

Risk Assessment



Results of the Pulp and Paper Sector Workshop

November 2019

Table of Contents

1. **Risk Assessment:** Introduction
2. **Risk Assessment:** The Swiss Cheese Model of Accident Causation
3. **Risk Assessment Workshop:** Process
4. **Risk Assessment Workshop:** Subject Matter Experts
5. **Risk Assessment Workshop:** Event Categories
6. **Risk Assessment Workshop Results:** Top 10 Risks
7. **Worker vs. Workshop Results:** Comparison of their Top 10 Risks
8. **Employer vs. Workshop Results:** Comparison of their Top 10 Risks
9. **Appendix A:** Workshop Process Details
10. **Appendix B:** Risk Assessment Methods/Standards
11. **Appendix C:** Workshop Contacts

Risk Assessment: Introduction

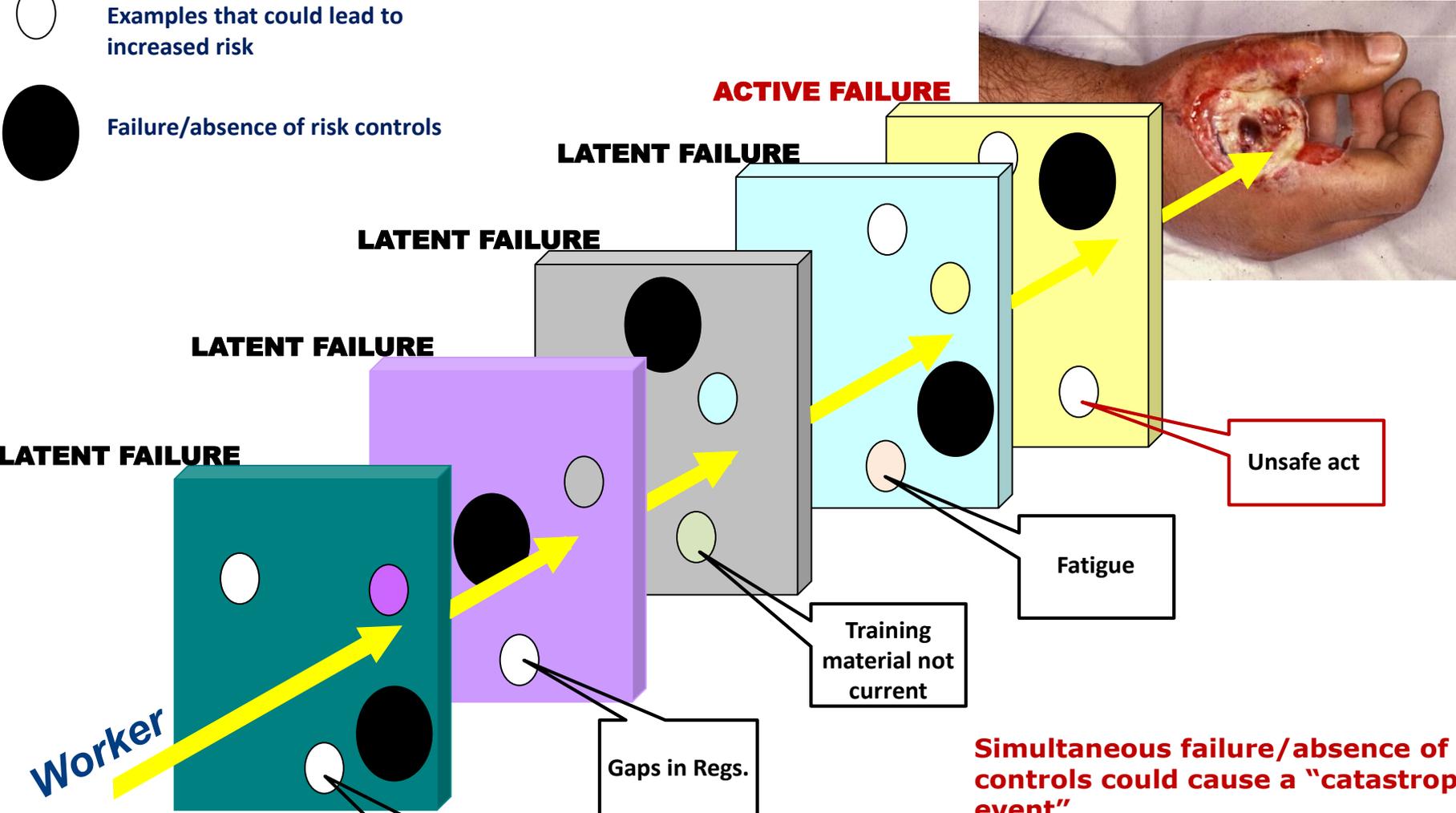
- ❑ **The Ministry launched in 2013, a project to put in place an integrated risk assessment methodology:**
 - To identify risks to worker health and safety and to work with employers and workers on reducing those risks
 - To provide more information to employers and to workers and their representatives about risks at the **SECTOR** level
- ❑ **Harness collective wisdom across the sector in a tripartite process to focus the industry, health & safety associations (HSAs), and the regulator on the highest risks to health and safety**
- ❑ **This approach draws on industry, worker, HSA, and ministry knowledge of risk and recognizes that one-size does not fit all**
- ❑ **The approach developed for this project draws on the empirical insights of risk management, and operations research/ decision science**

Prevention

The Swiss Cheese Model of Accident Causation

○ Examples that could lead to increased risk

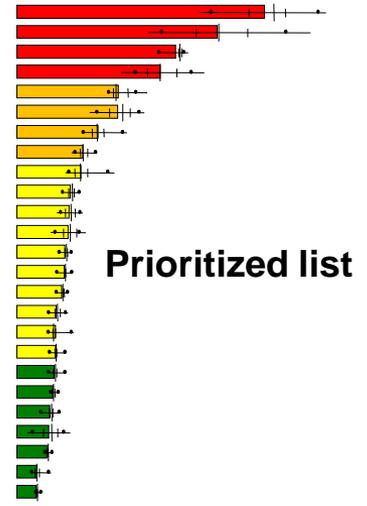
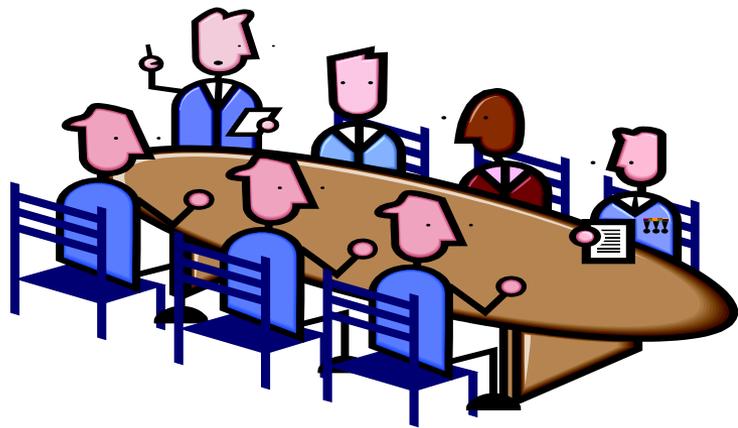
● Failure/absence of risk controls



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

Design issues

Workshop: A Tripartite and Collective Process



Workshop was face-to-face. No teleconferencing.

Workshop: A Tripartite and Collective Process

- ❑ **Workshop process was open, transparent, and collaborative:**
 - Ensured that any perspective or viewpoint was heard
 - Each response received was respected and not freely edited
 - Final list shared with workshop participants before the workshop
 - Final workshop results reviewed/validated by industry participants

- ❑ **Finding acceptable solutions that all members can support:**
 - Only industry experts ranked the risks, not government/HSA
 - Process was NOT about consensus, although the results demonstrate a significant degree of convergence

Subject Matter Experts: Workshop participants

#	Name	Company/Representation
1	Derek Leveque*	Unifor Local 333
2	Dick Gauthier*	Unifor Local 105
3	Ashley McIver*	Unifor Local 39
4	Fred Simard*	Unifor Local 256
5	Veena Palmer*	Atlantic Packaging
6	Marilyn Findlay*	Domtar Inc.
7	Jesse Hamlin*	Resolute Forest Products
8	Denis Lincez*	Rayonier Inc.

#	Name	Company/Representation
9	Mark Tranter	Observer (Atlantic Packaging)
10	Tom Welton	Workplace Safety North
11	Doug Brown	Workplace Safety North
12	Al Armstrong	MLTSD: Inspector
13	Denis Bernard	MLTSD: Inspector
14	Christine Bibby	MLTSD: Tech Support
15	Shantelle Alcindor-Nicol	MLTSD: Tech Support
16	Sujoy Dey	MLTSD: Facilitator

* Voting Participant

- 7  Worker representation
-  Employer representation

MLTSD: Ministry of Labour, Training and Skills Development

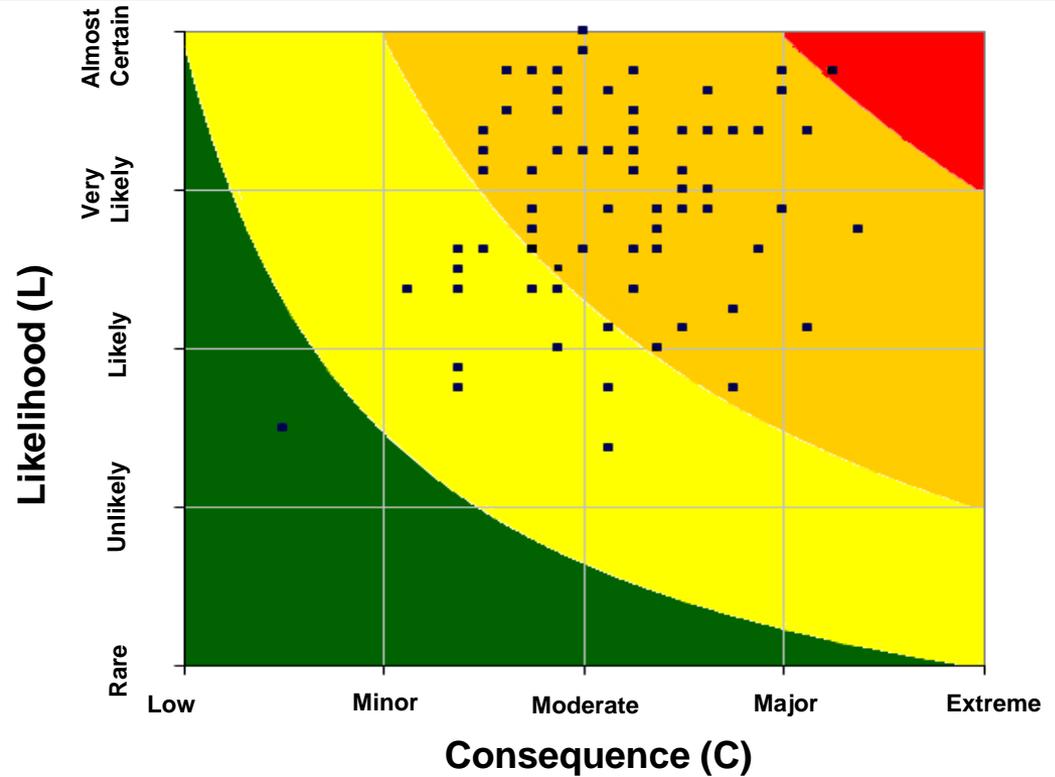
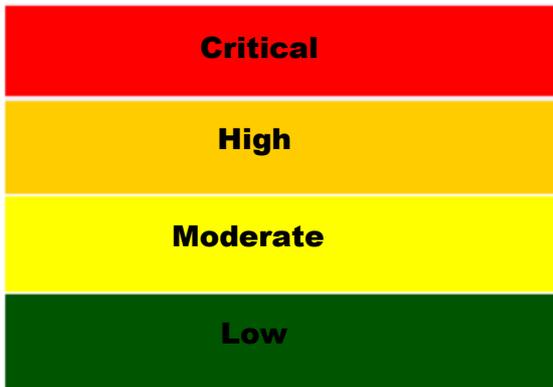
Risk Assessment Workshop: Event Categories

1. Age
2. Confined Space
3. Culture
4. Electrical
5. Environment
6. Falls
7. Fatigue
8. Fire
9. Guarding
10. Lifting Equipment
11. Lockout
12. Maintenance
13. Management of Change
14. Mobile Equipment
15. MSD
16. Occupational Illness
17. PPE
18. Psychosocial
19. Slips, Trips and Falls
20. Struck By
21. Substance Use
22. Supervision
23. Training
24. Transportation
25. Working Alone
26. Working at Heights
27. Workplace Distraction

Prevention

Pulp and Paper Sector: Heat Map

RISK RATING



LIKELIHOOD	DESCRIPTION
Almost Certain [5]	Unwanted event is almost certain to happen in the next year [or 90% or greater chance of occurrence]
Very Likely [4]	High probability for unwanted event to occur in the next year [or between 50%-90% chance of occurrence]
Likely [3]	It is possible for unwanted event to occur in the next year [or between 20%-50% chance of occurrence]
Unlikely [2]	Low probability for unwanted event to occur in the next year [or between 5%-20% chance of occurrence]
Rare [1]	Very low probability for unwanted event to occur in the next year [or less than 5% chance of occurrence]

CONSEQUENCE	DESCRIPTION
Extreme [5]	Fatality or Permanent Disability [or extreme impact/importance]
Major [4]	Serious Event/ Critical Injury or Critical Illness [or major impact/importance]
Moderate [3]	Temporary Disability (Lost Time): Injury/Illness [or moderate impact/importance]
Minor [2]	First Aid Treatment (No Lost Time) [or minor impact/importance]
Low [1]	No injury or illness [or negligible impact/importance]

Results: Top 10 of 79 Identified Events

Risk Rank	Category	Event (Situation or Condition) that could result in Injury or Illness OR What could keep you up at night?	L		C		Risk
			L	sd-L	C	sd-C	
1	Lockout	Inadequate/improper lockout of machines	4.75	0.46	4.25	0.71	20.19
2	Occupational Illness	Exposure to dust	4.75	0.46	4.00	0.76	19.00
3	Occupational Illness	Exposure to chemical agents (E.g. toxic chemicals, H2S gas, allergenic substances)	4.63	0.52	4.00	0.76	18.50
4	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance	4.38	0.52	4.13	0.35	18.05
5	Working at Heights	Falls from heights	4.38	0.92	4.13	0.64	18.05
6	Maintenance	Structural integrity of building/ceiling falling	4.38	0.74	3.88	0.35	16.95
7	Culture	Rushing to get the work done (taking shortcuts)	4.63	0.52	3.63	0.92	16.77
8	Maintenance	Maintenance of process lines (i.e. leaks, caustic explosions, etc.)	4.38	0.52	3.75	0.71	16.41
9	Guarding	Caught in/crushed by equipment during operation	3.75	0.89	4.38	0.52	16.41
10	Environment	Workplace conditions	4.38	0.52	3.63	0.52	15.86

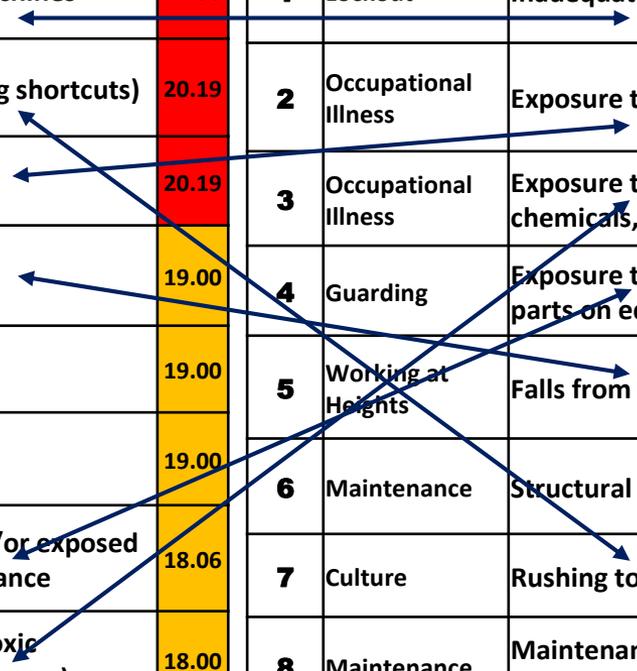
Worker Vs. Workshop Results: Top 10 Comparison

Worker

Workshop Results

Risk Rank	Category	Situation or Condition that could result in Injury or Illness OR What could keep you up at night?	Risk
1	Lockout	Inadequate/improper lockout of machines	21.38
2	Culture	Rushing to get the work done (taking shortcuts)	20.19
3	Occupational Illness	Exposure to dust	20.19
4	Working at Heights	Falls from heights	19.00
5	Occupational Illness	Improper/Inadequate ventilation	19.00
6	Training	Use of compressed air to clean workplace/worker	19.00
7	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance	18.06
8	Occupational Illness	Exposure to chemical agents (E.g. toxic chemicals, H2S gas, allergenic substances)	18.00
9	Training	Workers not fully trained/poorly trained	17.81
10	Fire	Fires or explosions	17.50

Risk Rank	Category	Situation or Condition that could result in Injury or Illness OR What could keep you up at night?	Risk
1	Lockout	Inadequate/improper lockout of machines	20.19
2	Occupational Illness	Exposure to dust	19.00
3	Occupational Illness	Exposure to chemical agents (E.g. toxic chemicals, H2S gas, allergenic substances)	18.50
4	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance	18.05
5	Working at Heights	Falls from heights	18.05
6	Maintenance	Structural integrity of building/ceiling falling	16.95
7	Culture	Rushing to get the work done (taking shortcuts)	16.77
8	Maintenance	Maintenance of process lines (i.e. leaks, caustic explosions, etc.)	16.41
9	Guarding	Caught in/crushed by equipment during operation	16.41
10	Environment	Workplace conditions	15.86



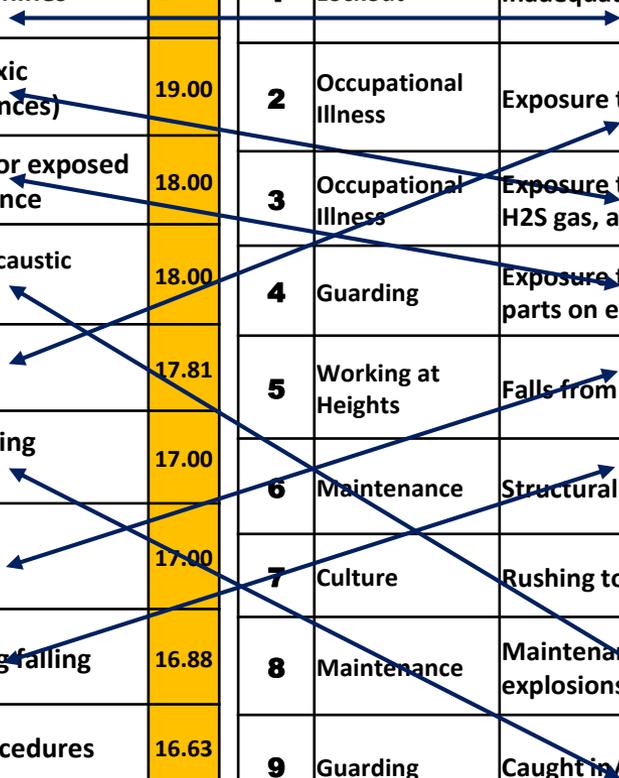
Employer Vs. Workshop Results: Top 10 Comparison

Employer

Workshop Results

Risk Rank	Category	Situation or Condition that could result in Injury or Illness OR What could keep you up at night?	Risk
1	Lockout	Inadequate/improper lockout of machines	19.00
2	Occupational Illness	Exposure to chemical agents (E.g. toxic chemicals, H2S gas, allergenic substances)	19.00
3	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance	18.00
4	Maintenance	Maintenance of process lines (i.e. leaks, caustic explosions, etc.)	18.00
5	Occupational Illness	Exposure to dust	17.81
6	Guarding	Caught in/crushed by equipment during operation	17.00
7	Working at Heights	Falls from heights	17.00
8	Maintenance	Structural integrity of building/ceiling falling	16.88
9	Training	Contractors on site not following procedures	16.63
10	Environment	Workplace conditions	15.94

Risk Rank	Category	Situation or Condition that could result in Injury or Illness OR What could keep you up at night?	Risk
1	Lockout	Inadequate/improper lockout of machines	20.19
2	Occupational Illness	Exposure to dust	19.00
3	Occupational Illness	Exposure to chemical agents (E.g. toxic chemicals, H2S gas, allergenic substances)	18.50
4	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance	18.05
5	Working at Heights	Falls from heights	18.05
6	Maintenance	Structural integrity of building/ceiling falling	16.95
7	Culture	Rushing to get the work done (taking shortcuts)	16.77
8	Maintenance	Maintenance of process lines (i.e. leaks, caustic explosions, etc.)	16.41
9	Guarding	Caught in/crushed by equipment during operation	16.41
10	Environment	Workplace conditions	15.86



Prevention

Results (contd.): Top 10 Categories Based On Highest Risk Within That Category

#	Category	Situation or Condition that could result in Injury or Illness OR What could keep you up at night?
1	Lockout	Inadequate/improper lockout of machines
2	Occupational Illness	Exposure to dust
3	Guarding	Exposure to unguarded moving and/or exposed parts on equipment during maintenance
4	Working at Heights	Falls from heights
5	Maintenance	Structural integrity of building/ceiling falling
6	Culture	Rushing to get the work done (taking shortcuts)
7	Environment	Workplace conditions
8	Mobile Equipment	Unsafe operation of mobile equipment
9	Training	Workers not fully trained/poorly trained
13 ¹⁰	Workplace Distraction	Cell phone use

Appendix A: Workshop Process Details

1. A sector is identified and defined for risk assessment;
2. Subject matter experts (SMEs) from the selected sector are identified;
3. Each of the selected SMEs list (identify) the situations or conditions (events) that could lead to injury or illness with appropriate evidence for each event (pre-workshop);
4. The lists are collected and amalgamated into one list (pre-workshop);
5. The amalgamated list is sent to each of the SME's for their review (pre-workshop);
6. A workshop is scheduled for the analysis and prioritization of each identified event on the amalgamated (final) list;
7. Workshop is face-to-face. No teleconferencing;
8. For each identified event on the list, the SME participants contribute towards a robust discussion. The discussion generates a deeper objective understanding and allows for all perspectives to be heard (comments are NOT attributed);
9. After the end of each discussion for each of the identified events, each of the SME participants "votes" (based on identified criteria/scale) to lock in their value judgments on the "likelihood of the event occurring" and the "severity of the consequence if the event was to occur";
10. Electronic voting tools are used. They make voting easy and anonymous. Voting results on each event are instantaneous;
11. Project manager takes the results to create a risk profile/heat map for the sector;
12. Results validation includes "smell test" by industry SMEs before releasing the final results

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)

* Not an exhaustive list

❑ For additional information or questions, please contact:

✓ **Sujoy Dey, Ph.D.**

Corporate Risk Officer

Ministry of Labour, Training and Skills Development

sujoy.dey@ontario.ca

✓ **Tom Welton, CRSP**

Director, Prevention Services and Education Programs

Workplace Safety North

tomwelton@workplacesafetynorth.ca