



Incident Reporting & Data Analytics: Implementing a Risk Management Information System for Youth Protection

Introduction

- Rick Curtis
- Pronouns: he, him, his
- Director, Princeton University Outdoor Action Program: 39 Years
- Founder: www.IncidentAnalytix.com
- Founder: www.OutdoorEd.com
- Author: **The Backpacker's Field Manual**

Learning Objectives – Short Version

- Learn how the **Safety I** framework and **Safety II** framework are complementary parts of an overall risk management plan
- Understand the **Systems Thinking Approach** to risk management
- Learn how a **Risk Management Information System (RMIS)** can provide rich data for implementing Safety I and Safety II principles
- Learn how to assess your program by building **AcciMaps** and **PreventiMaps**

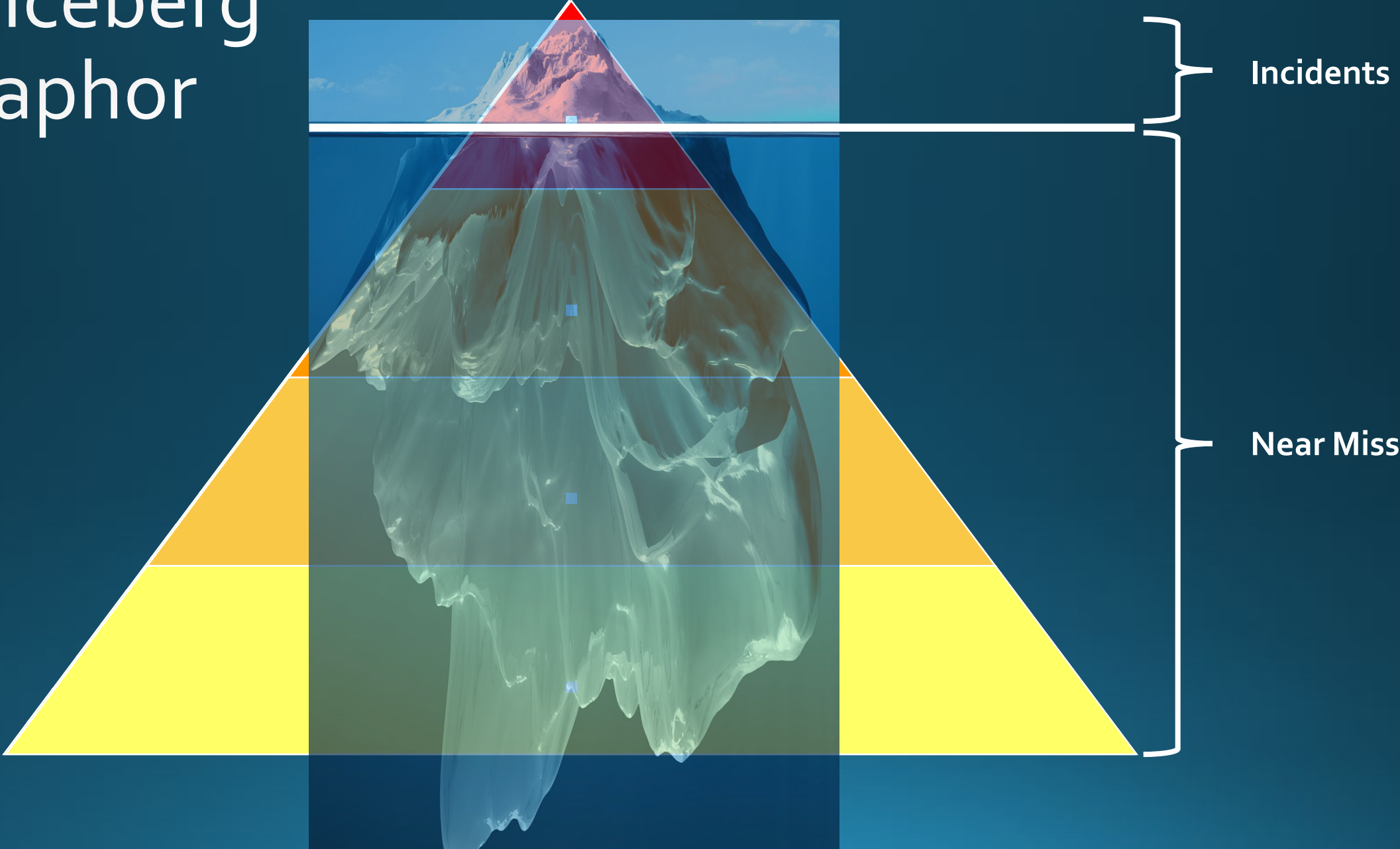
An Incident is either...

- Adverse Outcome
- Close Call/Near Miss

Accident Pyramid



The Iceberg Metaphor



Risk Level = Probability of Occurrence *
Potential Severity of Outcome

Risk Matrix

	Insignificant	Minor	Moderate	Major	Catostrophic
Probability of Occurrence	Almost Certain	Lowest Risk	High Risk	Highest Risk	Highest Risk
Likely	Lowest Risk	Medium Risk	High Risk	Highest Risk	Highest Risk
Possible	Lowest Risk	Low Risk	Medium Risk	High Risk	Highest Risk
Unlikely	Lowest Risk	Low Risk	Medium Risk	Medium Risk	High Risk
Rare	Lowest Risk	Lowest Risk	Low Risk	Low Risk	Medium Risk

Based on NASA Risk Matrix

How do we approach Risk?

Paradigms

- Safety I
- Safety II

Taxonomies of Causation

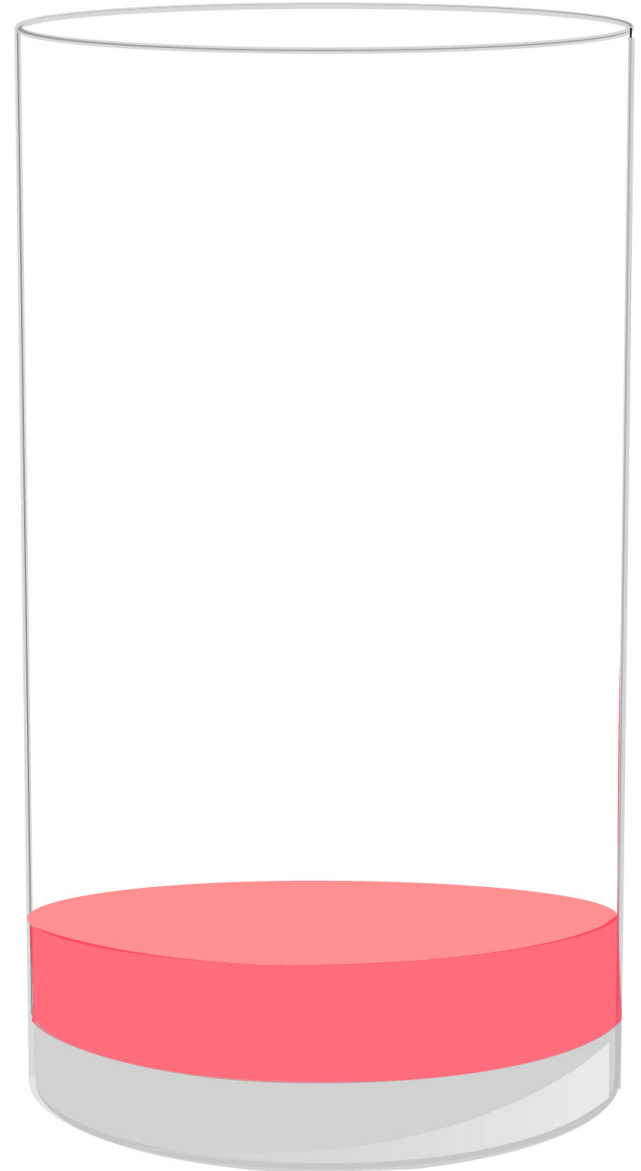
- Meyer (1979) revised by Williamson (1984 – 2013)
- Hale (1982)
- Rasmussen (1999)
- Curtis (2000)
- Salmon et al (2014)



Safety I

What's Going Wrong?

We are safe is there is as little as possible of this



Safety I

	Safety I
Definition of Safety	As few things as possible go wrong
Safety Management Principle	Reactive, respond when something happens or is categorized as unacceptable risk
View of Human Factors	Humans are predominantly seen as a liability or hazard. They are a problem to be fixed.
Accident Investigation	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify the causes.

Causation Taxonomies

- Dynamics of Accidents Model
 - Hale (1982)
- Risk Management in a Dynamic Society
 - Rasmussen (1997)
- Risk Assessment & Safety Management Model (RASMM)
 - Curtis (2000)
- Causation in Led Outdoor Activities
 - Salmon et al (2014)

Taxonomy: Risk Assessment & Safety Management Model (RASMM) ©

- Equipment Factors Hazards
- Environmental Factors Hazards
- Human Factors Hazards

Challenger Disaster – Safety I

- January 28, 1986
- Challenger breaks apart 73 seconds after liftoff
- All seven astronauts killed

Challenger Hazard Factors – Safety I

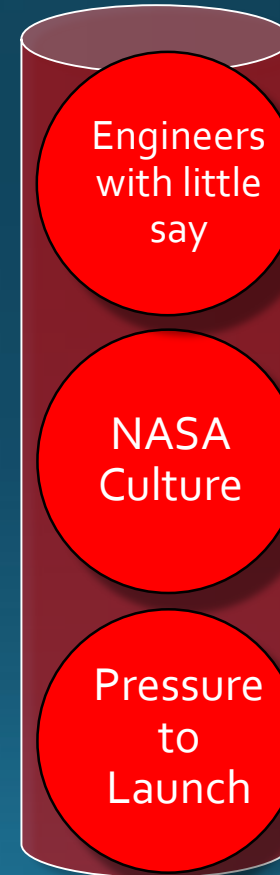
Equipment



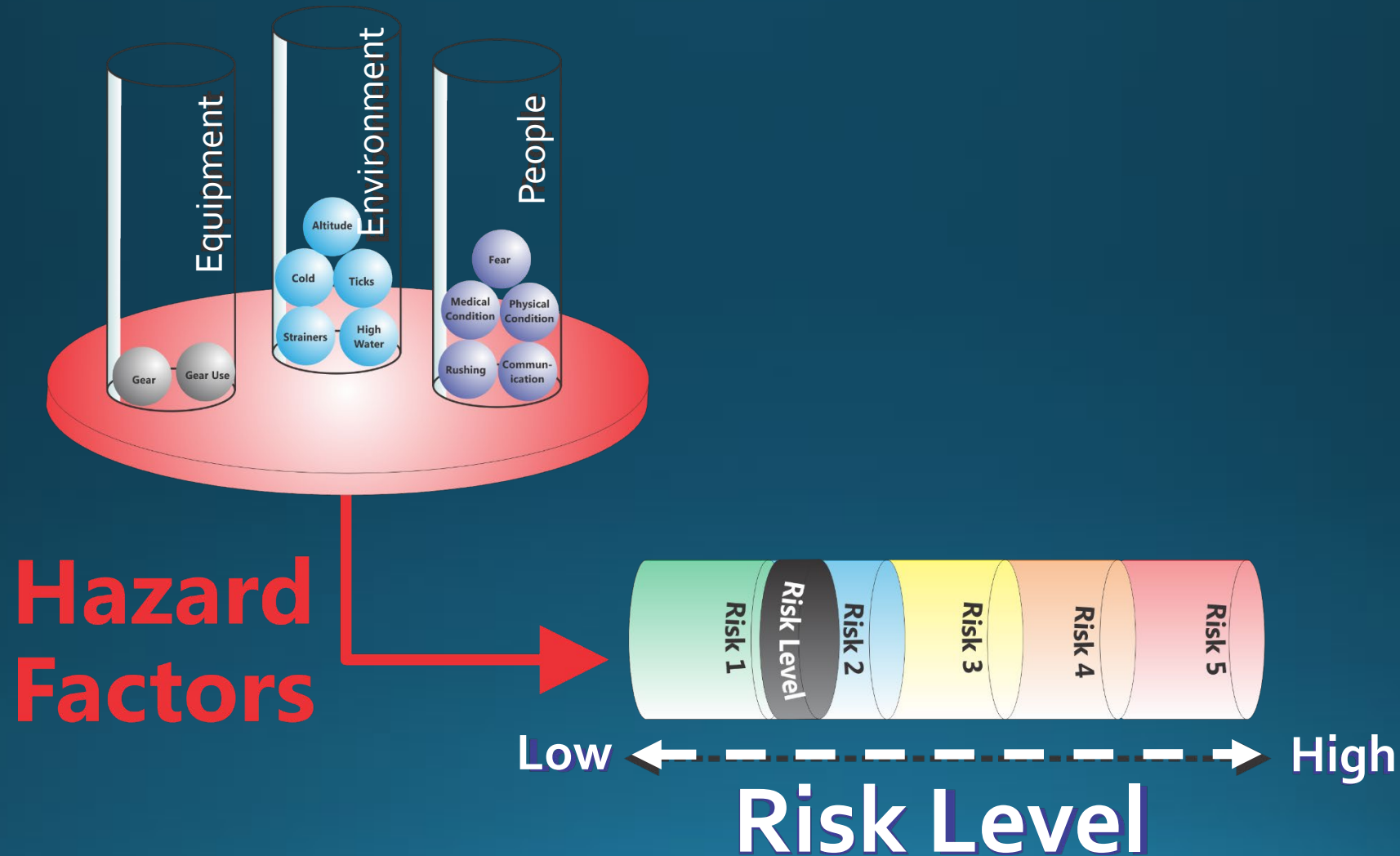
Environment



People



Risk Assessment & Safety Management Model (RASMM) ©





Safety II

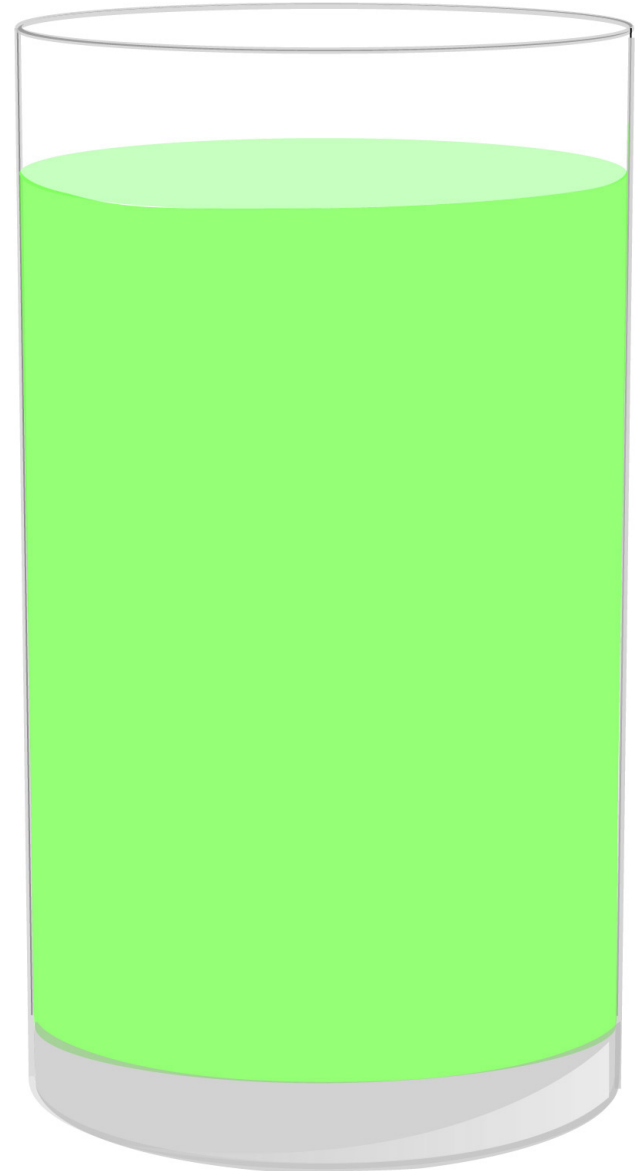
- **From Safety-I to Safety-II: A White Paper**
Hollnagel E; Wears RL; Braithwaite J. 2015



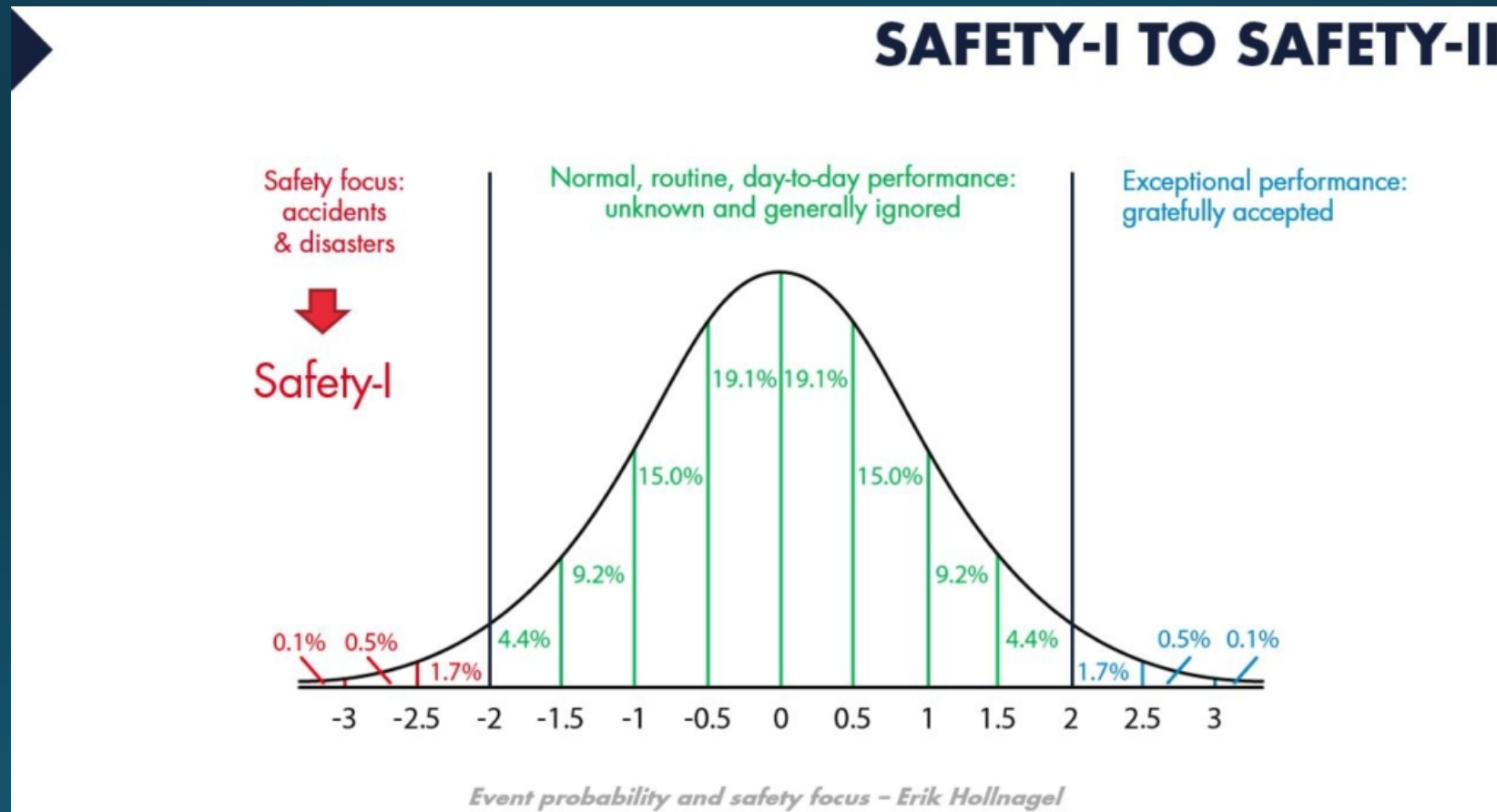
Safety II

What's Going Well?

We are safe is there is as much as possible of this



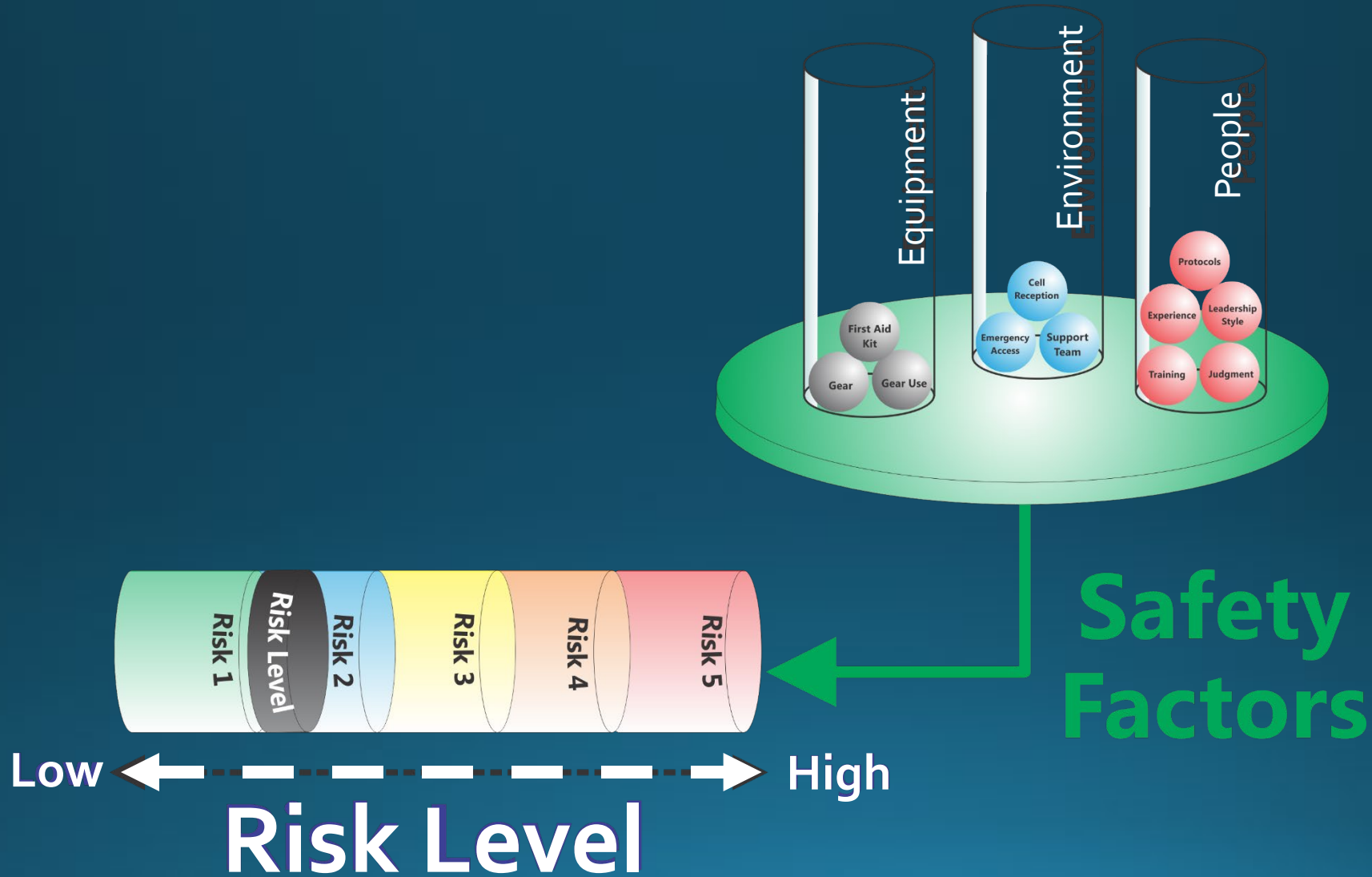
Safety I & Safety II



Safety II

	Safety II
Definition of Safety	As many things as possible go right
Safety Management Principle	Proactive, continuously try to anticipate developments and events
View of Human Factors	Humans are seen as a resource necessary for system flexibility and resilience. They provide flexible solutions to many problems.
Accident Investigation	Things basically happened in the same way regardless of outcome (positive or negative). The purpose of an investigation is to understand how things usually go right as a basis for explaining how things occasionally go wrong.

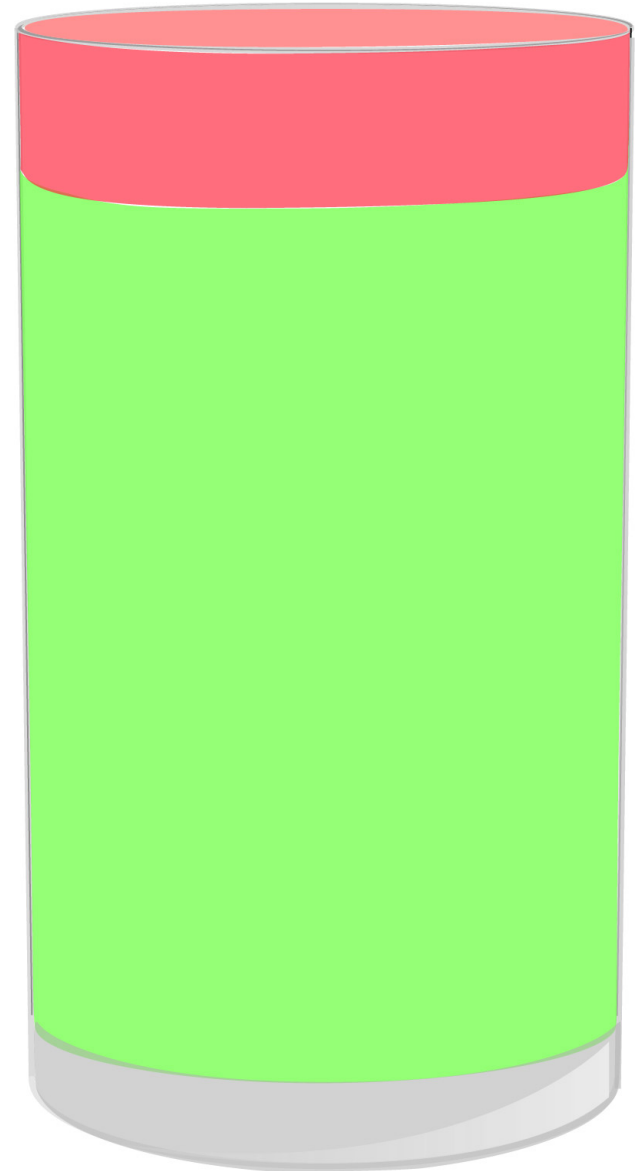
Risk Assessment & Safety Management Model (RASMM) ©



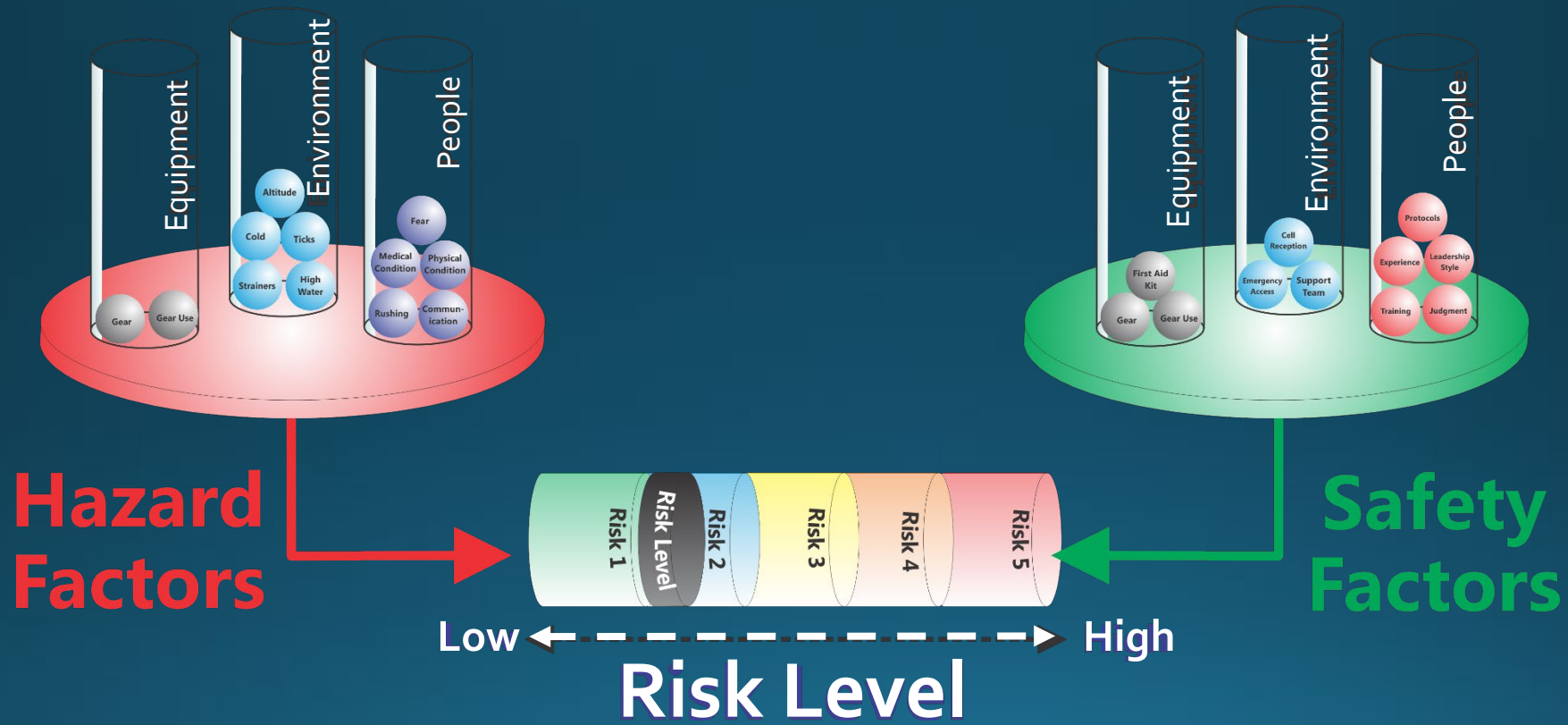


Safety I & Safety II

Covering the entire spectrum



RASM[©] – Safety I & Safety II



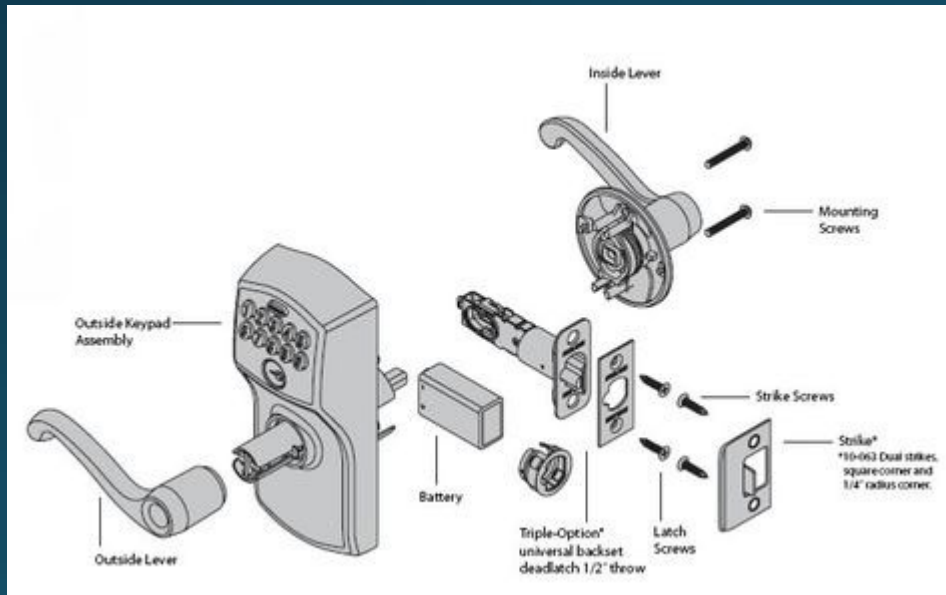
Safety I vs Safety II

	Safety I	Safety II
Definition of Safety	As few things as possible go wrong	As many things as possible go right
Safety Management Principle	Reactive, respond when something happens or is categorized as unacceptable risk	Proactive, continuously try to anticipate developments and events
View of Human Factors	Humans are predominantly seen as a liability or hazard. They are a problem to be fixed.	Humans are seen as a resource necessary for system flexibility and resilience. They provide flexible solutions to many problems.
Accident Investigation	Accidents are caused by failures and malfunctions. The purpose of an investigation is to identify the contributory causes.	Things basically happened in the same way regardless of outcome (positive or negative). The purpose of an investigation is to understand how things usually go right as a basis for explaining how things occasionally go wrong.
Risk Assessment	To assess the likelihood of a negative event	Understand the conditions where performance variability can become difficult or impossible to monitor and control

When do to use Safety I vs Safety II?

Safety I - Simple

- Bimodal – each component has a function, it works or it fails



Safety II - Complex

- Complex sociotechnical systems e.g. Health Care





What is a Risk Management Information System?

Database System for collecting and analyzing Incident and Close Call Data that allows you to apply Safety I & Safety II principles of causal analysis to inform your risk management process.

Developing an RMIS

Review your Incidents



Develop a Database



Train staff to submit data/Culture



Implement Change



Decide what Data to Track



Determine Taxonomy



Build Analytics



What Data to Track?

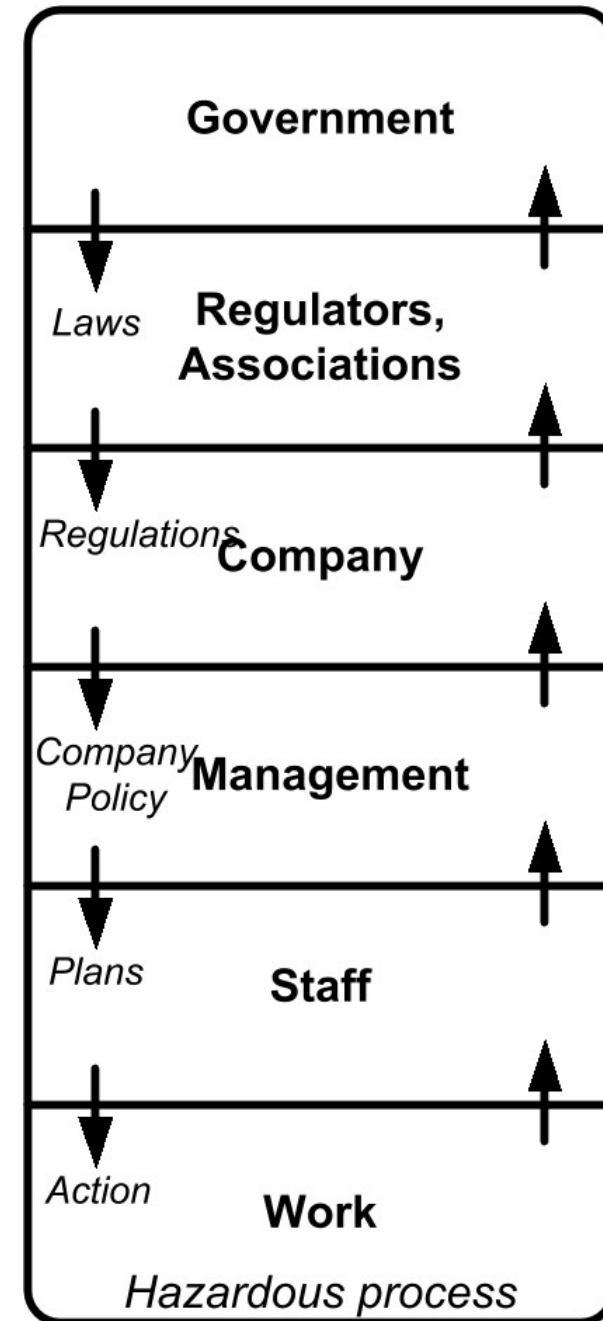
- Start with an assessment of past incidents
 - What are most common?
 - What are the most severe?
 - What incidents are commonly associated with that activity, population, etc. (even if it hasn't happened to you)
 - What has never happened (or you never heard about it) but you need to prepare for?

RMIS Data



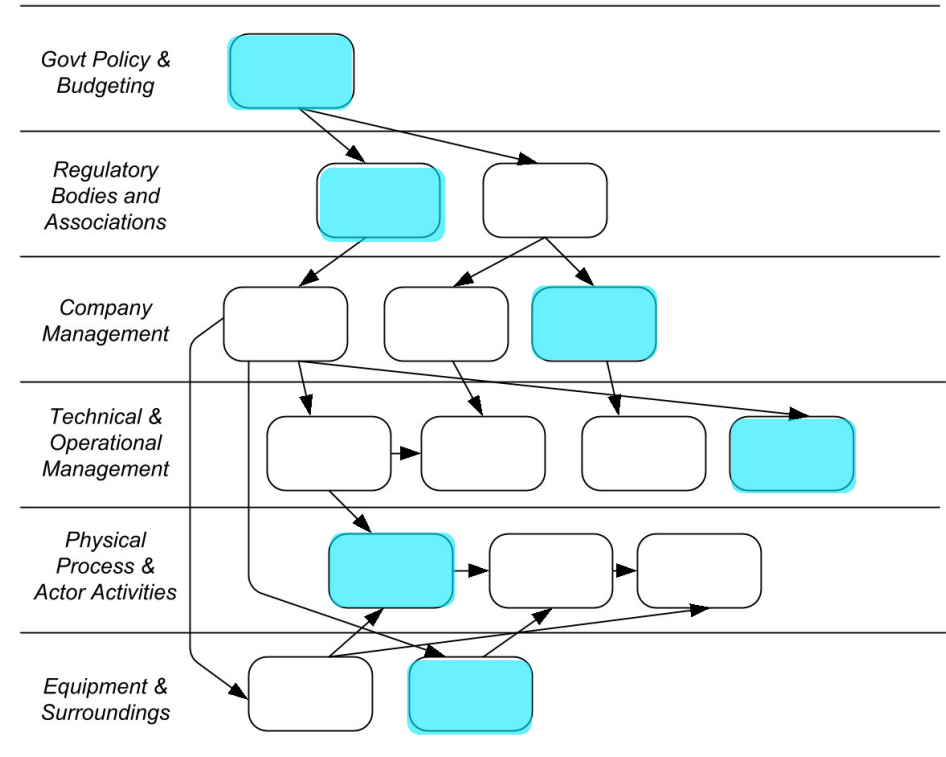
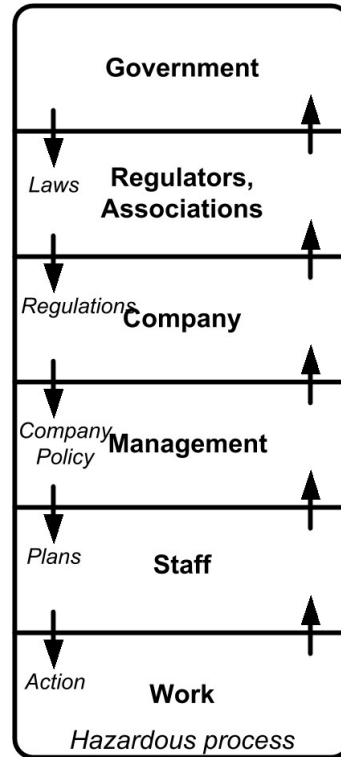
Systems Thinking


- Risk Management in a Dynamic Society, Safety Science, 1997, Jens Rasmussen
 - Safety I + Safety II



AcciMaps

- Map of a Sociotechnical system
- Negative Outcome is at bottom
- Higher Levels show factors contributing directly or indirectly to the negative outcome



 = Failures, decision, actions etc



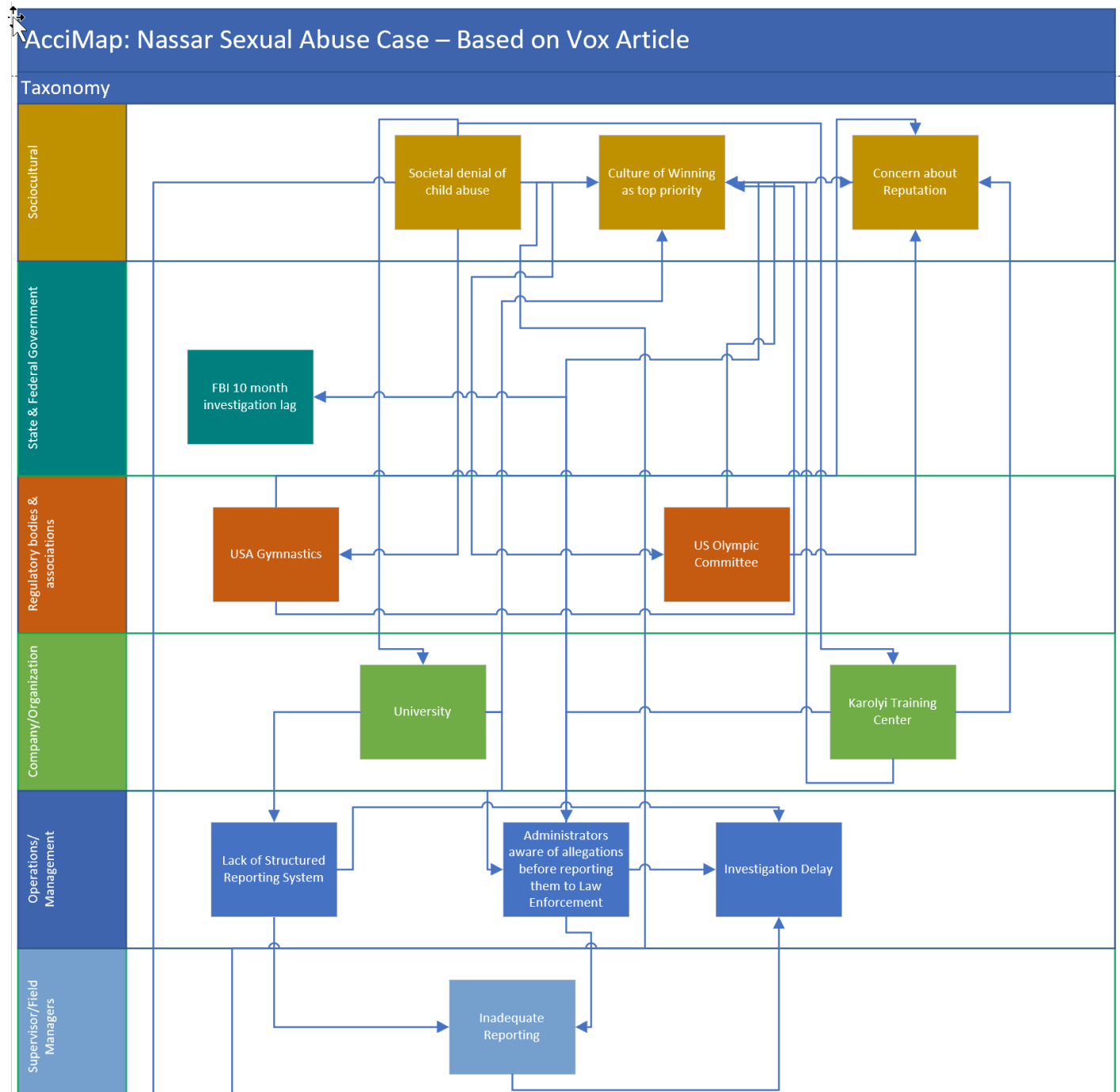
Adverse Event

Building an AcciMap

1. Create a blank AcciMap with the Taxonomy headings on the left sidebar in hierarchical order
2. Identify the outcome(s) and enter at the bottom
3. Identify Causal Factors on a sticky note
4. Enter the Causal Factors at each Taxonomy Level
5. Identify and Relationships between Factors
 - Had A not occurred, B would (probably) not have occurred
 - AND
 - B is a direct result of A (no other factor in between, otherwise link A to C and C to B)
6. Check causal logic
7. Formulate Safety Recommendations
 - What is In Scope?
 - What is Out of Scope

Nassar Case

- AcciMap generated from Excel



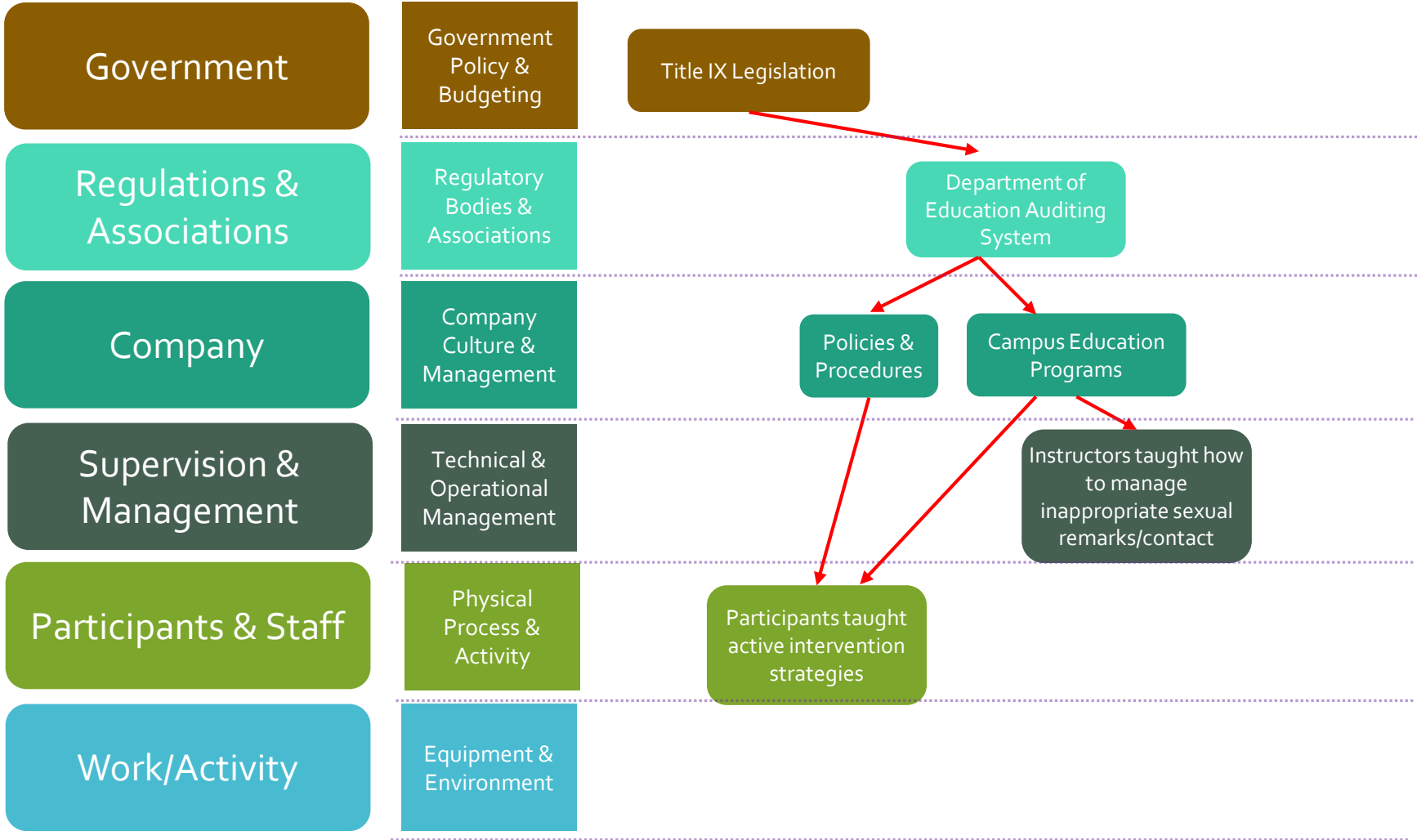
Safety II = PreventiMaps

- **Safety I = AcciMaps** (contributing factor analysis)
“What went wrong?”

then

- **Safety II = PreventiMaps** (mitigation factor analysis)
“What went right?”

PreventiMap: Title IX Implementation on Campus



Determining Scope

- Based on the Taxonomy you selected for your analysis, determine what things are:
 - In Scope
 - Out of Scope

Top 3 Contributory Factors/Taxonomy Level

AcciMap Meta-analysis: Salmon, et al - Safety Science 126 (2020)

Government Policy & Budgeting	Policy, legislation & regulation	Action omitted, failure to act	Judgment & decision making
Regulatory Bodies & Associations	Standards, policy & regulation	Communication & coordination	Judgment & decision making
Local Area Government planning & Budgeting, Company Management	Risk assessment & management	Qualification, experience, training & competence	Policy & procedures
Technical & Operational Management	Planning & preparation	Compliance violations & unsafe acts	Personnel management & recruitment
Physical Processes & Actor Activities	Judgment & decision making	Compliance violations & unsafe acts	Qualification, experience, training & competence
Equipment & Surroundings	Physical & natural environment	Equipment, technology & resources	Weather & climate

Key Concepts

- Safety I
- Safety II
- Taxonomy of Causation
- Systems Thinking
- Using an RMIS to collect Incident and Close Call Data
- Building AcciMaps – Safety I
 - Identifying In Scope vs Out of Scope
- Building PreventiMaps – Safety II
- Implementing Data Driven Organizational Change

Resources

www.IncidentAnalytix.com

Demo available today 4:30 – 5:00 PM
Click on Rooms

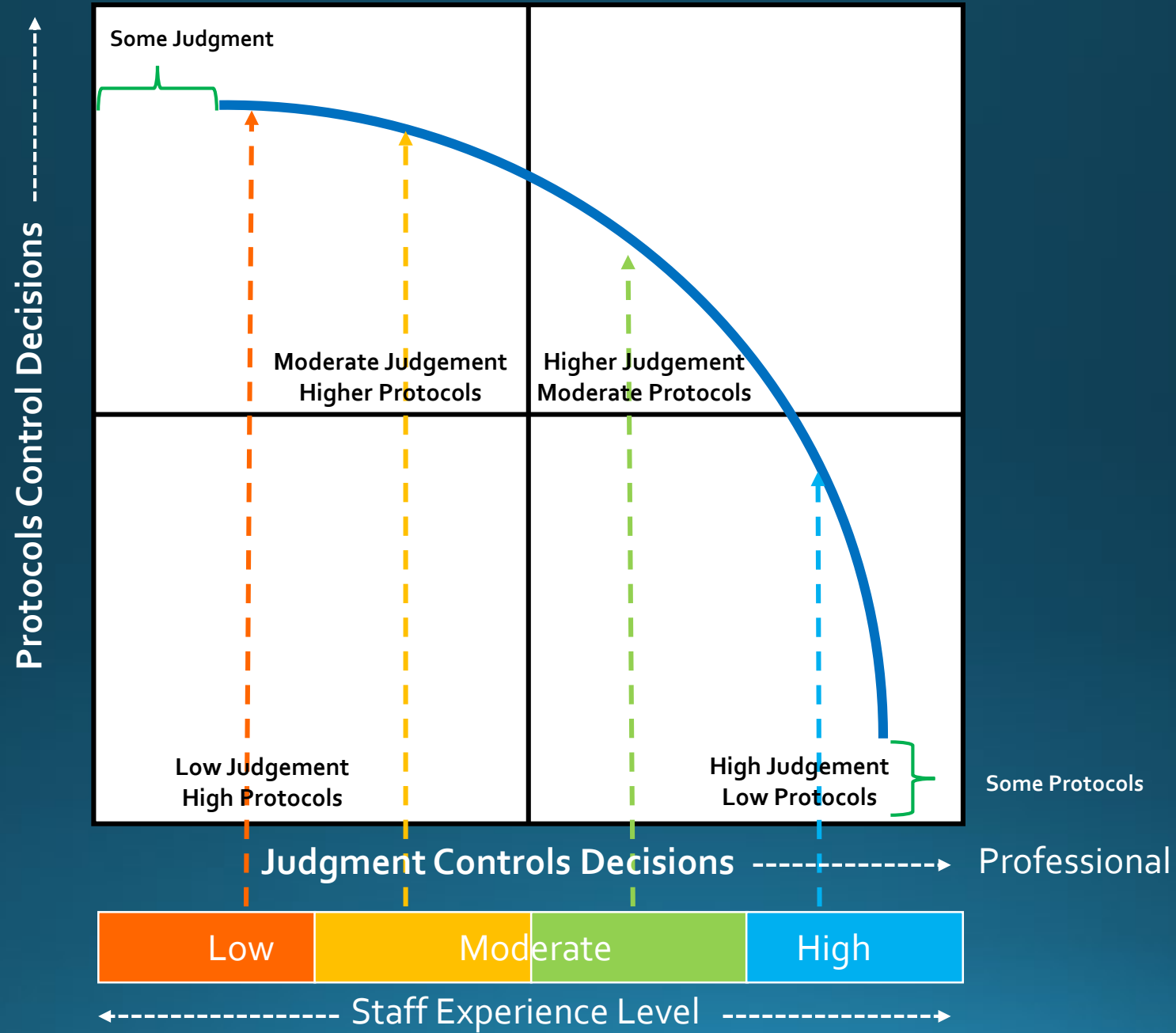
Take Home Action Steps

- Implement the RASM model of Contributing Factor Analysis and Mitigating Factor Analysis to manage risk more effectively
- Learn how the Safety I framework and Safety II framework are complementary parts of an overall risk management plan. Determine when factors are 'in scope' allowing actionable steps to be implemented for managing risk or 'out of scope' limiting organizational response.
- Understand the role that Incident Databases play in the collection and analysis of accident and near miss data through building AcciMaps and PreventiMaps and utilizing business analytics tools

Final Thoughts

The biggest mistake
about a mistake
is not learning from it.

Paraprofessional



Videos & Articles

- 1.5.5 Safety I vs Safety II - <https://www.youtube.com/watch?v=WMoLVvgNrhM>
- Doing Safety Differently – Sydney Dekker: <https://www.youtube.com/watch?v=6gREMV6j2A4>
- Safety II & Safety II – Erik Hoffnagel: <https://vimeo.com/channels/1366431/89492241>
- Perceiving what cannot be seen” - the practical side of Safety - II - Erik Hollnagel: <https://vimeo.com/159498494>
- A story of Safety II – Jeffrey Braithwaite: <https://www.youtube.com/watch?v=gauR843rRNk>
- Safety Differently | The Movie: <https://www.youtube.com/watch?v=moh4QN4IAPg>
- Sidney Dekker — Safety Differently Lecture: <https://www.youtube.com/watch?v=oMtLSoFNDZs>
- Sidney Dekker — Just Culture short course 1: <https://www.youtube.com/watch?v=PVWjggDANWA>
- The New View of Safety with Todd Conklin: <https://www.youtube.com/watch?v=loYUQlWiRgc>
- Dr. Todd Conklin speech "Risk Analysis is Fixed in Time - But Hazards Ebb and Flow: <https://www.youtube.com/watch?v=X211fU398o8>

Videos & Articles

- Guidelines for AcciMap Analysis: https://openresearch-repository.anu.edu.au/bitstream/1885/20987/2/01_Branford_Guidelines_for_ACCIMAP_2009.pdf
- Webinar: An Introduction to “New Safety” (HOP, Safety II, and Safety Differently): <https://www.youtube.com/watch?v=zqZVGaFlhyw>
- FAA Safety Management Systems (SMS) Fundamentals: Policy: <https://www.youtube.com/watch?v=j8NoPZx5YwM>
- FAA Safety Management Systems (SMS) Fundamentals: Safety Risk Management Component: <https://www.youtube.com/watch?v=b6dwxQ3oEAE>
- Mangatepopo canyoning tragedy a decade on: 'I know they would be loving every minute of life': https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12032068
- In a Flash TV Movie: <https://www.tvnz.co.nz/shows/in-a-flash/episodes/s1-e1>
- BBC NASA Challenger Disaster: <https://www.youtube.com/watch?v=reM5fTo-6PI>
- Challenger Disaster Governmental Report: <https://www.govinfo.gov/content/pkg/GPO-CRPT-99hrpt1016/pdf/GPO-CRPT-99hrpt1016.pdf>
- A Review of Accident Modelling Approaches for Complex Critical Sociotechnical Systems: <https://www.semanticscholar.org/paper/A-Review-of-Accident-Modelling-Approaches-for-Qureshi/c3a597212068c27be45d84dec76e86baabd4cf90>