SAFEMODE

Strengthening synergies between Aviation and Maritime in the area of Human Factors towards achieving more efficient and resilient MODES of transportation.

EUROCONTROL

Towards a Safety Learning Culture for the Shipping Industry – *learning to learn*

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CIEHF Pharmaceutical Manufacturing Group, UK, 12th October 2022

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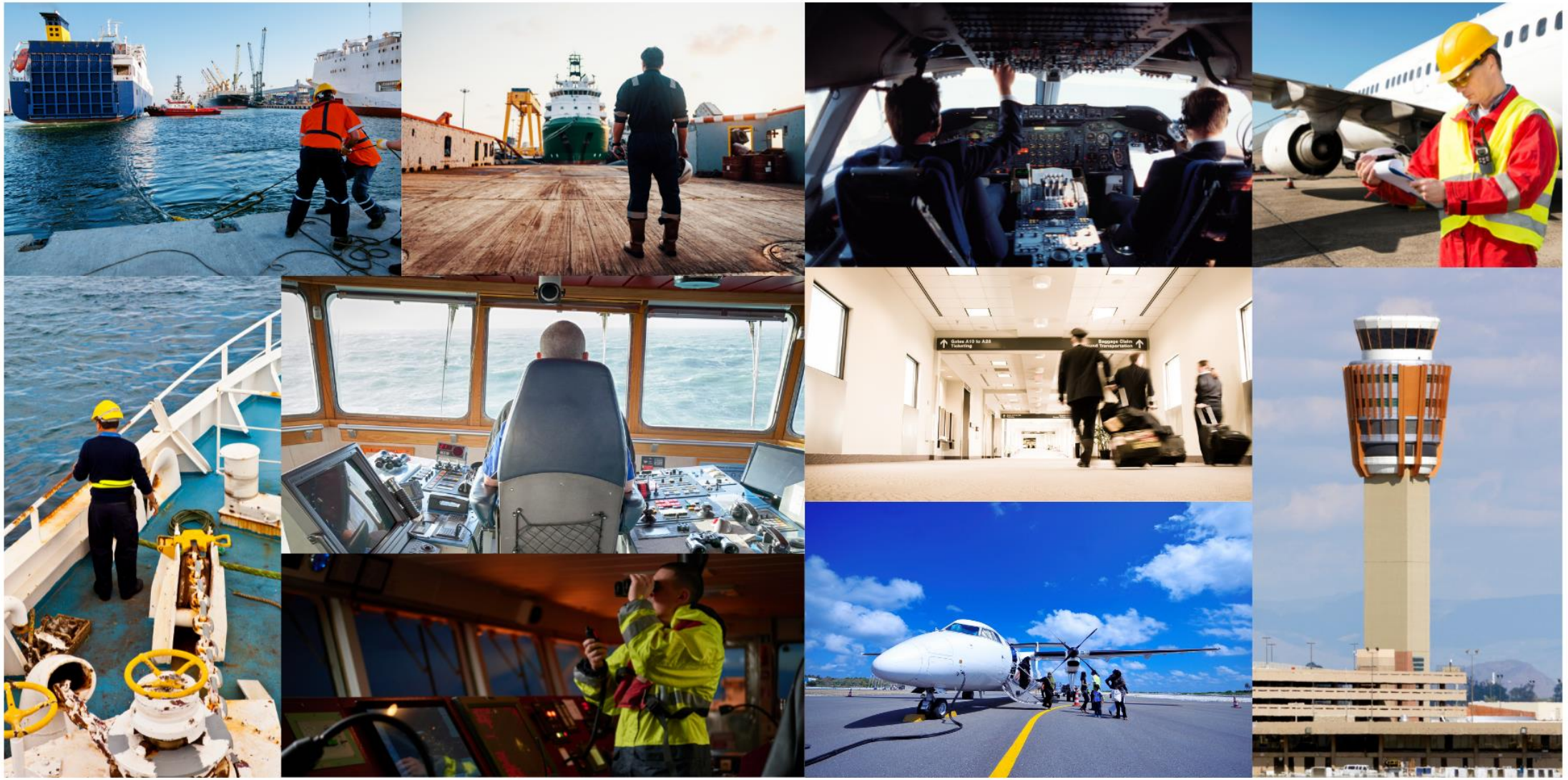
Safety Learning from Normal Work



- Original Study Aim
- Approach
- A Course Correction
- 10 Safety Learning Approaches
  - SHIELD Taxonomy
  - Reverse Swiss Cheese
- Way Forward
- Conclusions

https://www.safemodeproject.eu/uploadFile/7420221039476041055.pdf

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- SAFEMODE is all about Maritime & Aviation learning from each other in the safety and human factors domains
- It has a focus on design, and learning lessons from safety-related events
- This is seen as good safety culture

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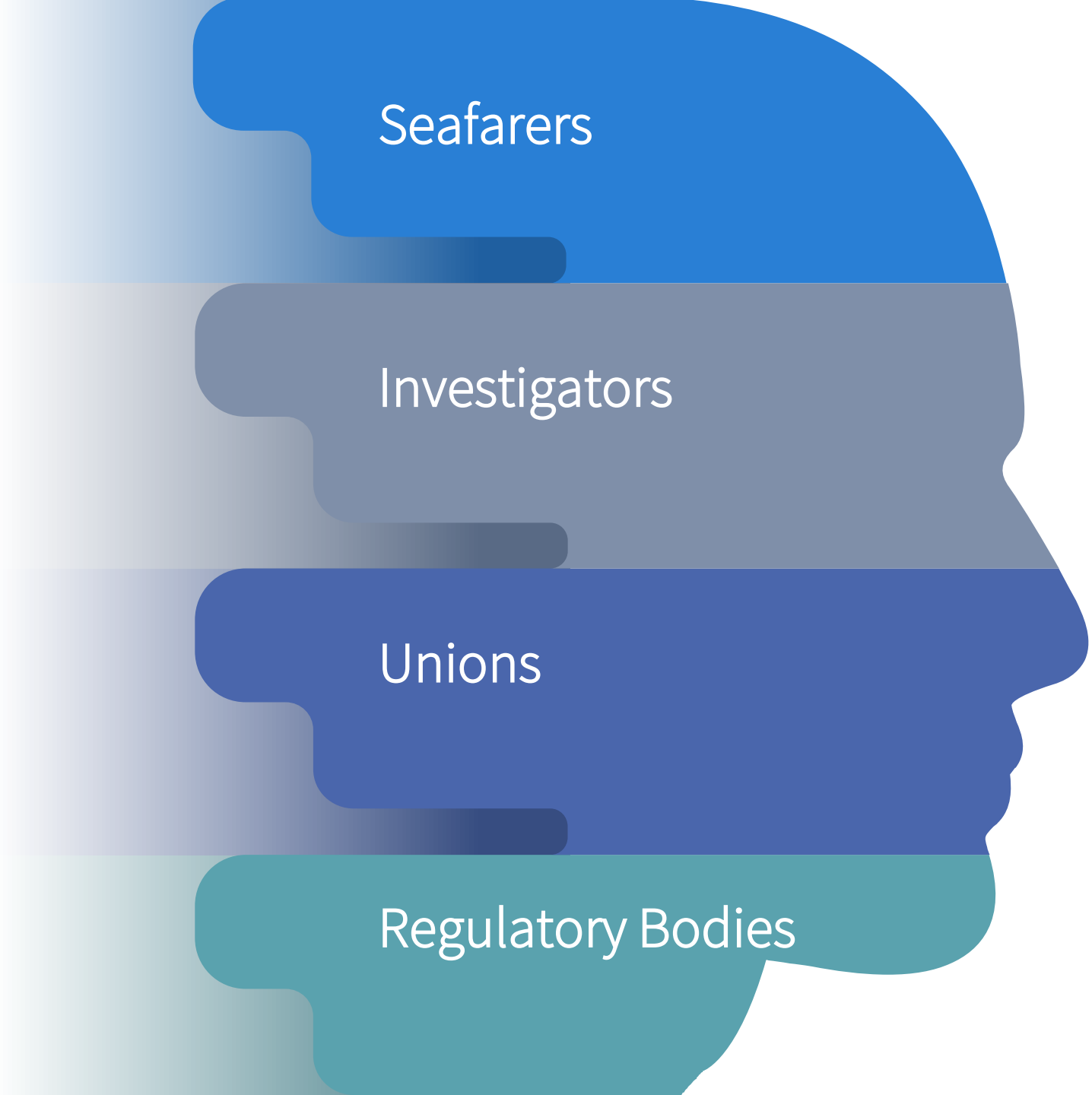
Original Aim: There needs to be a **Just Culture** framework put in place in Maritime to facilitate reporting, and thus **learning**. Guidance should be based on leading edge work ongoing in the **aviation** domain



Interview Approach

1. Investigation
2. Reporting
3. Near-Miss Reporting
4. Understanding the Human Element
5. What keeps ships safe?
6. Safety Management Systems (SMS)
7. Just Culture
8. Safety Learning

Interview Approach

- Confidential
- Online
- 60-90 minutes
- Same structured question format
- 2-3 interviewers
- Written record
- Transcripts & draft report verified by interviewees
- Content analysed & mined for quotes and themes
- Generally high agreement

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Interviews, Focus Groups, Presentations

19 Interviewees: 17 male, 2 female

Seafarers:

- Master / Captain (6)
- Chief Officer (1)
- Chief Engineer (2)
- Rating (1)

Maritime segment (seafarers)

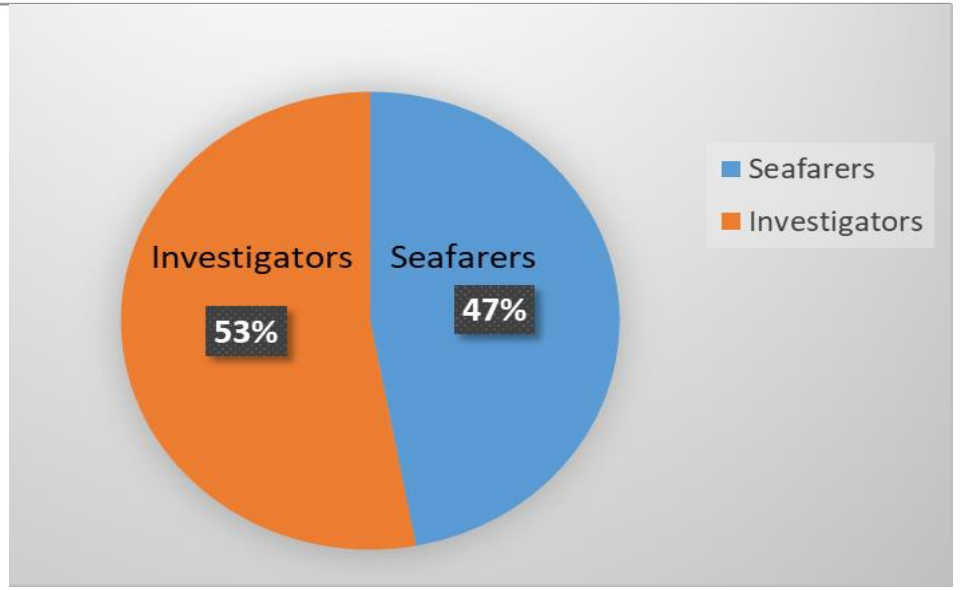
- cargo 8 (4 chemical tankers, 4 containers) 2 passenger / cruise ships

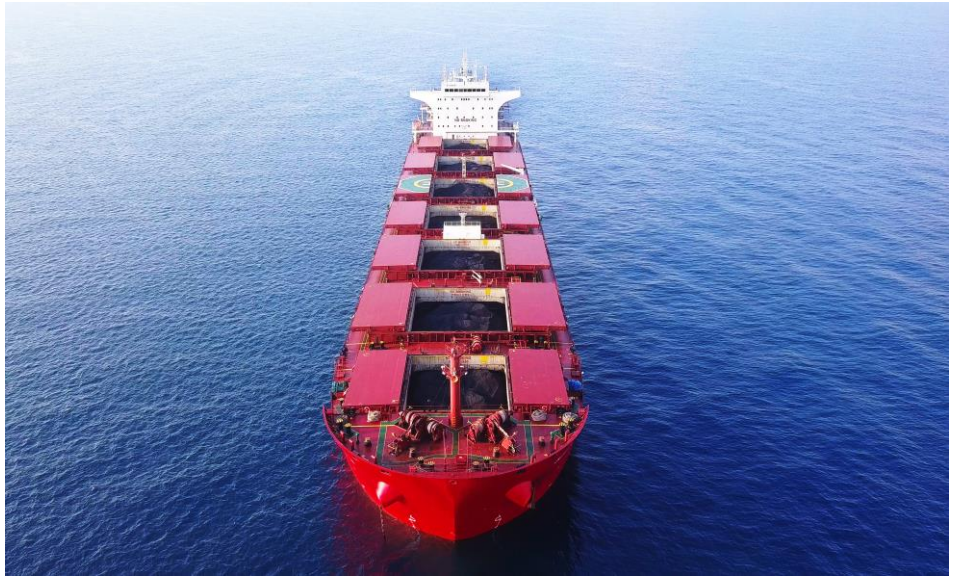
Geography – countries represented:

- Seafarers – *Mexico, Denmark, Romania, Netherlands, France, India, Sweden, UK*
- Investigators – *USA, UK, Malta, Spain, Portugal, Denmark, Italy*

EMSA, IMO, Unions, Training organization

MCA (HEAG), IMarEST, STABS 2021





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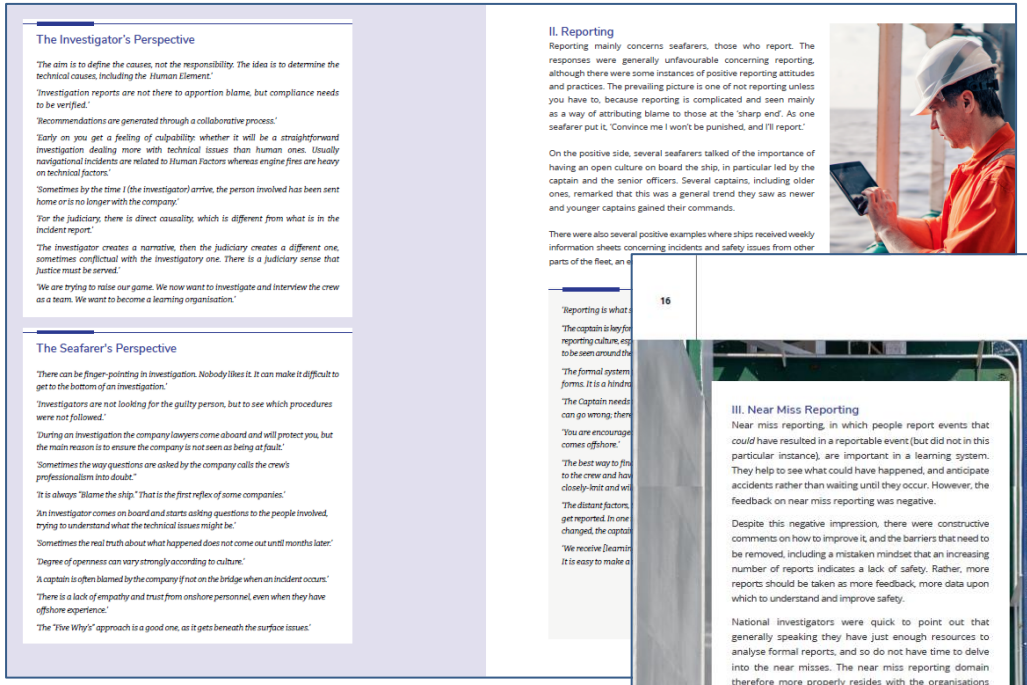
What the interviewees said about investigation, reporting, Just Culture and learning

Chapter 2 captures what they said



The Investigator's Perspective

'The aim is to define the causes, not the responsibility. The idea is to determine the technical causes, including the Human Element.'

'Investigation reports are not there to apportion blame, but compliance needs to be verified.'

'Recommendations are generated through a collaborative process.'

'Early on you get a feeling of culpability: whether it will be a straightforward investigation dealing more with technical issues than human ones. Usually navigational incidents are related to Human Factors whereas engine fires are heavy on technical factors.'

'Sometimes by the time I (the investigator) arrive, the person involved has been sent home or is no longer with the company.'

'For the judiciary, there is direct causality, which is different from what is in the incident report.'

'The investigator creates a narrative, then the judiciary creates a different one, sometimes conflictual with the investigatory one. There is a judiciary sense that justice must be served.'

'We are trying to raise our game. We now want to investigate and interview the crew as a team. We want to become a learning organisation.'

The Seafarer's Perspective

'There can be finger-pointing in investigation. Nobody likes it. It can make it difficult to get to the bottom of an investigation.'

'Investigators are not looking for the guilty person, but to see which procedures were not followed.'

'During an investigation the company lawyers come aboard and will protect you, but the main reason is to ensure the company is not seen as being at fault.'

'Sometimes the way questions are asked by the company calls the crew's professionalism into doubt."

'It is always "Blame the ship." That is the first reflex of some companies.'

'An investigator comes on board and starts asking questions to the people involved, trying to understand what the technical issues might be.'

'Sometimes the real truth about what happened does not come out until months later.'

'Degree of openness can vary strongly according to culture.'

'A captain is often blamed by the company if not on the bridge when an incident occurs.'

'There is a lack of empathy and trust from onshore personnel, even when they have offshore experience.'

'The "Five Why's" approach is a good one, as it gets beneath the surface issues.'

II. Reporting

Reporting mainly concerns seafarers, those who report. The responses were generally unfavourable concerning reporting, although there were some instances of positive reporting attitudes and practices. The prevailing picture is one of not reporting unless you have to, because reporting is complicated and seen mainly as a way of attributing blame to those at the 'sharp end'. As one seafarer put it, 'Convince me I won't be punished, and I'll report.'

On the positive side, several seafarers talked of the importance of having an open culture on board the ship, in particular led by the captain and the senior officers. Several captains, including older ones, remarked that this was a general trend they saw as newer and younger captains gained their commands.

There were also several positive examples where ships received weekly information sheets concerning incidents and safety issues from other parts of the fleet, an e

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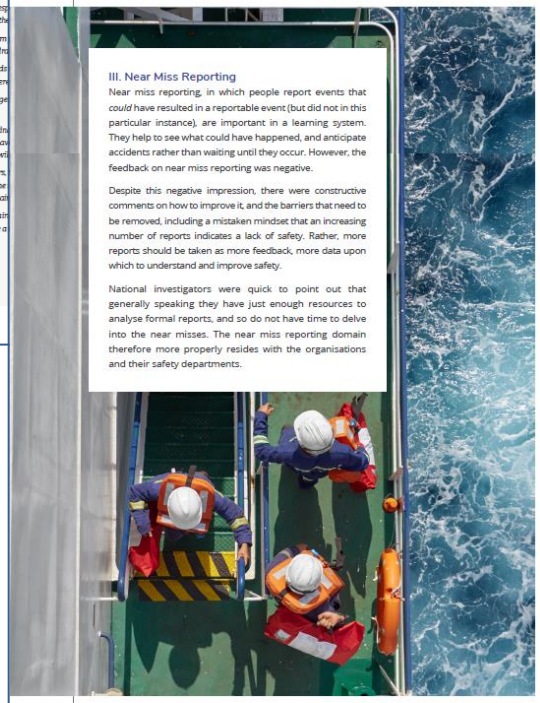

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III. Near Miss Reporting

Near miss reporting, in which people report events that *could* have resulted in a reportable event (but did not in this particular instance), are important in a learning system. They help to see what could have happened, and anticipate accidents rather than waiting until they occur. However, the feedback on near miss reporting was negative.

Despite this negative impression, there were constructive comments on how to improve it, and the barriers that need to be removed, including a mistaken mindset that an increasing number of reports indicates a lack of safety. Rather, more reports should be taken as more feedback, more data upon which to understand and improve safety.

National investigators were quick to point out that generally speaking they have just enough resources to analyse formal reports, and so do not have time to delve into the near misses. The near miss reporting domain therefore more properly resides with the organisations and their safety departments.

CHAPTER

Issues

'We do not get the reports we want. We get trips and falls, but never a mariner falling asleep on watch, or an engineer having problems assembling machinery.'

'If you are lucky, 10% of near misses are reported.'

'Some companies have near miss reporting targets in their SMS. So the captain ends up altering reports to reach the target.'

'There is a lot of data but we don't know how to analyse it. We're lacking strong methodologies.'

'Procedures that are not working are hidden.'

'Such reporting schemes promote organisational secrecy rather than organisational learning.'

'For near misses, the narratives are more useful than the checked boxes, but companies count the latter.'

'There is an anonymous reporting scheme. It has been used once in 17 years.'

'We have a near miss reporting system. It is electronic and time-consuming, and not very helpful.'

'Near miss reporting App can be used to report violations by another person, to discredit them.'

Work in progress

'To make them useful, companies need to focus on quality of the reports, not quantity, and disseminate anonymised descriptions of what happened for learning purposes.'

'We have an electronic voluntary reporting system which leads to monthly lessons learned. But on board there is no easy access to computers and very little or no wifi.'

'National administration tried to implement one but there was no participation.'

'We have a near miss system, but if a ship reports too many near misses, the company will say "your ship is not safe."'

'People have to believe they will not be punished, or else they will not report.'

'Our near-miss system informs the SMS. If they (onshore) detect a trend, they update the SMS.'

'A new App is being introduced by the company.'

VI. Safety Management Systems (SMS)

Safety Learning is usually part of the safety approach of a company or organisation, and so fits under what is called the Safety Management System or SMS. However, feedback on SMS from seafarers was not positive, as is highlighted in the insert. This to an extent corroborates the earlier assertion that there is sometimes quite a gap in understanding between onshore departments and operations on a ship.

Any SMS usually includes a learning process, but if reporting is poor or 'shallow', as indicated by the interviews, then learning will be limited. Moreover, having a learning process does not

VII. Just Culture

A number of the comments until now reflect the fact that seafarers are reluctant to report in case they are punished for their actions, whether this amounts to a reprimand, loss of job, or even in extreme cases being sent to prison. Just Culture, which means that no one is punished for honest mistakes, is now implemented in a number of industries to facilitate learning valuable safety lessons. For example, for some time now in aviation the decision has been made that it is better to learn than to blame, because if you blame someone you stop asking the harder questions about the underlying factors that contributed to the event, which will contribute to the next event if unchecked. This decision has certainly contributed to aviation becoming the safest mode of transport. The way it works is that pilots and controllers are not prosecuted after incidents or accidents (aside from a very small number of exceptions), and so feel safe to report honestly and completely, which maximises learning. In Europe, Just Culture in aviation has been enshrined in law, and is defined as follows:

"A culture in which front-line operators or other persons [staff] are not punished for actions or decisions taken by them that are commensurate with their experience and training, but in which gross negligence, wilful violations and destructive acts are not tolerated."
(Regulation No. EU 376/2017)

It is not a perfect definition. Determining what constitutes 'gross negligence', for example, can be very subjective and culturally-dependent. Similarly, 'wilful violations' can be interpreted in different ways. One way out of these difficulties is known as the **substitution test**, in which the question is asked whether someone else in the same situation might have made the same decision or error. It is important that those applying this test are familiar with the realities of work in practice, with all the constraints and trade-offs that people have to make on a daily basis. Many aviation organisations do not adopt Just Culture merely because the law says they must. For example, one European low-cost airline has a simple rationale as to why Just Culture is important:

- **Finding out what's really happening**
- **Having honest discussions**
  - Between managers and staff
  - Between companies
- **Learning from events**
- **Being able to anticipate future events**

All interviewees were asked if they believed putting Just Culture into legislation in shipping was a good idea (the Just Culture concept had to be outlined to about half the participants, who had not heard of it). Only half thought the industry was ready for such legislation. All, however, felt that criminalising seafarers was a significant impediment to reporting and learning.

Is making Just Culture a legal requirement a good idea?

'If we could eliminate criminal & civil case proceedings, it would really help. Stop criminalizing seafarers! Sometimes they are used as scapegoats.'

'Ships are manned by ship owners via a cascade of sub-contracting parties and manning agents. Most crew are on 6-month contracts. They know that if they report something, they will never get another contract. Blacklisting is a reality.'

'You need to send the message: we're not blaming you, but we need to learn.'

'Most HR have no marine background. They are defensive as they could end up in industrial tribunal trying to defend the company.'

'The term Just Culture is not what is important. Better to talk about Learning Culture.'

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Seafarers on Investigation

‘There can be finger-pointing in investigation. Nobody likes it. It can make it difficult to get to the bottom of an investigation.’

‘Investigators are not looking for the guilty person, but to see which procedures were not followed.’

‘During an investigation the company lawyers come aboard and will protect you, but the main reason is to ensure the company is not seen as being at fault.’

‘Sometimes the way questions are asked by the company calls the crew’s professionalism into doubt.’’

‘It is always “Blame the ship.”’ That is the first reflex of some companies.’

‘An investigator comes on board and starts asking questions to the people involved, trying to understand what the technical issues might be.’

‘Sometimes the real truth about what happened does not come out until months later.’

‘A captain is often blamed by the company if not on the bridge when an incident occurs.’

‘There is a lack of empathy and trust from onshore personnel, even when they have offshore experience.’

Reporting

- *'Reporting is what seafarers try to avoid at all costs.'*
- *'The captain is key for reporting – (s)he sets the tone of the on-board reporting culture, especially with multi-cultural crews. The Captain needs to be seen around the ship and talk to people, be open with them.'*
- *'The formal system for reporting is very complicated, with multiple forms. It is a hindrance to reporting.'*
- *'The Captain needs to send the message: We are human and things can go wrong; there is no blame, only questions.'*
- *'You are encouraged to report for safety. But nobody from the office comes offshore.'*
- *'Most crew are on a 6-month contract. If they report something they will never get another contract. Blacklisting is a reality.'*
- *'The best way to find out what really happened is to keep talking to the crew and have an open door policy – some cultures are very closely-knit and will defend each other.'*
- *'The distant factors, those under the influence of the company, don't get reported. In one instance after most of the crew had just been changed, the captain was blamed for not preventing the incident.'*
- *'We receive [learning] reports from other ships in the fleet. It is easy to make a report.'*

Is legalization of Just Culture a good idea?

- *'If we could eliminate criminal & civil case proceedings, it would really help.* ***Stop criminalizing seafarers!*** *Sometimes they are used as scapegoats.'*
- *'****Maritime may not be ready for it yet****. Ships are manned by ship owners via a cascade of sub-contracting parties and manning agents. Most crews are on 6-month contracts. They know that if they report something they will not get another contract. Blacklisting is a reality...'*
- *'You need to send the message:* ***we're not blaming you, but we need to learn****.'*
- *'****Most HR have no marine background****. They are defensive as they could end up in industrial tribunal trying to defend the company.'*
- *'The term Just Culture is not what is important.* ***Better to talk about Learning Culture****.'*

A Course Correction

Safety Culture

Culture of Care

Reporting Culture

Learning Culture

Just Culture

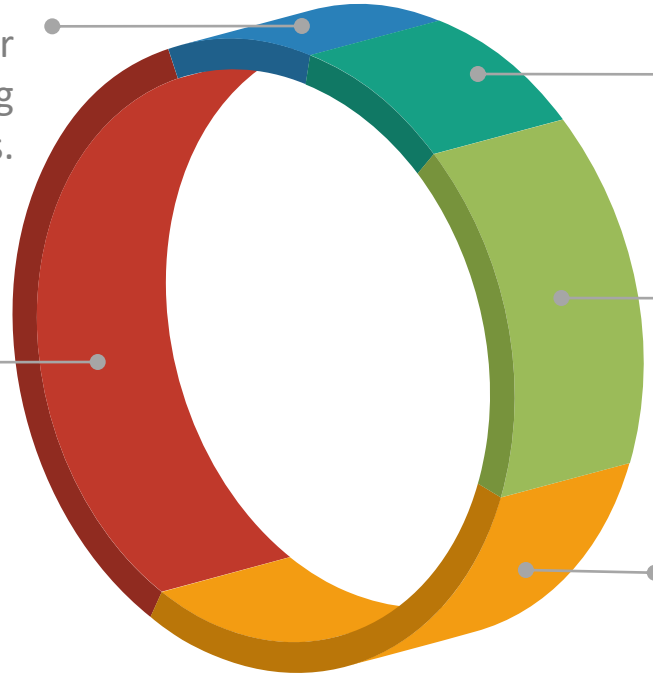
The SAFEMODE Safety Learning Cycle

Data Capture

Any events, incidents, accidents and near misses are reported and investigated using effective systems, language and processes.

Data Analysis

Data are analysed to determine causes, contributions, and remedial measures to prevent recurrence



Safety Learning

Specific and generic lessons are drawn to improve safety, including via job and interface design, automation, and improved risk assurance processes

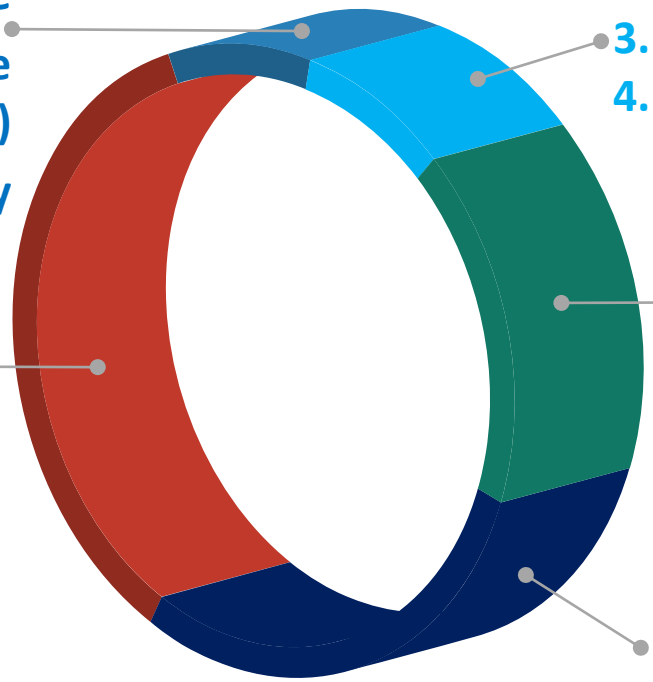
Operation & Maintenance

Normal and abnormal operations are monitored constantly for performance variations and safety exceedances

Risk-Informed Design / Deep Learning

Designers and risk assessors are able to use the lessons learned to make future airport systems more resilient. Organisational and systemic Human Element issues are addressed.

Ten Safety Learning Approaches



Data Capture

1. Common Language (Taxonomy)
2. Investigating Differently

Data Analysis

3. Evidence Base / Learning Platform
4. Ten Most Wanted

Safety Learning

5. Group Learning Review
6. Deep Dives
7. Safety Intelligence Sharing
8. Safety Alliances

Operation & Maintenance

Translate Learning into Practice

Better Understanding between Onshore and Ship

Continuous Learning

Deep Learning

9. Reverse Swiss Cheese Theory
10. Human Factors Toolkit

Taxonomy & Database (SHIELD)

This project has received funding from European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement N°814961.

SHIELD HF Taxonomy Unpacked

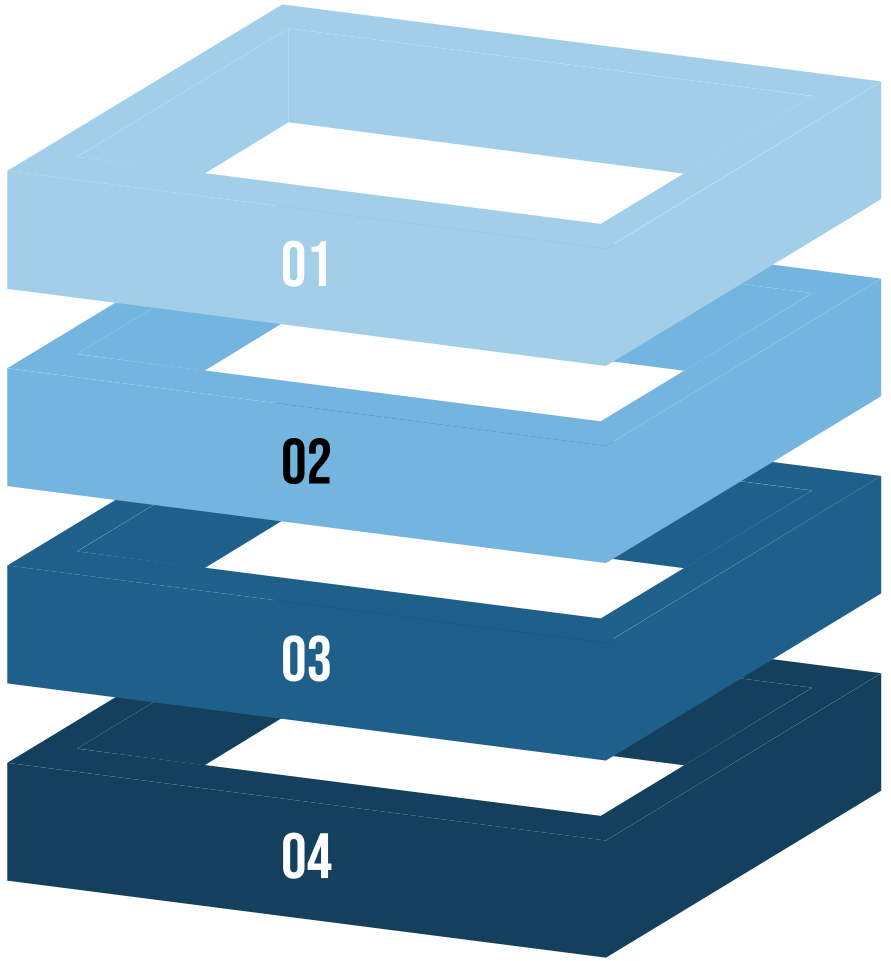
SHIELD HF LEVELS

LEVEL 1 – Acts
What happened? What didn't go according to plan?

LEVEL 2 - PRECONDITIONS
What factors influenced performance on the day? .

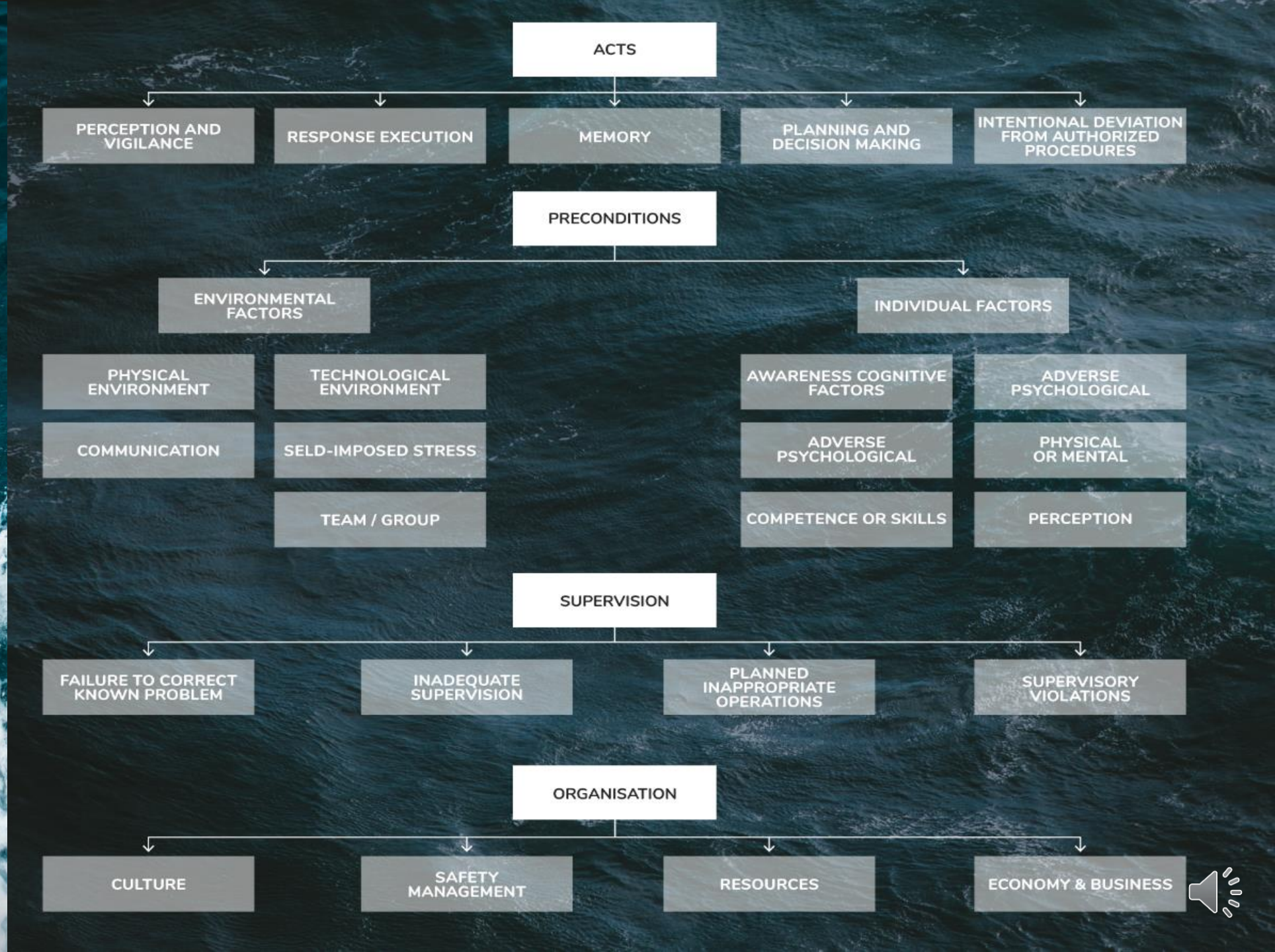
LEVEL 3 – OPERATIONAL LEADERSHIP
Working arrangements not as intended

LEVEL 4 – ORGANISATION
The deeper factors that can affect operations



SHIELD:

Translating Incidents into Safety Lessons



LEVEL 1: ACTS

Perception
Something not seen… Visual detection
Something not heard… Auditory detection
Something not felt… Kinesthetic detection
Something not smelled… Olfactory detection

Missed, detected late, wrong thing detected

Planning & Decision-Making
Plan or decision did not work

Plan or decision incorrect, late, or no plan/decision

Intentional Deviation
Workaround is employed

Workaround in normal conditions
Routine workaround, workaround in exceptional conditions, sabotage

Response Execution
Something is done incorrectly

Wrong timing, wrong sequence,
Right action on wrong object
Wrong action on right object
Lack of physical coordination
No action performed

Communicating
Plan is correct but not communicated properly

Wrong/no information transmitted

LEVEL 2: PRECONDITIONS 1/3

Physical Environment

Environment affects vision, movement, hearing, mental processing.
Heat or cold stress, acceleration, vibration.
Operation more complex due to weather or geographical environment.
Long term isolation.

Equipment & Workplace

Ergonomics & human machine interface issues
Automated system creates unsafe situation
Workspace layout & design incompatible with safety
Personal protective equipment interference
Inadequate communication equipment
Fuel or materials lead to unsafe performance.

Interpersonal Communications

Task planning/briefing/handover inadequate.
Inadequate communications due to team members' rank or position.
Language difficulties.
Use of non-standard terminology or hand signals.

Team/Group

Team members working towards different goals.
No cross-check & speaking up by team members
No monitoring & speaking up of team status and functioning
No adaptation of team performance in demanding situation.
Long term team confinement
Group think

LEVEL 2: PRECONDITIONS 2/3

Misperception

- Motion or visual illusion
- Misperception of changing environment
- Misinterpreted or misread instrument

Awareness

- Channelized attention or confusion
- Distraction or inattention
- Geographically lost
- Unsuitable mental model
- Pre-conceived notion or expectancy

Memory

- Forget actions/intentions
- No/inaccurate recall of information
- Negative habit

Mental Workload

- High or low workload
- Information processing overload
- Startle effect

LEVEL 2: PRECONDITIONS 3/3

Personal Factors

- Emotional state
- Personality style, Confidence level
- Performance/peer pressure
- Motivation
- Pre-existing psychological condition
- Risk underestimation

Physiological Condition

- Injury or illness existed during operation,
- Mental or Physical Fatigue,
- Hypoxia, decompression sickness.

Drugs & Nutrition

- Recreational drugs & alcohol
- Prescribed drugs or OTC medications
- Inadequate nutrition, hydration or dietary practice

Competence, Skills & Capabilities

- Inadequate experience
- Lack of proficiency
- Inadequate training or currency
- Body size, strength or coordination limitations

LEVEL 3: OPERATIONAL LEADERSHIP

Personnel Leadership

- No personnel measures against regular risky behaviour
- Inappropriate behaviour affects learning
- Personality conflict
- Lack of feedback on safety reporting

Operations planning

- Inadequate risk assessment
- Inadequate crew or team makeup or composition
- Inappropriate pressure to perform task
- Activity led or directed beyond capability or without adequate equipment

Task Leadership

- Inadequate leadership or supervision
- No correction of unsafe practices
- No enforcement of existing rules
- Allowing unwritten policies to become standard
- Directed deviation

LEVEL 4: ORGANISATION

Culture

- Safety Culture
- Multi-cultural factors

Safety Management

- Organisation structure / policy
- Safety risk management (proactive)
- Safety risk assurance (reactive)
- Safety promotion
- Publications, procedures, written guidance

Resources

- Personnel
- Budgets
- Equipment / parts / materials availability
- Inadequate training programs
- Design of equipment or procedures
- Operational information

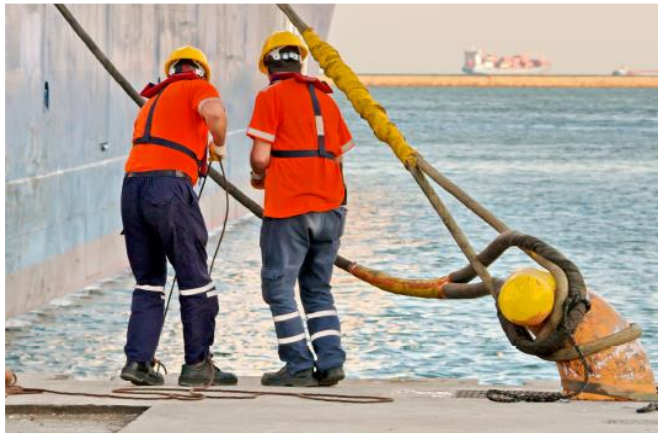
Economy & Business

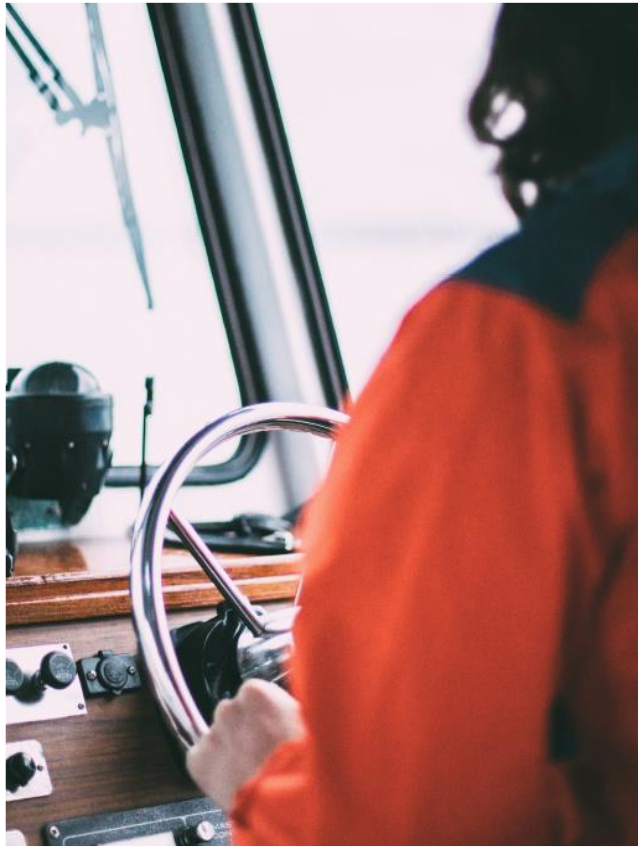
- Contractors
- External business environment
- Economic pressure
- Tempo of operations

Safety Alliances, Safety Intelligence Sharing

Ten Most Wanted…

Flooding / Foundering
Crane operations
Enclosed Spaces
Deck machinery handling
Hot Work Piracy
Contact Man Overboard Loss of Control
Grounding / Stranding
Lifeboat testing Electrocution
Falls from Height
Collisions Hull failure
Capsizing / Listing
Fire/Explosion
Mooring Operations





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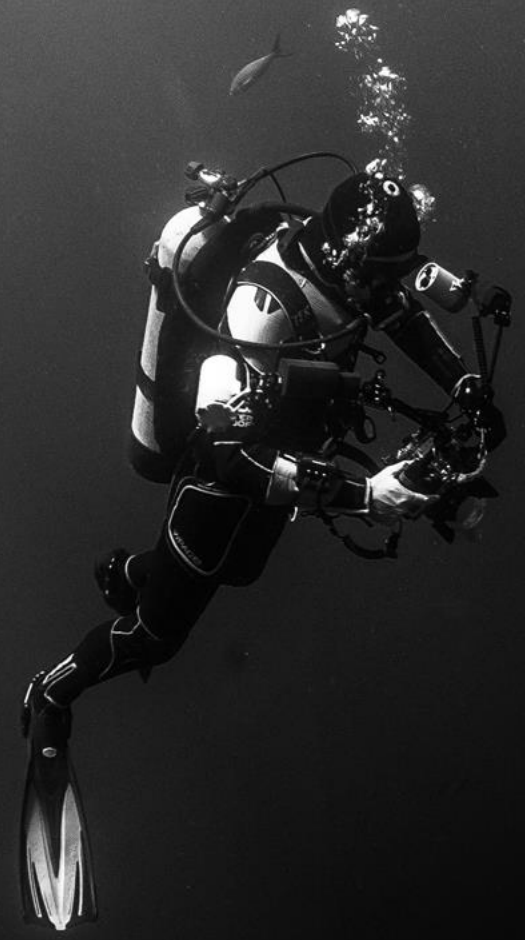


Safety Deep Dives

Explore a specific accident or incident trend

Examine the basis for safety

Which barriers are still working?

Which barriers are no longer working?

What are the key Human Factors involved (both positive and negative?)

Have any external factors changed?

Have internal factors changed (staffing, competency, etc.)?

Are the procedures still fit for purpose?

What are the deep systemic factors?

Where are the hotspots in the fleet?

Where are there best practices in the fleet?

What can be shared across the fleet?

SAFEMODE

HF Toolkit

Error Identification

HAZOP; TRACER; SOAM

Systemic Analysis

SHELL; STAMP; SESAR HPAP; Arktrans

HMI Prototyping

RTS Prototyping; Scenario-based design; Focus Groups; Eye Tracking

Real-Time Simulation

RTS Prototyping; Eye Tracking; NEUROID

HF Guidance

LOAT; HF Guidance

Human Reliability Assessment

HEART; CREAM; CARA

Task Analysis

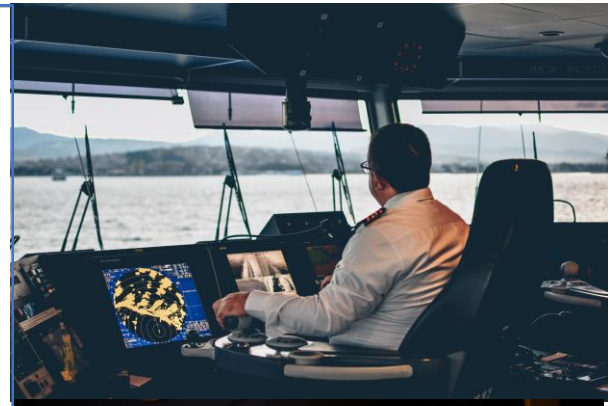
CIT; OSD; HTA;

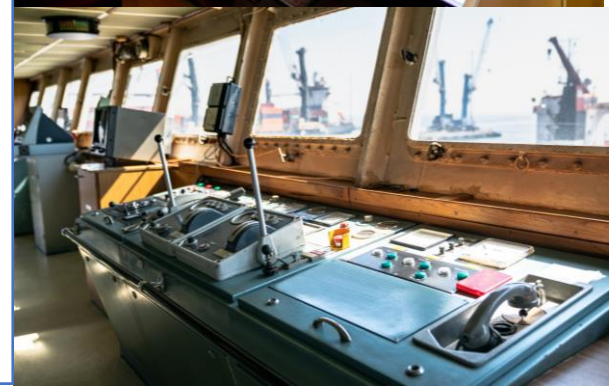
Walk-through / Talk-through

Organisational Aspects

Safety Culture Assessment;

HPSoE; Fatigue





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We need to look not only at '*work as done*', but '*business as done*'.

Leadership

Corporate Strategy

Shaping the Culture

Defining Policies & Procedures

Allocating Budgets & Targets

Operations – *setting the pace*

Procurement

Staffing Choices

Design and Automation Choices

SAFEMODE

Strengthening synergies between Aviation and Maritime in the area of Human Factors towards achieving more efficient and resilient MODES of transportation.

REVERSE SWISS CHEESE – MARITIME

Economy, Pressures, Laws, Regulations, Societal Trends

Upstream

Downstream

ORGANISATION

Strategy & Policy
Resources
Communications
Culture
Safety Management & Learning
Regulatory Compliance

DESIGN

Concept Requirements
Naval Architecture
Standards
Human Factors & Ergonomics
Safety Margins
Operational Feedback

VESSEL OPERATIONS

Master's Leadership
Professionalism
Teamwork
Speaking Up / Just Culture
Health & Wellbeing / Fitness for Duty
Onshore-Onboard Collaboration

FLEET SUPPORT

Crewing & Certification
Training & Procedures
Safety Management System
Investigation & Learning
Maintenance Planning System
Defect Reporting & Management

PROVIDENCE (LUCK)

Accident

Asking the hard questions…

‘How are our [Management] decisions onshore influencing crew performance, safety and safety culture at sea?

Asking the hard questions

Culture / Climate

Safety Culture
Company safety climate / morale
Multi-cultural impact

Safety Management

Organisation structure / policy
Safety risk management
Safety risk assurance
Safety promotion & training
Publications, procedures, written guidance

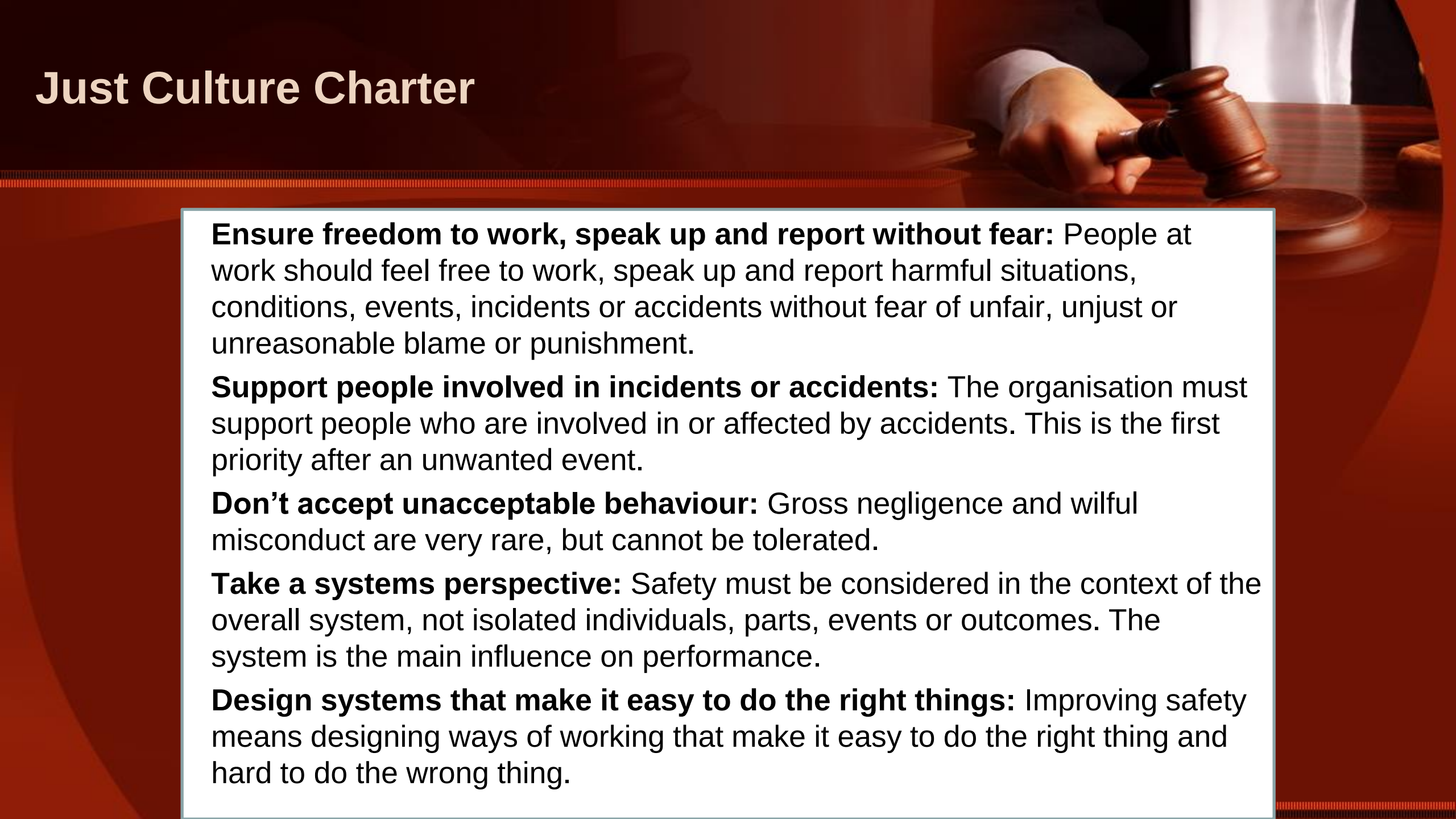
Resources Management

Personnel
Funding / budgets
Materials or parts / Equipment availability
Design of equipment or procedures
Operational information
Workspaces – interior offices, workspace layout, machine room design, exterior workspaces

Business/Economy

Contractors
External business environment
Economic pressure
Tempo of operations

Just Culture Charter



Ensure freedom to work, speak up and report without fear: People at work should feel free to work, speak up and report harmful situations, conditions, events, incidents or accidents without fear of unfair, unjust or unreasonable blame or punishment.

Support people involved in incidents or accidents: The organisation must support people who are involved in or affected by accidents. This is the first priority after an unwanted event.

Don’t accept unacceptable behaviour: Gross negligence and wilful misconduct are very rare, but cannot be tolerated.

Take a systems perspective: Safety must be considered in the context of the overall system, not isolated individuals, parts, events or outcomes. The system is the main influence on performance.

Design systems that make it easy to do the right things: Improving safety means designing ways of working that make it easy to do the right thing and hard to do the wrong thing.

The Way Forward

01

SAFETY INTELLIGENCE SHARING + SAFETY ALLIANCES

02

INVESTIGATING DIFFERENTLY + GROUP LEARNING REVIEWS

03

TAXONOMY + DATABASE / LEARNING PLATFORM + TEN MOST WANTED

04

HUMAN FACTORS TOOLKIT

05

DEEP DIVES + REVERSE SWISS CHEESE

Conclusions

- Safety Learning Culture is seen as the most promising destination for Shipping.
- Six use cases from the industry show that Shipping is already on the way.
- Adopting safety learning practices will help transform the industry into a safety learning culture.

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People are not the problem.
They are the solution.

Thank you for your attention

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https://safemodeproject.eu/

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