

Training on Marine Casualty / Marine Incident Investigation

Evidence analysis

Today's content



- 1. Safety & investigation, frame of reference**
- 2. Analysis Process**
- 3. Time Event Line & ECFA**



Knowing

- You can explain and read a time event line. Naming of typical investigation topics in the maritime sector. You can explain a medium complex events and causal factor chart.

Applying

- You can complete a time event line on your own and use this for the events and factor chart. Ability to classify typical investigation topics and their main causes.

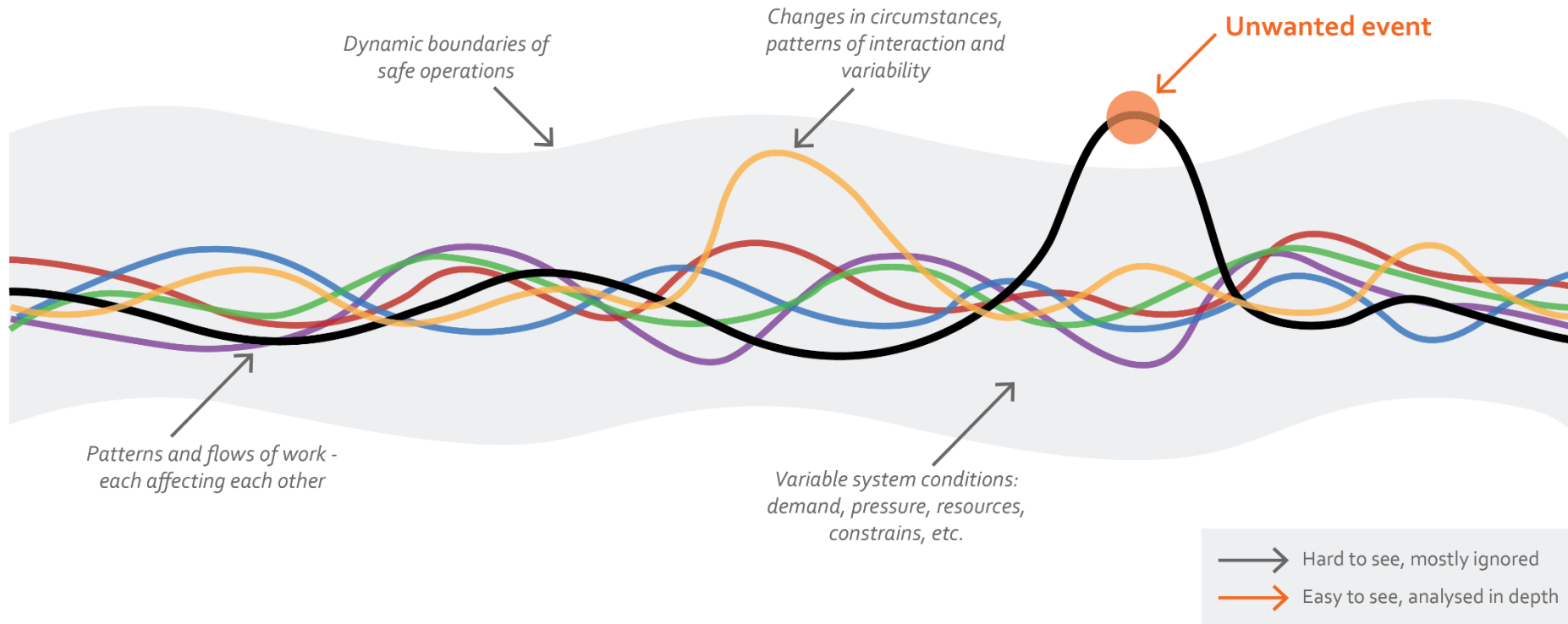
Analyzing

- Able to investigate the collected evidence and can explain multi-causal relation in the incident causation path using the concepts of barriers.



1. Frame of reference

Reference- view on incidents



Adpted from: Hollnagel, 2004

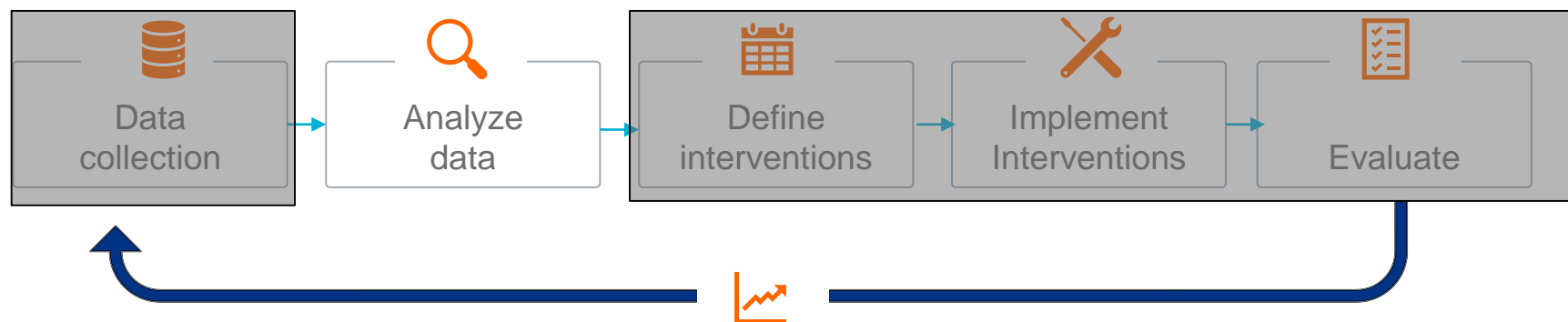


- Safety is the result of the organisation, processes and situational conditions
- Casualty events can be a symptom of suboptimal processes
- There are daily disturbances in processes, sometimes they lead to a casualty event
- Focus on the contributing factors, not at the marine casualty or marine incident itself.
- See module 1. for AI principles

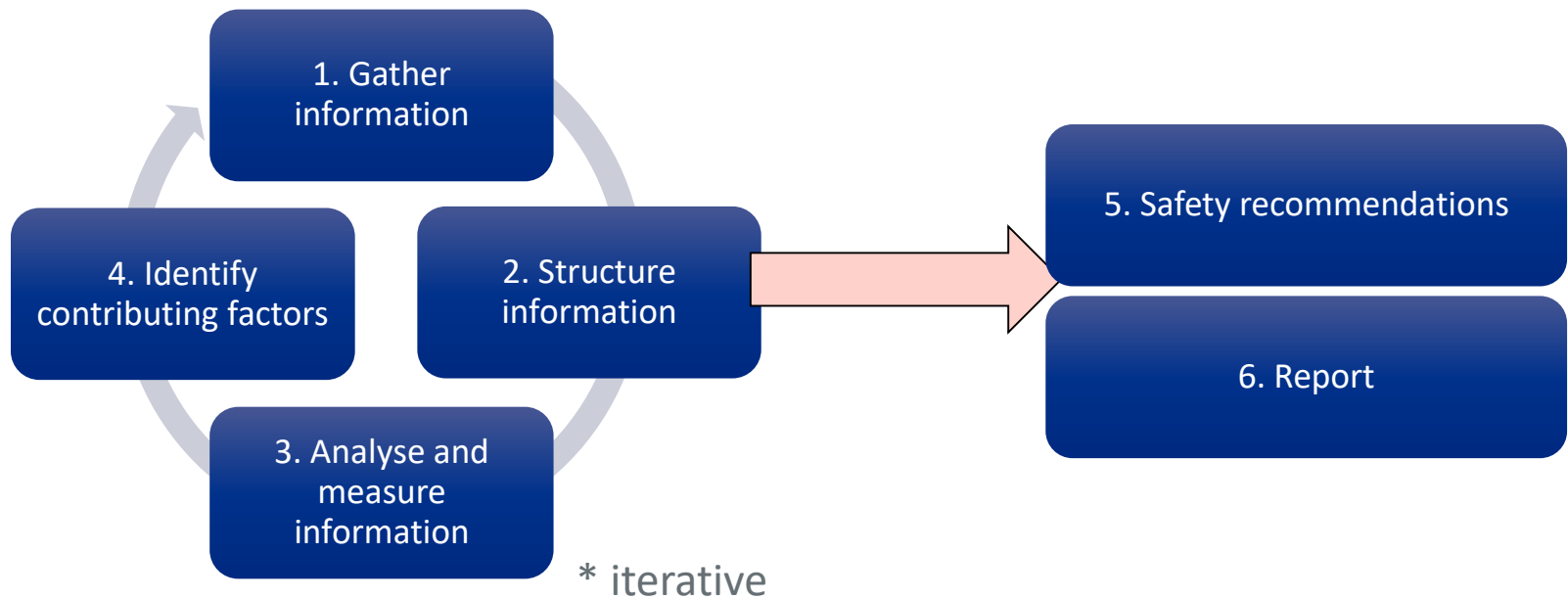


2. Analysis proces

Effective learning is a combination of applying all different phases.



Analyses – scope of investigation

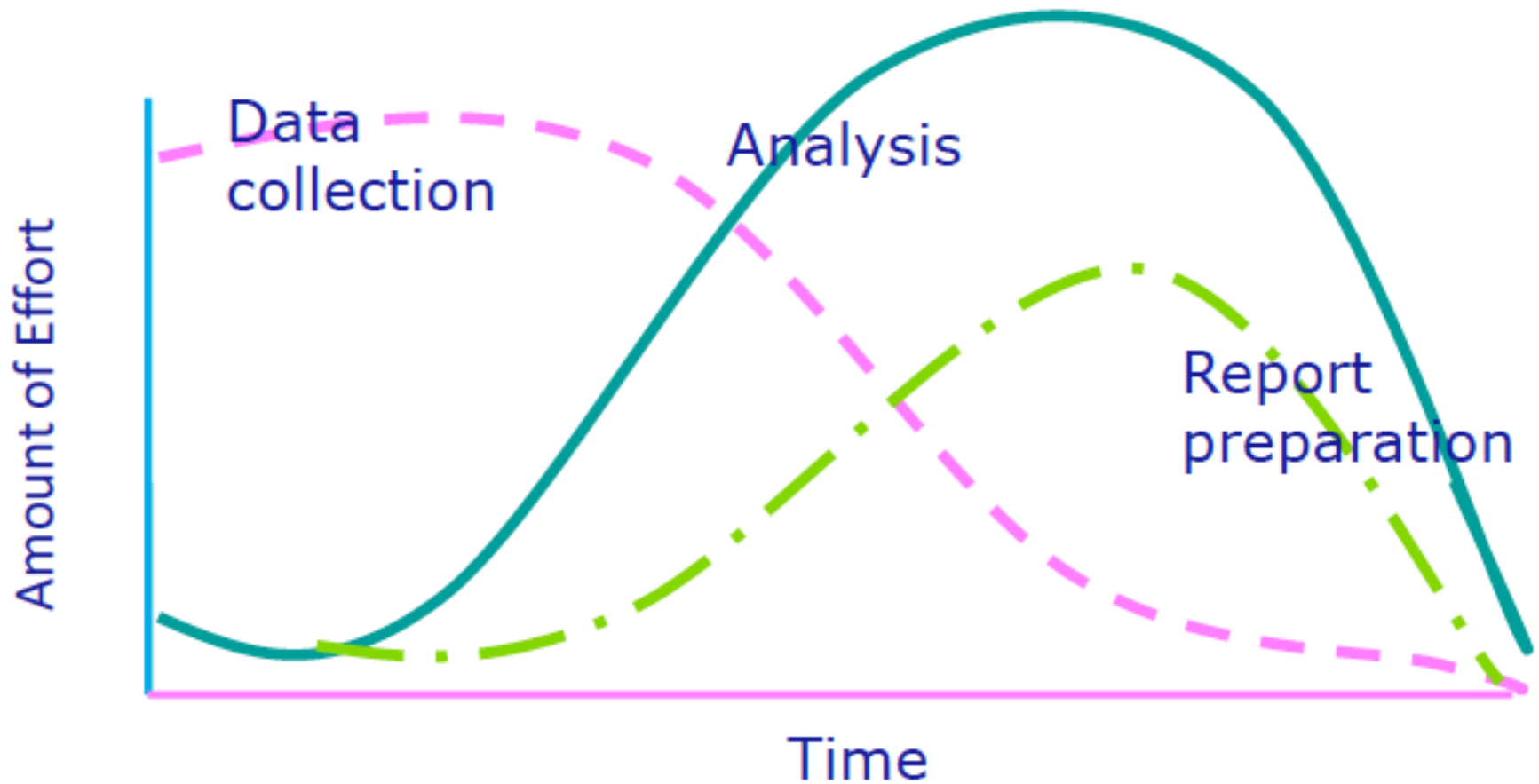




- The initial focus of an accident investigation is obtaining the evidence
- The evidence is subjected to rudimentary analysis as it is collected
- Indicating what other evidence needs to be collected.

and so on...

Analyses - investigation effort





- 5 –Whys
- Fault Tree Analysis
- STEP (Sequentially Timed Events Plotting)
- Barrier Analysis
- Change Analysis
- SHELL
- ATSB method
- MAIIF/IMO method



3. Time event line and ECFA



- **Helps to create an overview**
- **Prevents:**
 - Jumping to conclusions
 - Hindsight bias
- **Forms the basis for your analysis**

Can always be improved...
...(just like your analysis)

Making a timeline



- Stick to the facts
- Make a hard copy of the timeline, display and complete during the process
- Work with post-its
- Making a timeline (almost always) results in new questions
- A timeline = iterative
- A timeline \neq accident analysis

Take a stand



“Together everyone achieves more”



“Every investigation needs a ‘leader’





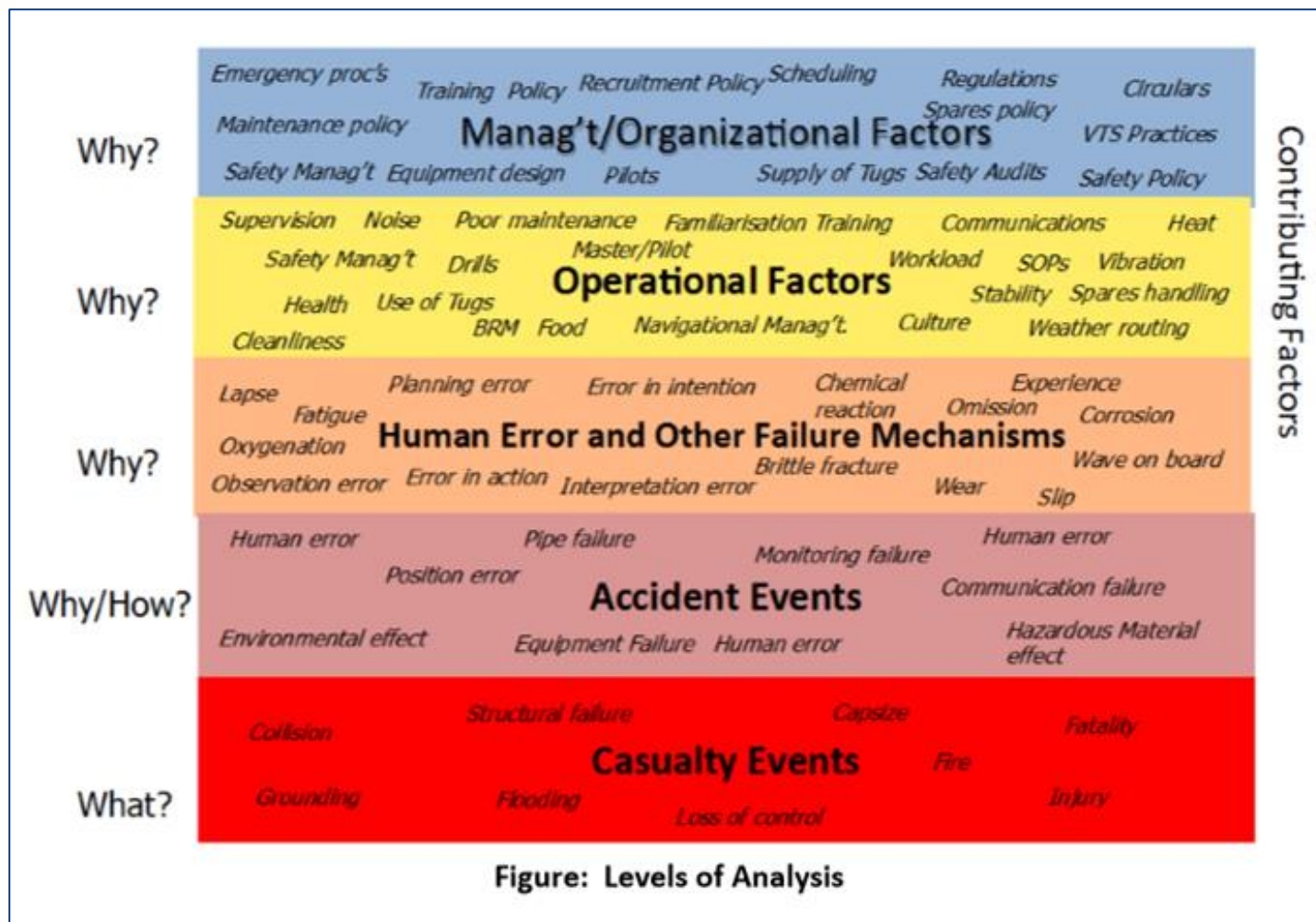
Timeline

1. Construct a time/event line – chronology
2. Identify the casualty and accident events



1. Analyse each accident event – asking Why? – through several layers to uncover failure mechanisms and operational and organizational factors which may have contributed to the accident
2. Identify safety issues and safety deficiencies
3. Illustrate analysis on an Event and Contributory Factors chart

The 5 why's



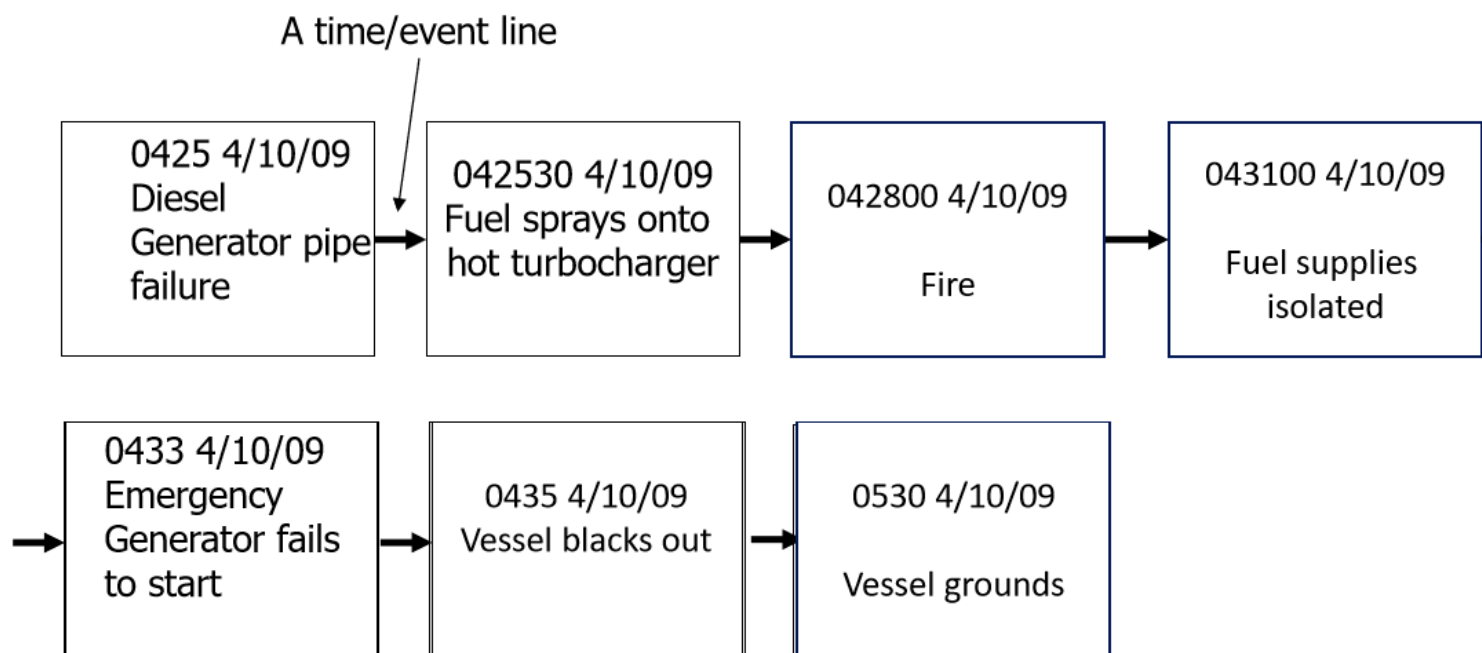


From (IMO Res. A. 1075(28)) 13

- 1. Event**
- 2. Casualty event**
- 3. Accident event**
4. Contributing factor
5. Safety issue
6. Safety deficiency

1 Event

“An action, omission or other occurrence.”



Always timed - if possible

2 Casualty event



“The event(s) which best describe the casualty”

- Fire
- Grounding
- Fall from height
- Engine failure
- Sinking

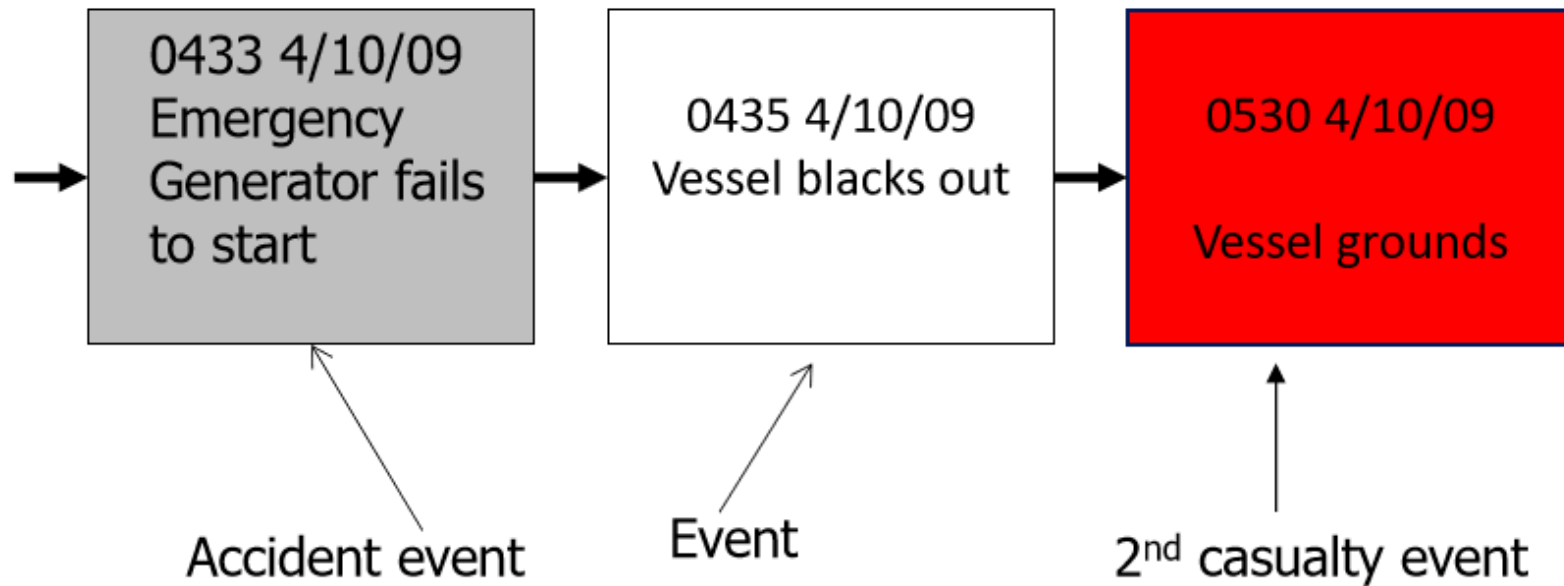
3 Accident Event



“An event that is assessed to be inappropriate and significant in the sequence of events that led to the marine casualty or marine accident. (e.g. human error, equipment failure, etc.)”

- Emergency generator fails to start
- Mate does not change course
- Instructions are not read

Looks like this



Exercise



- Make a Time Event Line
- Use the hand out and draw the events
- 30 minutes
- In groups

Create event line - chronology



- Find out where to start and where to finish, with the marine casualty as 'center point'.
- Events are actions, omissions or other occurrences.

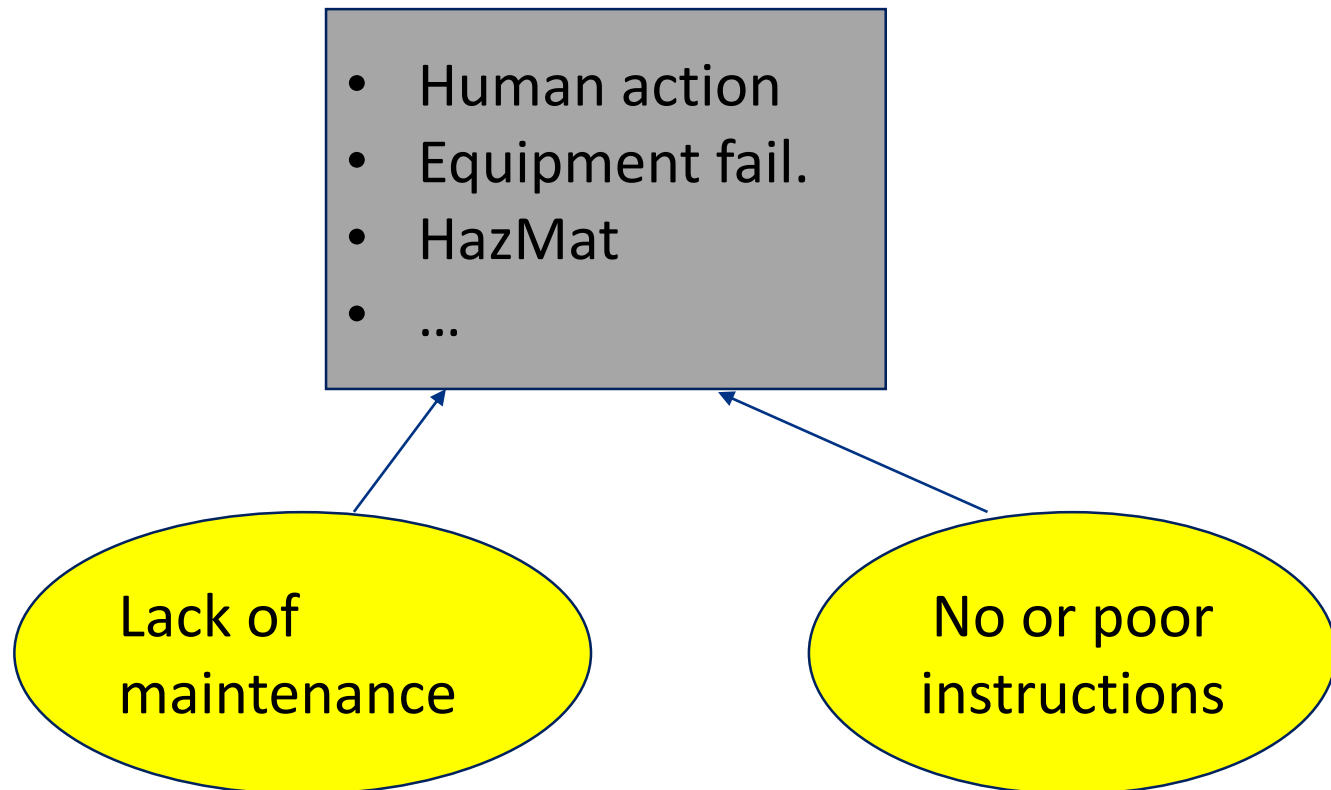


From (IMO Res. A. 1075(28)) 13

1. Event
2. Casualty event
3. Accident event
4. **Contributing factor**
5. **Safety issue**
6. **Safety deficiency**

4 Contributing factor

“A condition that may have contributed to an accident event or worsened its consequence. (e.g. man/machine interaction, inadequate illumination, etc.)”



5 Safety issue



“An issue that encompasses one or more contributing factors and/or other unsafe conditions.”

- Poor maintenance
- Lack of skills
- Inadequate training

6 Safety Deficiency



“A safety issue with risks for which existing defenses aimed at preventing an accident event, and/or those aimed at eliminating or reducing its consequences, are assessed to be either inadequate or missing. ”

Overview

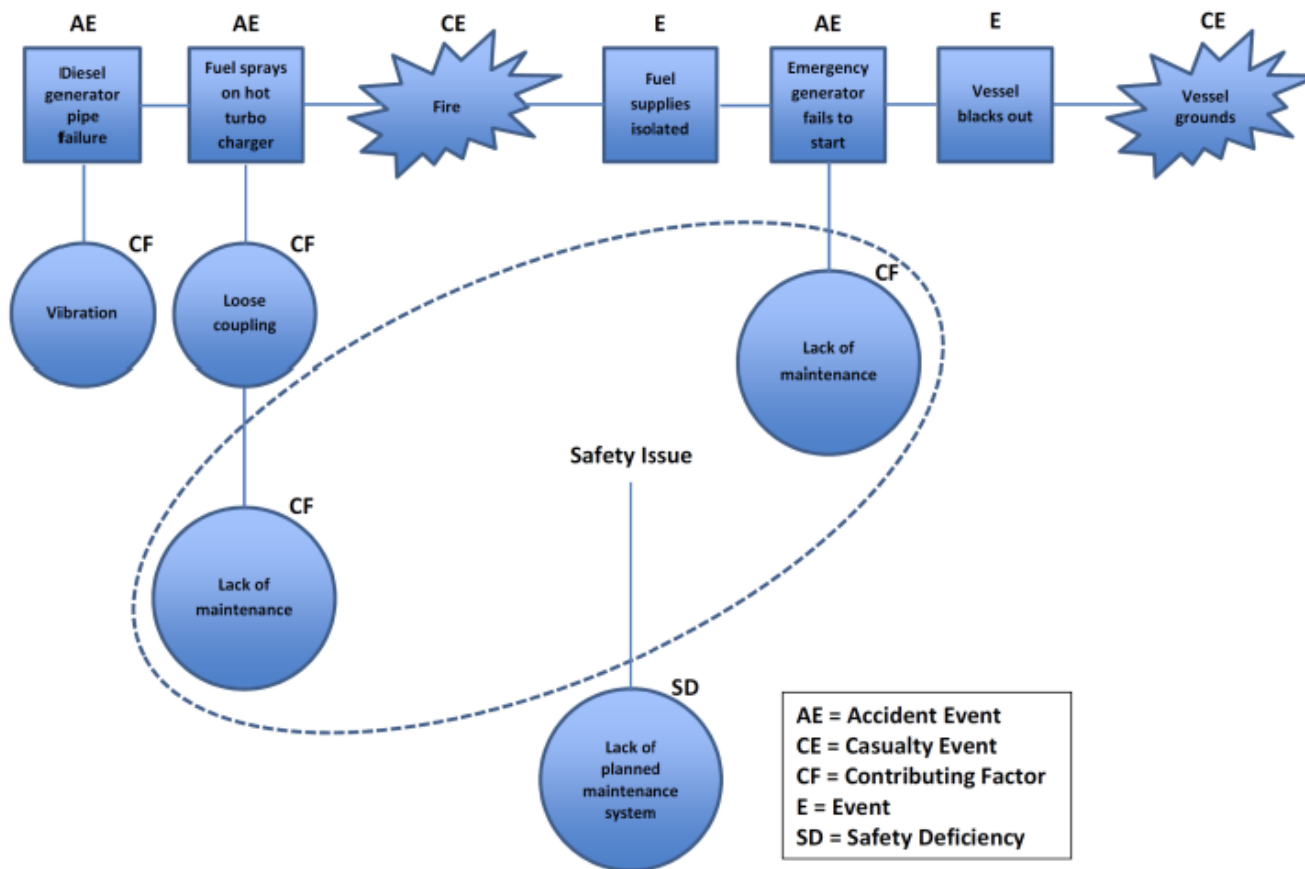
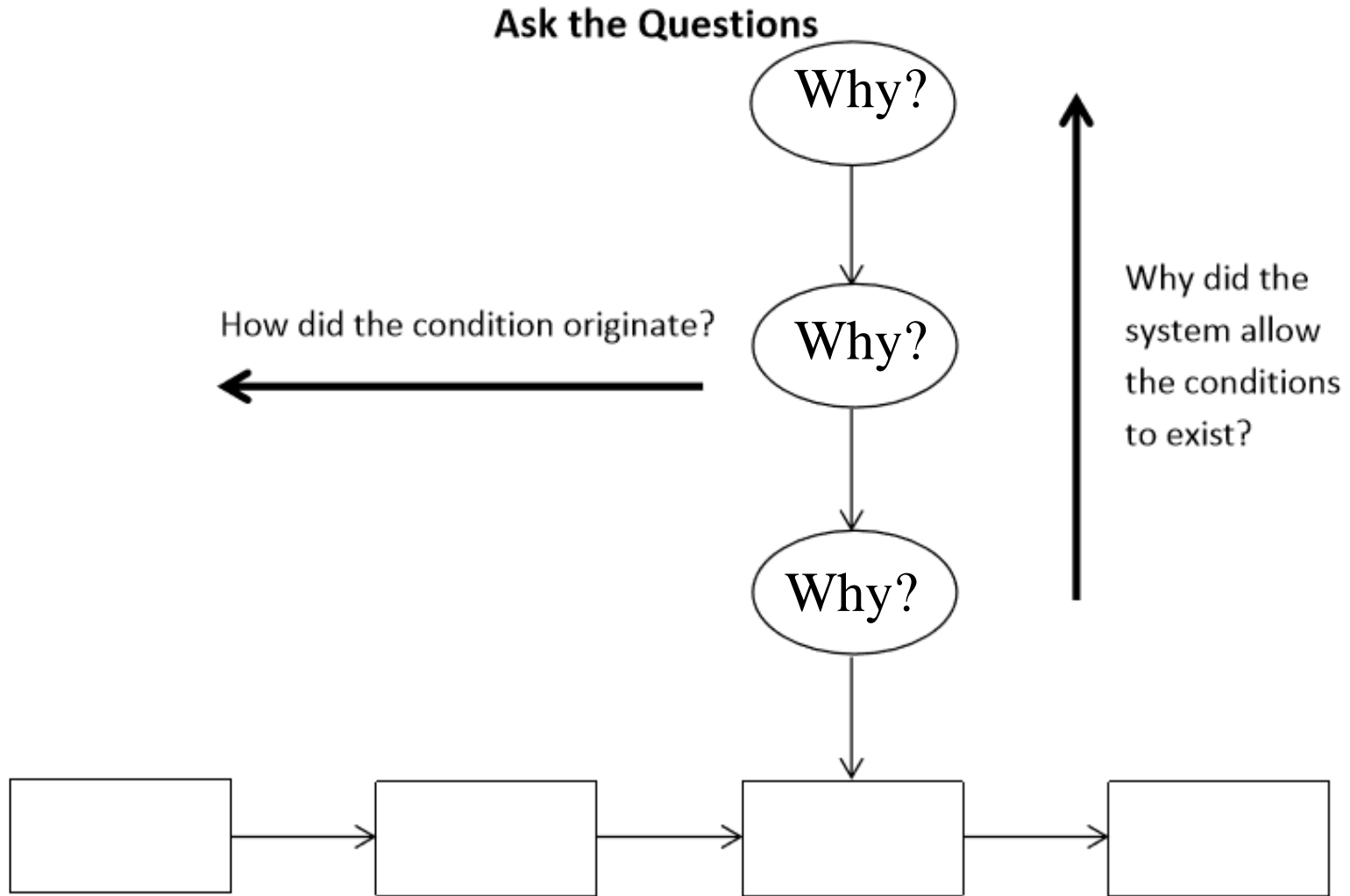


Figure: Example sequence of events leading to a casualty occurrence



Possible leads to recommendations



- Contributing Factor, Safety Issue & Safety Deficiency may trigger Safety Recommendations

For example;

- CF - No training
- SI - Lack of maintenance
- SD - No planned maintenance system
- SD - ISM procedures inadequate



- Guides the investigation, illustrates the chronology
- Helps identify safety significant events
- Helps determine contributing factors
- Clarifies reasoning
- Highlights gaps for further investigation
- Helps identify safety issues arising
- Provides a check for the investigation logic
- Illustrates the relevance of recommendations
- Gives guide to a possible report structure



- Start to develop from casualty event
- May cover before, during and after a marine casualty or marine incident.
- Fill in the gaps in the time/event line during interviews and by analysis of VDR and other evidence
- Use computer software or “Post-It” notes
- When contributing factors and casualty events identified – other topics and questioning areas may be needed. The analysis process is iterative

Guidelines for time event line

	Guidelines
Events	<p>Are actions, omissions or other happenings, e.g. 'crane strikes building'.</p> <p>Should be stated simply using one noun and one active verb.</p> <p>Should be quantified as much as possible and where applicable, e.g. 'the worker fell 6.3 metres' rather than 'the worker fell off the platform'.</p> <p>Should indicate the date and time of the event, when they are known.</p>
Contributing factors	<p>Describe conditions or circumstances that existed and possibly influenced or affected the event. These factors include risk controls that failed or were missing some of which could be safety issues, e.g. watchkeeper fatigued; insufficient manning; safe manning policy.</p> <p>Must be associated with the corresponding event.</p>
Primary event sequence	<p>Encompasses the main events of the accident and those that form the main line of the chart.</p>
Secondary event sequence	<p>In collisions or other complex cases a secondary event line helps depict clearly the events and how they related in time to each other.</p>



How far back into the system does an investigation need to go?

- Depends on many factors, such as the severity of the occurrence and the resources available.

If the investigation is:

- Still identifying safety issues that are significant and could practicably be addressed, then the investigation should continue.
- Focusing on factors that no organisation could reasonably be expected to address then the investigation should be finalised.



- Make an ECFA from our Time Event line by identifying and adding:
 - Contributing factors
 - Safety Issues
 - Safety deficiencies
- Use the Time Event Line given to you

The seven questions to safe operation



When considering the results of analysis: Remember the seven tests of safe operation:

1. Were the risks identified or identifiable?
2. Was the equipment fit for purpose?
3. Were the systems and procedures effective to maintain safe operation?
4. Were defenses and emergency procedures effective?
5. Was there a management system in place to monitor performance?
6. Were the individuals involved fit, competent and effective?
7. Did the individual assess the last minute risks (LMRA)?

Have you covered all these areas?



Wrap up of the day

Thank you for your attention!



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