INDUSTRY CASE STUDY ON THE ENVIRO NZ ENFORCEABLE UNDERTAKING

Prepared by Brent Sutton

EU Project Architect
brents@learningteamsinc.com
July 2025

Acknowledgement

Enviro NZ Limited was granted in November 2022 an Enforceable Undertaking (Section 123 of HSWA) in relation to the death of a worker on 16 March 2020[1].

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

He taonga kua ngaro

[1] https://www.worksafe.govt.nz/laws-and-regulations/enforceable-undertakings/accepted-enforceable-undertakings/envirowaste-services-limited/

Table of contents

Introduction

Enviro NZ operates one of New Zealand's most extensive landfill operations and resource and recovery centres at Hampton Downs located in the North Waikato Region. Landfill operations and the environment is always changing, and these dynamic and complex conditions contributed to a fatal accident in March 2020, prompting Enviro NZ to undertake an Enforceable Undertaking (EU) focusing on improving workplace safety in dynamic risk environments.

Initiated in November 2022, this programme targeted safety enhancements at the worker and industry levels and offered community wide safety learning opportunities. The EU deliverables consisted of four parts:

1. Project to apply safety improvement opportunities for workers and the workplace across two Enviro NZ sites, including the development of tools.
2. Project to develop and apply tools for three waste industry organisations and their workers, for:
    a. The organisations to better understand their dynamic risks
    b. The workers to gain more knowledge and skills (critical analysis and critical thinking) when working with dynamic risks.
3. Programme for learning and innovation opportunities for the waste industry and wider safety community.
4. A community programme to fund and expand youth alcohol and drug programmes in the Waikato region and scholarships for adolescent drug and alcohol practitioners in the Waikato.

This report looks at:

- Project to apply safety improvement opportunities for three waste industry organisations and their workers
- Programme for learning and innovation opportunities for the waste industry and wider safety community

The EU programme reflected a respectful and considered approach to learning from loss. It centres on the Points People who do the work at the landfill tiphead and at the refuse transfer station, the systems that support them, and the collective responsibility to ensure work is as safe as it can be.

It highlights the importance of worker engagement, participation, and representation, as well as workers building knowledge and skills.

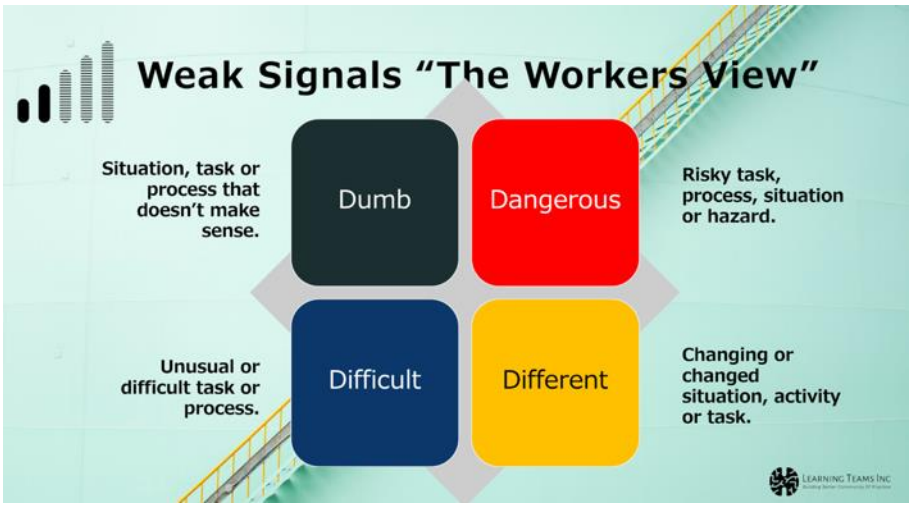
Additionally, it promotes organisations' better understanding of the changing and dynamic nature of risks in the waste industry, and how to learn and improve work practices and safety by viewing workers as a solution.

Summary of Learnings

1. **What We Plan Isn't Always What Happens**

   Learning: There's often a big difference between how we think work happens and how it gets done.

   Try This: Use the 4Ds tool to ask workers what feels "Dumb, Dangerous, Difficult, or Different" in their job. It will show you where rules don't match reality and help you support safer work.



2. **Workers Know What's Really Going On**

   Learning: Workers have smart ways of managing risk, but we don't always hear their stories.

   Try This: Start a conversation using the 4Ds or STKY (**S**tuff **T**hat can **K**ill **Y**ou) tools. Just ask, "What helps you stay safe?" or "What's something that didn't make sense this week?" You'll hear useful ideas to make work better.

3. **People Share More When They Feel Safe**

   Learning: When workers trust that they won't be blamed, they open-up and share what really happens.

   Try This: Ask questions in a calm, open way. For example, "What nearly went wrong but didn't?" or "What helped you make a good call today?" Over time, these questions lead to real learning and better decisions.

4. **Not All Risks Are on Paper**

   Learning: Dynamic risks—like weather changes, broken gear, or public behaviour aren't always in the safety plan.

   Try This: Ask during a pre-start: "What's different today?" or "What might change how this job plays out today?" These small questions help your team stay alert to changing risks.

5. **Frustration, Stress, Pressure Are Real Risks Too**

   Learning: Frustration, stress and time pressure, can lead people to take risks or skip steps.

   Try This: Ask, "Where in the work do you get most frustrated?", "What made the job difficult or hard yesterday or today?" or "Where did you feel rushed or under pressure?" This helps bring hidden risks to the surface and shows your team you care about their wellbeing.

6. **Simple Tools Make a Big Difference**

   Learning: The 4Ds and STKY tools helped teams talk more openly and spot issues that weren't showing up in audits or paperwork.

   Try This: Choose one tool, like the 4Ds and use it in a morning toolbox meeting or team talk. Keep it simple. You don't need a big program to get big insights.

7. **Leaders Who Listen Learn More**

   Learning: When leaders show curiosity, not just check for compliance, people are more likely to speak up.

   Try This: Ask, "What did we expect to happen today, and what actually happened?" It's a powerful way to shift the tone from blame to learning.

8. **Little Changes Make a Big Impact**

   Learning: The biggest improvements came from small actions, like one good conversation, or tweaking a confusing rule with the team.

   Try This: Try one change this week. Run a short 4Ds check-in, ask a worker to help redesign a checklist, or listen to a STKY story. Small wins build a stronger safety culture.

9. **You Can Start Today**

   Learning: You don't need permission, a new system, or a big budget. The tools work best when they're used regularly and informally.

   Try This: Just start. Pick a 4Ds card, ask a STKY question (see Appendices), or walk the job with a worker and ask, "What's tricky about this?" It's a simple way to learn and improve, one conversation at a time.

These learnings underline the value of talking with workers to gain their experiences, about how dynamic work is always changing and how they adapt to operational realities, fostering a safety approach rooted in understanding, care and collaboration.

This case study provides learning insights from the EU and this document can be freely shared with others across the waste industry sector, contributing to a wider conversation about safety in changing and dynamic environments.

As the author, I thank all the workers, supervisors, safety practitioners, managers, senior leaders and industry leaders who participated in this project and for sharing your stories, learnings, and experiences.

Thank you for your mahi.

Brent Sutton
EU Architect

How to read and apply these learnings from this report

Whether you are a small, medium, or large operator in the waste industry or any industry where:

- What people do at work changes, or
- The work environment or site conditions change, and
- The work has risks that can take your life or change your life

Then this report will be helpful to learn about and better understand these types of risks (called dynamic risk) in normal everyday work, and how we can tap into the very people who face these risks every day to improve work, operations, and safety.

Don't be overwhelmed by the problem; it is the small changes that we can make that matter.

By reading this report, we hope to spark your interest. You will find in this report;

- What we did
- The tools or systems that were developed and used
- What we learnt by using them, and
- What we encourage you to try out for yourself.

Just try one of the tools (like the 4Ds) and see what you learn. Be curious about this; it may feel uncomfortable to begin with. You will find that how you thought work was being done, or how you believed risk was being controlled, is not as good as you think.

Think of that as an opportunity not a threat. I am reminded of a Japanese saying in quality and operations,

"Fear the Green—Embrace the Red"

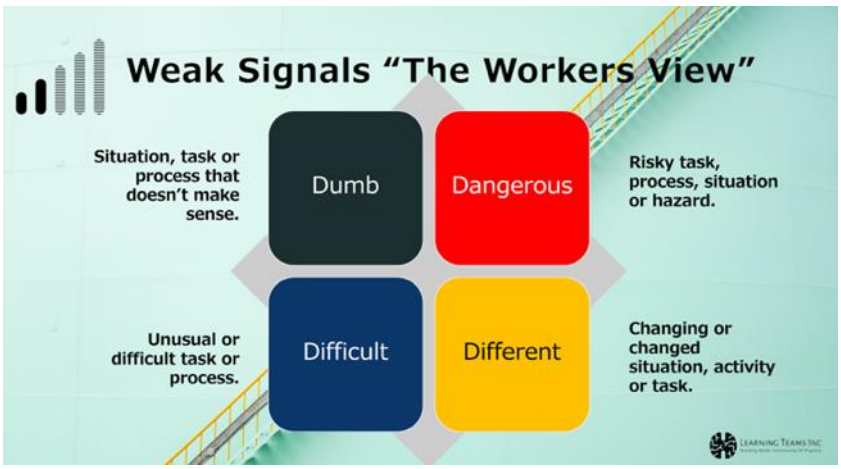
This translates to not accepting that everything is good because nothing is going wrong. It is symbolic of the watermelon, which is green on the outside and red in the middle. We need to open up the watermelon to see the red. The red is not bad; the fact that the risk is dynamic and can kill you means it will always be red. It is leaning into that red and being curious and learning that shows you how and why.

By understanding the red, we can make changes to manage it better and support people in making work go well, every day.

Understanding doing safety differently language

During the EU programme, tools and language was used that differs from traditional safety contexts. The table below provides a plain English explanation of the tools and the language.

4Ds	A worker engagement tool that allows workers to share stories about work, and what helps work to go well and what hinders work and where risk is present. The 4Ds stands for: • **Dumb** – Stories when the safety systems, rules, or ways of working didn't make sense or frustrated them? • **Dangerous** – Stories when work didn't feel right, felt unsafe or was more challenging than it should have been? • **Difficult** – Stories when work felt harder than it should have been or more demanding? • **Different** – Stories when work was different from usual, changing or surprising?



Dynamic Risk	Dynamic risks are the risks that can change throughout the day. And if a worker is exposed to that dynamic risk, it can cause a life-changing or life-altering event.
Field Based Decision Making	Certain times when working, where workers are having to problem solve or make decisions which could expose them to harm if the wrong decision is made.
Hard Controls	Risk controls that manage energy from harming workers and are not reliant on humans for them to work.

Psychosocial Risks	**Psychosocial risk refers to anything at work that can affect a person's mental health. It's about how the work environment, relationships, and pressures on the job can lead to psychological harm or make someone feel unsafe or unwell.**
Psychological Safety	When workers feel safe to speak up, ask questions, share ideas, or admit mistakes, be acknowledged and respected without fear of being punished or humiliated.
STKY	Stuff That can Kill You. These are risks that can cause death, or major harm. They can be physical, harm to health or mental harm.
Soft Controls	Risk controls that are reliant on humans to use as designed.
Work As Done	Is how work **really** happens in real life. It includes the adjustments, workarounds, and decisions workers make to get the job done in real-world conditions—often under pressure, with missing tools, or when things don't go as planned.
Work As Imagined	Is how the organisation and leadership **think** work happens. This could be managers, planners, or people writing procedures. It's what's written down or assumed—how the task ***should*** be done under perfect conditions.

Better understanding dynamic risks

Better understanding dynamic risks

Introduction to dynamic risks

Dynamic risks are the risks that can change throughout the day. And if a worker is exposed to that dynamic risk, it can cause a life-changing or life-altering event.

Dynamic risks are not always the same every time you do a job. They can pop up when:

- Something is different from usual (like a new worker, different weather, or a busy day),
- Work needs to be done quickly or under pressure, or
- Something unexpected happens, like equipment not working right, a hung or stuck load on a truck, or the public acting unsafely (public scavenging for waste at a refuse transfer station with loaders operating).

These risks are harder to plan for in advance, because they don't always show up in the safety paperwork. Examples of dynamic risks:

- A new truck driver doesn't follow traffic flow on site
- Wet weather makes slopes slippery for mobile plant operations
- Wind picks up and rubbish starts flying or the rear doors on a truck fly open
- Ground conditions become boggy and trucks start to lean when raising their trailers
- A bin is overweight and lifts unevenly
- A bins doors are pressurised from the weight behind it making it difficult to open
- A truck can't discharge its load (becomes hung or stuck) and a digger has to be used to clear the load
- The site is unusually busy after a public holiday, trucks are queuing and drivers are getting frustrated

In short:

Dynamic risks are the shifting risks that show up during normal work. Workers are often the first to spot them — and talking about them together helps everyone stay safer.

What we did – The initial engagement with stakeholders

We engaged with three waste companies—Leach & Co, Midwest Disposals, and Northland Waste—to look at how they manage the risks that can change during the day, such as adverse weather conditions, challenging public behaviour, or pressure to complete the job quickly.

The aim was to learn more about how everyday work really happens and how workers stay safe, especially when things don't go to plan. This wasn't about ticking boxes—it was about learning from the people doing the work.

First, we met with each company's team—leaders, workers, and health and safety reps. We talked through how they currently handle risks, what systems they use, and how they involve their teams.

We spent time on-site, listening to workers share their stories. We asked simple but powerful questions like:

- What could kill or seriously hurt you here? (We called this "STKY"—Stuff That Kills You)
- What helps you stay safe?
- When does work feel dumb, dangerous, difficult, or just different?

These conversations helped us understand not just the paperwork, but how safety really works on the ground—what people rely on, what gets in the way, and how teams help each other out when things change quickly.

We also looked at how sites plan the day, how teams talk about risks, and what happens when someone raises a safety concern. By the end, we had a clear picture of what's working, what's not, and what each organisation can build on moving forward.

The engagement forms we used are in Appendices 1 and 2.

Leach and Co	Midwest Disposals	Northland Waste
Transfer Station	*Landfill Operation*	*Transfer Station*
Landfill Operation	*Commercial Operation*	*Landfill Operation*
Public-Commercial Operation		*Public-Commercial Operation*
Wellington	Manawatu	Auckland/Whangarei

What we learnt from the stakeholders

Analysis of how the organisation viewed their risk approach

We found different approaches to how risk was managed across the four categories of:

1. Review of risk and controls
2. Risk participation approaches for workers
3. Risk and pre-start work planning
4. Review of lessons and feedback loops on risk

There were similarities across the stakeholders, such as:

- Daily or frequent planning sessions or conversations to manage day-to-day risks.
- Methods for worker engagement and participation, ranging from informal chats to formal H&S reps and digital systems.
- Auditing or verification of risk control effectiveness in various ways and how often.

The differences between them were

Category of difference	*Range of difference*
Understanding of dynamic risk	• Limited conceptual understanding; high instinctive awareness. • Moderate understanding; working on better identification of critical risks. • Strong understanding; formal critical risk process embedded.
Worker Representation	• Small team, everyone participates. • H&S reps and formal systems (committees). • Formal H&S reps, training pathways, committee governance.
Feedback and Learning Approach	• Strong informal culture, daily reflection. • Formalised monthly sessions, safety observations, audits. • Mixed — formal H&S committee and high informal leadership engagement.

Analysis of how workers see the organisation's risk approach

There were similarities in how workers saw the organisation's approach to risk and engagement, such as:

- The role of public and third parties as a risk.
- Trust in other workers.
- How work and the presence of risk is constantly changing.
- How they communicate with each other and management.

The differences between how the workers view this were:

Category of difference	*Range of difference*
Engagement format	• Informal daily chats; no structured reviews. • Ad-hoc communication with supervisor, monthly meetings. • Structured 1-on-1 learning sessions; morning debriefs.
Trust in leadership	• Mixed; trust varies depending on the person. • Trust in team is high, but minimal formal review. • Strong and consistent; leadership is visible and engaged.
Review of work	• No structured reflection; rely on experience and adaptability. • Monthly ops meeting, no regular reflection. • Daily reflection on what worked and what didn't work.
Raising safety issues	• Sometimes leads to investigations and drug testing, creating fear or resentment. • Goes to branch manager; reviewed in toolbox meeting. • Encouraged; responded to quickly and visibly by leadership.
Support from the organisation	• Mixed response; investigations can feel punitive. • Small team, informal but responsive to issues raised. • Leadership champions learning and open discussion; no stigma around asking for help.
Worker contribution to the team	• Trust affects willingness to contribute; informal more open. • Contributions are on familiarity/flow rather than structure. • Workers are encouraged to speak, leadership often initiates.
Training and experience	• Training noted but stress/frustration with external pressure. • Relies on experience, informal learning, and peer support. • Emphasis on coaching, buddy systems, long-serving staff.

Some of the interesting 4D stories about work, engagement and risk were:

DUMB: Work rules or systems that don't make sense.

- "It's people who come in and act like the rules are suggestions." (public & drivers ignoring signage /rules)
- "Drivers don't know how to reverse, keep hitting concrete blocks." (third party operators)
- "Deciding when to shut the tip head with high winds...different readings at the tip head and weighbridge."
- "Public can't seem to follow rules." (e.g. public not respecting safety zones or instructions)

DANGEROUS: Situations that feel unsafe or gut-level risk awareness.

- "White knuckle" moments on new tasks or machinery.
- "One day I was picking up a sludge bin...it was way overweight... the back wheels of the truck came off the ground."
- "Drivers shunt truck/trailer if load sticks."
- "Poor lighting on tip head for morning operations."
- Drivers exiting tip head when trailer bin is still lowering."

DIFFICULT: Tasks that are harder than they should be due to system design, resources, or human interaction.

- "Impatient, argumentative truck drivers."
- "Weather, particularly wind."
- "Coming in after a previous operator hadn't compacted material properly."
- "Drivers frustrated on short logbook hours... builds up our own frustration."
- "Access to digger when load gets stuck and drivers start getting angry."

DIFFERENT: Work that unexpectedly deviates from the norm and increases uncertainty.

- "After a public holiday, it's chaos... everyone turns up at once."
- "Tip face is different every day."
- "Weather changes behaviour and traction."
- "Doesn't take much wet weather for mud bog to happen."
- "Type of waste always changing."
- "We use our mobile phones, not RTs."
- "Hand signals used instead of formal comms."

Initial Analysis of shared dynamic risks

The four common dynamic risks associated with the stakeholders were:

Risk	Present in Work	Likely Harm - STKY
Workers on foot being crushed or struck by mobile plant and equipment.	• Directing trucks on landfill. • Working around moving plant in a transfer station.	Physical harm/death
Being struck/crushed or engulfed by discharged waste or being struck by flying waste.	• Directing the discharge of waste on the tip head.	Physical harm/death
Potential landslips/rollovers of mobile plant while working on inclines and declines in the landfill.	• Operating mobile plant on the landfill	Physical harm/death
Hazardous Waste (Gas bottles, Batteries and Chemicals and exposure to Asbestos) at transfer stations	• Illegal or unknown dumping of hazardous materials by the public and where workers operate.	Harm to health Physical harm/death

How the organisations managed those risks, varied, and the main ways they managed them were a mixture of:

Safe Work	Safe People
• Physical barriers to prevent mobile plant from accessing areas with workers on foot • Engineered/Isolation controls on mobile plant (ROPS/FOPS	• Behavioural controls/rules such as distance-based exclusions zone • Administrative controls such as beacons, lighting, reversing sensors, audible alarms, and rear cameras • RT communications, hand signals, and light wands • Administrative controls such as signs, traffic management plans, and traffic controllers (points person) • PPE controls such as Hi-Viz, hard hats, safety glasses, gloves and steelcap footwear.

There was a high reliance on administrative/behavioural controls for managing these risks. By the end of this, we had a good understanding of how risk is recognised and managed on the ground, setting the scene for the next stage.

What we learnt from this initial engagement

1. Daily planning talks (toolbox talks, whiteboards, informal chats) are the strongest and most consistent risk management activity across all sites.

2. All three organisations recognised critical risks, but their maturity levels differed.

3. Workers often manage risk through experience (tacit knowledge), peer trust, and adaptability, rather than relying solely on formal rules.

4. Rules and systems didn't always make sense to workers (DUMB), and sometimes created frustration, stress, or fear (e.g., investigations after reporting).

5. Leadership visibility and their response to safety issues influenced trust and worker contribution.

6. Systems for feedback and learning ranged from daily chats to monthly reviews, some were informal, while others were formal.

What learnings can you apply from the engagement

Using the engagement tools in Appendices 1 and 2 will support you to:

- Understand why worker insights are powerful and how asking open and curious questions (such as the 4Ds or STKY) reveals the workers' real-world challenges and improves understanding of risk for both the organisation and workers.

- Find the gap between "Work as Imagined" and "Work as Done." Allows the change process to start.

- Understand why workers must adapt and use informal systems to compensate when the formal system falls short.

- Initiate a conversation on how to implement small changes at work that enhance worker engagement, improve the design of work, or the controls and help them avoid or manage risk.

What we did: Developed and implemented a methodology to better understand dynamic risks.

We built a tool to help people understand how work actually happens (not just how it's documented in procedures) and where dynamic risks, those that could lead to life-altering harm, might emerge as conditions change.

The tool is called "Visual Risk Mapping" and it mapped:

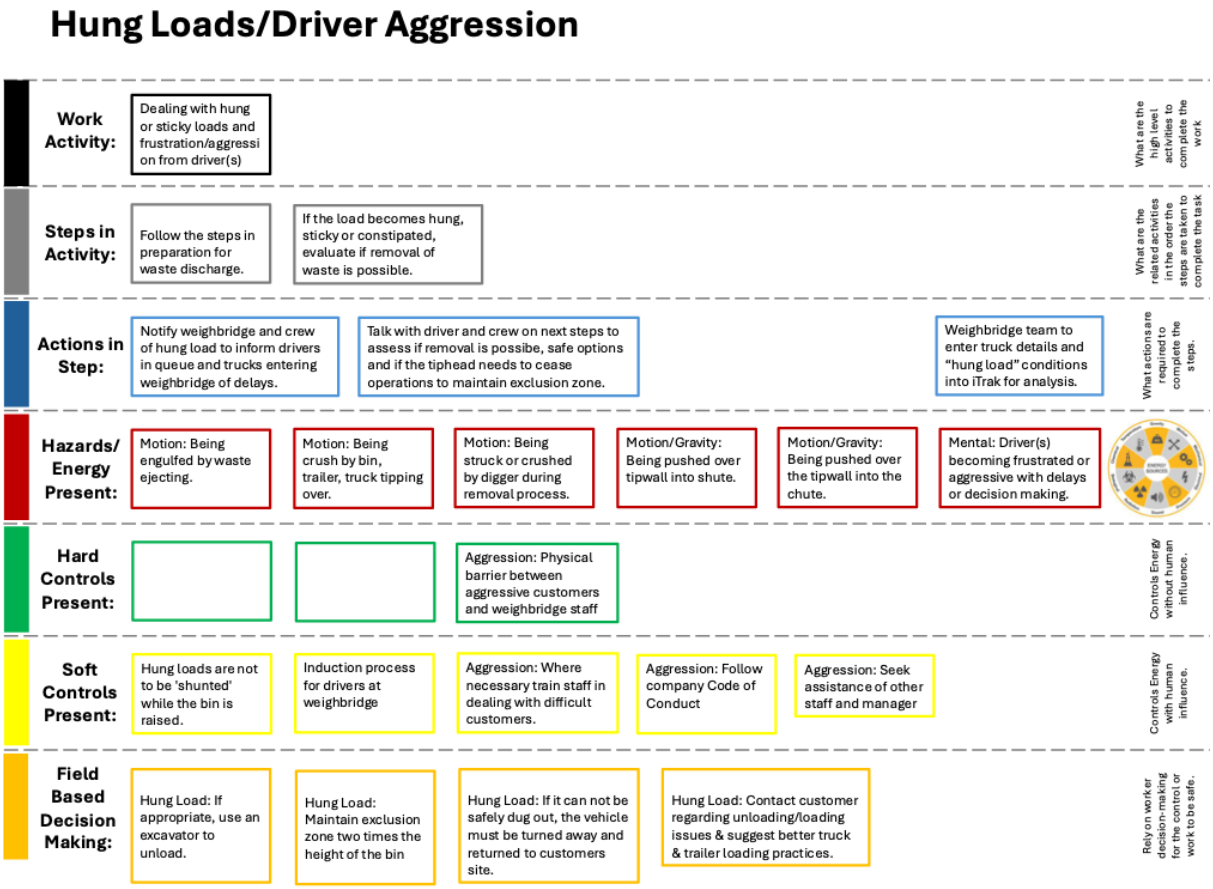
- What tasks are being done (broken down by work activity, steps in the activity, and actions in the step) in the work
- What hazards or energy are present in the work tasks.
- What controls are in place that directly manage the hazard and energy (Hard Controls).
- What controls are in place, which rely on human judgment to work (Soft Controls).
- Where workers are required to problem-solve in real time (Field based decision making).

We then took the information from the previous 4Ds activity to map out the risks.

An example of traditional information looked like this:

Dynamic Risk	Work Activity	Physical Harm Type	Risk presence found in
Being struck/crushed or engulfed by discharged waste or being struck by flying waste.	Directing the discharge of waste on the tip head and filling/compacting tiphead. Drivers/customers discharging waste on tiphead.	• Acute/Death Event	**General Risk register** Eye injury, struck by object from windblown refuse in high winds. Controlled by: • Consider first whether there is a need to be out of a vehicle in • high winds. • Body positioning relative to loose waste - keep • upwind if possible. • Consider closing tiphead if when windspeed 70kph Struck by falling waste as door opens when opening tailgate doors. Controlled by: • Hard Hats mandatory on the tiphead. • Bin or trailer doors to be opened with the door between the person and waste. **Identified by Workers**

A worked example of this visual mapping tool looked like this:



We also worked directly with frontline teams using the **4Ds conversation tool** (Dumb, Dangerous, Difficult, Different) to understand what made their work risky, frustrating, or unpredictable. And the **STKY conversation tool** to understand how risk is being managed.

We combined this information with leadership engagement to identify gaps between procedures and real-life work, to find opportunities for improvement.

The tool and how to use it are outlined in Appendix 3.

What we learnt from implementing this methodology.

1. **Most risk controls depend on people:** Information from the baseline assessment showed around 75% of controls needed workers to make the right call at the right time. This means safety often relies on tacit knowledge, good judgement in the moment, not just rules or equipment.

2. **Dynamic Risk is Different From Static Risk:** Risks aren't always fixed, they change based on weather, equipment failures, or public behaviour. Many leaders assumed rules or plans alone could control risk, but real work situations were much more complex.

3. **Workers Adapt All The Time:** Workers have to solve problems on the spot, especially when rules don't fit the real situation. These adaptations are often invisible until something goes wrong.

4. **Rules don't always work well in dynamic situations.** Workers often had to make decisions outside of the rules to get the job done safely, especially when something unexpected happened.

5. **The safety system often misses weak signals.** Workers shared stories about unclear layouts, poor lighting, changing ground conditions, and dealing with public aggression, none of which were showing up in formal systems.

6. **The 4Ds Exposed Gaps:**
    a. **DUMB**: Some systems didn't make sense to workers.
    b. **DANGEROUS**: Being exposed to physical risks were often paired with frustrations.
    c. **DIFFICULT**: Complex or unsupported tasks made work risky and isolating.
    d. **DIFFERENT**: Things changed quickly, adding pressure and confusion.

7. **Psychosocial Risk Was Hidden in Plain Sight.** Issues like aggression, fatigue, pressure, frustration, and confusion were part of daily work but weren't captured in traditional risk assessments. Psychosocial risks are present in dynamic risks. Truck drivers frustration in waiting to unload spilling over to the tiphead workers feeling under pressure to quickly resolve any delay.

8. **Leadership had mixed responses.** Some saw the value in these insights and made changes. Others were uncomfortable moving away from rigid rule based thinking. The biggest shift happened when leaders saw work through the eyes of the people doing it.

What can you apply from this approach to better understand dynamic risk

Below are six key learnings and some suggested actions you can take to kick-start your journey.

1. **Dynamic Risks Need a Different Approach**

   Risks that change throughout the day (e.g. weather, public pressure, equipment breakdowns) can't always be managed by static rules or checklists. These risks require real-time awareness and decision-making from workers, meaning your safety system must support "thinking" and "problem solving aides", not just *compliance*.

   Encourage safety conversations that focus on "what's changing today" and "what's different".

2. **Use the 4Ds and STKY to Hear the Uncomfortable Truth About Work**

   The 4Ds (Dumb, Dangerous, Difficult, Different) and STKY helped workers express where the system doesn't support them or where they must improvise. It gave voice to frustrations, unexpected risks, and daily challenges that aren't in the paperwork.

   Use short 4Ds check-ins at toolbox talks or debriefs to identify where things aren't working as imagined. Document what you learn from this feedback to start improvement. You will know the 4Ds are working when the language becomes part of the site's everyday communication.

3. **Map the Gaps Between "Work As Imagined" and "Work As Done"**

   Visual risk mapping tools helped show where workers had to make risky decisions, where controls were missing or weak, and where rules didn't match reality. This reduces blame and improves system co-design by making gaps visible.

   Pick one high-risk task. Walk it with workers and ask:

   - "Where do you make decisions on the fly?"
   - "What doesn't go to plan?"
   - "What controls rely on you just doing the right thing every time?"

4. **Most Risk Controls Still Rely on People**

   75% of controls were dependent on human action, attention, or behaviour. Nearly half required real-time judgement, often with little support.

   Review your risk register or critical task list:

   - Mark which controls depend on human behaviours (Soft Controls) and using a 4Ds conversation to find out when they work well and don't work well.
   - Mark which controls depend on problem solving or decision making and look in the procedures and training to see if the system supports this knowledge. If it doesn't, set up training to support workers to learn the knowledge required to make good decisions and effectively problem solve.

5. **Don't Ignore Psychosocial Risks**

   Workers shared stress, frustration, cognitive overload, and emotional fatigue—especially when dealing with aggressive customers, unclear rules, or impossible expectations. These affect decision-making and safety but are rarely reported as "risks".

   Start asking questions like:

   - "What's making work hard?"
   - "What pressures are you under?"
   - "Where are people being stretched too thin?"
   - "What do you rely on in these situations?

6. **Leadership Must Be Curious, Not Just Compliant**

   Some leaders embraced learning from workers. Others clung to rules and control. The organisation that grew the most asked why workers adapt, not just who broke the rule.

   Instead of asking "What went wrong?", start asking:

   - What did we expect to happen?"
   - "What actually happened?"
   - "How did people make it work?"

Using the risk mapping tool in Appendix 3 and the worker engagement tools in Appendices 4 and 5 together will support you on your journey to better understanding dynamic risks.

Workers and dynamic risks

Workers and dynamic risks

Background

This activity within the EU programme aimed to develop and implement a methodology for enhancing workers' critical analysis and thinking skills among workers facing dynamic risks.

What is curiosity, critical appraisal, and critical thinking

Curiosity – Noticing and Asking

Curiosity means taking the time to notice when something feels off and being willing to ask questions. A curious worker doesn't just say, "That's weird." They ask, "Why is that happening? Has it changed? Is this safe?"

Example: One worker noticed that tip head traffic had gotten more chaotic. Instead of just putting up with it, they asked, "Why are we reversing here now? Didn't it used to be easier?" That question led to uncovering that the layout had changed without worker input, and it was now creating blind spots.

Critical Appraisal – Does This Still Make Sense?

Critical appraisal is about pausing to ask, "Does this rule, process, or layout still work in real life?" It's checking whether our assumptions match reality.

Example: Several workers said that rules for managing "hung loads" (when rubbish gets stuck in a trailer) weren't being followed — not because they didn't care, but because the rules didn't help in real time. Instead, they were relying on teamwork and experience. This led to a conversation about whether the rules needed to evolve with input from those doing the work.

Critical Thinking – Thinking Through Choices and Consequences

Critical thinking is what workers do when they weigh up their options: "If I do this, what could go wrong? If I wait, what happens next? What's the safest choice in this situation?"

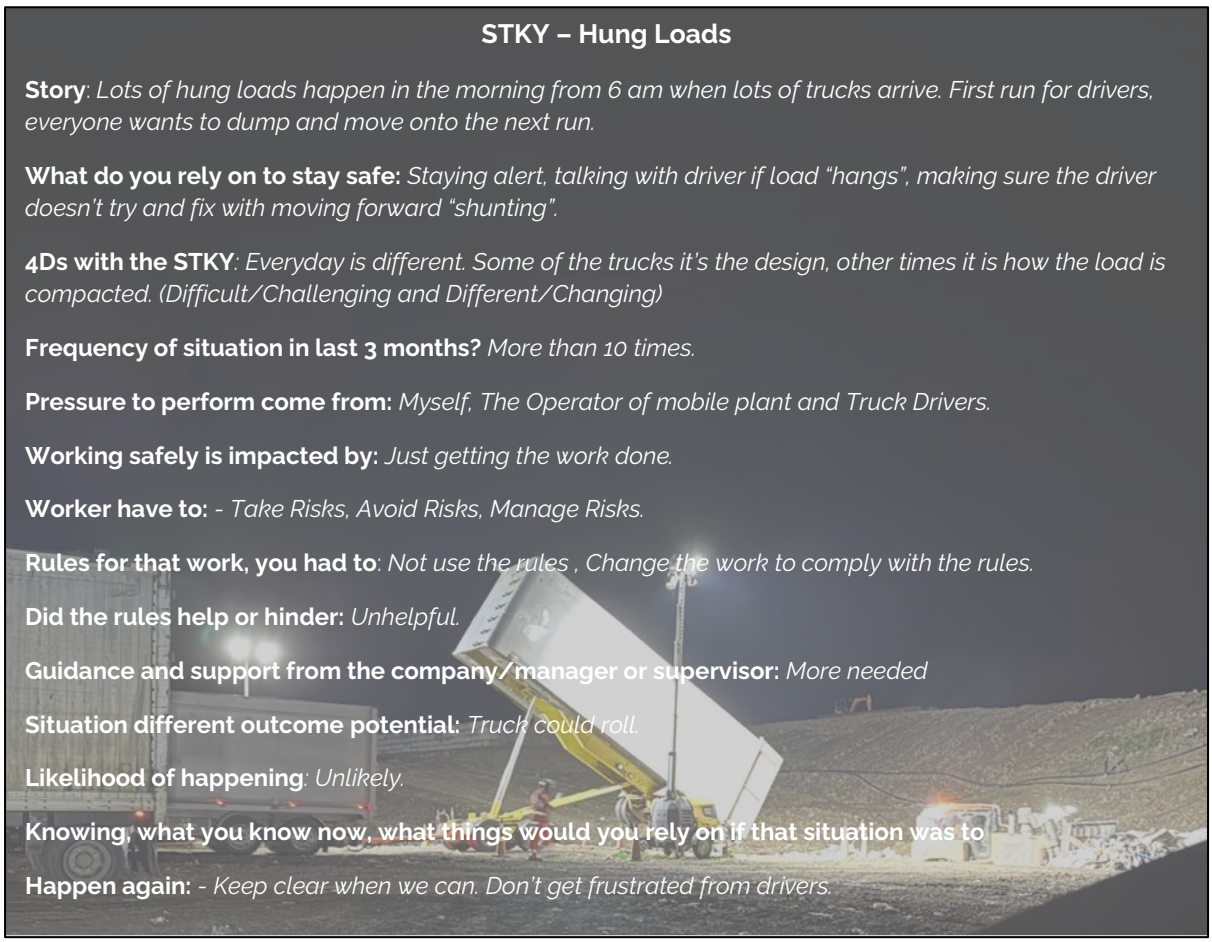
Example: During high winds, one worker saw that loose debris was flying around, but the site hadn't been closed yet. They decided to pause work and move people back, even though the job was falling behind. That's critical thinking: knowing the risk, understanding the environment, and making a safety-first decision, even under pressure.

What we did

We engaged with workers from the three stakeholders to learn from work. This included:

- Capturing 4D stories from frontline workers using paper and electronic forms.
- Running regular sessions with workers to talk about these stories and find patterns using:
    - The **4Ds**: which helped workers explore situations that felt Dumb (didn't make sense), Dangerous (risky/challenging), Difficult (hard or demanding), or Different (changing or surprising) than expected.
    - **STKY** (Stuff That Can Kill You): which helped identify moments where real risk showed up in normal work.
- Helping workers reflect on what pressures they faced, what rules helped or didn't help, and what support they got from leaders.
- Testing if these tools helped improve critical thinking, awareness of risk, and learning from everyday work

The STKY tool can be found in Appendix 5. Below is an example of a STKY tool output:



STKY – Hung Loads

Story: *Lots of hung loads happen in the morning from 6 am when lots of trucks arrive. First run for drivers, everyone wants to dump and move onto the next run.*

What do you rely on to stay safe: *Staying alert, talking with driver if load "hangs", making sure the driver doesn't try and fix with moving forward "shunting".*

4Ds with the STKY: *Everyday is different. Some of the trucks it's the design, other times it is how the load is compacted. (Difficult/Challenging and Different/Changing)*

Frequency of situation in last 3 months? *More than 10 times.*

Pressure to perform come from: *Myself, The Operator of mobile plant and Truck Drivers.*

Working safely is impacted by: *Just getting the work done.*

Worker have to: *- Take Risks, Avoid Risks, Manage Risks.*

Rules for that work, you had to: *Not use the rules , Change the work to comply with the rules.*

Did the rules help or hinder: *Unhelpful.*

Guidance and support from the company/manager or supervisor: *More needed*

Situation different outcome potential: *Truck could roll.*

Likelihood of happening: *Unlikely.*

Knowing, what you know now, what things would you rely on if that situation was to

Happen again: *- Keep clear when we can. Don't get frustrated from drivers.*

Analysis of STKYs gathered during the programme

The STKY themes were:

STKY Category	*STKY examples*
Physical and Mechanical Risks	• Machinery entrapment from tailgates, bins, or compactors. • Vehicle and pedestrian interactions on tipping platforms. • Machine rollovers due to uneven ground or narrow tipping edges. • Contact with moving plant, especially in tight areas. • Trailer instability during unloading and tipping operations.
Energy and Environmental Hazards	• Heat stress in high-temperature environments (e.g., PPE combined with summer heat). • Electricity exposure near transfer station infrastructure or vehicle faults. • Biological exposure to waste materials, sharps, and sewage during sorting. • Gas build-up risks, especially around waste pits or poorly ventilated spaces. • Fire risk from spontaneous combustion of materials (e.g., lithium batteries).
Transport and Traffic Risks	• On-road driving hazards, including fatigue, aggression from the public, and vehicle reliability. • Off-road driving risks such as soft edges, poor visibility, and navigation on unsealed roads. • Poor trailer and load management, including load shift and height clearance.
Human-System Interaction/Psychosocial Hazards	• Pressure to bypass safety systems (e.g., skipping checks due to time pressure). • Inadequate communication or signage, especially between drivers and ground crews. • Overreliance on casual staff or lone workers without full risk context. • Exposure to violence or aggression from customers or the public at transfer stations.

Workers shared with us their main strategies used to stay safe, including the use of hard and soft controls, communicating within the team, maintaining situational awareness, following processes or rules (when known and useful), team support and personal judgement and initiative.

What we learnt from workers

1. **Pressure to perform**: Workers shared that pressure to perform came from multiple sources simultaneously, compounding the stress. Pressure was not just top-down; peer pressure and self-imposed standards were also significant, and pressure from outside parties such as public and commercial drivers (e.g., tight tipping spaces, customer aggression, unpredictable waste types) created environments where performance pressure became normalised.

2. **Approach to risk:** Most workers defaulted to managing risks when balancing between "getting the job done" and "staying safe". Avoiding risks occurred where there was strong support and clarity. Taking risks was usually a response to pressure, confusion, or gaps in training and supervision. Most importantly, taking risks occurred when:
    - Rules or processes were impractical or missing
    - Public or driver behaviour created pressure
    - Workload or scheduling pressure made delays seem unacceptable

    And workers avoided risks when:

    - They felt empowered or supported by managers
    - The team communicated proactively
    - There was visible separation between people and the plant.

3. **The role of rules**: Rules were most effective when they were relevant to the work, compared to rigid or outdated rules often led workers to create informal workarounds, contributing to elevated STKY risk. We found that workers:
    - **Did not use or follow the rules**: When rules were impractical, unclear, or missing, especially in tight or dynamic settings.
    - **Change the work to comply with the rules**: Often used as a temporary fix.
    - **Make new rules**: Common when teams had autonomy or when systems failed to reflect actual site conditions
    - **Change the rules**: Seen when workers had to adapt to on-the-ground needs.

4. **View of risk:** Workers were more likely to rate future risk as "likely" or "very likely" when they felt the system or environment hadn't changed. Situations that were deemed "very unlikely" usually had clear learning actions, feedback loops, or stronger team communication put in place.

What we learnt from the programme “Workers understand risk”

1. **Workers are constantly managing dynamic risk**

   We learned that risk doesn’t just happen in events; it shows up in the normal day-to-day: overloaded trailers, windy tip heads, tight deadlines, and confusing site layouts. Workers are navigating these risks every day, using their own judgement, experience, and teamwork.

2. **Rules and systems often don’t match the reality of work**

   There was always a gap between how “Work is Imagined” (in procedures and rules) and how “Work is Done”. For example:

   - Rules said, "never go behind a trailer", but tip head layouts and workflow made it almost impossible to avoid.
   - Workers were told to stop unsafe work but weren’t always backed when they did.
   - Processes for "hung loads" existed, but they weren’t realistic under pressure, so workers created their own informal methods.

   This taught us that systems need to adapt to how real work happens, not the other way around.

3. **When workers are trusted to share their stories, deeper insights emerge**

   At first, workers shared short, surface-level issues like “traffic’s a mess” or “customers are rude.” But over time, as trust grew and the 4Ds/STKY tools were used, their stories became more thoughtful and revealing. They started to explain:

   - Why they felt unsafe
   - What they tried to do about it
   - What made it better or worse
   - What could be changed

   This shift indicates that as psychological safety increases, so does the depth of learning. And that learning can’t be captured through traditional safety metrics alone.

4. **Pressure to perform drives risky decisions and it comes from many directions**

   We learnt that risk-taking isn't careless, it's often a response to pressure. Workers talked about:

   - Rushing because customers were angry or impatient.
   - Skipping checks to avoid delays.
   - Fixing problems themselves because no support was available.
   - Not using rules that didn't fit the situation.

   It's a reminder that risk isn't just a personal choice; it's shaped by the system and the environment.

5. **Emotional and psychosocial risks are real and widespread**

   Many workers shared experiences of verbal abuse from the public and frustration. These aren't just side issues; they impact safety decisions, communication, and the willingness of people to speak up or step in. We learnt that:

   - Emotional strain often goes unnoticed or unspoken; it's absorbed by workers.
   - Pastoral care and de-escalation support are just as important as PPE or engineering controls.
   - Workers feeling they are backed by leadership makes a big difference. Workers are more likely to act safely when they know someone has their back.

6. **Workers are not the problem; they are the problem-solvers**

   Perhaps the most important thing we learnt is this: *Workers aren't just the source of risk, they're the key to improving it.* They're not only telling us what's wrong they're offering practical ideas and solutions:

   - "Why don't we move this barrier?"
   - "What if we had radios on both ends?"
   - "Couldn't we just brief everyone at the start of the shift?"

   When we give them the chance to reflect and share without blame they show deep understanding and strong ownership of safety.

7. **Learning is a skill; it can be grown**

   The tools we used helped workers develop the skills of:

   - **Curiosity**: noticing when something's changed or doesn't feel right.
   - **Critical Appraisal**: asking "does this rule or process still work here?".
   - **Critical Thinking**: thinking through the consequences of actions and making better choices.

What can you apply

See Appendices 4 and 5 on trying the 4Ds and STKY tool.

Listed below are 10 practical actions that others (whether they're leaders, supervisors, HSRs, or frontline workers) can do to improve how they manage risk, support learning, and engage workers.

1. **Use the 4Ds to Start Conversations**

   Encourage teams to talk about the moments in their day that felt:

   - **Dumb**: Something didn't make sense or frustrate you.
   - **Dangerous**: Something that feels risky or challenging.
   - **Difficult**: Something was hard to manage, unpredictable or demanding.
   - **Different**: Something wasn't what they expected, changing or surprising.

   Ask during a toolbox or tailgate talk: "Anyone seen something Dumb, Dangerous, Difficult, or Different this week?"

   You'll surface small issues before they turn into big ones.

2. **Use the 4Ds and run an Everyday Work Review**

   Pick a recent task or job. Ask the team:

   - What was new or different?
   - What made the work tricky?
   - What did we adapt or change?
   - What worked well and what didn't?

   Use a whiteboard or paper and keep it simple. Focus on how people made the job work, not just what went wrong.

3. **Bring the STKY Lens into the Field**

   Ask workers:

   - "What's the Stuff That Can Kill You here?"

   Then ask:

   - How do you stay safe?
   - What gets in the way?
   - What would you change?

4. **Make Risk Conversations part of the daily routine**

   Embed short learning conversations into:

   - Shift handovers ("What was difficult yesterday?")
   - Pre-starts ("Any risky surprises this week?")
   - Weekly standups ("What nearly went wrong but didn't?")

   Ask open questions, not "Did everything go okay?", but "What did we have to work around?"

5. **Redesign Rules with Workers**

   When rules aren't being followed, don't jump to discipline, get curious:

   - "Is this rule helpful in this situation?"
   - "What do people do instead?"
   - "Can we redesign this rule together?"

   Involve frontline workers in **rewriting or adjusting** work instructions or SOPs based on their lived experience.

6. **Create Safer Pressure Zones**

   If pressure to perform is pushing people into risky territory, step back and ask:

   - What's driving the rush?
   - Where is pressure coming from, managers, customers, co-workers?
   - Can we remove or reduce that pressure?
   - What can we do to allow the worker to gain back control of the work

   Try small changes like rotating tasks or building short pauses into the workday to slow things down and relieve stress.

7. **Show Support, Not Surveillance (Be a coach, not a referee)**

   If workers fear that raising issues will lead to blame. Flip that script by:

   - Thanking people who speak up.
   - Responding with action and feedback.
   - Sharing what changed because of their input.

8. **Build Understanding Through Storytelling**

   Instead of safety rules or bullet points, use short worker stories in training or team meetings:

   - "Here's what almost went wrong — and here's how they handled it."
   - "We had a close call, but the control _____ worked and the situation didn't get worse."

   These stories help build judgment, recognition of similar issues, and trust.

9. **Add Pastoral Care Tools, Get Your HSRs Involved**

   Psychosocial harm is real. Some small but powerful actions:

   - Buddy systems for new staff.
   - Check-in questions at the start of the day ("How are you feeling today?").
   - Training in de-escalation for dealing with the public and drivers.
   - Daily debriefs on situations that arose with frustration or anger.
   - Let workers know: "it's okay to not be okay", and there's someone to talk to.
   - Use HSRs to gather stories using the 4Ds for workers to share and reflect on their experiences.

10. **Track Themes, Not Just Incidents or Near Misses**

    Don't just focus on incidents, look for recurring signals in worker stories:

    - What pressures keep showing up?
    - What workarounds are becoming normal?
    - Where are rules being changed on the fly?

    These weak signals are early warnings and goldmines for improvement.

You don't need a perfect system. You just need to start listening, asking better questions, and treating workers like the experts they are in managing risk.

Learning and innovation opportunities for the waste and safety community

WasteMINZ programme

What we did

WasteMINZ (Waste Management Institute New Zealand) is the leading association for the waste, resource recovery, and contaminated land sectors in New Zealand. It serves as a collaborative platform for industry stakeholders to share knowledge, improve standards, and innovate around health, safety, and environmental practices.

The WasteMINZ Programme was a six-part series designed to view safety differently by improving on traditional safety approaches by understanding the #BetterWork ideas from WorkSafe NZ and other contemporary safety ideas.

The sessions included group discussions, reflection activities, and hands-on tools to apply. A total of 114 individuals participated.

The sessions were:

Module	*Content*
Module 1: Introduction to #BetterWork and contemporary safety	• Focused on foundational contemporary safety philosophies. • Explored the shift from 'why things go wrong' to learning from 'why work goes well' • Introduced core principles: being curious, being mindful, and accepting mistakes as learning moments. • Group reflections emphasized the need to shift from a blame culture to learning and improving.
Module 2: Learning from Why Things Go Right	• Exploring safety events differently to understand what supports successful outcomes. • Promoted the use of proactive leading indicators over reactive metrics. • Groups brainstormed actions to flip their reporting culture, e.g., fostering psychological safety, conducting audits, sharing lessons learned, and increasing leadership in the field.
Module 3: Work As Imagined versus Work As Done (WAI-WAD)	• Looked at the gap between how work is prescribed and how it is actually done.

Module	*Content*
	• The value of seeing this as worker adaptations and insights versus work arounds, short cuts and violations. • The natural tension between compliance-focused reporting and listening to everyday work. • The value of engagement with frontline workers to co-create procedures for safety in the work, not on paper.
Module 4: Learning when work goes wrong.	• Distinguished between investigative and learning mindsets. • Introduced systems thinking to uncover contributing factors beyond individual error. • Explored concepts like critical steps, critical controls, and error traps. • Reinforced the value of a non-punitive environment to encourage honest learning from failure.
Module 5: Using reflection to improve safety.	• What is reflection, how to practice to embed learning for workers and the organisation. • Ways to look and understand the gap between Work-as-Done and Work-as-Imagined. • Why safety systems get brittle overtime and the role of communication in change. • The value of workers participation in risk assessments and improvement talks.
Module 6: Making safety change for the longer term.	• Why small changes overtime make a difference. • Encouraged self-assessment of organizational and individual readiness for change. • Discussed how to create conditions that support adaptive, learning-centric workplaces. • The value of leaders engaging with workers, listening, learning and leading with positive change.

What we learnt

1. **Shifting the Safety Mindset**

   From Blame to Learning: The need to move from blaming individuals to one that seeks to understand and learn from events, including both successes and failures.

   The System Not The Worker: Recognising that failures are typically the result of system-level weaknesses, not individual shortcomings of workers.

2. **The Value of Worker Engagement**

   Workers in Decision-Making: The value of involving frontline workers in discussions about safety, procedures, and risk assessment.

   Being Open To Challenge: Having open conversations and listening to workers' real experiences were identified as crucial for effective safety outcomes.

3. **Learning From Operations Improves Safety**

   Learning From Work: Groups appreciated that learning doesn't just come from incidents; it's vital to learn from routine operations and positive outcomes.

   Use of Tools like the 4Ds: These were found to be effective in identifying weak signals and generating valuable insights from daily tasks.

4. **Enhancing Reporting and Feedback Loops**

   Reporting What Goes Well: A push to shift reporting toward capturing what goes well, not just what fails. Both Hampton Downs and the Pokeno facilities introduced a 5th D – delightful as they wanted to discuss when work went well.

   Leaders Being Visible: Leaders attending toolbox talks, being present in the field, and listening were seen as enabling learning in operations and safety.

5. **Bridging the Gap: Work-as-Imagined vs. Work-as-Done**

   Understanding Adaptations: Participants learned that deviations from procedures often reflect adaptations necessary for success, not rule-breaking.

   Revising SOPs with Worker Input: Standard procedures should reflect actual work conditions, with input from those who perform the tasks.

6. Safety Improvement through Small Wins

Use of Reflection Activities: Reflection was highlighted as essential for embedding learning and changing habits.

Small Changes for Big Impact: The "100 small things" concept resonated as a strategy for gradual and sustainable cultural change.

7. Embracing Change

Organisational Self-Assessment: Tools like the Continuum Thinking Frame allowed participants to assess their own and their organisation's readiness for change.

Leadership Role: Being open, curious to learn, and giving feedback about how work is actually performed is helpful for leaders.

What you can apply

See Appendix 4 on trying the 4Ds tool.

The learning series and resources are available for viewing at https://www.learningteamscommunity.com/environz-eu

Wider safety community programme

What we did

We ran a learning programme with two major safety groups in Aotearoa: WorkSafe's Innovation Team and NZISM (a safety professional body). Collectively with the Business Leaders Health and Safety Forum, this was known as CoSI (Community of Safety Innovation) with a reach of over 3500[2] members.

The focus was on providing four updates on the learnings and practical updates from the EU programme. We used tools like the 4Ds (Dumb, Dangerous, Difficult, Different) and STKY (Stuff That Can Kill You) to help workers and leaders talk about real work challenges.

The programme included nine events, comprising face-to-face sessions and online webinars from 2022 to 2025. Topics included better risk conversations, challenging rigid safety rules, and shifting focus from just compliance to learning and adaptation.

Over 400 people participated in the programme, with thousands more being able to access recordings through NZISM and the Business Leaders Health and Safety Forum

The timeline and outline of events across the CoSI group were:

Introduction & Early Engagement (2022–2023): WorkSafe NZ Innovation Group

Date	Event	Focus
4 Oct 2022	CoSI Session #1 (Wellington, F2F)	*Introduced the EU programme and the 4Ds framework. Alignment with #BetterWork strategy.*
10 Nov 2022	CoSI Session #2 (Wellington, F2F)	*Showcased co-creation and reflective practice using 4Ds stories.*
19 May 2023	CoSI Session #3 (Virtual, Nationwide)	*Explored stress, conversations, and safer environments through worker stories with the 4Ds.*
28 Jun 2023	CoSI Session #4 (Virtual, Nationwide)	*Focus on work adaptation, storytelling, and use of visual tools with the 4Ds.*

[2] https://www.linkedin.com/groups/10529783/

Professional Development and Knowledge Series (2024–2025): NZISM (Safety Practitioner Body)

Date	Event	Focus
3 Jul 2024	NZISM Risk Series #1 (Virtual)	*Risk management as an art; energy vs hazard; STKY; worker engagement.*
7 Aug 2024	NZISM Risk Series #2 (Virtual)	*"Green is Good" myth; prevention bias; critical vs dynamic risk.*
4 Sep 2024	NZISM Risk Series #3 (Virtual)	*Human error as system issue; control effectiveness; psychosocial risk.*
22 Jul 2025	NZISM EU Findings Presentation (Auckland, F2F)	*Summary and feedback session on EU learnings.*

Total NZISM Attendance: 314 in webinars. Recordings available 3000 members.[3]

What we learnt

1. **Rules often don't fit real work**: Many safety rules (like "life-saving rules") are too rigid for dynamic work situations. Workers need flexible guidance and support in problem solving, not just instructions on what *not* to do

2. **Worker insight is powerful**: Frontline workers know what's going on. When they're given the tools and space to talk about their work, they reveal risks, challenges, and opportunities we would otherwise miss.

3. **Leaders matters**: When leaders show curiosity and move from blame to learning, it sets the tone for better safety outcomes.

4. **Psychosocial risk is present and often hidden**: Stress, pressure, and system design are real risk factors that need to be part of any serious safety conversation.

5. **The 4Ds and STKY tools work**: These methods helped people talk about complex, risky work in a way that made sense—leading to practical insights and actions.

[3] https://www.nzism.org/

What you can apply

1. **Create space for learning**: Build time into safety programmes to hear from workers, not just train them

2. **Use everyday language**: Tools like the 4Ds provide workers with a shared way to discuss risk.

3. **Shift from rules to support**: Instead of enforcing fixed rules, develop work aids that help workers make good decisions in the moment.

4. **Start with what's working**: Use strengths-based questions; what are workers proud of, what helps them succeed, what do they believe would make work better?

5. **Encourage leadership curiosity**: Leaders don't need all the answers. They need to ask better questions and listen more deeply (use the 4Ds).

6. **Make safety about real work**: Look at how work is actually done with the workers, not just how it's supposed to be done on paper.

Appendices of the tools and frameworks to use

Appendix #1: Organisation Baseline Assessment Form

Appendix #2: Worker Engagement Assessment Form

Appendix #3: Visual Risk Mapping Document

Appendix #4: 4Ds Card

Appendix #5: STKY Form

Appendix #6: Everyday Work Review Form

The link for the resources is: https://hoptool.com/environzeutools

Trademark and Copyright Provisions

Appendix 1: Organisation Baseline Assessment

PCBU System and Worker Engagement Approach

Date: / / Time:

Organisation: _____

Location: _____

Present: Role:

Q: What system elements are contained in your formal health and safety system?
(Copy of table of contents if available)

Q: How, when and often, is the safety system independently audited or reviewed?

Q: Does your hazard identification and risk management system specifically identify risks that are critical or dynamic in nature (such as mobile plant and people on foot)?

Q: How do workers participate in the hazard identification and risk management of these types of critical or dynamic risk?

Q: Have you identified the risk of mobile/moving plant and workers or pedestrians on foot? And if so what are the current controls for managing this risk?
Q: What methods do you use to check or verify that this risk has not changed?
Q: What methods do you use to check that the controls for managing this risk remain effective?
Q: What methods do you use if a near miss, near hit, incident, accident or event happens?

Q. What pre-start or planning happens for the work day/shift ahead, what are the typical things that are discussed?

Q. How does the organisation conduct these?

Q. How often does the work teams get together to review what has worked well and what didn't go as planned?

Q. If something is raised in the sessions, what happens next, how are workers involved and what is the feedback loop?

Q. How do workers raise safety concerns, issues or events with the organisation?
Q. What does the organisation do when it receives a safety concern, issue or event?

Q. What other activities does the organisation do for workers to be engaged, participate and be represented on health and safety matters.

Appendix 2: Worker Engagement Assessment

Date: / / Time:

Organisation: _____

Location: _____

Present: Role:

Q: Describe what a normal day looks like in performing the role of:

Q: What are the STKYs (Stuff That Kills You) that you face in normal work?

Q: What do you rely on to keep safe when dealing with those STKYs

Q: Can you think of a time when doing normal work with the STKY, when the safety systems, rules or work – didn't make sense to you? (DUMB)
Q: Can you think of a time when doing normal work with the STKY, when normal work didn't feel right to you? (DANGEROUS)
Q: Can you think of a time when doing normal work with the STKY, when normal work was harder than it should have been? (DIFFICULT)
Q: Can you think of a time when doing normal work with the STKY, when normal work was different from what it normally is? (DIFFERENT)

Q. When you get together as a team, to discuss how you will manage your work day/shift ahead, what are the typical things you discuss?

Q. Who does most of the talking? Your team leader, or do you all contribute?

Q. How often does your team get together to review what has worked well and what didn't go as planned?

Q. How does the organisation (company) support you to do this?

Q. What do you do if something doesn't go as planned?

Q. How do you raise safety concerns with the organisation?
Q. What does the organisation normally do if you raise a safety concern?

Appendix 3: Visual Risk Mapping

Mapping of Work and Dynamic Risk – A Learning Resource

Mapping of Work and Dynamic Risk – A Learning Resource

Background

WORK = RISK and that work is necessary to create value in the organization. That work requires people to touch, oversee, manipulate, record, or alter things. Jobs and tasks comprise a series of human actions designed to change material or information to create outputs.

Those things (hazards) that workers have to interact with or be close to have energy, and harm occurs when that energy is released. Therefore, the risk of harm emerges when people work because they are exposed to hazards, and those hazards have energy, which in turn creates risk.

Because all work involves risk, the system or people occasionally lose control of these hazards. A life-changing event occurs when high amounts of energy are released and transferred to the worker(s) doing the work.

It's important to remember that human error is a normal and natural part of being human. It's not a problem until it occurs in sync with a hazard, leading to the release of energy and potential harm.

Human performance is the greatest source of variation in any operation, and the uncertainty in this performance cannot be eliminated.

Therefore, work involves risk under uncertain conditions.

Understanding these conditions present in Work as done creates the opportunity to improve work to be BetterWork®[1] by:

- Improving the "Efficacy of Controls" by understanding whether the controls for preventing energy or responding to/recovering from the energy release are present, effective, unusable, and sufficient.
- Improving the "System Fidelity" of the system by understanding if the systems for work are present, doable, relatable, achievable, and adaptable to change.
- Improving the psychosocial impacts of work design or conditions in work that physically impact humans and reduces goal conflicts and undue demand.

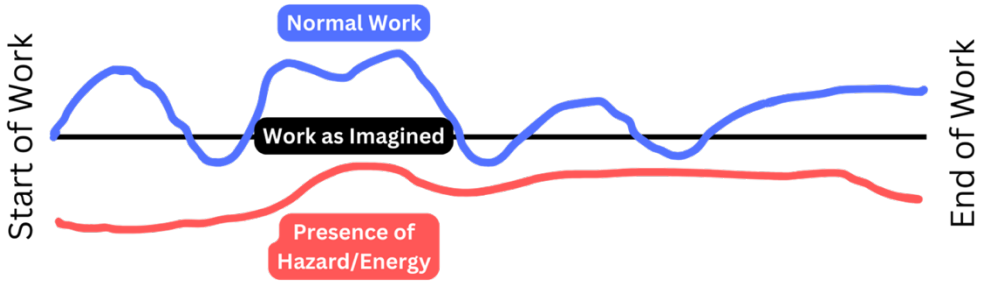
[1] BetterWork is a registered Trademark of Learning Teams Inc

Introduction To Mapping of Work and Dynamic Risk

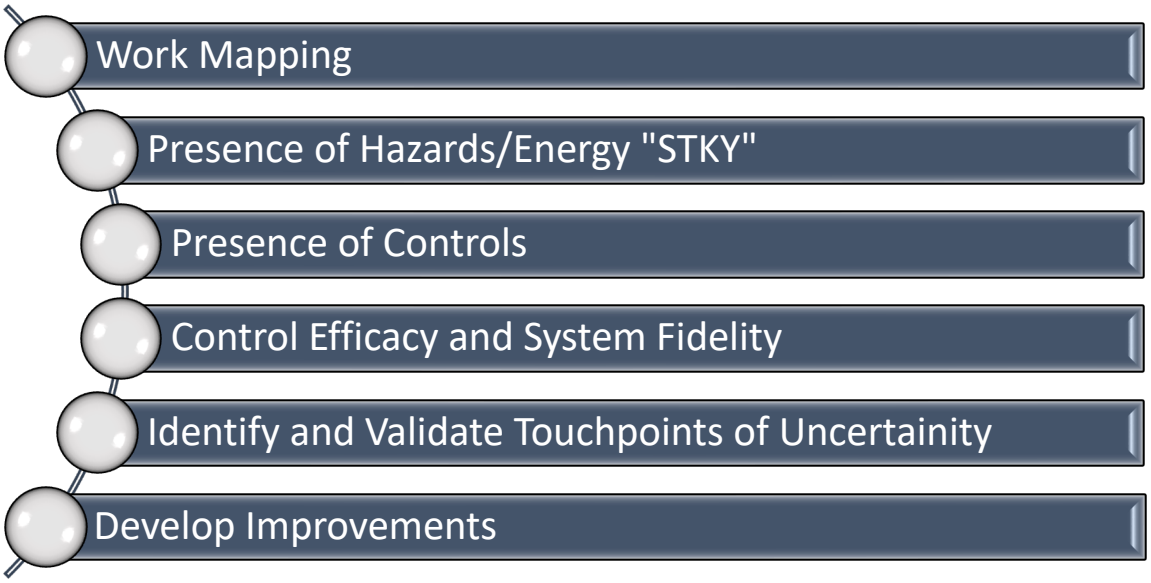
When work goes wrong we find a gap between Work as imagined (how the organisation believe work is done) versus how regular work needs to be done (Work as done).

Whether the controls are degrading, workers are adapting to be effective and efficient, or the safe systems of work don't accurately actual work, being able to listen, learn, and then lead with improvements can create BetterWork® from an operations, quality, and safety perspective.

Figure 1: Adapted from the work of Rob Fisher and Todd Conklin



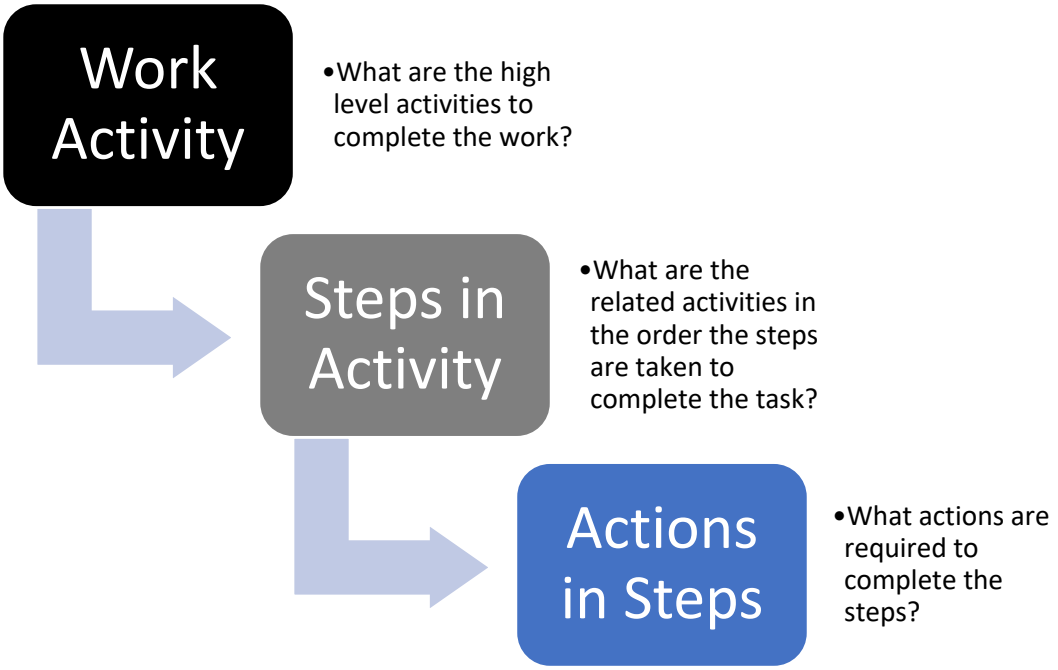
We have created a visual method, which is an adaption of the original Visual Context Mapping of Risk in the book 4DS® FOR HOP AND LEARNING TEAMS (ISBN: 979-8358-0207-26) by Josh Bryant and Brent Sutton. This mapping supports you to storyboard the work as seen through the eyes of the workers who do the work. It is made up of six phases:



Phase One: Work Mapping

You break that work down into:

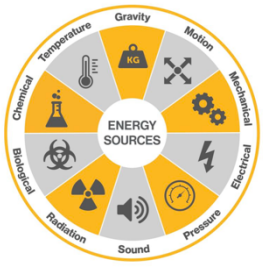
- What are the high-level activities needed to complete the work (**Work Activities**)
- What are the related activities in the order the steps are taken to complete the task (**Steps in Activity**)
- What actions are required to complete the steps (**Actions in Steps**)



Phase Two: Presence of Hazards/Energy "STKY"

In Phase Two, we look at the steps or actions from Phase one, too;

1. Map the hazards present and what energy type can be released
2. Identify whether they are STKY (Stuff That Can Kill You)
3. Discuss how that energy can be released
4. Talk and capture the stories about the conditions or circumstances when they work closest to the hazard/energy, we call this "Line of Fire".



Phase Three: Presence of Controls

In Phase Three, we explore the presence of controls, “safety measures.’ And ask questions, such as;

1. What prevents the energy from being released?
2. What responds and reduces the energy when released?
3. What helps the recovery of assets or persons from the energy after it is released?

After identifying the safety measures, explore with the group;

1. Which of those safety measures is about controlling the hazard/energy, and their function can’t be influenced by human behavior? (Hard Control)
2. Which of those safety measures is about controlling the hazard/energy, and their function can be influenced by human behavior? (Soft Control)
3. Which safety measures rely on worker decision-making for the control to function or work as intended? (Field Based Decision Control).
4. Which safety measures identified are critical to workers and why? (Critical Controls)

Phase Four: Control Efficacy/System Fidelity

Control Efficacy

Control efficacy is a term used to describe how well a control reduces or manages the risk it's meant to modify. The more effective a control is, the more confidence you have the risk is being managed as you expect.

Ask questions of the workers, such as;

1. Using the 4D's®[2] please describe times when the safety measures;
    a. Didn't make sense or frustrate you when performing the work? (Dumb)
    b. Didn't work as intended or made the work riskier? (Dangerous)
    c. Were difficult to function or perform than normal, or made the work more demanding on you? (Difficult)
    d. Performed differently from what you expected or surprised you? (Different)
2. How do you know the safety measure(s) are present and working?
3. What monitoring, inspection, or maintenance activities are undertaken to keep the safety measures functioning? When, how, and by who?
4. Where are those safety measures referenced or documented in your work planning, job safety analysis, or job start processes or systems?

[2] 4Ds® is a registered Trademark of Learning Teams Inc

System Fidelity

"System Fidelity" is the understanding that the systems for work are present, doable, relatable, achievable, and adaptable to change.

Evaluating the procedural fidelity for useability and error traps, using the Procedural Useability, Error-Likely Situations, and Error Traps analysis tool for assurance and verification (See Appendix 1). The tool explores four parts to this:

a. Task Analysis
b. Worker Interaction
c. Cognitive Load
d. Error-Likely Potential and Error Traps

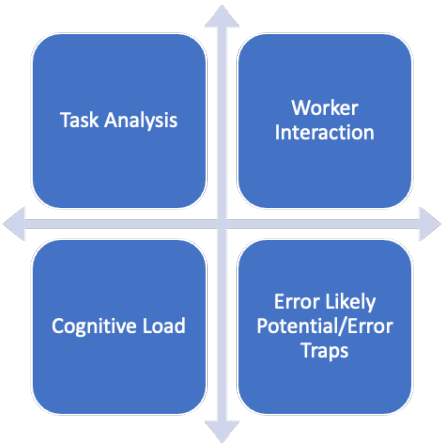


Figure 2 Procedural Useability, Error-Likely Situations and Error Traps Analysis Framework

Phase Six: Identify and Validate Touchpoints of Uncertainty

Touchpoints are where the work or field-based decision making can take workers closet to the sources of the hazards (energy) that create hazardous situations.

With these touchpoints, we need to identify the critical steps and evaluate them for "error-likely situations" or "error traps," and the risk-important actions that need to support work to go well.

Phase Seven: Develop Improvements

The output of this mapping framework is a "context-rich" series of problem statements and potential solutions that can feed directly into the Learning Team for deeper systemic analysis and problem-solving. You can organize and present this information in many ways. An example of organizing into categories for analysis and problem solving is an Organizational Learning Circle Map:

Organizational Learning Circle Map

Learning Lens Categories	Clusters of Understanding
Performance of why work goes well	• Skills for performing work • Knowledge to perform the task • Decision making needs • What needs to be said or done in the work
Operational Processes/Work Methods to support good work	• Procedures to support work to go well and the needs of the worker • Organizational wastes, bottlenecks, unnecessary steps in the process and flow of work • Presence and application of compliance-based or regulatory procedures and their purpose

Mapping of Work and Dynamic Risk – A Learning Resource

Learning Lens Categories	Clusters of Understanding
	• The fidelity of standardized work methods to support work that goes well • Methods of work reflect the complexity of work and the ability for work to be done well • The opportunity or threat of any innovations or changes to ways of working
Plant and Equipment present in work	• Design of plant and equipment to support work • Maintenance of plant and equipment to support work • Presence and application of preventative maintenance • Use and appropriate use (digital literacy) of technology in work
Use of Materials in work	• The quality and suitability of materials • The supply chain availability and delivery of materials • The organizational capacity for the handling, storage and segregation of materials • The specification and required application of materials
Influence of time in work	• The presence or impact of time constraints in normal everyday work • The presence or impact of deadlines in normal everyday work • The affect of unforeseen delays in how work goes well

Mapping of Work and Dynamic Risk – A Learning Resource

Learning Lens Categories	Clusters of Understanding
Role of Management and Leadership in good operations	• Operational priorities and goals to support work • Management decision making and support of operations • Leadership governance and curiosity of why works goes well • Availability and adequacy of resources to complete work to the desired standard
Ergonomic design and environmental conditions in normal everyday work	• The influence of workplace layout on why work goes well and good operations • The influence of the physical workplace environment on good operations • The influence of external environmental conditions like weather or natural events on good operations
External Factors and Supply Chain	• The influence of suppliers or the supply chain on good operations • The influence customer or consumer needs on good operations • The influence of eternal market shifts, changes or unanticipated challenges on good operations

Figure 3: Organizational Circle Map (Draft)

Appendix 1: Procedural Useability, Error-Likely Situations and Error Traps

Written documents describing work and its flow and any associated risks, controls, and actions are fundamental in supporting training and building on the current state of knowledge, provided that they reflect the actual work.

Research has shown[3], with written procedures and documents, that;

- At 95% accuracy or better and when the same procedures follow 80% of the rules for procedure clarity, most workers will follow the written procedures and try to keep the procedures up-to-date.
- At about 85% accuracy or less, about half of the workers stop using the procedures.
- At about 75% accuracy or less, less than 10% of the workers will refer to the procedure or try to keep it up-to-date.

Their research showed that, unfortunately, the typical operating procedure reviewed is about 75% accurate (so one step in four is missing or wrong). Therefore any safety-related information that guides, instructs, or supports people in their work must come from those who do the work and be reflective of the work (95% accurate).

When evaluating the procedure for useability and error traps, use this analysis tool for assurance and verification. The tool explores four parts to this:

- Task Analysis
- Worker Interaction
- Cognitive Load
- Error Likely Potential/Error Traps

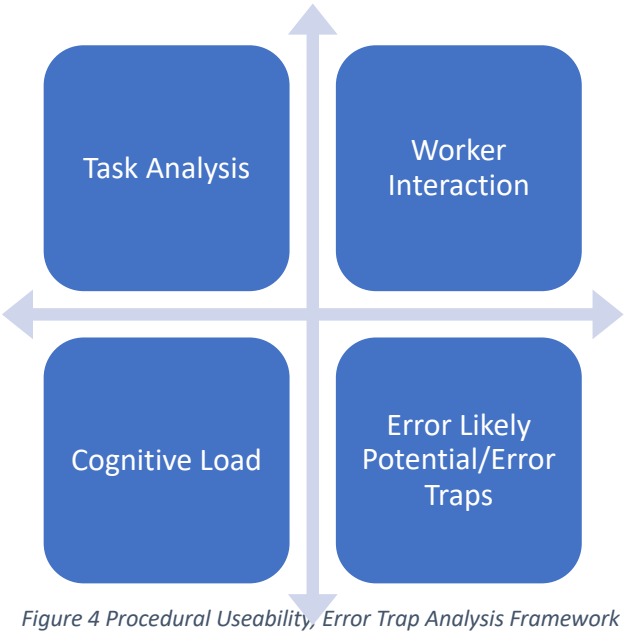


Figure 4 Procedural Useability, Error Trap Analysis Framework

[3] https://www.process-improvement-institute.com/

Procedural Useability and Error Trap Evaluation Tool[4]

Task Analysis	Analysis Thinking	Mitigation Strategies/Notes
Detailed Steps of the Procedure	Breaks down the procedure into individual steps. This granular view is essential for identifying where usability issues or error likely situations might arise.	
Identification of Critical Steps or Decision Points	Steps, points or risk important actions in the procedure that are crucial for its success or where important decisions are made. These areas require special attention because errors here could have significant consequences.	
Duration and Complexity of Each Task	Estimate how long each step takes and its complexity. Steps that are time-consuming or overly complex may need simplification or additional support.	

[4] Adapted from the work of Rob Fisher, Fisher Improvement Technologies

Mapping of Work and Dynamic Risk – A Learning Resource

Worker Interaction	Analysis Thinking	Mitigation Strategies/Notes
How Workers Interact with the Procedure	Discuss whether the procedure involves manual actions, interaction with machines, or software use. Such as: • Does the action involve interacting with a computer terminal, an automatic controller, or devices (gauges and valves)? Are they readable, meaningful and relatable? • Can the actions be performed as written and in the sequence written? • Does each step start with a verb? • Can each step be repeated after one reading? • Are steps segmented into small chunks (less than 7, 4+2) • Can the equipment be operated as specified? • Can the steps be physically performed?	

Mapping of Work and Dynamic Risk – A Learning Resource

Worker Interaction	Analysis Thinking	Mitigation Strategies/Notes
Ease of Understanding Instructions	Assess whether the instructions are clear and straightforward (without jargon). If users struggle to understand instructions, this increases the likelihood of errors.	
Clarity of Steps and Instructions	Looks at how well each step is communicated. Ambiguity or unclear wording can lead to misinterpretation, which can be mitigated by using clear, concise language, command driven language (active voice) with a verb for any steps. Avoid abstract verbs, adjectives, phrases, acronyms (without spelt out first time) or technical language (without plain english meaning first time).	

Mapping of Work and Dynamic Risk – A Learning Resource

Worker Interaction	Analysis Thinking	Mitigation Strategies/Notes
Potential Areas of Confusion or Vagueness	Identifies any vague steps or instructions that might confuse users, such as words like; • If, could, should, maybe, consider • when applicable • when appropriate • when needed • when required • as desired. These areas need to be clarified or redesigned to improve usability.	

Mapping of Work and Dynamic Risk – A Learning Resource

Cognitive Load	Analysis Thinking	Mitigation Strategies/Notes
Assessment of Mental Effort Required	Evaluates how much cognitive effort the user needs to exert to follow the procedure. High cognitive load can overwhelm users, leading to mistakes. In establishing work: • Are pre-requisites stated as conditions, as in what must be in place before you start? • Are workers warned before they perform risky actions? • Are all pre-job activities stated in procedural steps, as in what must you do to get things ready?	
Identification of Steps Leading to User Error	Steps that require significant mental effort are more prone to errors. These steps may need simplification or additional guidance to reduce cognitive strain, such as: • 7 steps required from memory • Contains multiple actions (3 or more in the same step)	

Mapping of Work and Dynamic Risk – A Learning Resource

Cognitive Load	Analysis Thinking	Mitigation Strategies/Notes
Ability to comprehend	What literacy, and numeracy skills and level is required to understand and carry out the actions using the information. Information should be relatable to equivalent of grade 5 (Age 10) or less for workers with english as a second language.	

Error Likely Potential/Error Traps	Analysis Thinking	Mitigation Strategies/Notes
Identification of Potential Error Points	Pinpoints where in the procedure users are most likely to make mistakes. Recognizing these points helps in designing better error-prevention strategies. Such as: • Does the worker need to be alerted of potential hazards (Cautions or Warnings) or need supporting information before performing the action? • The procedure is missing critical information. • The procedure conflicts with how the work must be done?	

Mapping of Work and Dynamic Risk – A Learning Resource

Error Likely Potential/Error Traps	Analysis Thinking	Mitigation Strategies/Notes
Likelihood of Errors	Estimates how likely errors are to occur at each step. High-risk steps should be redesigned or include additional safeguards. Such as: • Does the worker need to know specific operating ranges or limits to perform this action, recognize the successful completion of the action, and recognize an actual or potential problem to make an informed decision? • Is needed information found on an instrument, panel, or monitor, or is it in the procedure or another source such as a graph, table, drawing, or specification info? • Is that information readily accessible and correct ver? • Should this information be included in the procedure or be referenced? • What is the next logical step? • How is the next step affected by what is performed in the current step?	

Error Likely Potential/Error Traps	Analysis Thinking	Mitigation Strategies/Notes
Consequences of Potential Errors	At the impact of possible mistakes. If an error could have severe consequences, the procedure must be adjusted to minimize this risk. Such as: • What are the risks or outcomes of improper task performance? • Is the action frequently performed? • Is it easily overlooked? • Is this a complex piece of critical equipment that is rarely used? • Is the action performed infrequently, or is it so complicated that the user is unsure how to do it? • Is the action so complicated that nobody is ever certain it's done right the first time? • If a decision is required, is the decision point clearly defined and there is specific guidance on how to	

Error Likely Potential/Error Traps	Analysis Thinking	Mitigation Strategies/Notes
	make the decision? Unclear decision points can cause arguments and delays in performing actions. • Is it clear how to recover from an error and/or how to initiate an emergency stop of the energy?	

Appendix 2: Documenting the Map

LEARNING TEAMS INC
Building Better Community Of Practice

Mapping of Work and Dynamic Risk

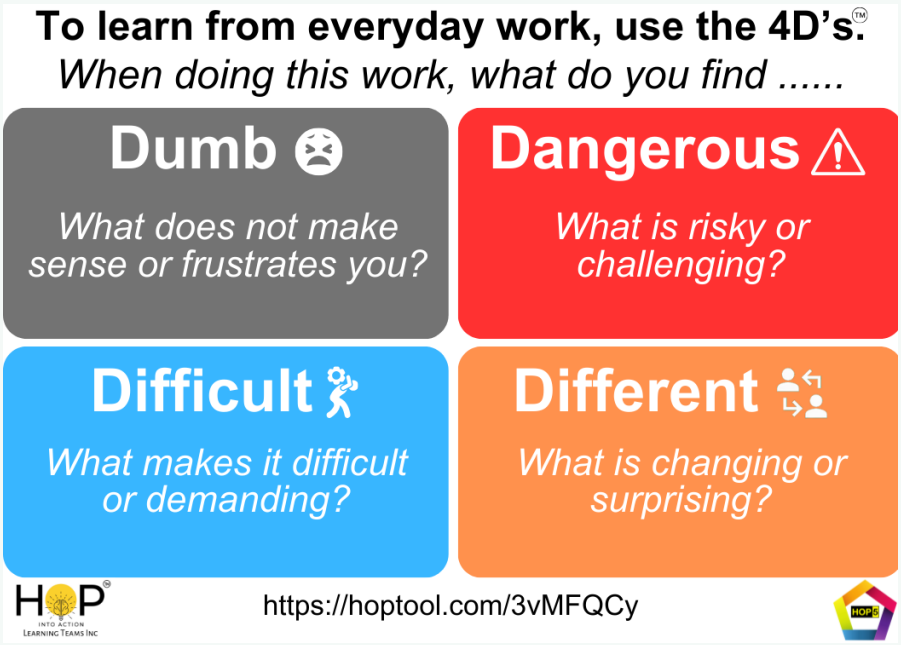
Work Activity:		What are the high level activities to complete the work
Steps in Activity:		What are the related activities in the order the steps are taken to complete the task
Actions in Step:		What actions are required to complete the steps.
Hazards/ Energy Present:		
Hard Controls Present:		Control Energy and can't be influenced by human behavior.
Soft Controls Present:		Control Energy and can be influenced by human behavior
Field Based Decision Making:		Rely on worker decision-making for the control to function.

What are the 4Ds

The 4Ds help us notice everyday problems that can affect health, safety, and how easy or hard the job feels:

- Dumb – Something that doesn't make sense, frustrates, or slows the job down.
- Dangerous – Something that puts someone at risk of harm or challenging work.
- Difficult – Something hard to do, needing more effort, or demanding on workers.
- Different – Something that's changed, surprising, or not how we usually do it.

Spotting these helps us fix things before someone gets hurt or frustrated.



Apppendix 5: STKY Worker Lead Form

Guided Facilitation STKY Conversation

Site/Work Area:

Date when done

MM DD YYYY

STKY (Stuff That can Kill You) for discussion

STKY Story

What do you rely on to stay safe?

*Thinking about the STKY and your normal work, have there been times when a situation:

1) Didn't make sense to you at the time?

2) Was different from what you expected?

3) Was difficult to foresee or understand?

4) Could have harmed you or someone else physically, affected their health or mental well-being?

What was that situation?

How often has that type of situation happened in the last 3 months?

- ◯ Once
- ◯ 1 to 5 Times
- ◯ 6 to 10 Times
- ◯ More than 10

STKY Worker Lead Guided Facilitation

Thinking about that situation, did pressure to perform come from? (choose as many as you think).

- [ ] Myself
- [ ] My Team
- [ ] The Operator of mobile plant
- [ ] Workers on Foot
- [ ] The Company/Manager or Supervisor
- [ ] Other (Please specify)

Thinking about that situation, was working safely impacted by? (choose as many as you think).

- [ ] Just getting the work done
- [ ] Doing the work to what I think
- [ ] Doing the work to the need of the company
- [ ] Doing the work to a schedule/time or cost

In that situation, workers have to? (choose as many as you think).

- [ ] Take Risks
- [ ] Avoid Risks
- [ ] Manage Risks

Thinking about the company rules for that work and in that situation, did you have to? (choose as many as you think).

- [ ] Not use or follow the rules
- [ ] Change the rules
- [ ] X Make new rules
- [ ] Change the work to comply with the rules

Did the rules, help or hinder the situation?

- ◯ Very Unhelpful
- [ ] Unhelpful
- ◯ Helpful
- ◯ Very Helpful

Thinking about that situation was guidance and support from the company/manager or supervisor?

- ◯ Way too much
- ◯ Feeling over managed
- ◯ Too little
- ☐ More needed

Imagine if that situation had a different outcome. One that was much worst!

Describe what you think could have happened?

How likely is that to happen?

- ◯ Very likely
- ☐ Likely
- ◯ Unlikely
- ◯ Very Unlikely

Knowing, what you know now, what things would you rely on if that situation was to happen?

And finally, if you were to report such an event, what words below would best describe how the company/manager or supervisor would respond?

- ◯ Do nothing
- ◯ Corrective Actions
- ◯ Improve
- ◯ Discourage
- ◯ Share with others
- ◯ Valuable
- ◯ Not useful
- ◯ Forgotten
- ◯ Make more rules
- ◯ Respond Quickly
- ◯ Fix
- ◯ Listen
- ◯ Investigate
- ◯ Don't want to know
- ◯ Useful
- ◯ Feedback Given
- ◯ Hinder
- ◯ Remove the rules that don't work
- ◯ Blame
- ◯ Learn
- ◯ Encourage
- ◯ Meet
- ◯ Complaining
- ◯ Complaince
- ◯ No feedback
- ◯ Change the rules
- ◯ Other (Please specify)

[ ]

Appendix 6: Review Form

Everyday Work Review Form

Review Date:		**Reference:**	

Participants:	

What is New?	**What we think the impact/benefit of change is?**
What is the change in work or the operation.	*How could it impact/affect or benefit how we do the work now?*

Everyday Work Review Form

Expected Outcome?	What did we learn, and what can be improved?
How will we adjust or plan for the work to go well.	What did we like from this change? What did the change lack? (4Ds) What do we long for? (change) What did we learn?