Canadian Surface Diamond Drilling Root Cause Analysis Workshop Results and Next Steps

A focused approach to improving workplace health and safety

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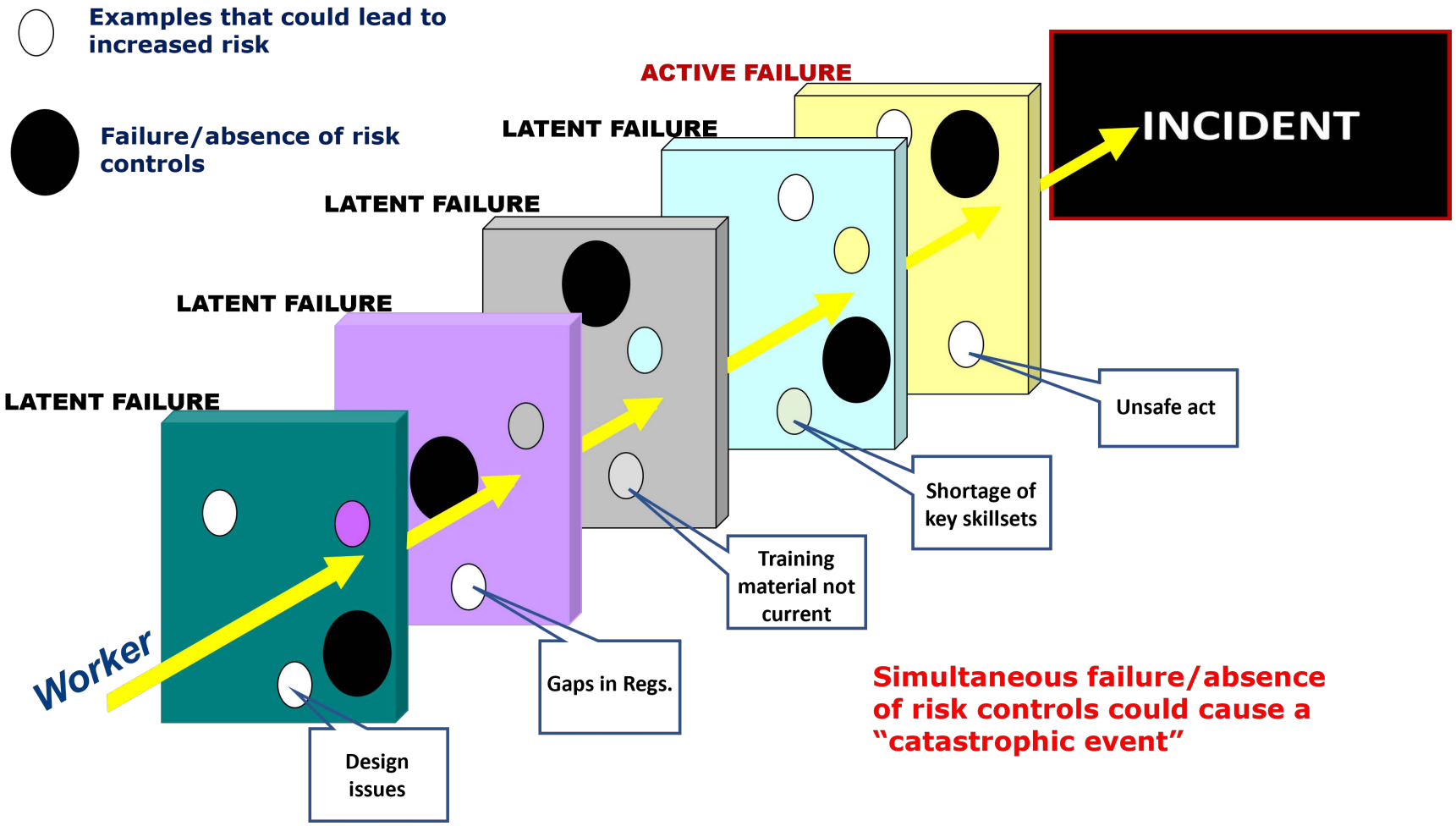
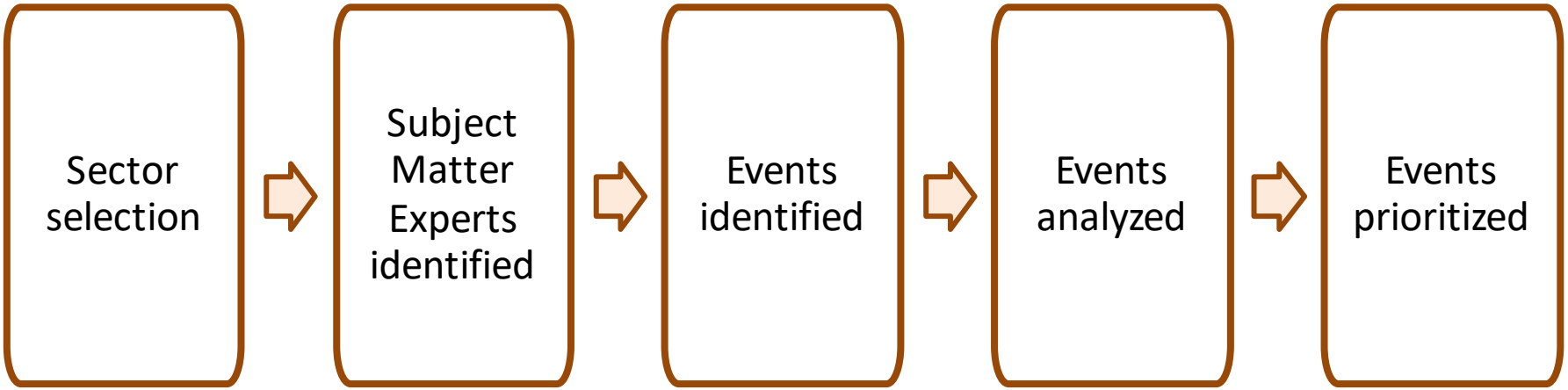
Risk Assessment Project



Simultaneous failure/absence of risk controls could cause a "catastrophic event"

Workshop: A Tripartite and Collective Process



Workshop: A Tripartite and Collective Process

Workshop process was open, transparent, and collaborative:

- Ensured perspectives/viewpoints were heard
- Responses were respected, not freely edited
- Final list shared with participants before workshop
- Workshop results reviewed/validated by participants

Finding acceptable solutions that all members can support:

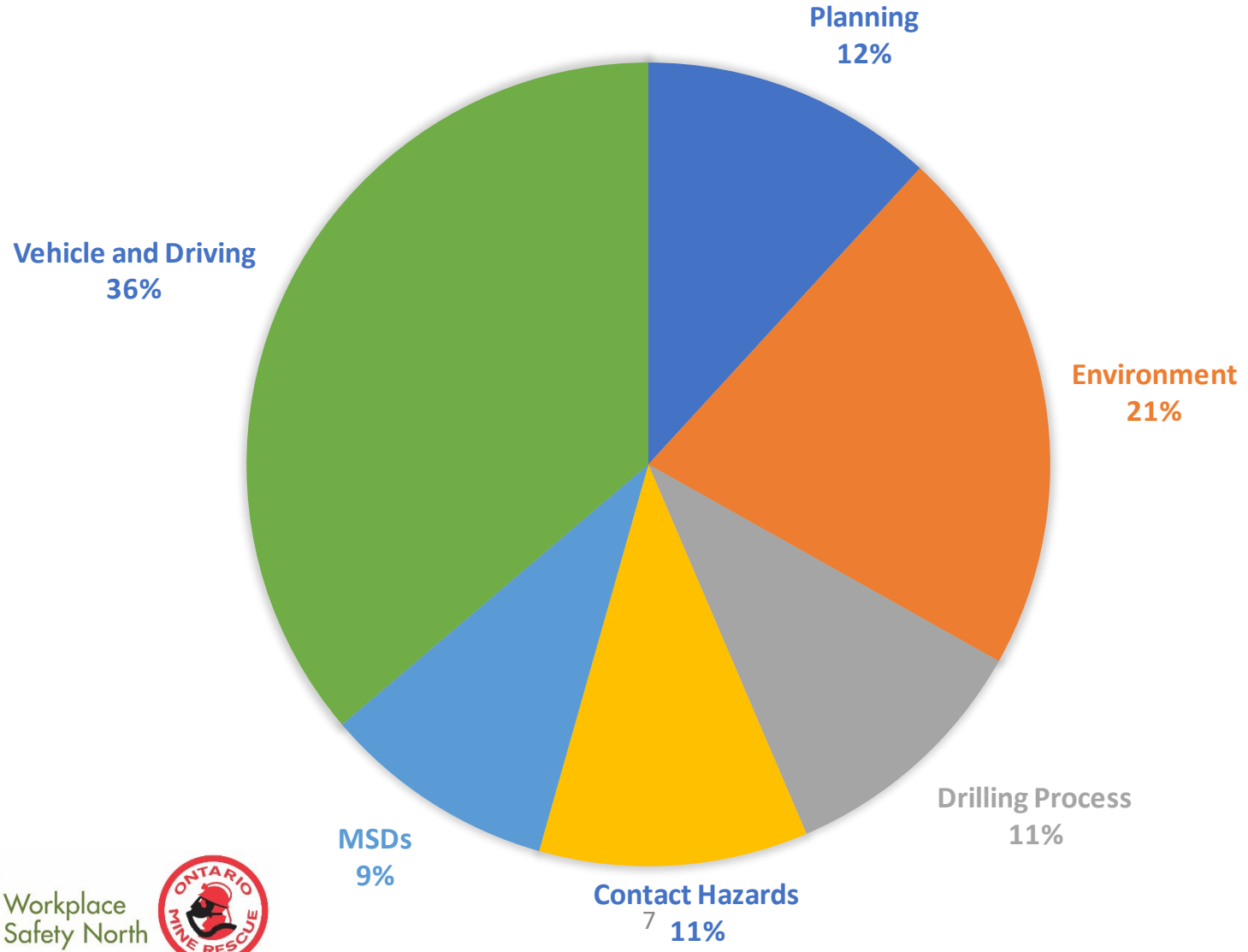
- Only industry experts ranked the risks
- Process was NOT about consensus (although results demonstrate a significant degree of convergence)

Risk Assessment Workshop Results:

Top 10 risk categories based on highest risk within that category

Rank	Category	Event (Situation/Condition) that could result in Injury or Illness OR *"What could keep you up at night?"*
1	**Planning**	Inadequate emergency response to a medical emergency has adverse effects on workers
2	**Environment**	Struck by Chicot (dead trees)
3	**Drilling Process**	Drilling on ice cover
4	**Contact Hazards**	Pinch Points
5	**Environment**	Exposure to extreme weather event, Contact or exposure to lightning event, over exposure to sun, contact with plant life or insects, contact with wildlife, contact by falling tree
6	**Musculoskeletal Disorder Hazards**	Repetitive work resulting in injury
7	**Vehicle & Driving**	Travel to and from drills by UTV and Snowmobiles
8	**Vehicle & Driving**	Travel (to, from and on drill sites) Drowsy driving
9	**Vehicle & Driving**	Helicopter material transport. Fly Program/Crew change, Crash and contact with rotating blades
10	**Vehicle & Driving**	Heavy duty mobile equipment

Top 10 Surface Diamond Drilling Risks



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Analysis of Top 10 Risks

Risks and undesired outcomes identified in the following overall ranking/categories

Rank	Risk Category	Contributing Factor	Result
1	**Planning**	Inadequate emergency response	Inadequate emergency response to a medical emergency has adverse effects on workers
2	**Environment**	Struck by Chicot (dead trees)	Injured worker or damage to equipment
3	**Drilling Process**	Drilling on ice cover	Injury to worker Damage to Equipment/environment
4	**Contact Hazards**	Pinch Points	Injury to a worker
5	**Environment**	Exposure to extreme weather event, Contact or exposure to lightning event, over exposure to sun, contact with plant life or insects, contact with wildlife, contact by falling tree	Injury to a worker
6 - 10	**Vehicles & Driving**	Travel to and from drills by Utility Task Vehicle and Snowmobiles Travel (to, from and on drill sites) Drowsy driving Helicopter material transport. Fly Program/Crew change, Crash and contact with rotating blades Heavy duty mobile equipment	Injury to a worker Damage to Equipment/environment

Root Cause Analysis Workshop: Participants

SUBJECT MATTER EXPERTS		
#	Name	Company/Representative
1	Shannon Bennett	JS Drilling, Ontario
2	Jim Butler	Hy-Tech Drilling, British Columbia
3	Gerry Cooke	Team Drilling, Saskatchewan
4	Clare Foladore	WSN, Formerly Vale – Exploration, Ontario
5	Wesley Keating	Hy-Tech Drilling, British Columbia
6	Kelly Lavis	Major Drilling, Saskatchewan
7	Barry Nabese	Hy-Tech Drilling, British Columbia
8	Mike Patenaude	Foraco, Ontario
9	Zach Purdy	Major Drilling, Manitoba
10	Ashton Van Gool	Team Drilling, Saskatchewan

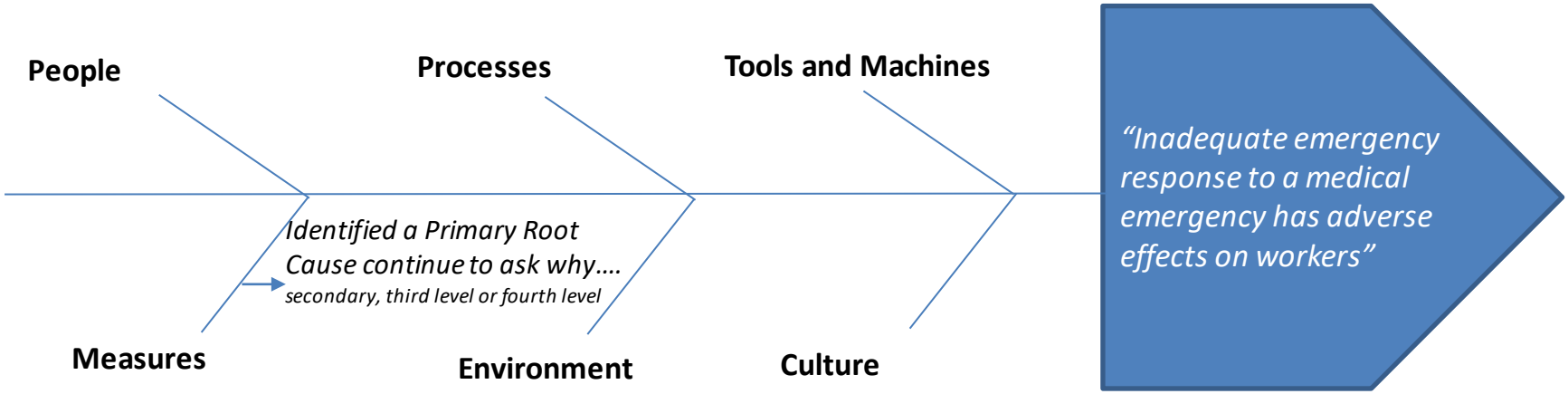
WORKSHOP PARTICIPANTS		
#	Name	Company/Representative
11	Louise Lowe	Canadian Diamond Drilling Association
12	Scott Secord	Ministry of Labour, Immigration, Training & Skills Development
13	Harsim Kalsi	Ministry of Labour, Immigration, Training & Skills Development
14	Rick Schulist	Ministry of Labour, Immigration, Training & Skills Development
15	James Johnstone	Workplace Safety North: Facilitator
16	Tom Welton	Workplace Safety North: Director
17	Tiana Larocque	Workplace Safety North: Tech Support
18	Tricia Valentim	Workplace Safety North: Tech Support

Root Cause Analysis: Risk Statement

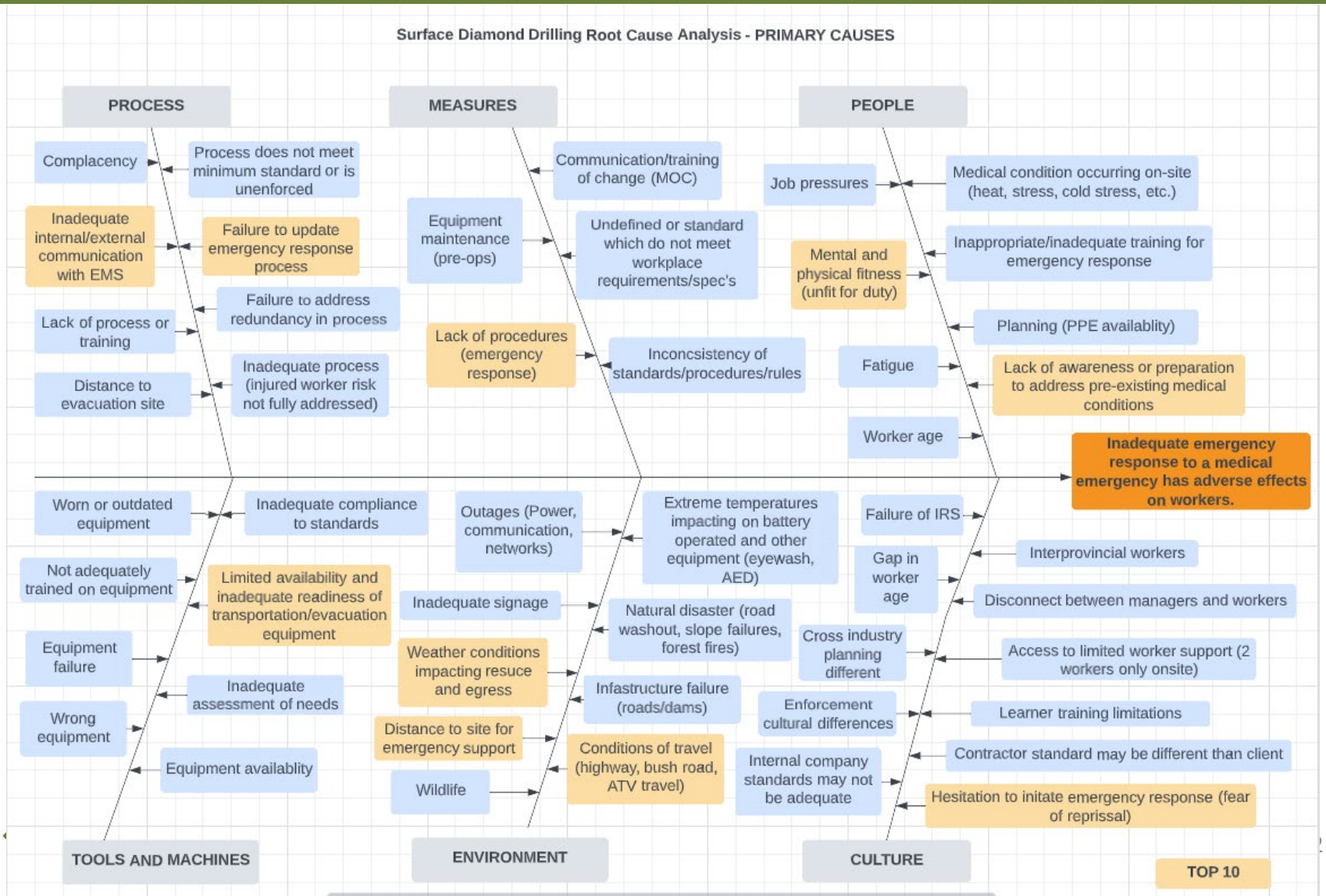
Based on risk assessment results and further analysis, the Root Cause Analysis working group confirmed and developed the following risk statement using the **"Fishbone"** approach addressing

"Inadequate emergency response to a medical emergency has adverse effects on workers."

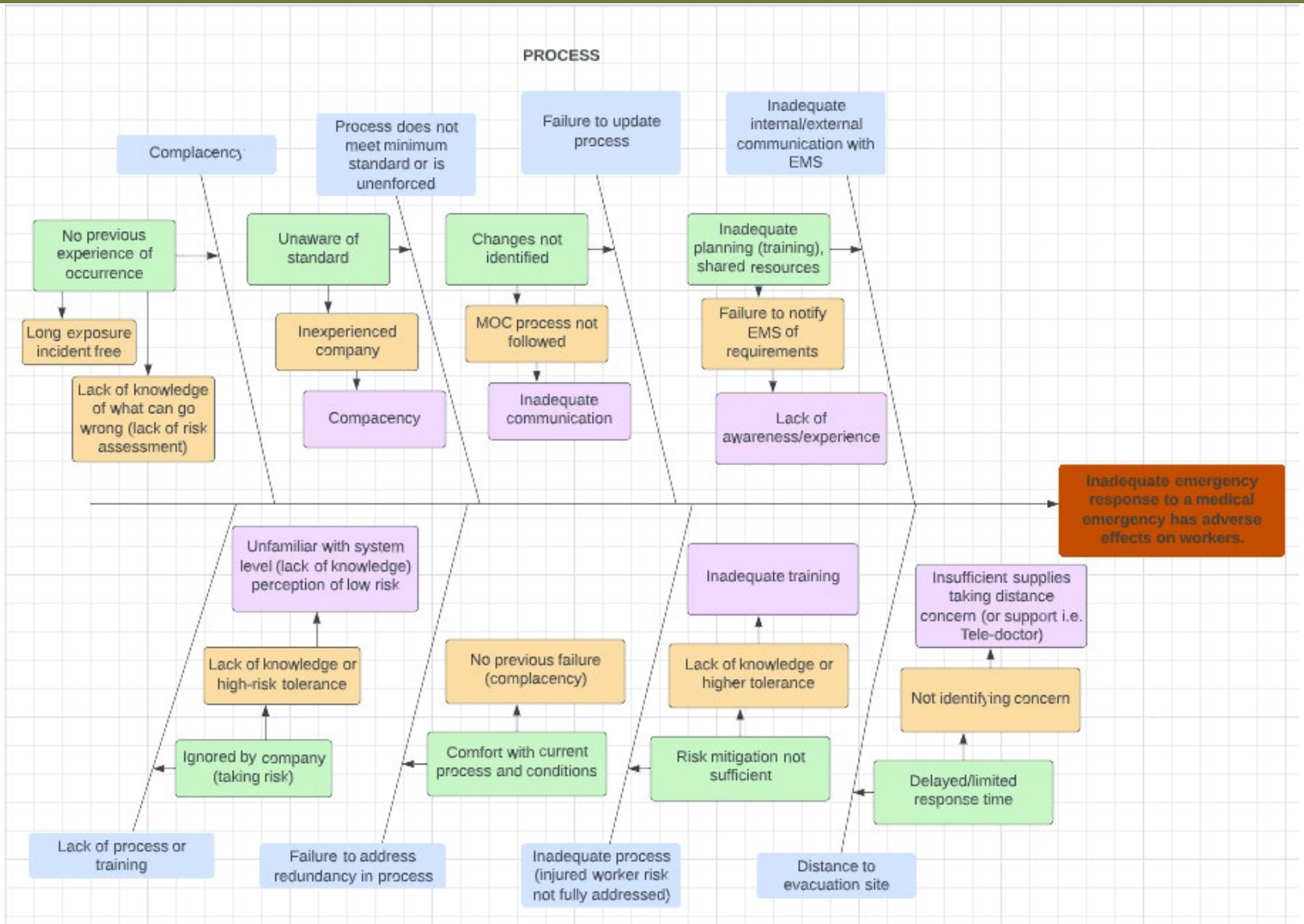
Fishbone Diagram



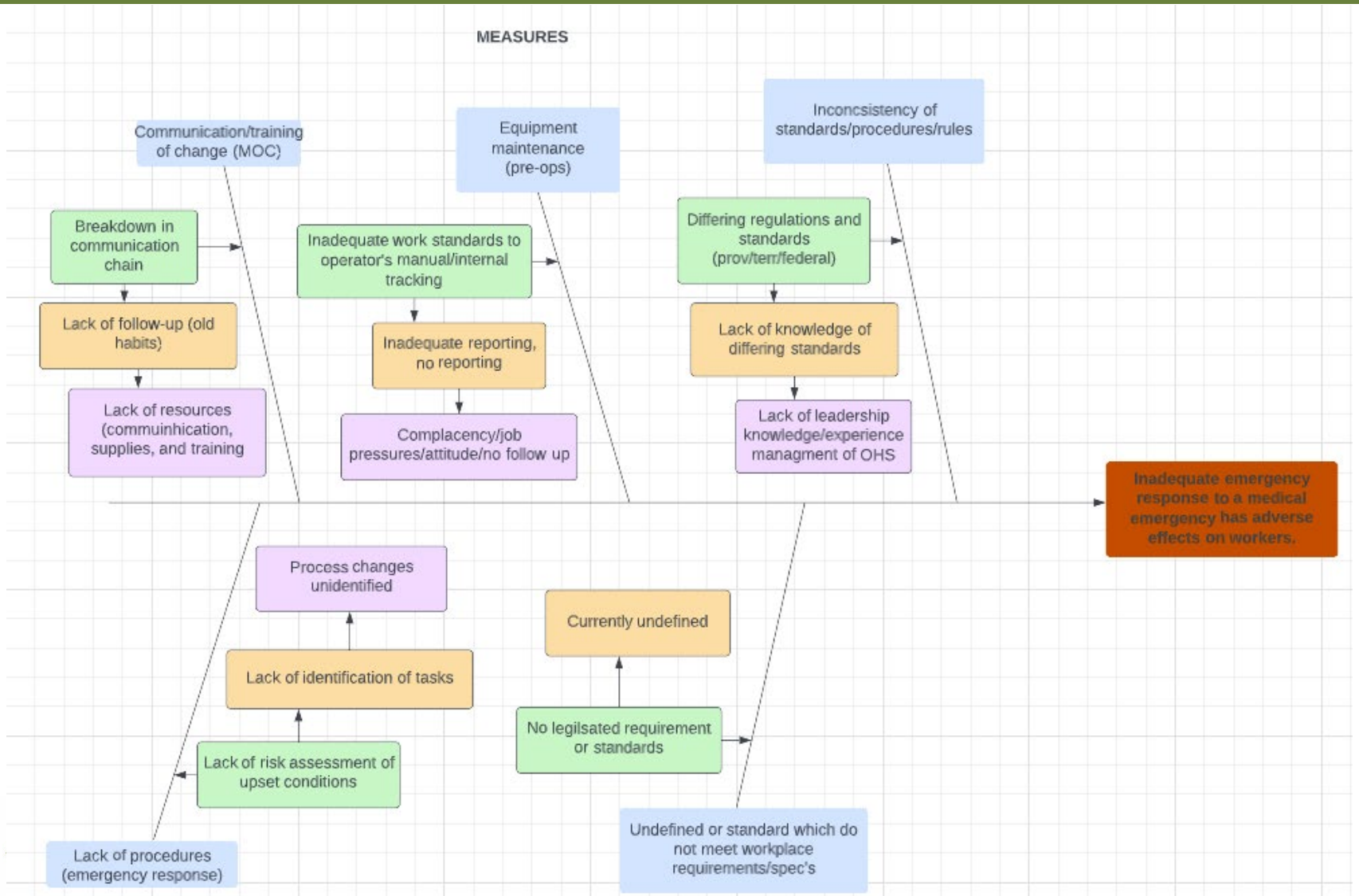
PRIMARY CAUSES



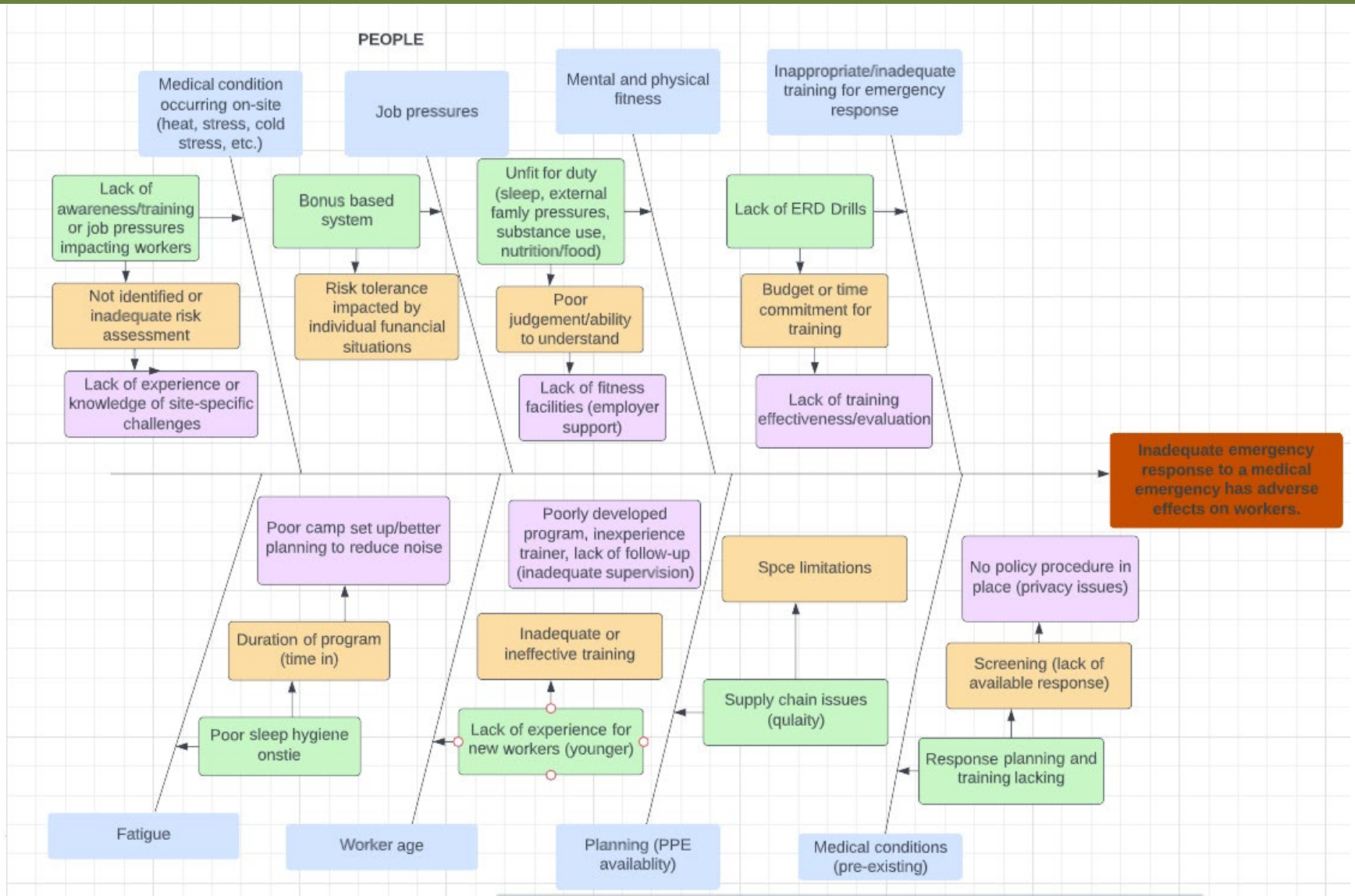
PROCESS


PROCESS
Complacency
Process does not meet minimum standard or is unenforced
Failure to update process
Inadequate internal/external communication with EMS
No previous experience of occurrence
Unaware of standard
Changes not identified
Inadequate planning (training), shared resources
Long exposure incident free
Lack of knowledge of what can go wrong (lack of risk assessment)
Inexperienced company
Compacency
MOC process not followed
Inadequate communication
Failure to notify EMS of requirements
Lack of awareness/experience
Inadequate emergency response to a medical emergency has adverse effects on workers.
Unfamiliar with system level (lack of knowledge) perception of low risk
Lack of knowledge or high-risk tolerance
Ignored by company (taking risk)
Lack of process or training
No previous failure (complacency)
Comfort with current process and conditions
Failure to address redundancy in process
Inadequate training
Lack of knowledge or higher tolerance
Risk mitigation not sufficient
Inadequate process (injured worker risk not fully addressed)
Insufficient supplies taking distance concern (or support i.e. Tele-doctor)
Not identifying concern
Delayed/limited response time
Distance to evacuation site

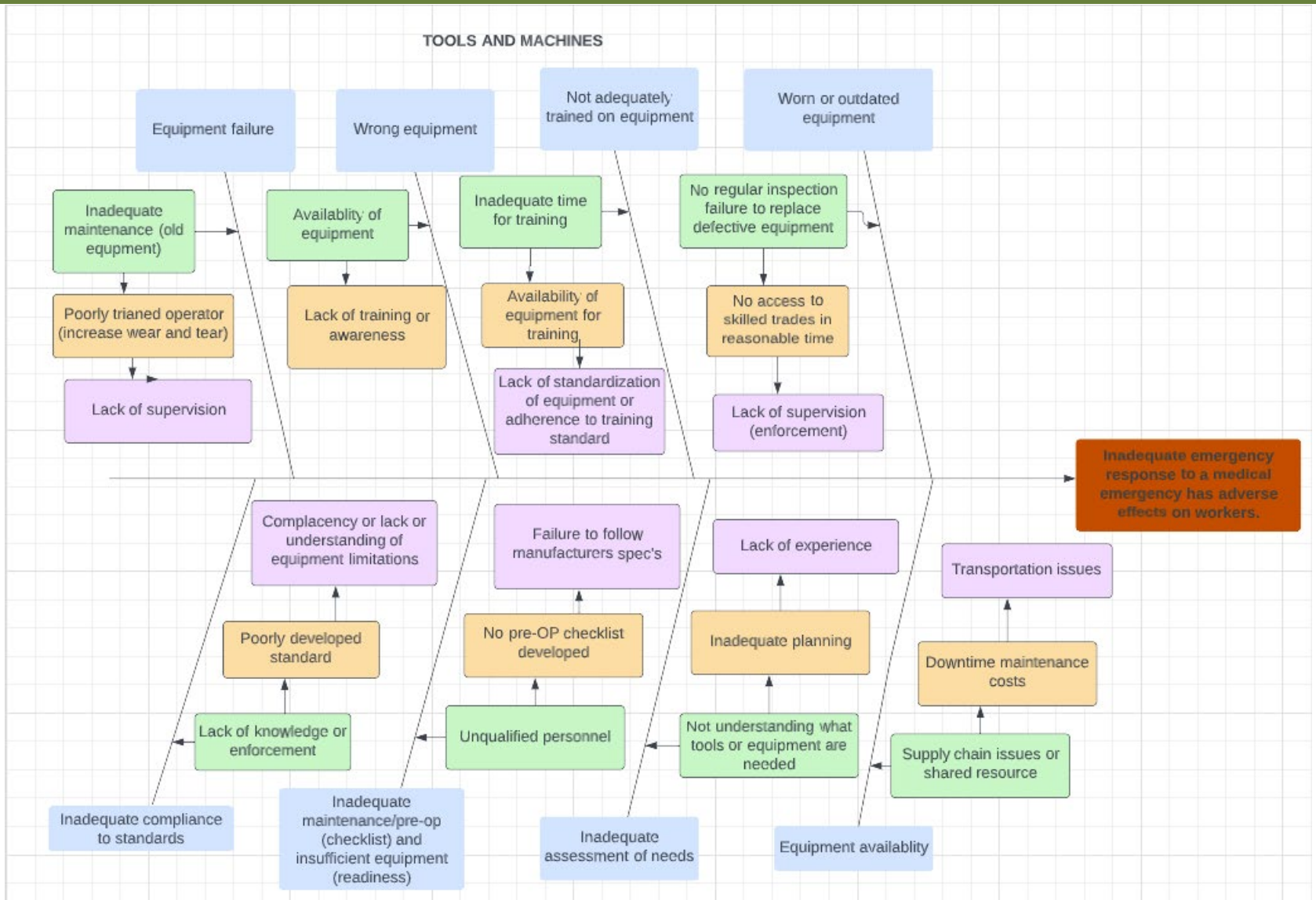
MEASURES


MEASURES
Communication/training of change (MOC)
Equipment maintenance (pre-ops)
Inconcsistency of standards/procedures/rules
Breakdown in communication chain
Inadequate work standards to operator's manual/internal tracking
Differing regulations and standards (prov/terr/federal)
Lack of follow-up (old habits)
Inadequate reporting, no reporting
Lack of knowledge of differing standards
Lack of resources (commuinhication, supplies, and training
Complacency/job pressures/attitude/no follow up
Lack of leadership knowledge/experience managment of OHS
Inadequate emergency response to a medical emergency has adverse effects on workers.
Process changes unidentified
Currently undefined
Lack of identification of tasks
No legilsated requirement or standards
Lack of risk assessment of upset conditions
Undefined or standard which do not meet workplace requirements/spec's
Lack of procedures (emergency response)

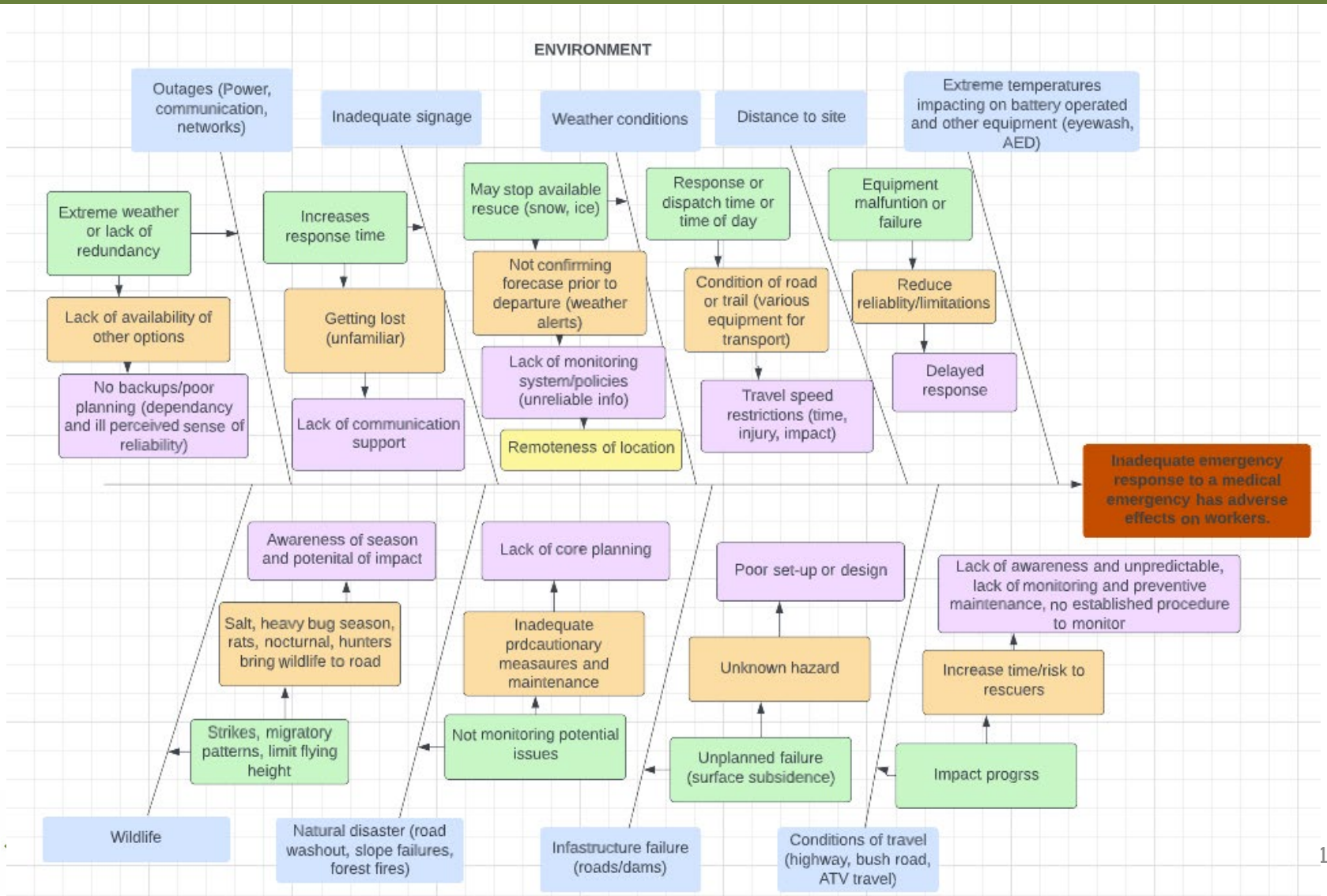
PEOPLE


PEOPLE
Medical condition occurring on-site (heat, stress, cold stress, etc.)
Job pressures
Mental and physical fitness
Inappropriate/inadequate training for emergency response
Lack of awareness/training or job pressures impacting workers
Bonus based system
Unfit for duty (sleep, external famly pressures, substance use, nutrition/food)
Lack of ERD Drills
Not identified or inadequate risk assessment
Risk tolerance impacted by individual funancial situations
Poor judgement/ability to understand
Budget or time commitment for training
Lack of experience or knowledge of site-specific challenges
Lack of fitness facilities (employer support)
Lack of training effectiveness/evaluation
Inadequate emergency response to a medical emergency has adverse effects on workers.
Poor camp set up/better planning to reduce noise
Poorly developed program, inexperience trainer, lack of follow-up (inadequate supervision)
Spce limitations
No policy procedure in place (privacy issues)
Duration of program (time in)
Inadequate or ineffective training
Screening (lack of available response)
Poor sleep hygiene onstie
Lack of experience for new workers (younger)
Supply chain issues (qulaity)
Response planning and training lacking
Fatigue
Worker age
Planning (PPE availablity)
Medical conditions (pre-existing)

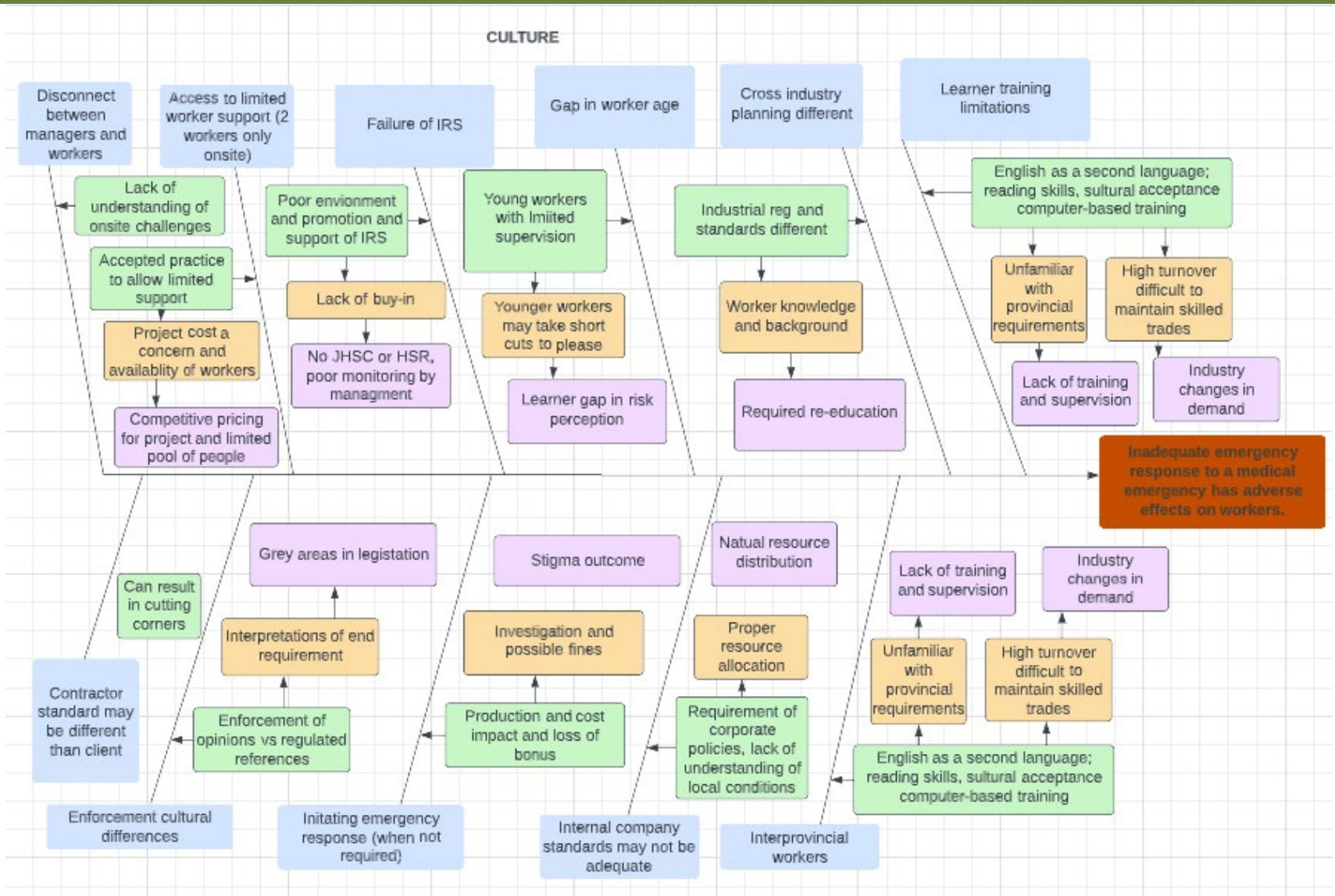
TOOLS AND MACHINES



ENVIRONMENT



CULTURE


CULTURE
Disconnect between managers and workers
Access to limited worker support (2 workers only onsite)
Failure of IRS
Gap in worker age
Cross industry planning different
Learner training limitations
Lack of understanding of onsite challenges
Accepted practice to allow limited support
Project cost a concern and availablity of workers
Competitive pricing for project and limited pool of people
Poor envionment and promotion and support of IRS
Lack of buy-in
No JHSC or HSR, poor monitoring by managment
Young workers with lmiited supervision
Younger workers may take short cuts to please
Learner gap in risk perception
Industrial reg and standards different
Worker knowledge and background
Required re-education
English as a second language; reading skills, sultural acceptance computer-based training
Unfamiliar with provincial requirements
High turnover difficult to maintain skilled trades
Lack of training and supervision
Industry changes in demand
Inadequate emergency response to a medical emergency has adverse effects on workers.
Grey areas in legistation
Can result in cutting corners
Interpretations of end requirement
Enforcement of opinions vs regulated references
Contractor standard may be different than client
Enforcement cultural differences
Stigma outcome
Investigation and possible fines
Production and cost impact and loss of bonus
Initating emergency response (when not required)
Natual resource distribution
Proper resource allocation
Requirement of corporate policies, lack of understanding of local conditions
Internal company standards may not be adequate
Lack of training and supervision
Industry changes in demand
Unfamiliar with provincial requirements
High turnover difficult to maintain skilled trades
English as a second language; reading skills, sultural acceptance computer-based training
Interprovincial workers

Top Primary Causal Factors

Ranking	Category	Primary Root-Cause
1	Processes	Inadequate (internal/external) communication (pre-planning) with Emergency Services
2	Tools and machines	Limited availability and inadequate readiness of transportation/evacuation equipment (transportation/evacuation of injured worker)
3	Measures	Lack of/inadequate emergency response procedures
4	Culture	Hesitation to initiate emergency response (for fear of reprisal; uncertainty as to when to do so)
5	People	Lack of awareness of OR lack of preparation to address crises from pre-existing medical conditions
6	People	Mental and physical fitness (unfit for duty)
7	Environment	Inclement/volatile weather conditions impacting rescue and egress
8	Environment	Excessive distance to emergency support (time, proximity)
9	Environment	Travel conditions (highway, bush road, ATV trail) affecting emergency response
10	Processes	Failure to update emergency response process

Top 10 root causes of inadequate emergency response in surface diamond drilling sector

As identified by workers, supervisors, and employers in the surface diamond drilling industry through a Workplace Safety North-facilitated root cause analysis workshop with the support of the Canadian Diamond Drillers Association.

1. **Inadequate emergency response planning with Emergency Services and workers**

2. **Limited availability and low readiness of transportation and evacuation equipment** (to transport injured worker to transfer point)

3. **Lack of, or inadequate, emergency response procedures**

4. **Hesitate to call for emergency response** (not sure when to call; fear of reprisal)

5. **Lack of awareness or preparation to address an emergency from pre-existing medical conditions**

6. **Mental and physical health** (fit for duty)

7. **Bad weather conditions preventing evacuation**

8. **Lengthy travel distance for emergency services**

9. **Evacuation travel conditions delay emergency response time** (highway, bush road, ATV trail)

10. **Failure to update emergency response process**

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List of Solutions and Controls for the Top Primary Root Causes

Notes:

- Scope of this exercise does not include assessment of listed controls.
- List provides information on specific controls and/or activities that support a control.
- Control performance should be **specific, measurable**, **observable**, and **auditable**

Next Steps: What should we focus on immediately?

Based on controls identified for the Top Primary Causal Factors, it would be beneficial, as a start, to focus right away on the following systemic weaknesses:

Ranking	Category	Primary Root-Cause
1	Processes	Inadequate (internal/external) communication (pre-planning) with Emergency Services
2	Tools and machines	Limited availability and inadequate readiness of transportation/evacuation equipment (transportation/evacuation of injured worker)
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Next Steps: Proactive efforts of the Mining Legislative Review Committee (MLRC)

Following a results presentation to the MLRC, a committee-specific to Surface Diamond Drilling Sector to conduct a detailed review of workshop results. Based on identified primary causal factors, several areas are being looked at to support the establishment of effective controls, including:

- Industry leading practices
- Knowledge of legislation & standards

Thank you for making workplaces safer.

Questions?

Workshop Contacts

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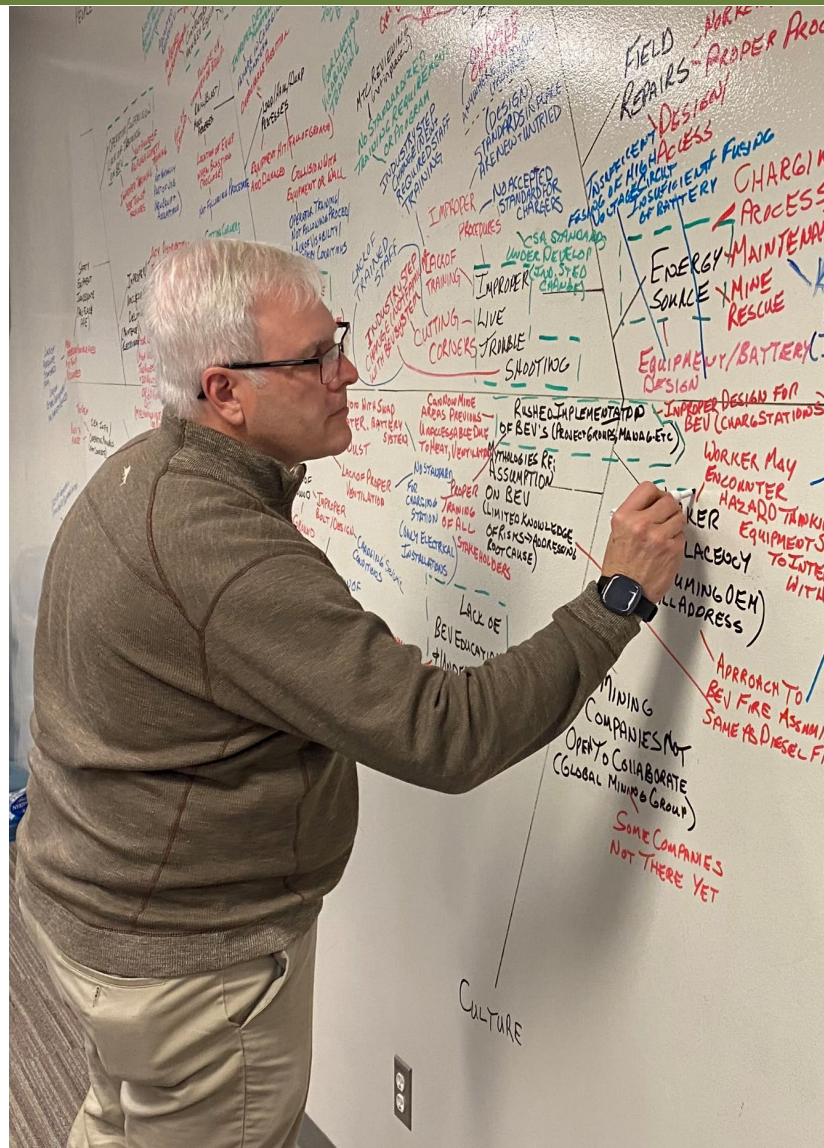

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