Methods for Assessing Risk

Tuesday, 2nd September

Our speakers

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Prior to joining RIMS in 2010, Carol held a number of progressively responsible risk management positions in the customer care, communications, manufacturing, defense, and insurance industries. A Miami University graduate, she serves on its Center for Business Excellence advisory board and is vice chair of the U.S. Technical Advisory Group for ISO 31000 standards. In 2009, she received RIMS' prestigious Harry & Dorothy Goodell Award. In 2011, Treasury & Risk acknowledged her as one of its 100 Most Influential People in Finance.

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Steve is a Director of T3 Australia Pty Ltd, a training company focussed on business management training and executive coaching, and principal consultant in risk management, business continuity, product recall and crisis management for consumer good companies. A qualified teacher by training, Steve's work experience spans the Australian government (n counter-terrorism), where he worked with the FBI in establishing the Olympic Intelligence Centre for the 1996 Olympics. He also supported the NSW Police as Director, Olympic Intelligence Centre before being recruited by The Coca-Cola Company. Steve's standards development work includes the International Standard for Product Recall (ISO 10393) and its related standard – the International Standard for Product Safety (ISO10377), as well as the U.S Standard for Organisational Resilience.

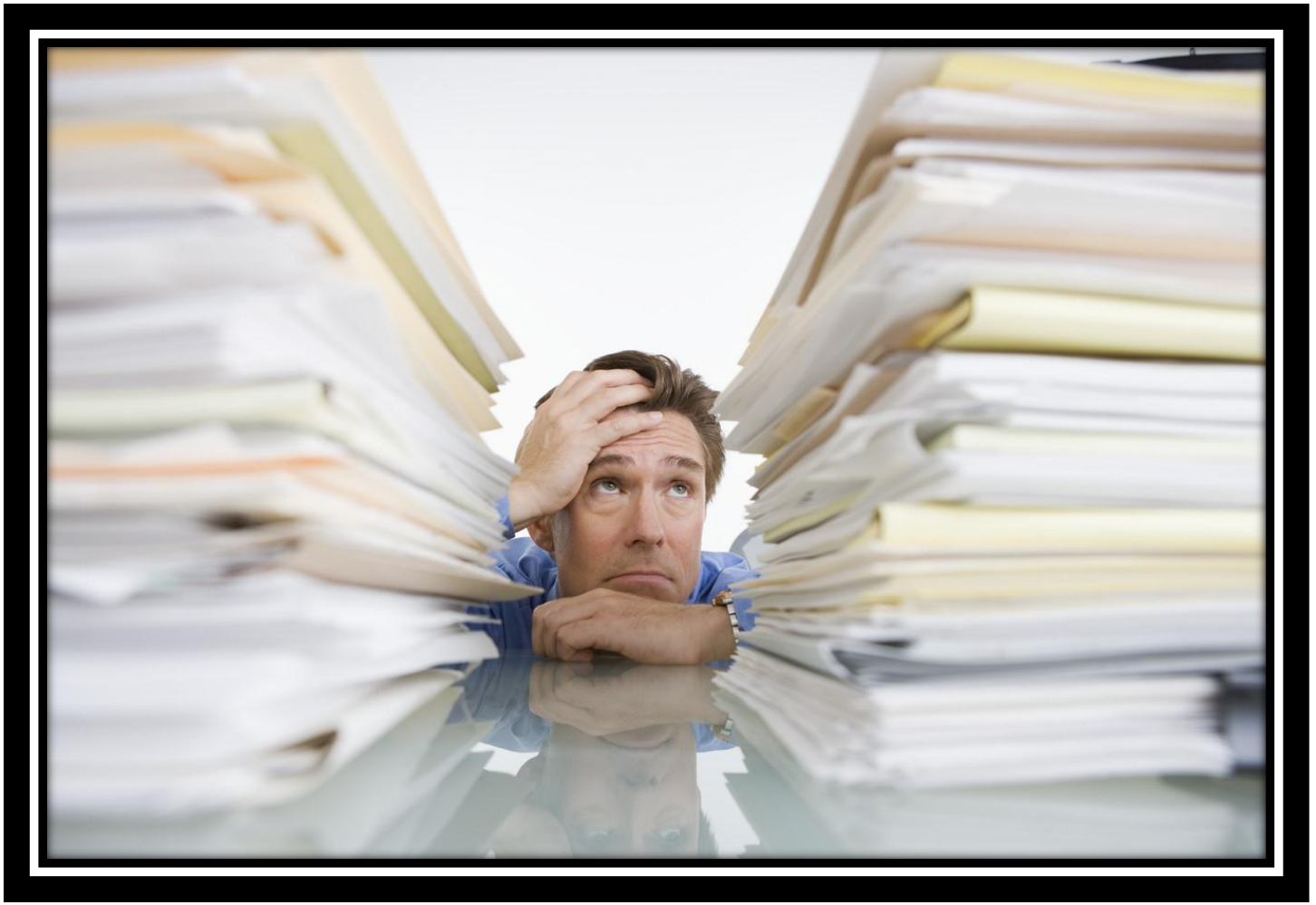
What to Expect

- The Characters
- The Plot
- The Story Unfolds
- Solutions and Suggestions
- The Outcome?
- Are Organizations Really Doing This?

A Risk Management Saga

THE CHARACTERS

Our Hero



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The Boss

The Consultants

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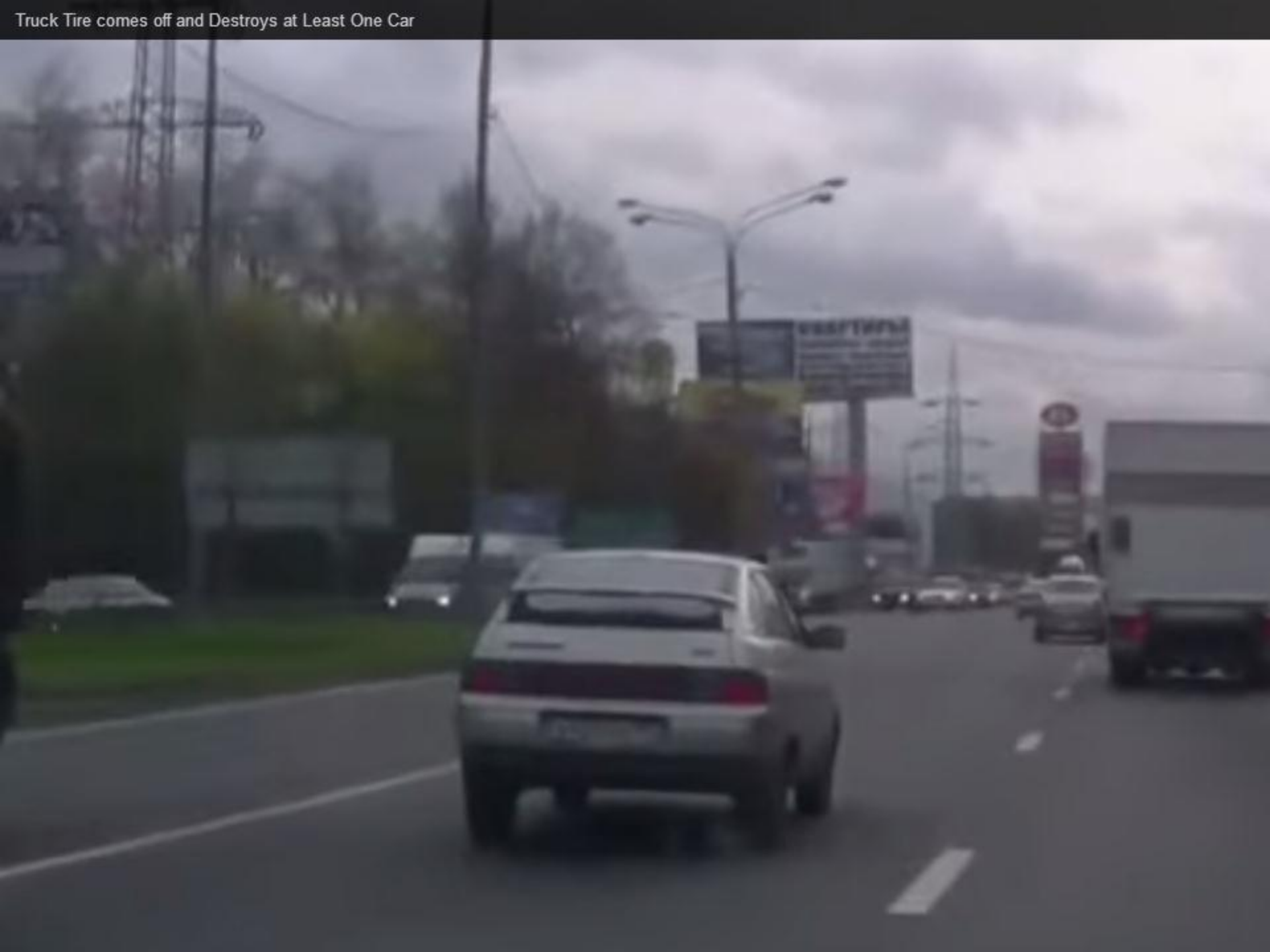
So what is the problem?

THE STORY UNFOLDS …

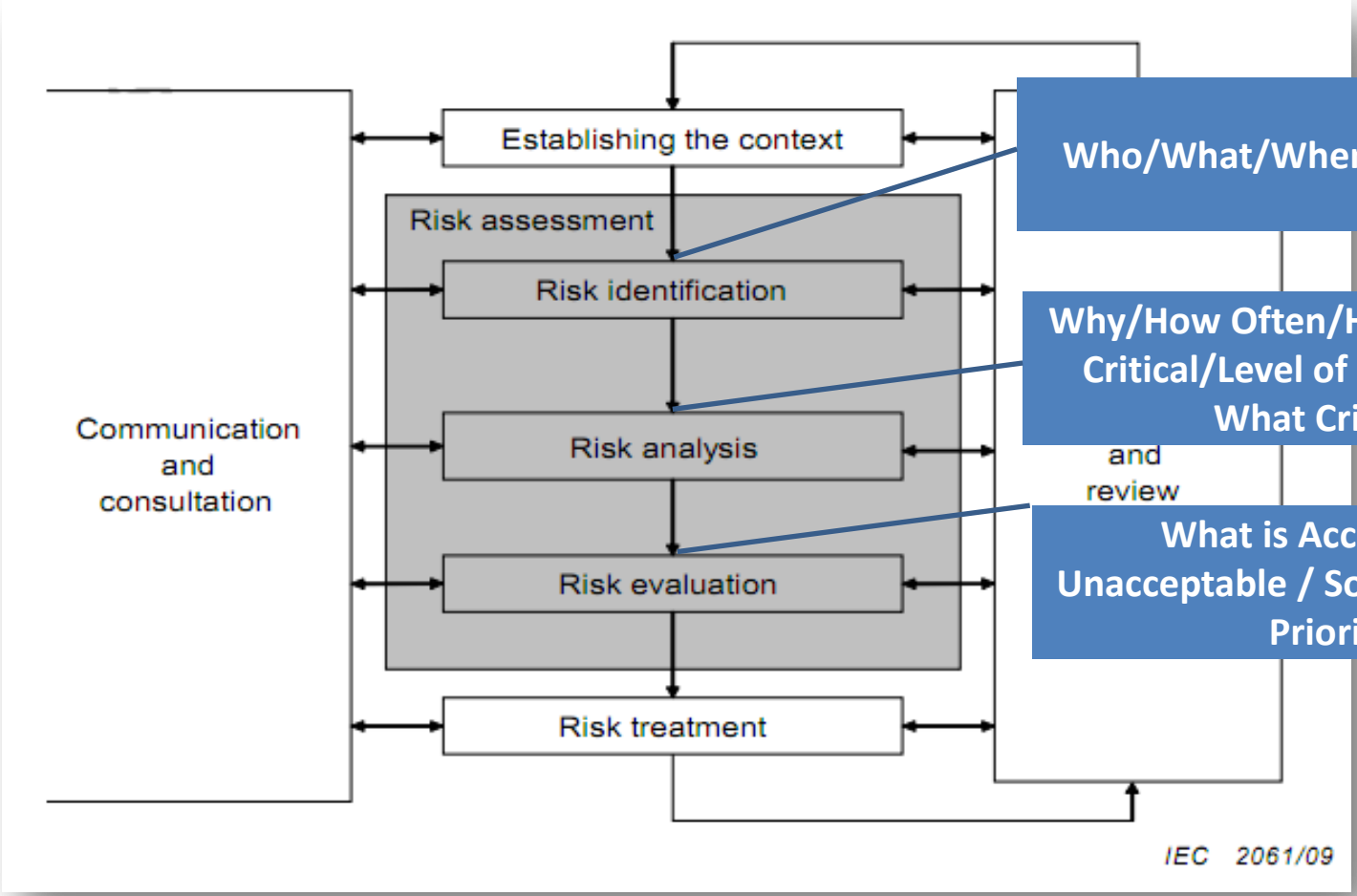

Truck Tire comes off and Destroys at Least One Car

What exactly is the RISK?


You know, this happened a few times before…
A quick repair and all will be forgotten.
Let's have risk management assess the risk.
What about our reputation? That YouTube video has over 150,000 views.


I wonder if those consultants I met at that RIMS event can help?

IEC/ISO 31010:2009 Risk Assessment Techniques



Who/What/When/Where/How

Why/How Often/How Much/How Critical/Level of Risk Based on What Criteria?

What is Acceptable or Unacceptable / Solution Options / Priorities

Risk management — Risk assessment techniques

Gestion des risques — Techniques d'évaluation des risques

Table A.1 – Applicability of Tools Used for Risk Assessment

Tools and Techniques	Risk Assessment Process					See Annex
	Risk Identification	Risk Analysis			Risk Evaluation	
		Consequence	Probability	Level of Risk		
Brainstorming	SA[1]	NA[2]	NA	NA	NA	B 01
Structured or Semi-Structured Interviews	SA	NA	NA	NA	NA	B 02
Delphi	SA	NA	NA	NA	NA	B 03
Checklists	SA	NA	NA	NA	NA	B 04
Primary Hazard Analysis	SA	NA	NA	NA	NA	B 05
Hazard and Operability Studies (HAZOP)	SA	SA	A[3]	A	A	B 06
Hazard Analysis and Critical Control Points (HACCP)	SA	SA	NA	NA	SA	B 07
Environmental Risk Assessment						B 08
Structure <<What if?>> (SWIFT)						B 09
Scenario Analysis						B 10
Business Impact Analysis						B 11
Root Cause Analysis						B 12
Failure Mode Effect Analysis						B 13
Fault Tree Analysis						B 14
Event Tree Analysis						B 15
Cause and Consequence Analysis						B 16
Cause-and-Effect Analysis						B 17
Layer Protection Analysis (LOPA)						B 18
Decision Tree						B 19
Human Reliability Analysis						B 20
Bow Tie Analysis						B 21
Reliability Centered Maintenance						B 22
Sneak Circuit Analysis						B 23
Markov Analysis						B 24
Monte Carlo Simulation						B 25
Bayesian Statistics and Bayes Nets	NA	SA	NA	NA	SA	B 26
FN Curves	A	SA	SA	A	SA	B 27
Risk Indices	A	SA	SA	A	SA	B 28
Consequence/Probability Matrix	SA	SA	SA	SA	A	B 29
Cost/Benefit Analysis	A	SA	A	A	A	B 30
Multi-Criteria Decision Analysis (MCDA)	A	SA	A	SA	A	B 31

[1] Strongly Applicable.

Techniques can be:

- qualitative
- semi-quantitative
- quantitative
- combination
- predictive
- post-action

Risk Assessment Considerations

When considering risks for relevance and importance, the following ***"material"*** variables can help:

Qualitative

- **Likelihood:** The frequency, relative frequency, or probability
- **Severity:** The impact of the consequence (may be expressed in multiple terms: financial, human, reputation, property, ability to continue operations, etc.)
- **Timing:** Speed to onset (velocity), when the event/trend occurs (trigger), how long it lasts (duration)
- **Vulnerability**: susceptibility related to the entity's preparedness, agility, and adaptability

Quantitative

- **Expected value:** Mean, mode, or median for forecasts, budgets
- **Variability:** Range, standard deviation, and probability distribution
- **Ratios:** How much of one thing there is compared to another thing.

Source: RIMS Workshop: *ERM Accelerating Theory Into Practice*

Types of Risk Assessments

Identify
- Brainstorming
- Structured interviews/what ifs?
- Checklists

Analyze
- Consequence/likelihood matrix
- Root cause
- Cause and effect analysis
- Influence diagram
- Bow tie analysis
- Monte Carlo simulation

Evaluate
- ALARP
- Solution effect analysis
- Force field analysis

Brainstorming – Open Ended

Identify

SAMPLE RISK ASSESSMENT QUESTIONS

- ❑What keeps you up at night?
- ❑What might impede your ability to serve our customers or significantly impair your objectives?
- ❑What risks should we consider over the next 12-18 months?
- ❑What risks will be important for our sustainability ten years from now?
- ❑What are the consequences to the organization if the risk occurs?
- ❑What are the early warning signs that the risk may occur?

Source: RIMS Workshop: *ERM Accelerating Theory Into Practice*

Interviews – What Ifs

SAMPLE "WHAT IF" INTERVIEW QUESTIONS

- Our acquisition due diligence process fails to properly assess and identify human resources and employee benefit issues that could potentially lead to major earnings-per-share losses?
- A disgruntled employee misappropriated confidential information (ours or a client's) and published that information on an open web-site?
- Our assets were confiscated or nationalized by a change in government control in [country name(s)]?
- We failed in a major product launch/client implementation?
- Significant government regulations were enacted that impeded our growth in [our industry]?
- Our competition launched a cutting-edge technology that provided greater scalability, simpler integration, and cost less than our products?
- Everything happened at once?

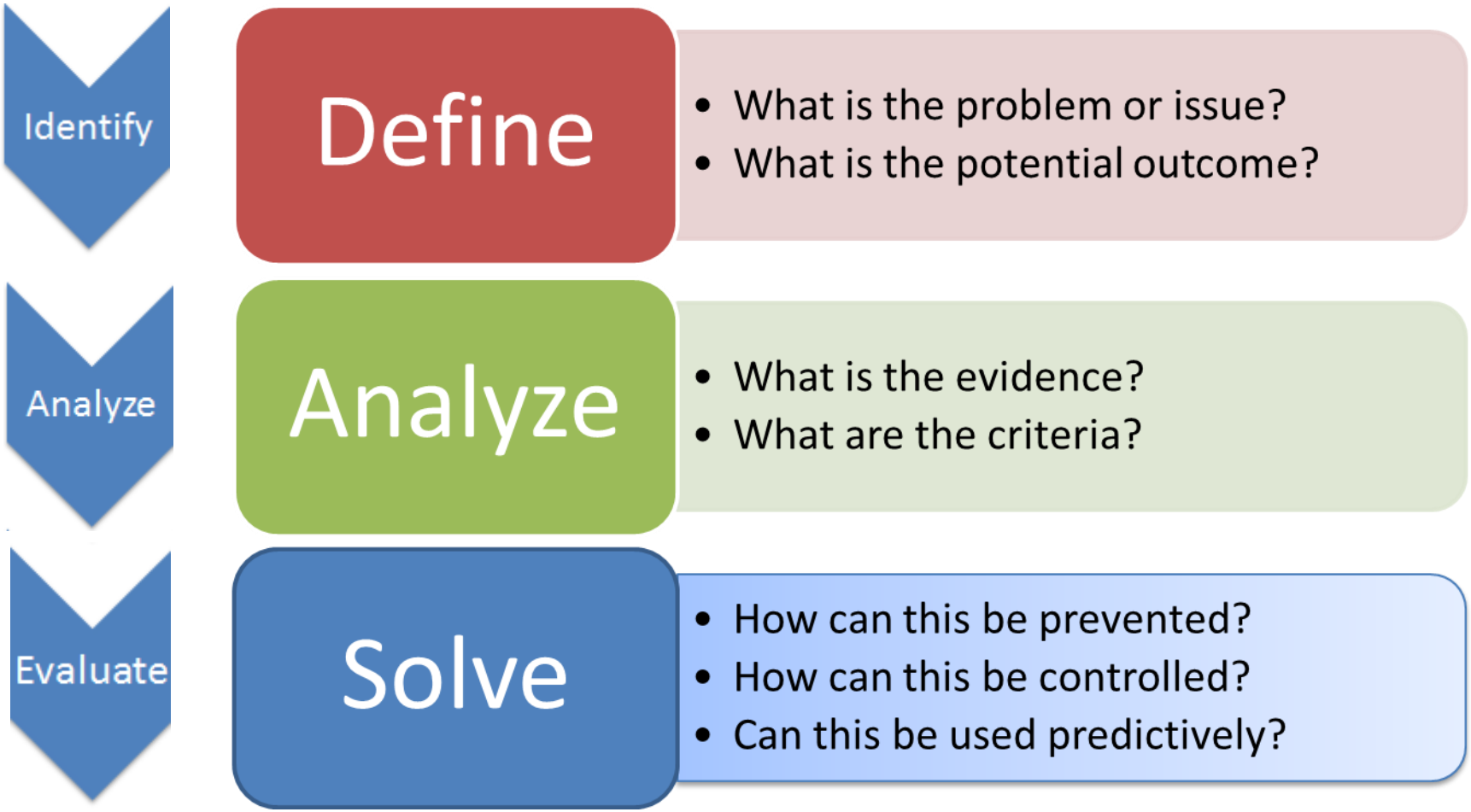
Source: RIMS Workshop: *ERM Accelerating Theory Into Practice*

Checklists

	Check all that apply (√)	Controls adequate (Y/N/NA)
Quality of raw materials		
Adequacy of design		
Fabrication completion		
Assembly capability		
Parts availability		
Maintenance frequ		
Human competen		
……		

All great approaches for identifying risk. This checklist technique may work best for this situation. But how do we analyze and evaluate the risk?

Said Another Way

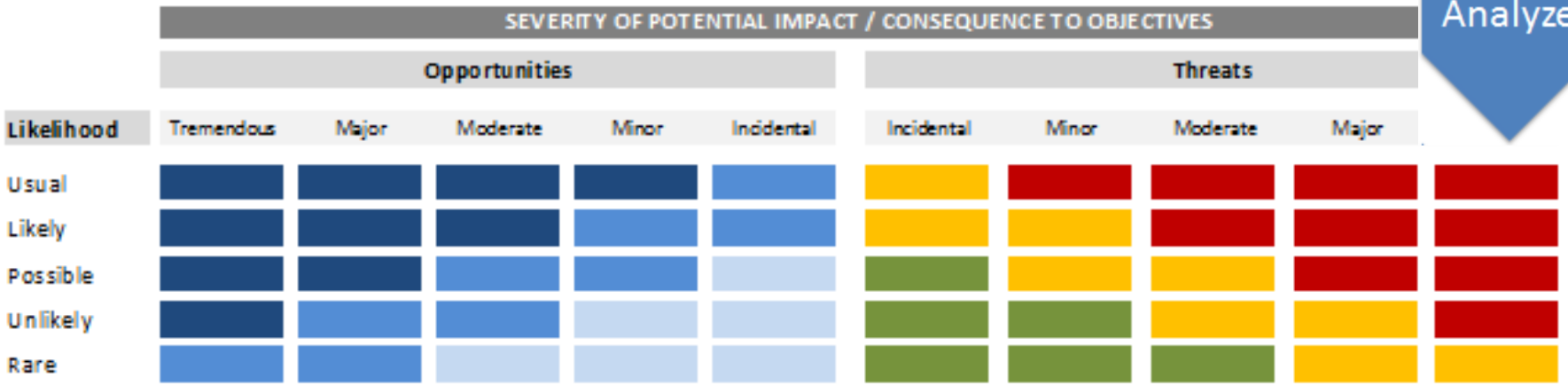


Are There Existing Risk Controls?

Source: RIMS Workshop: *ERM Accelerating Theory Into Practice*

Consequence/Likelihood Matrix

Analyze



Other potential criteria might include:

- ❑ Time to onset (velocity, immediacy, etc.)
- ❑ Duration of impact
- ❑ Capacity of the organization to absorb
- ❑ Controllability
- ❑ Visibility (for monitoring)
- ❑ Interdependencies
- ❑ Readiness
- ❑ Degree of confidence

Source: RIMS Strategic Risk Management Implementation Guide *2012*

Expert Elicitation

- Expert elicitation is a structured process to elicit subjective judgments from experts.
- It is widely used in quantitative risk analysis to quantify uncertainties in cases where there are no or too few direct empirical data available to infer on uncertainty.

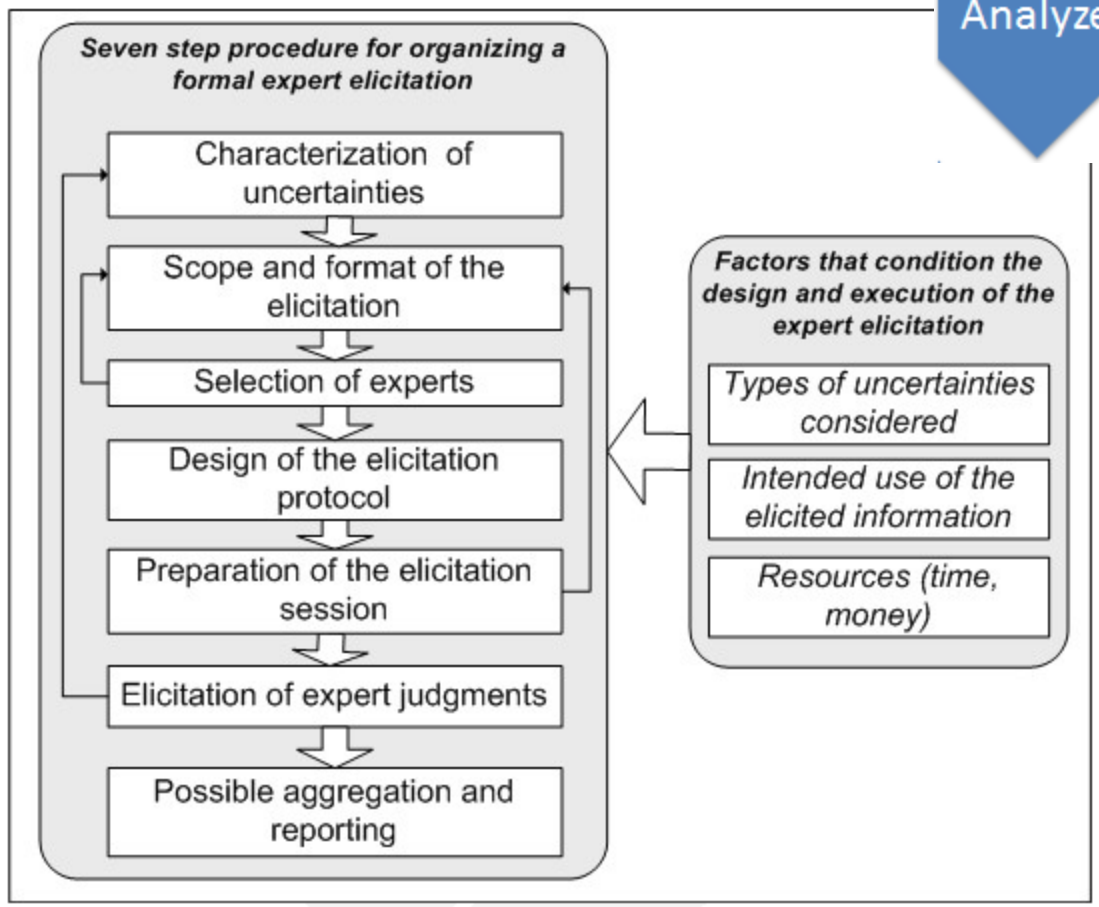
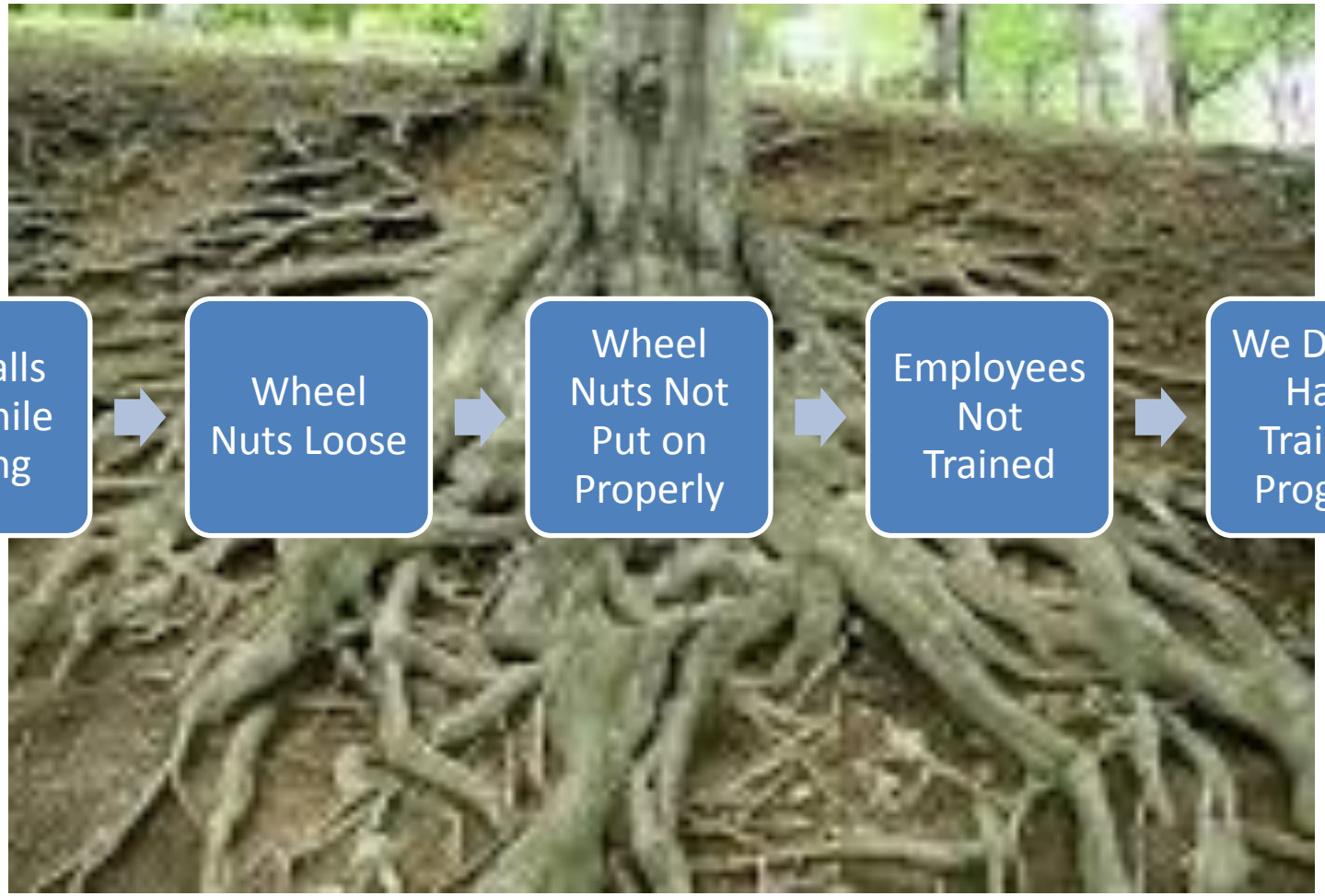


Figure: Seven step procedure for a formal expert elicitation (Knol et al., 2010).

http://www.inl.gov/technicalpublications/documents/3310952.pdf

Root Cause

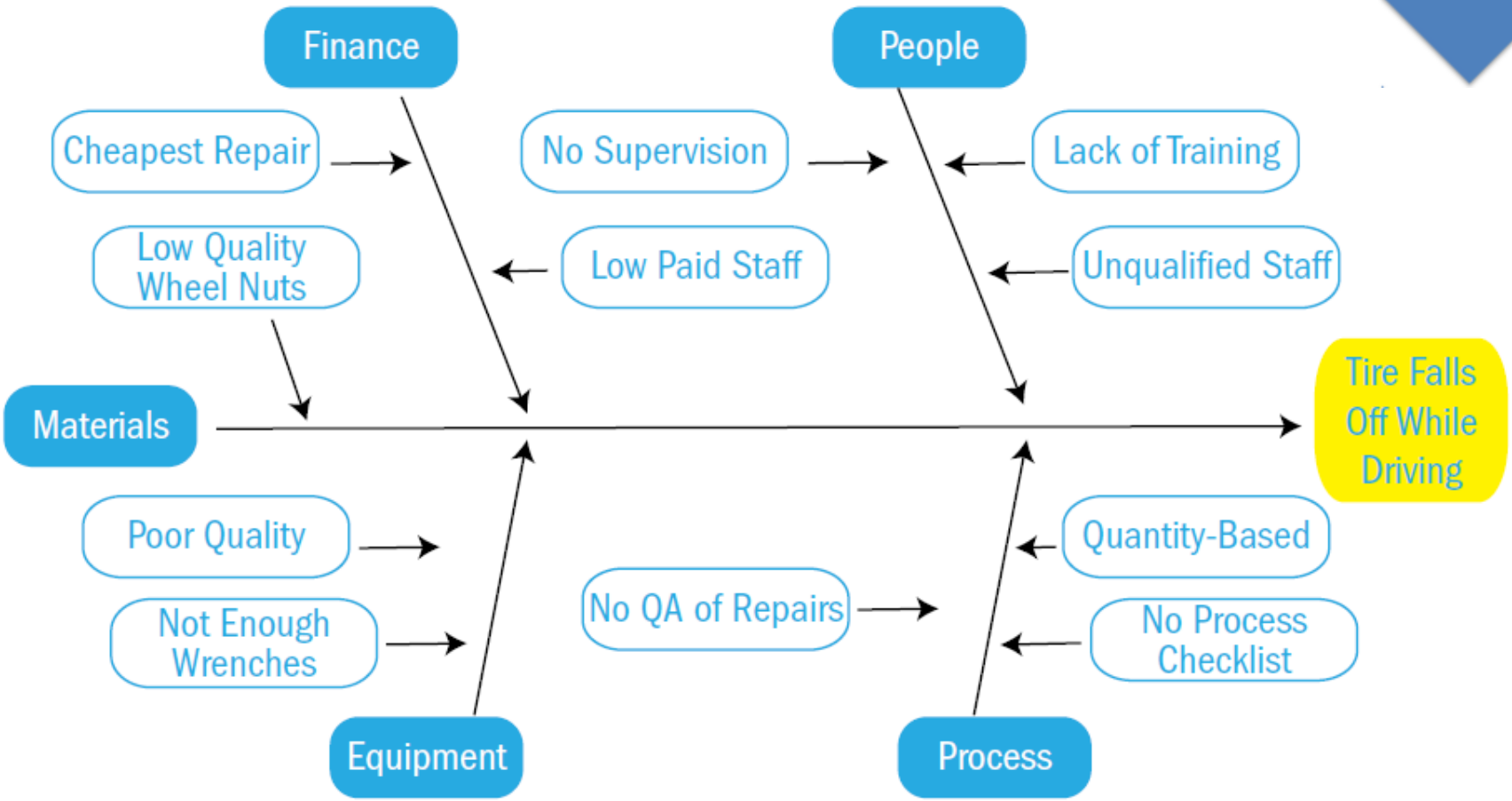
Analyze



Tire Falls Off While Driving → Wheel Nuts Loose → Wheel Nuts Not Put on Properly → Employees Not Trained → We Do Not Have Training Program

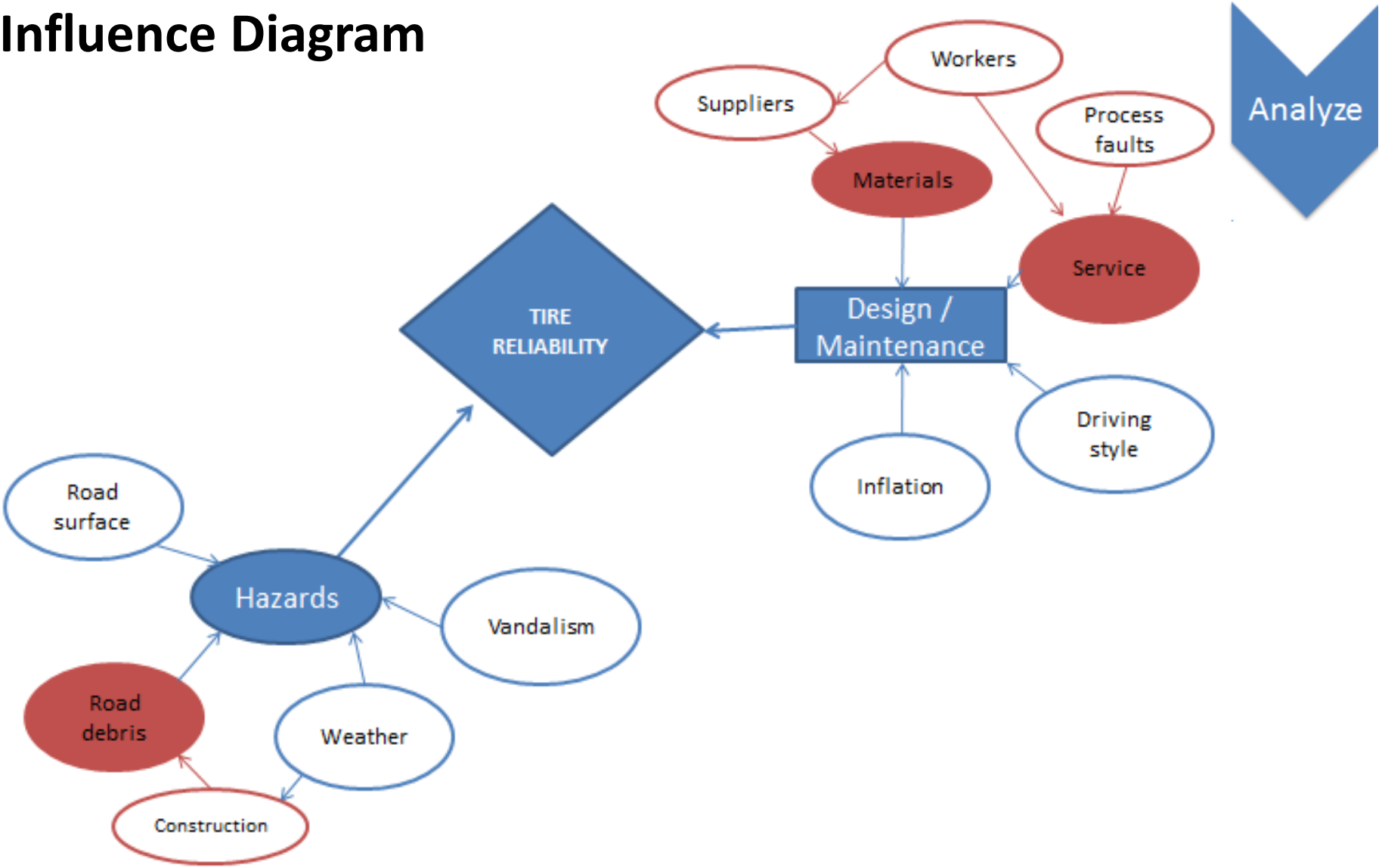
Cause and Effect Analysis

Analyze



Source: RIMS Executive Report Root Cause Analysis: More Than Just Cleaning Up the Mess

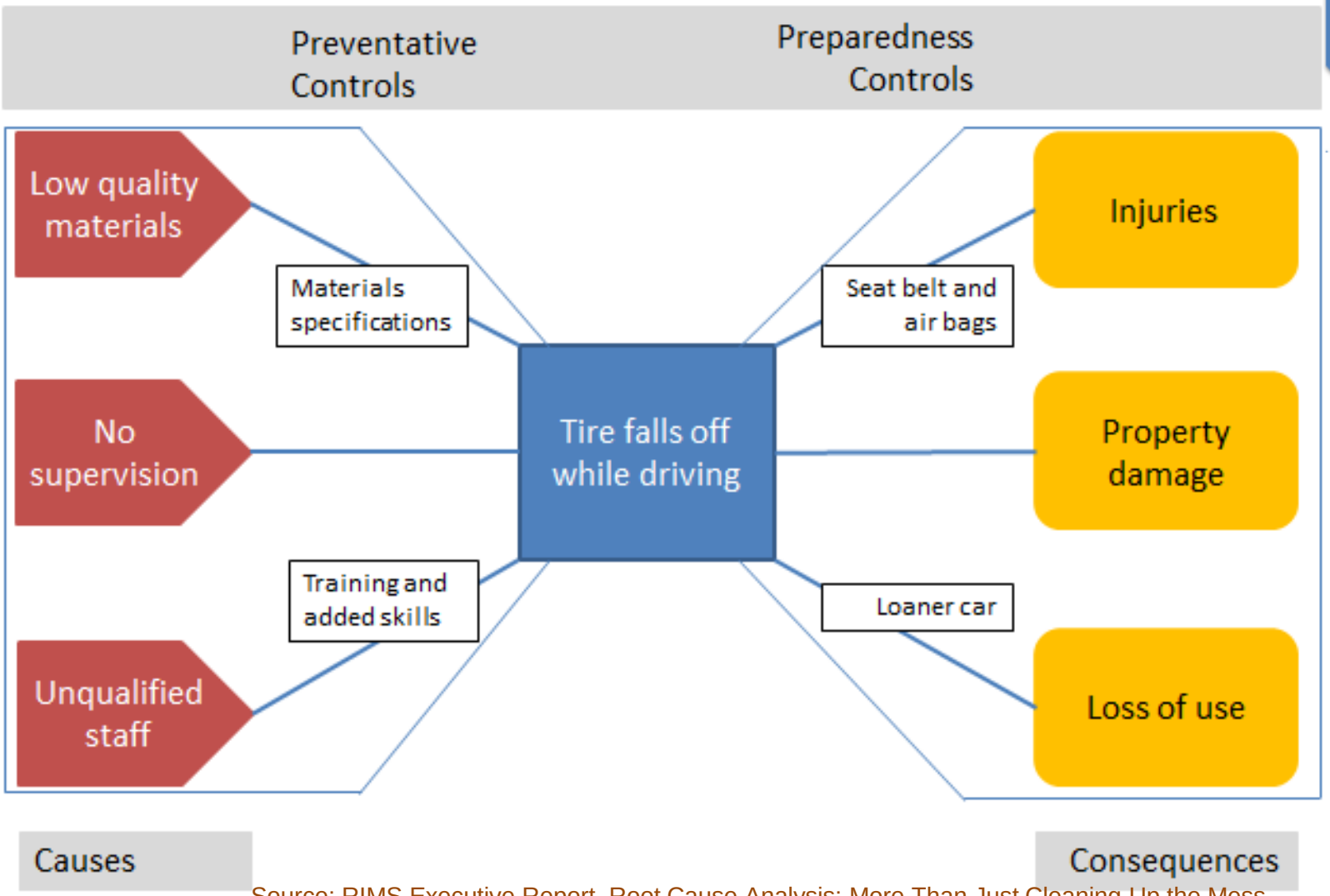
Influence Diagram



Source: RIMS Executive Report Root Cause Analysis: More Than Just Cleaning Up the Mess

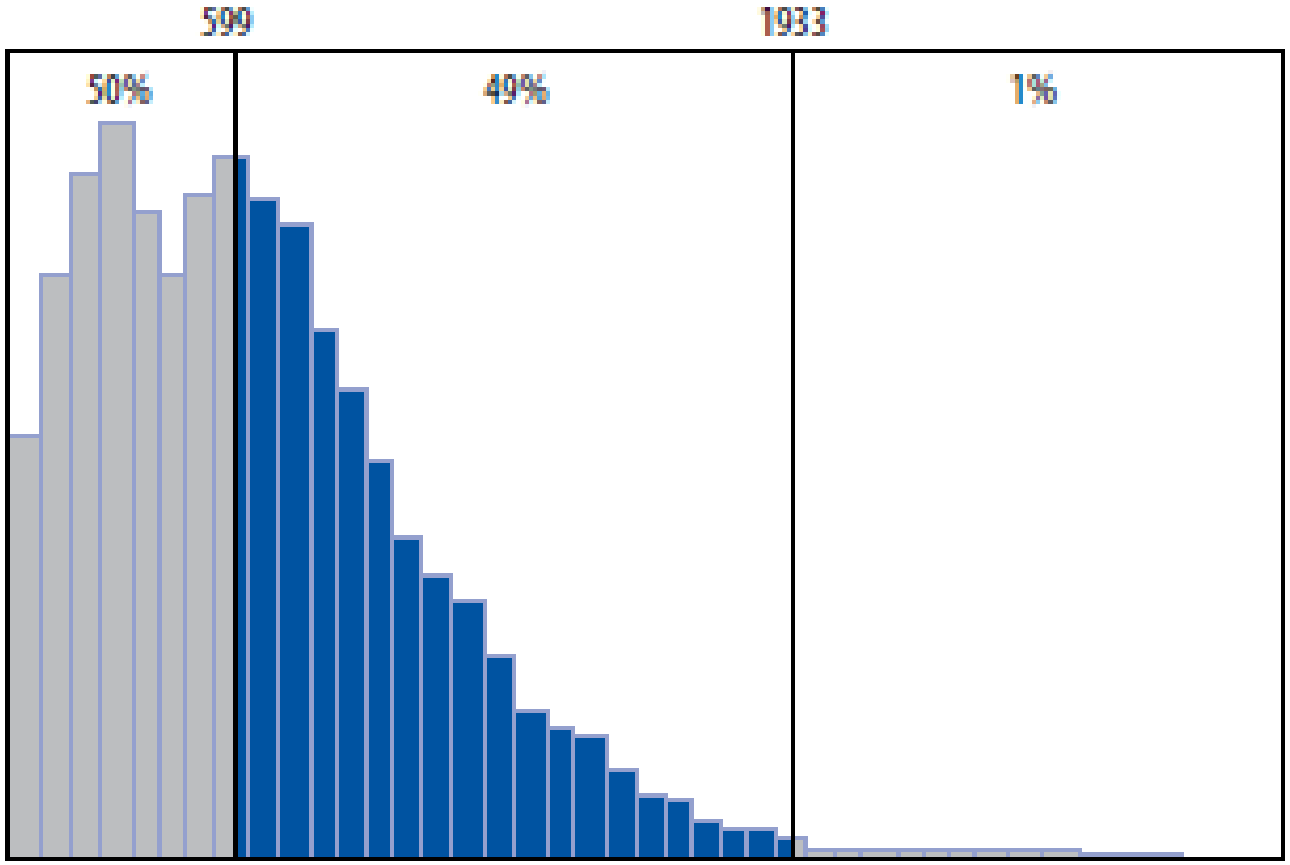
Bow Tie Diagram

Analyze



Source: RIMS Executive Report Root Cause Analysis: More Than Just Cleaning Up the Mess

Monte Carlo Simulation



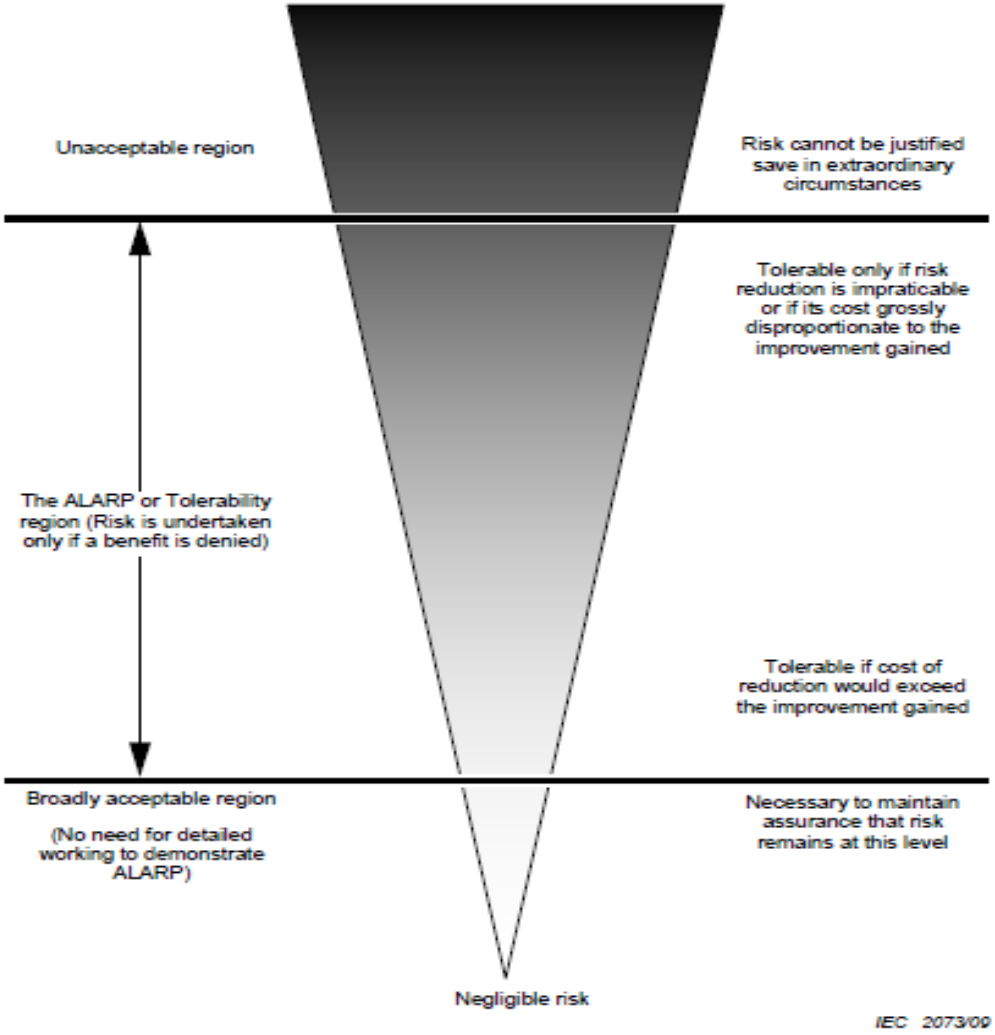
Source: RIMS Executive Report *Exploring Risk Appetite and Risk Tolerance.*

So what now?

SOLUTIONS AND SUGGESTIONS

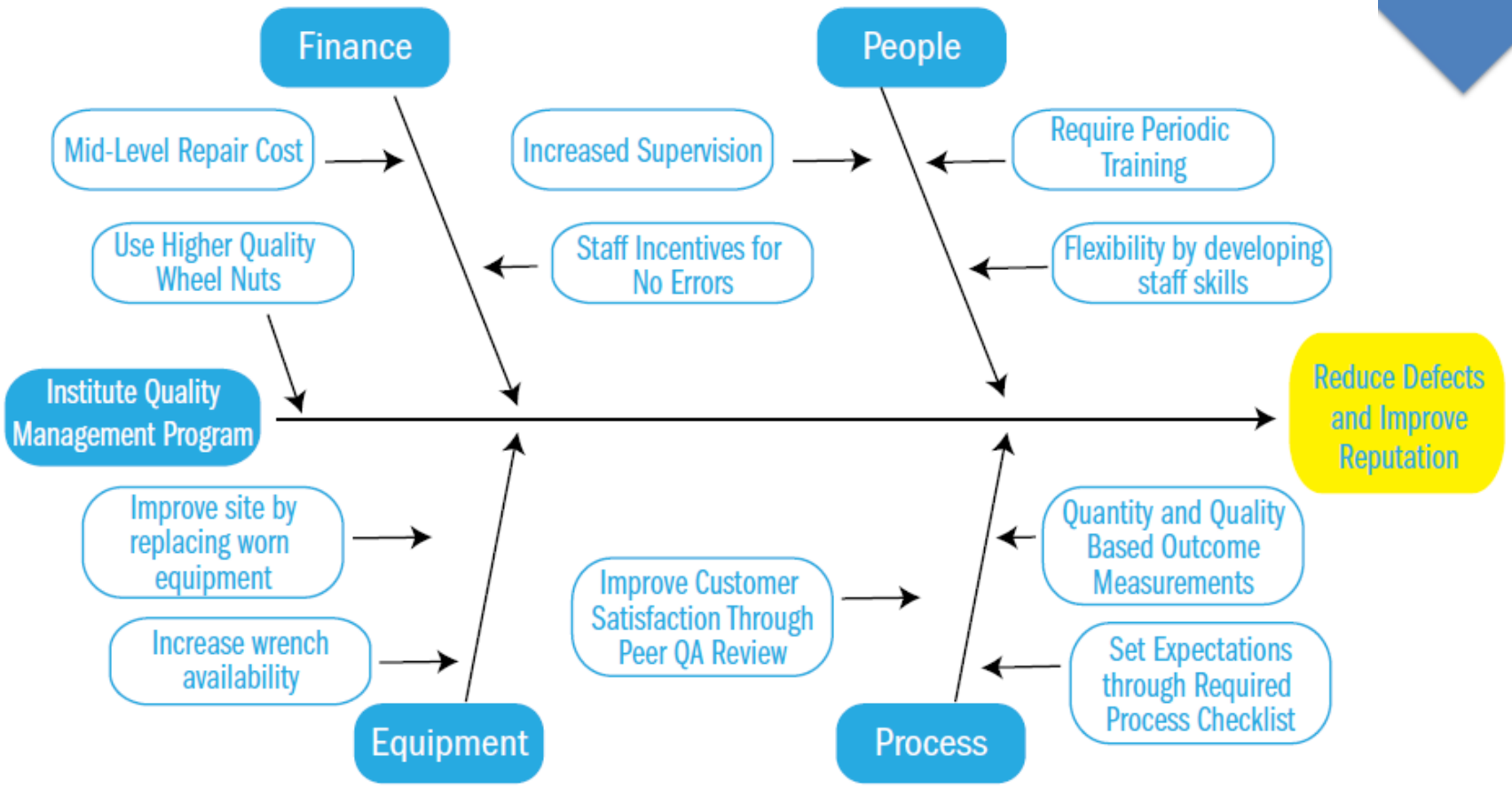
Evaluate

ALARP =
As Low As
Reasonably
Practicable



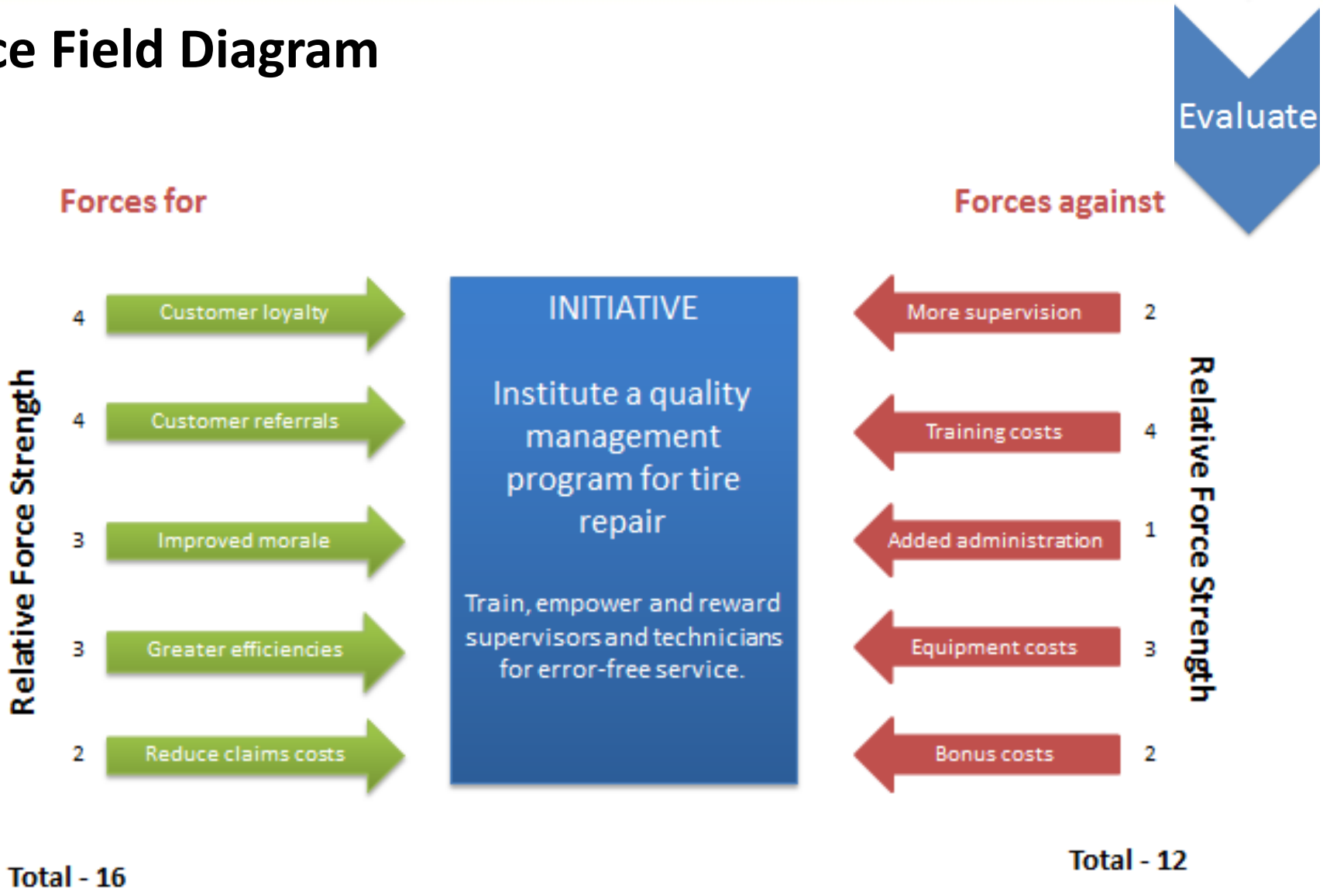
Solution Effect Analysis

Evaluate



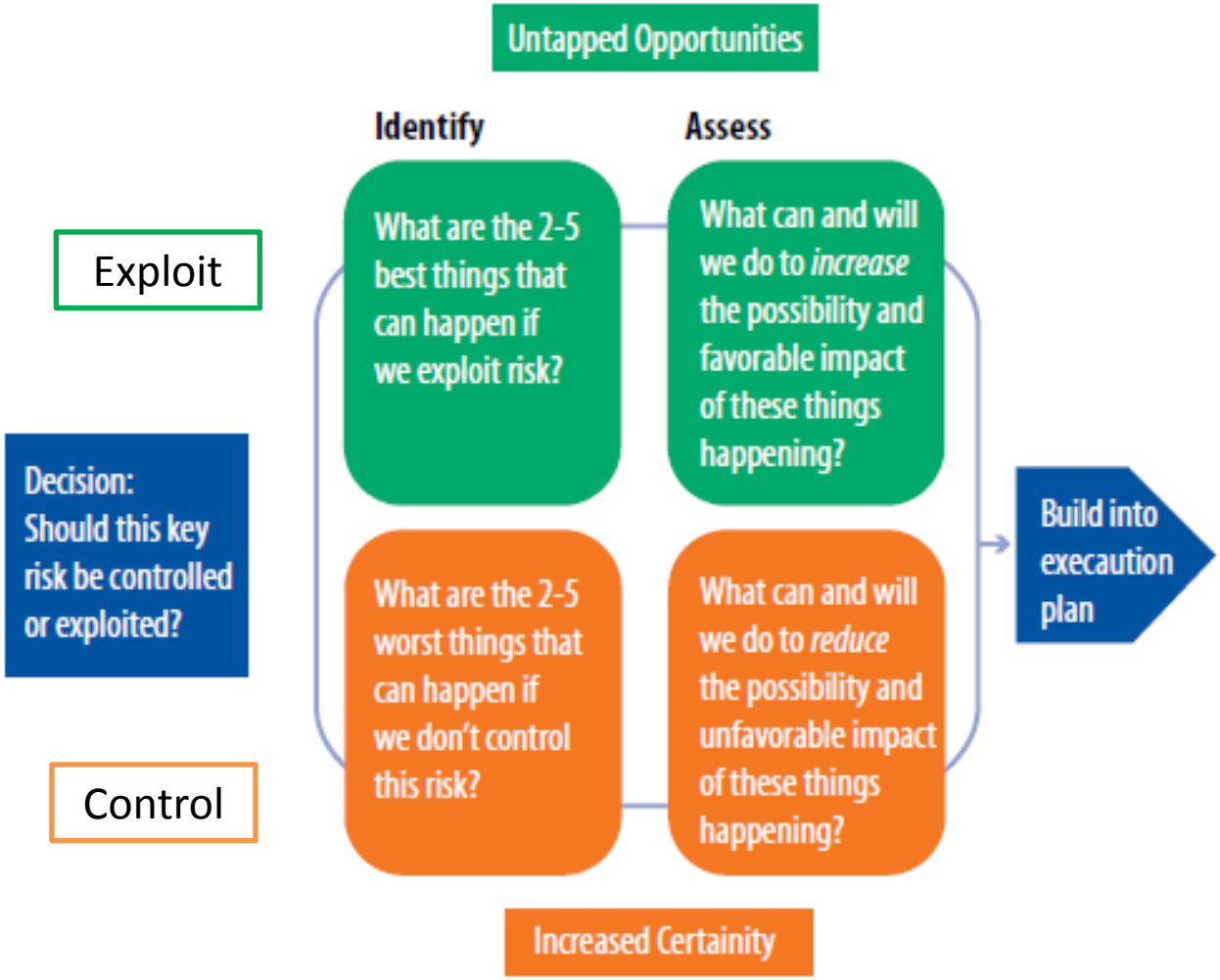
Source: RIMS Executive Report Root Cause Analysis: More Than Just Cleaning Up the Mess

Force Field Diagram



Source: RIMS Executive Report Root Cause Analysis: More Than Just Cleaning Up the Mess

Divergent Paths



If What, Then What, So What?

THE OUTCOME?

You Are the Consulting Team

- Choose one or more risk assessment methods. Be prepared to explain why you chose the method(s).
- Discuss how you would advise our hero to assess and respond to management's "What is the risk?" question.
- You can make as many assumptions as you want, but you will need to document them.

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In Response to the Question, "What's the Risk?" Our Hero Should Recommend

1. Accept – the risk is within the company's capacity to absorb
2. Avoid – sell the truck rental business
3. Mitigate – recall all trucks for inspection and repair
4. Transfer – increase insurance program limits of liability
5. Exploit – Establish insurance captive to sell insurance to truck renters

Conclusions

- Risk assessments provide the foundation for risk management by systematically evaluating risk to support a factual basis for informed decision making.
- Risk assessments can be accomplished in varying degrees of detail. The level of detail is dependent upon the type of risk, purpose of the analysis, resource limitations, and the information available to the assessor(s).
- At times, risk management teams underutilize the number and types of risk assessment methods available to them.
- Risk may be assessed using a quantitative computational approach or a qualitative subjective judgmental approach, or a combination of both.

Lessons from life

ARE COMPANIES REALLY DOING THIS?

Risk Estimation
Does the 5 x 5 (or 4 x 6) have a place?

Probability	Severity			
	1	2	3	4
Rare	Low	Low	Low	Moderate
Unlikely	Low	Low	Moderate	High
Possible	Low	Moderate	Moderate	High
Probable	Low	Moderate	High	Extreme
Highly probable	Moderate	High	Extreme	Extreme
Almost inevitable	Moderate	High	Extreme	Extreme

Truck Accidents

Infinity Cables

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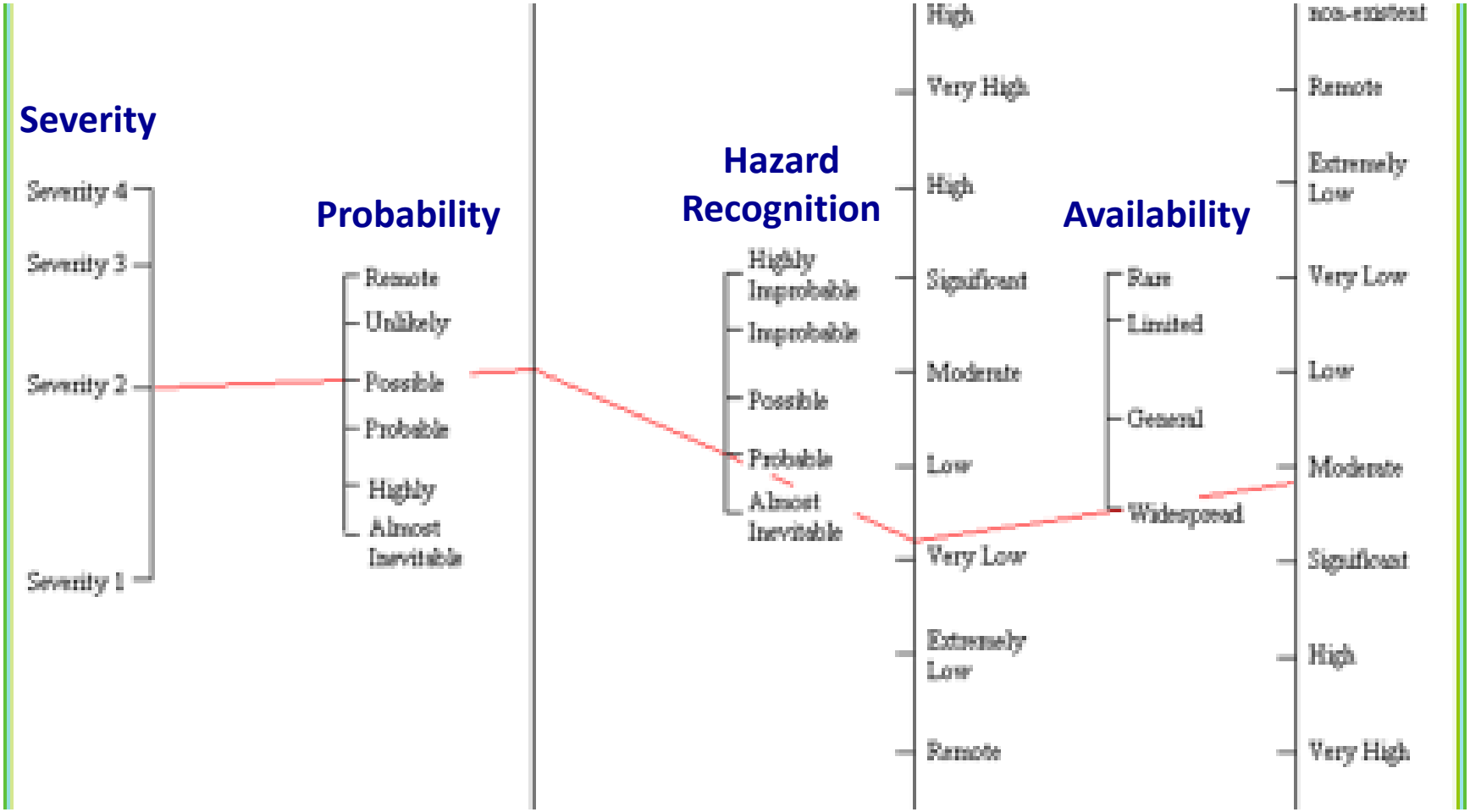
Food Safety

Hazards of Hazard Analysis – Sanbrook Recall

- Under mounting pressure from the ACCC, Sanbrook Brands announces an immediate "voluntary" recall of all Happy Baby Softfeel Latex dummies nationally
- Sanbrook conducted tests which a company spokesman said "proved the dummies were safe".
  - "A very small number of products were found to have a risk of teat separation, with reported incidents at a very low rate of **0.000016, or 1.6 soothers in every 100,000** sold."

- February 2011, Sanbrook appoints liquidators

ACCC Product Safety Nomograph



Application to Consumer Goods Safety

- Severity/Consequences
  - Vulnerable groups
  - Reputation, Financial, Regulatory Consequences
- Probability
  - Intended use, foreseeable use, foreseeable misuse
  - Problems of good data, injury statistics
- Availability
  - Distribution of product
  - Common products – every household
- Recognition of hazard
- Allergens
- Contaminants
- Age and lifecycle of product
  - Assembly and installation
  - Second hand goods
  - Counterfeit goods

Key Messages

- Risk management methodologies necessary
  - Consistent application
  - Engagement
  - Culture
  - Appropriate resourcing and action
- Risk management methodologies need to be customised to suit each industry
- Need (ultimately) to be expressed in plain English – so decision-makers can get involved!

Questions and Final Comments

How did our hero fare?