Incident investigation from an industry's perspective

Zero incidents by Learning from Incidents

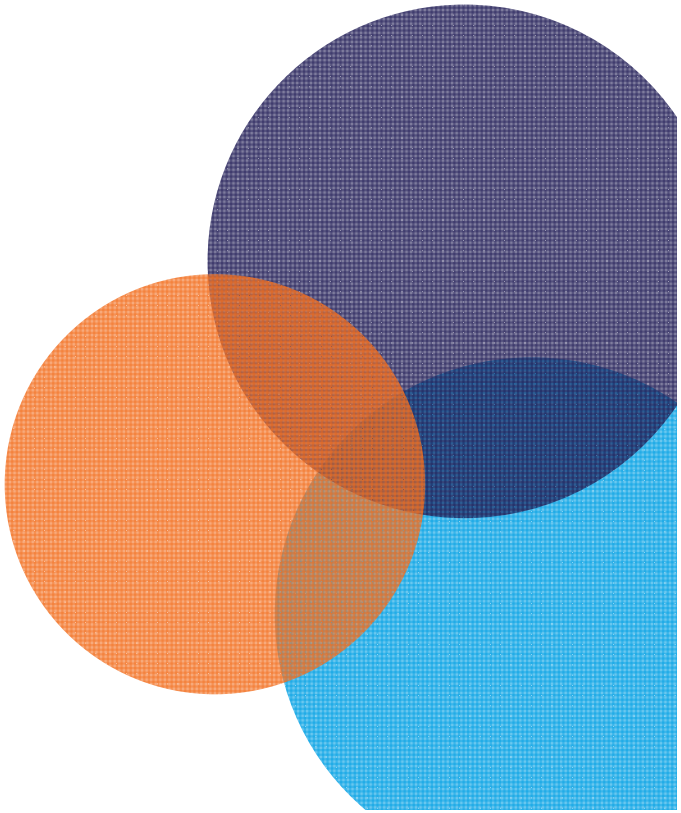
Willem Peuscher – Board member Tripod Foundation
EU

12 December 2018

- **Willem Peuscher's background**

- **From Incident investigation→ Learning from incident(s).**

- **Considerations for discussions around selection of incident investigations techniques**



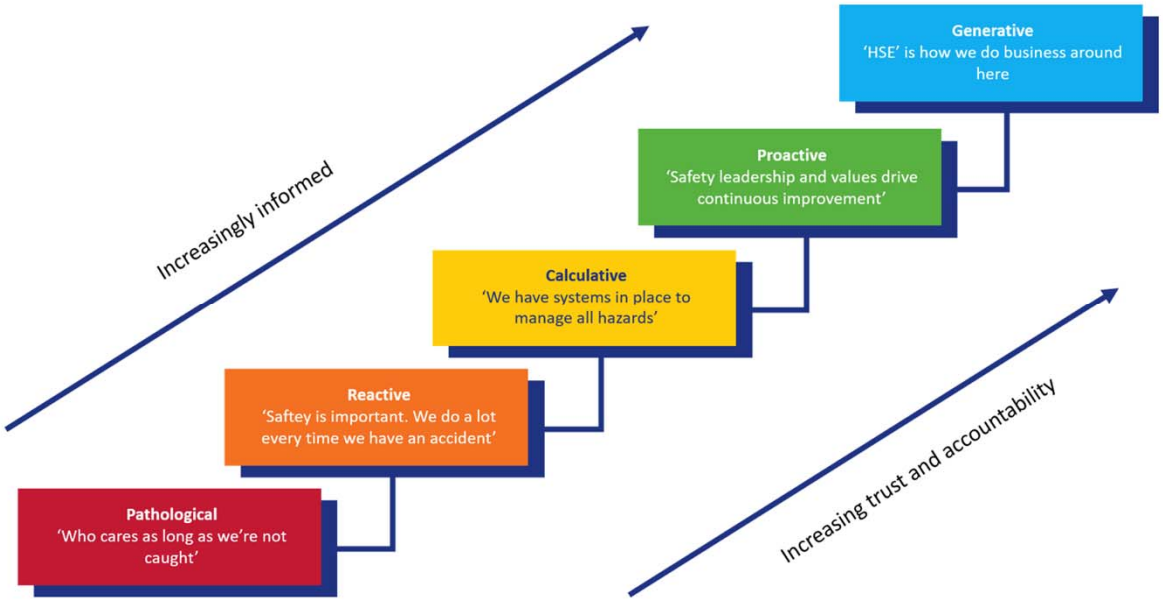
Willem Peuscher's background

Willem@safetyleadersfoundation.com

	tripod foundation	SafetyLeadersFoundation
1984-2016	2006 - current	2017 - current
Chemical, Upstream, Central office and field operations; HSE	Energy institute 2013	Preventing (fatal) incidents at the workplace
Incident investigation, Permit to Work	Board member and assessor	Board member
Life-Saving Rules		Learning from incidents; Serious gaming animations for workforce

What does industry want from investigations?

Why to investigate incidents?



You do all the effort to arrive at zero incidents in future

Pathological – who is to blame, compliance with law?

Reactive –what went wrong and how

Calculative – why did it happen?

Pro-actice – What are behaviourial learnings for leaders

Generative – continuous organisational learning, always alert.

Example of incident

What are the questions you have as investigator?

Viewing this example – what are the questions you would have as investigator?

And what are the questions you have as leader of an organisation?

What happened?

How it happened?

Why it happened?

What are the learnings?

For whom are the learnings?

How to sustain the learnings?

Example of incident

What happened till 0:40 sec

IOGP incident #7583
Fatalities: 1
Region: Europe
Country: Germany
Location: Onshore
Year: 2006

Production May/June 2018 Amsterdam
Copyright animations: Safety Leaders Foundation
Copyright icons: IOGP
Language version: English
Animation by: www.jeroenbrinkhuis.com
Further queries to info@safetyleadersfoundation.com

Link vimeo
Link PC

International Association of Oil & Gas Producers

What are the questions you have as investigator?

Viewing this example – what are the questions you would have as investigator?

And what are the questions you have as leader of an organisation?

What happened? - chronology

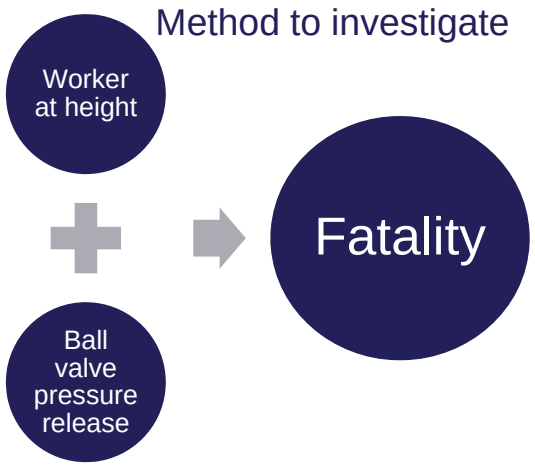
How it happened? – ‘causal’

Why it happened? – ‘root causes’

What are the learnings?

For whom are the learnings?

How to sustain the learnings?



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Learning from incident: what should investigation answer?

workers

- Can it happen to me?
- Will I be fired if I make a fault
- Can I refuse to do a job if is seems risky

supervisors

- Concern about victim and family and colleagues
- How to set the right conditions so the worker can do job safe?
- How to prevent re-occurrence for in the future

leaders

- Concern about victim and family and colleagues
- I cut budget and we got cheaper labourers. Did that have an impact?
- Is our safety culture right?

Learning from incident: what should investigation answer?

What
Chronology

know the right way of working and know what can go wrong

How
Causal

Know what effects the **behaviour of workers** and then set the right **work conditions**

Why
Root causes

Set the right **culture** and **organisation**

Investigation technique to facilitate various level questions

What
Chronology

Actions by people in the field

Ball valve: Did workers know about residual pressure in ball valves? Were they suspicious if handle is in closed position; Did they feel OK to ask about residual pressure?

How
Causal

Conditions set by supervisors

Ball valve: was it normal practice to check all pipework before issuing Permit to Work? Were workers who isolated the piping competent about trapped energy?; Did supervisor validate conditions in the field? Was there time pressure;

Why
Root causes

Organisational aspects and cultures by leaders

Ball valve: was time to prepare for the Turnaround enough?; was supervisor able to spend enough time in the field? was the culture to do all work safely? Was competence assurance part of contractor bid/selection?

Learning from incidents- other important aspects

Toolbox dependent on type of incident: Facts fining, timelines, what if tables, is/is not tables, ladder of inference, interviews, causal trees, event trees, ect etc.

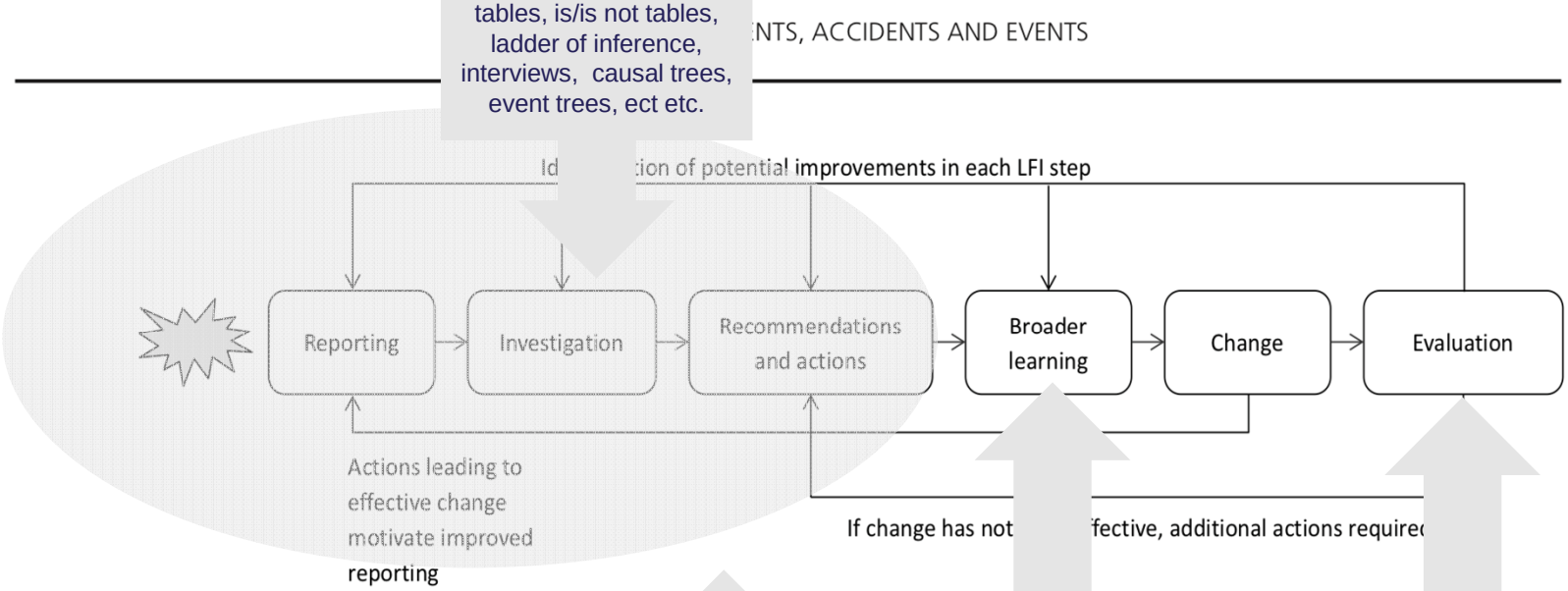


Figure I.1: LFI process model

Standardise in company

Have Learning From Incidents process

Standardise in company

Example of Learning from incidents process for employees

who is involved, what can I do differently, how can we set the right preconditions

relevant LFI selected and sent to teams

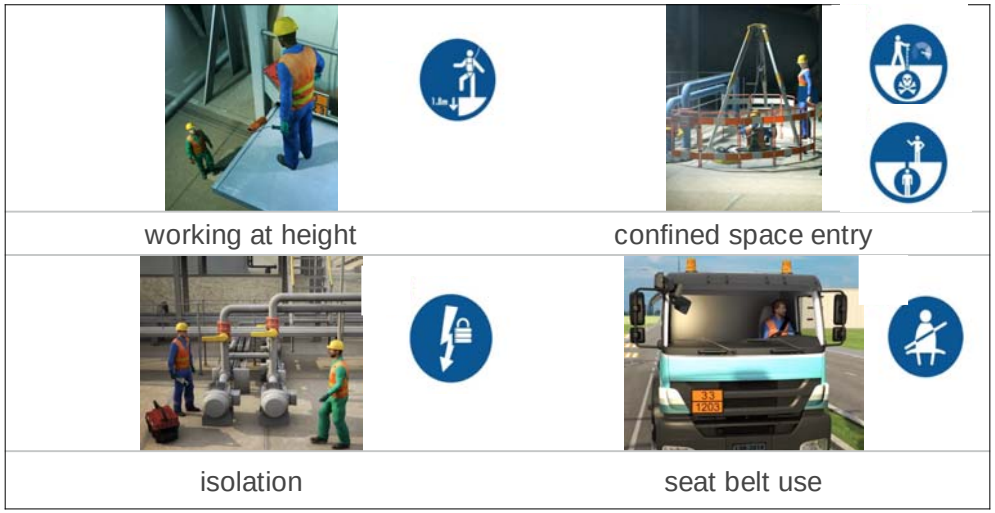
Watch during team session

Discuss and Learn

summarise learning

Most successful example of Learning from Incidents in industry:

Examples of repeated fatalities in Shell 1998-2008



75% reduction in fatal incidents in 3 years time, >90% after 10 years

Zero incidents by Learning from Incidents is possible!

Back up slides

Some suggestions for reviewing investigation reports

Incident **investigation** methods should clarify **what** happened and **how**. There are many tools to help to visualise and create a structure

Incident **analysis** methods should help to clarify **why** it happened. There are limited amount of tools to help.

Notes:

It is **not** the man who reported the incident or had the incident who is **to blame**. He was probably the last man who prevented the incident from happening, but when he made an error the incident happened. There were many before him in the line of control who made errors. (Hind sight bias - easy to blame afterwards)

All victims left home before work, with the intention to return home.

Focus on behaviour of these workers and investigate backwards on how that behaviour was cultivated in the organisation by direct supervisors, leaders and top management.

There are many people who have a stake in the incident causation, from minutes before the incident to months and maybe years before the incident happened.

For industry serious incidents: there should always be a management system which analysed serious incidents including single type of fatalities. These systems use measures and controls to prevent the incidents to happen. These control were less effective, often due to human action. The key to improve is the understanding of why people acted as they acted

The only way to find out **how** and **why** things happened: try to find out why people acted as they acted.

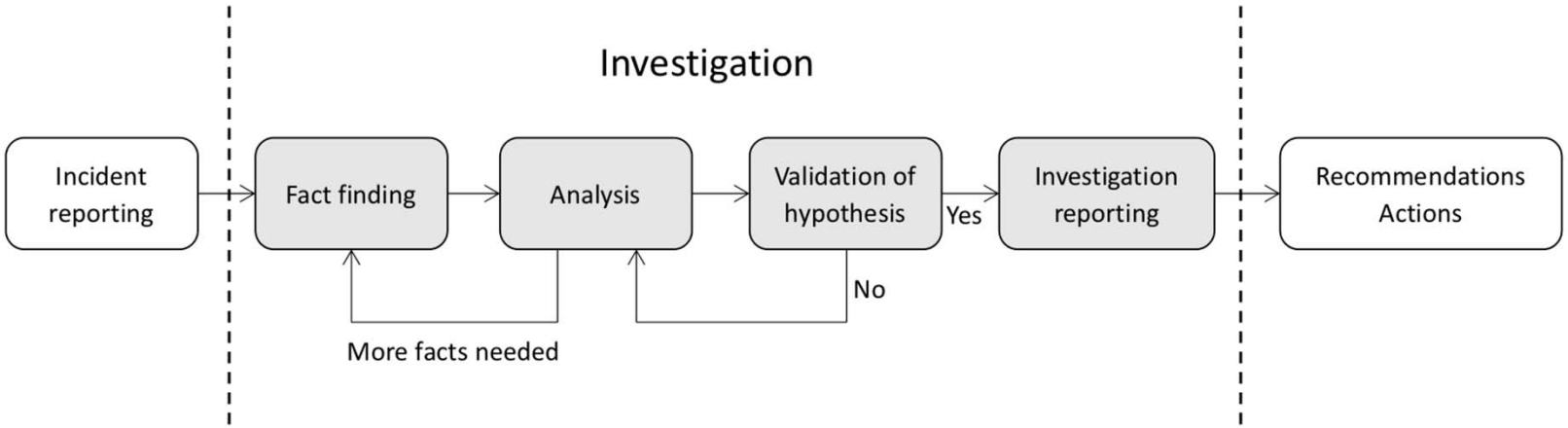


Figure 11: Investigation

Incident investigation techniques and analysis techniques

Reference:

Energy Institute: link

Table A2: Analysis methods features

		Training required	Paper-based or software		Retrospective analysis of incident reports	Used in petroleum industry	Generates graphical content (e.g. timeline)	Complete method for incident analysis	Provides solutions	Includes checklists or flow diagrams	Comments
			Paper	Software							
1.	ARCA - APOLLO Root Cause Analysis	✓	✓	✓	✓	✓	✓	✓	✓		Described as a general problem solving method
2.	Black Bow Ties		✓	✓		✓	✓				
3.	DORI – Defining Operational Readiness to Investigate		✓								Not an analysis method – describes how to conduct an investigation
4.	ECFA – Events and Causal Analysis (Charting) and ECFA+ - Events and Conditional Factors Analysis		✓				✓				Part of the MORT method but is often used as a charting method in an investigation/analysis to provide graphical depiction of incident
5.	Fishbone diagram		✓		✓		✓				Purely a method for graphically presenting results; software systems available to help draw
6.	HERA – Human Error Repository and Analysis System		✓	✓	✓						
7.	HERA-JANUS – Human Error Reduction In ATM (Air Traffic Management)	✓	✓		✓		✓	✓		✓	
8.	HFACS – The Human Factors Analysis and Classification System	✓			✓					✓	Classification system only – aviation based, would need to adapt
9.	HFAT – Human Factors Analysis Tools	✓	✓	✓	✓	✓	✓	✓	✓	✓	Can be applied to any type of behaviour and has been used as a proactive method in risk assessment
10.	HFIT – Human Factors Investigation Tool	✓	✓	✓			✓	✓		✓	
11.	HSYS - Human System Interactions	✓	✓	✓		✓				✓	Can be used for proactive analysis in risk assessment
12.	ICAM - Incident Cause Analysis Method	✓	✓	✓	✓	✓	✓	✓	✓	✓	
13.	MEDA – the Maintenance Error Decision Aid	✓	✓			✓	✓	✓	✓	✓	Maintenance error; contains basic solutions but relies on the user to identify definitive improvements. There are examples, however the user/interviewee needs to really come up with the definitive improvements; use other tools with MEDA e.g. timeline, police interview methods

Incident investigation techniques and analysis techniques

Reference:

Energy Institute: link

Table A2 continued.

		Training required	Paper-based or software		Retrospective analysis of incident reports	Used in petroleum industry	Generates graphical content (e.g. timeline)	Complete method for incident analysis	Provides solutions	Includes checklists or flow diagrams	Comments
			Paper	Software							
14.	MORT – Management Oversight and Risk Tree	✓	✓	✓	✓	✓	✓	✓		✓	
15.	PEAT – the Procedural Event Analysis Tool	✓	✓	✓						✓	Flight crew error – can be adapted
16.	PRISMA – Prevention and Recovery Information System for Monitoring and Analysis	✓	✓		✓	✓	✓	✓	✓	✓	Was designed for retrospective analysis and to collect and structure data on incidents
17.	SCAT® – Systematic Cause Analysis Technique	✓	✓	✓		✓		✓	✓	✓	Provides an indication of 'areas for corrective action' rather than ready-made solutions
18.	SOL – Safety through Organisational Learning	✓	✓	✓			✓	✓	✓	✓	The software version, Sol-VE includes a module for identifying corrective actions
19.	SOURCE™ – Seeking Out the Underlying Root Causes of Events	✓	✓	✓		✓		✓		✓	Does not provide solutions but includes a checklist to help develop solutions. Does not generate graphical content, but recommends the use of fault trees or causal analysis charting
20.	Step	✓	✓				✓			✓	
21.	Storybuilder	✓		✓	✓		✓	✓			Training useful but not essential. Specifically for occupational incidents. Designed for use in all industries
22.	TapRooT®	✓	✓	✓	✓	✓	✓	✓	✓	✓	Solutions module available soon. Method includes advanced interviewing techniques for investigation
23.	Kelvin Top-Set®	✓	✓	✓		✓	✓	✓		✓	
24.	TRACEr – Technique for Retrospective and Predictive Analysis of Cognitive Errors		✓		✓	✓				✓	Forms part of the HFAT methodology
25.	Tripod Beta	✓	✓	✓	✓	✓	✓	✓			Does not provide ready-made solutions but leads the analysis back to basic risk factors that form the key elements of improvements
26.	WBA – Why Because Analysis		✓		✓		✓				
27.	5 Whys		✓				✓				A simple method for exploring issues
28.	Why tree		✓				✓				

Near misses with high potential risk should be investigated thoroughly

Example Consequences

Fatalities, major fire-explosion, gas leak
Permanent disability, fire, minor gas leak
Lost time injury, RIDDOR reportable
Medical treatment injury, minor fire
First aid treatment, limited plant damage

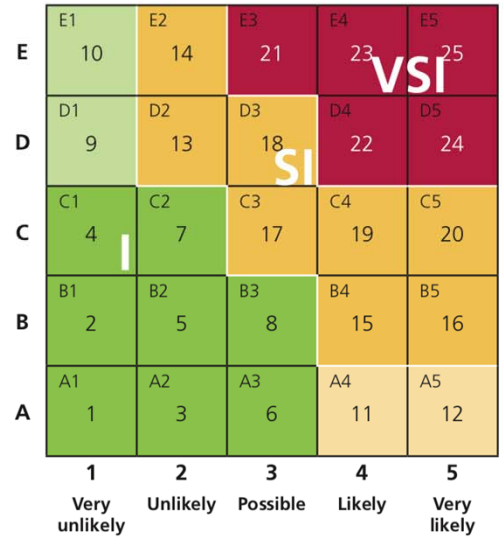


Figure 9: Risk matrix

Incident causation model – widely used in Industry

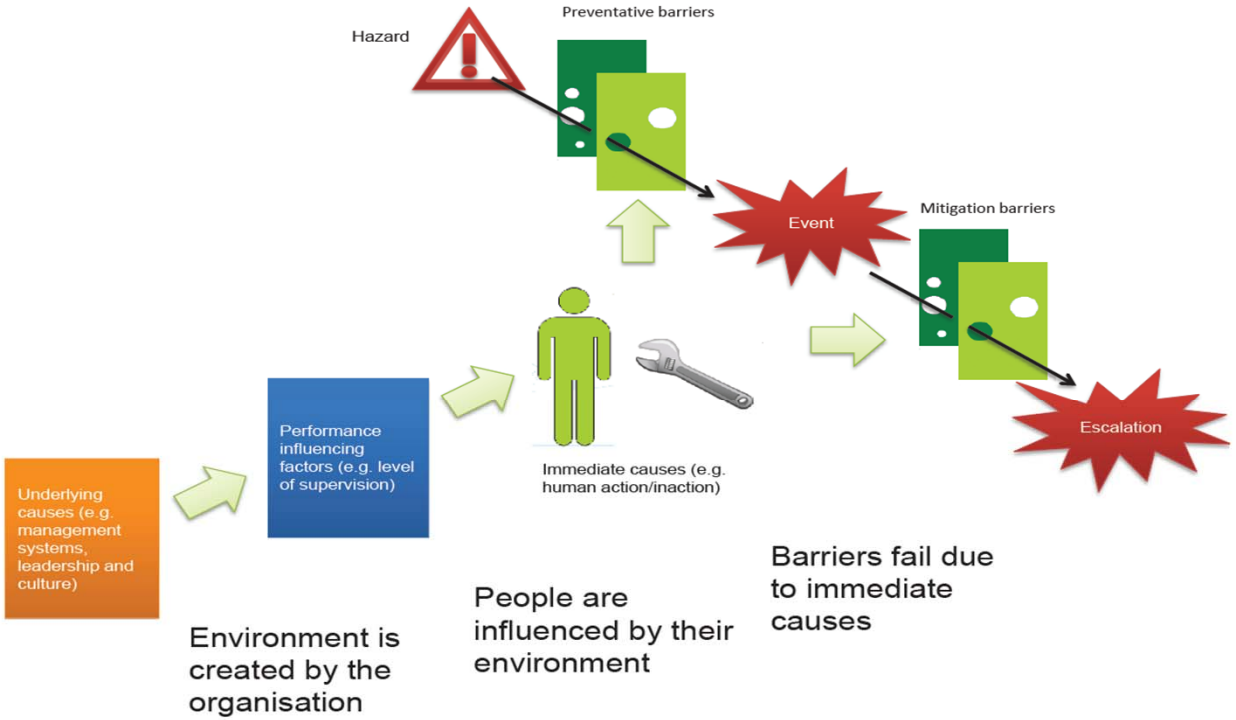
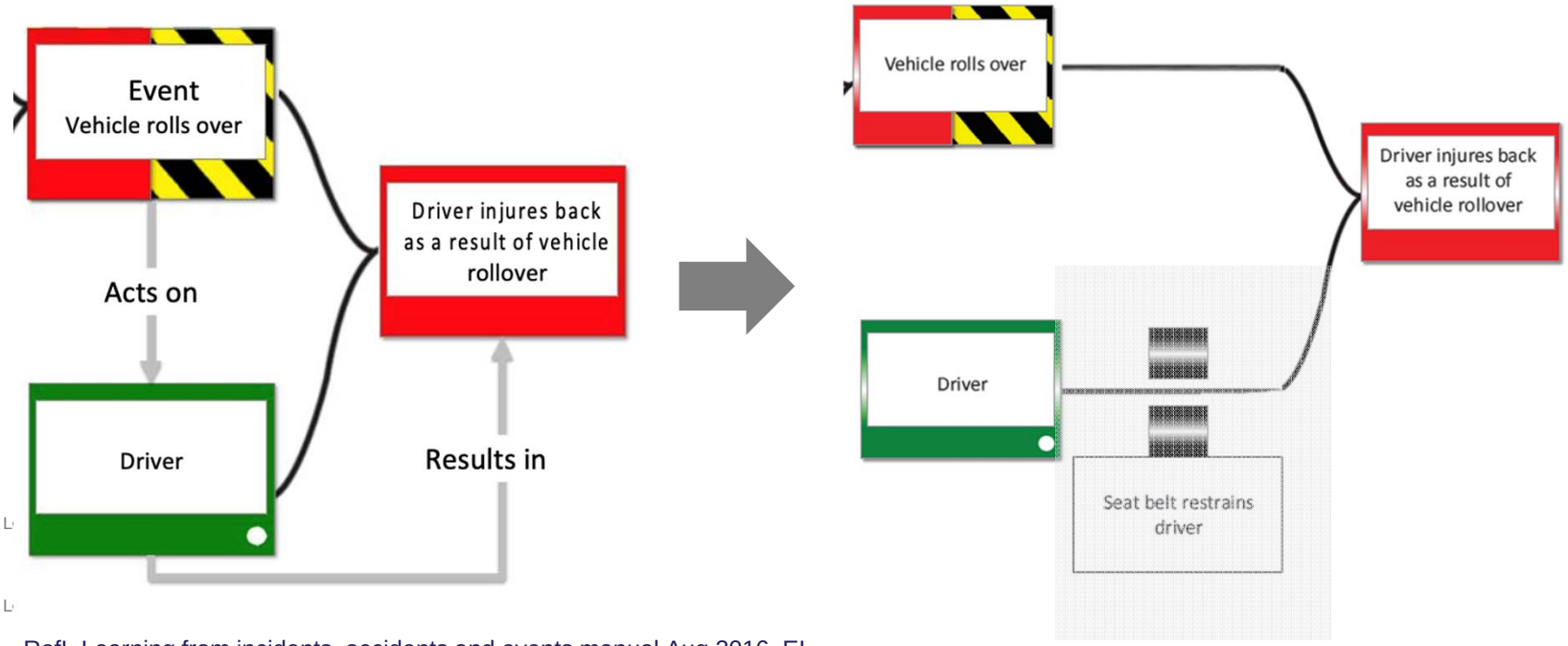


Figure 2: Incident causation model

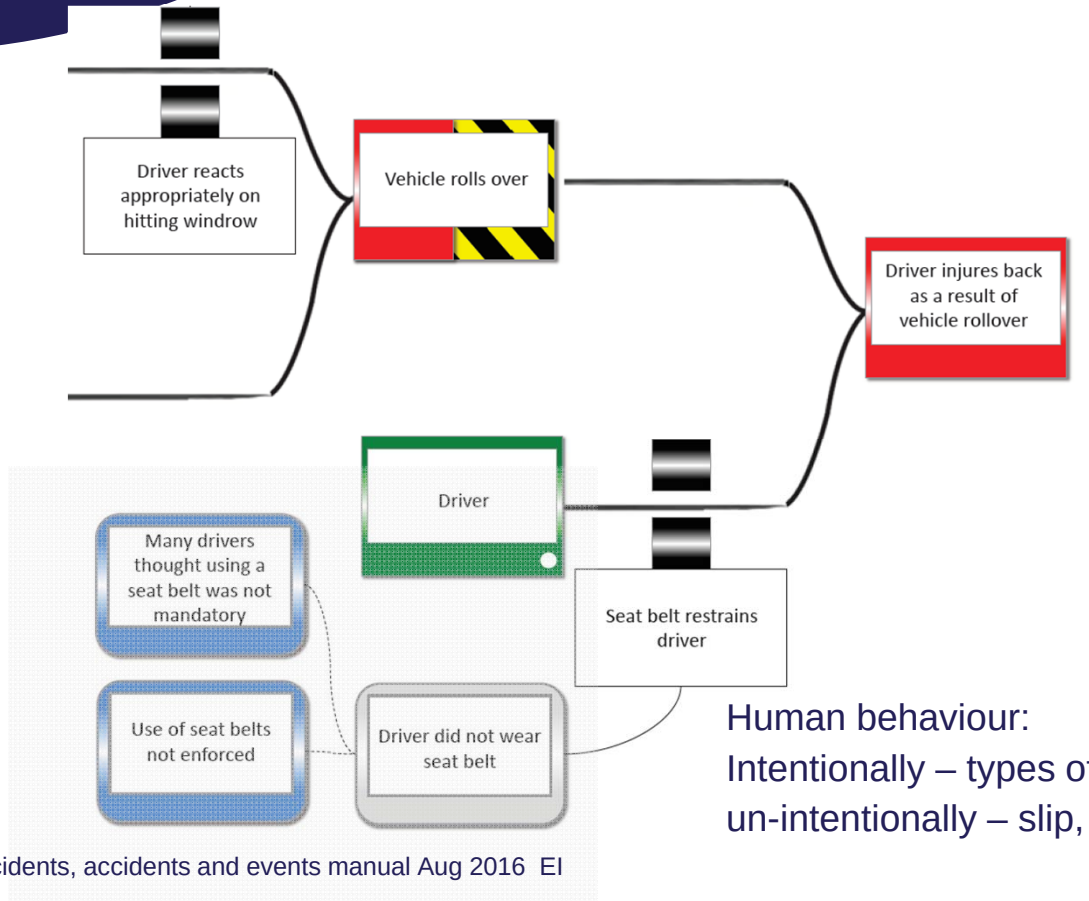
Tripod Beta
1. List the events

Tripod Beta
2. Build the causation tree
3. understand the controls



RefL Learning from incidents, accidents and events manual Aug 2016 EI

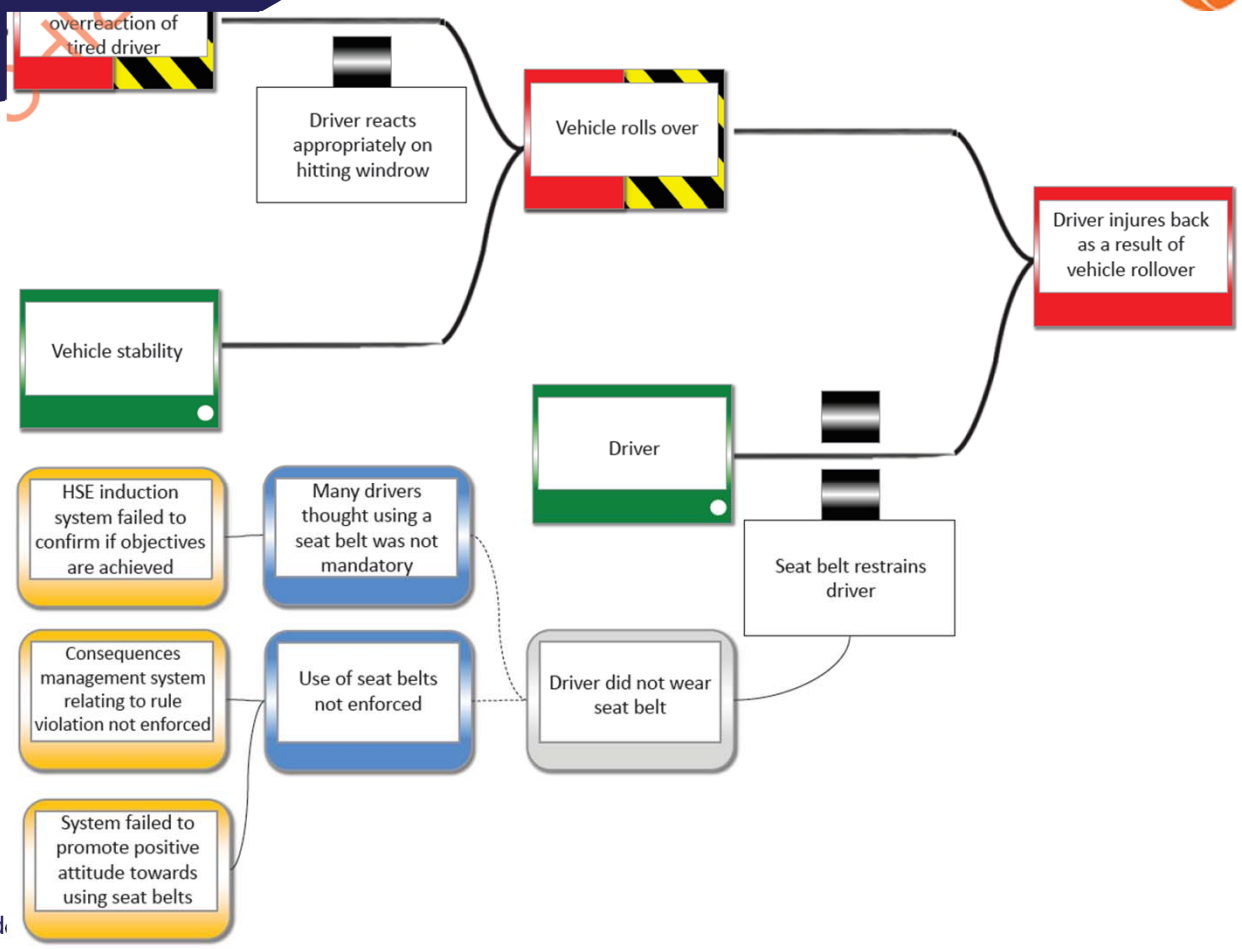
Tripod Beta
4. Understand the human behaviour and conditions



Human behaviour:
Intentionally – types of violation
un-intentionally – slip, lapse, mistake

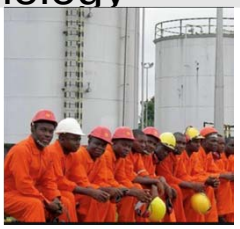
RefL Learning from incidents, accidents and events manual Aug 2016 EI

Tripod Beta
5. Understand underlying causes



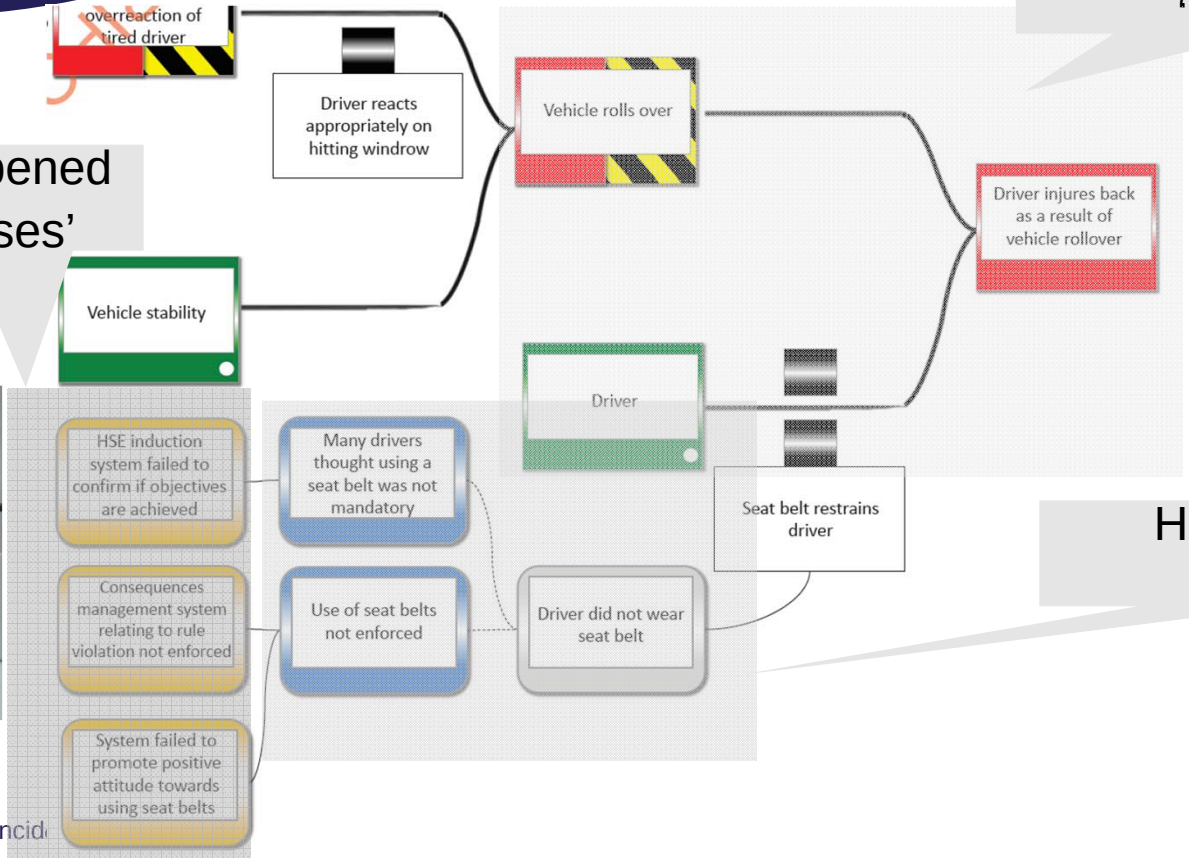
Tripod Beta
5. Understand underlying causes

What happened
'Chronology'

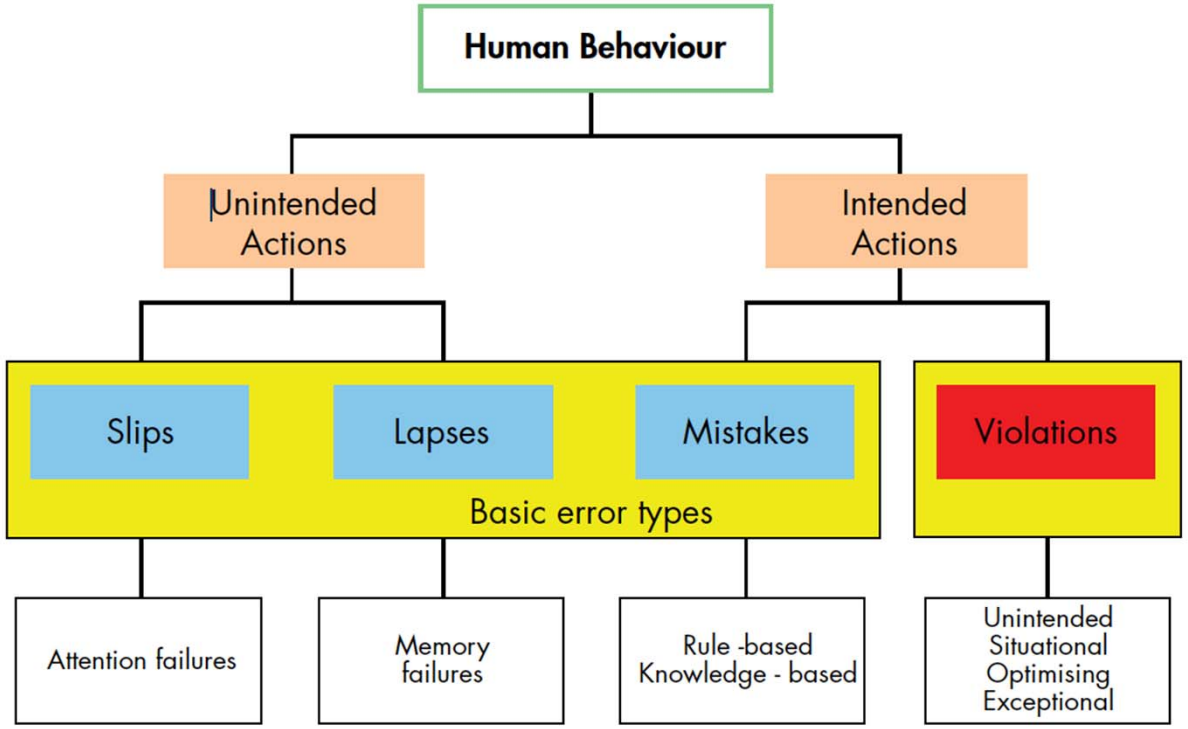


Why it happened
'Root causes'

How it happened
'Causal'



Human Behaviour



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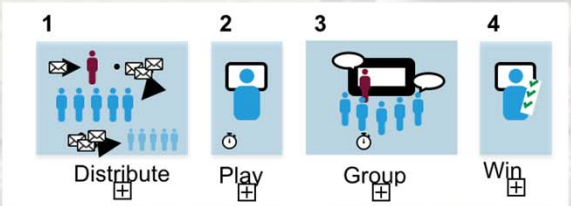

Learning From Incidents - iLFI[R]

ePtW (pre job discussion in permit to work)

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evision

Operationalise Bowtie

energy institute