# Human Factors and The Safety Culture in Shipping
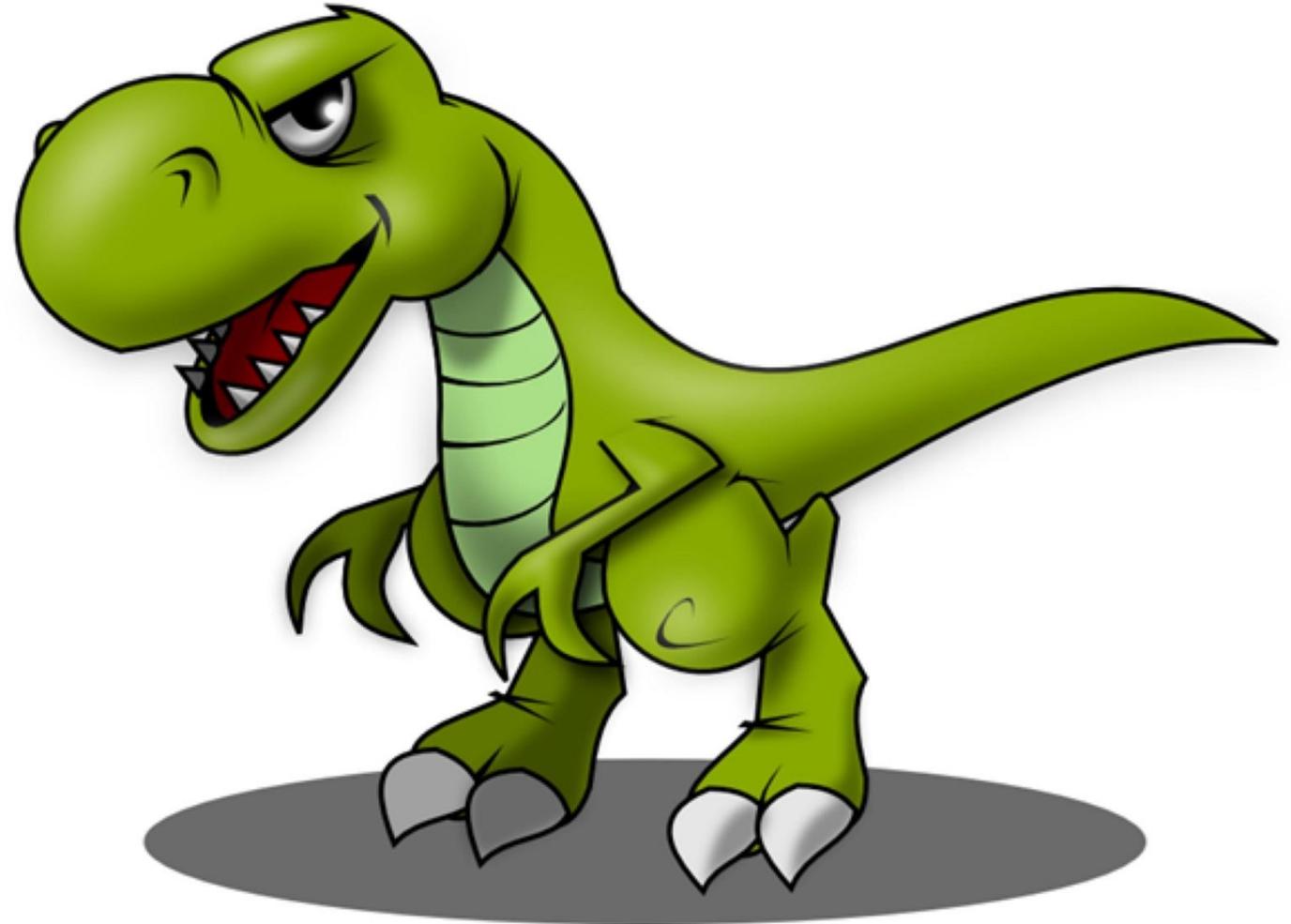
**Dubai – TMS Tanker Conference**

**16th October 2018**

**SAFER, SMARTER, GREENER**

# Is this Me or the Industry

Safety

- Risk based
- Process based
- Rule based
- Behavioural Based

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# Is this Me or the Industry

- A Recent study **Being Human – in safety-critical organisations** concluded that **"Humans are crucial to safe performance in complex systems."**
  - The authors begin by stating that the underlying drivers of our behaviour – which have evolved over millions of years – will not go away and cannot be ignored.

- It seems as if the **human element in shipping has been pushed firmly down the agenda.**
  - Humans will soon become superfluous to our industry.
  - Moreover, if four-fifths of shipping accidents are the result of human error, these can best be mitigated by reducing the human propensity to make mistakes to a minimum by **removing men and women from vessel and port operations completely.**

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# Is this Me or the Industry

- But are they right? Will levels of **safety be improved** through a shift to digital shipping, with no or **minimal interaction from humans?**

- Will a sweet spot be found where humans and machines focus on what they both do best? And will **humans remain crucial to safe performance** in complex systems.

- There is no doubt that shipping is **becoming increasingly complex**, and will continue down this path. **A new generation of professionals** will be attracted with skills related to keeping these critical systems working optimally.

- But the **human element is key** because a safe ship is an efficient ship. A genuinely  sustainably and safer shipping industry is one where **humans are engaged, motivated, and properly led** – rather than replaced by algorithms.

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# Reputational Management

- In recent years, the spread of inspections and other forms of enforcement (audits, surveys, vetting, assurance etc.) **has reached a stage of 'explosion' both in terms of scope and frequency**.

  – TMSA scores are becoming routine numbers

- There is a real concern that the enforcement regime, i.e. compliance with rules, regulations and industry standards, has **fallen victim to its original intentions of managing safety risks.**

- The **tolerance for human imperfection and technical failures is close to non-existent**. But this behaviour is a symptom of deeper problems within the industry.

- Recently a Energy Major concerned by the potential of high profile shipping incidents, to undermine its reputation, proactively initiate a project aimed at:

  – **identifying causal factors and behavioural practices** associated with major incidents across the industry.

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# What you see is not always what you get !

- **Culture surrounds us and influences the values, beliefs and behaviours.** The western world's approach to management is based on an emotionally detached rationality.
  - It assumes that human cultures in the workplace should resemble the laws of physics or engineering, and therefore have universal application, this assumption reflects a western cultural bias.

- Maritime safety must transcend national boundaries, including all the cultures therein.
  - Nevertheless, in spite of assertions that maritime is free from the influences of cultural factors, **one does not have to be particularly discerning to detect differences in how people respond in similar situations.**

- Some people are reticent about acknowledging that cultural differences exist, finding such thinking simplistic, primitive and even immoral.
  - This results in a type of **cultural blindness** that perpetuates the false assumption that we all see things and behave in the same way. Clearly, we do not.

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# Dealing with Bias and language

- Judgement is shaped by **personal experience**.

  - Based on a lifetime of personal experience, we all develop **mental models** that, in general, serve well for quickly evaluating everyday situations intuitively in the absence of a complete set of facts. **Unfortunately, many of these mental models reflect personal bias.**

- **A fundamental source of problems in** cross-cultural transactions.

  - With English nominally being the language of maritime the language barrier may disrupt effective communications when English speakers interact with non-English speakers and non-English speakers interact with other non-English speakers.

- **Even when English speakers interact with other English speakers there may be significant differences in perception.**

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# The way forward

- Equally important is that the enforcement regime should move beyond a culture of **negative reporting** i.e. **non-compliances, failures, defects, detentions and human errors.**
  - Rather, the focus should be on understanding how, despite all the environmental, social and technical obstacles, **people generally succeed in carrying out their jobs.**

- This leads to an entirely different and motivational language of safety
  - one that is **characterised by every day trade-offs**, adaptability, adjustments, or 'seamanship' – and **one where human performance is seen as a solution and not the problem**.

- It is not difficult to figure this out on a vessel where seafarers **often find ways to carry out tasks differently than set out in procedures** and rules, due to lack of resources, unstable work environment, time pressures, inadequate procedures and substandard designs of vessel and equipment that leave **no choice but to violate those procedures.**

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# What does the Market Say

- The UK Chamber of Shipping launched a new safety online forum on Tuesday 17 January 2017.
  - The site was developed by a working group of members in order to promote a **strong safety culture** in UK shipping to share ideas, reports and safety alerts between members.

- UK Chamber of Shipping, President Dr. Grahaeme Henderson, remarks:

  - *'As the President of the UK Chamber of Shipping and also being responsible for Shell's global shipping and maritime business, I have made it my personal objective to improve the safety and wellbeing of all maritime professionals. These must not be just nice words, but turned into a ruthless approach to making safety part of everything that we do, by working closely with our seafarers and contracting partners on a new approach to personal safety management'.*

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# The safety level in shipping has changed little over the last 20 years



**Serious accidents**
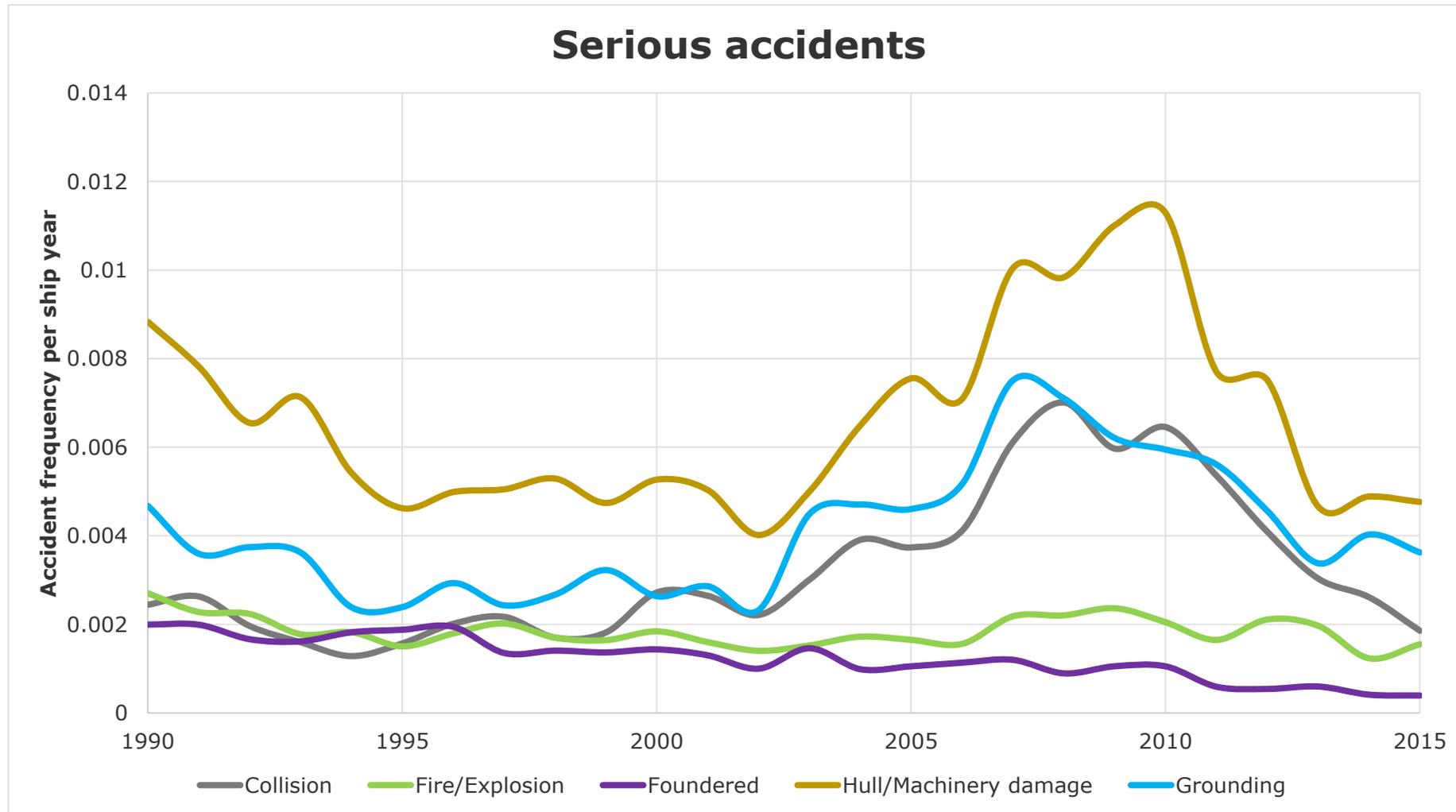
All cargo carrying ships (dry cargo/passenger, tankers and bulk carriers)

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MARINE CASUALTIES AND INCIDENTS IN GENERAL

CONTI PERIDOT

FIGURES FOR 2016

**3145** CASUALTIES & INCIDENTS

**106** FATALITIES

**79** VERY SERIOUS CASUALTIES

**957** PERSONS INJURED

**26** SHIPS LOST

**3505** SHIPS INVOLVED

**123** INVESTIGATIONS LAUNCHED

Collision, CONDIT-CARLA MAERSK, ships damaged, 09/03/2015

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# Human Factors TMSA 3
## *what are*
## *you*
## *doing about it ?*



Tanker Management and Self Assessment 3
A Best Practice Guide

Third Edition 2017

OCIMF

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# TMSA
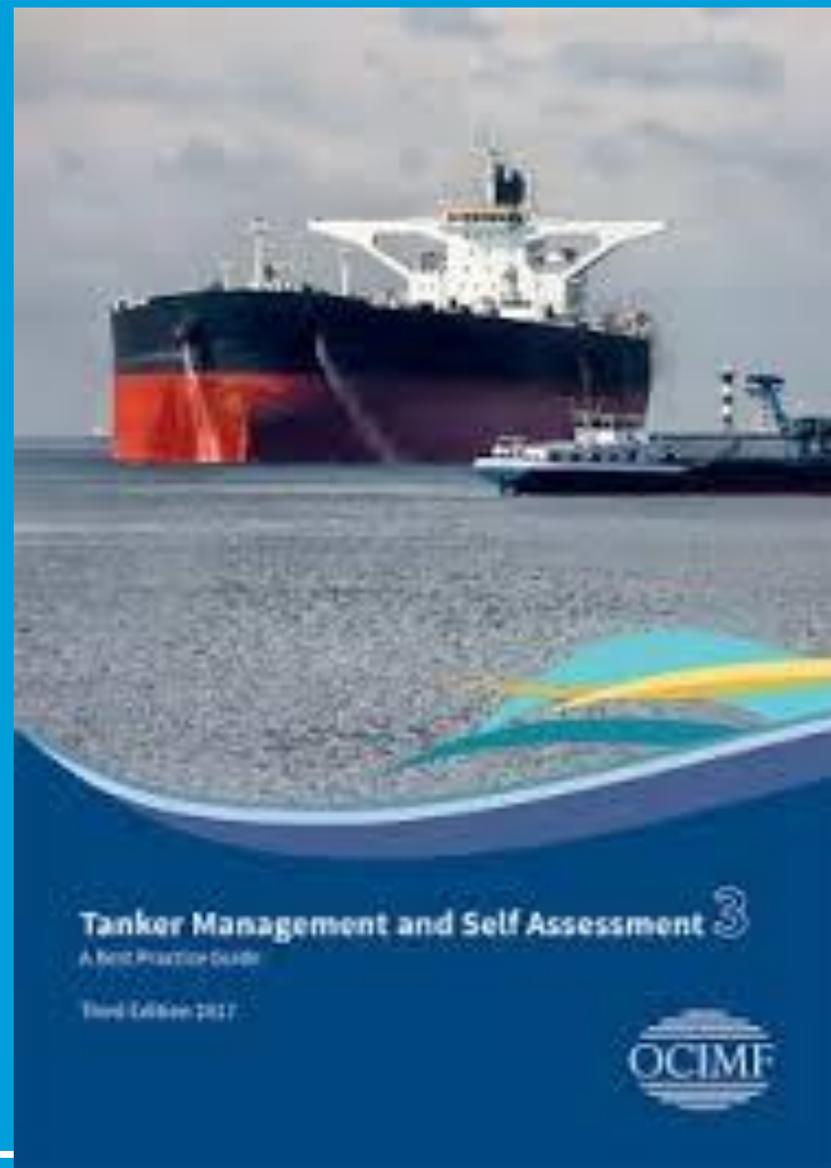
- 12 KPI references to Human Factors/culture
- 30 Best practice Guidance

## Element 1

| Stage | KPI's | Best Practice |
|-------|-------|---------------|
| 2.3 | Vessel and shore – based management teams promote HSSE excellence | Strong effective leadership is visibly demonstrated through:<br>• **Leading by example**<br>• **Empowering personnel to intervene** to prevent hazardous situations developing |
| 4.3 | All personnel demonstrate commitment to HSSE excellence | Examples of commitment include participating in:<br>• **A Behaviour-Based safety system**<br>Managers and S/T's demonstrate commitment by their behaviour |

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# Element 2

| Stage | KPI's | Best Practice |
|---|---|---|
| 4.3 | The Company Promotes appropriate interpersonal skills training | Training may included:<br>• **Team building**<br>• **Cultural diversity**<br>• **Effective communications** |
| | | |

# Element 9a

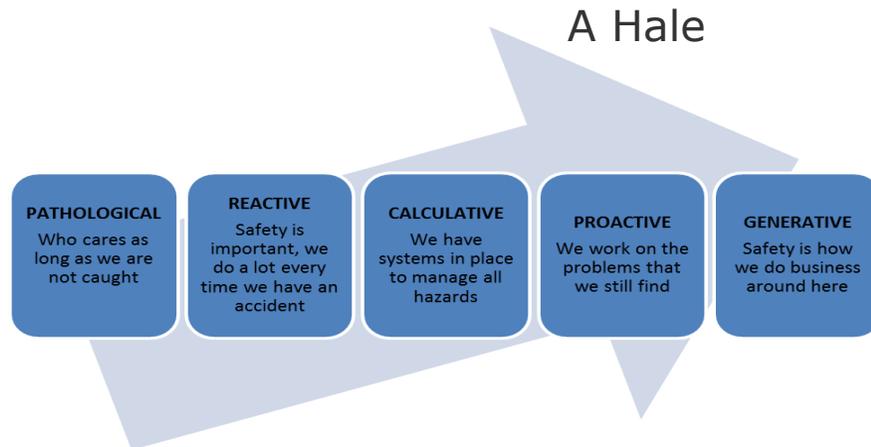| Stage | KPI's | Best Practice |
|---|---|---|
| 3.2 | Procedures measures and compare the strength of safety culture across the fleet to identify areas for improvement and to provide motivation to crew | Measures:<br>• **Near miss reporting**<br>• **BBS system observations**<br>• **Best practices identified**<br>• **Hazards are identified**<br>• **Unsafe acts identified**<br>• **Safety suggestions** |

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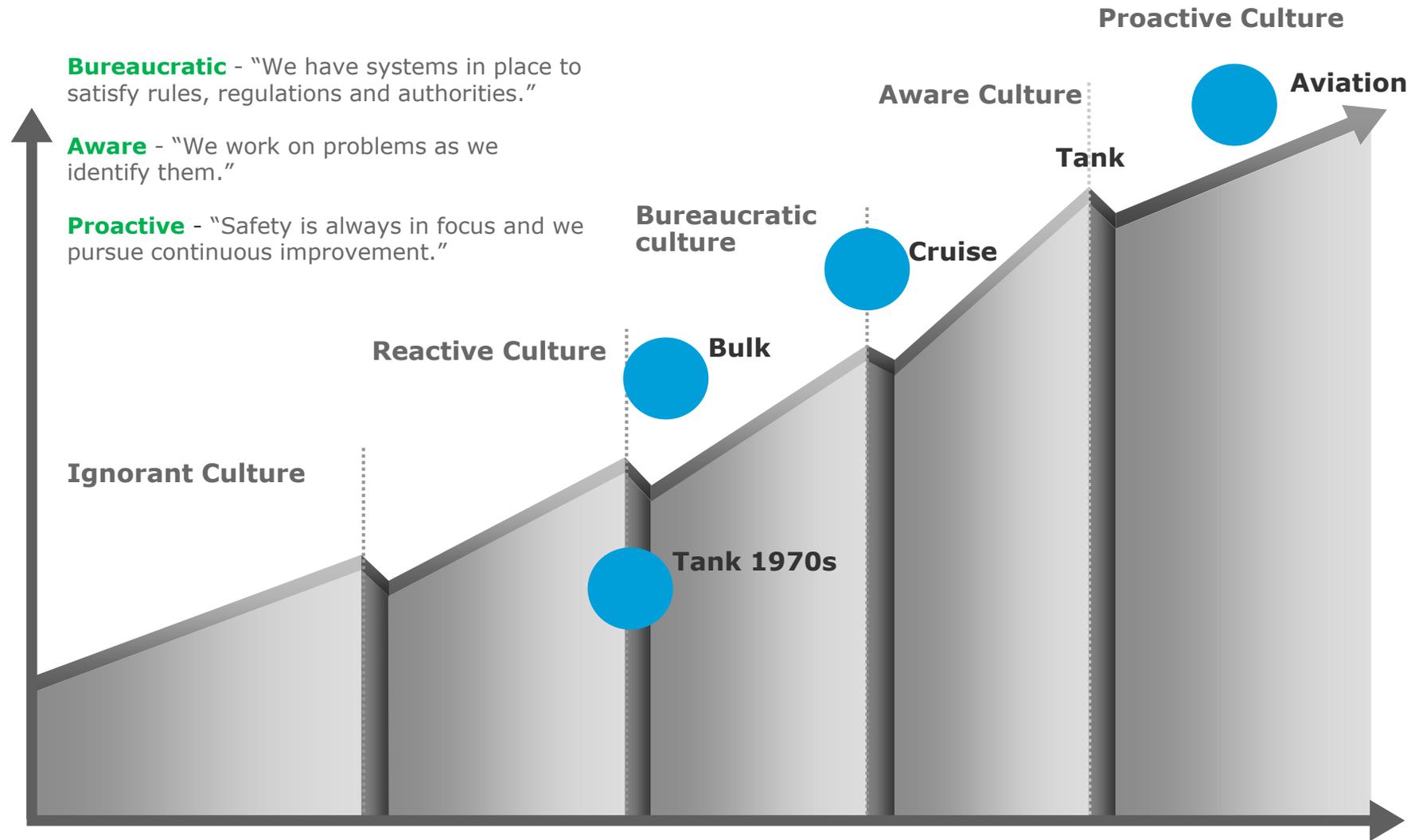# What is safety culture and why does it matter

## What is Safety Culture?

*"Safety Culture is the elements or parts of organizational culture that* **influence** *the organizational members'* **attitudes**, **beliefs**, **perceptions**, *and* **behaviours**, *which have an impact on the level of safety within the organization."*

A Hale

**PATHOLOGICAL**
Who cares as long as we are not caught

**REACTIVE**
Safety is important, we do a lot every time we have an accident

**CALCULATIVE**
We have systems in place to manage all hazards

**PROACTIVE**
We work on the problems that we still find

**GENERATIVE**
Safety is how we do business around here

## Why it matters

- Culture impacts on the **performance** of the whole organization.

- Maritime **regulatory compliance** alone has **not achieved accident reduction** to the extent of other industries. If we are to improve our safety record, we must properly **address** the **human element**.

- The organization's safety culture can be a **leading indicator** of the vulnerability to incidents and accidents in safety critical industries.

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# The maturity of a Safety Culture

**Bureaucratic** - "We have systems in place to satisfy rules, regulations and authorities."

**Aware** - "We work on problems as we identify them."

**Proactive** - "Safety is always in focus and we pursue continuous improvement."

Proactive Culture

Aware Culture

Aviation

Tank

Bureaucratic culture

Cruise

Reactive Culture

Bulk

Ignorant Culture

Tank 1970s

# What makes up Safety Culture

## Safety Culture

The product of individual and group values, attitudes, perceptions, competencies and patterns of behaviour that can determine the commitment to, and the style and proficiency of an organisation's management of safety.

| Safety Climate | Behaviour | Organisation |
|---|---|---|
| **'how people feel'** | **'what people do'** | **'what the organisation has'** |
| Individual and group values, attitudes and perceptions. | Safety-related actions and behaviours. | Policies, procedures and management systems. |

# Safety Culture maturity is reflected in responses to incidents

## Application of initiatives

- The shipping industry most frequently applies initiatives **reactively** either**:**
  - either learning from **incidents** or
  - implementing good practices observed from **other industries**.
- Responses to incidents are in general:
  - **technical** or
  - **procedural**,
- Rarely do we address the **underlying human factors** (root cause of ~90% of incidents).
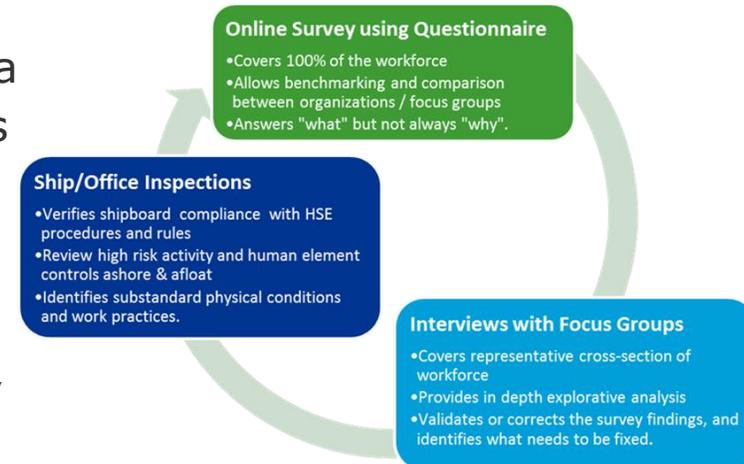
## Learning

- **Learning is easily lost** if human fallibility is viewed as the 'cause' behind accidents.
  - This is an egregious, overly **simplistic** and naïve understanding of human factors.
  - Part of the problem is that, unlike other high risk industries, the maritime industry does **not value** human and behavioural sciences in the same manner as engineering sciences.
- **Human error** should instead be analysed as a **symptom of a malfunctioning system**.

**Major accidents offer tremendous potential for learning from failures.**

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# Safety Culture Development in two steps

- Step 1*: Identify the status of the culture through DNV GL's Safety Culture Survey*

  – A safety culture survey where the employees in the entire organization have the opportunity to express their perception of the safety situation

  – The survey gives an excellent starting point to explore further reason

- Step 2: Identify the underlying factors affecting in the organization culture

  – DNV GL use a mixed method where we use a qualitative method with interviews and focus groups to identify the underlying causes

  – Through better understanding of the underlying causes we ensure the recommendations to cover the real problem, not only the symptoms

  – The extent of the qualitative method will be decided with the company's management

**Online Survey using Questionnaire**
- Covers 100% of the workforce
- Allows benchmarking and comparison between organizations / focus groups
- Answers "what" but not always "why".

**Ship/Office Inspections**
- Verifies shipboard compliance with HSE procedures and rules
- Review high risk activity and human element controls ashore & afloat
- Identifies substandard physical conditions and work practices.

**Interviews with Focus Groups**
- Covers representative cross-section of workforce
- Provides in depth explorative analysis
- Validates or corrects the survey findings, and identifies what needs to be fixed.

# To establish a baseline of safety culture, a combined quantitative and qualitative approach was agreed …

**1** | **Quantitative Perspective**

**"What are the issues?"**

**Safety Culture Survey**

- All seafarers and staff have the opportunity to anonymously express their perception of the safety situation
- Suitable for benchmarking/ comparative purposes
- Very efficient assessment tool
- Answers "what", but not always "why"
- Starting point to explore the under-lying causes of focus areas in 2.
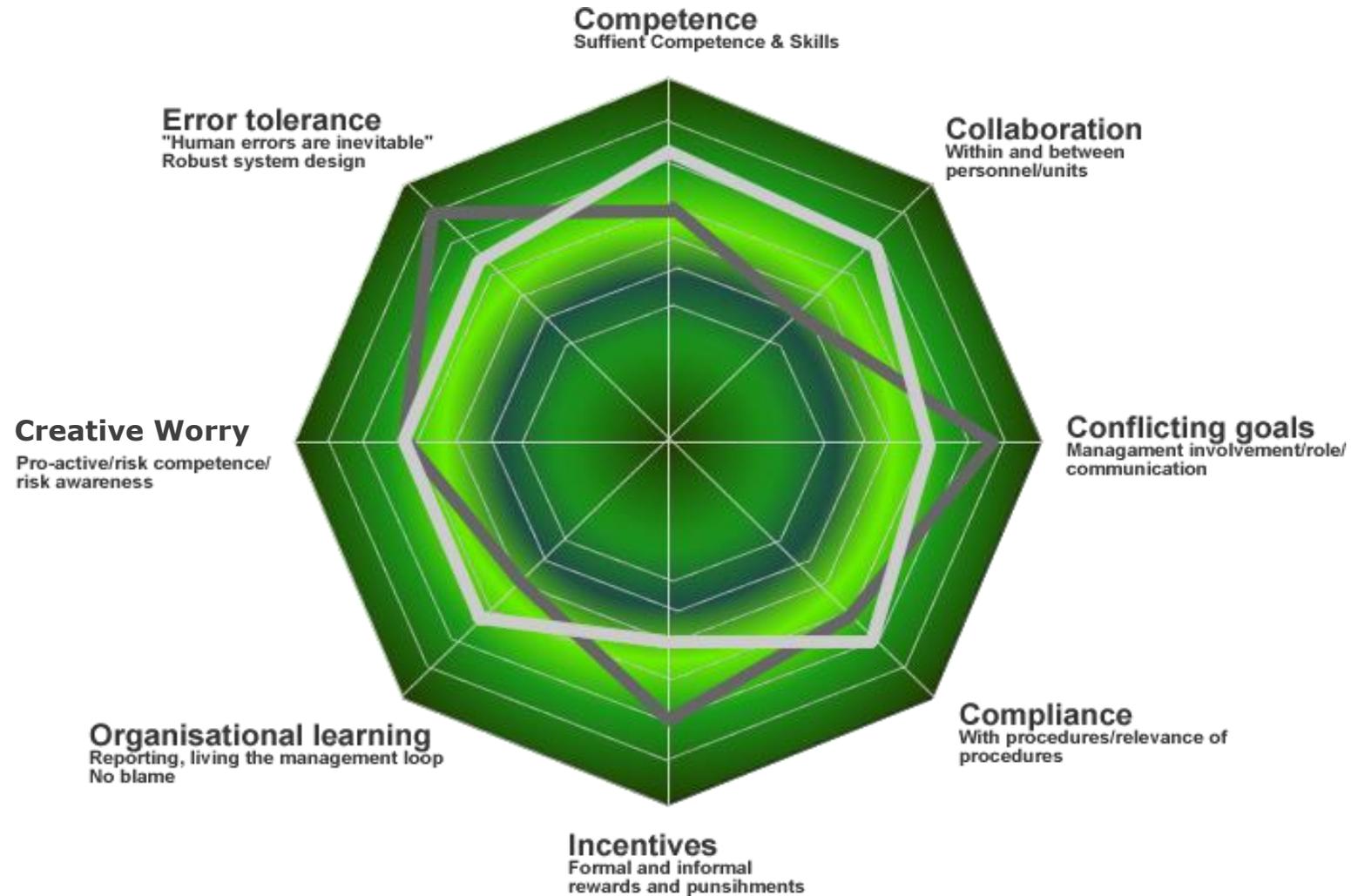
**2** | **Qualitative Perspective**

**"Why are these the issues?"**

**Validation in Interviews and Workshops**

- Understanding the underlying issues in interviews and workshops with seafarers and staff on focus areas
- In-depth explorative analysis (explains and confirms survey results)
- More time and resource consuming
- Results are harder to compare
- Allows to derive recommendations on improvement actions – covering real problems, not symptoms

**BSM SaCuBa**

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# Eight dimensions form DNV GL's safety culture framework



**Competence**
Suffient Competence & Skills

**Collaboration**
Within and between
personnel/units

**Conflicting goals**
Managament involvement/role/
communication

**Compliance**
With procedures/relevance of
procedures

**Incentives**
Formal and informal
rewards and punsihments

**Organisational learning**
Reporting, living the management loop
No blame

**Creative Worry**
Pro-active/risk competence/
risk awareness

**Error tolerance**
"Human errors are inevitable"
Robust system design

# Dimensions describing Safety Culture

## Competence

We want to understand how good the company is at recruiting, training and developing their staff to ensure they have the right skills to carry out their jobs safely.

## Collaboration

We want to understand how much people work together to identify and manage safety hazards and what the quality of this collaboration is, e.g. does it lead to improvements in safety systems or procedures.

## Managing conflicting goals

We want to understand to what extent safe behavior is demonstrated by management and to what extent safety is prioritized.

## Compliance

We want to understand how relevant, available and understandable safety instructions are (e.g. procedures, permit to work, life saving rules, verbal instruction, etc.) and the extent to which employees follow these instructions.

## Incentives

We want to understand what external and internal drivers exist that influence whether or not people demonstrate safe behavior.

## Organizational learning

We want to understand how the company uses feedback from accident/incident/near miss reporting systems to learn from experience and improve the safety program.

## Creative worry

We want to explore whether or not people are actively anticipating what could challenge safety and thinking about what could be done to reduce the risk of major hazards.

## Error tolerance - a resilient organization

We want to understand what processes the company has in place to protect itself and recover from unwanted incidents.

# DNV GLs Safety Culture Survey

- 60-80 statements and questions connected to how the respondents perceive organisational processes and the individuals' work situation related to safety

- Statements and questions are linked to 8 dimensions important for Safety Culture

- Analyses with focus on statistical significance to ensure objective prioritization and benchmarking for improvement

- The analyse highlights areas with large differences and explore combination of independent variables, set of questions causing the difference and free text answer

- Internal reliability verified through Cronbach's Alpha

**Benefits**

- Includes the entire organisation

- A broad approach with opportunity to benchmark units or other variables

- The Safety Culture Survey should be a starting point exploring the underlying causes for variance within the company

**Challenges**

- The perception of the level of Safety Culture will vary (what is excellent?)

- Subjective evaluation of safety culture, a snapshot of the paradigm from which the respondent is replying

## The Safety Culture Survey is a starting point for exploring the underlying causes of variance within the company

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# DNV GL Safety Culture Survey - Examples

## Competence

We want to understand how good the company is at recruiting, training and developing their staff to ensure the employees have the right skills to carry out your jobs safely.

Example questions for Competence:

- *The company selection process ensures that we employ crew with good seamanship*
- *An induction is given to new employees addressing important safety topics*
- *I feel that my training is designed to fit to my level of experience*

## Collaboration

We want to understand how much people work together to identify and manage safety hazards and what the quality of this collaboration is, and if it lead to improvements in safety systems or procedures.

Example questions for Collaboration:

- *My manager on shore has a good understanding of my ship's operation*
- *When I work in a team, I always know exactly what my responsibilities are*

## Competence

We want to understand how good your company is at recruiting, training and developing their staff to ensure you have the right skills to carry out your jobs safely.

**6) * Please rate how strongly you personally agree or disagree with the following statements**

|  | Strongly disagree | Disagree | Neither agree or diagree | Agree | Strongly agree | I don't know/not applicable |
|---|---|---|---|---|---|---|
| The company selection process ensures that we employ crew with good seamanship | ○ | ○ | ○ | ○ | ○ | ○ |
| An induction is given to new employees addressing important safety topics | ○ | ○ | ○ | ○ | ○ | ○ |
| I feel that my training is designed to fit to my level of experience | ○ | ○ | ○ | ○ | ○ | ○ |
| Our training has prepared us to work as a team that is well-coordinated, also during an emergency | ○ | ○ | ○ | ○ | ○ | ○ |

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# Safety Culture Survey - Examples
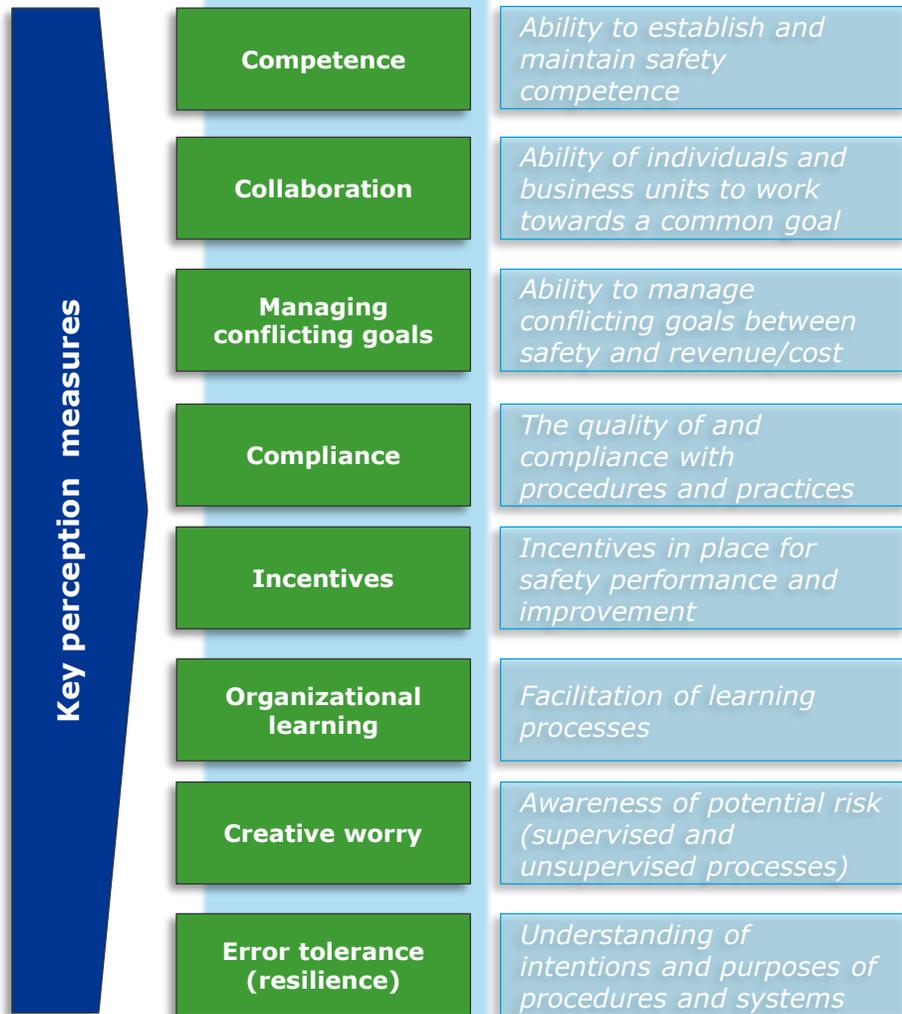
## Collaboration

We want to understand how much people work together to identify and manage safety hazards and what the quality of this collaboration is, e.g. does it lead to improvements in safety systems or procedures.

**\* Please rate how strongly you personally agree or disagree with the following statements**

| | Strongly disagree | Disagree | Neither agree or diagree | Agree | Strongly agree | I don't know/not applicable |
|---|---|---|---|---|---|---|
| My manager discusses safety-related issues with me | ○ | ○ | ○ | ○ | ○ | ○ |
| My manager on shore has a good understanding of my ship's operation | ○ | ○ | ○ | ○ | ○ | ○ |
| Safety issues are usually resolved by management and the workforce working together | ○ | ○ | ○ | ○ | ○ | ○ |
| When I work in a team, I always know exactly what my responsibilities are | ○ | ○ | ○ | ○ | ○ | ○ |

Questback distributes tailored questionnaires to recipient e-mail lists, monitoring and collating responses automatically.

# Safety Culture key success factors!

**Key perception measures**

| Factor | Description |
|--------|-------------|
| **Competence** | *Ability to establish and maintain safety competence* |
| **Collaboration** | *Ability of individuals and business units to work towards a common goal* |
| **Managing conflicting goals** | *Ability to manage conflicting goals between safety and revenue/cost* |
| **Compliance** | *The quality of and compliance with procedures and practices* |
| **Incentives** | *Incentives in place for safety performance and improvement* |
| **Organizational learning** | *Facilitation of learning processes* |
| **Creative worry** | *Awareness of potential risk (supervised and unsupervised processes)* |
| **Error tolerance (resilience)** | *Understanding of intentions and purposes of procedures and systems* |

- It is not difficult to observe seafarers being left with **no choice** but to **violate procedures** and to find ways to carry out tasks differently due to e.g.:
  - lack of resources; and/or
  - unstable work environment; and/or
  - time pressures; and/or
  - inadequate procedures; and/or
  - substandard designs of vessel and equipment.

- A **negative reporting** culture (non-compliance, failures, defects, detentions and human errors should be refocused to understand **how**, despite all the environmental, social and technical obstacles, people generally **succeed** in carrying out their jobs.

- This leads to an entirely different and motivational language of safety from one that is:
  - Characterized by **every day trade-offs**, adaptability, adjustments, or 'seamanship'; to
  - One where **human performance** is seen as a **solution** and **not the problem**.

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# Identify the underlying factors affecting the culture

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# Identify the underlying factors for safety culture

**Interviews and Focus Groups will be used to better understand the findings from the safety culture survey.**

The qualitative assessment will use an iterative method for exploring the reasons "why". This is to understand the underlying causes behind the weak and strong areas of safety culture that came out of the survey.
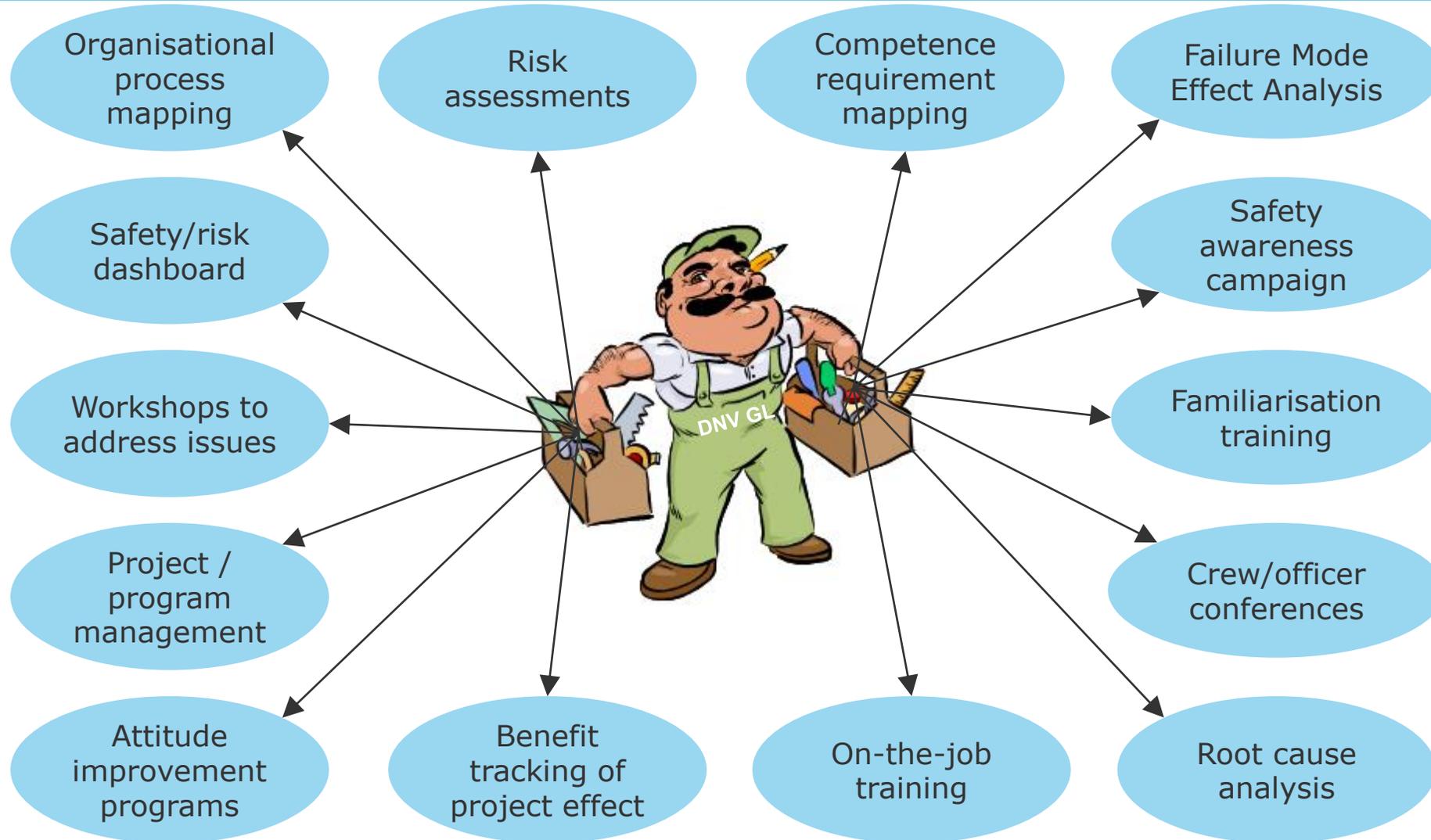
A set of performance shaping factors will be used to identify how organizational factors affect human performance. This method is used in previous projects and based on Human Reliability Analyses.

The assessment can be performed through:

- Telephone interviews

- One to one interviews

- Focus groups (8-10 persons)


The scope of the qualitative assessment will be decided on case-by-case basis.

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# The DNV GL Safety Excellence tool box



Organisational process mapping

Risk assessments

Competence requirement mapping

Failure Mode Effect Analysis

Safety/risk dashboard

Safety awareness campaign

Workshops to address issues

Familiarisation training

Project / program management

Crew/officer conferences

Attitude improvement programs

Benefit tracking of project effect

On-the-job training

Root cause analysis

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# Thank You

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