MARINE
Safety Forum

Failed Mooring Line Incident on Anchor Handling Vessel

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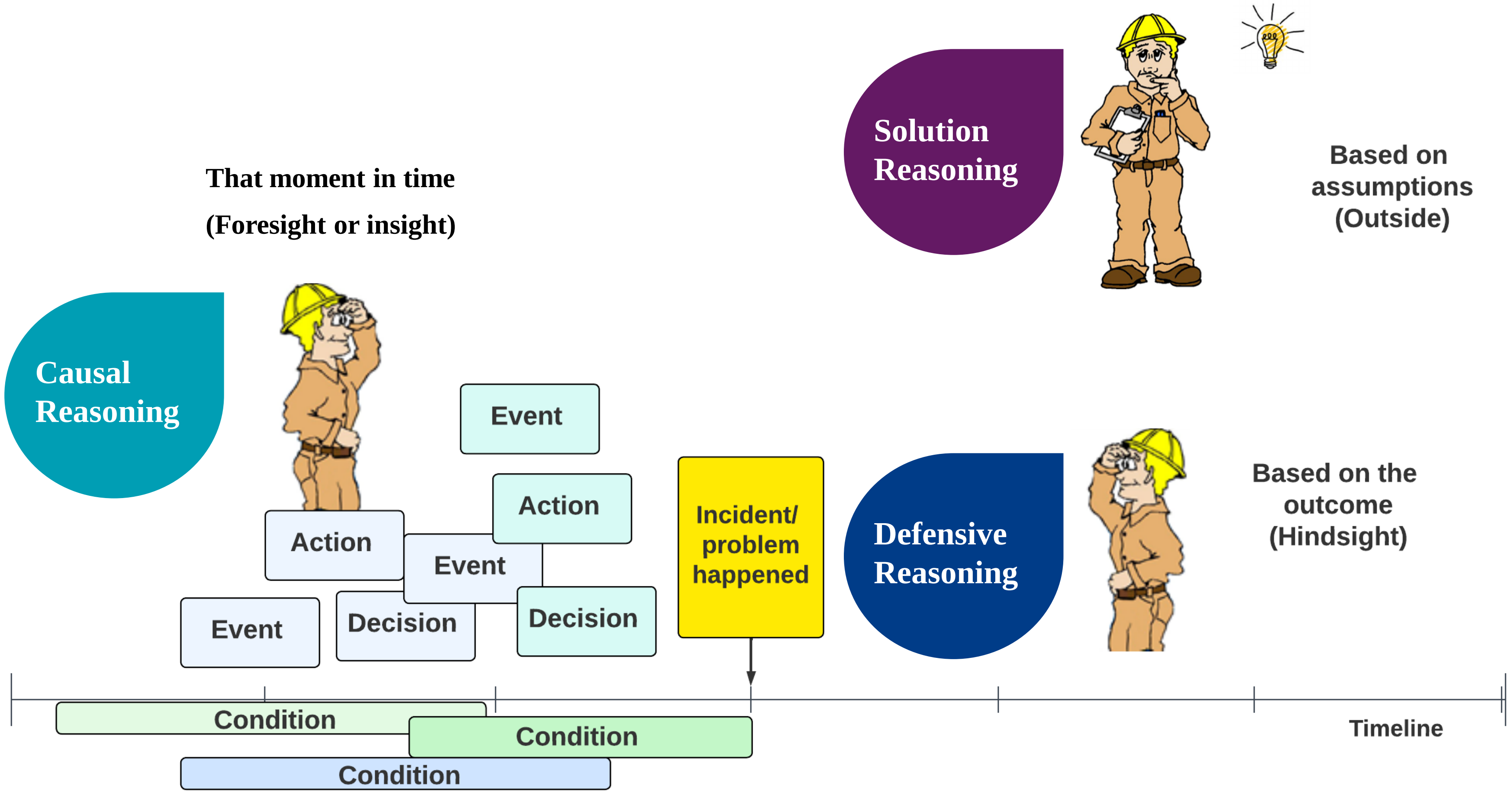
Overview

- Causal Learning / Human Factors approach to investigations.
- Failed mooring line incident.
- Some reflections on HF in causes.

The Causal Learning Approach – Causal Thinking



Incident Background

The vessel was in the process of mobilising equipment for a rig move.

The vessel was moored stern to the quayside with one aft mooring rope at each side and thruster control from the vessel to maintain the vessel in position while the load-out operations were carried out.

One fibre rope had been spooled to the vessel and there was a pause to prepare for the next spooling operation.

Three operatives were gathered at the stern of the vessel discussing the next part of the job.

Problem Statement

What was expected to happen:

The vessel was expected to carry out mobilisation operations safely and then depart the quay.

What actually happened:

Two contractors were injured when struck by a mooring line while carrying out mobilisation operations.

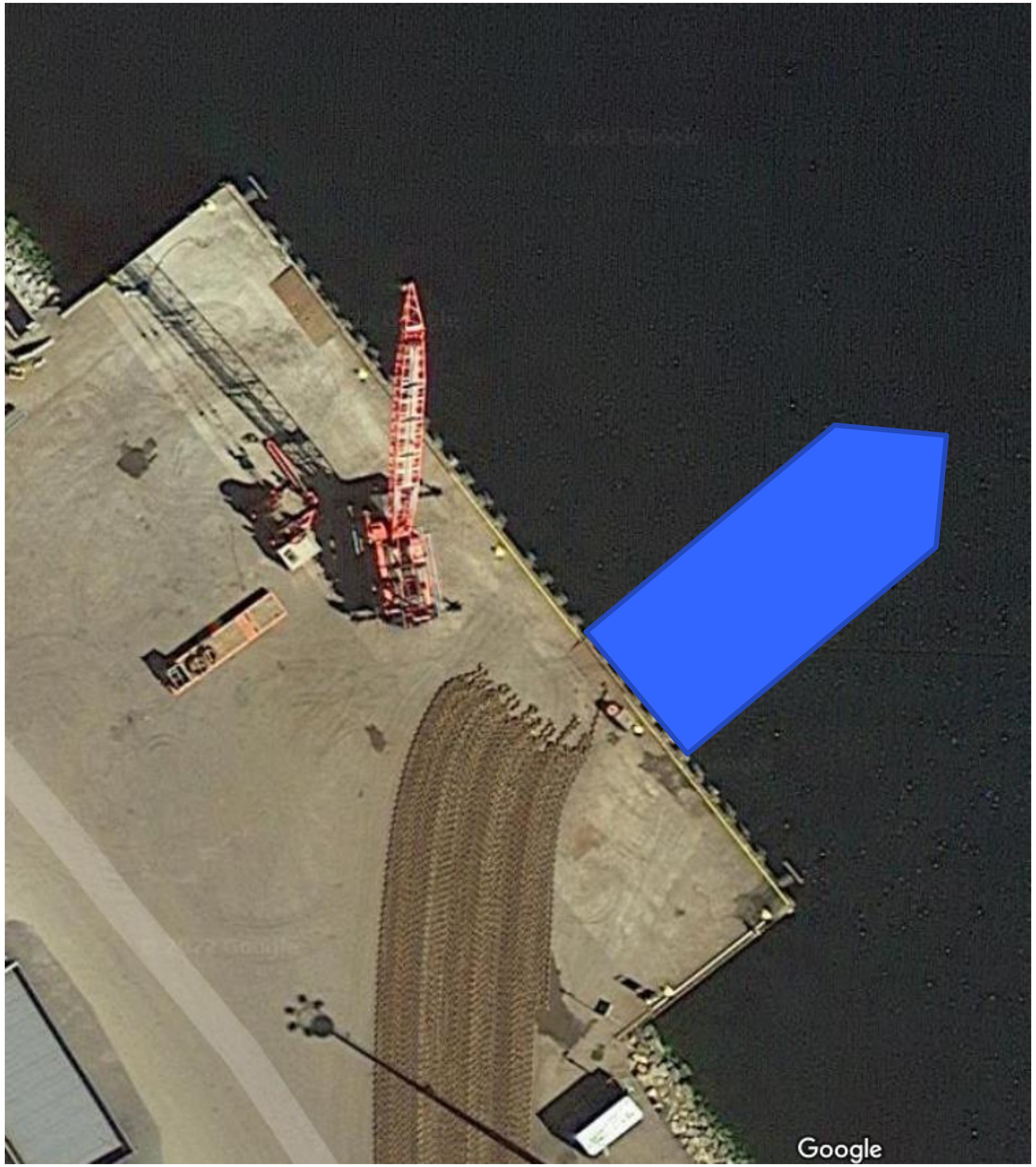
Impact ACTUAL:

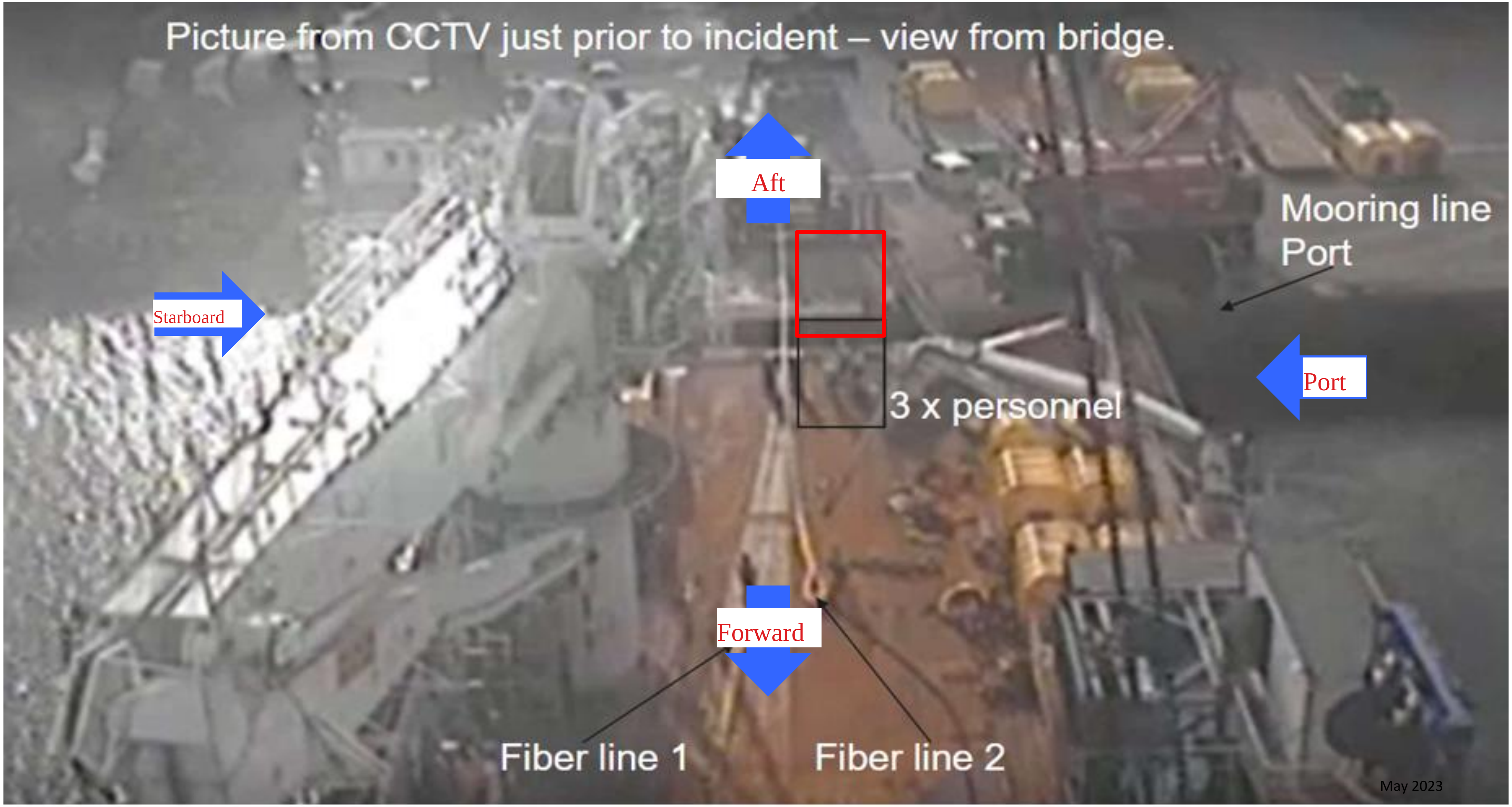
Both injured parties were hospitalised.

Impact POTENTIAL:

This is classed as a high potential incident. There was potential to seriously injure three people with at least one being a fatality.

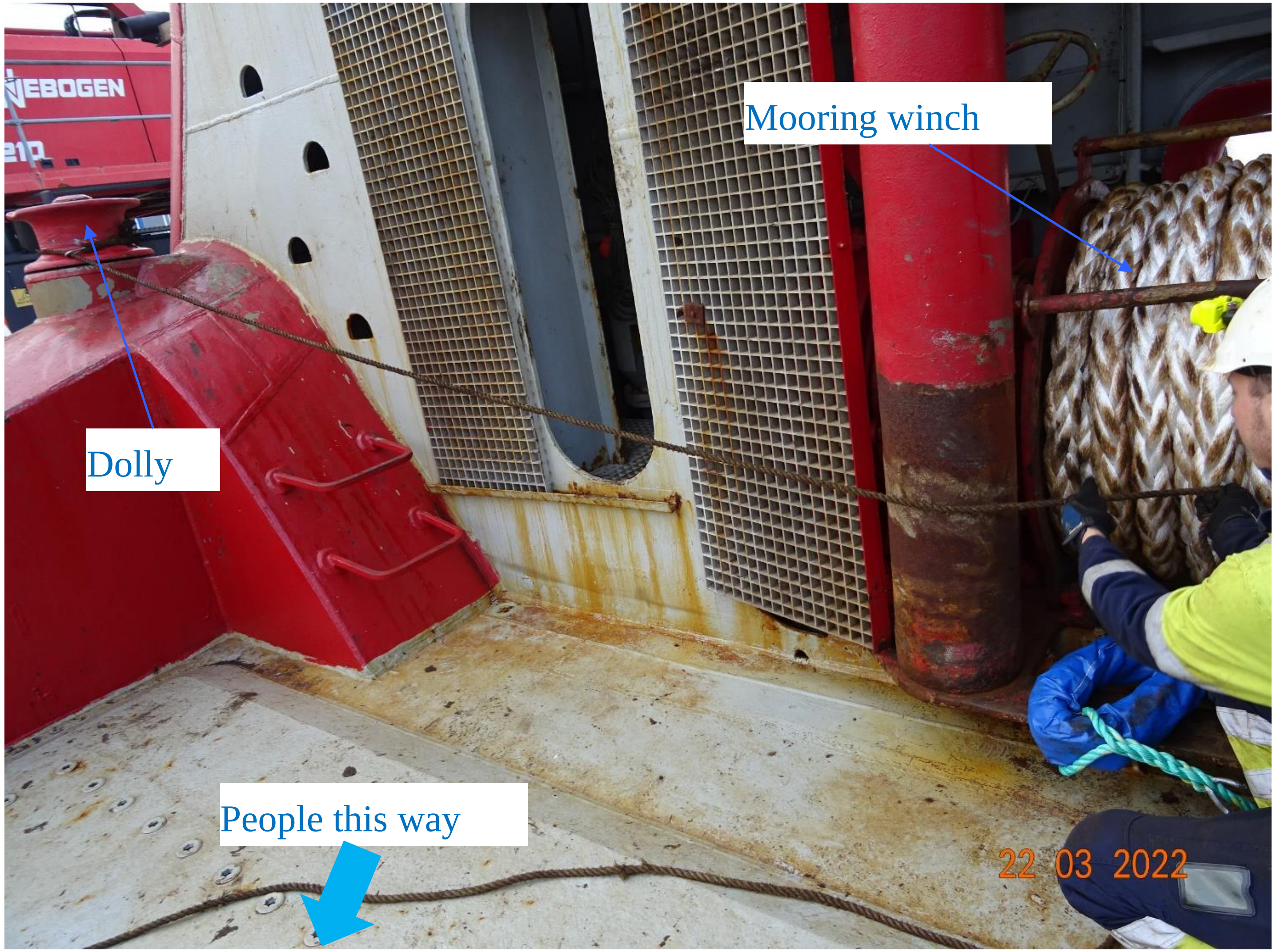
Vessel Mooring




Picture from CCTV just prior to incident – view from bridge.
Aft
Starboard
Mooring line Port
Port
3 x personnel
Forward
Fiber line 1
Fiber line 2

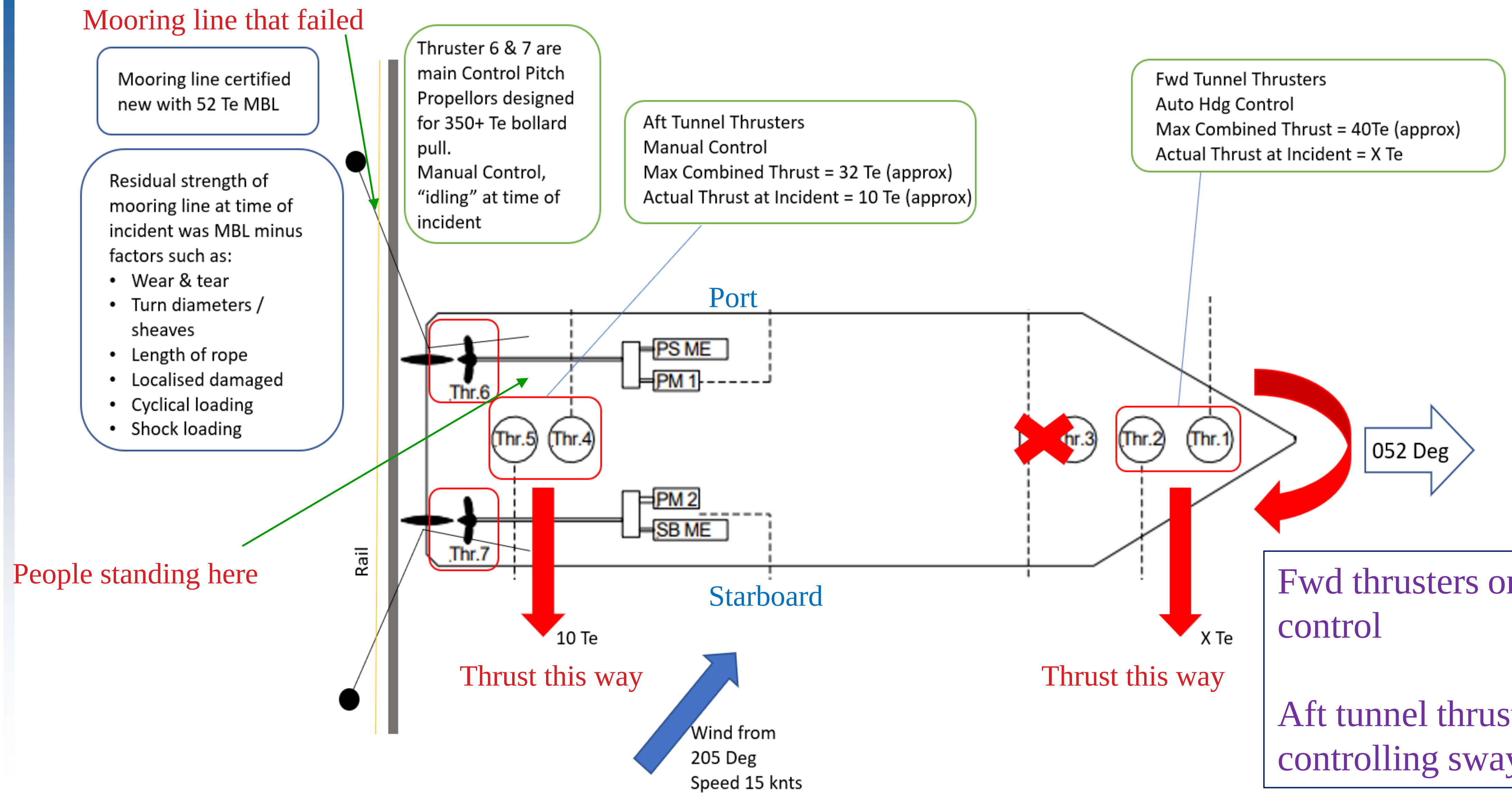
View of aft deck and quayside immediately after the incident

Replacement mooring line on the winch showing lead from winch around dolly on stern



Stern of vessel from port side bollard on quay showing failed line.

How the Vessel was Moored and Kept in Position During Operations



Fwd thrusters on auto hdg control

Aft tunnel thrusters in manual controlling sway

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Timeline – Lead-up to Incident

12:50	Vessel moors stern-to.
12:50	Bridge Officer 1 assisting vessel station keeping with manual control of aft thrusters
12:50	Bridge Officer 2 operating winch for spooling of fibre rope from shore
13:20	Spooling of first fibre rope starts
14:40	Spooling of first fibre rope completed
14:40	Spooling drum changed on quayside
15:00	Port aft mooring line tightened
15:00	3 x staff near stern of vessel
15:00	Vessel manipulator crane in operation near eyes of fibre ropes 1 & 2 near centre of deck
15:03-15:08	Load from stern thrusters increased gradually from 10%-30% power output (force to starboard, into the wind)
15:08	Port mooring line fails and two personnel struck by mooring line.

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Causal Overview

- Explaining the tension on the mooring line
- Explaining why the force caused the mooring line to fail
- Explaining why the injured persons were in the snapback zone when the line failed

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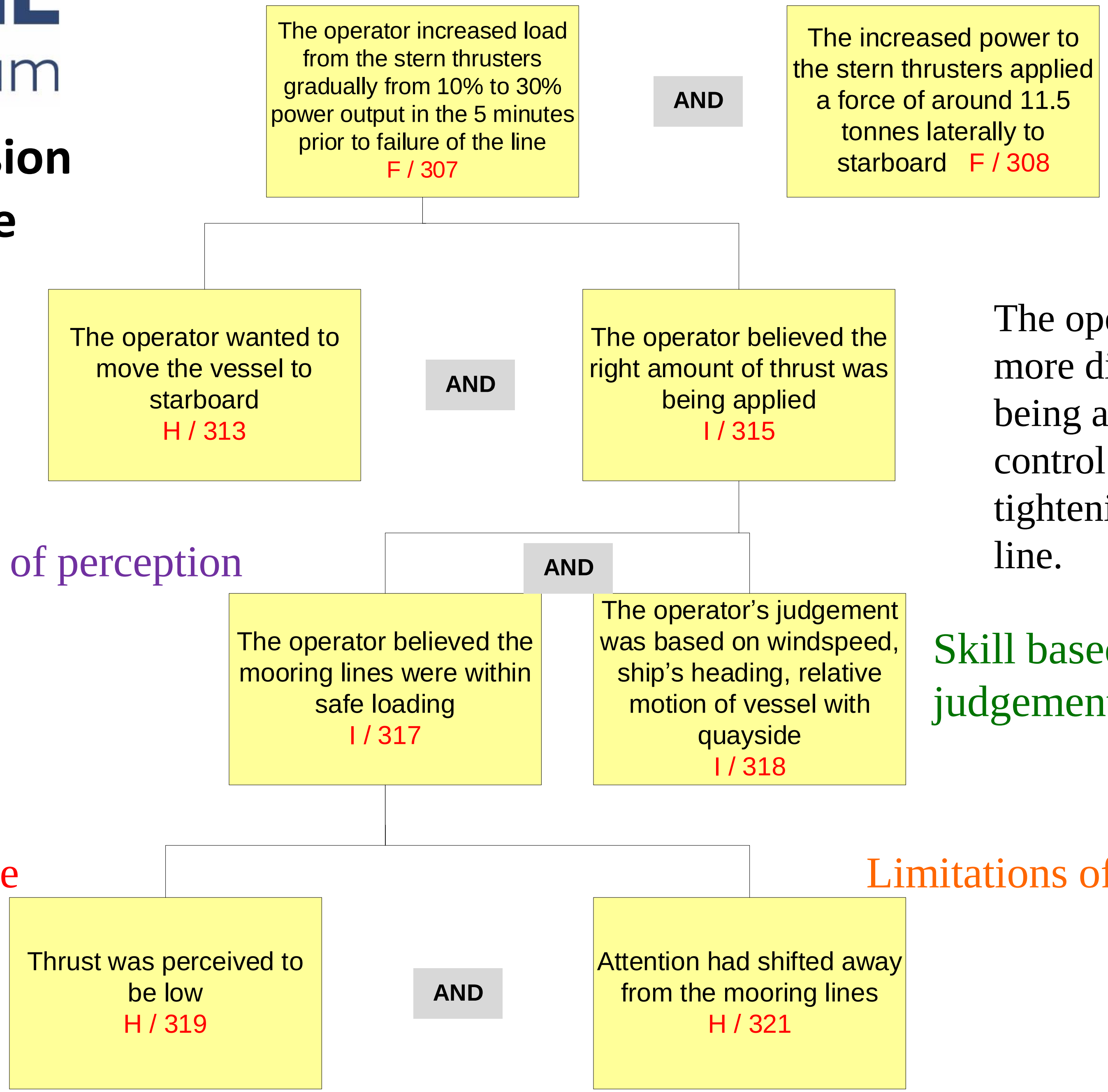
Explaining the tension on the mooring line



Limitations of perception

Skill based judgements/decisions

Individual experience

Limitations of attention

The operators judgement is made more difficult due to 1) the thrust being applied by the auto heading control 2) the effect of the tightening of the port aft mooring line.

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Explaining why the force caused the line to fail

The maximum breaking load (MBL) of the rope was degraded:

- Natural degradation e.g. from environmental factors
- Mooring arrangement (rope bend around the dolly on the stern and lead of the rope from the mooring winch)
- Friction on the rope from rail on the quayside

HUMAN FACTORS

- Nobody could know the MBL of the rope at the time – decisions made based on incomplete information
- Mooring arrangement chosen as it was ‘ergonomically’ easier – we have to be realistic about how people will work

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Explaining why the injured persons were in the snapback zone

- The rail crane was being used which prevented the deck crew from standing further forward on the deck
- The crew were in an accepted work location discussing the next part of the job
- The crew perception was they were in a safe area (stood here many times before and near the gangway)

It was a snapback zone but also a work area

Potential Improvements

Supporting operators on the bridge - Is there a way to consolidate the thrust data for the operator, to a single point of control? Is there a way to improve the information for operators or how operators use the information to help them judge how much thrust is needed, e.g. the tension on the mooring lines?

Mooring lines - protection of lines and possible use of mooring lines with snap back prevention built into the line.

Stern Operations Mooring Risk Assessments – better consideration of:

- Are mooring lines needed at all?
- Safest means of stern to quay mooring including characteristics of quay and vessel
- Where possible route the mooring line directly overboard

Q&A