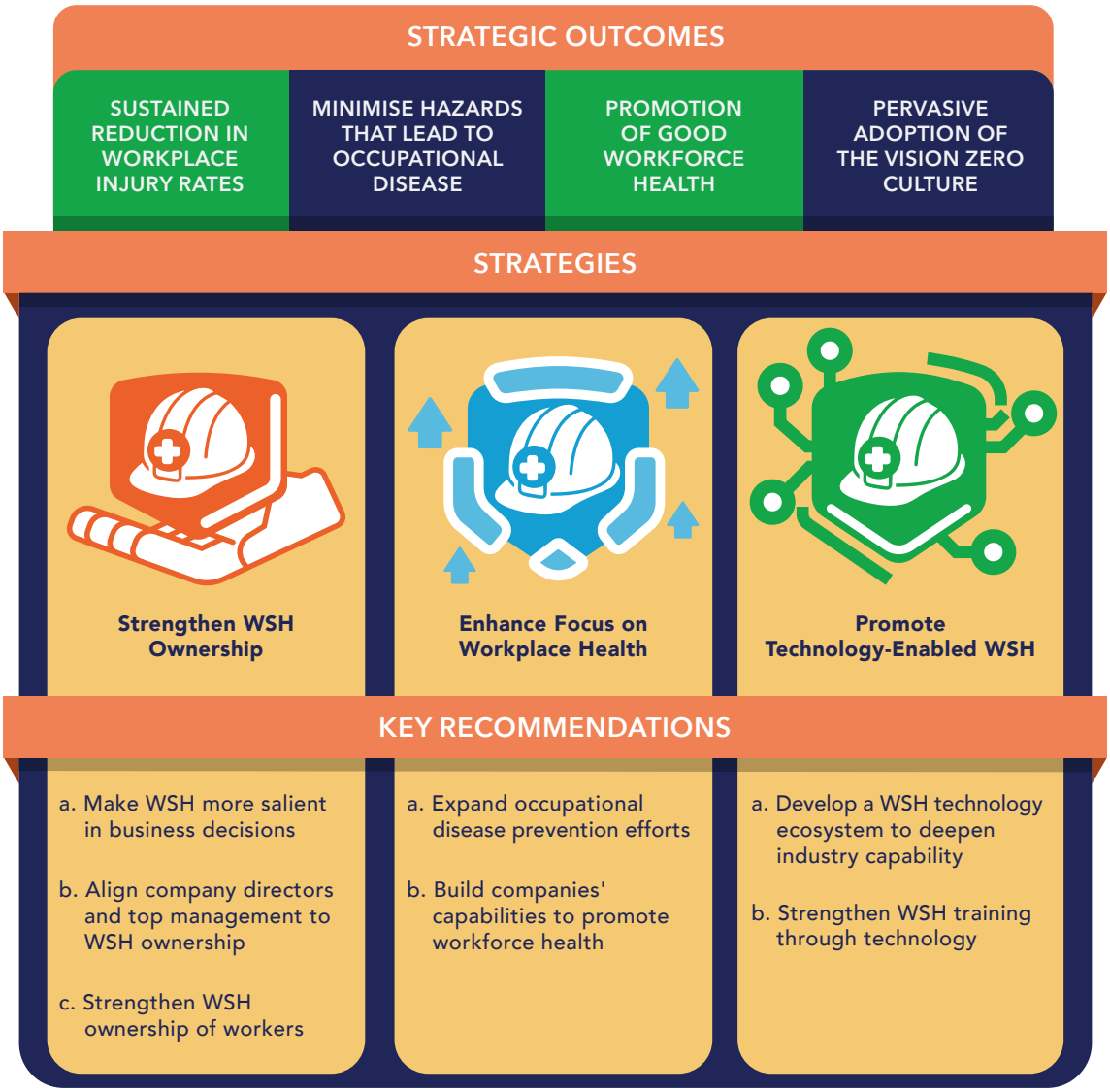
companies' WSH capabilities to detect and manage WSH risks.

3.2 Strengthen WSH Training through Technology

- Incorporate technologies into WSH training, where it is shown to be effective.
- Deploy technology for team learning on work coordination to operate safely.
- Explore use of micro-learning applications on hand-held devices for continuous upgrading of knowledge.

Overview of the Committee's WSH 2028 Recommendations

18. The Committee's WSH 2028 recommendations are summarised as follows:



INTRODUCTION

SINGAPORE'S WSH JOURNEY

Singapore's Workplace Safety and Health (WSH) framework was last reformed in 2005 following high-profile workplace accidents such as the 2004 Nicoll Highway collapse. To improve WSH outcomes, the focus of the framework was shifted from compliance with prescriptive rules under the then-Factories Act to a more performance-based regime under the WSH Act.

The WSH Act incorporated three guiding principles: (i) reduce risk at source by requiring all stakeholders to remove or minimise the risk they create; (ii) encourage companies to adopt greater ownership of safety and health outcomes; and (iii) impose higher penalties for poor safety management and outcomes.

The Government then worked with stakeholders to develop a set of strategies to help companies and workers understand and comply with the law. The 10-year WSH 2015 national strategies were developed in 2005 with the goal of halving the workplace fatal injury rate from 4.9 per 100,000 workers in 2004 to 2.5 by 2015. WSH 2015 had four key thrusts: (i) build strong capabilities to better manage WSH; (ii) implement an effective regulatory framework; (iii) promote the benefits of WSH and recognise best practices; and (iv) develop strong partnerships locally and internationally.

The WSH 2015 strategies had been instrumental in reducing our workplace fatal injury rate to 2.9 per 100,000 workers by 2007. With this achievement, the target was revised in 2008 to reduce the workplace fatal injury rate to below 1.8 by 2018. To achieve the new target, WSH 2018 was developed as the 2nd set of 10-year national strategies for Singapore. While the four key thrusts under WSH 2015 remained relevant for the WSH 2018 strategies, a new emphasis on developing a progressive and pervasive WSH culture was introduced for sustainable improvement.

Guided by the national WSH strategies, we have strengthened WSH regulations, developed capabilities, raised awareness and deepened industry ownership of WSH. The Ministry of Manpower (MOM) has increased its enforcement presence and penalties for non-compliance, while the WSH Council has intensified its industry engagement efforts. These efforts have borne fruit as our workplace fatal injury rate declined to 1.2 per 100,000 workers in 2017 and 2018 – the lowest rates recorded for Singapore.

To put the improvements in perspective, Singapore's 3-year average fatality rate relative to countries in the Organisation for Economic Co-operation and Development (OECD) had improved from 18th place in 2010 to 7th place in 2018, reflecting a major shift in culture, mindset and practices. This translates to lives saved – from 67 deaths in 2008, to 41 deaths in

2018. Nevertheless, the WSH community is united in its belief that every fatality is one too many. More details of Singapore's WSH performance is in Annex A.

A NEW TARGET FOR 2028

Notwithstanding the improvements over the years, Singapore can and should strive to do better in WSH to reflect the value we place on the well-being of our people. We want Singapore to aspire to WSH standards that are amongst the best in the world.

For businesses, safer and healthier workplaces also mean more productive workplaces. They avoid losses in output, delays and staff absenteeism arising from work injuries and ill-health. Within safe and healthy working environments, workers can have the confidence to give their best.

In September 2017, at the XXI World Congress on Safety and Health at Work, the Prime Minister announced a more ambitious target of achieving and sustaining a workplace fatal injury rate at less than 1.0 per 100,000 workers by 2028. This is not an easy goal. Amongst OECD member countries, only four have achieved a fatality rate of less than 1.0 on a sustained basis (see Table 1). Achieving this will make Singapore's workplaces one of the safest in the world.

Table 1: Only four OECD countries have achieved a workplace fatality rate of less than 1.0 on a sustained basis[1]

Rank	Country	Average workplace fatality rate
1	Netherlands	0.55
2	Sweden	0.79
3	United Kingdom	0.81
4	Germany	0.98
5	Greece	1.09
6	Denmark	1.22
7	Singapore	1.4
8	Finland	1.44
9	Belgium	1.50

Rank	Country	Average workplace fatality rate
10	Iceland	1.57
11	Australia	1.6
12	Norway	1.62
13	Switzerland	1.63
14	Israel	1.7
15	Poland	1.73
16	Canada	1.83
17	Japan	1.86
18	Spain	2.05

[1] Based on public data from OECD countries on the most recent 3-year average workplace fatal injury rates per 100,000 workers: (i) 2014-16 for Canada, EU countries, Israel, New Zealand, Turkey; (ii) 2015-17 for Australia, Iceland, Japan, Mexico, Republic of Korea, United States of America; and (iii) 2016-18 for Singapore. For Chile, only the 2017 rate was publicly available.

Sources: Eurostat, ILOSTAT, Japan Industrial Safety and Health Association, Korean Occupational Safety and Health Agency, Safe Work Australia, Stats NZ, Administration of Occupational Safety and Health (Iceland), Statistics Iceland, and U. S. Bureau of Labor Statistics.

Rank	Country	Average workplace fatality rate
19	New Zealand	2.1
20	Slovak Republic	2.16
21	Hungary	2.22
22	Ireland	2.37
23	Italy	2.51
24	Slovenia	2.51
25	Czech Republic	2.56
26	France	2.67
27	Austria	3.07
28	Estonia	3.31

Rank	Country	Average workplace fatality rate
29	Portugal	3.37
30	Chile	3.4
31	United States of America	3.5
32	Latvia	4.01
33	Luxembourg	4.06
34	Lithuania	4.09
35	Republic of Korea	5.3
36	Mexico	7.8
37	Turkey	7.9

THE WSH 2028 TRIPARTITE STRATEGIES COMMITTEE

To develop WSH 2028, our next set of 10-year national WSH strategies, MOM convened a Tripartite Strategies Committee comprising representatives from the Government, industry, unions; and partner organisations such as training providers, voluntary welfare organisations, insurance companies, healthcare institutions, and institutes of higher learning. The Committee's composition is in Annex B.

The Committee was guided by the following principles in formulating our recommendations:

a. To bring the interests of businesses into greater alignment with WSH. Ultimately, the management must be intrinsically motivated to continually improve their businesses' WSH standards. This is more sustainable and effective than relying solely on regulatory compliance.

b. For workers to take greater ownership in WSH. In the world-leading WSH management systems and processes, workers provide valuable insights to work situations and risks, and have strong ownership in developing and implementing safe working practices.

c. To be ready for the future of work. Successful WSH strategies for the next decade must factor in Singapore's demographic shifts and Industry 4.0[2], which present new challenges but also opportunities to improve safety and health for all.

[2] Industry 4.0, or the Fourth Industrial Revolution, refers to the fusion of technological breakthroughs, such as in artificial intelligence, robotics, additive manufacturing and biotechnology, that has the potential to transform lives and businesses.

WSH 2028 VISION AND STRATEGIC OUTCOMES

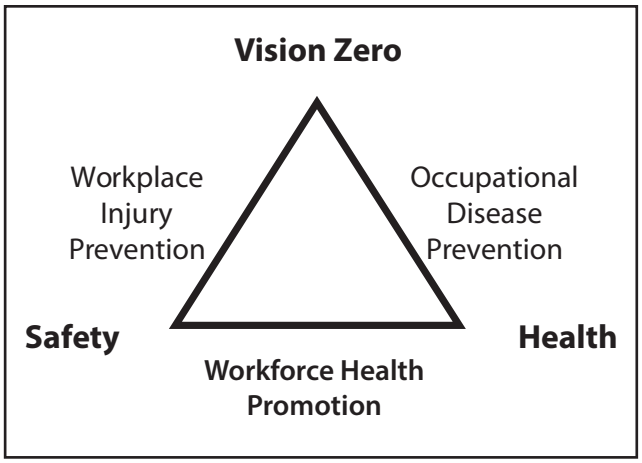
VISION

A Healthy Workforce in Safe Workplaces;
A Country Renowned for Best Practices in Workplace Safety and Health

A common vision for all stakeholders is key to reducing the workplace fatal injury rate to less than 1.0 per 100,000 workers. The WSH 2028 vision builds on the WSH 2018 vision of "A safe and healthy workplace for everyone; and a country renowned for best practices in workplace safety and health".

The updated vision reaffirms our aspiration to be a global leader in WSH practices. The vision acknowledges that workplace safety and workforce health are of equal importance, with progress to be made in both **workplace injury prevention and occupational disease (OD) prevention.** At the same time, workforce health could affect workplace safety. An unhealthy worker, with poorly managed chronic diseases, could suffer dizziness or loss of consciousness, compromising his own and his colleagues' safety. Therefore, our WSH strategies also need to include **workforce health promotion**, for workplaces to facilitate the prevention, detection and management of ill-health conditions, so that they do not become safety risks.

Only with effective injury prevention, OD prevention, and workforce health promotion, can we attain **Vision Zero** – the aspiration that all cases of injury and ill-health at work can be prevented.



STRATEGIC OUTCOMES

To track progress in attaining the WSH 2028 vision, the Committee identified four strategic outcomes that reflect success in workplace injury prevention, OD prevention, workforce health promotion, and adoption of the Vision Zero culture, respectively.

Strategic Outcome 1: Sustained Reduction in Workplace Injury Rates

The proof of a safe workplace is a low rate of workplace injuries. Injuries not only affect workers' lives and livelihoods, but also impose costs on companies and their customers in terms of project delays, loss of output, and penalties. Companies should always put processes in place to manage safety risks, and imbue workers with skills and awareness to identify and prevent hazards.

We aim to reduce and sustain the workplace fatal injury rate at below 1.0 per 100,000 workers within the next 10 years, in line with best performing countries (see Table 2). This would be around a 30% reduction in fatal injury rate from the three-year average up to 2018. But it is not enough to just reduce the fatal injury rate. It is also important to reduce major injuries at the workplace as they reflect wider attitudes towards safety. Thus, we aim to similarly reduce the major injury rate by 30% to below 12.0 per 100,000 workers. Reducing Singapore's workplace injury rates to the target levels from the current three-year average directly translates to preventing the loss of more than 140 lives and loss of livelihood for more than 1,000 workers due to major injuries from 2019 to 2028, if we progressively work towards these targets.

Table 2: Success indicators of a sustained reduction in workplace injury rates

Success indicators	Current[3] (2016-18 average)	Desired (Three-year average by 2028)
Workplace fatal injury rate per 100,000 workers	1.4	<1.0
Workplace major injury rate per 100,000 workers	17.2	<12.0

Strategic Outcome 2: Minimise Hazards that Lead to Occupational Disease

While we want to prevent ODs, tracking OD incidence rates are however lagging indicators. Due to the long latency periods before ODs are diagnosed, OD rates usually reflect the outcome of circumstances from years ago.

A leading indicator of OD incidence is whether workers are sufficiently protected against exposure to toxic substances and excessive noise. Protection can be achieved in two main ways: (i) by upstream controls that remove or isolate the hazard from workers; or if that is not possible, (ii) by reducing workers' exposure to the hazard to an acceptable level through other control measures, such as the use of personal protective equipment.

Currently, 46% of workplaces under MOM's surveillance have adopted upstream noise and chemical hazard controls. The remaining companies have provided other control measures, such as the

[3] Source: Workplace Safety and Health 2018.

use of personal protective equipment, to reduce workers' exposure to acceptable levels. Nonetheless, there is the risk that personal protective equipment may not be worn properly or is poorly maintained. Thus, the Committee aims for more than 75% of workplaces under MOM's surveillance to have implemented upstream risk control measures to remove excessive noise and toxic substances by 2028 (see Table 3).

Table 3: Success indicator of minimising hazards that lead to occupational diseases

Success indicator	Current (2018)	Desired (by 2028)
Proportion of workplaces under MOM's surveillance that implement upstream controls to remove noise and chemical-related health risks	46%	>75%

Strategic Outcome 3: Promotion of Good Workforce Health

To minimise the effects of poor workforce health on safety, the Committee recommends prioritising the address of the following chronic diseases: diabetes, hypertension (high blood pressure) and hyperlipidaemia (high LDL cholesterol). These chronic diseases are common, with approximately one-third of working residents suffering from at least one of them[4]. They also place workers at increased risk of cardiovascular diseases that were the leading cause of disability-adjusted life years (DALYs) in Singapore in 2017[5]. If these conditions are not detected early and well-managed, they could result in dizziness, unconsciousness or reduced mobility, which increase the risk of workplace accidents especially in workers performing safety-sensitive jobs[6].

Therefore, we should monitor the adoption of workplace practices that can detect, manage and prevent diabetes, high blood pressure, and high LDL cholesterol (see Table 4). In the next 10 years, we should aspire for at least 50%

[4] Source: The National Health Survey 2010 by the Ministry of Health (MOH).

[5] Source: Institute for Health Metrics and Evaluation. The DALYs metric is a summary measure of the disease burden in a population. It has two components: (i) years lived with disability, which is the collective number of years that people in a population live with ill-health due to disease or injury, and (ii) years of life lost, which is the number of years lost due to premature death.

[6] Safety-sensitive jobs refer to jobs where impaired performance, for whatever reason, could result in a significant incident affecting the safety or health of employees, customers, the public, property, or the environment. Common safety-sensitive jobs are construction workers, vocational drivers, crane operators, and plant and machine operators.

of all employees to have access to employer-initiated health promotion activities, such as health screening, health coaching and workplace exercise programmes. We also aim to increase the percentage of employees in high-risk industries[7] who benefit from WSH risk management measures that consider workforce health risks, in particular from chronic diseases.

Table 4: Success indicators of workforce health promotion

Success indicator	Current[8] (2017)	Desired (by 2028)
% of all employees with access to employer-initiated health promotion activities, such as health screening, health coaching, and workplace exercise programmes	New	50%
% of employees in high-risk industries whose employers consider the impact of workforce health risks (e.g. hypertension and diabetes) for safety-sensitive jobs	51%	75%

Strategic Outcome 4: Pervasive Adoption of the Vision Zero Culture

We have yet to attain our desired outcome of a progressive and pervasive WSH culture that was identified as part of the WSH 2018 strategies. Only when this is attained, with companies intrinsically motivated to prevent accidents and keep their workforce healthy, can we sustain low rates of workplace injuries and ill-health.

In embodying Vision Zero, companies need to have a culture of care, trust and prevention where: (i) top management adopts progressive WSH practices to prevent injury and ill-health beyond legislative requirements; (ii) workers report near-misses and unsafe conditions or behaviours without fear of reprisal; and (iii) companies actively identify potential risks and investigate incidents and near-misses so that root causes of accidents are systematically addressed.

[7] High-risk industries refer to industries with the highest average fatal or major injury rates from 2014 to 2018; i.e. construction, manufacturing, marine, and transportation and storage.

[8] Source: Supplementary Survey on Quality Workplaces 2017, Manpower Research and Statistics Department, MOM.

While it is difficult to measure WSH culture directly, it is possible to assess the strength of a company's WSH culture by looking at its practices. Specifically, we should monitor the adoption of WSH practices that demonstrate the culture of care, trust, and prevention (see Table 5).

Notwithstanding this, stakeholders should not lose sight of the overall objective for monitoring these indicators – not for their own sake, but as a reflection of our maturity in achieving a progressive and pervasive WSH culture.

Table 5: Success indicators that reflect pervasive adoption of the Vision Zero culture

Success indicator	Current[9] (2017)	Desired (by 2028)
% of employees in high-risk industries where top management is responsible for allocating manpower and/or financial resources for WSH	62%	75%
% of employees in high-risk industries whose employers have a programme to encourage reporting of near-misses or unsafe conditions or unsafe acts	59%	75%
% of employees in high-risk industries whose employers have a policy allowing employees to stop work should they feel the work environment or work activity is unsafe	60%	75%

The way forward will require us to adopt three broad strategies. Strategy 1 of the report explains how we can achieve a breakthrough in workplace injury prevention by strengthening WSH ownership. Strategy 2 details how we plan to improve OD prevention and promote workforce health, while Strategy 3 concludes with the use of technology as an enabler for better WSH outcomes.

[9] Source: Supplementary Survey on Quality Workplaces 2017, Manpower Research and Statistics Department, MOM.

STRENGTHEN
WSH OWNERSHIP

STRENGTHEN WSH OWNERSHIP

PROGRESS UNDER WSH 2018

Over the past decade, the risk-based inspection and enforcement regime combined with more stringent penalties, and supported by public education and engagement efforts, have brought about improved WSH outcomes.

Today, there is pervasive adoption of basic WSH practices. MOM's survey found that 92% of employees worked in companies that implemented WSH risk assessments and 83% of employees worked in companies where WSH precautions were communicated to staff[10].

The Committee believes that the level of ownership for WSH by all stakeholders has to move beyond "basic" to be global-leading. This is the only sure foundation for sustained improvements in WSH. Today, we are not able to say that most businesses, employers and workers proactively adopt progressive WSH practices beyond the basic safeguards. For example, the most progressive companies in the world invariably have a near-miss reporting system, and would empower workers to stop work if they spot any unsafe situation. This is not yet the working culture in Singapore today. In fact, only about half of employees in high-risk industries work in companies that have either a near-miss reporting system or a policy for workers to trigger work stoppage in unsafe situations[11].

DESIRED OUTCOMES

Singapore already has a strong reputation for safety and high standards of compliance as part of our competitive business advantage. Achieving the strategic outcomes of WSH 2028 will be another capability that strengthens Singapore's reputation for integrity, quality, trust and competency. This will in turn strengthen local companies' competitiveness for business internationally, and help attract top international companies operating in high-risk industries, such as chemicals, energy, and offshore and marine, as well as those that provide WSH products and solutions to set up operations in Singapore.

Good WSH is not only good for workers, but also good for business. Thus, the Committee's aspiration for 2028 is that every company is intrinsically motivated to care for their workers' safety and health, and there is mutual trust between employers and workers.

a. "Intrinsically motivated" – this implies that each company willingly takes full ownership for WSH. The company's approach to WSH is not driven by external pressure, such as regulatory requirements.

b. "Care for workers' safety and health" – it should be the care for their workers that provides the

[10] Source: Supplementary Survey on Quality Workplaces 2017, Manpower Research and Statistics Department, MOM.

[11] In 2017, only 59% and 60% of employees in high-risk industries worked in companies that have a near-miss reporting system, and a policy to stop work in unsafe situations, respectively.

drive and energy for a company to fully embrace ownership of WSH. The Committee recognised that while there can be other alternative goals (e.g. to outdo their competitors), a concern for their workers' safety and health is the most appropriate lens.

c. "Mutual trust" – this recognises that the responsibility to embrace ownership for WSH is not just an action a company must take, but must also be adopted by all its stakeholders, especially its workers. Trust must be two-way: workers must be able to trust that when they speak up about WSH hazards, they will not have to fear reprisal. Employers must be able to trust that when they implement safety systems, workers will diligently apply them day after day.

BARRIERS TO STRONGER WSH OWNERSHIP

In its consultations, the Committee heard views of various barriers to strengthening WSH ownership:

a. While WSH violations can result in composition fines or prosecution, they do not impose significant commercial disadvantage to a company. This results in some employers holding the view that implementing better WSH measures offers minimal benefit to their business. This perpetuates the mindset of keeping time and resources devoted to WSH practices and training to the bare minimum for compliance with prevailing regulations, and a culture of perfunctory risk assessments.

b. Specifically, for the construction sector, while the WSH track record of a bidder is part of the tender evaluation, it is in practice given a lower weightage, with price carrying the highest weight.

c. There is a lack of attention to the WSH risks in a supply chain, especially in Small and Medium Enterprises (SME) where the resources and know-how are more limited. As the performance of a supply chain is only as strong as its weakest link, there is an opportunity for larger companies that are buyers of services to play a greater role in uplifting their SME partners' WSH standards.

d. There is also a lack of clear strategic direction on the importance of WSH. Even in the high-risk industries, only 43% of firms had someone in the top management responsible for allocating resources for WSH[12]. In the lower-risk industries, such a practice is an exception rather than the norm.

e. This is further compounded by the fact that WSH as a business risk is generally not well understood amongst company directors. In its latest review, MOM's International Advisory Panel (IAP) for WSH[13] noted that section 48 of the WSH Act already imposes

[12] Source: Supplementary Survey on Quality Workplaces 2017, Manpower Research and Statistics Department, MOM. These firms accounted for only 62% of workers in the high-risk industries.

[13] The IAP was set up in 2006 by MOM to advise Singapore on its WSH strategies. It's 6th and most recent meeting was held in August 2018.

a duty on company directors, including Boards of Directors, to exercise due diligence to ensure the safety and health of workers, and that this provision has been in place since 2006. However, there is no detailed description in the WSH Act of the required standard of due diligence for directors regarding WSH, nor is there practical guidance to company directors on how they can discharge their duties.

f. The IAP also observed that the responsibilities of contracting parties (principals)[14] were similarly not sufficiently articulated.

RECOMMENDATIONS

The Committee is mindful that the easiest and quickest way for companies to have WSH management systems that *resemble* those that are amongst the best in the world, is to make it a requirement that all companies must comply with, and back it up with more legislation, penalties, and enforcement.

However, the Committee is convinced that such an approach would be short-sighted. The Committee believes that at this stage of Singapore's WSH journey, it is timely to invest more in efforts that can bring about a sustained and enduring culture of risk prevention.

At the same time, the Committee believes that there is scope for more to be done to: (a) make WSH more salient in the decisions of businesses; (b) align and clarify the interests of company directors and top management to support WSH; and (c) ensure that workers also exhibit strong ownership for WSH. Investing in changes on these fronts will create the right conditions to enable a strong WSH culture to take root.

The Committee is also of the view that if pursued and implemented well, by 2028 Singapore can add WSH to its already strong list of competitive business strengths, and set Singapore and Singapore companies apart from the global competition.

Make WSH More Salient in Business Decisions

Empower Clients and Service Buyers to Take Greater WSH Ownership

The Committee heard feedback from businesses that they understand the benefits of choosing partners and contractors with a stronger safety performance. Their partners' or contractors' safety lapses may affect their own operations through delays, loss of output, absence of skilled manpower, and reputational damage. However, businesses face difficulty translating this intent into day-to-day business decision-making, because information on the safety performance of companies is difficult to obtain and not comprehensive. For example:

[14] A principal is any person or organisation who engages another person, including self-employed persons or organisations, to supply labour or perform work under a contract for service.

a. Businesses principally rely on their partners' declared safety records, and these vary in reliability, scope and granularity.

b. MOM already publishes the names of all companies with Stop-Work Orders, fatal work injuries, convictions under the WSH Act, demerit points, and on its Business Under Surveillance (BUS) programme[15]. Today, public developers and some progressive companies already consider these companies' WSH records during tender evaluation. However, this is limited to the WSH records of only around 120 of the worst-performing companies each year.

The Committee believes that we should empower clients and service buyers to take greater ownership of WSH. Hence, it recommends that more information on every company's WSH performance be published to help clients and service buyers make more informed decisions when awarding contracts. This includes information on non-fatal work injuries, as it also reflects gaps in companies' WSH management systems and processes. It is also important that fatality and injury rates, and other aspects of WSH performance, should be normalised by workforce size and industry to facilitate a meaningful comparison.

Make Unsafe Businesses Feel the Consequences

Today, a business with a higher rate of Work Injury Compensation (WIC) claims will not pay a significantly higher premium for WIC insurance. Insurers have explained to the Committee that there is limited information on a company's total claims history, as companies can change insurers from year to year. A business that is quoted a higher premium can easily switch to another insurer, who does not have sufficient information on the WSH risks of the particular firm.

To the degree that WIC insurers in Singapore provide differentiated premiums to factor in higher risks, they do so at a fairly aggregate level. For example, a firm in the construction industry will face a higher premium compared to a firm in the retail industry.

The result of this is two-fold. Firstly, the cost of operating with poorer WSH standards is not felt by the unsafe company. Secondly, within the same sector, safer companies end up subsidising the premiums of the less safe companies.

As a result, in Singapore, WIC insurance premiums currently range from around 0.3% to 1.5% of wages. By contrast, in Finland and Germany, where WIC insurance premiums are priced to more closely reflect the actual risk of the *firm*, they ranged from 0.3% to 8% and 0.75% to 8% of wages, respectively.

[15] Contractors in the construction sector may be given demerit points by MOM for breaching the WSH Act, depending on the severity of the breach. BUS is a programme by MOM to help companies with poor WSH records develop or improve on their WSH management system.

How Finland and Germany Ensure WIC Insurance Premiums Reflect Firm-level Risks

In Finland, insurers are required to share WIC claims data every quarter, so that each company's WSH risk can be comprehensively assessed. This allows differentiation of WIC insurance premiums by a firm's risk of occupational diseases and accidents based on past claims.

In Germany, DGUV, the national authority overseeing the German Social Accident Insurance, has exercised more active market intervention. DGUV sets the WIC insurance premiums annually, which not only depend on the risk of accident in a particular industry, but also the number and severity of accidents in a firm that will result in surcharges or reductions to WIC premiums.

The Committee notes that as part of administering the WIC Act, MOM possesses information of all WIC claims that are made for reportable work injuries and ODs.

The Committee recommends that MOM shares WIC claims data with the insurance industry, so that insurance premiums can be differentiated according to the WSH performance of a particular firm.

For the construction sector, which remains the industry with the highest share of workplace fatalities[16], the Committee reviewed whether the consequences can be made even sharper.

The Government as a developer typically accounts for 60% of total construction project value[17]. Currently, some public developers disqualify contractors with serious safety lapses from being awarded contracts for a defined period. This approach has helped improve safety standards, as demonstrated by the lower number of construction fatalities at public projects compared to private projects.

The Committee recommends that the disqualification system be improved:

a. Today, the criteria for disqualification vary across public developers. There is scope to harmonise the criteria for disqualifying unsafe contractors from new contracts. As the objective is for contractors to improve their WSH standards, the disqualification period should be calibrated accordingly to allow contractors reasonable opportunity to improve and not force them out of business.

b. There is also scope for the list of disqualified contractors to be shared with private developers. While private developers should not be obligated to similarly disqualify contractors, the publication of such information is consistent with the goal to empower clients with information to help them take greater ownership of WSH.

[16] From 2014 – 2018, fatalities in the construction sector accounted for 40% of all fatalities.

[17] The main public sector developers are the Land Transport Authority (LTA), Housing and Development Board (HDB), JTC Corporation, Public Utilities Board (PUB), Ministry of Education (MOE) and Ministry of Health (MOH).

"Procurement contracts should impose good safety records on sub-contractors. Only when we do this, the smaller contractors who are hand-to-mouth will follow."

BATU union leader

Strengthen WSH Capabilities in the Supply Chain

Lead enterprises in a supply chain can make a significant impact in nurturing a strong WSH culture among their suppliers and sub-contractors through their procurement standards. They can also serve as role models to mentor their suppliers (especially SMEs) in the adoption of progressive WSH practices.

"SMEs live hand-to-mouth. There needs to be support of resources, materials and consultants. It is important that we facilitate co-payment [by supply chain leaders] so that the SMEs have a part to invest in WSH."

SME Chief Executive

Today, lead enterprises under WSH Council's bizSAFE programme raise their suppliers' risk management capabilities, for instance, through in-house training, or incorporating risk management criteria in tender evaluations. These lead enterprises are recognised through the bizSAFE Mentor Award at the annual bizSAFE Convention by the WSH Council.

Under WSH 2028, we should do more to enhance support for supply chain leaders to strengthen WSH capabilities in their supply chain, especially their SME suppliers. The Committee recommends that the Government:

a. Provide incentives for supply chain leaders who invest in improving the WSH capability of their suppliers.

b. Provide a route for lead enterprises to certify their in-house WSH training as fulfilling the mandatory training requirements imposed under the WSH Act.

c. Allow lead enterprises to offer their certified programmes to their supply chain partners as an alternative to mandatory external training programmes.

These moves will allow supply chain leaders and their partners to save time and cost, and also allow them to invest in customising their in-house WSH training beyond basic training requirements.

Align Company Directors and Top Management to WSH Ownership

Other than sharpening firms' commercial motivation to be safer, the Committee also recommends that existing legal requirements on WSH be made clearer, with practical guidance given to companies on how they can comply.

In particular, clear guidance should be provided for company directors, and businesses contracting with self-employed persons.

Approved Code of Practice on WSH Duties of Company Directors

The Committee notes that in the first decade in which the 2006 WSH Act was in force, MOM investigations have progressively moved upstream to examine systemic and structural factors contributing to poor WSH standards. This has resulted in greater awareness of WSH as a company risk.

The Committee recommends that greater efforts be made to engage and educate company directors on WSH risks, so that WSH is factored into a company's corporate governance. This will also ensure that the chief executive and top management of companies accord due importance to WSH. The WSH Council should introduce an Approved Code of Practice on WSH duties of company directors for high-risk industries. An Approved Code of Practice is not mandatory, but failure to adopt them or other measures of similar effect can be taken into account by the Court in any prosecution under the WSH Act.

Other countries, such as the United Kingdom and Australia, have also specified the actions that company directors, including Board directors, can take to fulfil their WSH duties. These actions include regular briefing and discussion on WSH in Board meetings, ensuring periodic audits of WSH practices, and requiring management to take into account contractors' WSH records when awarding contracts.

Australia's specification of WSH Duties of Directors

Australia's model Work Health and Safety Act requires directors to exercise due diligence to ensure their company meets it's WSH obligations. To demonstrate they have exercised due diligence, directors will need to show that they have taken reasonable steps to:

- Acquire and keep up-to-date knowledge of WSH issues
- Understand WSH risks in company operations
- Ensure appropriate resources to mitigate risks
- Ensure processes for timely communication and response on WSH issues
- Ensure processes to comply with WSH laws
- Verify the use of WSH resources and processes

Directors may also need to take other steps to discharge their duty of diligence.

Since the requirements started to apply, there has been an increase in company directors receiving training on WSH matters, as well as greater awareness of WSH in Australian companies generally.

The Committee proposes that MOM and WSH Council consult closely with the Singapore Institute of Directors (SID) to formulate specific measures that can be incorporated into Singapore's Code of Practice.

Approved Code of Practice on WSH Duties of Principals to their Contractors

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Another area where there is insufficient awareness is the duty of principals to ensure that the self-employed persons they engage (contractors), have the expertise to carry out the work and have

taken adequate WSH measures. This is already a requirement under the WSH Act.

Self-employed persons generally have autonomy over when and how the work is done, and typically do not benefit from the structured safety training that businesses provide for their employees.

Hence, the Committee recommends that the WSH Council introduce an Approved Code of Practice to clarify the WSH responsibilities of principals towards the self-employed persons they engage, and suggest practical steps that should be taken to fulfil these responsibilities.

Strengthen WSH Ownership of Workers

Besides company directors and service buyers, we will need worker advocates to champion progressive WSH practices in every workplace. The managers of firms also need workers to strongly support the cause of WSH. This is particularly the case as we strive to raise the quality of WSH from merely meeting regulatory requirements, to striving for WSH excellence.

The Committee believes that the Labour Movement is well-placed to be a strong advocate and champion of progressive WSH practices. The Labour Movement can do so in the following ways:

a. To institutionalise in its Collective Agreements and Memoranda of Understanding (MOUs) with companies:
   - Setting up of a WSH committee comprising both worker and management representatives;
   - Establishing a system to report and learn from near-misses;
   - Establishing a system where workers are empowered to stop work in unsafe conditions; and
   - Creating joint management-worker teams to conduct internal WSH inspections and implement control measures.

b. To invest in developing in-house WSH expertise in every union. This would better equip unionists to spot workplace hazards, advocate for progressive WSH practices, and educate their colleagues.

c. To educate foreign workers on progressive WSH practices through its Migrant Workers' Centre (MWC). MWC already has excellent platforms such as its Foreign Worker Settling-In Programme and network of migrant worker ambassadors that can support this.

"Near-miss reporting was formerly seen as a potential for punishment, so we have to educate workers."

Supervisor

"The mindset is important. We position it as opportunities for safety improvements, where the reporting of near-misses must be followed up with safety improvements."

WSH Officer

CONCLUSION

Creating stronger WSH ownership will require a comprehensive effort, effecting changes in the culture at workplaces, the incentives and motivations of managers, the way WSH risks are 'priced', and strong advocacy from the Labour Movement.

Strengthen WSH Ownership

Make WSH More Salient in Business Decisions

- Publish every company's WSH performance in terms of workplace fatality and major injury rates, normalised by workforce size and industry to facilitate meaningful comparison
- Share work injury compensation claims data with insurance industry, so that premiums can be differentiated according to the WSH performance of a firm
- All public-sector developers to adopt harmonised criteria to disqualify unsafe construction firms
- Share list of disqualified construction firms with private developers
- Provide incentives for supply chain leaders, such as main contractors and shipyards, to invest to improve WSH capability of their suppliers
- Allow leading enterprises to certify their in-house WSH training as fulfilling government-mandated training requirements and to offer them to supply chain partners

Align Company Directors and Top Management to WSH Ownership

- Introduce an Approved Code of Practice on WSH duties of company directors
- Introduce an Approved Code of Practice on WSH duties of principals to their contractors

Strengthen WSH Ownership of Workers

- Labour Movement's Collective Agreements and MOUs with companies to institutionalise:
  - WSH Committee comprising workers and management
  - System to report and learn from near-misses
  - System to empower workers to stop work in unsafe conditions
  - Joint worker-management teams to conduct internal WSH inspections and implement control measures
- Build in-house WSH expertise in every union
- Mobilise Migrant Workers' Centre to educate foreign workers on progressive WSH practices.

ENHANCE FOCUS ON **WORKPLACE HEALTH**

ENHANCE FOCUS ON **WORKPLACE HEALTH**

CURRENT EFFORTS ON WORKPLACE HEALTH

It is insufficient to focus solely on injury prevention, which has been the main focus of WSH 2018. A healthy workforce is the outcome of a safe workplace. At the same time, a healthy workforce is also a contributor to safety, because healthy and fit workers can concentrate better and work safely.

Traditionally, the term Workplace Health refers to the prevention of ODs arising from workplace hazards. However in recent years, a broader paradigm for Workplace Health has emerged to encompass the **promotion of workforce health**, through the prevention and management of chronic diseases. The Committee agrees that the Workplace Health agenda should focus on these dual limbs.

On the OD front, we have made some progress in reducing our OD incidence rate over the last decade[18]. But there is more to be done to strengthen our ability to detect and prevent ODs. Besides existing known ODs, Industry 4.0 may also bring about emerging workplace health hazards that could introduce new ODs. Our OD prevention strategy thus needs to evolve and be updated with prevailing health hazards.

For workforce health, Singapore's strategy is still in a nascent stage. Together with the Health Promotion Board (HPB), we have begun to make in-roads into promoting workplace programmes that improve health. We have also been supporting adoption of age-friendly workplace practices, such as in workplace or job redesign[19], so that older workers can continue working safely even in jobs involving manual work.

BARRIERS AGAINST THE FOCUS ON WORKPLACE HEALTH

The Committee understands that there is still insufficient focus on workplace health in the industry today. Our engagements with companies and workers suggest the following confluence of reasons:

a. Unlike workplace safety lapses where the result of an injury (e.g. amputation or fractures) is immediate and visible, the result of poor workplace health management may not manifest so readily. Some ODs emerge only after a prolonged period of hazard exposure. Consequently, employers and workers lack the urgency to address the underlying hazards and many opt to use personal protective equipment (e.g. hearing protector or respiratory mask) as their first line of defense. Instead, the use of personal protective equipment should be the last resort, as they could be improperly worn or poorly maintained.

[18] The OD incidence rate dropped from 36.2 per 100,000 workers in 2008 to 16.4 in 2018.

[19] For instance, slip-resistant walking surfaces and deploying technology to reduce strain for manual work activities.

b. The challenge is even greater in the promotion of workers' individual health. Some employers do not see it as part of their responsibility, nor something they can influence, given workers' own choices in diet and lifestyle. Some workers themselves are reluctant to participate in employer-facilitated interventions to promote health, as they fear disclosure of health conditions could adversely affect their employability.

"It is important to ensure workers are healthy. It will be too late if we only start when something happens."

Union leader

c. In many organisations, it is very common for the prevention of work injuries and occupational diseases to be managed by the WSH team, and workforce health promotion overseen by the Human Resource (HR) function with the assistance of medical practitioners. There is very little integration between the two functions, and this presents a missed opportunity to detect and prevent ill-health that could be detrimental to workplace safety. MOM's survey shows that only 51% of employees in high-risk industries work in firms which consider the impact of health in risk assessments[20]. In addition, beyond providing standard advisories[21], many workers do not receive sufficient guidance on precautions to take to ensure that their health conditions do not affect safety at work.

d. Some ODs are currently not reportable. Under the WSH Act, there are 35 reportable ODs.

e. Only a fraction of workplaces is placed under MOM's surveillance to monitor if their hazard exposure levels are within permissible limits. The majority of these workplaces were identified during inspections. However, it is likely that many workplaces with health hazards are outside of MOM's surveillance regime, since inspections cannot cover all workplaces.

f. With the advent of Industry 4.0, new workplace health hazards could emerge, such as from nanoparticles, additive manufacturing, synthetic biology and poorly designed human-machine interfaces. Many of these technologies are still at their nascent stage with yet unquantified risks.

g. Medical practitioners also typically focus on the treatment of ill-health rather than its prevention, and therefore do not probe into work factors that could have caused or contributed to the illness.

h. Lastly, many employers, especially SMEs, do not have the necessary knowledge and resources to address workplace health issues comprehensively.

[20] Source: Supplementary Survey on Quality Workplaces for 2017, Manpower Research and Statistics Department, MOM.

[21] An example of a standard advisory is: "This medication may cause drowsiness, do not drive or operate heavy machineries".

RECOMMENDATIONS
Expand Occupational Disease Prevention Efforts

Encourage Adoption of Upstream Measures to Prevent ODs

In the hierarchy of controls to reduce WSH hazards, elimination of risk is the most effective method. However, if the hazardous work process or machinery cannot be eliminated, companies should then consider measures such as substitution or engineering controls. The use of personal protective equipment should be the last resort, rather than the first line of defence, as is often the case today.

The Committee recommends that MOM and the WSH Council work with the industry to promote the use of inherently safer work processes or machinery. The priority should be for the top reported ODs – these are work-related musculoskeletal disorders (WRMSD) and noise induced hearing loss.

For example, we should promote the use of circular saw blades that generate far less noise during operations than conventional blades. Exoskeleton suits or other lifting aids are also already available to help workers reduce the risk of developing WRMSD during lifting operations. By systematically targeting risker work processes with elimination, substitution or engineering control measures, the Committee believes that we will be able to reduce OD incidence in a more sustainable manner.

Expand the WSH Act's List of Reportable ODs

The Committee proposes that MOM expand the list of reportable ODs under the WSH Act. Today, work-related low back musculoskeletal disorders and certain occupational cancers are non-reportable because a significant proportion of these diseases could also arise from non-work factors. It is estimated that these two categories of OD could account for 54% and 19% of Singapore's disease burden attributed to work[22].

Improvements in diagnostic methods mean that doctors can more reliably and cost-effectively evaluate whether such conditions can be attributed to work. Hence, it is timely to consider expanding the list of reportable ODs to these conditions.

In expanding the list of reportable ODs, the Committee recommends prioritising those where either a significant number of deaths or a significant share of the disease burden are estimated to be due to work factors. These would be work-related low back musculoskeletal disorders, occupational lung cancer, occupational leukaemia and occupational liver cancer.

The Committee also recommends that MOM continue to review available diagnostic methods and emerging hazards, and update the list of reportable ODs if necessary.

[22] Source: Institute for Health Metrics and Evaluation. Singapore's burden was estimated based on research evidence of diseases attributed to work factors in other high-income countries. 20% were estimated to be arising from reportable ODs under the WSH Act.

Raise Capabilities of Medical Community to Detect and Report ODs

The current list of ODs is largely detected and reported by designated workplace doctors (DWDs)[23] who are trained to identify ODs. As the first point-of-contact for diagnosis and treatment of ODs is likely to be done by non-DWDs, such as general practitioners or specialists in hospitals, the Committee proposes that MOM and the WSH Council work with the medical community to raise their capability to detect and report ODs.

Increase Health Hazard Surveillance to More Workplaces

In 2017, MOM obtained noise and chemical exposure reports from around 320 workplaces, which make up a fraction of all workplaces where workers are likely subject to excessive noise and hazardous chemicals. The Committee proposes that MOM increases its surveillance footprint to more companies where workplace health hazards are likely to arise. This can be achieved by requiring them to submit exposure level data to MOM.

Build Companies' Capabilities to Promote Workforce Health

The World Health Organisation (WHO) has identified that employers can play a key role in the promotion of workforce health, as they can facilitate employees' participation in health programmes such as health screening, follow-up checks, or exercise sessions at the workplace. However, employers should not be made legally responsible to promote workforce health, as this could result in the unintended consequence of discrimination against workers with poor health. The Committee thus recommends that the Government adopt a promotional approach in supporting employers to improve their workers' health.

Develop Guidelines on Job Adaptations for Chronic Disease Management

To address knowledge gaps, the Committee recommends that the WSH Council and HPB develop guidelines on job adaptations that employers can take to support workers in managing their chronic diseases. The Committee suggests that the guidelines focus on diabetes, high blood pressure and high LDL cholesterol, which affect close to 1 in 3 working residents[24]. Given that these conditions are common in the workforce, one simple but practical adjustment is to review work schedules so that all employees have sufficient time for medication and food. Not doing so could result in, for example, a diabetic worker losing consciousness due to low blood sugar levels. Such job adaptations need not be onerous nor costly.

One important issue that requires a balanced and sensible approach, is the disclosure of one's personal medical conditions to his employer. The Committee supports the view that, subject

[23] DWDs are medical practitioners trained in workplace health and licensed by MOM to conduct statutory medical examinations to ensure employees' fitness for work in jobs with workplace health hazards.

[24] Based on the National Health Survey 2010 by MOH, 35.6% of working residents in Singapore aged 18 to 69 years old were found to have at least one of the chronic conditions of diabetes, high blood pressure, or high LDL cholesterol.

to certain conditions, workers should not in general be compelled to disclose their medical conditions[25] to their employers, even if the health services is offered or facilitated by the employer. While employers may need some health data in order to plan a relevant health programme, they can rely on aggregated health data which does not identify specific workers.

However, the Committee also recognised that there are certain safety-sensitive jobs where non-disclosure could be detrimental to safety at work. For example, crane operators with poorly managed chronic diseases endanger not only themselves, but the entire worksite. In such instances, the Committee encourages workers to have a conversation with their employer in the spirit of mutual care and trust so that their employer can better support them.

Increase Access to Total WSH Services

In 2014, MOM and the WSH Council introduced the Total WSH initiative that integrates the prevention of workplace injuries and ODs with the promotion of work force health. The WSH Council also partnered HPB to promote Total WSH adoption through raising awareness and building capabilities. The Committee recommends increasing companies' access to Total WSH services so that more can benefit. Financial support should also be provided to encourage companies to address WSH risks and workforce health risks in an integrated manner.

Singapore's Total WSH Approach in Keppel Offshore & Marine

Keppel Offshore & Marine's operations involve work-at-height and physically demanding activities. They recognise that the good health of their workers is key for the prevention of work injuries and occupational diseases.

In adopting the Total WSH approach, Keppel implemented not only safety but health practices as well, which includes:

- Providing employees with free health screening
- Providing employees with chronic conditions with follow-up checks by its DWDs and Occupational Health Nurses (OHNs)
- Establishing a multi-disciplinary team of WSH officers, DWDs, and OHNs to review and modify work processes to better support workers with chronic conditions, for instance modified work schedules to allow timely medication and food intake for those with diabetes.

[25] The exception is when employers are required to report workers' medical conditions, or when workers are required to disclose their health status for assessing fitness to work. For example, employers and doctors are required to report specified ODs under the WSH Act or WIC Act to MOM.

Upskill WSH Professionals in Workforce Health

WSH professionals are usually experts in workplace safety management. However, they lack the knowledge to effectively manage the impact of ill-health on workplace safety. In particular, WSH professionals should have knowledge of the following:

a. Risks that poorly controlled chronic diseases pose to workplace safety;

b. Job adaptations to allow those with chronic conditions to continue working safely; and

c. Measures to facilitate the return to work for those recuperating from a major health incident, such as heart attacks or strokes.

To address this gap, the Committee proposes that the WSH Council develop appropriate training to upskill WSH professionals. This should be incorporated into training requirements for new WSH officers. For existing WSH officers, they should undergo such courses as part of their continuing professional development.

Raise Awareness of Measures to Promote Workers' Mental Health

Singapore's IAP noted that many developed countries have developed, or are developing, policies and strategies to deal with work stress that could affect workers' mental health.

In developing such policies however, there is a need to consider that it is challenging to establish if the underlying risk factors of an individual's stress are personal or work-related. There is also a high level of individual subjectivity in what level of work stress can harm mental health.

"Mental health can be very subjective, everyone has a different threshold for stress. We should adopt a promotional approach and not make it a legal requirement."

WSH Professional

The United Kingdom's (UK) approach to work-related stress

The UK's Health and Safety Executive (HSE) has introduced the Management Standards to help employers use the familiar WSH risk management approach to manage work-related stress.

The Management Standards outline 6 common causes of work-related stress based on scientific research to help employers identify, assess and mitigate these risks – (i) work demands, (ii) job control, (iii) social support at work, (iv) clarity of job roles, (v) organisational change, and (vi) avoidance of workplace conflict.

The Management Standards are supported by a 35-questions survey to help companies assess their risk of work-related stress, and risk assessment templates to determine actions that can be taken to mitigate the risks.

In view of these considerations, the Committee proposes that MOM and the WSH Council partner HPB to adopt a promotional approach to raise awareness among employers of common mental health risks among workers, including work stress, and how to promote workers' mental health. This approach includes providing training to supervisors to recognise common mental health issues and to provide support[26], educational talks to build workers' mental resilience, and developing guidelines on workplace psychosocial hazards with the potential to cause stress and harm workers' mental health.

CONCLUSION

There is a need to enhance focus on workplace health to enable our workers to remain safe and healthy. This will require more comprehensive detection of occupational diseases, and the adoption of upstream risk controls to prevent workplace health hazards. As chronic diseases become more common with Singapore's older workforce, companies also need to be given greater support to promote workforce health, so that workers can work productively and safely for as long as they wish to.

Enhance Focus on Workplace Health

Expand Occupational Disease Prevention Efforts

- Encourage adoption of upstream measures to prevent ODs
- Expand the WSH Act's list of reportable ODs
- Raise capabilities of medical community to detect and report ODs
- Increase health hazard surveillance to more workplaces

Build Companies' Capabilities to Promote Workforce Health

- Develop guidelines on job adaptations that employers can take to support workers in managing their chronic diseases
- Increase companies' access to Total WSH Services
- Upskill WSH professionals in workforce health
- Raise awareness of measures that promote workers' mental health

[26] HPB has made available workplace mental health programmes, such as training to equip managers and human resource personnel with self-care knowledge and skills to be supportive leaders at the workplace.

PROMOTE **TECHNOLOGY ENABLED WSH**

PROMOTE **TECHNOLGY-ENABLED WSH**

EMERGING USE OF TECHNOLOGY IN WSH

By 2028, Singapore will have made much progress towards its vision to be a Smart Nation. Many industries have embarked upon transformation plans, taking advantage of developments in sensor technology, Internet of Things (IoT), artificial intelligence, and automation.

There is thus immense potential for the practice of WSH itself to be transformed through technology.

MOM has started using technology in enforcement and promotion of good WSH practices. In 2017, MOM launched the SnapSAFE mobile application that allows the public to report unsafe work practices, and companies to conduct internal hazard reporting and safety management. MOM has also applied data analytics to target higher-risk workplaces for inspection, and deployed camera-equipped drones for surveillance of difficult-to-access work areas. While these initiatives enhance MOM's regulatory capability, it does not fundamentally raise the capability of businesses to manage WSH risks better.

BARRIERS TO INCREASING ADOPTION OF TECHNOLOGY FOR WSH

The Committee heard from businesses, especially SMEs, some of the barriers to more widespread adoption of technology to manage WSH:

a. Companies, especially SMEs, lack knowledge on the range of WSH technology products that are available and best-suited for their operations. They need assistance to understand the benefits of investing in such technologies and to know how to unlock their potential.

b. Most technology companies focus on solutions that improve productivity and cost efficiency. Some of these solutions, for example, in IoT, sensors and e-learning, could also be used for WSH. However, technology companies generally do not target the WSH market as they have limited understanding of the WSH problems that need to be solved. There is no champion to articulate the WSH business problems, and to facilitate the emergence of innovative solutions.

"We need to look to the future and use technological applications for WSH."

WSH Officer

As a result, the use of technology in WSH is at an early stage:

c. Today, businesses deploy data loggers on mobile cranes in order to record and detect unsafe use or deployment of these cranes. Since their introduction in 2015, the incidence of Dangerous Occurrences involving mobile crane operations has fallen by 73%. However, there remain many high-risk activities that are currently not monitored using technology, even though it is increasingly possible to do so. Examples include monitoring outdoor workers for heat-stress or impending loss of consciousness, body-worn cameras to detect unsafe work practices, and video analytics to detect workers straying beyond designated walkways, or working at heights without properly secured safety lines.

d. There are over 100 training providers offering more than 360,000 WSH training places annually, but much of it still takes place in the traditional face-to-face, classroom context. There is much scope to use technology to improve WSH training delivery.

RECOMMENDATIONS
Develop a WSH Technology Ecosystem to Deepen Industry Capability

"Training methods need to evolve. Look into creative ways."

Supervisor

To address the lack of knowledge of WSH technology solutions and the fragmented solutions space, the Committee proposes the development of a WSH Technology Ecosystem, that can systematically match the WSH problem statements of companies with the solutions offered by technology companies. The following elements will be critical to the WSH Technology Ecosystem.

Develop a WSH Technology Roadmap

The Committee recommends developing a WSH Technology Roadmap to identify which of the emerging technologies can have the greatest impact to solve WSH problem statements. Such a roadmap should be developed with the help of a panel of technology experts and forward-thinking WSH practitioners, and be regularly refreshed. As various sectors undergo industry transformation under their respective Industry Transformation Maps (ITM), WSH technology should be embedded as part of the technology adoption plans. For example, the construction sector under the Built Environment cluster[27] is adopting the Design for Manufacturing and Assembly (DfMA) methodology which not only improves productivity by greater use of automation, but also reduces WSH risks by moving construction works into more controlled factory conditions. This reduces workers' exposure to hazards such as work-at-height risks. Another example is the Logistics ITM, where sensor and video recording technologies can be promoted to enhance vehicular safety as part of its industry digital plan.

[27] The Built Environment cluster consists of the following sectors: (i) construction, (ii) real estate, (iii) environmental services, and (iv) security.

Set up a WSH Innovation and Technology Network

A WSH Innovation and Technology Network that taps on existing pools of expertise – such as Enterprise Singapore's (ESG) Centres of Innovation, research institutes and technology companies – should be set up to develop new solutions, or adapt existing technology for WSH applications. MOM should coordinate this Network, by identifying pressing WSH problems to be solved, mobilising the resources in the Network to tackle them, and working with agencies to develop industry Technical References or Standards for the solutions. The Network should also work with agencies like the Infocomm Media Development Authority (IMDA) to curate a set of "ready-to-go" and high-impact WSH technological solutions and innovations, which can be readily adopted by companies. By aggregating demand in this way, the Network can also increase the viability for technology companies to develop WSH products for companies.

Continue the WSH Technology Challenge

MOM should continue its WSH Technology Challenge to catalyse the development of innovative solutions to difficult WSH problems, and to validate the viability of solutions for widespread adoption. MOM's first WSH Technology Challenge offered funding of up to $1 million to reduce injuries due to work-related vehicular accidents, which was the top cause of workplace fatalities from 2013 to 2016 [28]. The Committee recommends that MOM quickly evaluate the outcomes of this initiative, and take on board lessons learnt to improve future WSH Technology Challenges.

Provide Rapid Follow-On Support

The Committee also recommends that successful solutions emerging from the Technology Challenge be given rapid follow-on support, tapping on existing technology adoption and development grants offered by ESG. This will accelerate the deployment and adoption of WSH technologies across the economy.

Catalyse Supply and Adoption of WSH Monitoring Services

The availability of cheap sensors, 5G and IoT will make it possible for management teams to remotely monitor their own workplaces, and for unsafe practices to be detected and remedied, or for them to be identified for learning. Today, in the realm of physical security and cyber security, monitoring services are offered to business end-users as a service. This is a scalable and effective way to broaden adoption of technology and enhance capabilities. Likewise, under Industry 4.0, companies can remotely monitor many production processes, to ensure that quality is maintained. The Committee believes that the advent of WSH Monitoring as a service to business end users is within reach. There are pilot projects in Japan and Germany that are already testing this concept, where

[28] MOM issued its first WSH Tech Challenge in 2017. 5 of 36 proposals were awarded funding for research, development and test-bedding. Results are expected to be ready in the later half of 2019.

companies are able to monitor the health of their own workers. The Committee recommends that MOM examine how to bring this about so that companies have an easy way to level up their WSH capabilities.

Strengthen WSH Training Through Technology

The Committee recommends that the WSH Council review the existing methods of delivery of WSH training, in order to make it more timely and effective.

Incorporate Technologies into WSH Training

WSH training should incorporate methods which have been demonstrated through research to be effective and superior to traditional learning methods. While we should not blindly embrace the latest learning technology for its own sake, there is scope to consider the use of blended learning involving both traditional classroom-based and experiential training methods to improve learning outcomes.

Deploy Technology for Team Learning

In addition, technology can also be deployed imaginatively to help in team learning. This is especially relevant when considering that WSH has to be practiced at an individual as well as team level. There are promising examples of how technology can help teams understand complex procedures and to learn how many individual workers can coordinate their work to work safely (see box article).

Melbourne's Building Leadership Simulation Centre

Simulation learning is used in Australia to enhance training by creating an immersive virtual construction worksite. Trainees are confronted with challenges of a real worksite and are given the opportunity to negotiate, solve problems, communicate, and provide direction to site personnel, management, and subcontractors. Learning is reinforced and enhanced during the simulation sessions with trained actors playing roles such as inspectors, site personnel and difficult clients to which the participants need to respond to each simulated scenario.

With realistic break-out rooms mocked up as site offices, monitored by cameras and a demonstrative group of actors, the scenario becomes life-like and immediate pressure is felt. The only difference is that unlike a real worksite, mistakes made would not lead to loss of lives or injuries as well as its other associated losses – time delays, project and business downtime, and recovery work. Participants can review and reflect on their actions after the exercise to identify performance gaps and implement corrective behaviours.

This type of simulation can achieve sustainable behavioural change, enhanced technical skills through application and serve as an effective training assessment tool.

Explore Use of Micro-Learning Applications

To ensure that workers' WSH knowledge is kept up-to-date and regularly reinforced, the Committee recommends that the WSH Council explore the use of micro-learning applications on hand-held devices for continuous upgrading of knowledge. Such micro-learning can occur while on breaks or during commutes, to avoid the longer time away from work inherent in classroom training. The content of such applications can also include updates on WSH requirements, and lessons learnt from WSH incidents.

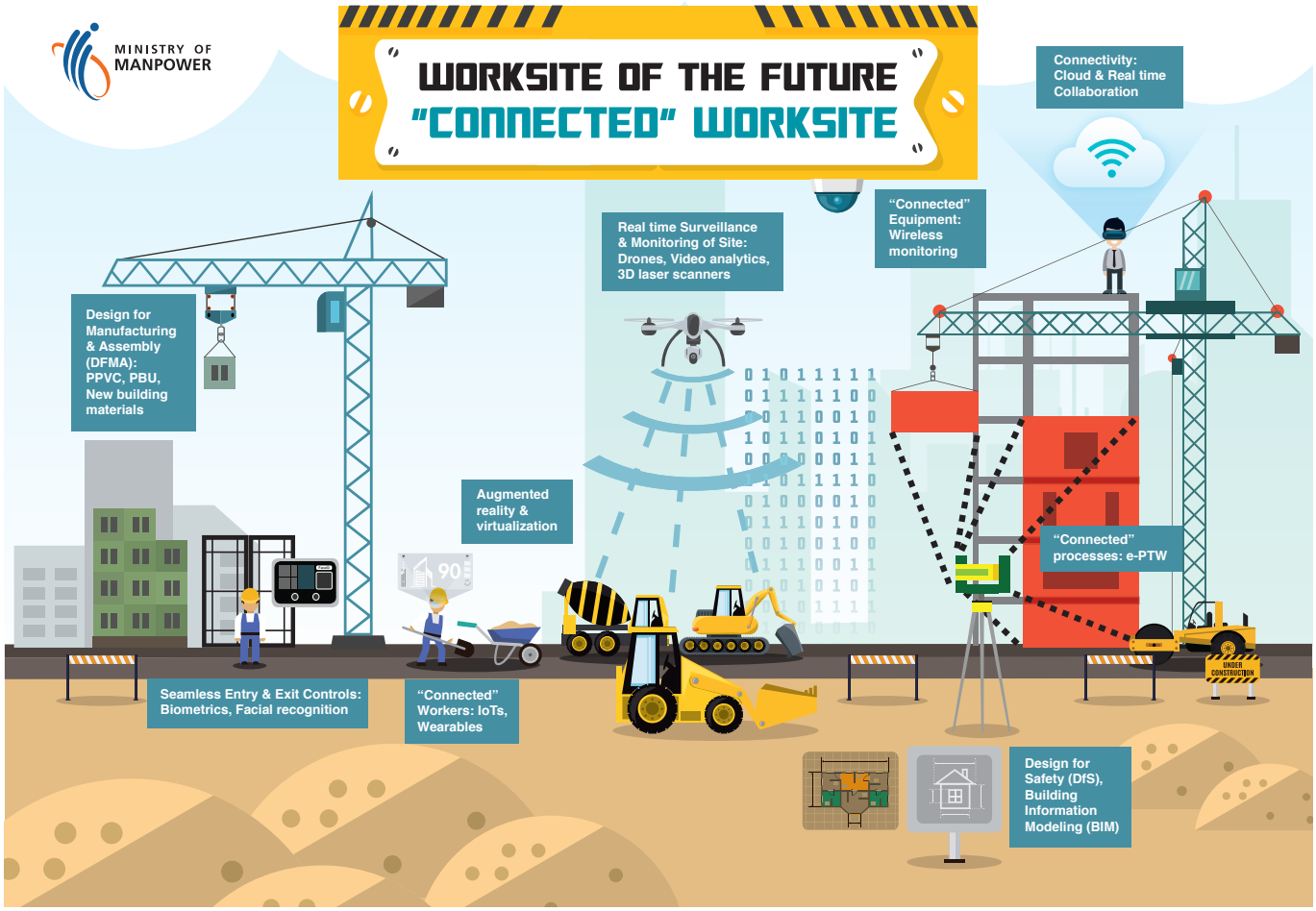
CONCLUSION

The Committee is excited by the potential of technology to revolutionise WSH. If this strategy is implemented well, we can look forward to a future where all workplaces are smart workplaces with pervasive use of technology for WSH; where all companies, including smaller ones, stand to benefit from WSH technologies; where there is a vibrant WSH technology market with innovative start-ups and technology companies offering world-class WSH solutions; and where there is a strong WSH technology ecosystem matching challenging WSH problem statements with leading-edge solutions.

Singapore's Vision of Smart Workplaces

The Committee envisions that Smart Workplaces of the future would be "connected" on many fronts; using technology to improve planning, design, operations and maintenance processes to enhance both productivity and WSH outcomes. For example, a Smart Worksite in the construction industry (see illustration) would enable real-time surveillance, monitoring and management of WSH risks in the following ways:

- Wearable devices that use IoT to detect if a worker's health status is "at-risk", such as due to heat stress, fatigue, abnormal heart rate and proximity to hazardous equipment
- Wireless surveillance equipment such as drones attached with cameras and other IoT sensors to detect unsafe work conditions or practices, or perform safety inspections for works at-height
- Biometric technology that integrate workers' WSH information (e.g. training qualifications) with digitised work processes (e.g. e-permit to work system) and entry / exit control systems to verify workers' competency in high-risk work
- DfMA using Prefabricated Prefinished Volumetric Construction (PPVC) to make construction safer by reducing workers needed onsite and activities at-height
- Cloud platforms that allow developers, architects, consultants, main contractors and sub-contractors to have real-time collaboration in terms of monitoring work progress, managing WSH risks and sharing of data


MINISTRY OF MANPOWER
WORKSITE OF THE FUTURE
"CONNECTED" WORKSITE
Connectivity: Cloud & Real time Collaboration
"Connected" Equipment: Wireless monitoring
Real time Surveillance & Monitoring of Site: Drones, Video analytics, 3D laser scanners
Design for Manufacturing & Assembly (DFMA): PPVC, PBU, New building materials
Augmented reality & virtualization
"Connected" processes: e-PTW
Seamless Entry & Exit Controls: Biometrics, Facial recognition
"Connected" Workers: IoTs, Wearables
Design for Safety (DfS), Building Information Modeling (BIM)

Promote Technology-Enabled WSH

Develop a WSH Technology Ecosystem to Deepen Industry Capability

- Develop a WSH technology roadmap to identify emerging technologies with greatest impact to solve WSH problems
- Set up a WSH innovation and technology network coordinated by MOM to mobilise research institutions, leading technology companies and experts to develop WSH solutions
- MOM to continue implementing the WSH Technology Challenge to catalyse development of innovative solutions for difficult WSH problems
- Provide rapid follow-on support for successful solutions from the WSH Technology Challenge to accelerate industry adoption
- Catalyse the supply and adoption of WSH monitoring services to strengthen companies' WSH capabilities to detect and manage WSH risks

Strengthen WSH Training Through Technology

- Incorporate technologies into WSH training, where it is shown to be effective
- Deploy technology for team learning on work coordination to work safely
- Explore use of micro-learning applications on hand-held devices for continuous upgrading of knowledge

ACKNOWLEDGEMENTS

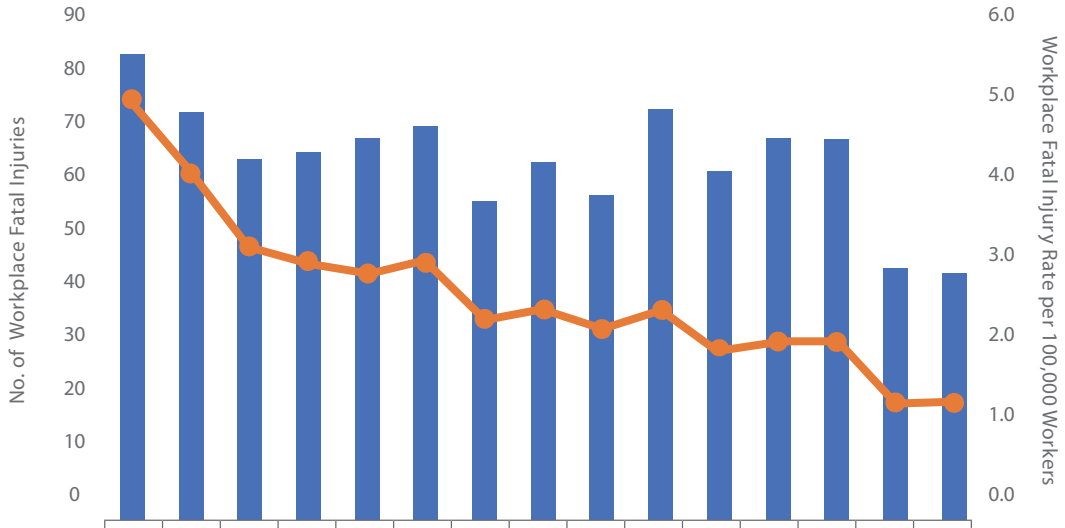
This report is the culmination of the Committee's effort over the past one year since April 2018. The Committee wishes to express their appreciation to all members of the public and stakeholder groups who provided feedback and insights via the various interviews, REACH Listening Points and focus group discussions. Through the personal sharing of experience and ideas, the Committee gained better understanding of the current state, tested viewpoints with the stakeholders and discerned the key shifts required for the next WSH breakthrough.

This marks the start of stronger collective efforts towards fostering a healthy workforce in safe workplaces. The Committee urges all stakeholders to keep up the momentum and fully support the implementation of these recommendations. With persistence and fortitude, the Committee believes that we will achieve our vision of A Healthy Workforce in Safe Workplaces; A Country Renowned for Best Practices in Workplace Safety and Health.

ANNEX A: **SINGAPORE'S WSH PERFORMANCE**

Singapore's fatality rate has declined by 75% since the beginning of our WSH reform in 2004. Our workplace fatality rate declined from 4.9 per 100,000 workers in 2004 to 1.2per 100,000 workers in the past 2 years.

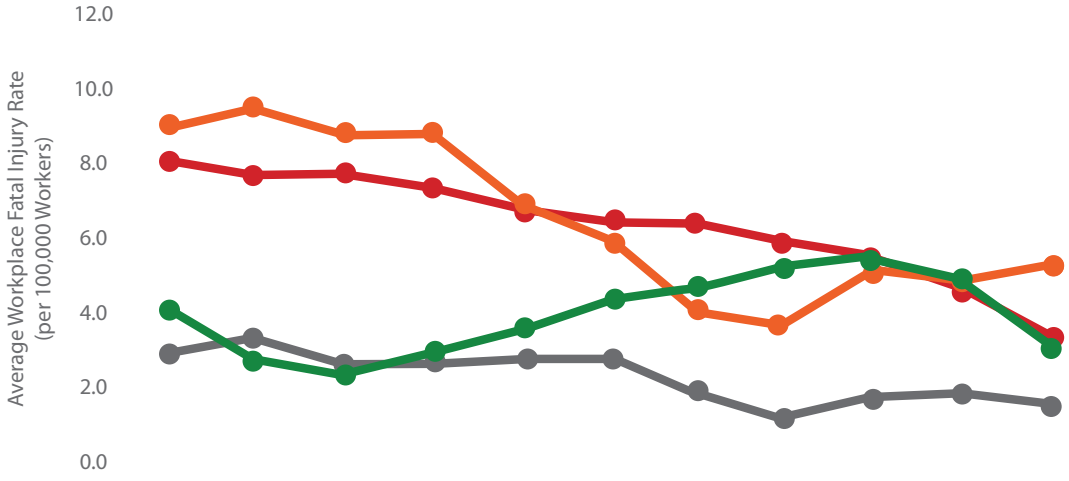
Chart 1: Number and rate of workplace fatal injuries from 2004 to 2018



	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
No. of Workplace Fatal Injuries	83	71	62	63	67	70	55	61	56	73	60	66	66	42	41
Workplace Fatal Injury Rate per 100,000 Workers	4.9	4.0	3.1	2.9	2.8	2.9	2.2	2.3	2.1	2.3	1.8	1.9	1.9	1.2	1.2

In terms of sectoral performance since 2006[29], there was a significant decline in fatality rate for the construction sector and a more gradual decline for the manufacturing sector. The fatality rate for the transportation & storage sector would have been more stable if not for the inclusion of work-related traffic accidents from 2013 onwards. Fluctuations in the fatality rates of the marine and transportation & storage industries remain causes for concern (see Chart 2).

Chart 2: 3-year average workplace fatal injury rates across high-risk industries

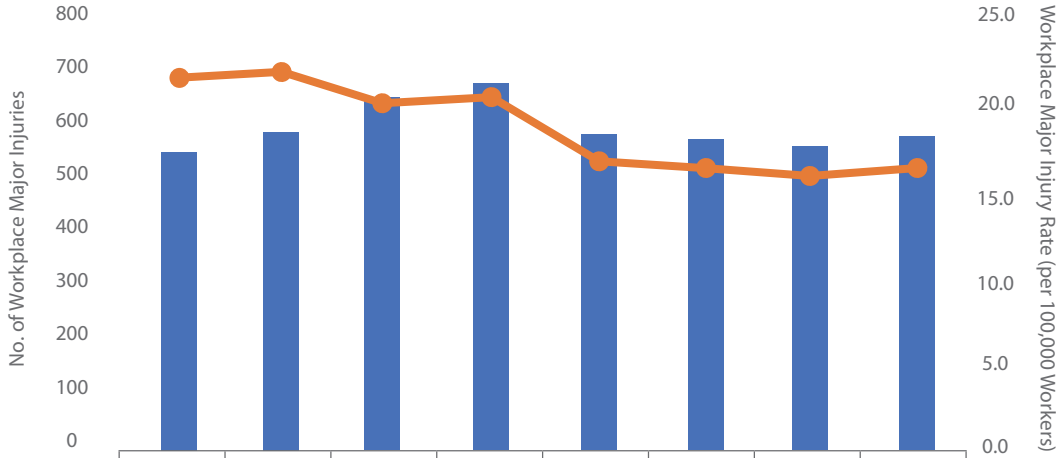


	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Construction Sector	8.1	7.7	7.7	7.2	6.5	6.2	6.2	6.0	5.3	4.3	3.5
Marine Sector	9.1	9.6	8.6	8.7	6.9	5.9	4.0	3.6	4.9	4.5	5.2
Manufacturing Sector	2.8	3.1	2.4	2.4	2.5	2.5	1.9	1.5	1.7	1.8	1.6
Transportation & Storage Sector	4.1	2.4	2.2	2.8	3.3	4.3	4.4	5.4	5.3	4.6	3.0

[29] Sectoral breakdowns were only available from 2006 when WSH Act was enacted.

Unlike fatal injuries which were more concentrated in a few higher-risk industries and hence easier to target, major injuries are spread across a more diverse range of causes and sectors. Improvements in the major injury rate were more gradual, with a decline from 21.3 major injuries per 100,000 workers in 2011 to 17.4 major injuries per 100,000 workers in 2018 (see Chart 3).

Chart 3: Number and rate of workplace major injuries from 2011 to 2018[30]

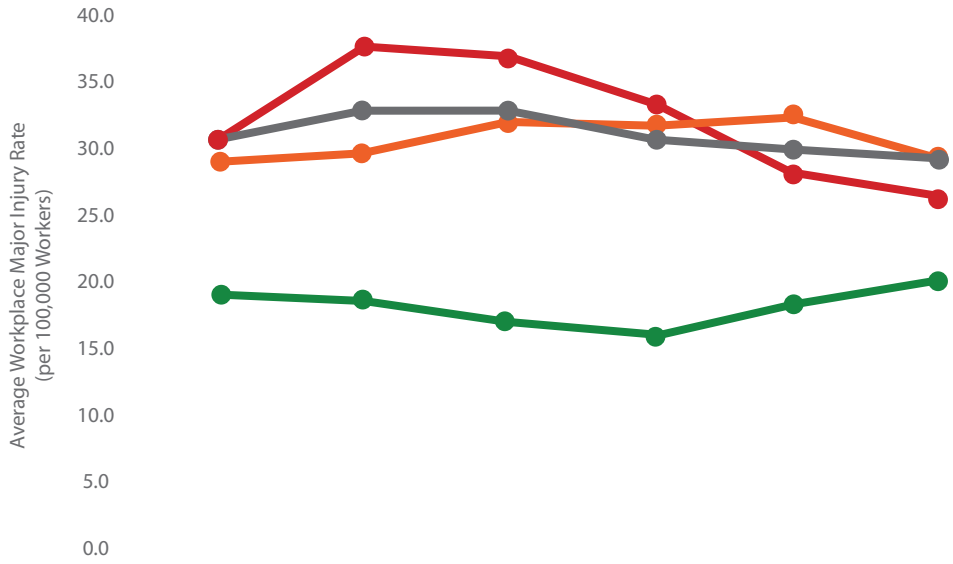


	2011	2012	2013	2014	2015	2016	2017	2018
No. of Workplace Major Injuries	556	588	640	672	597	594	574	596
Workplace Major Injury Rate (per 100,000 Workers)	21.3	21.6	19.8	20.0	17.6	17.4	16.9	17.4

[30] Major injuries were tracked from 2011 onwards based on a revised expanded definition.

Improvements in sectoral major injury rates were inconsistent, although sustained improvements were seen for the construction and manufacturing sectors since 2012 (see Chart 4).

Chart 4: 3-year average workplace major injury rates across high-risk industries



	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018
Construction Sector	31.1	37.8	36.5	34.5	28.8	27.6
Marine Sector	29.1	29.7	31.1	32.5	33.3	29.9
Manufacturing Sector	31.2	33.6	32.7	31.9	30.0	29.7
Transportation & Storage Sector	19.8	18.7	17.1	16.7	19.3	20.4

ANNEX B:
WSH 2028 TRIPARTITE STRATEGIES COMMITTEE

Name	Position in Committee	Nominating Organisation	Designation
Tripartite Advisory Panel			
Zaqy Mohamad	Panel Member	Ministry of Manpower	Minister of State
Mary Liew	Panel Member	National Trades Union Congress	President
Robert Yap	Panel Member	Singapore National Employers Federation	President
Tripartite Strategies Committee			
John Ng	Committee Chairperson	Singapore National Employers Federation	Vice President
Aileen Tan	Committee Member	Singapore Telecommunications Limited	Group Chief Human Resource Officer
Kala Anandarajah	Committee Member	Rajah & Tann Singapore LLP	Head, Competition & Antitrust and Trade Lead Partner, Corporate Governance
Karl Hamann	Committee Member	QBE Insurance (Singapore) Pte. Ltd.	Chief Executive Officer
Kwek Kok Kwong	Committee Member	NTUC LearningHub Pte. Ltd.	Chief Executive Officer

Lucas Ng	Committee Member	Petrochemical Corporation of Singapore (Private) Limited	General Manager (Plant)
Melvin Yong	Committee Member	National Trades Union Congress	Assistant Secretary General
Mohamed Abdul Akbar Bin Mohamed Abdul Kader	Committee Member	Nan Guan Construction Pte. Ltd.	Managing Director
Poon Hong Yuen	Committee Member	Ministry of Manpower	Deputy Secretary (Workforce)
Tony Lombardo	Committee Member	Lendlease	Chief Executive Officer (Asia)
Wong Chit Sieng	Committee Member	SP Group	Chief Corporate Officer
Wong Weng Sun	Committee Member	Sembcorp Marine Ltd.	President and Chief Executive Officer
Yam Ah Mee	Committee Member	Sembcorp Design and Construction Pte. Ltd.	Chief Executive Officer
Zee Yoong Kang	Committee Member	Health Promotion Board	Chief Executive Officer
Vivien Chow	Committee Resource Person	Government Technology Agency	Director, Applied Innovation and Partnership
Ownership Workgroup			
Yam Ah Mee	Workgroup Chairperson	Sembcorp Design and Construction Pte. Ltd.	Chief Executive Officer
Melvin Yong	Workgroup Co-Chairperson	National Trades Union Congress	Assistant Secretary General

Victor Ng	Workgroup Member	Building Construction and Timber Industries Employees' Union	Executive Committee Member
Kwee Wei-Lin	Workgroup Member	Pontiac Land Group	Senior Vice President
Julie Cheong	Workgroup Member	Food Drinks & Allied Workers' Union	President
Joyce Koh	Workgroup Member	Singapore Institute of Directors	Executive Director
Koh Chwee	Workgroup Member	Jurong Town Corporation	Director (Workplace Safety and Construction Quality Division)
Douglas Foo	Workgroup Member	Singapore Manufacturing Federation	President
Wim Roels	Workgroup Member	Singapore Chemical Industry Council	Chairman
Rajendran s/o Govindarajoo	Workgroup Member	Chemical Industries Employees' Union	President
Kenneth Loo	Workgroup Member	Singapore Contractors Association Ltd.	President
Tan Chee Kiat	Workgroup Resource Person	Building and Construction Authority	Group Director (Business Development)
Chia Ser Huei	Workgroup Resource Person	Ministry of Finance	Director (Resource Management)
Workplace Health Workgroup			
Wong Weng Sun	Workgroup Chairperson	Sembcorp Marine Ltd.	President and Chief Executive Officer

Zee Yoong Kang	Workgroup Co-Chairperson	Health Promotion Board	Chief Executive Officer
Chia Kee Seng	Workgroup Member	School of Public Health, National University of Singapore	Professor
Abu Bakar Mohd Nor	Workgroup Member	Association of Singapore Marine Industries	President
Eric Soh	Workgroup Member	Samwoh Corporation Pte. Ltd.	CEO
Gregory Chan	Workgroup Member	The Occupational and Diving Medicine Centre	Senior Specialist Physician
Yeo See Peng	Workgroup Member	SBS Transit Ltd.	Senior Vice President
Chan Hsien Hung	Workgroup Member	Yang Kee Logistics Pte. Ltd.	General Manager
Capabilities Workgroup			
Mohamed Abdul Akbar Bin Mohamed Abdul Kader	Workgroup Chairperson	Nan Guan Construction Pte. Ltd.	Managing Director
Kwek Kok Kwong	Workgroup Co-Chairperson	NTUC LearningHub Pte. Ltd.	Chief Executive Officer
Fang Koh Look	Workgroup Member	Absolute Kinetics Consultancy	Executive Chairman
Quek Ser Tong	Workgroup Member	Department of Civil and Environmental Engineering, National University of Singapore	Head

Srinivasan Ramabhadran	Workgroup Member	Asia Pacific, Dupont Sustainable Solutions	Managing Director
Bernard Soh	Workgroup Member	Singapore Institution of Safety Officers	President
Ang Boon Tian	Workgroup Member	Registered Industrial Hygienist Board of the Occupational and Environmental Health Society	Chairman
Michael Fung	Workgroup Member	SkillsFuture Singapore	Deputy Chief Executive (Industry); Chief Human Resource Officer; Chief Data Officer
Partnerships and Technology Workgroup			
Lucas Ng	Workgroup Chairperson	Petrochemical Corporation of Singapore (Private) Limited	General Manager (Plant)
Karl Hamann	Workgroup Co-Chairperson	QBE Insurance (Singapore) Pte. Ltd.	Chief Executive Officer
Goh Wei Leong	Workgroup Member	Healthserve Ltd.	Chairman
Eugene Fidelis Soh	Workgroup Member	Tan Tock Seng Hospital & Central Health	Chief Executive Officer
James Tan	Workgroup Member	AETOS Holdings Pte. Ltd.	Executive Director/Chief Executive Officer
Michael Khor	Workgroup Member	Nanyang Technological University	Director, Talent Recruitment and Career Support (TRACS) Office and Bibliometrics Analysis

Regulation Workgroup			
Poon Hong Yuen	Workgroup Chairperson	Ministry of Manpower	Deputy Secretary (Workforce)
Kala Anandarajah	Workgroup Co-Chairperson	Rajah & Tann Singapore LLP	Head, Competition & Antitrust and Trade Lead Partner, Corporate Governance
Nelson Tee	Workgroup Member	Specialists Trade Alliance of Singapore	Honorary President
Andris Leong	Workgroup Member	Building and Construction Authority	Director (Construction & Structural Investigation Department) Building Engineering Group
Lew Yii Der	Workgroup Member	Land Transport Authority	Group Director (Safety & Contracts)
Ng Say Cheong	Workgroup Member	Housing & Development Board	Acting Group Director (Building & Infrastructure)

ANNEX C: **MOM'S INTERNATIONAL ADVISORY PANEL FOR WSH**

MOM's International Advisory Panel (IAP) for WSH was formed in 2006 with the following terms of reference:

a. Advise on significant trends and developments in workplace practices that would impact on WSH in Singapore;

b. Share approaches to WSH challenges in other countries that might guide Singapore's WSH developments; and

c. Critique WSH standards, practices and the regulatory regime in Singapore and provide advice on possible improvements to bring WSH standards in Singapore to the level of leading-edge countries.

The IAP members who reviewed the preliminary WSH 2028 national strategies at the sixth meeting on 28 and 30 August 2018 are:

1. Kevin Myers | President, International Association of Labour Inspection (IALI)

2. Michelle Baxter | Chief Executive Officer, Safe Work Australia (SWA)

3. Walter Eichendorf | President, German Road Safety Council (DVR)

4. David Michaels | Professor, Department of Environmental and Occupational Health, Milken Institute School of Public Health, George Washington University

5. Marie Larue | President and Chief Executive Officer, Institut de recherche Robert-Sauvé en santé et en sécurité du travail (IRSST)

6. Park Doo Yong | President, Korea Occupational Safety and Health Agency (KOSHA)

ANNEX D:
LIST OF OCCUPATIONAL DISEASES UNDER THE WSH ACT

1. Aniline poisoning
2. Anthrax
3. Arsenical poisoning
4. Asbestosis
5. Barotrauma
6. Beryllium poisoning
7. Byssinosis
8. Cadmium poisoning
9. Carbamate poisoning
10. Compressed air illness or its sequelae, including dysbaric osteonecrosis
11. Cyanide poisoning
12. Diseases caused by ionizing radiation
13. Diseases caused by excessive heat
14. Hydrogen Sulphide poisoning
15. Lead poisoning
16. Leptospirosis
17. Liver angiosarcoma
18. Manganese poisoning
19. Mercurial poisoning
20. Mesothelioma
21. Noise-induced deafness
22. Occupational asthma
23. Occupational skin cancers
24. Occupational skin diseases
25. Organophosphate poisoning
26. Phosphorous poisoning
27. Poisoning by benzene or a homologue of benzene
28. Poisoning by carbon monoxide gas
29. Poisoning by carbon disulphide
30. Poisoning by oxides of nitrogen
31. Poisoning from halogen derivatives of hydrocarbon compounds
32. Musculoskeletal disorders of the upper limb
33. Silicosis
34. Toxic anaemia
35. Toxic hepatitis

ANNEX E: KEY FINDINGS FROM WSH 2028 CONSULTATIONS

The Committee engaged a wide range of stakeholders to develop the national strategies that would shape Singapore's WSH landscape over the next 10 years. Through the engagements, stakeholders' views were sought on the current challenges and ideas to improve WSH in the future.

How was engagement conducted?

Engagement took the form of focus group discussions, one-to-one interviews, surveys via REACH Listening Points, meetings, and dialogues with stakeholder groups. Stakeholders were invited to share their personal experiences, challenges, and ideas for the future in the areas of strengthening ownership for WSH, managing the impact of workers' ill-health on workplace safety, and adopting technological innovations for WSH.

Who did the Committee engage?

The Committee engaged close to 3,000 individuals between July 2018 and January 2019.

Public	Stakeholder Groups
• Local and foreign workers • Members of the public who contributed their views through email or at WSH events	• International Advisory Panel (IAP) for WSH • Union Leaders through the National Trades Union Congress (NTUC) • Employers through the WSH Council and Industry and Functional Committees [31] • Workplace Safety and Health Officers • Designated Workplace Doctors • Foreign workers through Healthserve • Government officials

[31] The Committee engaged the 16 Industry and Functional Committees under WSH Council.

What our stakeholders shared:

I. Strengthen WSH ownership

Measures to strengthen WSH ownership will need to impact a firm's bottom line

SMEs live hand-to-mouth. There needs to be support of resources, materials and consultants. It is important that we facilitate co-payment [by supply chain leaders] so that the SMEs have a part to invest in WSH."

SME Chief Executive

- Participants generally agreed that top management of companies had the greatest responsibility for WSH as they controlled the resources and WSH practices on the ground, and needed to take more ownership. Many believed that top management, especially from SMEs, viewed WSH as a compliance cost and were unlikely to take stronger ownership for WSH unless it directly affected profitability.

- To deepen ownership among top management, a number of participants suggested that MOM could do more to reward companies with good WSH records or which have demonstrated clear efforts to improve their WSH practices. They felt that this would help to balance the existing impression that MOM was solely an enforcer or catcher of bad practices. Instead, it would present MOM as a cooperative partner in improving WSH practices.

- Most participants supported the idea to codify the specific WSH duties of company directors, including Board of Directors. Some also suggested that information on WSH duties should be added to training curriculum targeted at top management. However, a few participants also cautioned that initiatives to increase awareness and ownership among top management should avoid giving the impression that other parties were less responsible for WSH.

Increasing WSH transparency seen as a positive step; but implementation needs to closely consider business impact

"Procurement contracts should impose good safety records on sub-contractors. Only when we do this, the smaller contractors who are hand-to-mouth will follow."

BATU Union Leader

"I think public grading is quite a challenge, especially in sectors such as Construction and Manufacturing. They will not like their grades because the accident rates are higher."

WSH Officer

- Many participants were in favour of making companies' WSH performance more transparent to improve the decisions made by service buyers, and to encourage stronger WSH ownership. Some participants shared that such information was currently limited to self-declarations and selectively published enforcement records. Participants generally agreed that main contractors, developers, and shipyards would benefit from including WSH performance in their procurement processes. The large majority of local and foreign workers interviewed also agreed with the idea that there should be a public record of firms' WSH performance to hold firms accountable.

- However, participants had mixed views about the business impact of making WSH information more transparent, such as via a public ranking system. While many participants believed that a ranking system would help improve procurement decisions, others were concerned that a one-size-fits-all metric would disadvantage firms operating in riskier industries such as construction. Some participants felt that collecting and reporting WSH data to the Government would be onerous for SMEs. A few also cautioned that firms may under-report WSH incidents if there was such a requirement.

Support for better employer and worker collaboration on management of WSH risks, such as near-miss reporting

"The mindset is important. We position it as opportunities for safety improvements, where the reporting of near-misses must be followed up with safety improvements."

WSH Officer

"Near-miss reporting was formerly seen as a potential for punishment, so we have to educate workers."

Supervisor

"To encourage incident reporting by workers the process has to be easy and must be acted upon."

Union leader

- There was consensus that a collaboration between employers and workers to report and address near-miss incidents was a valuable way to improve WSH outcomes. The IAP also recognised that workers can provide valuable insights to work situations, risks and potential solutions to WSH challenges, and should be encouraged by employers to contribute to the management of WSH risks.

- Participants felt that a common ingredient of companies with better WSH outcomes was a culture of prevention, trust and care. A number of participants shared examples where WSH culture was lacking and contributed to poor outcomes, such as cases in which near-miss incident reports were ignored, and even where workers were admonished for highlighting safety incidents to their superiors. The IAP also noted that when near-misses were ignored, the opportunities to learn from them and prevent future injuries or fatalities were lost. A few participants suggested that firms should continually communicate their WSH values and norms to their workers and supervisors to improve the culture.

II. Enhance focus on workplace health

Support for more attention to promote workforce health

"Our workforce is ageing. It is important to ensure workers are healthy. It will be too late if we only start when something happens."

Union leader

"By adopting Total WSH in a company, and doing it well, is costly. MNCs got all the funds, but not SMEs."

SME Employer

"Unions must play a part. Our union helped a worker with sleep apnea get a different role. If not for the union, I don't think he will still be working."

HR Manager

- Participants mostly agreed that employers should pay more attention to workers' health given the impact on worker retention and workplace safety. A few noted that with an ageing workforce, employers could not ignore prevalent chronic diseases like diabetes.

- Participants had mixed views on how employers could accommodate workers' health conditions. A few were concerned that this would add to business costs. Some shared that larger companies already had policies to adjust job scopes or redeploy workers with health issues. However, others felt SMEs would have difficulty providing accommodations, and this would discourage workers from working with their employers on health issues.

- A number of participants felt that workers were likely not disclosing their health issues to avoid the risk of being discriminated by their employers and colleagues. Participants suggested that unions, designated workplace doctors, and Total WSH services providers could act as the bridge between employers and workers on health issues.

- A few expressed concerns that MOM would penalise employers for work accidents that resulted from health issues that weren't managed properly. They called for a promotional approach to address the impact of poorly managed ill-health on workplace safety. Other participants opined that the Government should provide grants to increase adoption of measures to promote workforce health.

- While there was common ground on the key role of employers to promote workforce health, many perceived workers as jointly responsible in deciding if they wanted their employers to play a role in their health.

Promotional approach needed to help employers better manage work stress and its risk to mental health

"Stress is inevitable in today's context, multitasking is increasingly common at work. A worker may have already reached a bottleneck, but is still forced to take on more."

HR Manager

"Mental health can be very subjective, everyone has a different threshold for stress. We should adopt a promotional approach and not make it a legal requirement."

WSH Professional

"When you talk about mental health, it is not just from work. Personal issues also affect mental health."

Employer

- Most participants had personally encountered or known of others dealing with work-related stress and called for more attention to address this issue as it could impact mental health. The IAP also noted that work-related psychosocial stress is expected to become more prevalent in the fast-paced and rapidly changing society.

- However, many participants were concerned that addressing work-related stress and mental health issues were difficult. For example, workers' thresholds for stress varied widely, and determining whether the issue was related to work or personal reasons was

a challenge. Others added that supervisors were not trained to observe and detect mental health conditions. The IAP acknowledged that other jurisdictions also faced difficulties managing work-related psychosocial issues due to its complex nature.

- Participants generally agreed that a promotional approach should be taken to encourage employers to pay greater attention to work stress and its risk to mental health. They suggested that the Government raise awareness, provide guidance, and tools and resources to support this initiative. There were also calls for the Government to take steps to remove the stigma associated with mental health.

III. Promote technology-enabled WSH

Adoption of technology to improve WSH standards

"I would like to see safety become more 'sexy' and innovative, and not only punitive."

Union leader

"We need to look to the future and use technological applications for WSH."

WSH Officer

- Many recognised a big opportunity to raise WSH standards through the adoption of new technology. Participants recognised how data collection and analysis had improved proactive management of WSH risks, such as using sensors and video analytics to supervise worksites. They also appreciated how automation had reduced workers' exposure to high-risk activities in some industries.
- Some employers said they would like to see the Government take the next step by creating a market for technology-based WSH solutions, and supporting adoption of technology through subsidy.

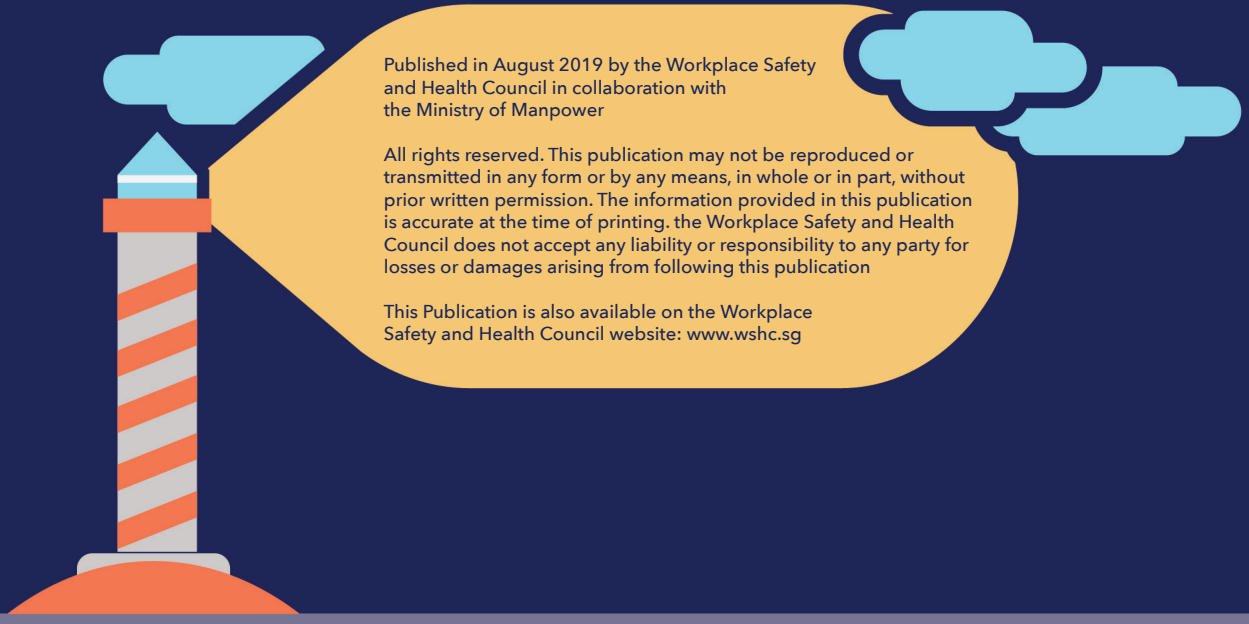
Improving WSH training with new technology

"Training methods need to evolve. Look into creative ways."

Supervisor

- Participants shared a wide range of views about WSH training standards. Some viewed that WSH training was largely classroom-based, and was hence less effective in building capabilities to manage WSH risks in real-world situations.
- Participants suggested using technology to make WSH training more engaging and experiential for learners, such as through gamification and micro-learning via mobile applications.
- Overall, participants agreed that use of technology can improve WSH training. Nonetheless, they highlighted that the adoption of technology-assisted solutions would need to bear in mind considerations such as the intense competition for user attention on mobile learning platforms.

The Committee greatly appreciates all who shared their views and suggestions with us. These have helped to shape the Committee's recommendations on Singapore's national WSH strategies for the next 10 years.



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