WSH Tech for Construction

Provide evidence-based, insightful and practical solutions

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WSH Institute is part of the Occupational Safety and Health Division in the Ministry of Manpower

The WSH Tech team in WSH Institute was formed to support one of the 3 key strategies laid out in WSH 2028 – Promote Technology-Enabled WSH :

(i) To translate WSH challenges into technology plans to:

- Reduce accident risks caused by human error/judgement (or unsafe behaviour / lack of situational awareness)
- Minimise jobs that are dull, dangerous or repetitive (including hazardous work environment)
- Assess physical and cognitive fitness to catch potential problems before accidents occur (health affecting work safety)

(ii) To promote effective market-ready solutions for sector wide adoption, and grow the WSH technology ecosystem in Singapore.

A coordinated approach to integrate WSH into the tech ecosystem

For **market ready solutions**, we are working with sector leads to incorporate WSH requirements or solutions into the sectoral Industry Digital Plans

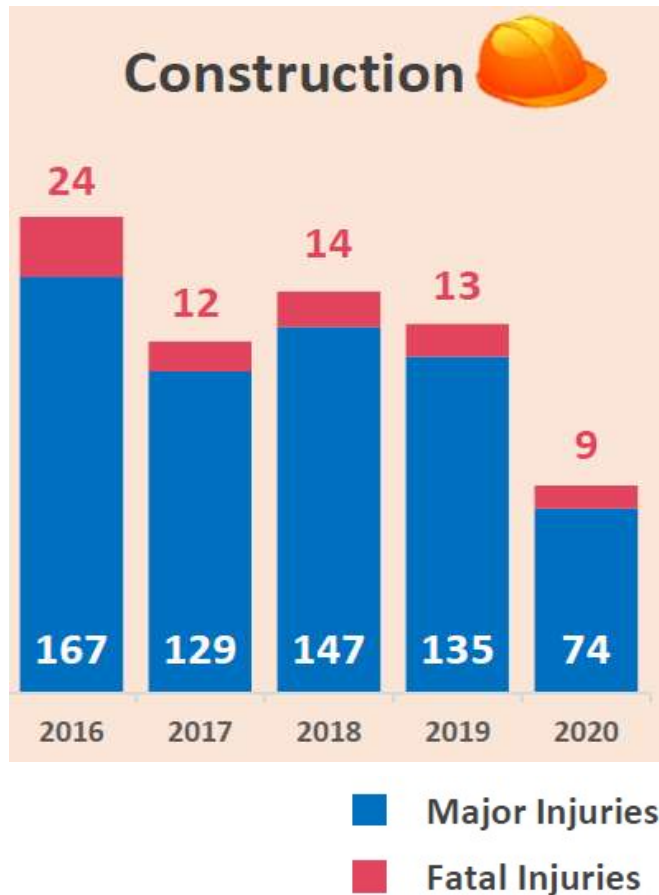For **solutions in prototype stage**, we support pilot testing via sector leads' innovation platform

Where **no visible solutions are available**, we leverage on Research Institutes and Institutes of Higher Learning to conduct research & development.

Construction

2016	2017	2018	2019	2020
24	12	14	13	9
167	129	147	135	74

■ Major Injuries
■ Fatal Injuries

TOP CAUSES OF WORKPLACE INJURIES
(Fatal) Across sectors: FFH and Vehicular accidents
(Major) Across sectors: STF
(Fatal) Construction: FFH
(Major) Construction: FFH and STF

Injury types	Possible tech mitigation
FFH	ePTW, Drones, Geofencing, Health monitoring
STF	Wearables, Vision AI, Health monitoring
Vehicular accidents	ADAS, DSMS, Blind spot detection, 360 camera and proximity sensors

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WSH solutions in sectoral Industry Digital Plan (IDP)

SG·D | SMEs GO DIGITAL

CONSTRUCTION AND FACILITIES MANAGEMENT | INDUSTRY DIGITAL PLAN

A guide for enterprises to assess their digital readiness and opportunities to go digital, and acquire solutions to enable plugging into Integrated Digital Delivery (IDD).

https://www.imda.gov.sg/programme-listing/smes-go-digital/industry-digital-plans/Construction-and-Facilities-Management-IDP

SMEs GO DIGITAL

LOGISTICS | INDUSTRY DIGITAL PLAN

A Guide for Small and Medium Enterprises (SMEs) to Assess Their Digital Readiness and Opportunities to Go Digital

https://www.imda.gov.sg/programme-listing/smes-go-digital/industry-digital-plans/logistics-idp

WSH solution categories under Construction and Facilities Management IDP

e-Permit-to-work (e-PTW)

Digital Wearables for Workers' Health and Safety

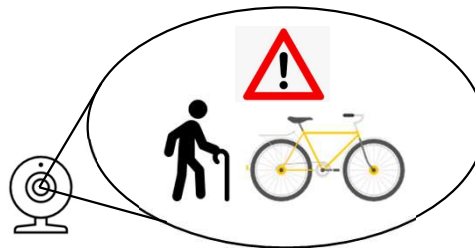Integrated and Smart Worksite Monitoring and Inspection

WSH solution categories under Logistics IDP

Fleet safety management

Vehicular Safety Technology and their functions

Advanced Driver Assistance System (ADAS)	Driver Status Monitoring Systems (DSMS)	Blind Spot Detection	360 Degrees Camera	Proximity Sensors
• Forward Collision Warning • Lane Departure Warning • Headway Monitoring Warning • Traffic Sign Recognition	Alerts driver of abnormal driving status such as: - Fatigue - Distraction - Smoking - Cell phone usage	Assists driver to avoid collision by detecting vehicles and pedestrians in blind spots when changing lanes or turning.	Provides real-time view of area surrounding vehicle	Alerts driver when vehicle is too close to a person or an object.

Listed on PSG

Logistics: Fleet Safety management

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Electronic Permit-to-Work (E-PTW)

E-PTW is a well established digital technology with many service providers in the market. It is featured as one of the solutions in the Construction and Facilities Management IDP, with funding support available.

Benefits of E-PTW include:

- Improved safety through audit trail – ensures qualified person approve the PTW

- Protection against falsification of PTW – cannot backdate

- Full visibility of which high risk activities are ongoing and which PTWs have closed

- Dashboard to help safety supervisors identify conflicting works and overdue permits

- Enhanced productivity – reduces paper work and waiting time; assigns to other staff easily to cover staff absences

Listed on Advanced Digital Solutions (ADS) and Productivity Savings Grant (PSG)*

Internet of Things (IoT) sensors, Geofencing and Worker Tracing

Advancement in IoT technology enables transformation of construction sites and facilities management into smart workplaces, to improve both safety and productivity.
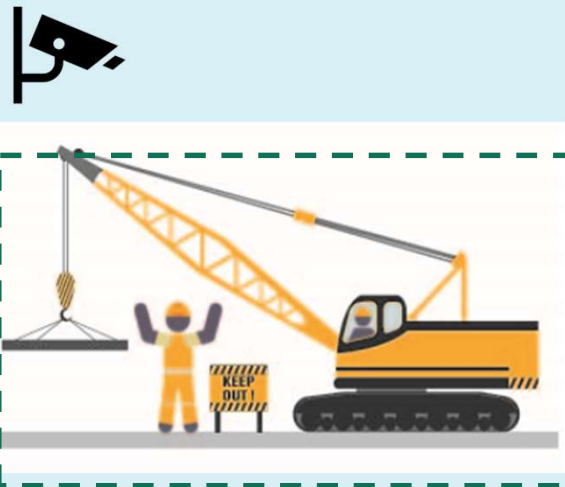
IoT Sensors

Connect workers and equipment to provide real-time monitoring of construction site personnel and environment. E.g. Operation of equipment, confined space monitoring.
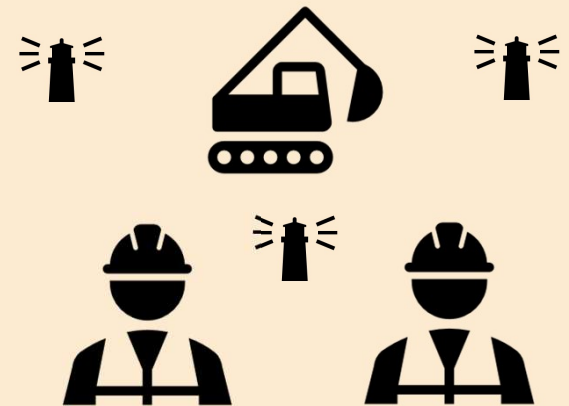
Geofencing

Draw virtual boundaries around high risk areas.
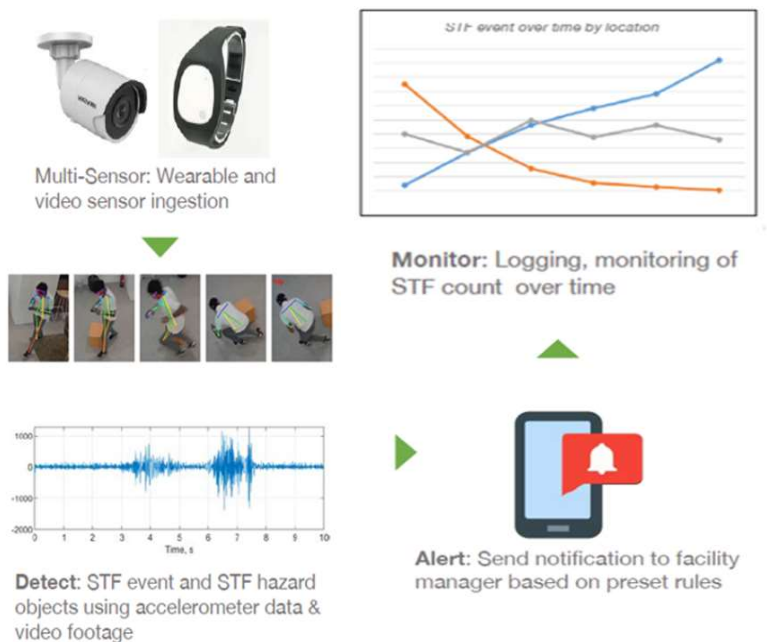
Worker Tracing

Ensure workers are at the right place at the right time and detect lone workers in distress
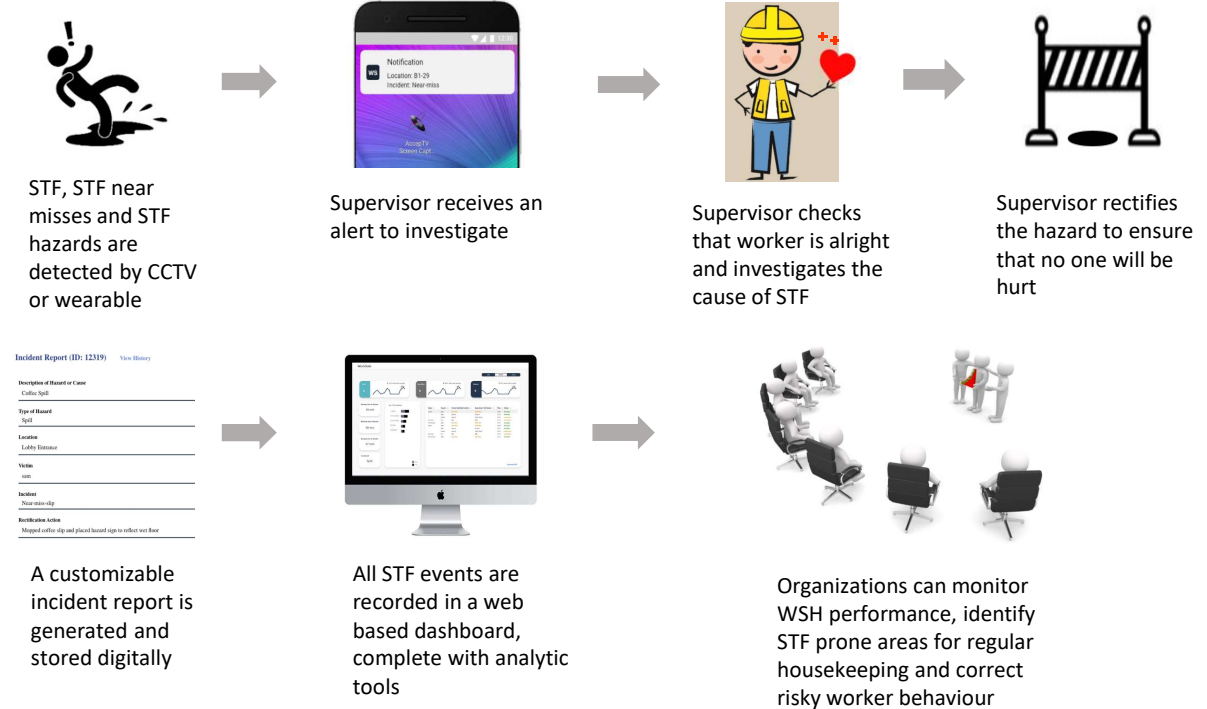
STF prevention solution using wearables and vision AI

WSHI launched a problem statement via BEAMP:D on OIP in Apr 2020 to seek solutions for slips, trips and falls (STF)

Use case for STF prevention solution

Multi-Sensor: Wearable and video sensor ingestion

Detect: STF event and STF hazard objects using accelerometer data & video footage

STF event over time by location

Monitor: Logging, monitoring of STF count over time

Alert: Send notification to facility manager based on preset rules

Source: Vulcan AI Pte Ltd

STF, STF near misses and STF hazards are detected by CCTV or wearable

Supervisor receives an alert to investigate

Supervisor checks that worker is alright and investigates the cause of STF

Supervisor rectifies the hazard to ensure that no one will be hurt

A customizable incident report is generated and stored digitally

All STF events are recorded in a web based dashboard, complete with analytic tools

Organizations can monitor WSH performance, identify STF prone areas for regular housekeeping and correct risky worker behaviour

Use case for STF prevention solution

Source: Channel News Asia https://www.channelnewsasia.com/news/singapore/new-ai-system-seeks-to-prevent-slips-and-falls-at-workplaces-14465912

Benefits and application of STF prevention solution

Source: (CNA) Sharul from CTM explaining how they improved their SOP after detection of 2 near misses at the plant

Source: (Frontline) Steven Goh from BATU sharing the STF prevention technology on Channel 8, Frontline, 12 Mar 2021
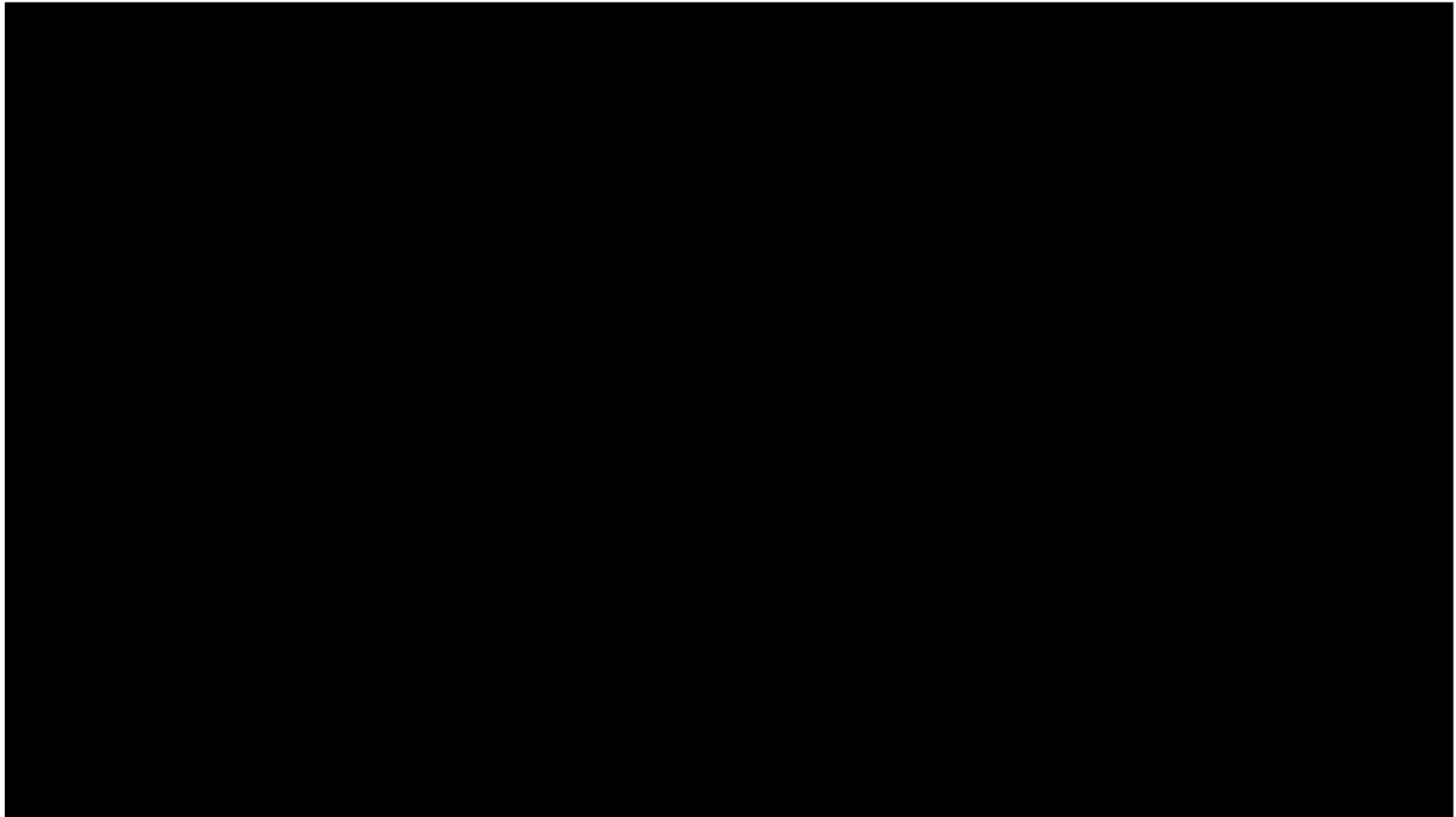
Key Benefits

- Detecting near misses allows early intervention to remove the hazard or correct risky worker behaviour

- Ability to render prompt assistance

- Heightened safety awareness

- Audit trail for action taken

- Automated generation and digital storage of STF reports

Source: Vulcan AI Pte Ltd

Drone technology reduces WAH risks for building façade inspections

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Source: H3 Dynamics https://www.youtube.com/watch?v=gknz2zdiNCg

Worker health monitoring

Coronavirus: Tracking workers' health with mobile apps, wearable devices

Source: Nervotec

Source: The Straits Times (published 12 Aug 2020)

Source: Damstra Vault Solo

Source: GoX

There is grant support for specific WSH Tech

➢ The **Productivity Solutions Grant (PSG)** supports businesses in the adoption of IT solutions or equipment that improve productivity. Receive up to 80% funding support for eligible costs.

➢ The **Advanced Digital Solutions (ADS)** supports businesses in adopting solutions for safe re-opening and long-term digitalisation to digitise workflows and reduce reliance on manpower. Receive up to 80% funding support for cost of integrated digital solutions.

Find the list of pre-approved solutions in the GoBusiness Gov Assist portal and IMDA website

Pre-scoped IT Solutions for Building & Construction

Solutions supported under the Productivity Solutions Grant are regularly reviewed. Do take note of the current support levels and grant caps.

e-Permit-to-work (e-PTW)   +

FM Workflow Automation   +

Quantity Surveying and Valuation   +

About   Who can Apply   Funding Support   Contact

- Be in a financially viable position to start and complete the project.

Enterprises can contact the project leads of the ADS projects they are interested in. More will be added progressively.

List of supported ADS projects   + Expand All   − Collapse All

Construction   ⌄

Facilities Management   ⌃

Project Information	Contact Details
Project Name: Remote Digital Assistant (Artificial Intelligence (AI)-enabled Equipment Performance Management)	
Tailored AI-enabled digital assistant solution to	

https://govassist.gobusiness.gov.sg/productivity-solutions-grant/itsolution/buildingconstruction/

https://www.imda.gov.sg/advanceddigitalsolutions#Facilities-Management

Calling for good solutions

Solution providers with good WSH technology proposals can email contact@wshi.gov.sg with a write-up of how the solution can improve WSH.

You can feedback to us on WSH issue(s) you face and share solution(s) that you have tried or are exploring

We want to hear from you

We look forward to your feedback on the WSH issues(s) you face and the solution(s) that you have tried or are exploring:

For construction companies:
Go.gov.sg/construction-tech-feedback