Singapore WSH Research Agenda (2011-2016) and global/regional/local need to change

Dr Jukka Takala
Executive Director
Workplace Safety and Health Institute
9 October 2013
About WSH Institute

Research Agenda and needs

Singapore priorities
Global and EU needs
Burden of disease and injury, economic burden, competitiveness

Research for solutions
Strategies, programmes, new paradigm, or business as usual?
What we do

Singapore’s WSH Framework

Progressing WSH in Singapore

OSHD
Occupational Safety & Health Division

WSHC
Workplace Safety & Health Council

WSHI
Workplace Safety & Health Institute

REGULATOR
Legislation, Policies, Compliance Assistance & Enforcement

INDUSTRY PARTNER
Educating & Engaging Stakeholders, Promoting WSH

THINK TANK
Charting New Grounds for WSH Excellence and Innovation
About WSH Institute

Research Agenda and needs

Singapore priorities
Global and EU needs
Burden of disease and injury, economic burden, competitiveness

Research for solutions
Strategies and programmes, new paradigm, or business as usual?
To provide researchers with useful directions and guidelines for participating in WSH research.

Through the research agenda, WSH Institute will:

- Provide solutions that address local WSH needs;
- Raise WSH standards and capabilities in Singapore;
- Provide a systematic approach to deal with emerging WSH issues;
- Reduce WSH costs and increase productivity.
National Research Agenda (2011-2016)

Research priority list generated internally (MOM and WSHC)

Input from stakeholders & experts (Questionnaires for Wider Group, followed by Focus Groups)

Draft of WSH Research Agenda

Review by Steering Committee and IAP

Public comment and review

Singapore WSH research priorities 2011-16
Available for download from WSH Institute website @ www.wshi.gov.sg
Research Priorities (2011-2016)

Research Priorities are grouped into 2 Distinct Research Themes:

(1) Business and organisational aspects of WSH

(2) WSH risks and solutions

These encompass a combination of top down and bottom up approaches to tackle the WSH issues faced by the industry.
<table>
<thead>
<tr>
<th>Research Areas</th>
<th>Research Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhancing WSH leadership and culture</td>
<td>Characteristics of effective WSH leadership</td>
</tr>
<tr>
<td></td>
<td>Roles of leaders in instilling strong WSH culture</td>
</tr>
<tr>
<td></td>
<td>Strategies for building WSH leadership capabilities</td>
</tr>
<tr>
<td></td>
<td>Communication of WSH to workforce and enterprise</td>
</tr>
<tr>
<td>Linking WSH to business</td>
<td>Correlation of WSH to business and productivity</td>
</tr>
<tr>
<td></td>
<td>Studies on companies with successful WSH programmes</td>
</tr>
<tr>
<td>Measuring WSH performance</td>
<td>WSH performance and statistics</td>
</tr>
<tr>
<td></td>
<td>Leading indicators</td>
</tr>
<tr>
<td></td>
<td>Near miss and minor injury reporting</td>
</tr>
</tbody>
</table>
Research Priorities with Greater Focus (2011 to 2013)

Theme 1: Research on Business and Organizational Aspects of WSH

- Correlation of WSH performance to business and productivity
- Behavioural economics for WSH performance
- Business case studies on corporations/companies with good WSH performance
- Development of databases for WSH performance analysis
- Leading indicators for monitoring or predicting WSH performance (with respect to corporation, sectoral, or national level)
- Characteristics of effective WSH leadership, with local or Asian emphasis
- Strategies for building up capabilities of WSH leadership
- Roles of leaders in instilling strong WSH culture
- Roles of second level leadership or middle management in WSH performance
- Methods and tools for senior management to implement WSH
## Theme 2: Research on WSH Risks and Solutions

<table>
<thead>
<tr>
<th>Research areas</th>
<th>Research Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Addressing imminent WSH concerns</strong></td>
<td>Psychosocial issues at workplaces</td>
</tr>
<tr>
<td></td>
<td>New technologies (including production and implementation WSH concerns for ageing workforce)</td>
</tr>
<tr>
<td><strong>Designing for safety and health</strong></td>
<td>Designing for safety</td>
</tr>
<tr>
<td></td>
<td>Redesign of work processes/operations for WSH</td>
</tr>
<tr>
<td></td>
<td>Innovative products/technologies to manage WSH risks</td>
</tr>
<tr>
<td></td>
<td>Human factors and ergonomics</td>
</tr>
<tr>
<td></td>
<td>Effectiveness of risk assessment, audit, and WSH systems</td>
</tr>
<tr>
<td><strong>Managing workplace health hazards</strong></td>
<td>Monitoring and control of exposure to health hazards</td>
</tr>
<tr>
<td></td>
<td>Specific occupational health conditions</td>
</tr>
<tr>
<td></td>
<td>Workplace health audit system</td>
</tr>
</tbody>
</table>
Research Priorities with Greater Focus (2011 to 2013)

Theme 2: Research on WSH Risks and Solutions

• Methodology and implementation of designing to ensure safety and health
• Study and solutions for recognition/awareness of hazards
• Study on reaction/behaviour of workers when confronted with potentially hazardous situations
• Study and solutions to enhance situational awareness of workers
• WSH concerns for ageing workforce
• Ergonomics considerations and solutions for the ageing workforce
• Fatigue management, including effects and optimisation of overtime and shifts
• Improvement of WSH performance through human factors
• Innovative solutions to minimise WSH risks in relevant industry sectors
• Monitoring and controlling of exposure to hazardous substances
## Current Research Projects

### Theme 1: Business and Organizational Aspects of WSH

<table>
<thead>
<tr>
<th>S/N</th>
<th>Project title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>WSH leadership framework</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>Business case studies of companies with good WSH</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3</td>
<td>Intelligent system for determining productivity and safety index using BIM</td>
<td>Ongoing</td>
</tr>
</tbody>
</table>
# Current Research Projects

## Theme 2: WSH Risks and Solutions

<table>
<thead>
<tr>
<th>S/N</th>
<th>Project title</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Research study on bin-dropping incidents at waste incineration plants</td>
<td>Completed</td>
</tr>
<tr>
<td>2</td>
<td>Study on root causes and human factors for Falls from height</td>
<td>Ongoing</td>
</tr>
<tr>
<td>3</td>
<td>Impact of fatigue on situation awareness of workers in the Marine and Logistics and Transport sectors and to develop a fatigue risk management system for the 2 sectors</td>
<td>Ongoing</td>
</tr>
<tr>
<td>4</td>
<td>Behaviour-centred, communications-reinforced approach to workplace safety</td>
<td>Ongoing</td>
</tr>
<tr>
<td>5</td>
<td>Intelligent review of design for safety using safety knowledge-based building information modelling</td>
<td>Ongoing</td>
</tr>
<tr>
<td>6</td>
<td>Prototype FPSWizard: A design support system to improve the selection and design of personal fall protection systems</td>
<td>Ongoing</td>
</tr>
<tr>
<td>7</td>
<td>NANOEXS – Potential occupational exposures to nanoparticles in Singapore</td>
<td>New!</td>
</tr>
<tr>
<td>8</td>
<td>Occupational ill-health in the Singapore Construction Sector: Cancer and Non-Malignant Respiratory Diseases; ConstructHealth.Sg</td>
<td>New!</td>
</tr>
</tbody>
</table>
The Institute will spearhead these research priorities through the following avenues:

- Commissioning of projects on targeted research topics by leading experts
- Collaborating with research institutes, both local and overseas
- Conducting research within the Institute

There will be a strong emphasis on industrial applications and solutions for all research work undertaken by the Institute. The Institute will look into targeted studies to address specific or sectoral risks and adopt a systems approach to develop solutions.
The WSH Institute will call for research proposals twice a year. Details of the funding, such as the quantum of support, the preferred periods of study and other requirements, will be announced with the request for proposals. The submitted proposals will be evaluated competitively based on the following criteria:

- Alignment to research agenda
- Impact on improving WSH standards
- Critical analysis of the WSH issue of interest
- Effectiveness of proposed approach / solutions
- Innovative research-to-practice proposal
- Enhancement of WSH research capabilities
WSH Institute has forged strong institutional partnerships with various international centres.

Signing of Memorandum of Understandings (MOUs) with international partners to cover the following:

- Visits and exchange programmes to build up staff capabilities;
- Joint research activities & joint research publications;
- Organisation of training courses or seminars;
- Sharing and exchange of WSH info resources.
Our Local Partners:

- Ministry of Manpower
- Workplace Safety and Health Council

Our International Partners:

- IFA (Germany)
- HSL (UK)
- FIOH (Finland)
- NIOSH (USA)
- KOSHA (Korea)
## Work-related Fatalities – World

### 2.99 billion economically active, 2008 (some data 2003)

<table>
<thead>
<tr>
<th>Region</th>
<th>Economically active population</th>
<th>Fatal accidents reported to the ILO (2008)(^1)</th>
<th>Fatal accidents best estimate 2008</th>
<th>Accidents causing at least 4 days' absence Average est. 2008</th>
<th>Work-related diseases</th>
<th>Work-related mortality</th>
<th>Deaths (^1) caused by dangerous substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>EME</td>
<td>427,681,309</td>
<td>11,210</td>
<td>15,159</td>
<td>14,252,505</td>
<td>269,989</td>
<td>285,148</td>
<td>90,400</td>
</tr>
<tr>
<td>FSE</td>
<td>193,354,716</td>
<td>2,111</td>
<td>14,519</td>
<td>13,650,601</td>
<td>170,166</td>
<td>184,685</td>
<td>56,976</td>
</tr>
<tr>
<td>CHN</td>
<td>740,792,400</td>
<td>180</td>
<td>97,542</td>
<td>91,706,292</td>
<td>334,138</td>
<td>431,680</td>
<td>111,879</td>
</tr>
<tr>
<td>IND</td>
<td>473,300,000</td>
<td>179</td>
<td>46,928</td>
<td>44,120,055</td>
<td>355,863</td>
<td>402,791</td>
<td>119,153</td>
</tr>
<tr>
<td>OAI</td>
<td>457,166,678</td>
<td>1,247</td>
<td>80,567</td>
<td>75,746,706</td>
<td>269,541</td>
<td>350,107</td>
<td>90,250</td>
</tr>
<tr>
<td>SSA</td>
<td>273,414,298</td>
<td>15</td>
<td>57,771</td>
<td>54,314,626</td>
<td>364,551</td>
<td>422,322</td>
<td>122,062</td>
</tr>
<tr>
<td>LAC</td>
<td>222,632,385</td>
<td>2,196</td>
<td>31,165</td>
<td>29,300,625</td>
<td>107,180</td>
<td>138,345</td>
<td>35,887</td>
</tr>
<tr>
<td>MEC</td>
<td>128,010,251</td>
<td>929</td>
<td>14,296</td>
<td>13,441,062</td>
<td>73,687</td>
<td>87,984</td>
<td>24,673</td>
</tr>
<tr>
<td>All 2008:</td>
<td>2,991,283,518</td>
<td>21,604</td>
<td>320,580</td>
<td>317,421,473</td>
<td>2,022,570</td>
<td>2,343,149</td>
<td>910,286</td>
</tr>
<tr>
<td>USA</td>
<td>154,287,000</td>
<td>5,214</td>
<td>5,370</td>
<td>5,594,188</td>
<td>95,808</td>
<td>101,179</td>
<td>38,016</td>
</tr>
<tr>
<td>EU-27</td>
<td>237,997,300</td>
<td>4,706</td>
<td>5,900</td>
<td>7,374,297</td>
<td>161,970</td>
<td>167,870</td>
<td>73,989</td>
</tr>
<tr>
<td>Singapore new</td>
<td>3,340,000</td>
<td>61</td>
<td>61</td>
<td>57,000</td>
<td>1,388</td>
<td>1,449</td>
<td>566</td>
</tr>
<tr>
<td>Finland</td>
<td>2,726,000</td>
<td>41</td>
<td>49</td>
<td>42,708</td>
<td>1,693</td>
<td>1,734</td>
<td>871</td>
</tr>
</tbody>
</table>

\(^1\) or latest relevant and available data
Deaths attributed to work, 2.3 million/year

- Communicable diseases: 18%
- Cancer: 32%
- Respiratory Diseases: 0.4%
- Circulatory diseases: 17%
- Mental Disorders: 1%
- Digestive systems diseases: 23%
- Genitourinary system: 8%
- Accidents and violence: 1%

Sources: Hämäläinen P, Takala J, Saarela KL; TUT, ILO, EU-OSHA, 2008
Work-related Annual Deaths –
Pattern in developed countries,
Singapore distribution of fatal illnesses, EU in brackets

Deaths attributed to work, Singapore (Res.) 924, EU: 168,000, ref. WHO A

- 62% (57%)
- 22% (23%)
- 5% (6%)
- 1% (0.4%)
- 4% (5%)
- 3% (3%)

- Communicable diseases
- Respiratory Diseases
- Mental Disorders
- Genitourinary system
- Cancers
- Circulatory diseases
- Digestive systems diseases
- Accidents and violence

Sources: Hämäläinen P, Takala J, Saarela KL; TUT, ILO, WHO, EU-OSHA, WSH Institute Singapore
Occupational Cancer

- UK: **8010 deaths/year** (Rushton L. a.o.: Br Journal of Cancer, 2012)
- UK: ILO Attr.Fractions: **13 300 deaths/year**
  - see also V McCormack, J Peto, G Byrnes, K Straif and P Boffetta, BJC 2012
- USA today: **37 000 – 61 000 deaths/year**
- EU: **95 600 deaths/year**
- Singapore: **594 (residents) – 891 (total economically active)**

Sources:
- [http://www.nature.com/bjc/journal/v107/n1s/index.html](http://www.nature.com/bjc/journal/v107/n1s/index.html)
Major causes of death by age group, EU-25, 2001

2) Cancer = Malignant neoplasms including leukaemias and lymphomas.
3) In the age group 0 (= less than 1 year) the principal causes of death were 'Certain conditions originating in the perinatal period' (48.0%) and 'Congenital malformations and chromosomal abnormalities' (27.7%), which in the chart are included in 'Other'.
Source: Eurostat – Mortality Statistics.
DALYs in men in 2010 by age

http://www.healthmetricsandevaluation.org/gbd/visualizations/region
DALYs in women in 2010 by age

http://www.healthmetricsandevaluation.org/gbd/visualizations/region
## 10 leading causes of Deaths in Western Europe

<table>
<thead>
<tr>
<th>1990 Mean rank (95% UI)</th>
<th>2010 Mean rank (95% UI)</th>
<th>% Change (95% UI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 (1-1)</td>
<td>1.0 (1-1)</td>
<td>-20% (-23 to -9)</td>
</tr>
<tr>
<td>2.0 (2-2)</td>
<td>2.0 (2-2)</td>
<td>-21% (-28 to -3)</td>
</tr>
<tr>
<td>3.0 (3-3)</td>
<td>3.1 (3-5)</td>
<td>9% (-11 to 19)</td>
</tr>
<tr>
<td>4.1 (4-5)</td>
<td>4.3 (3-6)</td>
<td>11% (6 to 15)</td>
</tr>
<tr>
<td>5.0 (4-6)</td>
<td>5.6 (4-9)</td>
<td>216% (69 to 313)</td>
</tr>
<tr>
<td>5.9 (5-6)</td>
<td>5.9 (4-7)</td>
<td>10% (0 to 21)</td>
</tr>
<tr>
<td>7.1 (7-8)</td>
<td>6.3 (4-7)</td>
<td>19% (10 to 37)</td>
</tr>
<tr>
<td>7.9 (7-9)</td>
<td>7.9 (7-9)</td>
<td>18% (12 to 24)</td>
</tr>
<tr>
<td>9.0 (8-11)</td>
<td>9.2 (8-11)</td>
<td>17% (10 to 28)</td>
</tr>
<tr>
<td>9.0 (8-11)</td>
<td>10.5 (10-12)</td>
<td>2% (-6 to 10)</td>
</tr>
<tr>
<td>10.3 (8-12)</td>
<td>12.1 (11-15)</td>
<td>-6% (-11 to -1)</td>
</tr>
<tr>
<td>16.5 (11-19)</td>
<td>16.0 (11-19)</td>
<td></td>
</tr>
</tbody>
</table>

http://www.healthmetricsandevaluation.org/gbd/visualizations/regional

Murray et al. Lancet 2012,
### 10 leading causes of DALYs in Western Europe

<table>
<thead>
<tr>
<th>1990 Mean rank (95% UI)</th>
<th>2010 Mean rank (95% UI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0 (1-1) 1 Ischemic heart disease</td>
<td>1 Low back pain 1.4 (1-2)</td>
</tr>
<tr>
<td>2.1 (2-3) 2 Low back pain</td>
<td>2 Ischemic heart disease 1.6 (1-2)</td>
</tr>
<tr>
<td>2.9 (2-3) 3 Stroke</td>
<td>3 Stroke 3.5 (3-5)</td>
</tr>
<tr>
<td>4.7 (4-7) 4 Lung cancer</td>
<td>4 Major depressive disorder 4.2 (3-8)</td>
</tr>
<tr>
<td>5.2 (4-9) 5 Major depressive disorder</td>
<td>5 Lung cancer 5.4 (4-9)</td>
</tr>
<tr>
<td>5.5 (4-7) 6 Road injury</td>
<td>6 Falls 5.9 (3-9)</td>
</tr>
<tr>
<td>7.0 (5-8) 7 COPD</td>
<td>7 COPD 7.0 (5-9)</td>
</tr>
<tr>
<td>8.3 (6-11) 8 Falls</td>
<td>8 Neck pain 8.7 (5-14)</td>
</tr>
<tr>
<td>9.7 (6-16) 9 Neck pain</td>
<td>9 Other musculoskeletal 9.2 (7-12)</td>
</tr>
<tr>
<td>10.4 (9-13) 10 Diabetes</td>
<td>10 Diabetes 9.6 (7-12)</td>
</tr>
<tr>
<td>10.8 (8-14) 11 Other musculoskeletal</td>
<td>12 Road injury 12.1 (9-1)</td>
</tr>
</tbody>
</table>

The **disability-adjusted life year (DALY)** is a measure of overall disease burden, expressed as the number of years lost due to disability or early death

\[
\text{DALY} = \text{YLD} \text{ (years lived with disability)} + \text{YLL} \text{ (years of life lost)}
\]

[http://www.healthmetricsandevaluation.org/gbd/visualizations/regional](http://www.healthmetricsandevaluation.org/gbd/visualizations/regional)

Work life expectancy (WLE) and employment expectancy (EE) (years) constitute a holistic indicator for successful work life.
Employment Rate (%) for various economies for age group 55 to 64 (Overall)

Source: OECD, Statistics Finland, WSH-Institute Singapore
Cost of injury and illness, ILO: 4 % of Global GDP

4.8 % of GDP in Australia, 2008-09

3.2 % of GDP in Singapore, 2011

EU, USA: 1.8%- 6 % of GDP

source: www.safeworkaustralia.gov.au/


www.wshi.gov.sg
Competitiveness and WSH: World (selected countries)

### Competitiveness Index

- **Competitiveness rank**
- **Death rates**
- **Linear (Death rates)**

#### Fatal accidents / 100 000 workers 2008

Source: WSH Institute and World Economic Forum 2012-2013

About WSH Institute

Research Agenda and needs
- Singapore priorities
- Global and EU needs
- Burden of disease and injury, economic burden, competitiveness

Research for solutions
- Strategies, programmes, new paradigm, or business as usual?
Challenge, not just for today but for life – paradigm change

• To achieve a sustainable working life
• Search for policies, strategies, programmes, profiles
• A holistic approach, protection, prevention, promotion, leaders and population cultures

• Good Work!


PERCEIVED AND REAL RISKS

PERCEIVED RISK

Work-related

Terrorist attack

Mobile phones

Airline accident

Violent robbery

Avian flu

Stock exchange crash

Glass of wine

REAL RISK

Work-related

Heat wave

War activities, anywhere

Traffic Accident

Cancer

Circulatory diseases

Sources: S. Hertlich, M.Hamilo, S.kuvalehti (FI), WHO/ILO/J.Takala
Trends – change of mindset

Occupational Diseases Are Common

Common Diseases are Occupational
CREATING HEALTHY WORKPLACES
The future of work is having a good job

Health at work – an independent review of sickness absence
Dame Carol Black and David Frost CBE
November 2011

SINGAPORE WORKPLACE SAFETY AND HEALTH CONFERENCE 2012
A comprehensive and integrated approach to managing workplace safety and health:

- To provide and maintain a safe and healthy working environment for all employees.
- To identify and address WSH risks in a proactive and integrated way with the active participation of employees.
Research on: accidents – injuries – exposures and solutions ...

Design for Safety, Control Banding, GHS... evidence 4 action

http://www.asse.org/professionalaffairs_new/PtD/Opening%20Session/Paul%20Schulte.pdf
## Research on targets and indicators

<table>
<thead>
<tr>
<th>TARGET</th>
<th>INDICATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMPROVED POLICIES AND LEGISLATION TO COVER OSH</td>
<td>- Number of ratifications of ILO Conventions (especially No.155/161), Compensation, Enforcement</td>
</tr>
<tr>
<td>OCCUPATIONAL HEALTH SERVICES</td>
<td>- Percentage of active labour force covered</td>
</tr>
<tr>
<td>INFRASTRUCTURE AND MANPOWER</td>
<td>- Percentage now of active labour force in specific OSH occupations (medical, inspection, hygienists, safety officers, full-time safety representatives), Size of inspectorate (number of inspectors as percentage of active labour force, and percentage of professionally qualified inspectors), Percentage of doctors, nurses, etc. in active labour force, Number and capacity of training institutes, universities, safety councils, workers’ education units, Number of researchers, research reports, Number of information centres, service capacity (all in relation to the size of active labour force)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TARGET</th>
<th>INDICATOR</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 RECORDING OF</td>
<td>- Percentage of active labour force covered by recording/notification systems</td>
</tr>
<tr>
<td>ADVISORY BODIES AND VOLUNTARY SYSTEMS</td>
<td>- Existence of a tripartite advisory body and the number of possible sectoral bodies, Number of safety committees and safety committee members (often compulsory) as percentage of the number of enterprises and of the active labour force, Number of companies that have established occupational safety and health management systems (percentage of all enterprises), Number of consultancy companies specialized in OSH (in relation to the active labour force)</td>
</tr>
</tbody>
</table>

- **Accidents**
- **Diseases - Work-related - Occupational**
- **Costs of accidents and diseases at work**
Research objective

Zero Harm - Vision Zero

I ❤️ my job
Thank You