Workplace Safety North

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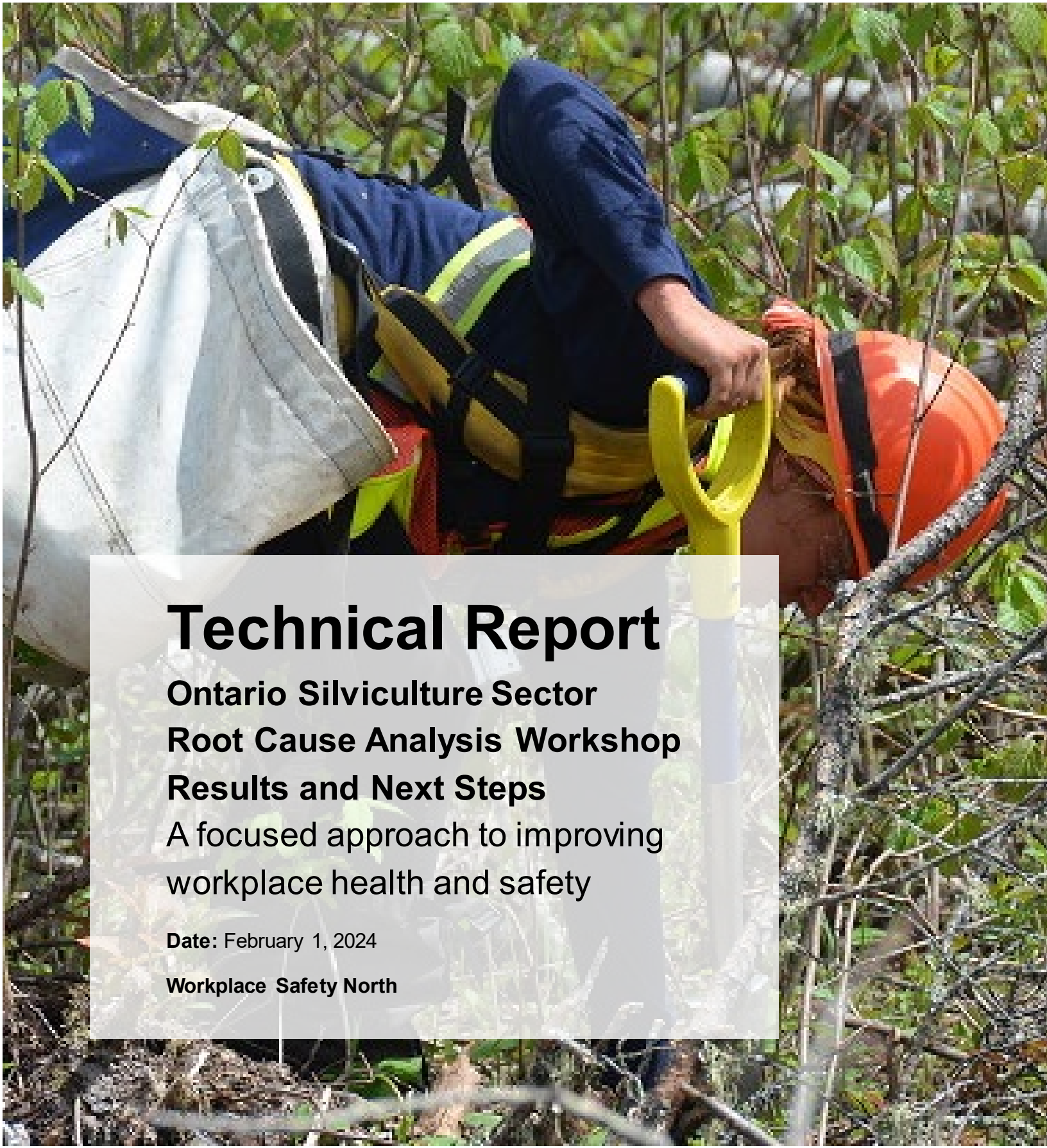

Technical Report

Ontario Silviculture Sector Root Cause Analysis Workshop Results and Next Steps

A focused approach to improving workplace health and safety

Date: February 1, 2024

Workplace Safety North

Technical Paper: Root Cause Analysis report - Environmental factors including exposure to danger trees, wind and weather events, temperature extremes and wildlife

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Executive Summary

A volunteer group of worker and management subject matter experts, met face-to-face to conduct a risk assessment of the hazards in Ontario's silviculture industry, and later, a root cause analysis of its top health and safety risk.

The group of representatives from management, worker, government, and not-for-profit organizations, was facilitated by Sabrina Missere, Health and Safety Specialist at Workplace Safety North (WSN). In advance of the workshop, each industry expert submitted their top health and safety concerns, and during risk assessment workshop, more than 30 identified risks were reviewed and discussed by the group. Both management and worker agreed the top risk was about environmental hazards, factors including exposure to danger trees, wind and weather events, temperature extremes and wildlife.

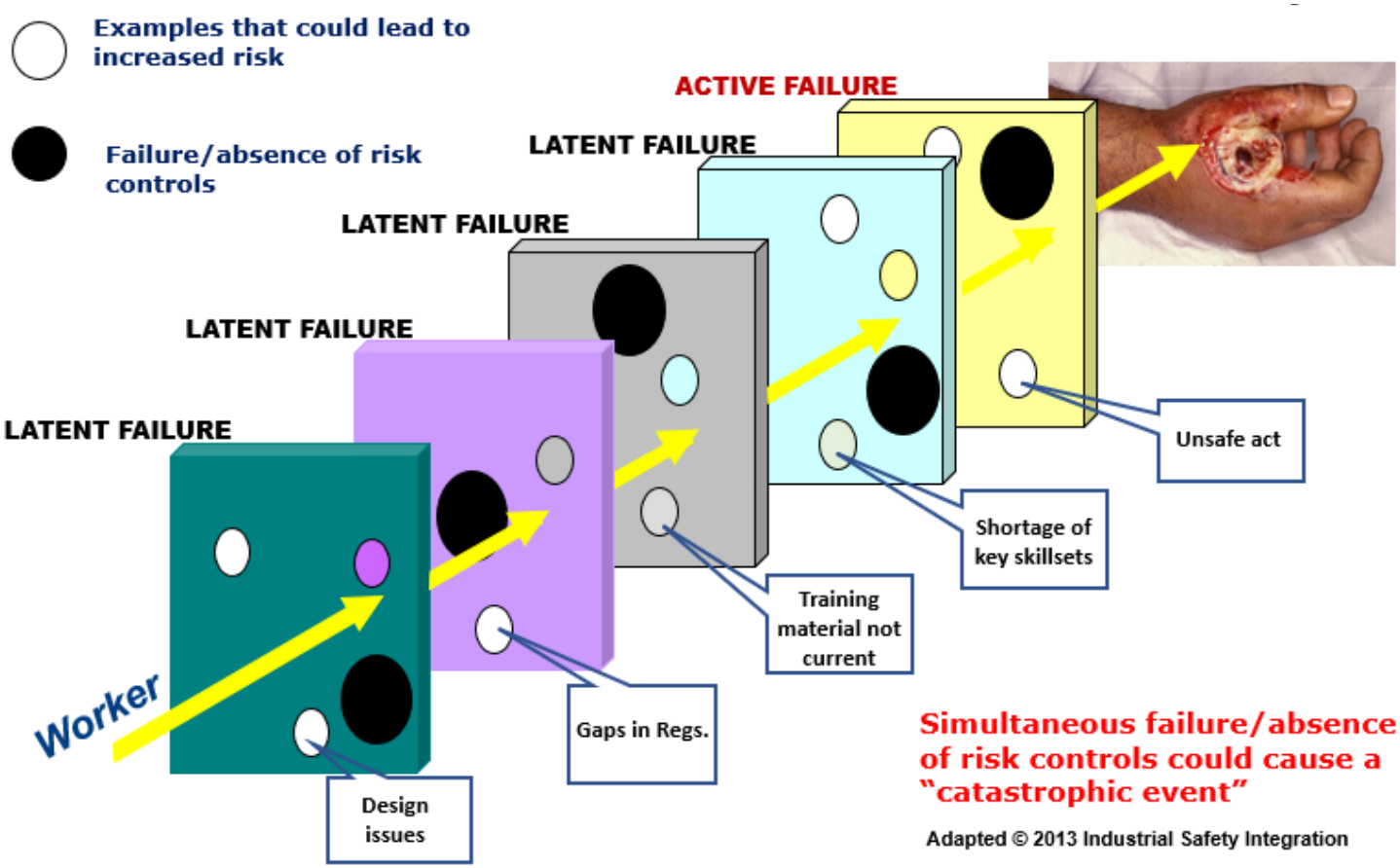
The experts' root cause analysis workshop determined the top 10 causal factors for **"Environmental factors including exposure to danger trees, wind and weather events, temperature extremes and wildlife can have negative impacts on workers."** The top 10 causal factors:

1. Remote work locations limit connectivity
2. Severe weather conditions can affect emergency response
3. Forest management practices increase exposure to danger trees
4. Inconsistent application of work procedures during wind and weather events
5. Inconsistent enforcement of safety practices due to camp culture
6. Lack of consistent sector-specific safety guidelines and resources
7. Worker turnover results in high level of inexperienced personnel
8. Inconsistent risk assessment of environmental hazards
9. Lack of safety program oversight results in higher level of risk acceptance
10. Fatigue, illness and living conditions compromise the ability to recognize hazards

Furthermore, the group of representatives determined specific controls for each. Next steps include an immediate focus on the most common systemic weaknesses. WSN will work with industry to establish a Silviculture Advisory Committee to engage with and provide sector-specific support in advancing:

- Industry leading practices and standards
- Knowledge of leading practices and standards

1. Risk Assessment Project: The Subject of Inquiry



Pictured above: James Reason's Swiss Cheese Model of simultaneous failure, or absence of risk controls, that could cause a "catastrophic event." In this model, when there are latent failures in design, gaps in regulation, outdated training material, shortage of skillsets, and an unsafe act, all the "holes" in the system line-up to potentially cause an incident, including critical injury or fatality.

2. Background: Revisiting the 2023 Risk Assessment Workshop Results

In March 2023, a volunteer group of subject matter experts met face-to-face for a silviculture sector workplace risk assessment at Workplace Safety North (WSN) headquarters in North Bay, Ontario. The workshop with representatives from management, worker, Ministry and Workplace Safety North was facilitated by Sabrina Missere, Health and Safety Specialist at Workplace Safety North (WSN).

In advance of the workshop, each industry expert submitted their top health and safety concerns, and during the one-day workshop, all 34 identified risks were reviewed and discussed by the group.

Various risk categories were discussed, ranging from environmental and driving hazards to emergency preparedness, ergonomics, and psychosocial hazards. The comprehensive list covered potential risks like eye injuries, exposure to hazardous substances, and working around equipment.

The identified risks included not only physical dangers like falling trees and motor vehicle incidents, but also environmental factors such as strong winds. The importance of emergency planning and addressing issues like repetitive strain injuries was highlighted. The workshop results emphasized the need for a comprehensive and proactive approach to ensure a safe working environment.

When it came time for the final vote on the top risks, only actual workers and managers from the silviculture industry were eligible to vote. To ensure an open and fair voting process, handheld electronic devices recorded votes anonymously. Both worker and management agreed: the top risk in Ontario Silviculture sector is dead snag trees or branches, chicots, hang ups, spring poles in cutover falling on workers.

Top 10 health and safety risks in the Ontario Silviculture Sector:

1. Dead snag trees or branches, chicots, hang ups, spring poles in cutover falling on workers
2. Highway traffic incidents (especially those involving transport trucks)
3. Unsafe driving on forestry roads
4. Motor vehicle incidents
5. Strong winds: Standing trees falling on workers in the block
6. Heat stress leading to dehydration
7. ATV, wheel, and track machine incidents (rollover, loss of control, speed, collision, leaving roadway)
8. Wildlife encounters or attacks
9. Lack of emergency planning
10. Musculoskeletal injuries and repetitive strain injuries

This Provincial Silviculture Sector Risk Assessment Workshop successfully brought together industry experts to identify and prioritize health and safety risks. By taking a collaborative approach and considering various perspectives, the workshop created solutions that all stakeholders could support.

Health and safety in the workplace

When the group of industry experts reviewed the risk assessment results, there was discussion around the environmental hazards, 4 of which ranking in the top 10:

1. (1) Dead snag trees or branches, chicots, hang ups, spring poles in cutovers falling on workers.
2. (5) Wind events: standing trees falling on workers in the block with strong winds.
3. (6) Heat stress leading to dehydration while working in hotter environments.
4. (8) Wildlife encounters or attacks resulting in workplace incident.

Note: # in brackets indicates ranking within the top 10 risks

The above identified risks had similar risk categories and contributing factors. Following review and discussion, both industry worker and management members voted and confirmed that that it was worth capturing all 4 identified environmental hazards through the next step: a detailed analysis of the root causes of environmental hazards and the creation of an effective prevention plan put in place to address the primary causal factors of these identified risks.

Using the risk assessment method and analyzing its root causes within the workplace is an extremely effective method to identify leading indicators to allow industry to work more proactively in addressing key concerns.

In November 2023, the group of industry experts met for two days to determine the root cause of environmental factors (exposure to danger trees, wind and weather events, temperature extremes and wildlife) in the workplace, and develop critical controls that can be put in place to address the risks.

3. Root-Cause Analysis: Risk Statement

Based on the results of the silviculture sector risk assessment, the following risk statement was selected by the Workshop Committee Members for Root-Cause Analysis focus using the "Fishbone" approach:

"Environmental factors including exposure to danger trees, wind and weather events, temperature extremes and wildlife can have negative impacts on workers."

4. Root-Cause Analysis Workshop: A Bipartite and Collective Process

- Workshop participants were peer-recognized industry and system experts.
- Workshop process was open, transparent, and collaborative.
- Participants were able to participate in-person or virtually.
- Ranking and prioritization of causal factors was voted on by industry management and worker only; MLITSD and WSN did not vote.

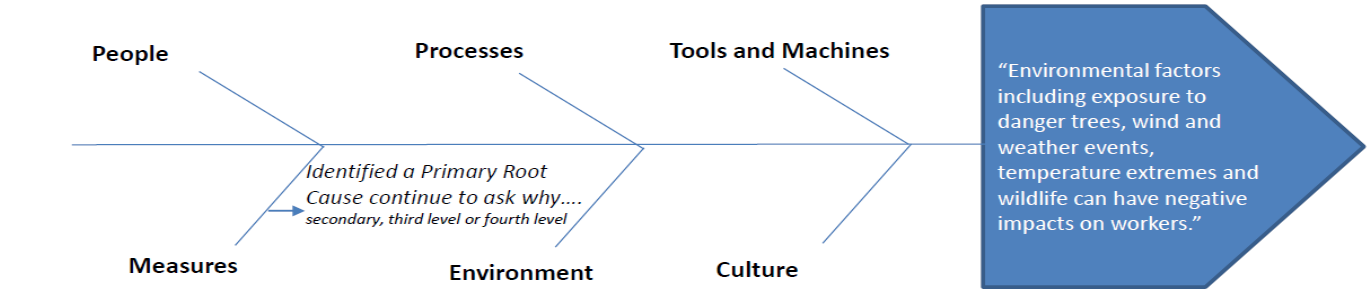
Validation of the results, in addition to workshop subject matter expert participants, included having the results presented and discussed among silviculture industry constituents through a webinar hosted by Workplace Safety North.

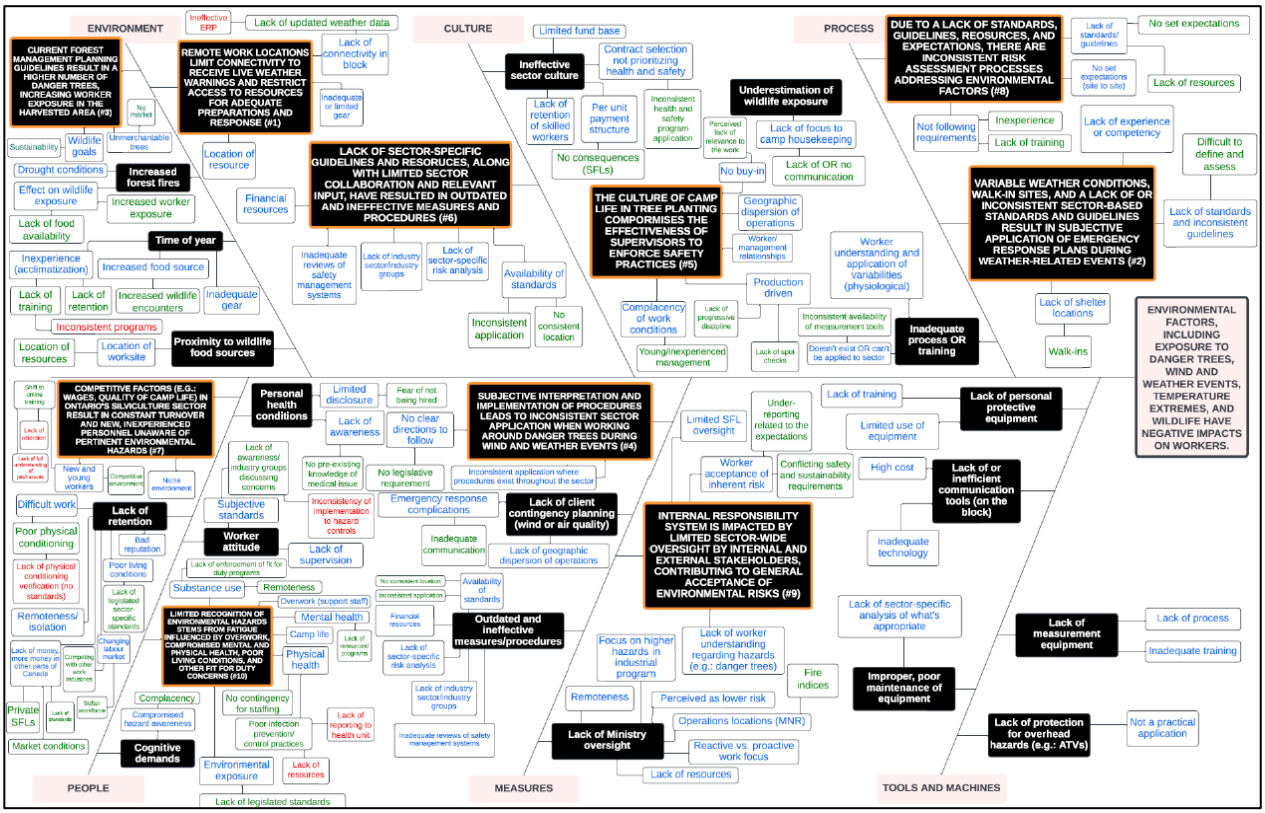
5. Workshop Participants:

Due to the nature and timelines of silviculture operations, the risk assessment and root cause analysis sessions were open to participation at the availability of the industry partners. As such, various industry partners and their worker and management representatives were invited to participate in as many sessions as they were able to. The following industry and system partners included:

- Brinkman Reforestation
- Nedaak Inc.
- First Resource Management
- Outland
- Haveman Brothers Forestry Services
- Resolute FP Canada
- Fisher Wavy Inc.
- Greenmantle Forest Inc.
- Workplace Safety North
- Ministry of Labour

6. "Fishbone" Diagram: Primary Causal Factors





CLOSE-UP of fishbone diagram: Primary causal factors of environmental factors (exposure to danger trees, wind and weather events, temperature extremes and wildlife) focused on six key workplace factors including: People, Environment, Measures, Culture, Process and Tools and Equipment.

28 Primary Causal Factors Identified by Category

#	Category	Primary Root-Cause
1	Environment	Remote work
2	Process	Emergency response plan - No/lack of considerations of wind, weather, etc.
3	Environment	Forest management plan requirement (chicots)
4	Measures	No consistent procedures (danger trees, wind/weather)
5	Culture	Poor enforcement of measures and procedures
6	Culture	Outdated and ineffective measures/procedures
7	People	Inexperience
8	Process	Inconsistent risk assessment processes
9	Measures	Lack of IRS (management presence)
10	People	Fatigue
11	Tools and machines	Lack of or inefficient communication tools
12	Process	Inadequate process or training
13	Culture	Ineffective sector culture
14	Environment	Increased forest fires
15	Tools and machines	Inadequate personal protective equipment
16	People	Lack of retention
17	People	Worker attitude
18	People	Personal health conditions
19	Environment	Time of year
20	Tools and machines	Improper, poor maintenance of equipment
21	Measures	Outdated and ineffective measures/procedures
22	Measures	Lack of Ministry oversight
23	Culture	Underestimation of wildlife exposure
24	People	Cognitive demands
25	Tools and machines	Lack of measurement equipment
26	Measures	Lack of client contingency planning (wind or air quality)
27	Environment	Proximity to wildlife food sources
28	Tools and machines	Lack of protection for overhead hazards (e.g.: ATVs)

7. Top 10 Primary Causal Factors:

#	Category	Primary Root-Cause
1	Environment	**Remote work**
2	Process	**Emergency response plan - No/lack of considerations of wind, weather, etc.**
3	Environment	**Forest management plan requirement (chicots)**
4	Measures	**No consistent procedures (danger trees, wind/ weather)**
5	Culture	**Poor enforcement of measures and procedures**
6	Culture	**Outdated and ineffective measures/procedures**
7	People	**Inexperience**
8	Process	**Inconsistent risk assessment processes**
9	Measures	**Lack of IRS (management presence)**
10	People	**Fatigue**

Following a review of the Top 10 Primary Causal Factors, the industry group of subject matter experts began to develop controls that could be put in place for such factors and address the risk of environmental hazards causing harm to workers in the workplace.

8. Critical controls to address primary causal factors of Environmental Hazards

Note: Control lists are not in any order of priority

1. ENVIRONMENT: Remote work locations limit connectivity to receive live weather warnings and restrict access to resources for adequate preparation and response.

- Use of Garmin units (or equivalent) to monitor weather
- Policy: Manager notifies supervisor of weather pattern fluctuations (further chain of communication to be clarified in policy for worker awareness).
- 24-hour two-way communication policy.
- Ensure functional satellite phones are available on every block.
- Working alone policy and procedure (ensure enforcement).
- Radio usage for solitary workers in remote areas.
- Encourage Ministry of Natural Resources and Forestry to make available a merged online map with active fires with weather station data (make layers accessible to industry)

2. PROCESS: Variable weather conditions, walk-in sites, and a lack of or inconsistent sector-based standards and guidelines result in subjective application of emergency response plans during weather-related events.

- Establishment of a silviculture advisory committee to formulate sector-based standards and guidelines and training.
- Encourage SFLs to examine site-specific emergency response plans (on a weekly/monthly basis).
- Encourage SFLs to require scheduled drills to test ERPs and determine gaps for continuous improvement.
- Development of a standard template for emergency drill documentation to be disseminated to firms (see SWO).
- Make Safe Workplace Ontario (SWO), or equivalent third-party certified health and safety program mandatory
- Encourage SFLs to factor in considerations for renewal when making access plans for blocks (post-work assessment); encourage MNRF enforcement.
- Advise MNRF of this issue (advisory committee to be apprised)
- Development of contingency/shelter-in-place plans.
- Requirements for enhanced first aid response in remote areas; potentially include first response personnel (e.g.: medical first aid responder Level 2).
- Encourage mandatory training regarding wilderness first aid.

3. ENVIRONMENT: Current forest management planning guidelines result in a higher number of danger trees, increasing worker exposure in the harvested area.

- Alert the MNRF and the MLITSD of the existence of this problem; encourage a formal risk assessment.
- Establishment of a silviculture advisory committee to examine forest management planning guidelines.
- Messaging or enforcement of current rules regarding windfirm trees.
- HSAs (WSN) to create/disseminate alerts/bulletins pertaining to hazards associated with danger trees.
- Ensure harvesting contractors are aware of requirements.
- Dialogue among all parties associated with one project: combined pre- and post-work assessment.

4. MEASURES: Subjective interpretation and implementation of procedures leads to inconsistent sector application when working around danger trees during wind and weather events.

- Establishment of a silviculture advisory committee to formulate standard procedures addressing working near danger trees/around weather events.
- Encourage SFLs to ensure contractors have appropriate measures in place.

5. CULTURE: The culture of camp life in tree planting compromises the effectiveness of supervisors to enforce safety practices.

- Supervisory/management training.
- Encourage SFLs to make mandatory supervisory training.
- Encourage mentorship training
- Establishment of a silviculture advisory committee to recommend appropriate supervisor training (both management and worker reps).
- Encourage accommodation for different needs such as daycare in camps or remote work for specific tasks.
- Require risk assessments around environmental factors in the field with the workers

6. CULTURE: Lack of sector-specific guidelines and resources, along with limited sector collaboration and relevant input, have resulted in outdated and ineffective measures and procedures.

- Establishment of a silviculture advisory committee to recommend appropriate supervisor training (both management and worker reps).
- Establish PPE guidelines based on risk assessment
- Worker engagement on what is working and what is not working and why (surveys)
- Establish stop work guidelines based on environmental conditions

7. PEOPLE: Competitive factors (e.g.: wages, quality of camp life) in Ontario's silviculture sector results in constant turnover and new, inexperienced personnel unaware of pertinent environmental hazards.

- Establishment of a silviculture advisory committee to review wage and camp living conditions to make tree planting in Ontario a sustainable industry.
- Consistent training module across the province in environmental hazards
- Encourage SFL's to ensure that companies are training their employees, emphasis for new, on their rights and prove it
- Establish a tree planters bill of rights for consistency
- Testing competencies to help identify gaps in knowledge
- Danger tree assessment (WorkSafe BC)
- Make mandatory alerts to public health units, MNRF, and MLITSD regarding the existence of tree planting camps and their locations, including in contract language

8. PROCESS: Due to a lack of standards, guidelines, resources, and expectations, there are inconsistent risk assessment processes addressing environmental factors.

- Silviculture advisory committee to work toward the development of a standardized risk assessment (and accompanying guidelines and training for its use) on:
  a) Danger trees (see WorkSafe BC)
  b) Wind and weather events
  c) Air quality (wildfire and smoke)
  d) Extreme temperatures as they apply to silviculture (e.g.: seasonal considerations; narrow timelines to complete contract work)
  e) Wildlife

9. MEASURES: Internal responsibility system is impacted by limited sector-wide oversight by internal and external stakeholders, contributing to general acceptance of environmental risks.

- Silviculture advisory committee helping to engage MLITSD, SFL's, MNRF and management and worker representation for consistency with:
  a) company accountabilities
  b) training of new supervisors
  c) measures and procedures based on standards and guidelines, risk assessments

10. PEOPLE: Limited recognition of environmental hazards stems from fatigue influenced by overwork, compromised mental and physical health, poor living conditions, and other fit for duty concerns.

- Realistic job expectations, appropriate workload for management
- Anyone operating a vehicle should follow hours of service whether they are CVOR or not
- Minimum living conditions
- Establishing psychological risk assessment and mental health resource training
- Back up for individuals who are sick
- Allowing days off to minimize burnout
- Establishing Fit for duty policies and procedures
- Working alone policies and procedures
- Training on employee rights
- Work condition programs and MSDs prevention
- Infection control programs and practices

9. Next Steps: What should be focused on immediately

The group of representatives determined specific controls for each. Next steps include an immediate focus on the most common systemic weaknesses. WSN will work with industry to establish a Silviculture Advisory Committee to engage with and provide sector-specific support in advancing:

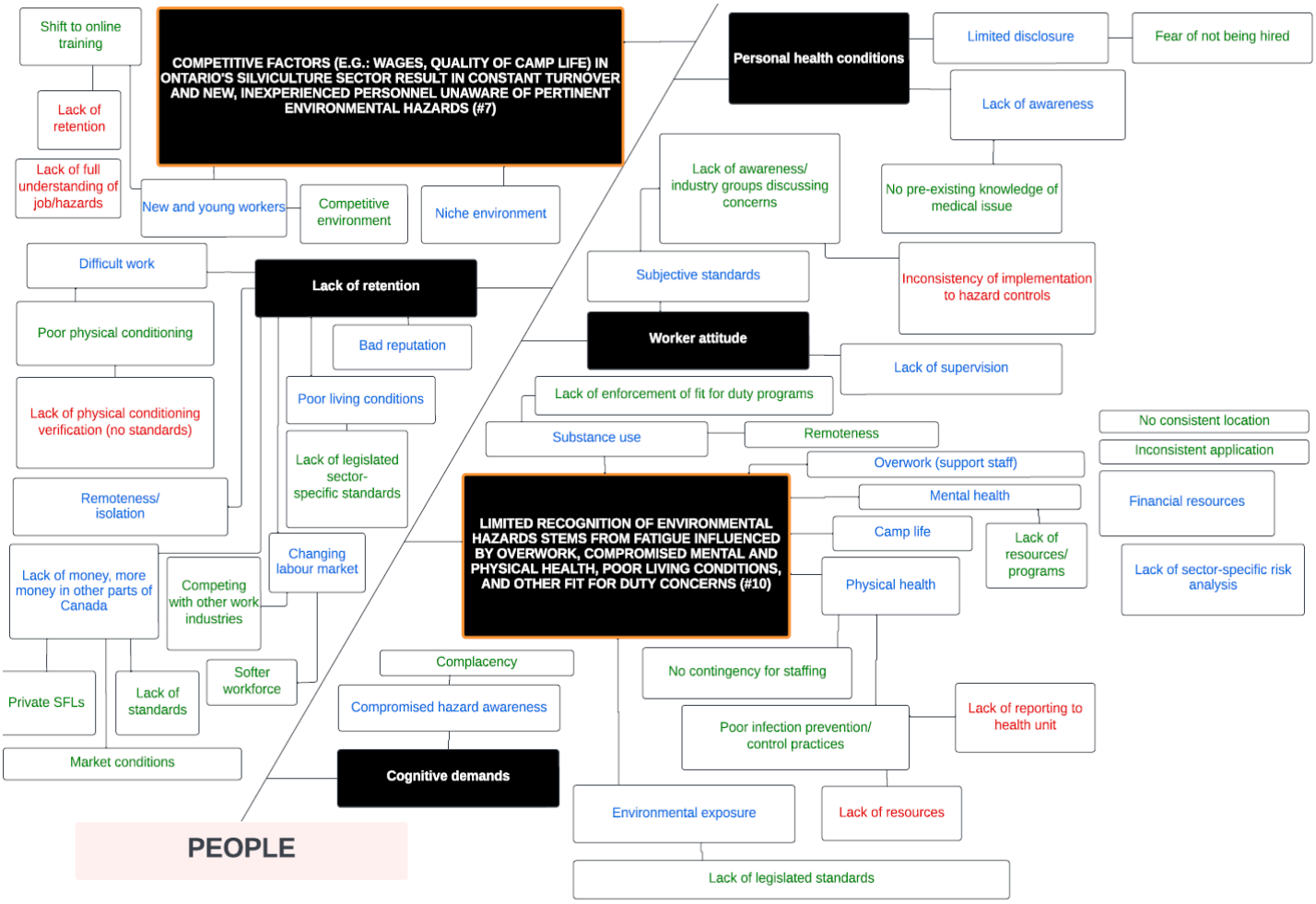
- Industry leading practices and standards
- Knowledge of leading practices and standards

10. References

1. Top 10 Health and Safety Risk in Silviculture Operations 2023:
Top 10 Health and Safety Risks in Silviculture Sector | Workplace Safety North

2. Root Cause Analysis Results (Appendices)

11. Appendix I –VI: "Fishbone Diagram" for Primary, Secondary, Tertiary and Quaternary Causal Factors



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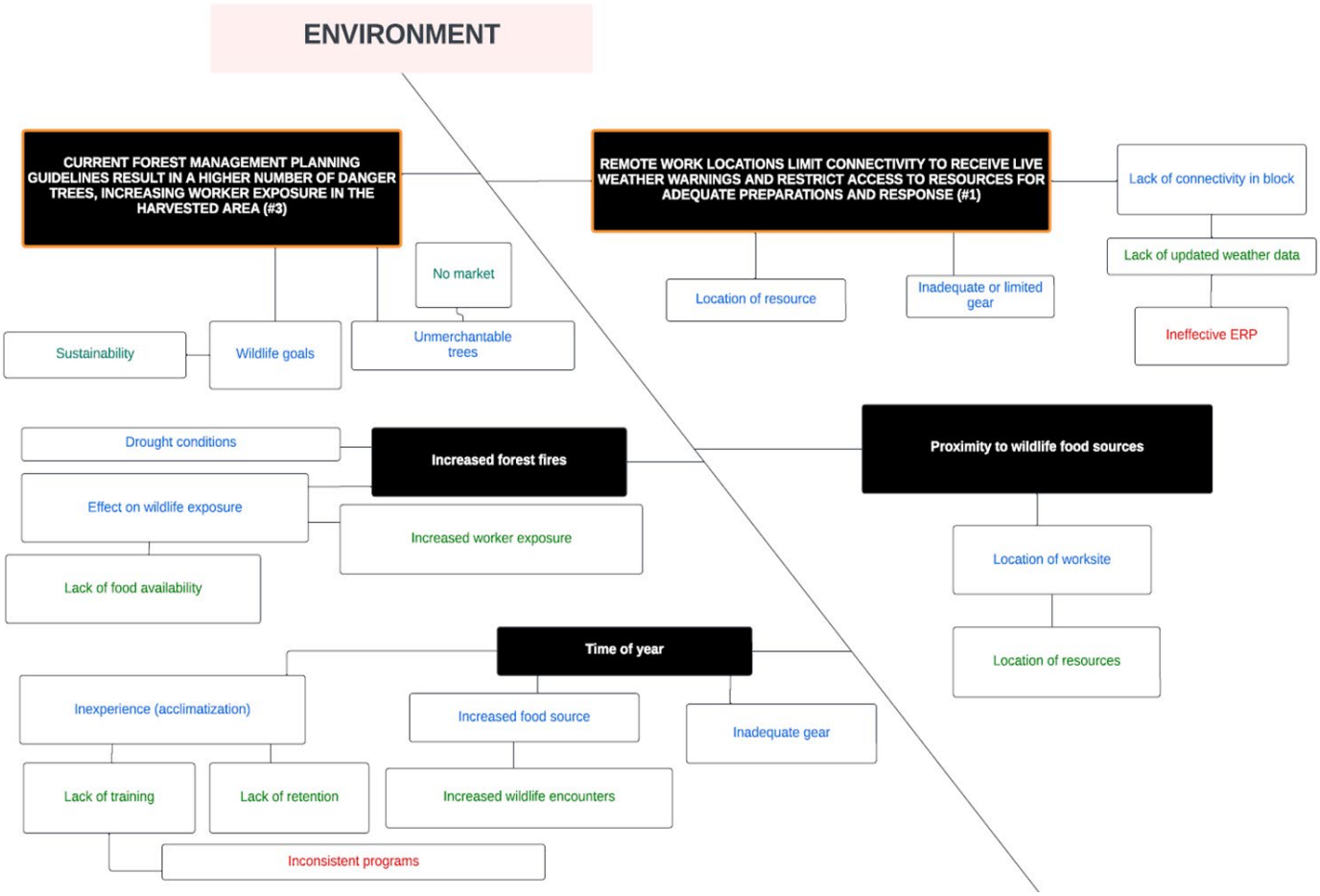

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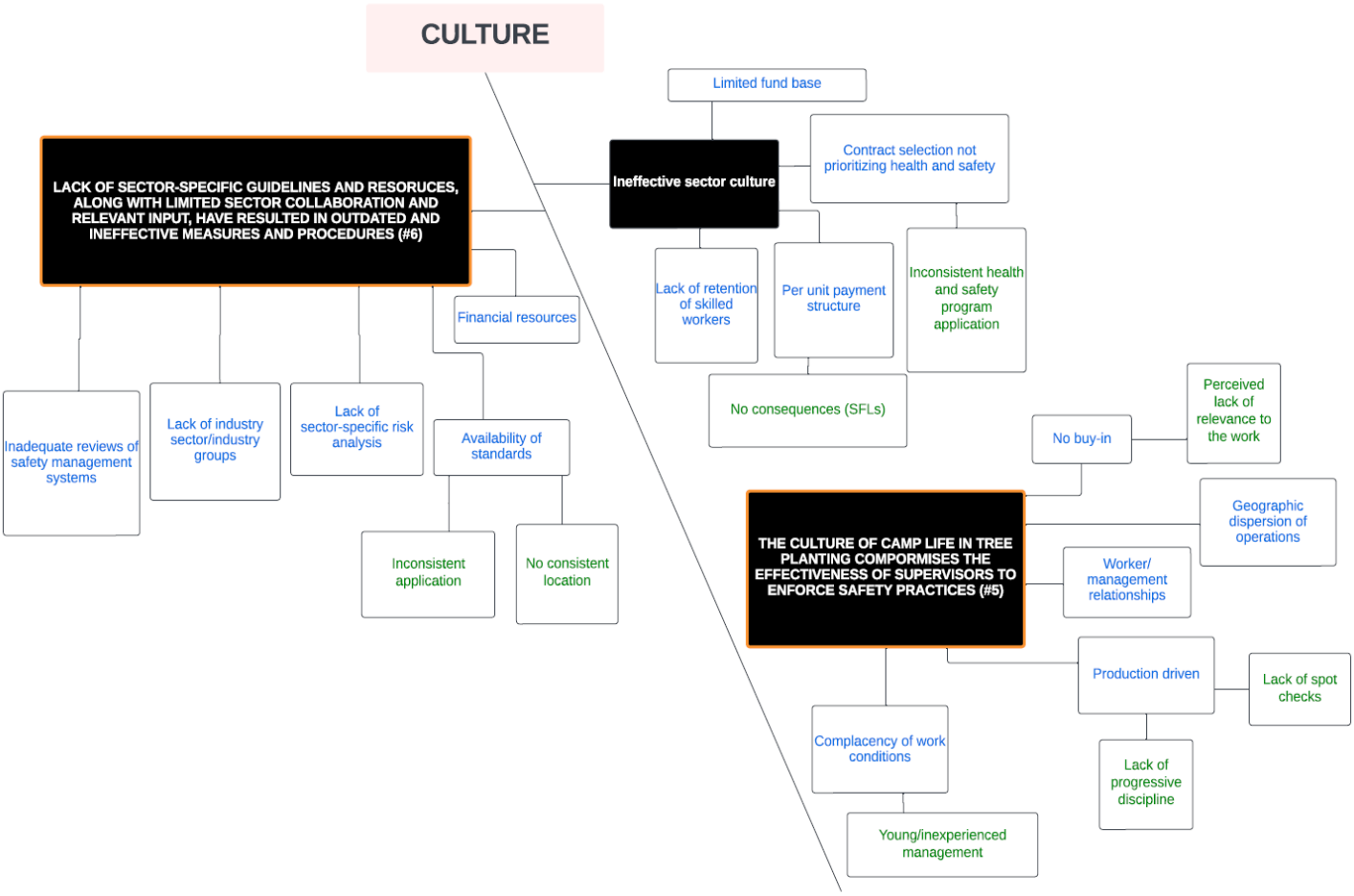

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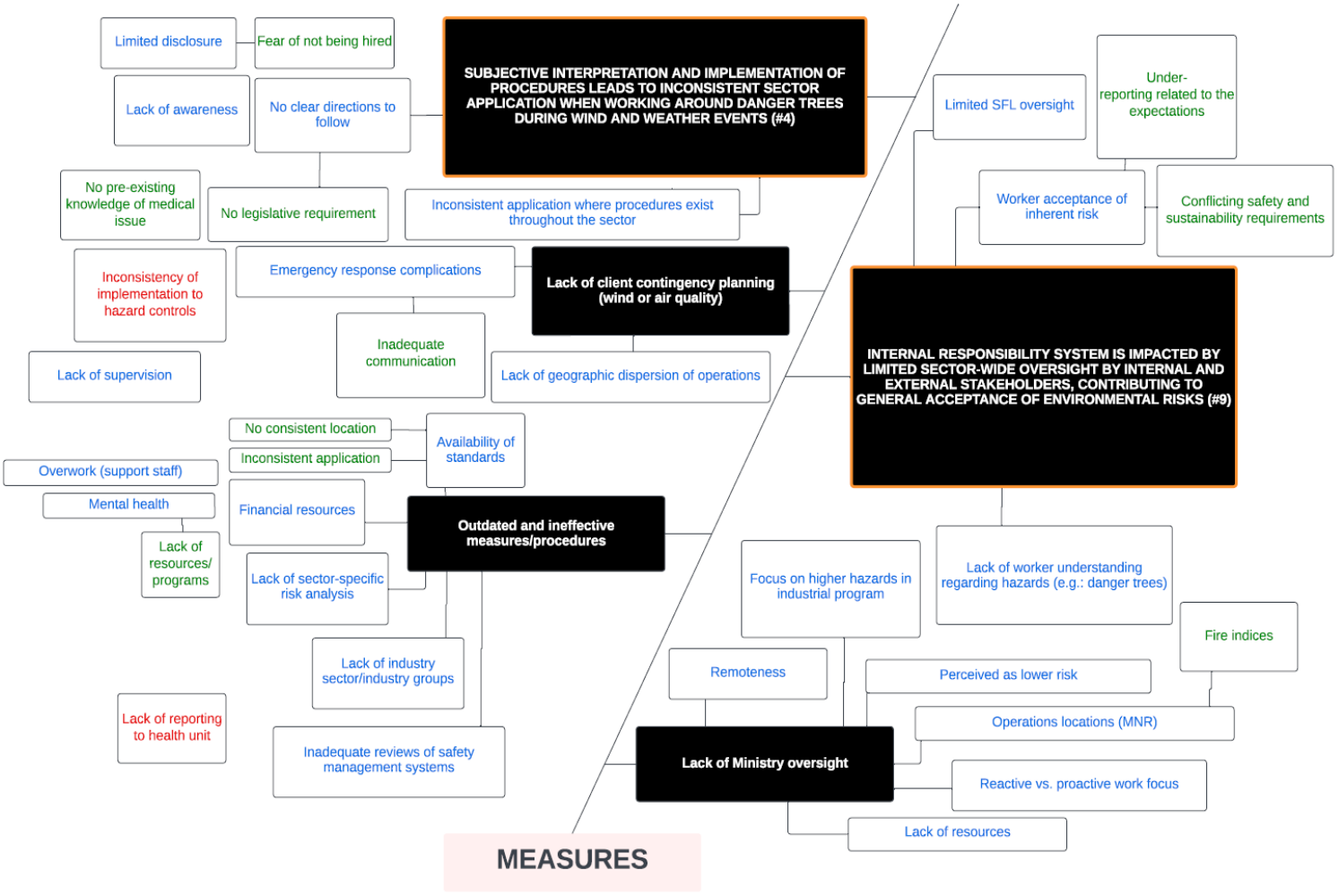

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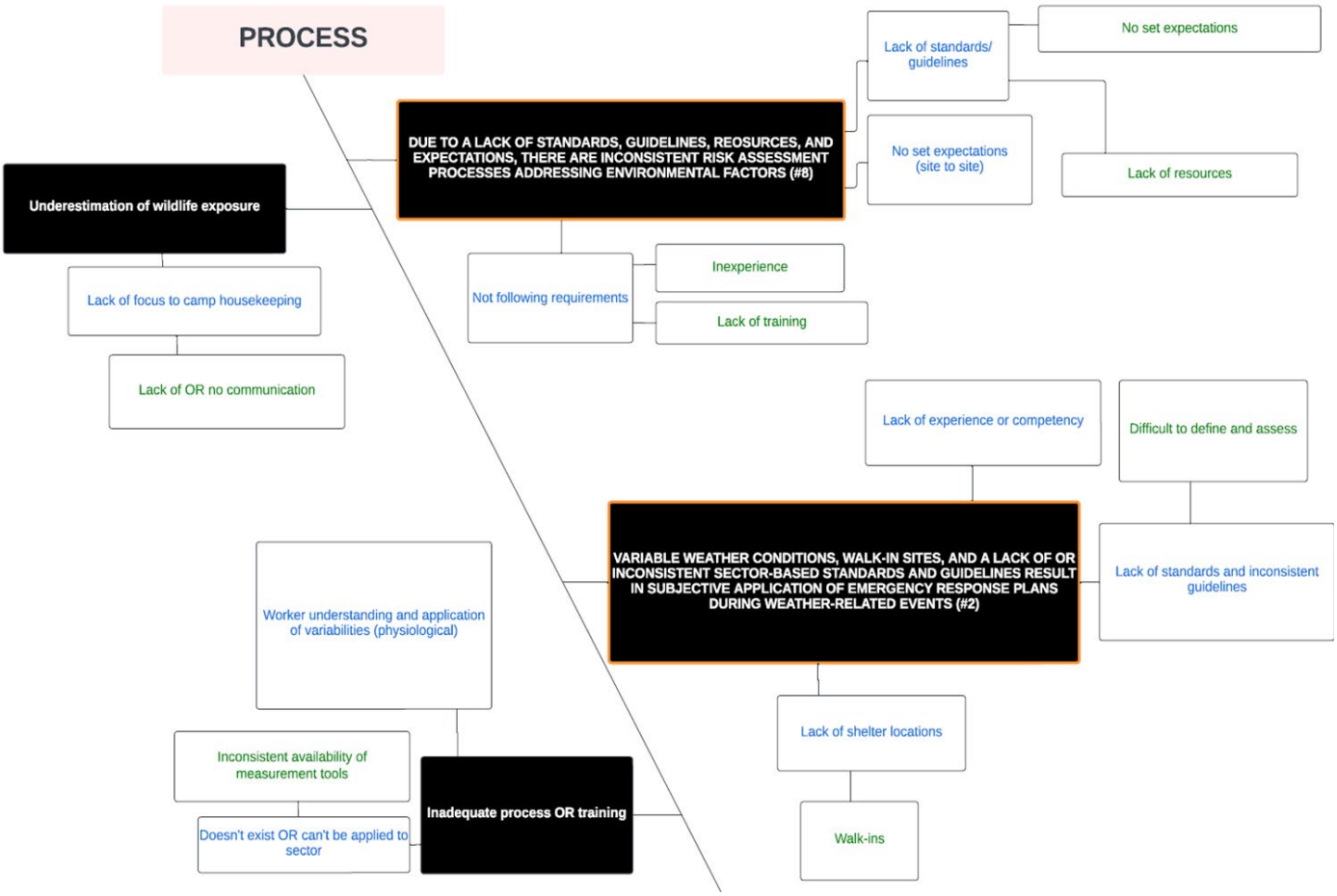

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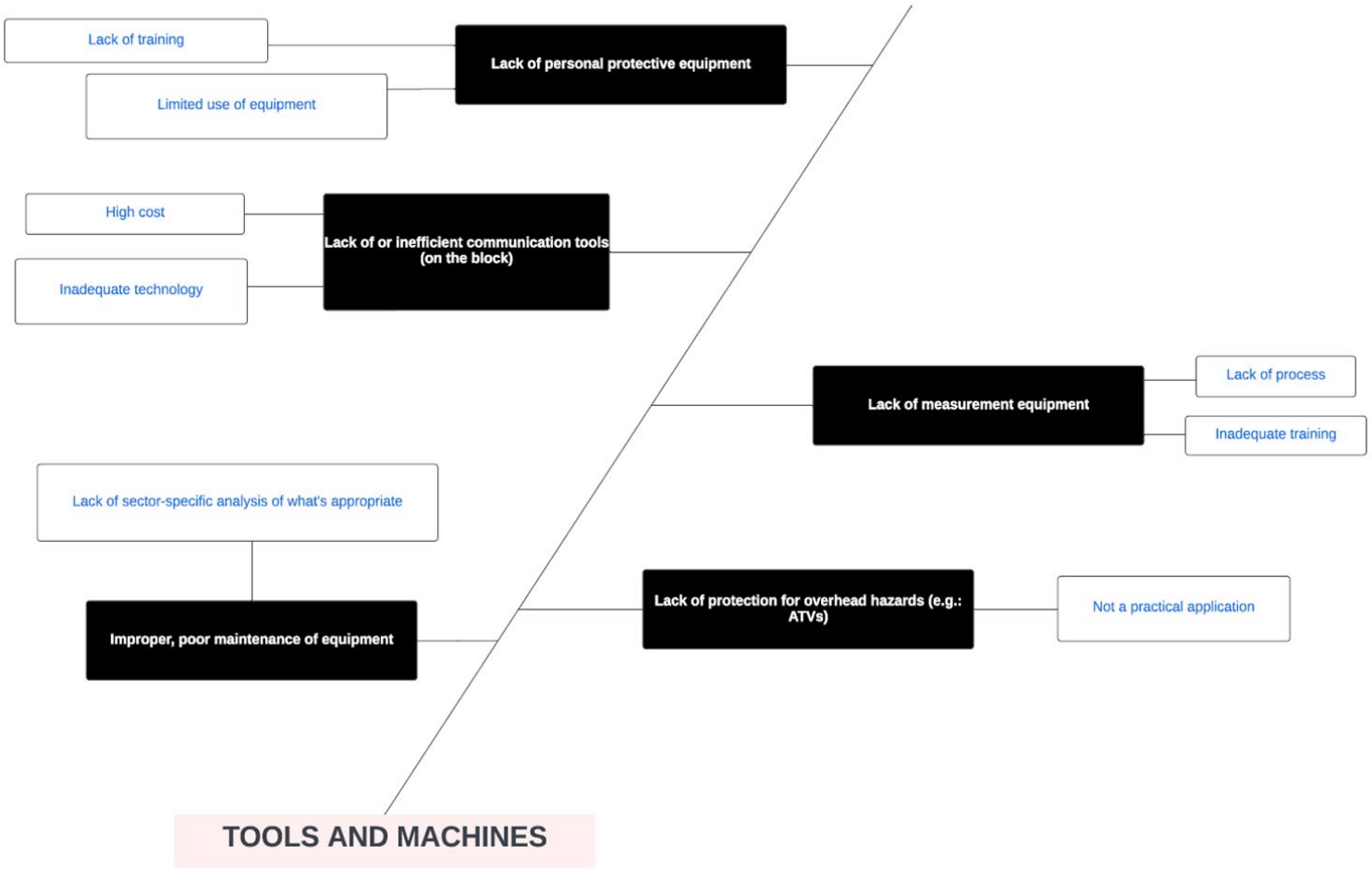

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12. Appendix A: Risk Assessment Methods/Standards

1. Bayesian Analysis
2. Bow-tie analysis
3. Brainstorming (e.g. what-if)
4. Business impact analysis
5. Cause and effect analysis
6. Checklists
7. Computer Hazard and Operability Studies (CHAZOP)
8. Consequence Analysis (also called Cause-Consequence Analysis)
9. Likelihood/Consequence matrix
10. Construction Hazard Assessment and Implication Review (CHAIR)
11. Decision tree
12. Delphi technique
13. Energy Barrier Analysis (or Energy Trace Barrier Analysis)
14. Environmental risk assessment
15. Event tree analysis
16. Failure Mode and Effect Analysis (FMEA)
17. Failure mode, effect and criticality analysis
18. Fault Tree Analysis
19. Fishbone (Ishikawa) Analysis
20. Hazard analysis and critical control points
21. Hazard and Operability studies (HAZOP)
22. Human reliability analysis
23. Job Safety Analysis (JSA)
24. Level of Protection Analysis (LOPA)
25. Markov analysis
26. Monte Carlo
27. Preliminary Hazard Analysis (PHA)
28. Reliability centered maintenance
29. Scenario analysis
30. Sneak circuit analysis
31. Structured/semi-structured interviews
32. SWIFT (i.e. structured what-if)
33. Systemic Cause Analysis Technique (SCAT)
34. Human Error Analysis (HEA)
35. Workplace Risk Assessment and Control (WRAC

Risk Management Standards:

1. Risk Management Principles and Guidelines (ISO 31000:2009)
2. Risk Assessment Techniques (ISO/IEC 31010:2009)
3. OH&S Hazard Identification and Elimination and Risk Assessment and Control (CSA Z1002)
4. Process Safety Management (CSA Z767-17)
5. Enterprise Risk Management (COSO 2004)
6. Global Minerals Industry Risk Management (GMIRM)
7. International Council on Mining & Metals (ICMM)

13. **Appendix B**: Workshop Contacts

For additional information or questions, please contact:

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14. Appendix C: Poster: Top 10 health and safety risks in Silviculture Sector

15. Appendix D: Poster: Top 10 Root Causes of Environmental Hazards in Silviculture Sector

16. Appendix E: Root Cause Analysis: Passenger Vehicle Driving Hazards

1. Background: Additional Root Cause Analysis conducted by members

Upon review of the top 10 health and safety risks, it was identified that risk numbers 2, 3, 4 and 7 related to driving hazards. Worker and management representatives decided it would be beneficial to conduct an additional Root-Cause Analysis to better understand the causal factors related to driving, with emphasis on passenger vehicles in the silviculture sector.

Top 10 health and safety risks in the Ontario Silviculture Sector:

1. Dead snag trees or branches, chicots, hang ups, spring poles in cutover falling on workers
2. Highway traffic incidents (especially those involving transport trucks)
3. Unsafe driving on forestry roads
4. Motor vehicle incidents
5. Strong winds: Standing trees falling on workers in the block
6. Heat stress leading to dehydration
7. ATV, wheel, and track machine incidents (rollover, loss of control, speed, collision, leaving roadway)
8. Wildlife encounters or attacks
9. Lack of emergency planning
10. Musculoskeletal injuries and repetitive strain injuries

This two-day root cause analysis took place January 29th and February 8th and followed the same process as the previous session.

2. Root-Cause Analysis: Risk Statement

Based on the results of the silviculture sector risk assessment, and the decision to conduct a second Root-Cause Analysis workshop, the worker and management representatives identified the following risk statement to focus on using the "Fishbone" approach:

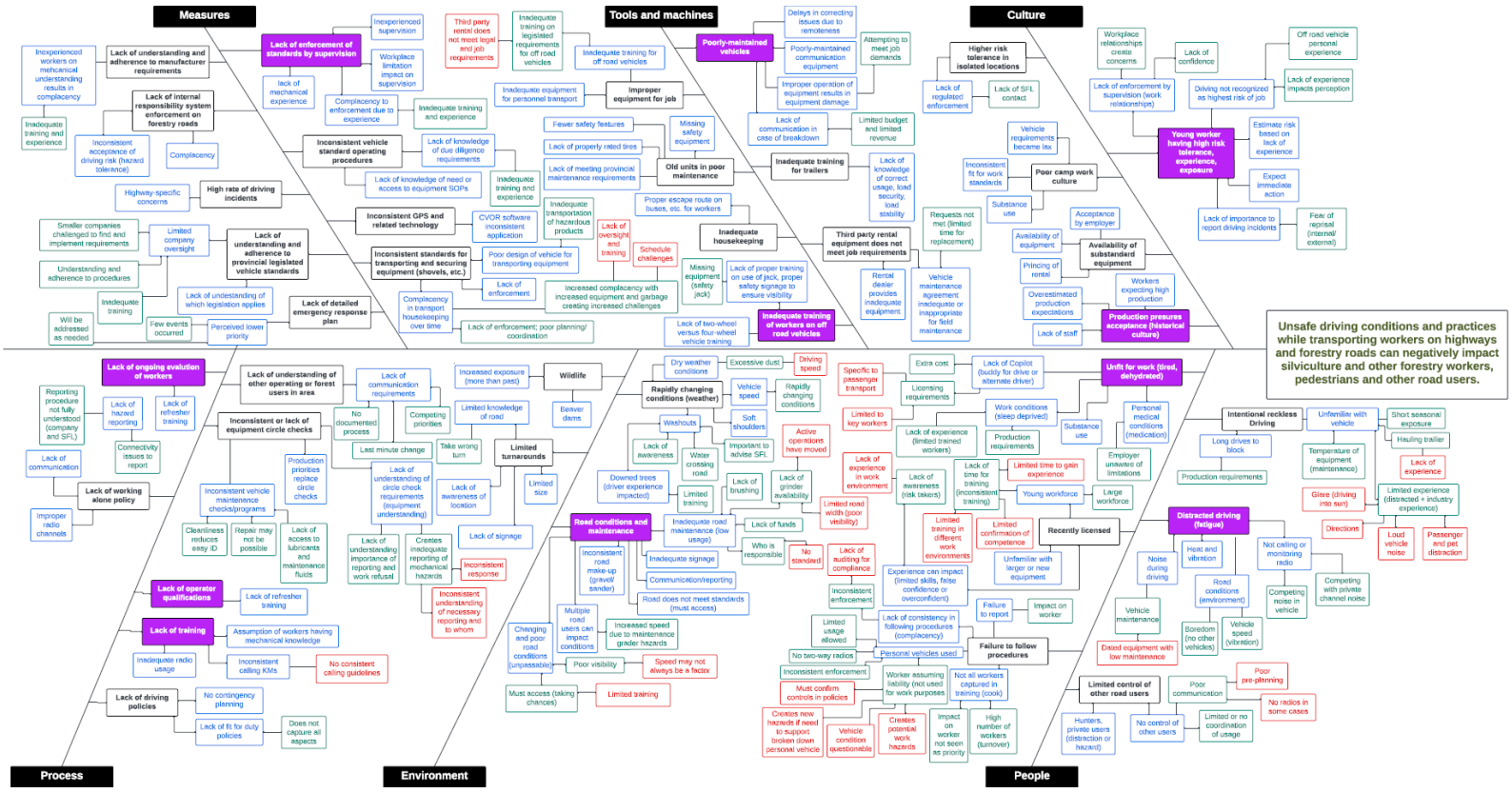
Unsafe driving conditions and practices while transporting workers on highways and forest roads can negatively impact silviculture and other forestry workers, pedestrians, and other road users.

3. Root-Cause Analysis Workshop: A Bipartite and Collective Process

- Workshop participants were peer-recognized industry and system experts.
- Workshop process was open, transparent, and collaborative.
- Participants were able to participate in-person or virtually.
- Ranking and prioritization of causal factors was voted on by industry management and worker only; MLITSD and WSN did not vote.

Validation of the results, in addition to workshop subject matter expert participants, included having the results presented and discussed among silviculture industry constituents through a webinar hosted by Workplace Safety North.

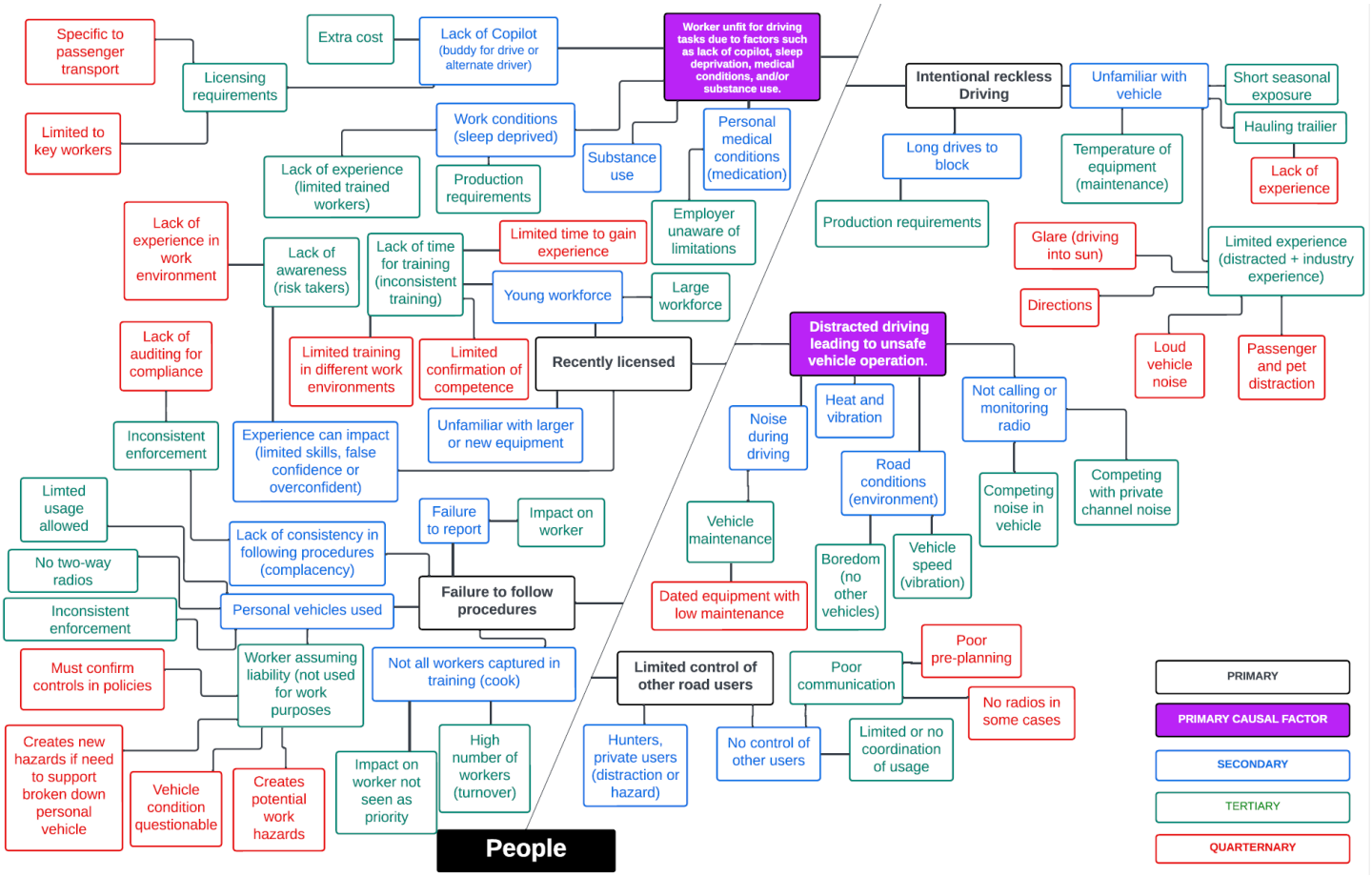
4. “Fishbone Diagram” for Primary, Secondary, Tertiary and Quaternary Causal Factors

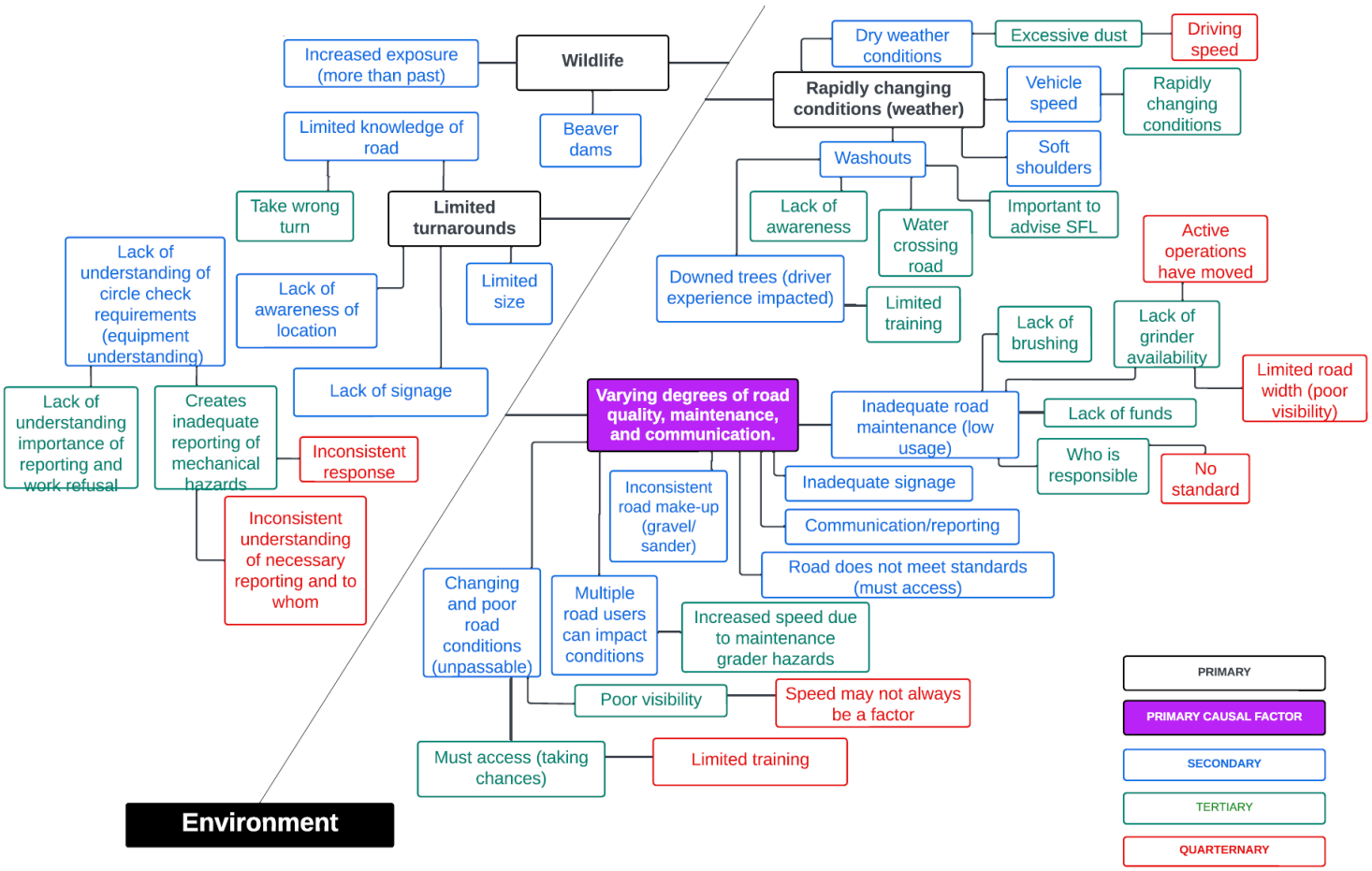


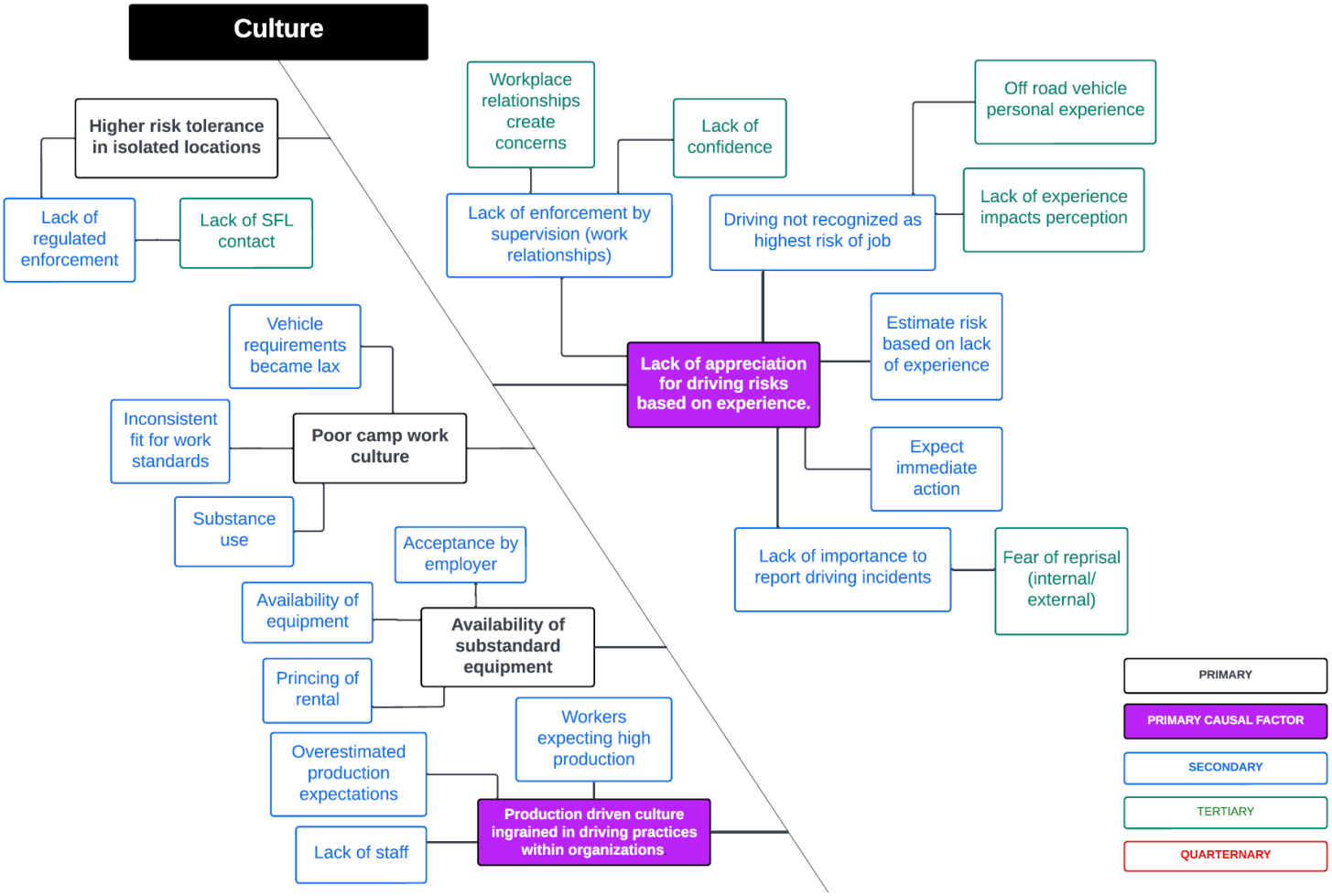
CLOSE-UP of fishbone diagram: Primary causal factors focused on six key workplace factors including: People, Environment, Measures, Culture, Process and Tools and Equipment.

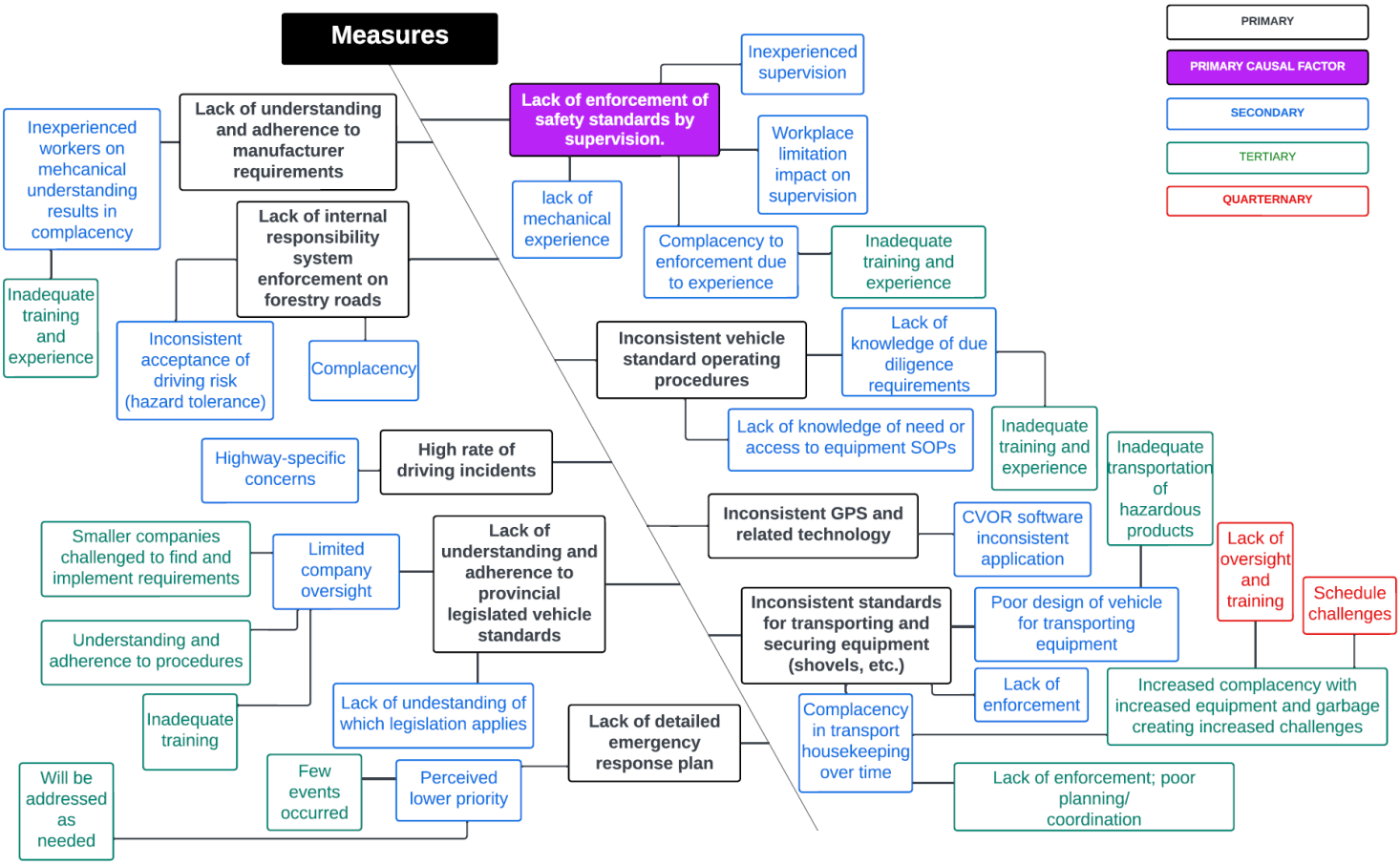
Causal Factors:

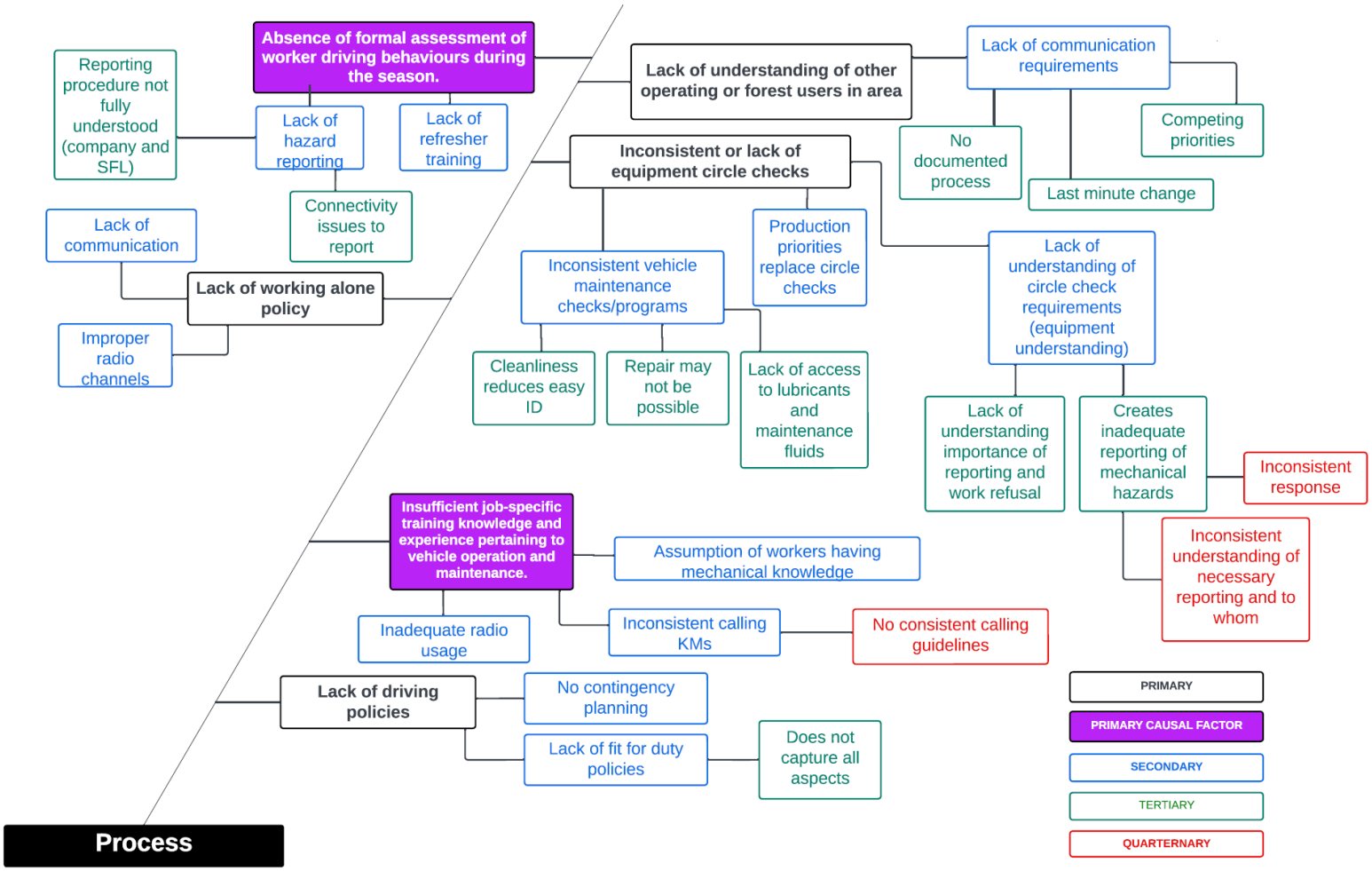
Primary
Secondary
Tertiary
Quaternary

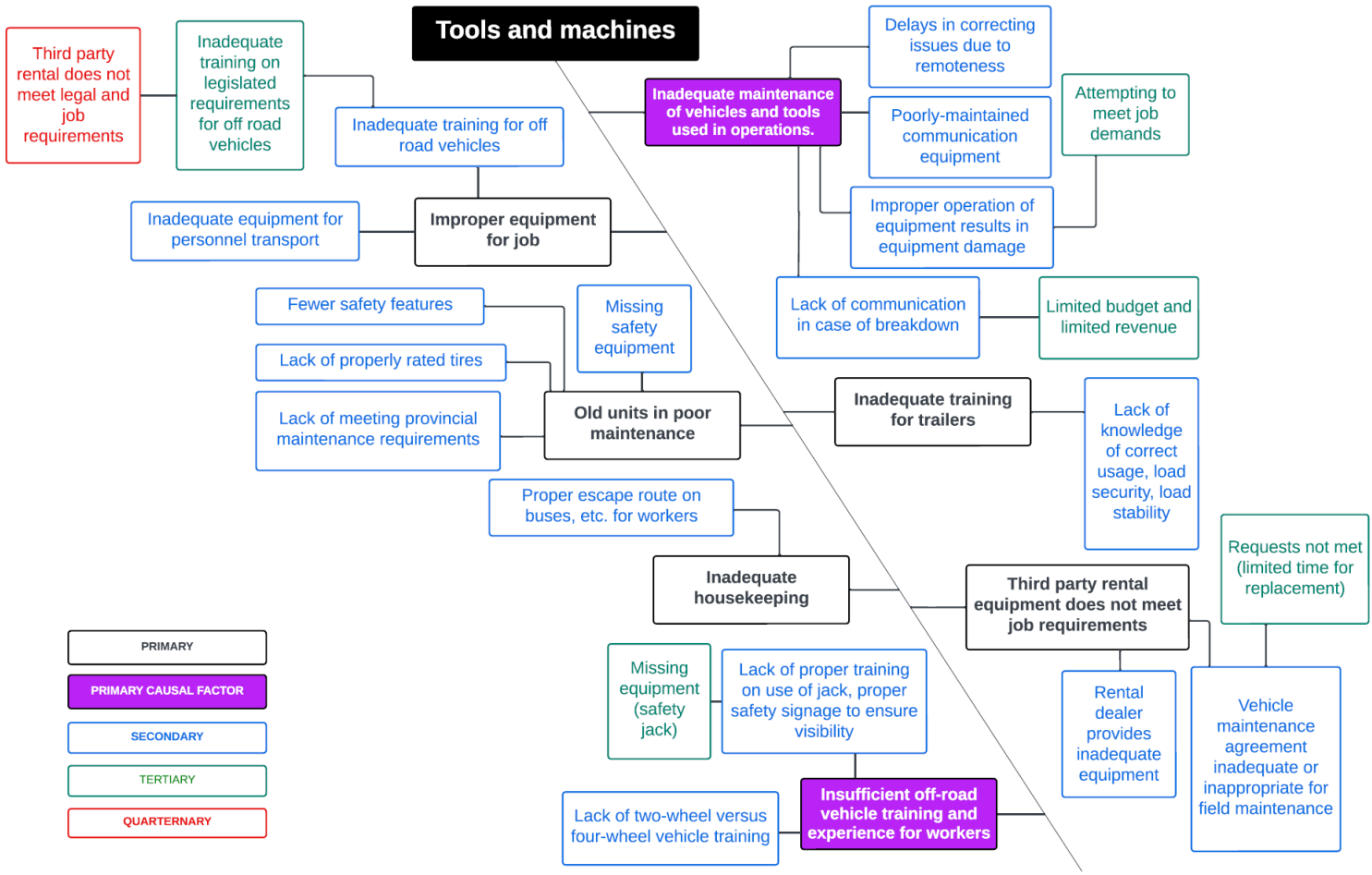

Specific to passenger transport
Licensing requirements
Limited to key workers
Extra cost
Lack of Copilot (buddy for drive or alternate driver)
Worker unfit for driving tasks due to factors such as lack of copilot, sleep deprivation, medical conditions, and/or substance use.
Work conditions (sleep deprived)
Lack of experience (limited trained workers)
Production requirements
Substance use
Personal medical conditions (medication)
Employer unaware of limitations
Lack of experience in work environment
Lack of awareness (risk takers)
Lack of time for training (inconsistent training)
Limited time to gain experience
Young workforce
Large workforce
Lack of auditing for compliance
Limited training in different work environments
Limited confirmation of competence
Recently licensed
Inconsistent enforcement
Experience can impact (limited skills, false confidence or overconfident)
Unfamiliar with larger or new equipment
Limted usage allowed
No two-way radios
Inconsistent enforcement
Must confirm controls in policies
Lack of consistency in following procedures (complacency)
Failure to report
Impact on worker
Personal vehicles used
Failure to follow procedures
Worker assuming liability (not used for work purposes
Not all workers captured in training (cook)
Creates new hazards if need to support broken down personal vehicle
Vehicle condition questionable
Creates potential work hazards
Impact on worker not seen as priority
High number of workers (turnover)
People
Intentional reckless Driving
Unfamiliar with vehicle
Short seasonal exposure
Hauling trailier
Lack of experience
Long drives to block
Temperature of equipment (maintenance)
Production requirements
Glare (driving into sun)
Limited experience (distracted + industry experience)
Directions
Loud vehicle noise
Passenger and pet distraction
Distracted driving leading to unsafe vehicle operation.
Heat and vibration
Noise during driving
Not calling or monitoring radio
Road conditions (environment)
Competing noise in vehicle
Competing with private channel noise
Vehicle maintenance
Boredom (no other vehicles)
Vehicle speed (vibration)
Dated equipment with low maintenance
Limited control of other road users
Poor pre-planning
Poor communication
No radios in some cases
Hunters, private users (distraction or hazard)
No control of other users
Limited or no coordination of usage
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY


Wildlife
Increased exposure (more than past)
Beaver dams
Limited knowledge of road
Limited turnarounds
Take wrong turn
Lack of awareness of location
Limited size
Lack of understanding of circle check requirements (equipment understanding)
Lack of signage
Lack of understanding importance of reporting and work refusal
Creates inadequate reporting of mechanical hazards
Inconsistent response
Inconsistent understanding of necessary reporting and to whom
Rapidly changing conditions (weather)
Dry weather conditions
Excessive dust
Driving speed
Vehicle speed
Rapidly changing conditions
Soft shoulders
Washouts
Lack of awareness
Water crossing road
Important to advise SFL
Downed trees (driver experience impacted)
Limited training
Active operations have moved
Lack of brushing
Lack of grinder availability
Limited road width (poor visibility)
Varying degrees of road quality, maintenance, and communication.
Inadequate road maintenance (low usage)
Lack of funds
Who is responsible
No standard
Inadequate signage
Inconsistent road make-up (gravel/ sander)
Communication/reporting
Road does not meet standards (must access)
Changing and poor road conditions (unpassable)
Multiple road users can impact conditions
Increased speed due to maintenance grader hazards
Poor visibility
Speed may not always be a factor
Must access (taking chances)
Limited training
Environment
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY


Culture
Higher risk tolerance in isolated locations
Lack of regulated enforcement
Lack of SFL contact
Workplace relationships create concerns
Lack of confidence
Lack of enforcement by supervision (work relationships)
Off road vehicle personal experience
Lack of experience impacts perception
Driving not recognized as highest risk of job
Vehicle requirements became lax
Inconsistent fit for work standards
Poor camp work culture
Substance use
Lack of appreciation for driving risks based on experience.
Estimate risk based on lack of experience
Expect immediate action
Lack of importance to report driving incidents
Fear of reprisal (internal/ external)
Acceptance by employer
Availability of equipment
Availability of substandard equipment
Princing of rental
Workers expecting high production
Overestimated production expectations
Production driven culture ingrained in driving practices within organizations
Lack of staff
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY


Measures
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY
Lack of enforcement of safety standards by supervision.
Inexperienced supervision
Workplace limitation impact on supervision
lack of mechanical experience
Complacency to enforcement due to experience
Inadequate training and experience
Lack of understanding and adherence to manufacturer requirements
Inexperienced workers on mehcanical understanding results in complacency
Inadequate training and experience
Lack of internal responsibility system enforcement on forestry roads
Inconsistent acceptance of driving risk (hazard tolerance)
Complacency
Inconsistent vehicle standard operating procedures
Lack of knowledge of due diligence requirements
Lack of knowledge of need or access to equipment SOPs
Inadequate training and experience
Inadequate transportation of hazardous products
Lack of oversight and training
Schedule challenges
Increased complacency with increased equipment and garbage creating increased challenges
High rate of driving incidents
Highway-specific concerns
Inconsistent GPS and related technology
CVOR software inconsistent application
Lack of understanding and adherence to provincial legislated vehicle standards
Smaller companies challenged to find and implement requirements
Limited company oversight
Understanding and adherence to procedures
Inadequate training
Inconsistent standards for transporting and securing equipment (shovels, etc.)
Poor design of vehicle for transporting equipment
Lack of enforcement
Lack of undestanding of which legislation applies
Lack of detailed emergency response plan
Complacency in transport housekeeping over time
Lack of enforcement; poor planning/ coordination
Few events occurred
Perceived lower priority
Will be addressed as needed


Process
Absence of formal assessment of worker driving behaviours during the season.
Reporting procedure not fully understood (company and SFL)
Lack of hazard reporting
Lack of refresher training
Connectivity issues to report
Lack of working alone policy
Lack of communication
Improper radio channels
Lack of understanding of other operating or forest users in area
Lack of communication requirements
No documented process
Competing priorities
Last minute change
Inconsistent or lack of equipment circle checks
Inconsistent vehicle maintenance checks/programs
Production priorities replace circle checks
Cleanliness reduces easy ID
Repair may not be possible
Lack of access to lubricants and maintenance fluids
Lack of understanding of circle check requirements (equipment understanding)
Lack of understanding importance of reporting and work refusal
Creates inadequate reporting of mechanical hazards
Inconsistent response
Inconsistent understanding of necessary reporting and to whom
Insufficient job-specific training knowledge and experience pertaining to vehicle operation and maintenance.
Assumption of workers having mechanical knowledge
Inadequate radio usage
Inconsistent calling KMs
No consistent calling guidelines
Lack of driving policies
No contingency planning
Lack of fit for duty policies
Does not capture all aspects
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY


Tools and machines
Third party rental does not meet legal and job requirements
Inadequate training on legislated requirements for off road vehicles
Inadequate training for off road vehicles
Inadequate equipment for personnel transport
Improper equipment for job
Delays in correcting issues due to remoteness
Inadequate maintenance of vehicles and tools used in operations.
Poorly-maintained communication equipment
Attempting to meet job demands
Improper operation of equipment results in equipment damage
Lack of communication in case of breakdown
Limited budget and limited revenue
Fewer safety features
Missing safety equipment
Lack of properly rated tires
Lack of meeting provincial maintenance requirements
Old units in poor maintenance
Inadequate training for trailers
Lack of knowledge of correct usage, load security, load stability
Proper escape route on buses, etc. for workers
Inadequate housekeeping
Third party rental equipment does not meet job requirements
Requests not met (limited time for replacement)
Rental dealer provides inadequate equipment
Vehicle maintenance agreement inadequate or inappropriate for field maintenance
Missing equipment (safety jack)
Lack of proper training on use of jack, proper safety signage to ensure visibility
Lack of two-wheel versus four-wheel vehicle training
Insufficient off-road vehicle training and experience for workers
PRIMARY
PRIMARY CAUSAL FACTOR
SECONDARY
TERTIARY
QUARTERNARY

5. Poster: Top 10 Root Causes of Passenger Vehicle Driving Hazards in Silviculture Sector

6. Critical controls to address primary causal factors of Passenger Vehicle Driving Hazards

1. **Process: Insufficient job-specific training knowledge and experience pertaining to vehicle operation and maintenance.**

- Practical demonstration of a circle check, basic maintenance, and familiarity with driver controls.
- Review of policies and procedures related to driving and maintenance.
- Review and emphasis on electronic logging device use.
- Practical ride-a-longs with supervisors on the bush road.
- Using a consistent checklist for ride-a-long documentation.
- Safe driving on forest roads modules or equivalent.
- Radio checks before going out in the field.
- Proper vehicle license as per legislative requirements. Develop and implement a standard for silviculture companies with these controls.
- Incorporation of experience and knowledge from mentors and tabletop exercises.
- Clear guidelines on what is acceptable for field maintenance.

2. **People: Distracted driving leading to unsafe vehicle operation.**

- Distracted driving policy (no cellphones, eating, seating, cargo securement, etc.).
- Develop a distracted driving program.
- Legislative requirements regarding distracted driving.
- Clean cab vehicle policy
- Worker training orientation program to include passenger etiquette in the vehicle.

3. **People: Worker unfit for driving tasks due to factors such as lack of copilot, sleep deprivation, medical conditions, and/or substance use.**

- Fit for duty policies (incl. exposure to environmental factors, e.g.: excessive heat, rough weather – impact on workers)
- Legislative requirements around impaired driving.
- Company culture to support and enforce company policies.
- Remove workers with production-based payment from driving.
- Education on psychosocial and psychological risk factors, e.g., fatigue, hours worked and sufficient off-duty time, medical conditions, and/or substance use; sufficient off-duty time; hours of service legislation.
- Peer support programs
- Policies (enforced) on taking scheduled breaks and working within set hours (ensuring culture supports this)

4. **Measures: Lack of enforcement of safety standards by supervision.**

- Competent Supervisor training (or equivalent) to ensure understanding of legislative requirements – ensure training includes safety standards and supervisory skills (e.g.: time management, people management, conflict resolution)
- Pre-season engagement training with supervisors
- Legislated supervisor awareness training (five-step or equivalent)

- Consistent implementation (and enforcement) of company-wide procedures and scheduling to perform inspections.
- Mentorship program for new supervisors
- Diversifying roles to free management responsibilities to focus on other necessary activities
- Establishing check-ins during the season regarding supervisor training/responsibilities.
- Identifying additional supervision/support with larger camps span of control.
- Have enough staff to perform staff functions.
- SFL due diligence in contractor management throughout the full contract.

5. Culture: Production driven culture ingrained in driving practices within organizations.

- Management must ensure that the primary message needs to be that safety is more important than anything, safety always first.
- Management must ensure that there is adequate equipment in good standing.
- Develop a silviculture advisory committee to assist WSN in establishing health and safety resources, policies, procedures, safety talks, job task analysis etc.
- Accountability of workplace parties in maintaining standards throughout the season.
- Sharing best practices from incidents and learnings throughout the season with other committees and firms.

6. Culture: Lack of appreciation for driving risks based on experience.

- Sharing of company hazard alerts (WSN can be the conduit) and through safety conversations on an ongoing weekly basis throughout the season.
- Working with external organizations (such as WSN) or industry experts (professional experienced drivers) on training information and instruction for workers.
- Updated visuals/videos regarding serious driving incidents and road hazards.
- More emphasis on driver training with practical components including realistic scenarios.

7. Tools and machines: Insufficient off-road vehicle training and experience for workers.

- Practical demonstration of a circle check, basic maintenance, and familiarity with driver controls.
- Review of policies and procedures related to driving and maintenance.
- Practical ride-a-longs with supervisors on the bush road.
- Using a consistent checklist for ride-a-long documentation.
- Safe driving on forest roads modules or equivalent.
- Radio checks before going out in the field.
- Proper vehicle license as per legislative requirements.
- Develop and implement a standard for silviculture companies with these controls.
- Incorporation of experience and knowledge from mentors and tabletop exercises.
- Clear guidelines on what is acceptable for field maintenance.
- Training/Refresher training for loading and off-loading and load securement.
- Include off-road vehicle usage with working alone policy and training.
- Worker training around additional hazards with off-road vehicles in relation to blind spots, debris, etc.

8. Tools and machines: Inadequate maintenance of vehicles and tools used in operations.

- Ensure pre-season preventative maintenance.
- Documentation of circle checks, manager/supervisor review and corrective action follow up.
- Preventative maintenance and protocols for all passenger vehicles.
- Policies around proper cleaning of vehicles to facilitate proper inspection prework.
- Training on specific maintenance such as torquing/changing wheels and torque/psi values, safe jacking and towing practices, equipment usage, proper tools, etc.

9. Process: Absence of formal assessment of worker driving behaviors during the season.

- Practical demonstration of a circle check, basic maintenance, and familiarity with driver controls.
- Review of policies and procedures related to driving and maintenance.
- Review and emphasis on electronic logging device use.
- Refresh on practical ride-a-longs with supervisors on the bush road.
- Refresh on using a consistent checklist for ride-a-long documentation.
- Radio checks before going out in the field.
- Continue to incorporate, as needed, experience and knowledge from mentors and tabletop exercises.
- Refresh guidelines on what is acceptable for field maintenance.
- Safety standdown to review and refresh on safety topics.

10. Environment: Varying degrees of road quality, maintenance, and communication.

- Preseason planning to allocate adequate time for travel based on road conditions.
- Safe driving on forestry roads or equivalent training.
- Establishing language on adapting driving behaviors to road conditions in policies, procedures, and training materials.
- Establish site safety plans based on environmental conditions.
- Establish communication between SFL and contractors on hazard reporting, actions taken, and for who is responsible for road maintenance.
- Consistent signage on language used on the roads, at the beginning of roads and kilometer markers throughout.
- Flagging of identified road hazards. Stopping and flagging.
- Consistent practices on road markers and for calling kilometers.
- Legislative requirements for signage as per *Section 117 Industrial Regs*.