WASTEMINZ CONFERENCE - JUNE 2025

AI and worker engagement

Improving safety outcomes in sites with dynamic risk.

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ENVIRO NZ

Improving safety at dynamic sites

We acknowledge the loss of a life in our care and commit to ensuring their story shapes a safer future for others.

- **Dynamic sites** are where the hazards and work activities are known, but the hazardous situations that arise, or when present in the workplace, from the plant and environment are constantly changing.
- Opportunity for **research and learning** into dynamic work sites using emerging technology.

Visual Artificial Intelligence

Develop and implement tools for worker engagement and assessing risk at dynamic work sites

Visual Artificial Intelligence (VAI) Trial

Can VAI inform better worker engagement?

VAI Technology

Mobile AI

- Loader mounted cameras with VAI firmware

Fixed/ Static AI

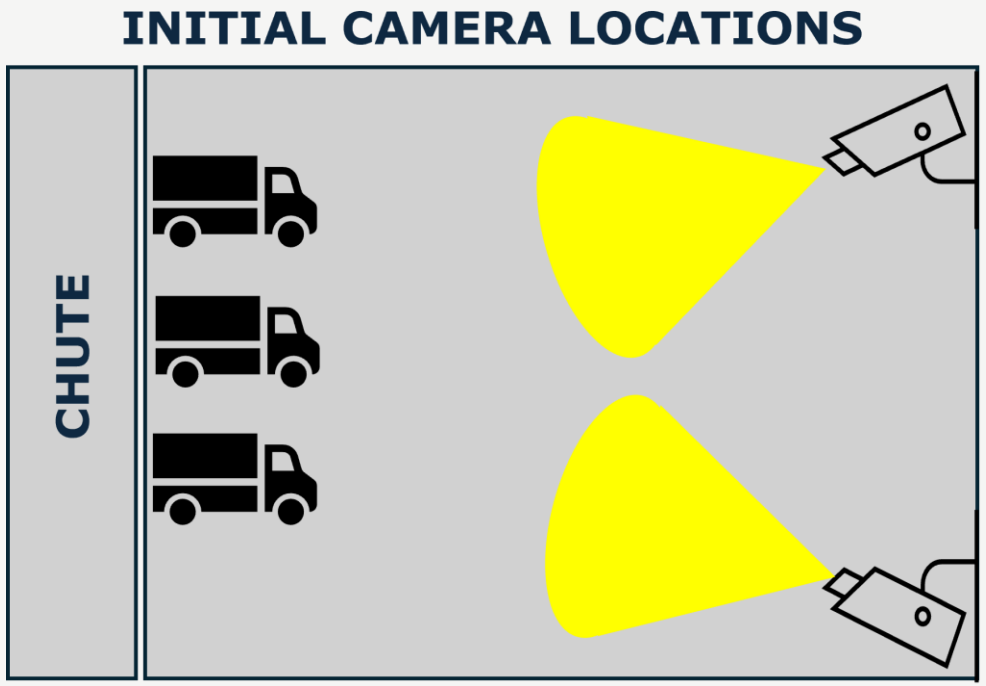
- Pole mounted cameras with AI software overlaid

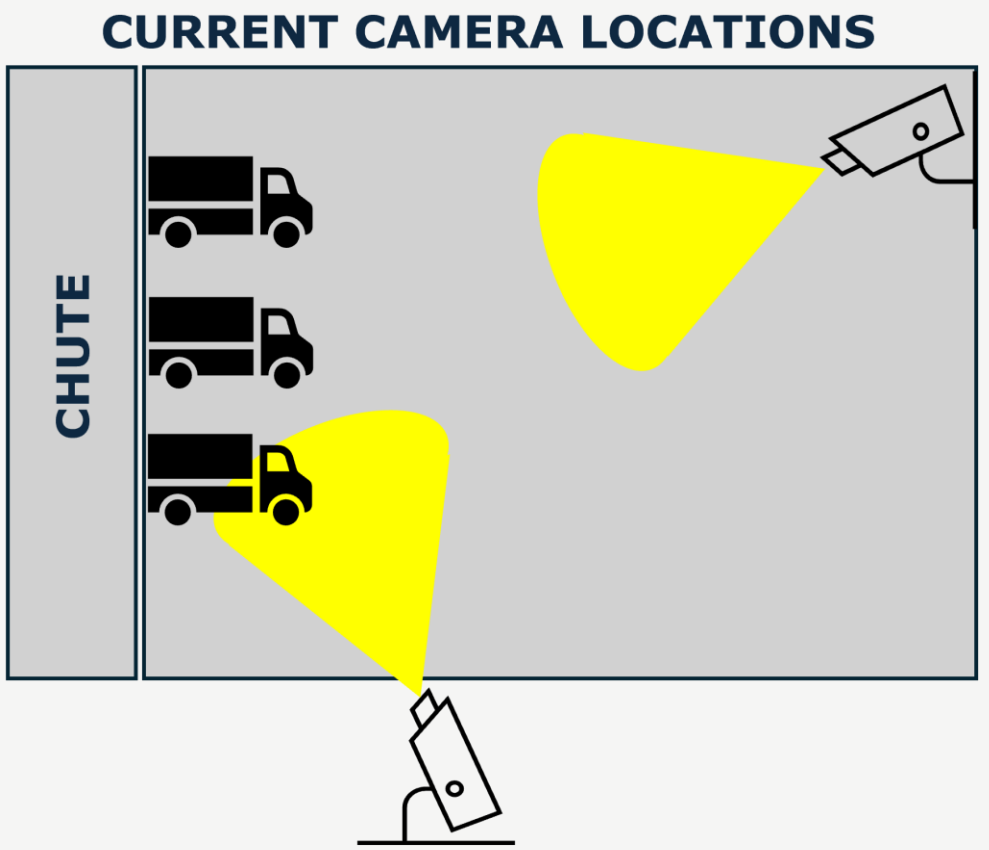
A Journey of Development

Mobile AI

A Journey of Development

Static AI





A Journey of Development

Static AI

VAI Trial Outcomes

VAI Challenges

- **Hardware:** Robustness, moisture, camera positioning
- **Firmware:** False detections, manual updates, connectivity issues, cyber security.
- **Worker perception:** Confidence in the system, ‘big brother’ concerns.

VAI Learnings

- **AI is just another tool/ layer of control**
- **Conservatism in high-risk environments**
- **Planning for failure**
- **Better understanding of worker behaviour**

VAI Comparative Study

Hampton Downs facility

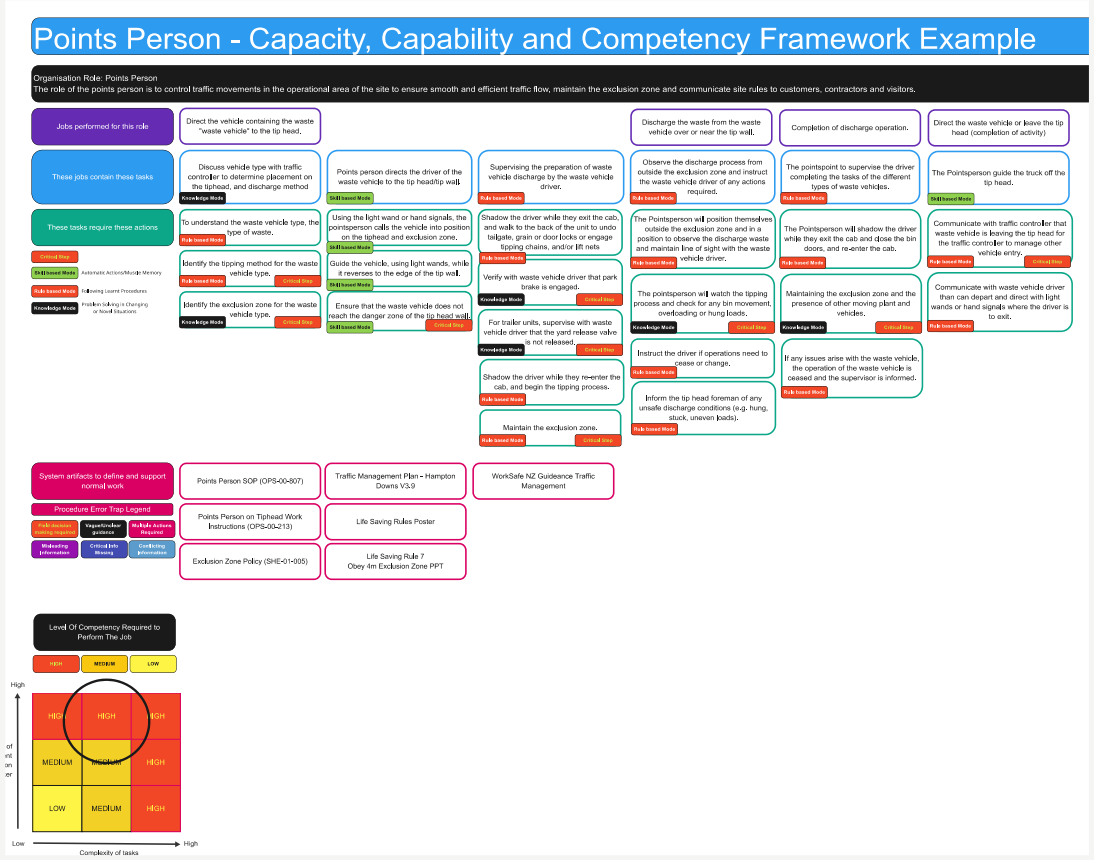
- ✔ VAI trial
- ✔ Worker Competency Evaluation
- ✔ Worker Engagement

Pokeno facility

- ✘ VAI trial
- ✔ Worker Competency Evaluation
- ✔ Worker Engagement

Worker Competency

Risk Based Competency Framework



Competency Framework

Identify Work Activity, Steps and Actions in Work

↓

Identify the Critical Steps in the work (when workers are close to energy)

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Identify what human performance mode workers have to operate in

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Look at system that supports work to validate match against performance mode

↓

Evaluate Level of Competency to perform the job

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Worker Engagement Tool

4Ds Tool: Worker Insights for Work as Done

DUMB

Drivers reversing into blind spots without a signal

DANGEROUS

Shrapnel from compressed materials

DIFFICULT

Trying to operate safely while working in high wind and dust

DIFFERENT

Working around breakdowns with temporary solutions

+ 5D: Delightful!

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Framework

Daily Toolbox Meeting

Capture daily narratives: 4Ds

↓

Safety Committee Meeting

Review safety themes and identify recurring issues

↓

Learning Team Sessions

Deep dives into issues following LEARN > SOAK > SOLVE

↓

Monthly Tailgates

Feedback insights and learnings

Worker Engagement Tools

"We now feel they [management] have our back, before we were just told what to do"

VAI Comparative Study

Visuals of VAI detections gave **greater context** to situations and risk, and can be used as a complimentary control

However, **worker engagement** at both sites proved to be the key to better understanding dynamic work

Industry Project – Understanding dynamic risk

Redesign worker engagement and participation

3 industry participants

Capturing worker stories.

Building worker critical analysis and thinking skills.

Helping PCBUs better understand dynamic risk.

Can we improve visibility over WAI v WAD?

Value of amplifying the frontline voice?

Worker Engagement - STKY

Purpose: Building worker critical analysis and thinking skills

Methodology: Stuff That Can Kill You (STKY) Framework

Identify a STKY
Share work stories using the 4Ds

→ **Explore what keeps workers safe in WAD**

→ **Explore frequency of STKY and work factors**

→ **Explore use of rules and guidance**

→ **Reflect on a potential if situation was different**

→ **Reflect on learnings and what workers believe creates safe work**

Example: Hazardous Waste (nail gun cartridges, lithium batteries, ammunition, flares, CO_2 canisters, paint spray cans)

Hazardous products are dumped into general waste

→ *Inspecting general waste, sorting out hazardous waste and using loader to move to right areas*

→ *> 10 times in the last 3 months*

→ *Workers do not use the rules, and make up new rules*

→ *Can become a projectile (could hit someone) or explosive*

→ *Need to let the team know what this means for the operators*

What did we learn?

- Workers will share more when **psychologically safe** (learn vs blame)
- **Storytelling** (4Ds/STKY), when informal or facilitated, offers a powerful lens into work as done (weak signals) and emerging risk patterns
- Worker-led innovation and informal adaptations are **learning opportunities**, not indicators of system weakness.
- Rules need to be **flexible** to allow knowledge to manage dynamic risk.
- **Trust, peer support, teamwork and humour** play central roles in maintaining safe outcomes under pressure for workers.
- **Feedback loop** is important for continued worker engagement.

Dynamic Risks

Purpose: Helping PCBU to better understand dynamic risk

Methodology: Visual Risk Mapping Framework

Identify Work Activity, Steps and Actions in Work → **Identify the Hazards and Energy in Work** → **Identify Hard/Soft Controls for managing energy** → **Identify when decision making is required for work to go well**

Dynamic Risks

Mapping of Work and Dynamic Risk

Work Activity:		What are the high level activities to complete the work
Steps in Activity:		What are the related activities in the order the steps are taken to complete the task
Actions in Step:		What actions are required to complete the steps.
Hazards/ Energy Present:		
Hard Controls Present:		Controls Energy without human influence.
Soft Controls Present:		Controls Energy with human influence.
Field Based Decision Making:		Rely on worker decision-making for the control or work to be safe.

Industry Engagement Tools

"We are now innovating in work design to change the dynamic nature of risk."

"4Ds and STKY allows use to see the weak signals in normal work."

What did we learn

- The difference between Work As Imagined and Work As Done is **reality** for dynamic work environments.
- Traditional hazard management is **not sensitive to identifying the complexity of work** with dynamic risk.
- Harnessing the **knowledge of workers**, using 4Ds and STKY allows us to see and understand the dynamic nature of the work.
- Building worker knowledge **improves their critical thinking around dynamic risk**.
- Use **work design** to change the dynamic nature of risk.
- Changed how we see risks, and that can be **uncomfortable at times**.

Final reflections

- Our journey took us to a different destination
- Openness – no egos in the room
- Trust and communication is vital
- Embrace diversity of thinking
- Better work design leads to safer work. Safer work leads to better work
- Co-construct outcomes - We learn from doing safety with people
- Systematic approach

Questions?

Enviro NZ will publish reports relating to the VAI and Dynamic Risk work on the WasteMINZ website.

Please register your interest by emailing EU@environz.co.nz.