Presentation Outline

- Intro to shared challenge faced by global health and safety community – *Delivering continuous improvements in H&S performance*
- A suggested strategy for tackling it – *A tale of two pyramids*
- Realising the strategy – *Lessons learned from HSE's Discovering Safety Programme*
- Deeper dive into individual project work on Discovering Safety
- Invite to work together and combine research efforts

DISCOVERING SAFETY

Shared health and safety challenge faced by CIC and HSE's DSP

CONSTRUCTION INDUSTRY COUNCIL
建造業議會

Vision

To drive for unity and excellence of the construction industry of Hong Kong.

Mission

To strengthen the sustainability of the construction industry in Hong Kong by providing a communications platform, striving for continuous improvement, increasing awareness of health and safety, as well as improving skills development.

"…striving for continuous improvement…"

"…aim of improving performance…"

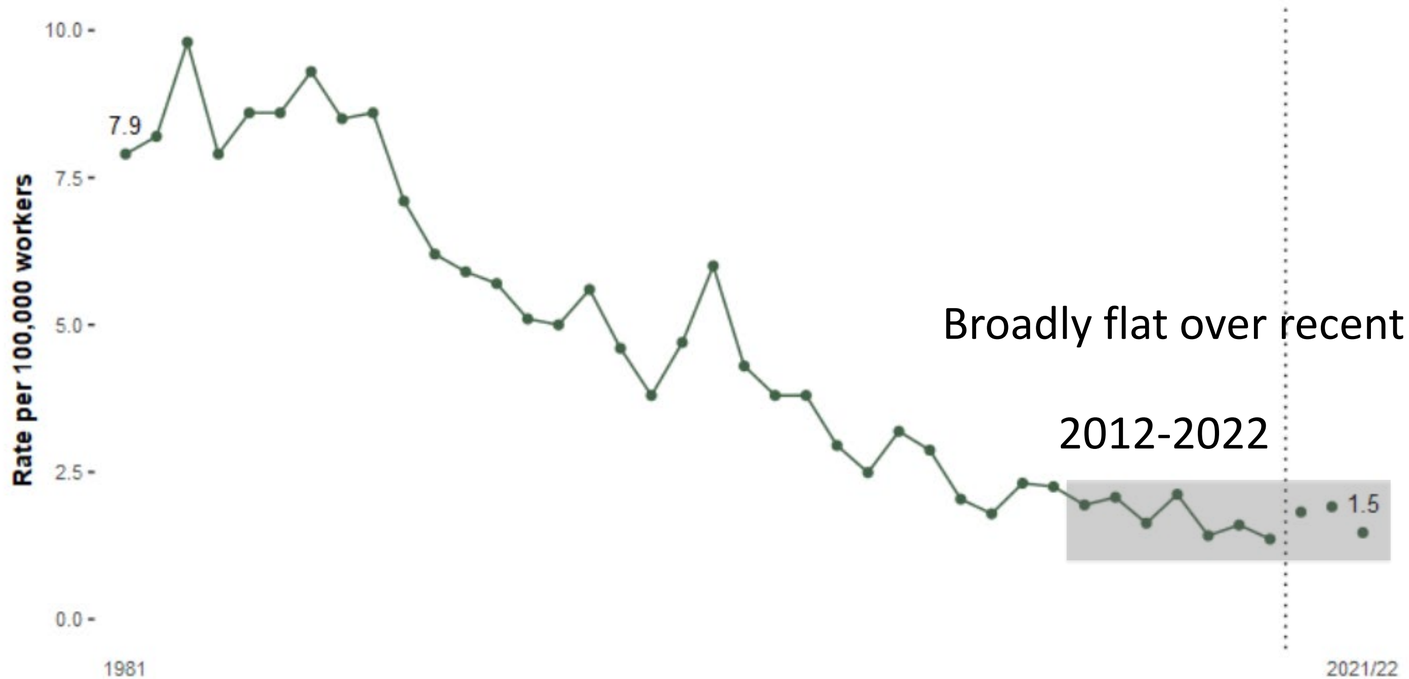
DISCOVERING SAFETY

Delivering health and safety benefits through a data driven global community

Discovering Safety aspires to be a leader in innovative, data driven health and safety with the aim of improving performance through the use of cutting edge data and analytical techniques.

Trends in fatal injury rates, GB Construction workers

Fatal injuries per 100,000 workers in GB construction workers (1981-2022)

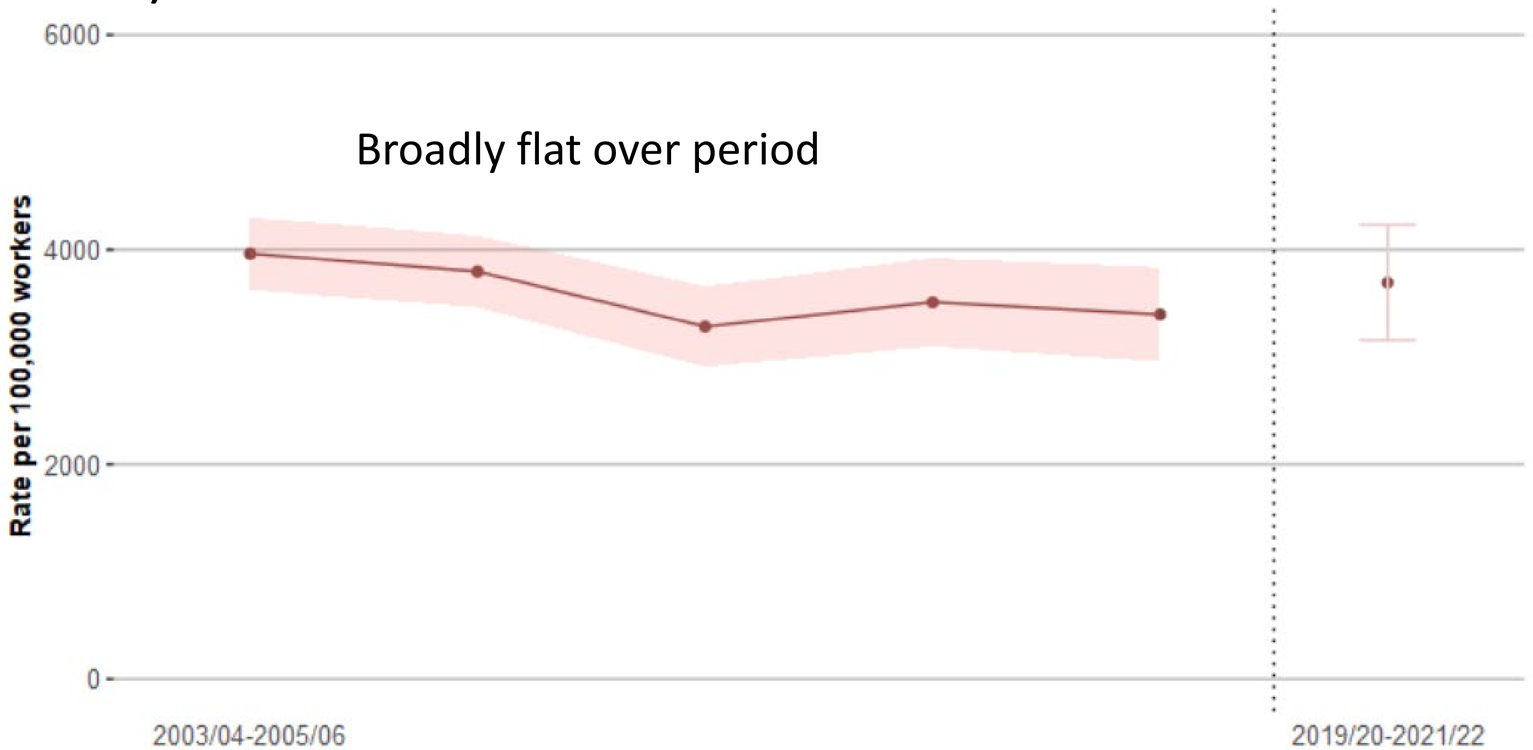


Source: https://www.hse.gov.uk/statistics/industry/construction.pdf

DISCOVERING SAFETY

Trends in work-related ill health, GB Construction workers

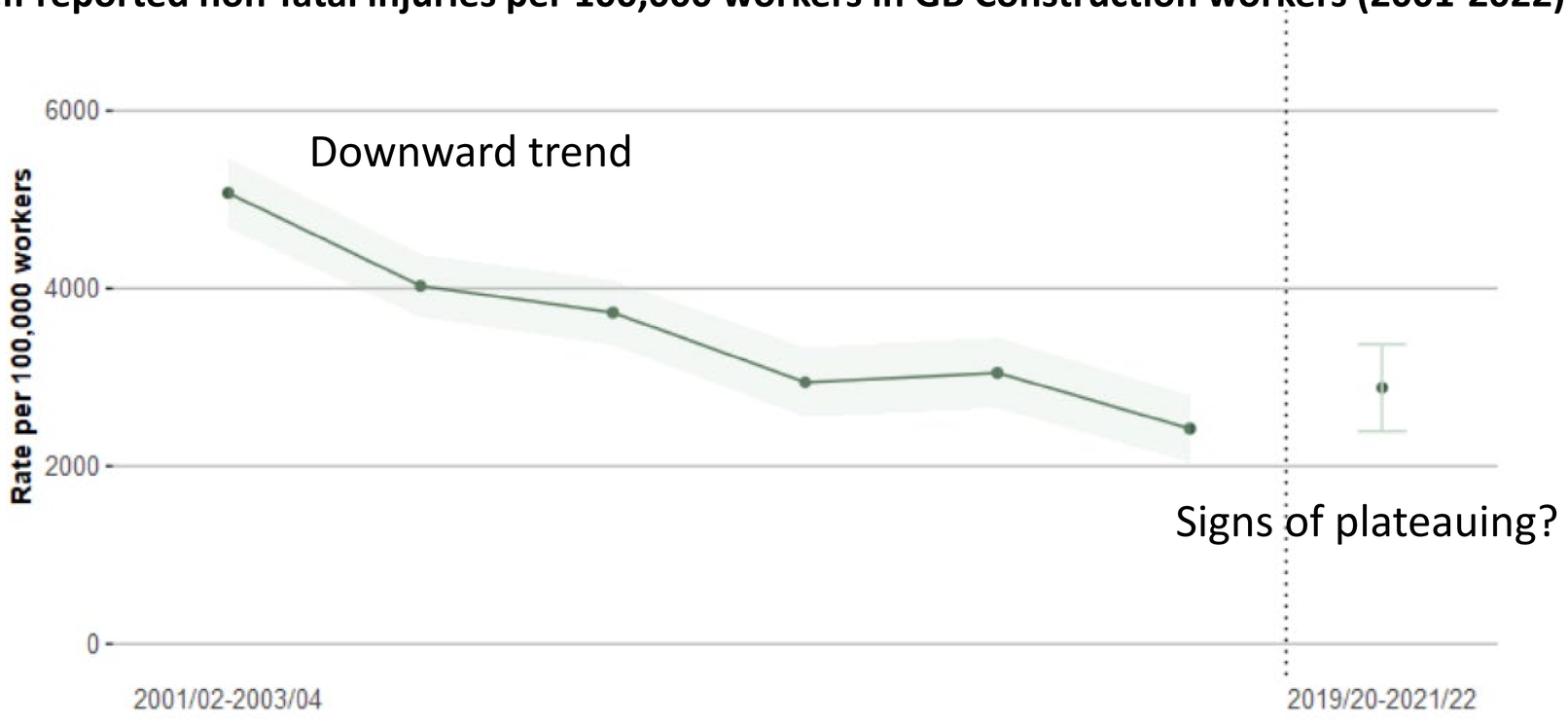
Self reported cases of work related ill health per 100,000 workers in GB construction workers (2001-2022)



Source: https://www.hse.gov.uk/statistics/industry/construction.pdf

Trends in non-fatal injury rates, GB Construction workers

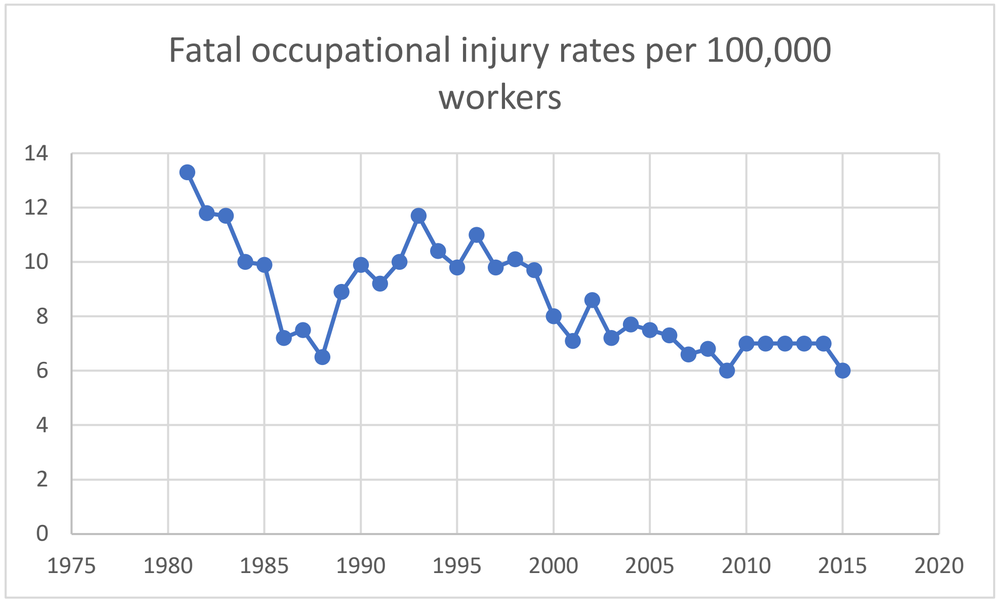
Self reported non-fatal injuries per 100,000 workers in GB Construction workers (2001-2022)



Source: https://www.hse.gov.uk/statistics/industry/construction.pdf

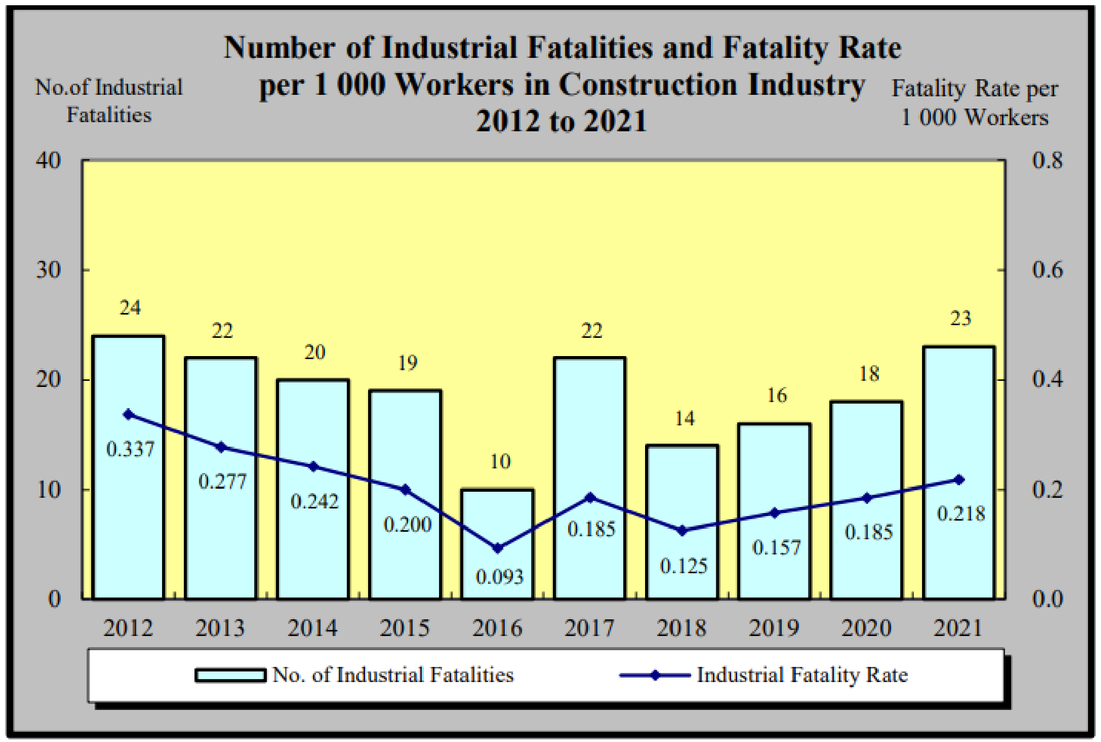
DISCOVERING SAFETY

Trends in fatal injury rates in Hong Kong, 1975 to 2021



https://ilostat.ilo.org/

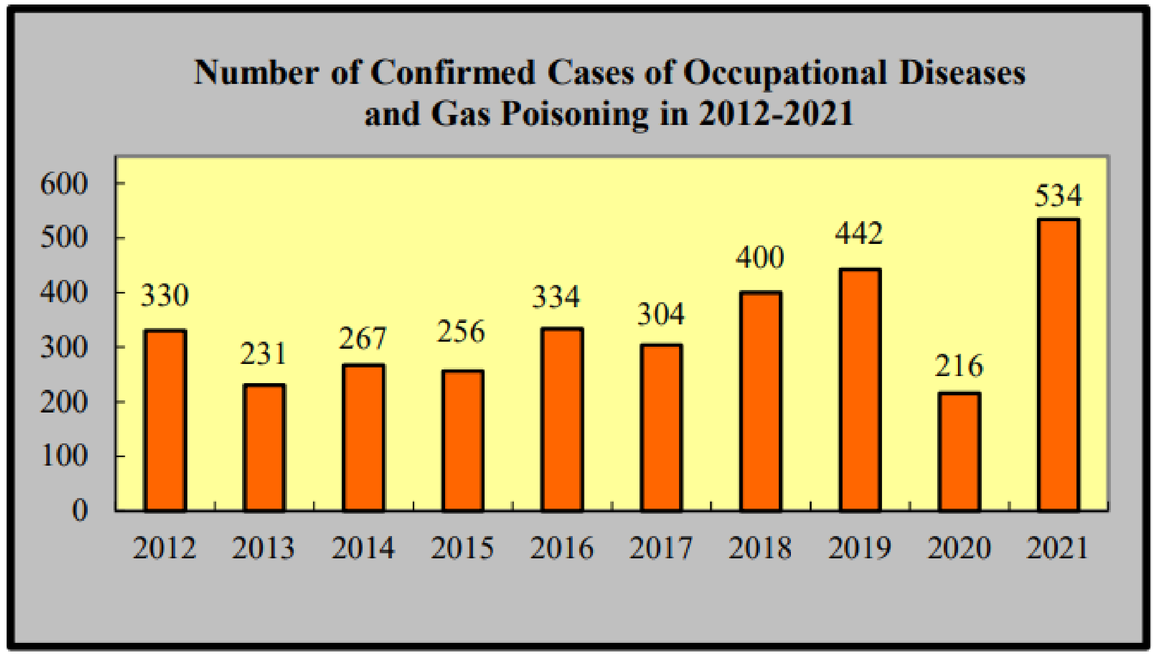
2017-2021, signs of plateauing?



Source: Hong Kong Labour Department Statistics, Issue 22, Aug 2022

Trends in occupational disease in Hong Kong, 2012 to 2021

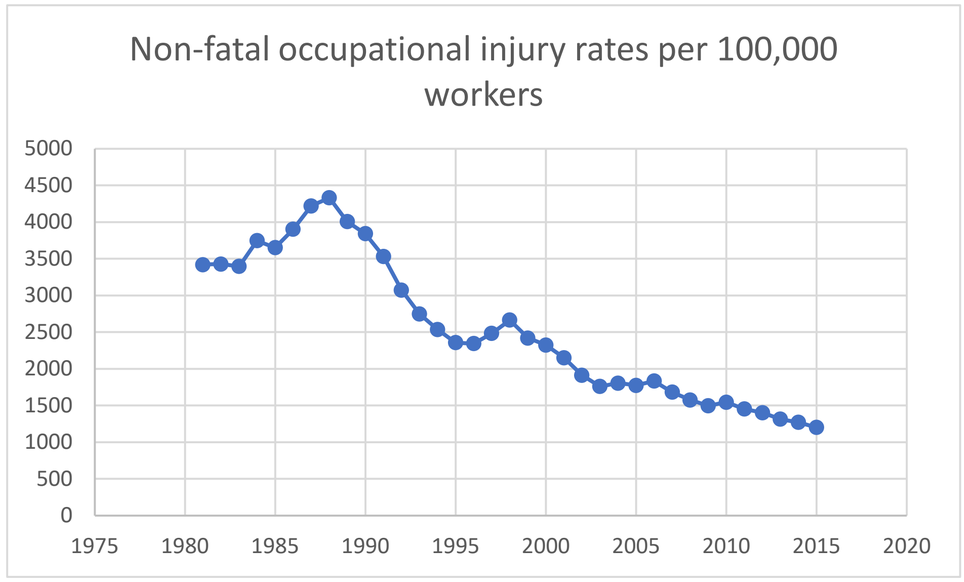
Number of Confirmed Cases of Occupational Diseases and Gas Poisoning in 2012-2021



Source: Hong Kong Labour Department Statistics, Issue 22, Aug 2022

DISCOVERING SAFETY

Trends in non-fatal injury rates in Hong Kong, 1975 to 2021



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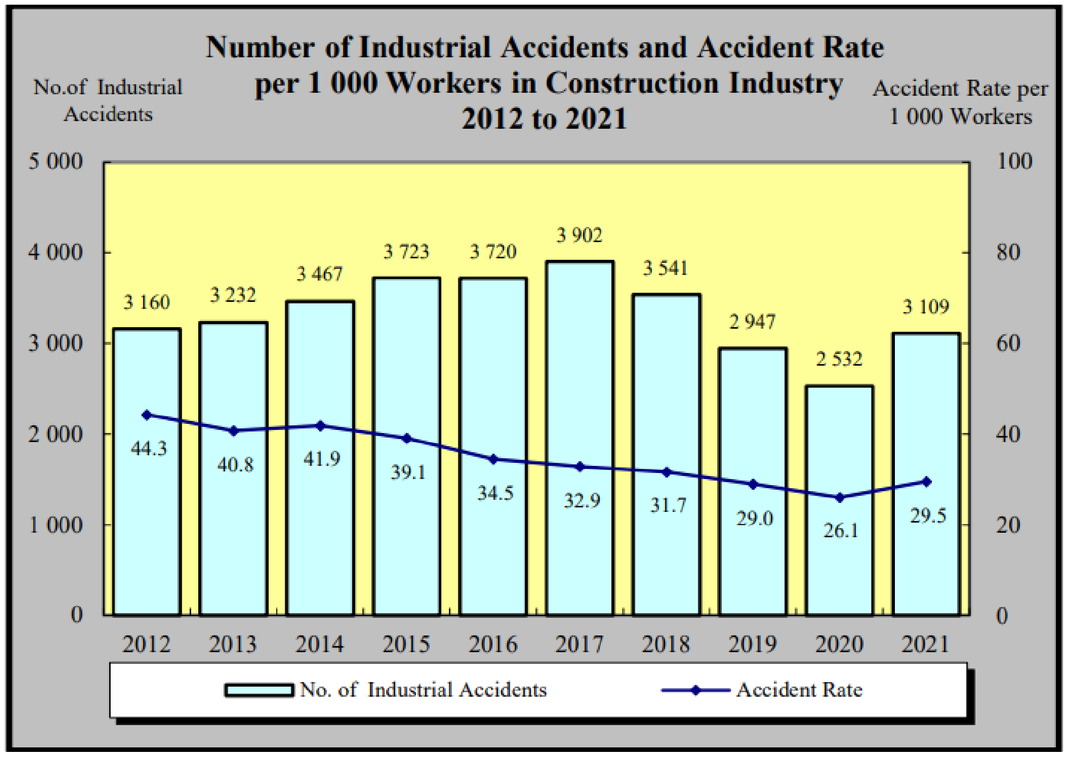
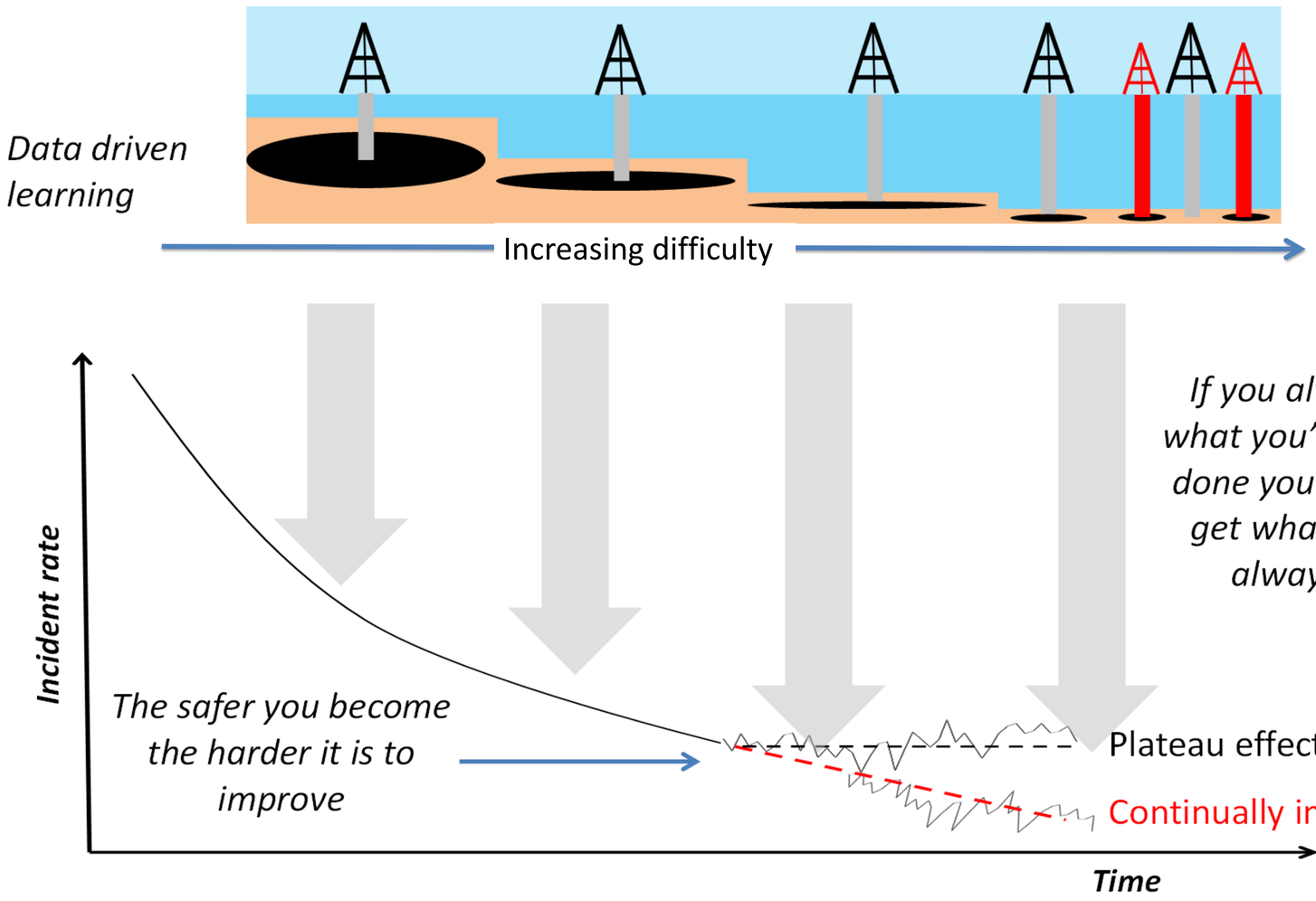
2019-2021, signs of plateauing?



Source: Hong Kong Labour Department Statistics, Issue 22, Aug 2022

Delivering data-driven improvements in health and safety performance



DISCOVERING SAFETY

Delivering health and safety benefits through a data driven global community

How? – A tale of two pyramids

By pushing construction risk management up the (technology-enhanced) hierarchy of risk controls

DISCOVERING SAFETY

Technology examples

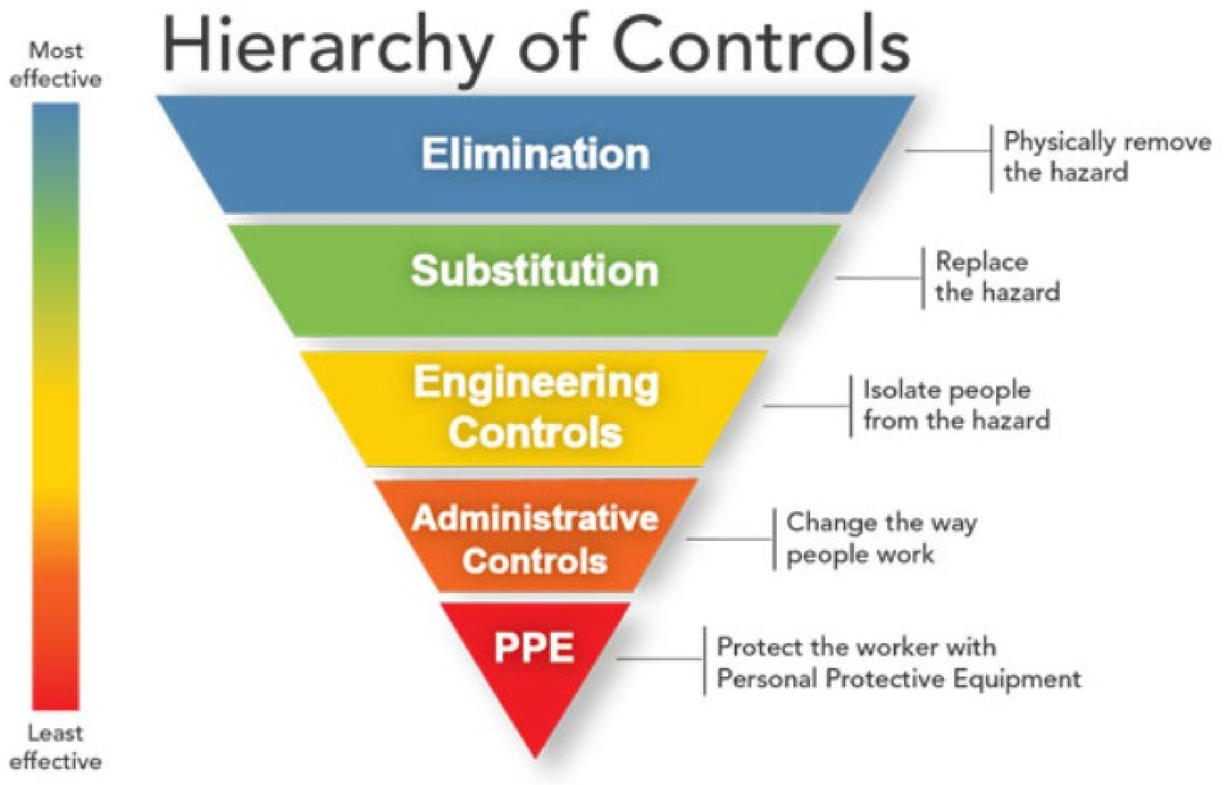
Eliminate risk through design, planning using BIM, digital twins

Substitute humans with tech e.g. drones, robots, cobots

Wireless sensor networks, IIoT

Enhanced training and instruction using VR/AR, Enahnced KM using Regtech, Robotic process automation, Common data environments

Wearables, computer vision



How? – A tale of two pyramids

By pushing construction project data analytics up the knowledge pyramid

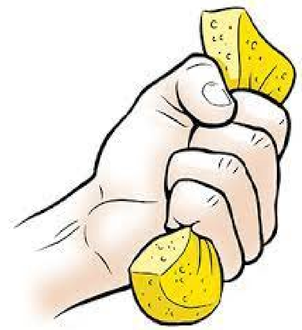
DISCOVERING SAFETY

Prescriptive analytics, recommenders, advisers

Predictive analytics, risk scores

KPI's, scorecards, dashboards

Core organisational health and safety data



Actionable intelligence

Discovering Safety research initiatives

- Innovation/Sandbox work (accelerating adoption of industrial safetytech)
- Work with designers, contractors and clients on construction projects
  - Use of BIM/4D modelling for treating H&S risks in design
  - Use of predictive analytics & risk scoring to assure H&S performance on projects
- Foundational technical work
  - Development of text mining and natural language processing capabilities to leverage knowledge content from unstructured H&S datasets
  - Exploration of use of recommender systems for H&S

Safetytech Accelerator

ATKINS
Member of the SNC-Lavalin Group

3D REPO

bimacademy

wood.

MANCHESTER 1824
The University of Manchester

NaCTeM
The National Centre for Text Mining

ENTERPRISE KNOWLEDGE
Making your information work for you.

Deeper dive into specific project work

DISCOVERING SAFETY

Work with designers, contractors and clients on construction projects –

Use of BIM for determining risk treatment strategies in design

1- Construction Scope
Combination of two concepts

Project Type

- ☑ Domestic Building
- ☑ High Rise Building
- ☑ Infrastructure

Work Scope

- ☑ C2-In situ concrete
- ☑ C3- Precast Concrete
- ☑ C9- Refurbishment

2- Element

- ☑ Column
- ☑ Slab
- ☑ Beam
- ☑ Stair
- ☑ Flat Roof

3- Location

- ☑ High Level – Edge
- ☑ High Level – Joist
- ☑ High Level – Opening
- ☑ Confined Area
- ☑ Excavation Area

4- Activity

- ☑ Material sourcing
- ☑ Component manufacture
- ☑ Install construction
- ☑ Operation

5- Risk Factor

- ☑ Physical – Collapse
- ☑ Physical-Collapse-Design
- ☑ Physical-Collapse-Incomplete
- ☑ Physical – Opening
- ☑ Physical – Edge
- ☑ Task – Manual Handling

6- Risk

- ☑ Fall-From ladder
- ☑ Fall-From open edge
- ☑ Fall-From scaffold
- ☑ Fall-through fragile material
- ☑ Fall-Slip or trip on the same

Mitigate

7- Mitigation Plan

ERIC ☑ ☑ ☑ ☑

Stage ☑ ☑ ☑ ☑

Site team of any activities when covers or guardrails need to be removed

Database of evidence-based risk treatments

HSE

HSE reg intel

Project design risk registers

3D Repo

SafetiBase

Design Risk Scenario
In situ concrete
Floor or roof slab with openings – Risk of fall through openings

Eliminate risk by change in design

Reduce risk by substitution or modification of components

Control likelihood or severity of risk by further design

Inform other designer, contractor, duty-holder

At Prelim stage Of design

1.

2. Can no's of openings be reduced? Can size of openings be reduced?

3. a. Design strategy to use cast in fibreglass mesh where possible
b. Mark openings next to walls, passageways, etc.

4. Openings with high residual risk flagged up

At Detailed design stage

5. a. Examine service requirements to eliminate openings in walkways movement areas

6. a. Consider cast in sockets fixings for floor plates or guardrail systems

7. a Identify openings next to design features where special provision may be needed

8 a. Inform planners/contractors of any identified issues with openings

At Pre Construction planning stage

9 a. Plan guardrail/floor plate systems to provide protection throughout construction phase

10. B Use clash detection tools to finalise service runs and opening dimensions

11. a Specify where cast in sockets etc to be provided by contractor

12. a How certain are risk controls on openings – flag up any uncertain areas

During Construction phase

13 a Securely fix floor plates over openings with adequate swl
b. Install and manage guardrail systems to planners spec

14 a

15 a. Plan protective measures for when where openings will be exposed

16 a Feed forward information required by site teams to maintain protection

DISCOVERING SAFETY

Work with designers, contractors and clients on construction projects –

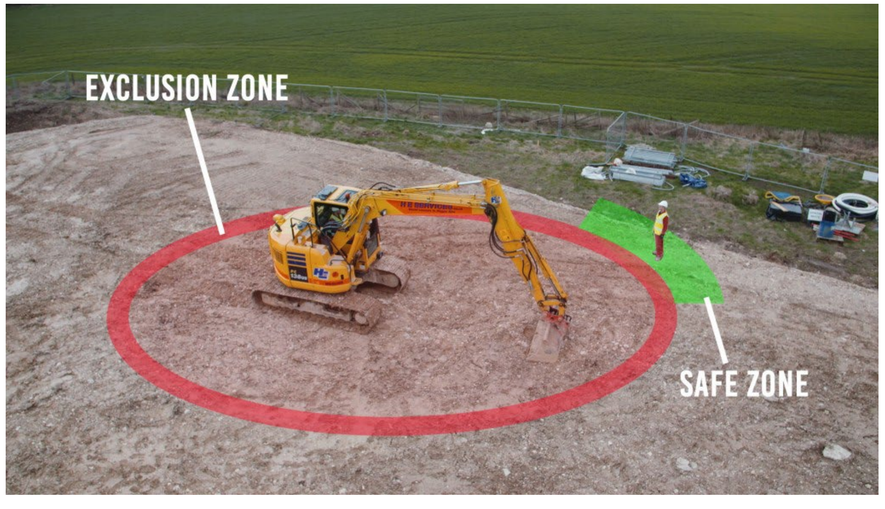
Use of emerging tech in construction phase to assure risk treatment strategies

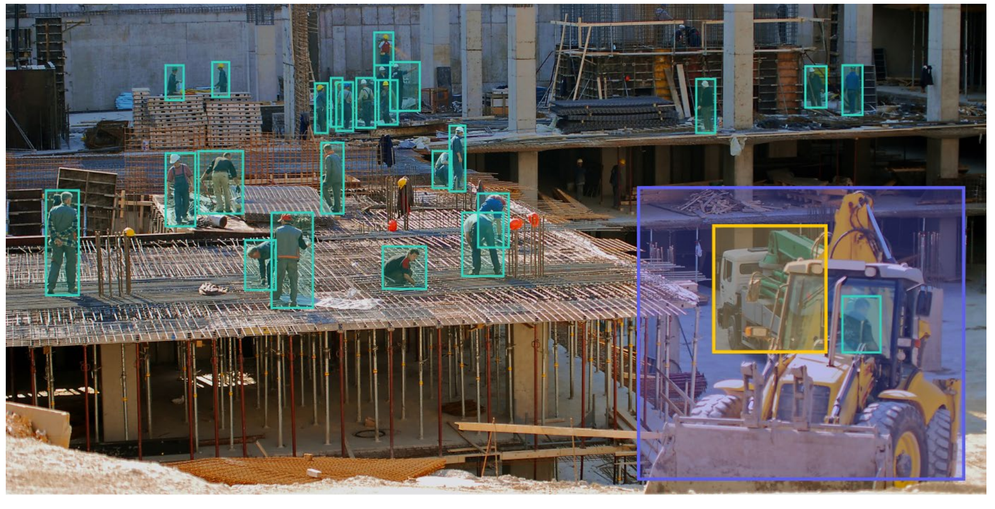
- Use of tracking technology, sensor technology, computer vision technology for hazard identification, risk control assurance
- e.g. identification of uncapped rebar, unprotected edges, incursion into exclusion zones

As planned –
Design intent
e.g. use of zonal working practices in vicinity of heavy plant

Learning for future design

As built –
Design assurance
e.g. use of geofencing tech to mange zonal working practices





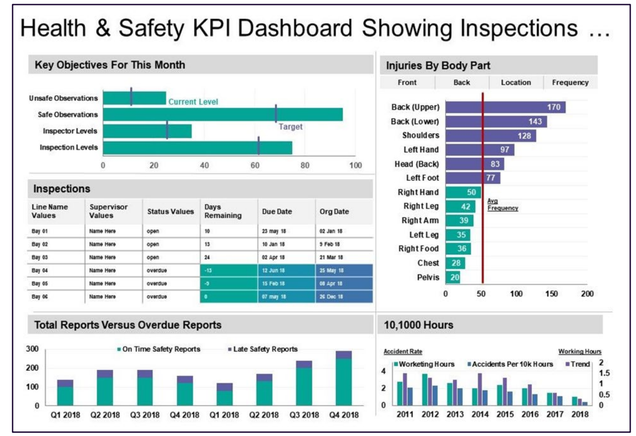
DISCOVERING SAFETY

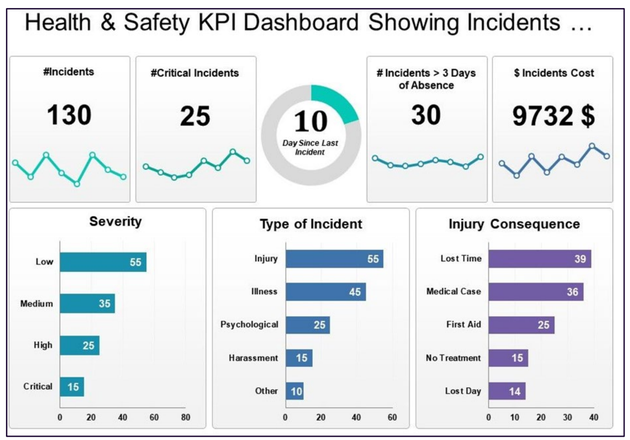
Work with designers, contractors and clients on construction projects –

Dynamic tracking of H&S performance across project work schedules

Traditional approach – tracking of KPI's statically

- scheduling and carrying out of inspections, audits and investigations
- associated findings and corrective actioning closeout
- carrying out of senior leadership team site tours
- carrying out of point of works briefings and toolbox talks
- review and sign-off of risk assessments and method statements
- carrying out of occupational health surveillance and subsequent specialist referrals
- delivery of health and safety focused training and instruction



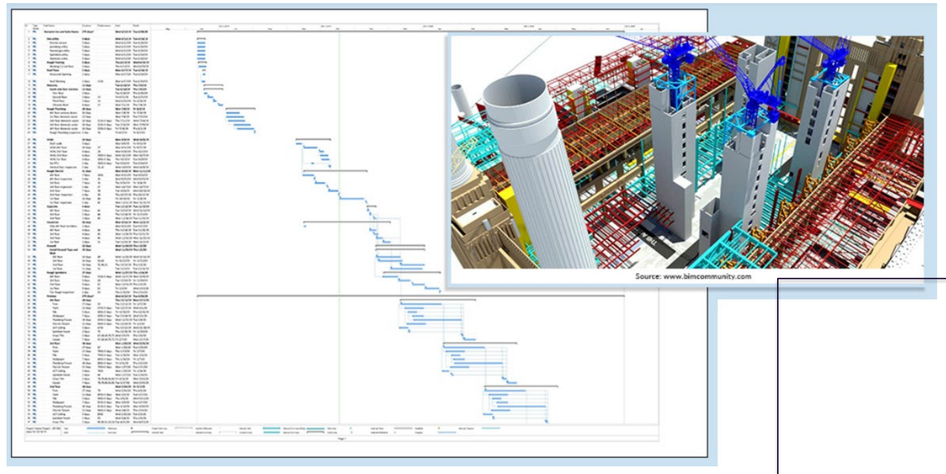


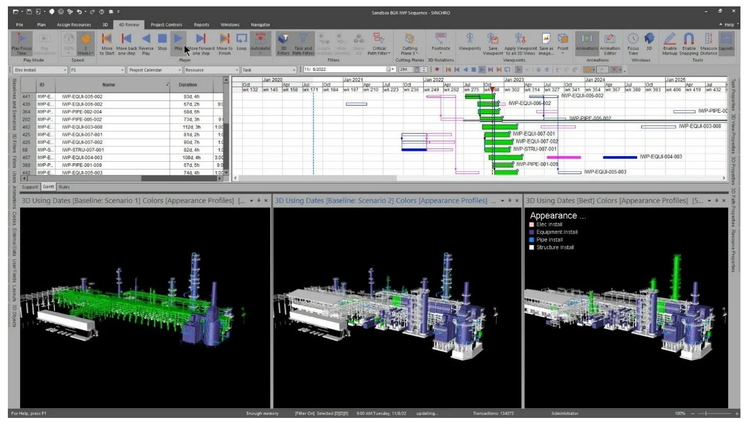
DISCOVERING SAFETY

Work with designers, contractors and clients on construction projects –

Dynamic tracking of H&S performance across project work schedules

Something more dynamic?





Construction Phase

e.g.

	Site clearance t1	Excavation works t2	Foundation works t3	Steel erection t4	Form & pour concrete, floors, roof t5	Masonry work t6	etc.
Risk scenarios Risk treatments & controls Assurance of treatments and controls using KPI's							

Link KPI's tracked to work schedule and track dynamically

DISCOVERING SAFETY

Work with designers, contractors and clients on construction projects –

Dynamic tracking of H&S performance across project work schedules

Example –

Leading indicators for "Install rebar" work task

Desired safety outcomes for key risk treatments and controls:

- No unguarded rebar ends

Linked lagging indicators:

- No of unguarded rebar ends observed on inspection as a ratio of total area inspected

Critical elements of risk treatments and controls:

- Specification of scope and frequency of rebar works inspection, coverage in RAMS, toolbox talks, training and instruction linked to rebar works **planned**
- Rebar works inspected within specified period, toolbox talks, training **delivered**
- **Faults fixed** within specified timescales, repairs and improvements meet plant design standards

Linked leading indicators:

- Quality assessment of RAMS for install rebar, relevant toolbox talks, staff training, inspection of works, all carried out as scheduled
- Corrective actions closed out within specified time periods

DISCOVERING SAFETY

Work with designers, contractors and clients on construction projects –

Use of predictive analytics & risk scoring to assure H&S performance on projects

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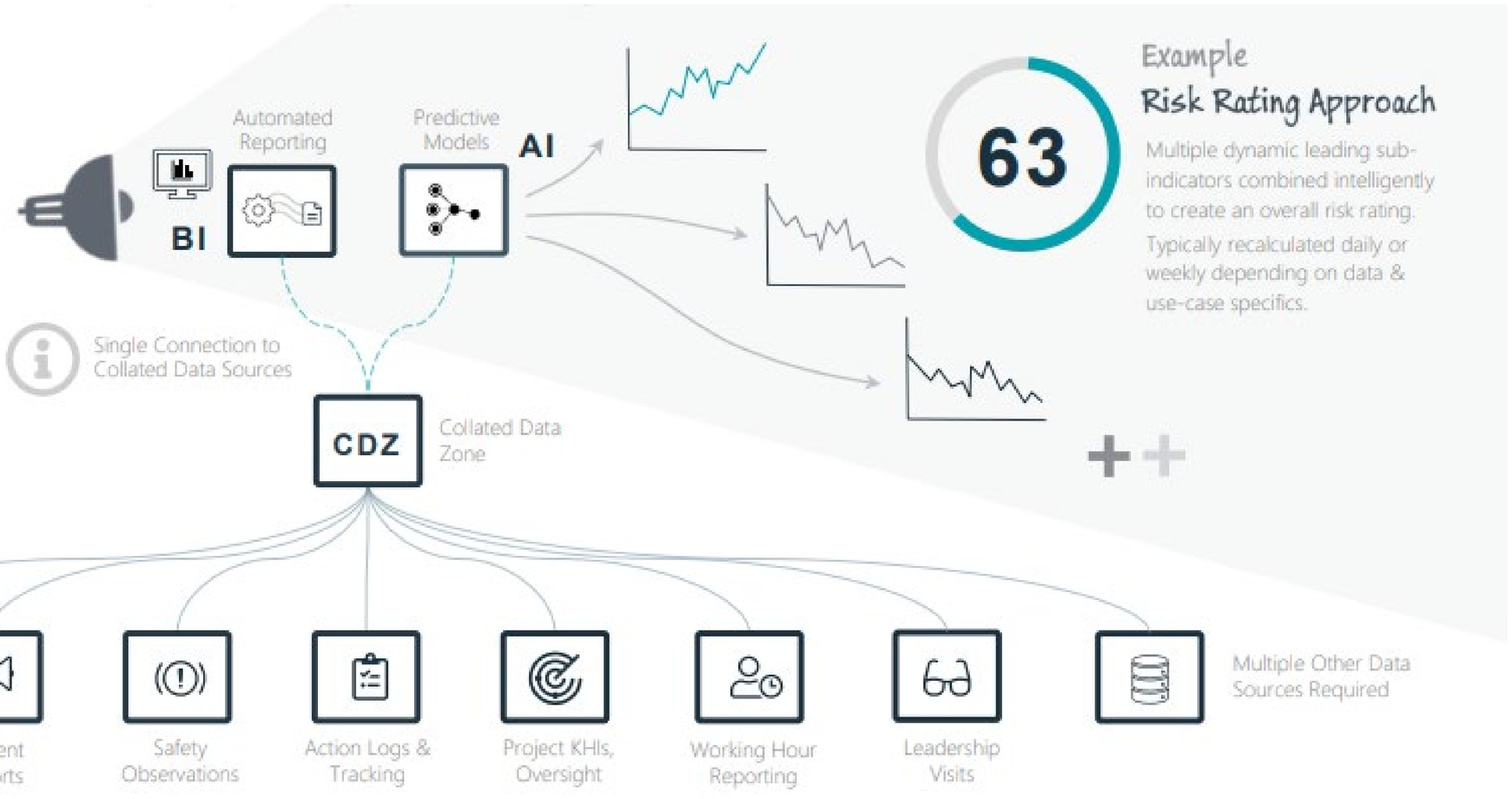

DISCOVERING SAFETY

Ways of getting involved with Discovering Safety

Health and safety leading indicators

Text mining

Safetytech

Design risk treatments

Contribute to project communities of practice

DISCOVERING SAFETY

Share routine health and safety data

Microsoft Azure

Construction

Pilot project outputs

New industry challenges

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