

Identifying Potential Challenges and Needs in the Maritime Industry – an Approach

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Faculty of Psychology

Chair of Work, Organizational & Business Psychology

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Agenda

1. Introduction
 - RUB
 - Project ENHANCE
2. Process & Maritime Industry
3. Maritime Industry – Skills and Challenges
4. Method
5. Impression of the data
6. Potential Training Design
7. Key Points

1. Introduction - RUB



Psychological Background for the Team ENHANCE

- Faculty: Work, Organizational & Business Psychology
- Focus: safety related topics (e.g. rule violation), training and team, intentional forgetting in routine situations, digitisation of work with focus on augmented/virtual reality
- PhD focus on development of training

1. Introduction – ENHANCE

ENHANCing Human Performance in Complex Socio-Technical Systems

- Development of new training and performance assessment methods
 - Investigation of commonalities among socio-technical systems
 - Example: process industry and maritime industry



(Kluge, Nazir, & Manca, 2014)





2. Process & Maritime Industry

Commonalities and Differences

Process Industry (Kluge, Nazir, & Manca, 2014)

Automation

Large increase - high performing central processing Units

Alarm Management

Production of a large number of alarms causing higher stress, loss of cognitive efficiency

Tasks

Handling, analysing, interpreting amounts of distributed information simultaneously

Maritime Industry

Automation

Large increase – bigger vessels & decrease of crew members

Alarm Management

A large number of alarms, causing higher stress, loss of cognitive efficiency

Tasks

analysing, interpreting amounts of information simultaneously



2. Process & Maritime Industry

Commonalities and Differences

Process Industry (Kluge, Nazir, & Manca, 2014)

Skills/Knowledge

Increased mental representation,
 situational awareness, Team-
 communication

In-depth knowledge

Challenges

coordination complexity, deep
 comprehension of the data,
 multiple or conflicting goals, non-
 transparency, coupling and
 interconnections

Human Error account for 50 %

Maritime Industry

Skills/Knowledge

Leadership, communication,
 situational awareness, decision
 making, managing stress, coping
 with fatigue

In-depth knowledge

Challenges

coordination, comprehension of
 the data, multiple or conflicting
 goals, coupling and
 interconnections

Human Error account for 75-96%
 (Allianz GCS,2017)

3. Maritime Industry

Example: Grounding of the Costa Concordia



- Planned operation to the port of Savona
- Hitting a rock, due to changes in the route
- Lead into a disaster: 30 people died, 2 were missing, tons of motorcycle oil were spilled into the sea, great economic impact



3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Teamwork

A team can be described by „a distinguishable set of two or more people who interact [...] toward a common and valued goal/objective/mission, who have been assigned specific roles or functions to perform“ (Salas et al., 1992)

- Supporting others
- Solving conflicts and fostering useful discussion
- Exchanging information
- Distribute and coordinate activities

Costa Concordia: men on the watch was not constantly on the lookout – tasks within the team seem not to be clearly assigned (MCIB, 2012).

3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Communication

Communication is a major part of good team work and is characterized by the exchange of information, feedback or response, ideas and feelings.

- One-way communication
- Two-way communication (close loop)

Costa Concordia: Shared language was missing, language problems were present (MCIB, 2012).

3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Leadership

Leaders are responsible for building an effective team by ensuring safe and efficient team functioning in order to maximize task performance.

- Authority and assertiveness
- Providing and maintaining (safety) standards
- Planning and prioritizing
- Managing workload and resources

Costa Concordia: Master broke safety rules - used his mobile phone on the bridge, which is banned, more people than allowed were on the bridge (MCIB, 2012).



3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Situational Awareness

SA is characterized by perceiving the elements within the environment in a volume of time and space, comprehending the meaning and the projection of their status in the future. (Endsley, 1988)

- Perception
- Comprehension
- Anticipating future events

Costa Concordia: Distraction by using the mobile phone, constantly lookout was missing (MCIB, 2012).

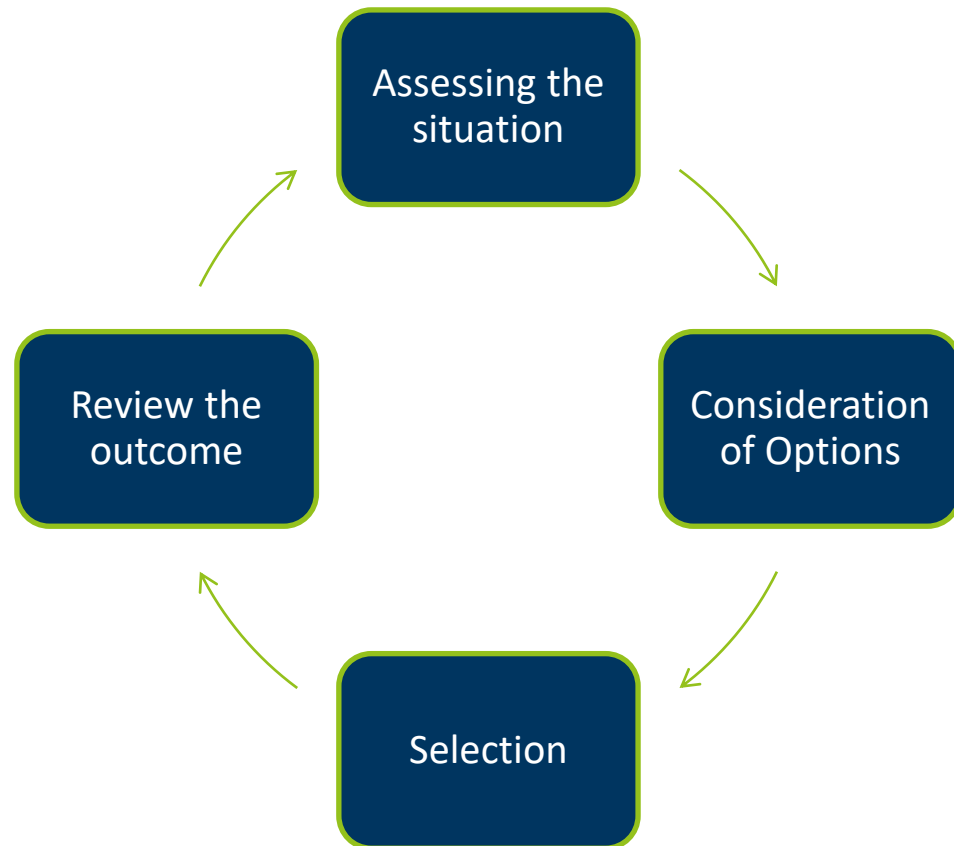
3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Decision Making

In order to meet the needs of a given situation, a judgement or a chosen option are reached by the process of decision making.

Costa Concordia: Speed remained three times higher than recommended for this operation (MCIB, 2012).





3. Maritime Industry

Skills and Challenges (Flin, O'Connor, & Crichton 2008)

Managing Stress

Relation between the individual and the environment that is assessed by the person as demanding or exceeding for his or her resources and endangering his or her well-being. (Lazarus & Folkman, 1984)

- Intense
- Sudden
- Short duration

Costa Concordia: Stress causes physiological and psychological reactions, hampering to assess the situation correct and being unable to make a proper decision (MCIB, 2012).

4. Method



Subject Matter Experts

- Characteristics:
 - First officer/captain
 - Variability in courses
 - Training experience at least five years



8 Interviews

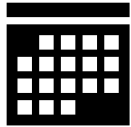
- Duration: 60-90 minutes
- Semi-structured, 28 questions regarding tasks, non-technical skills, critical incidents, training
- Example question – communication
 - How would you describe „good“ communication?
 - What communication problems might cause critical incidents?

4. Method



Focus Group interviews with course participants

- Characteristics:
 - Variety in hierarchy levels
 - At least 8 years experience on a vessel



Interviews

- Duration: 10-15 minutes
- Semi-structured, five questions considering automation, critical incidents, non-technical skills

5. Example Quotes

Maritime Industry

Automation
 Large increase – regarding bigger vessels and decrease of crew members

Alarm Management
 Production of a large number of alarms causing higher stress, loss of cognitive efficiency

Tasks
 analysing, interpreting amounts of distributed information simultaneously for deciding the correct (automation) mode for handling

“More automation means more things to control”

“[...] you can lose the focus on the job or how to navigate the vessel because you have a lot of alarms going on”

“there are multiple operations or multiple tasks that has to be continued, simultaneously.”

5. Example Quotes

Maritime Industry

Skills/Knowledge

Team work, leadership, communication, situational awareness, decision making, managing stress, coping with fatigue

In-depth knowledge of the dynamic response

Challenges

Ambiguity in crew-coordination, comprehension of the data of the system, multiple or conflicting goals, dynamic effects, coupling and interconnections

“[...] we need to see, where the sequence is ending up.” (SA)

“communicate on a normal level and not raising the voice”

“you know he will be there for you, support you and give you all the feedbacks and do everything he can”

“Take the decision before it's too late.”

“So, differences between nations that is absolutely the most challenging they have on the bridge.”

5. Example Quotes

Maritime Industry

Organizational factors:

Regulations, Check-lists, coping with safety on board

Cultural background

Variety of nationalities, communication problems, cultural hierarchy

“then you have some they have finishing the checklist and sign it without doing all the checks.”

“in some cultures, 'yes' can have eight different meanings. [...] he reply 'yes' but how can you know that he actually understand it.”

6. Potential Training Design

Team training:

The team is functioning effectively and safely

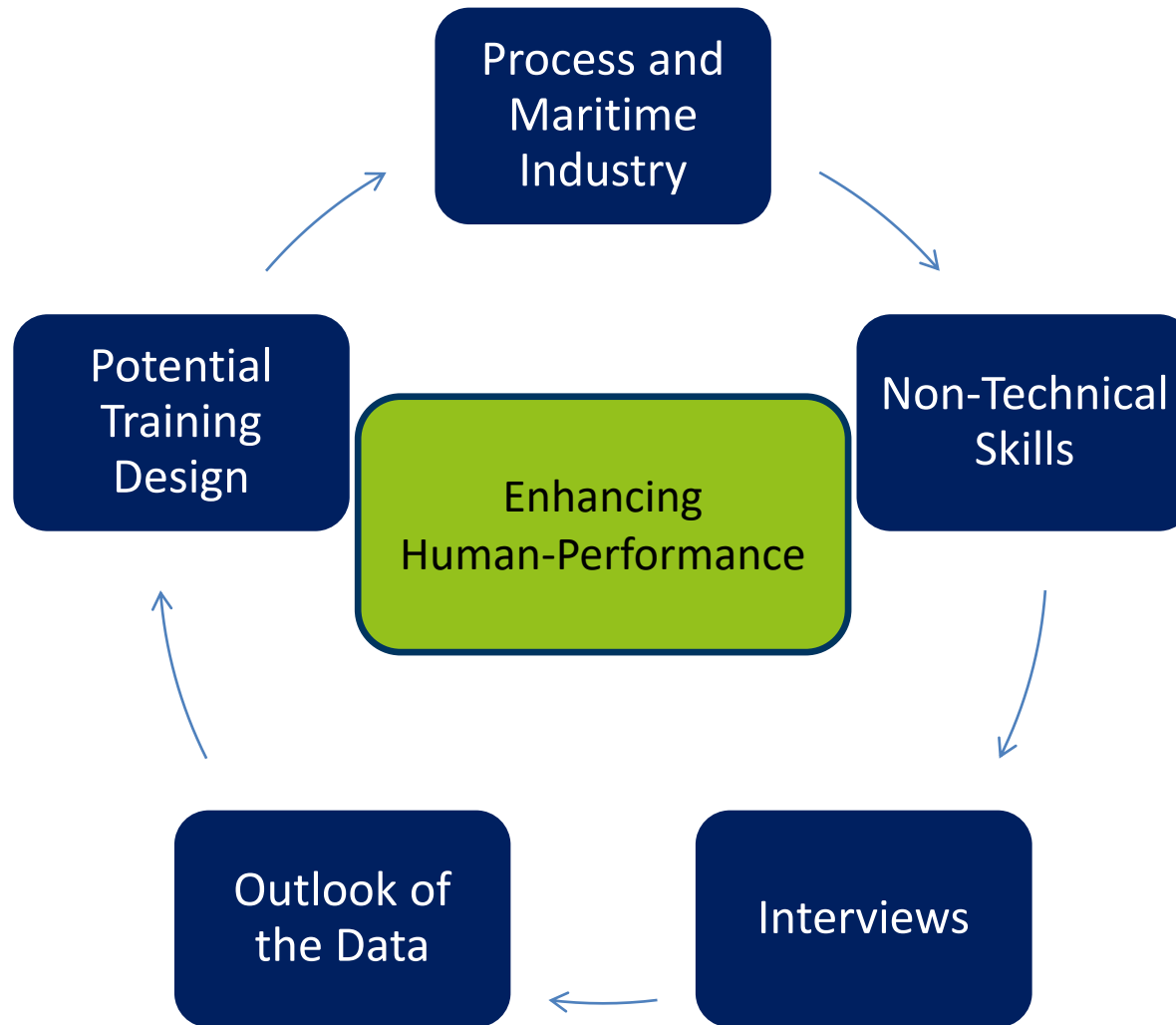
- **Knowledge:** seminars, workshops, case-studies
- **Skills:** On-the-job practice, role-play, high & low fidelity simulation
- **Safety Attitude:** group discussions, facilitating critical reflection

Leadership training:

Applying flexible leadership styles

- **Knowledge:** seminar, case study
- **Skills:** Behaviour role modelling, low-fidelity & high fidelity simulations
- **Safety Attitude:** critical reflection

7. Key points





8. References

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Thank you!



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