

Root-Cause Analysis Report

GENERAL FREIGHT (TRUCKING): DRIVER FATIGUE



February 2020

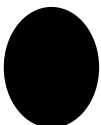
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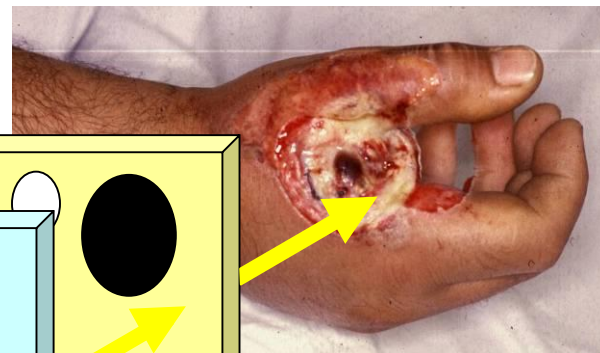
Risk Assessment: The Swiss Cheese Model of Accident Causation



Examples that could lead to increased risk



Failure/absence of risk controls



ACTIVE FAILURE

LATENT FAILURE

LATENT FAILURE

LATENT FAILURE

LATENT FAILURE

Worker

Unsafe act

Fatigue

Training material not current

Shortage of key skillset

Design issues

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

Revisiting 2019 Risk Assessment Results: Top 10 Risk Events

Risk Rank	Category	Event (Situation or Condition) that could result in Injury or Illness OR “What could keep you up at night?”	Risk
1	Environmental	Distracted driving	
2	Fatigue	Driver fatigue	
3	Awareness	Careless drivers on the road (other truck drivers, other motorists)	
4	Awareness	Lack of truck awareness training for average everyday car drivers sharing the roads with the trucking industry	
5	Environmental	Driving conditions	
6	Slips/Trips/Falls	Slips, trips and falls	
7	Psychosocial	Stress	
8	Training	Inadequate or insufficient training/skills/qualifications	
9	Occupational Illness	Illness resulting from the lifestyle of a long-distance truck driver	
10	Slips/Trips/Falls	Working at heights (tarping loads)	

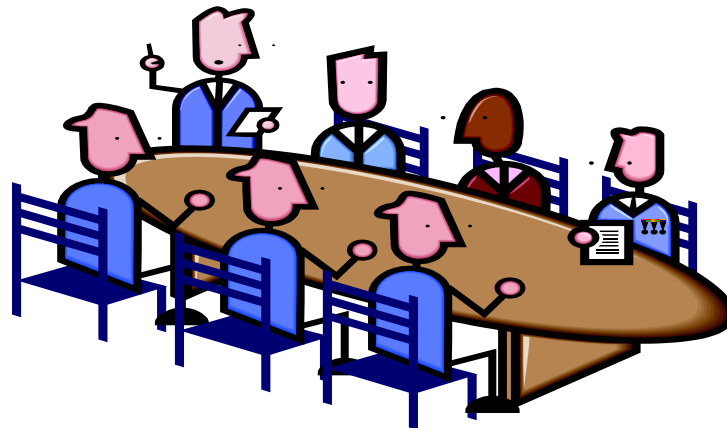
Root-Cause Analysis: Risk Statement

Based on the results of the General Freight Risk Assessment, “Driver Fatigue” was selected by the Infrastructure Health & Safety Association’s (IHSA) **Transportation Advisory Council** for a Root-Cause Analysis using the “Fishbone” approach:

“Driver Fatigue can have serious unintended adverse effects on the safety and well-being of the driver, carrier, fellow workers and the community.”

Workshop: A Tripartite and Collective Process

- ❑ Workshop participants were peer-recognized industry/system experts
- ❑ Workshop process was open, transparent and collaborative
- ❑ Workshop was face-to-face. No teleconferencing
- ❑ Ranking/prioritization of causal factors was done using Employer and Worker votes only (Government & IHSA do not vote)



Subject Matter Experts: Industry, Research & System Partners Consulted

#	Company/Representation
1	Teamsters (Cooney Bulk Sales) *
2	Teamsters (Loblaws) *
3	Owner-Operator (ConTrans) *
4	Non-Union (APPS Transport) *
5	AMJ Campbell*
6	ERB Transportation*
7	JBT Transport*
8	Midland Transport*
9	Northbridge Insurance
10	Unifor (Penske Logistics)

#	Company/Representation
11	ESDC Labour Program
12	University Health Network (UHN)
13	MTO: Enforcement & Carrier Branch
14	Infrastructure Health & Safety Association
15	MLTSD: Operations Division
16	MLTSD: Prevention Division

ESDC: Employment & Social Development | Government of Canada

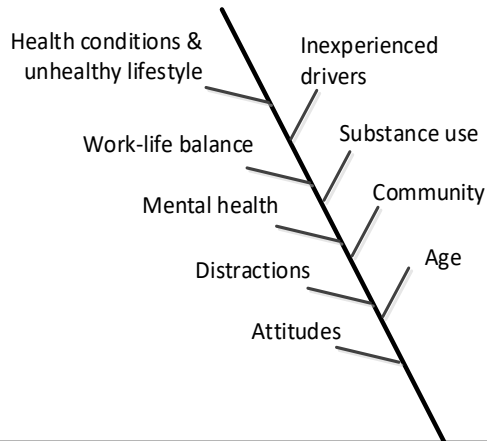
MTO: Ministry of Transportation

MLTSD: Ministry of Labour, Training & Skills Development

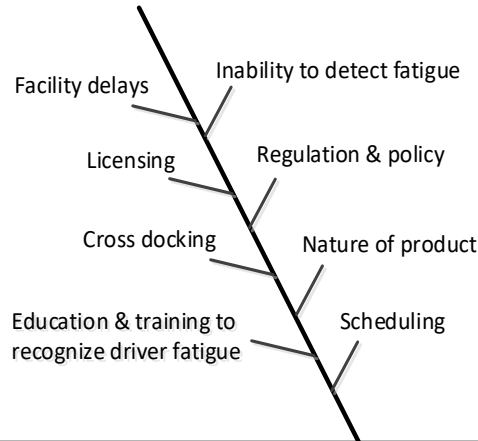
* Voting Participant

“Fishbone” Diagram: Primary Causal Factors

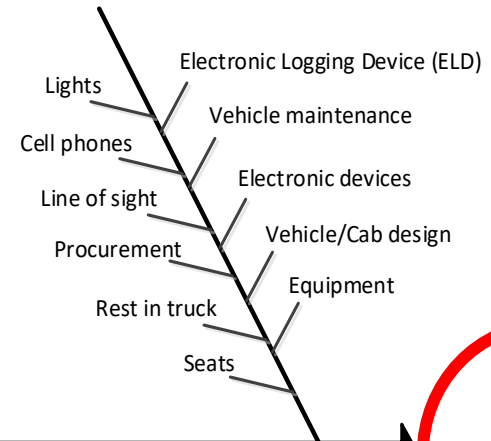
People



Processes

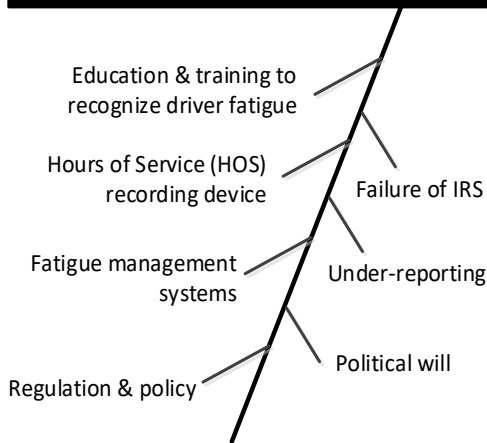


Tools & Machines

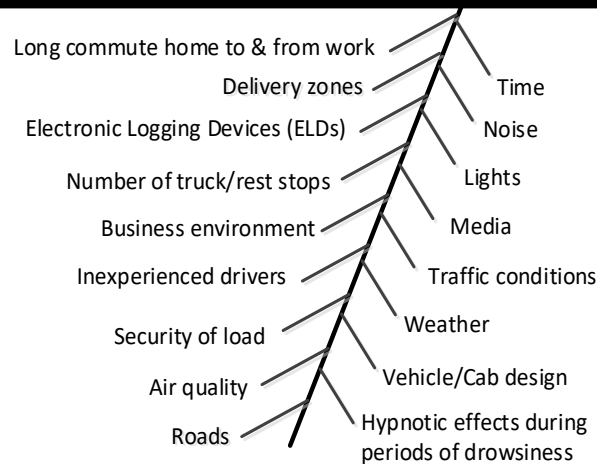


Driver Fatigue

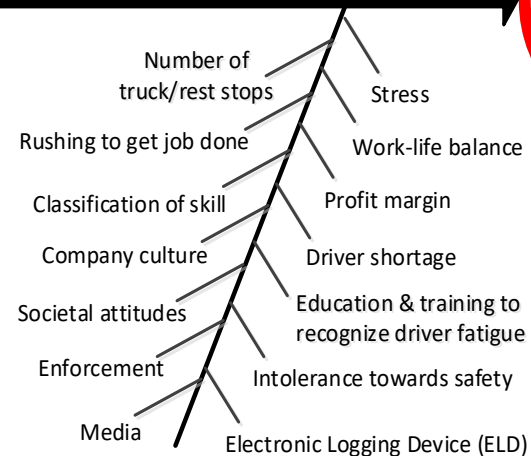
Measures



Environment



Culture

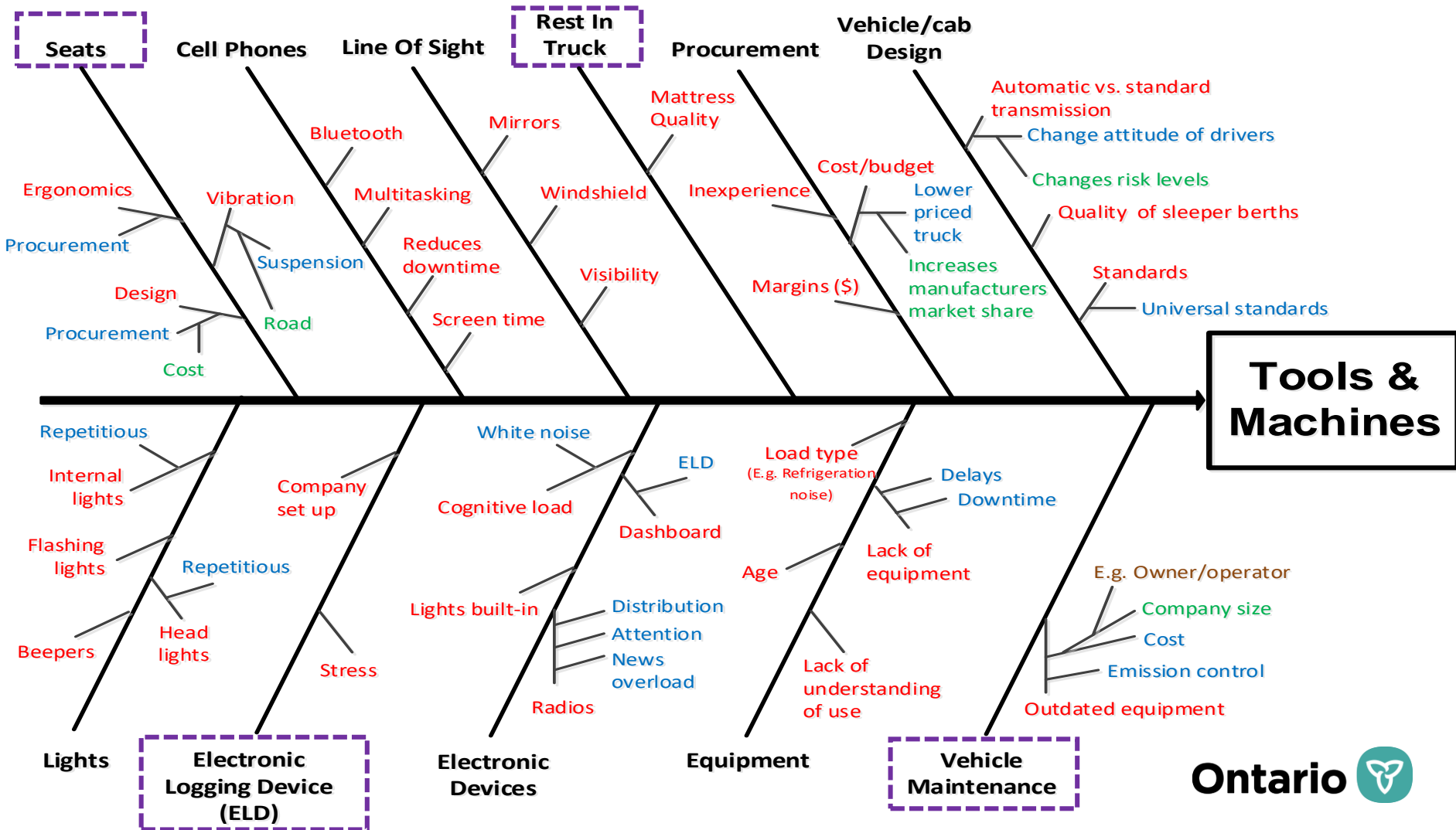


Top (Priority) Primary Causal Factors: Driver Fatigue






Priority	Category	Primary Causal Factor
1	Environment	Traffic conditions
2	People	Health conditions & unhealthy lifestyle
3	People, Culture	Work-life balance
	Culture	Stress
	People	Mental health
4	Environment	Hypnotic effects during periods of drowsiness
	Environment	Number of truck/rest stops
	Culture, Processes, Measures	Education & training to recognize driver fatigue
5	Processes	Licensing
6	Culture	Rushing to get job done
	Measures	Political will
7	Environment, People	Inexperienced drivers
	Culture	Company culture
8	Culture	Classification of skill
	Culture	Societal attitudes
9	Tools & Machines	Vehicle maintenance
	Tools & Machines	Seats
	Tools & Machines	Rest in truck
10	Tools & Machines, Culture	Electronic Logging Device (ELD)
	People	Substance use

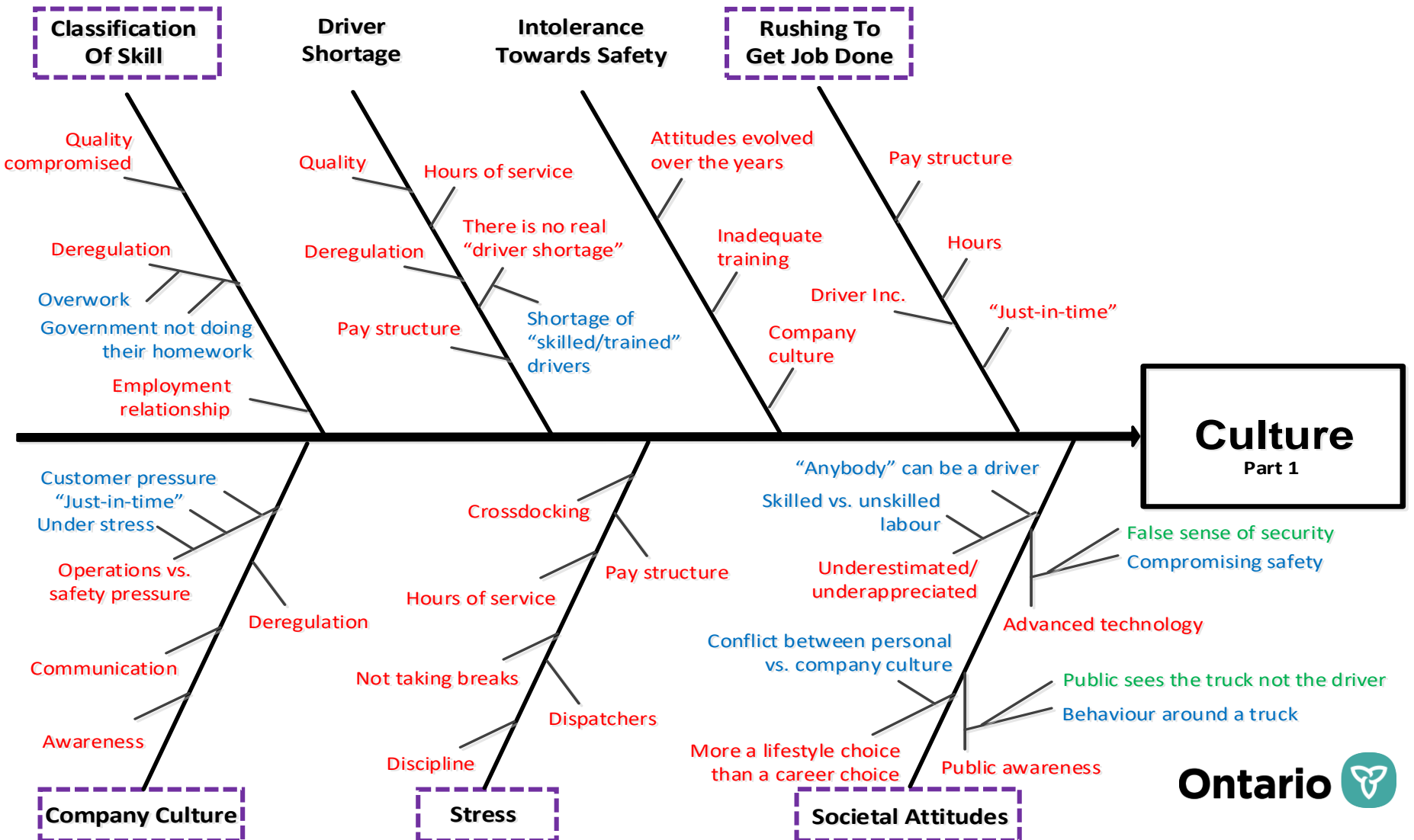
“Fishbone” Diagram: Tools & Machines

- Top Primary Root-Cause
- Primary Root-Cause
- Second level Root-Cause
- Third level Root-Cause
- Fourth level Root-Cause








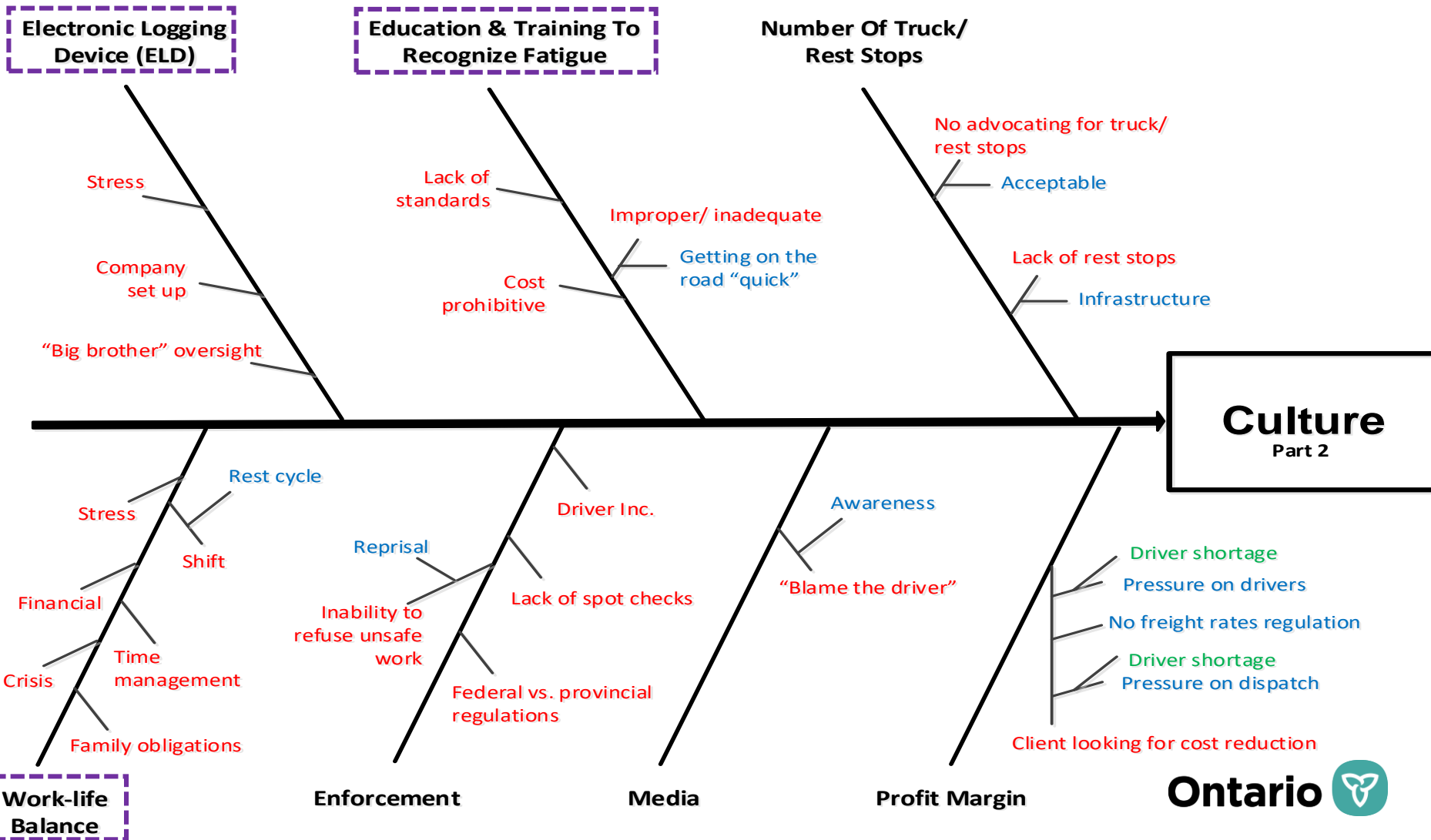
“Fishbone” Diagram: Culture (Part 1)

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause



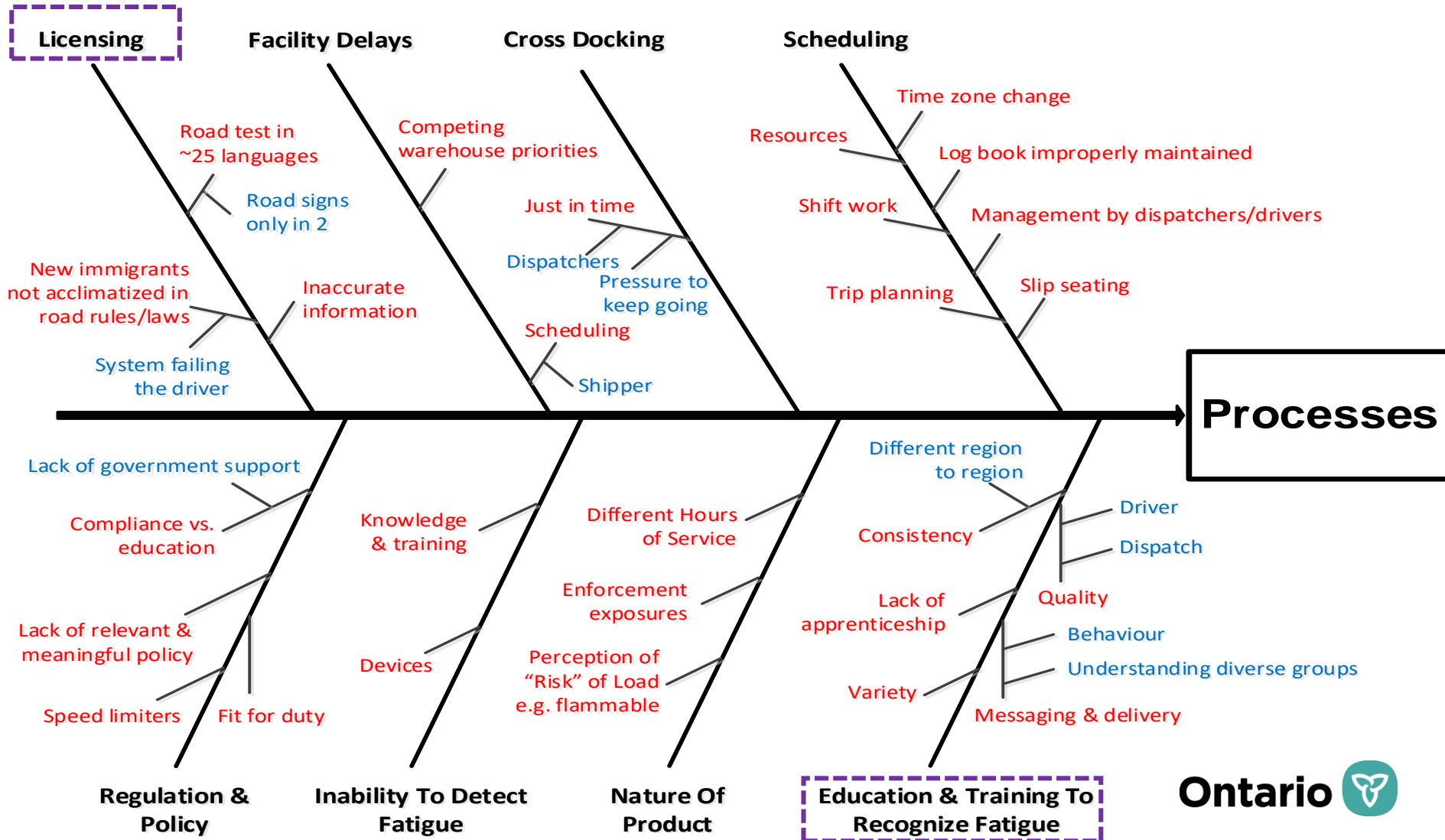
“Fishbone” Diagram: Culture (Part 2)

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause








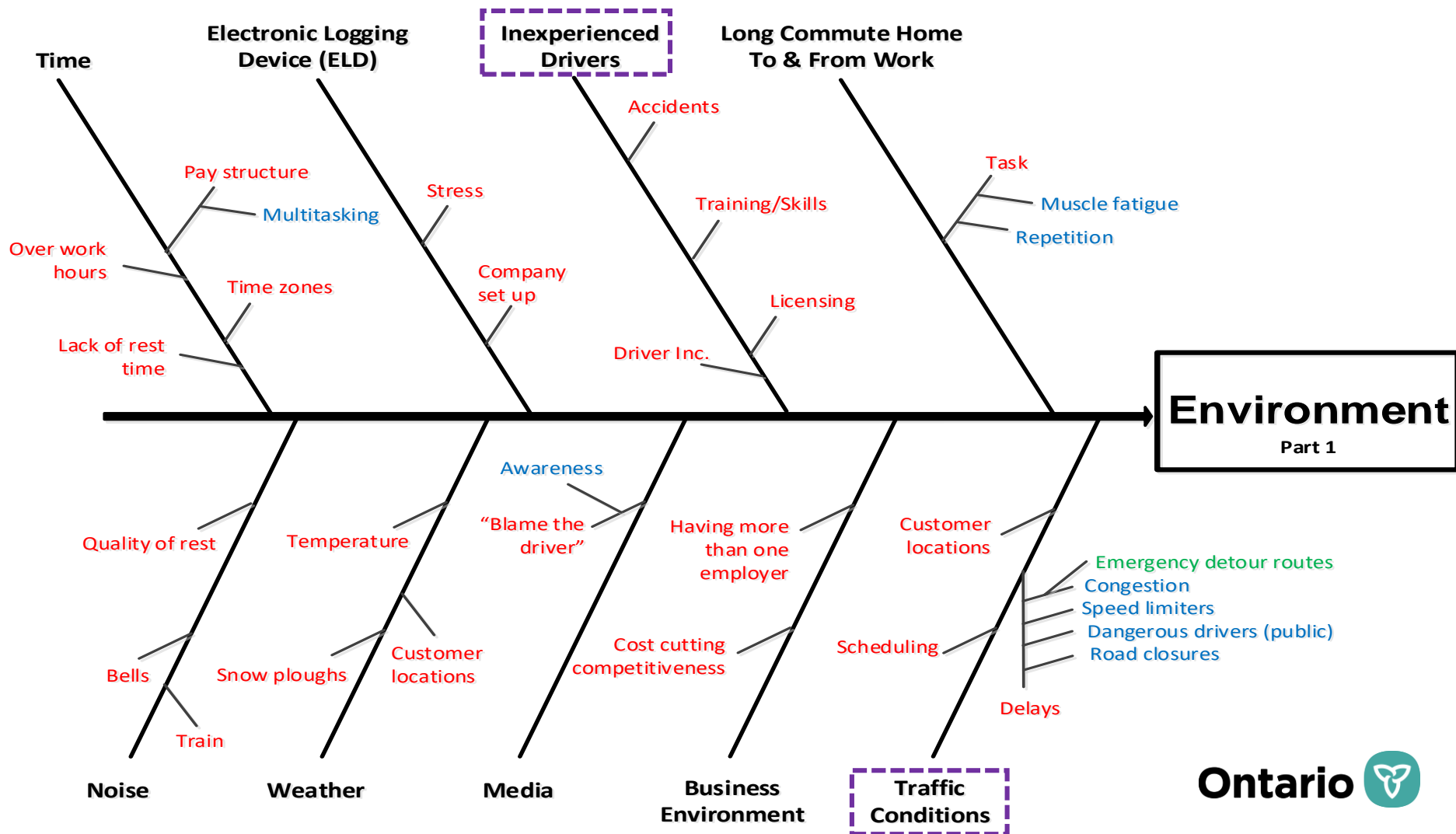
“Fishbone” Diagram: Processes

- Top Primary Root-Cause
- Primary Root-Cause
- Second level Root-Cause
- Third level Root-Cause
- Fourth level Root-Cause








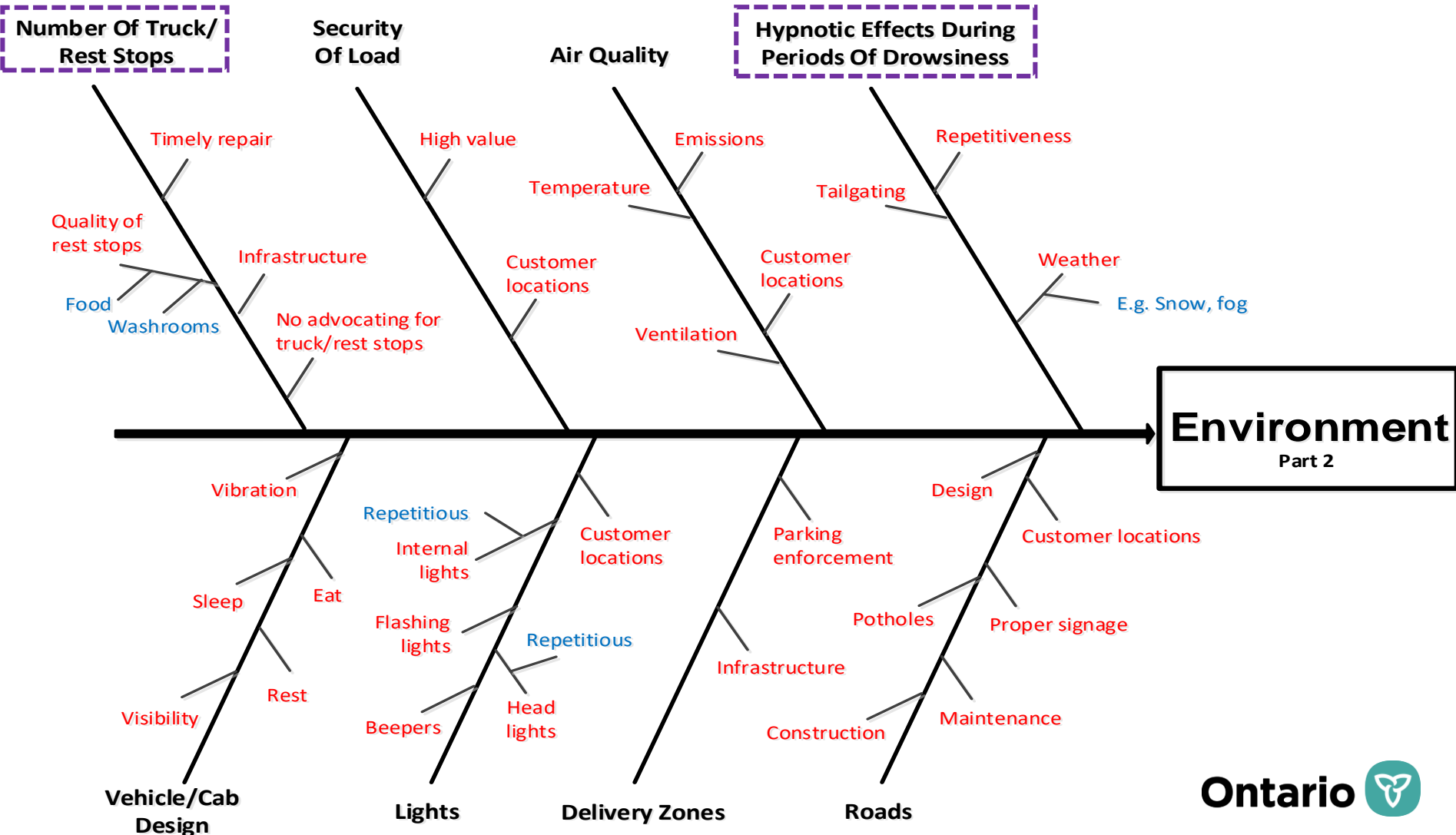
“Fishbone” Diagram: Environment (Part 1)

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause








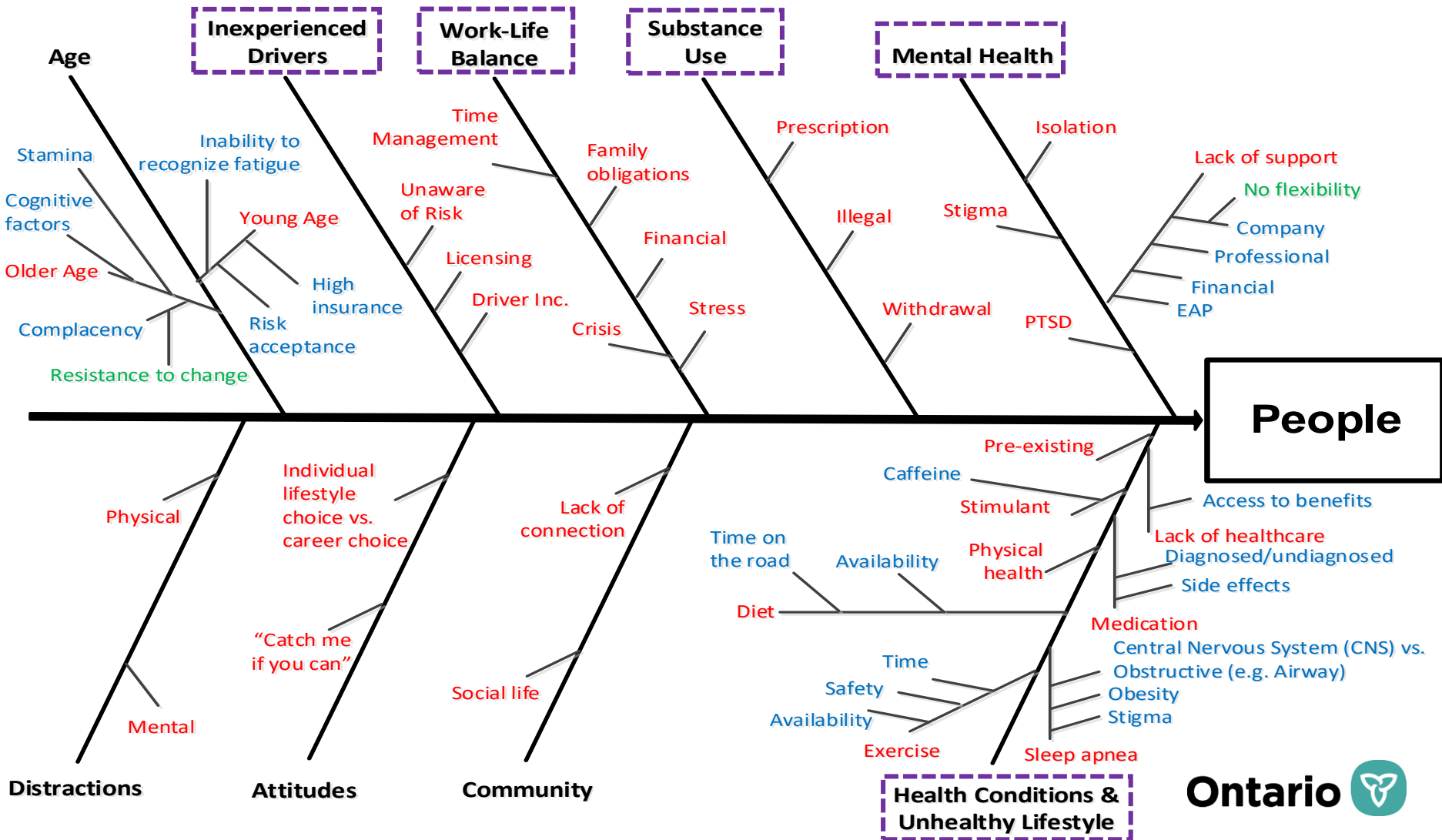
“Fishbone” Diagram: Environment (Part 2)

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause








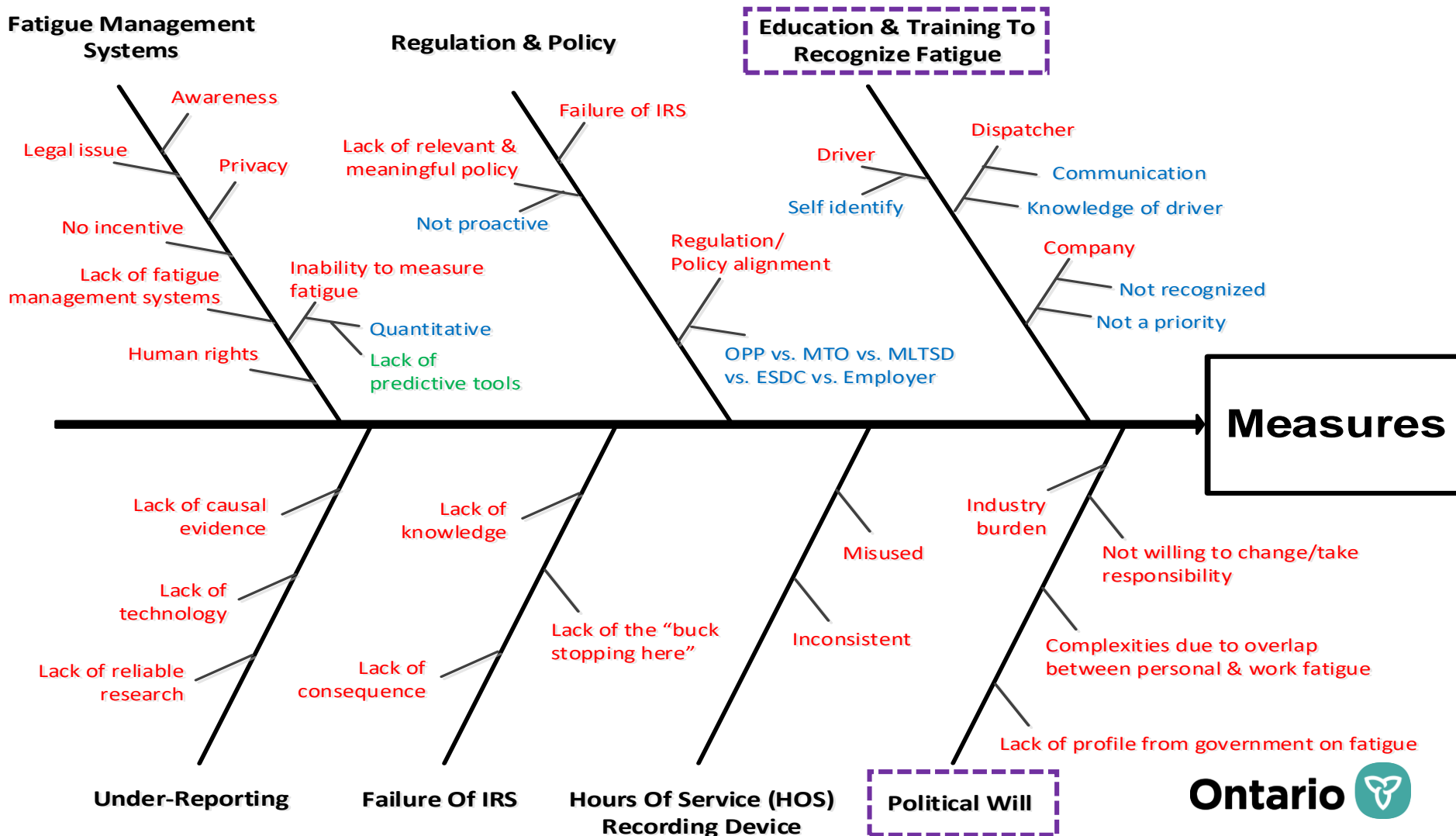
“Fishbone” Diagram: People

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause



“Fishbone” Diagram: Measures

-  Top Primary Root-Cause
-  Primary Root-Cause
-  Second level Root-Cause
-  Third level Root-Cause
-  Fourth level Root-Cause



Next Steps: Focus on Systemic Weaknesses Immediately!

- 1. Classify truck driving as a skilled trade (Red Seal)**
 - Needs to be implemented at the federal level
- 2. Review and address critical training gaps in M.E.L.T.**
 - E.g. Fatigue, training hours, standards, school audit, insurance, etc.
- 3. Mandatory graduated licensing for all truck drivers**
 - Including testing for English/French competency
- 4. Greater enforcement of non-compliant carriers**
 - Driver Inc.
- 5. Promote mental health and wellness**
 - Provide support tailored to the driver

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 (or 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 Error Analysis (HEA)
23. Human reliability analysis
24. Job Safety Analysis (JSA)
25. Level of Protection Analysis (LOPA)
26. Markov analysis
27. Monte Carlo Analysis
28. Preliminary Hazard Analysis (PHA)
29. Reliability centered maintenance
30. Scenario analysis
31. Sneak circuit analysis
32. Structured/semi-structured interviews
33. SWIFT (i.e. structured what-if)
34. Systemic Cause Analysis Technique (SCAT)
35. Workplace Risk Assessment and Control (WRAC)

Risk Management Standards:

1. Risk Management Principles and Guidelines (ISO 31000:2018)
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**

Appendix B: Workshop Contacts

- ✓ **Sujoy Dey, PhD | CRM | Six-Sigma Black Belt**
Corporate Risk Officer
Ministry of Labour, Training & Skills Development
sujoy.dey@ontario.ca

- ✓ **Michelle Roberts**
Director, Stakeholder & Client Engagement
Infrastructure Health & Safety Association
mroberts@ihsa.ca