

Human Element

Crew Resource Management - awareness of the human element in the operative daily routine

1 Introduction

This information is intended to encourage individual crew members to address the Human Element and their own safety and corporate culture and show that every person, be it a member of crew on board or a land-based member of staff, plays a part in minimizing risks and strengthening safety. Active safety culture significantly depends on everyone recognizing their responsibility for it, developing the right inner attitude and actively living it, and thus acting for the safety of the ship, the company and the environment.

This requires that employees bear in mind the spectrum of possible human leaks, i.e. factors that may lead to mistakes, incidents or even accidents. Clear awareness for these potential leaks and the knowledge of how to monitor them closely and reduce their likelihood of occurrence minimize the overall risks.

In the following, the twelve most important human-related factors that can negatively influence workflows and procedures are presented: the "Dirty Dozen". In addition, principles and tools are presented to reduce the risks of these negative influences.

2 Human Element

EMSA attributes over 65% to human actions in its accident reports.¹ A large part of these incidents are considered avoidable, cannot, however, simply be attributed to lack of knowledge or an individual's negligence, but have a far wider range of causes. In addition, research, such as specific accident investigations, shows that it is usually a combination and summation of several factors, such as e.g. technical problems or failures, combined with unexpected external circumstances and procedures that had not taken this kind of situation into account, which then results in misconduct. As complex as the maritime system is in its interactions and mutual dependencies between environmental conditions, technology and the acting human being, as large is the spectrum of possible errors and causes of accidents.

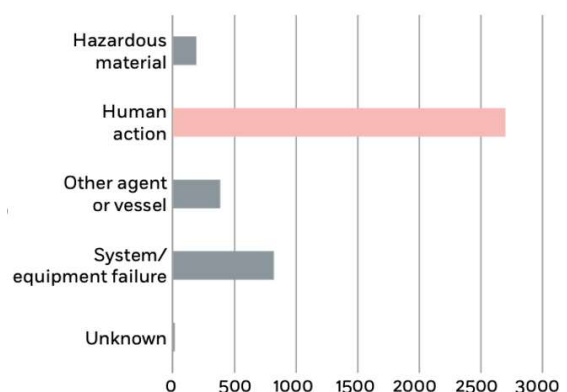
The general term "Human Element" expresses this spectrum, incorporates all variables and influencing factors to be differentiated. Human factors research explores this spectrum, defining the human element as the ability of people to deal effectively and confidently with complexity, difficulties, pressure and workload, and thus also to act confidently and purposefully with their own capacities and skills in everyday routine processes, but also in emergency and exceptional situations.

The human part of this complex system is not only the crew member on board. It is also the developers of ship bridges and technical auxiliary equipment, authors of checklists and procedures, personnel management and company management, port authorities, pilots and also the suppliers of cargo and containers. Ultimately, therefore, the human element affects the entire maritime system, including shipowners, ship operators and managers, as well as the authorities, all of whom influence operational handling on board ships through general regulations, guidelines and direct orders.

To illustrate this complexity of the system, James Reason distinguishes between different levels of a system and thus highlights the areas in which risks and error potentials are hidden.

2.5.1 ACCIDENT EVENTS

Figure 2.21: Distribution of accident events for 2011 - 2018



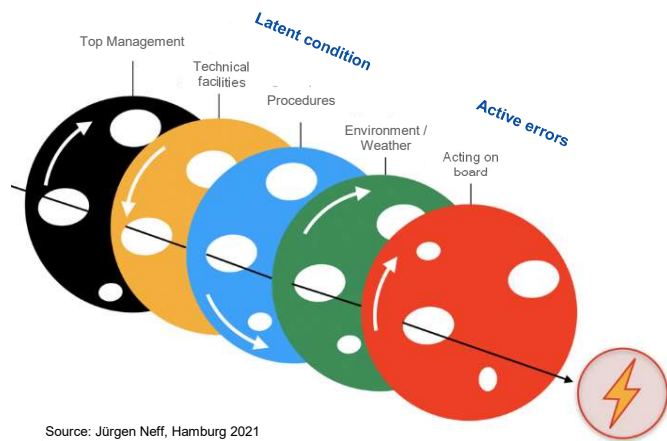
From a total of 4104 accident events analysed during the investigations, 65.8% were attributed to a human actions category and 20% to system/ equipment failures.

Source: EMSA, Portugal, 2019 - "Annual Overview of Marine Casualties and Incidents 2019," European Maritime Safety Agency, Lisbon; Portugal, 2019. p. 28

¹ "Annual Overview of Marine Casualties and Incidents 2019," European Maritime Safety Agency, Lisbon; Portugal, 2019, p. 28

3 Latent and active errors

Reason differentiates between "latent conditions" that initially create the situation and the framework to commit "active errors." Swiss cheese is often used as a model for the different safety levels of an organization, with an accident always being a result of flaws (holes) at all safety levels. A key assumption of Reason is that every active error ultimately has its cause in the latent conditions that make it possible in the first place. Ultimately, an active error or accident is always traceable to the management level. This is where the decisions are made that will create the latent conditions for active errors in operations. It is only through a chain of decisions and actions that the conditions for emergency situations and potential, visible errors become possible.



Nevertheless, if an emergency situation occurs, those responsible for operations, as the last link in the chain, must deal with the situation on site, bearing not only the difficulty of increased personal risk, but also the pressure to act. Both are factors that significantly increase the likelihood of them making further crucial mistakes. It is therefore all the more important that they in particular have a strong awareness of the latent sources that frequently lead to active errors and know how to keep their probability of occurrence as low as possible.

4 Dirty Dozen

The "Dirty Dozen" Model² is a systemization of the most important latent error sources. It lists the twelve main areas from which operative errors may occur.

| | |
|--------------------------------|-----------------------------|
| 1. Leaks in communication | 2. Distraction |
| 3. Leaks in resources | 4. Pressure / stress |
| 5. Overconfidence | 6. Lack of physical fitness |
| 7. Leaks in teamwork | 8. Leaks of awareness |
| 9. Lack of knowledge | 10. Fatigue |
| 11. Standards & safety culture | 12. Lack of assertiveness |

Ultimately, awareness of the human element means to know these twelve areas, to always keep them in mind and to actively minimize their risk potential.

The dirty dozen chart of page 4 points out important aspects of these twelve human-related areas and potential error sources in the operative handling and offers guiding questions that are useful for both the individual as well as the team to check one's own concrete work environment for safety and security leaks. The principles and tools presented show how these leaks can be closed proactively.

To close these leaks, it is critical that the operative teams actively works together in this and that every individual takes on responsibility for it in equal measure.

This is only achieved if the human factor is considered a relevant element of the safety culture, the team openly and regularly makes it part of the discussion, integrates it into its professional work and transparently highlights its relevance.

² Dupont, G.: The dirty dozen errors in maintenance, in Proceedings of the 11th Symposium on Human Factors in Aviation Maintenance, FAA, Washington DC, 1997.

The management and the team leader bear the responsibility to achieve this. First and foremost, they have to ensure an appropriate atmosphere where errors and leaks are considered natural (JUST Culture) arising inevitably from latent conditions; an atmosphere where, for this reason exactly, commitment to a common attentiveness is demanded from and supported by every single person every day.

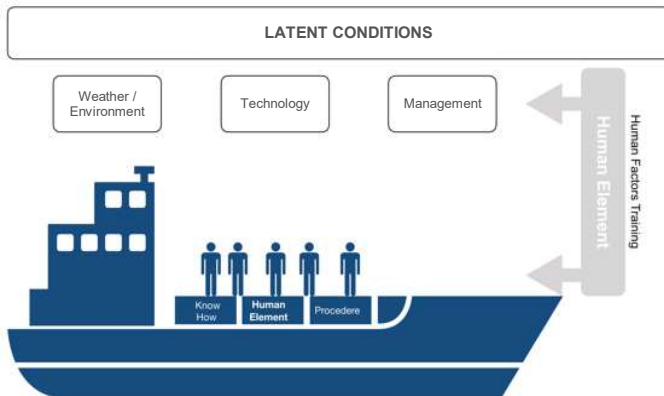
Living safety culture crucially depends on the *collective awareness* of these factors. An attitude towards this that is practiced on a daily basis only emerges if the commitment is regularly renewed. However, there is nothing more effective in making the team and the system as a whole more resilient against irregularities. That is why: attitude before rules.

INFO: Dirty Dozen - Modell

The "**Dirty Dozen - Modell**" systemizes the twelve most important latent factors that lead people to make operative errors. It developed from experiences, accident studies and near-miss reports in (military) aviation and has seen a wide dispersion into other safety critical work sectors ever since.

5 Cooperation on all levels

Mainly, the Dirty Dozen address the active errors on the operative level. However, it is important to stress that the burden of a self-dependent safety culture must not simply lie with the team or even individual employees alone. Only if an open JUST culture prevails and is practiced by the company in general, will the presented principles take effect. Still, knowledge and awareness of active errors and the possibility to reduce their likelihood of occurrence are not a guarantee that they will not occur at all anymore. And it also does not mean that other organisational levels are relieved of their responsibility to avoid creating latent conditions for potential risk situations. Because that would mean leaving the base to fend for themselves. Acting responsibly at management level means, in turn, to do everything in one's power so that the base has to use their knowledge as little as possible. This is another element expressed in Reason's cheese model.



Source: Jürgen Neff, Hamburg 2021

In addition, structures that uphold and ensure commitment to error and JUST culture should be developed in the whole company. CRM and Human Factors Training on various levels in the company can support this.

6 Conclusion

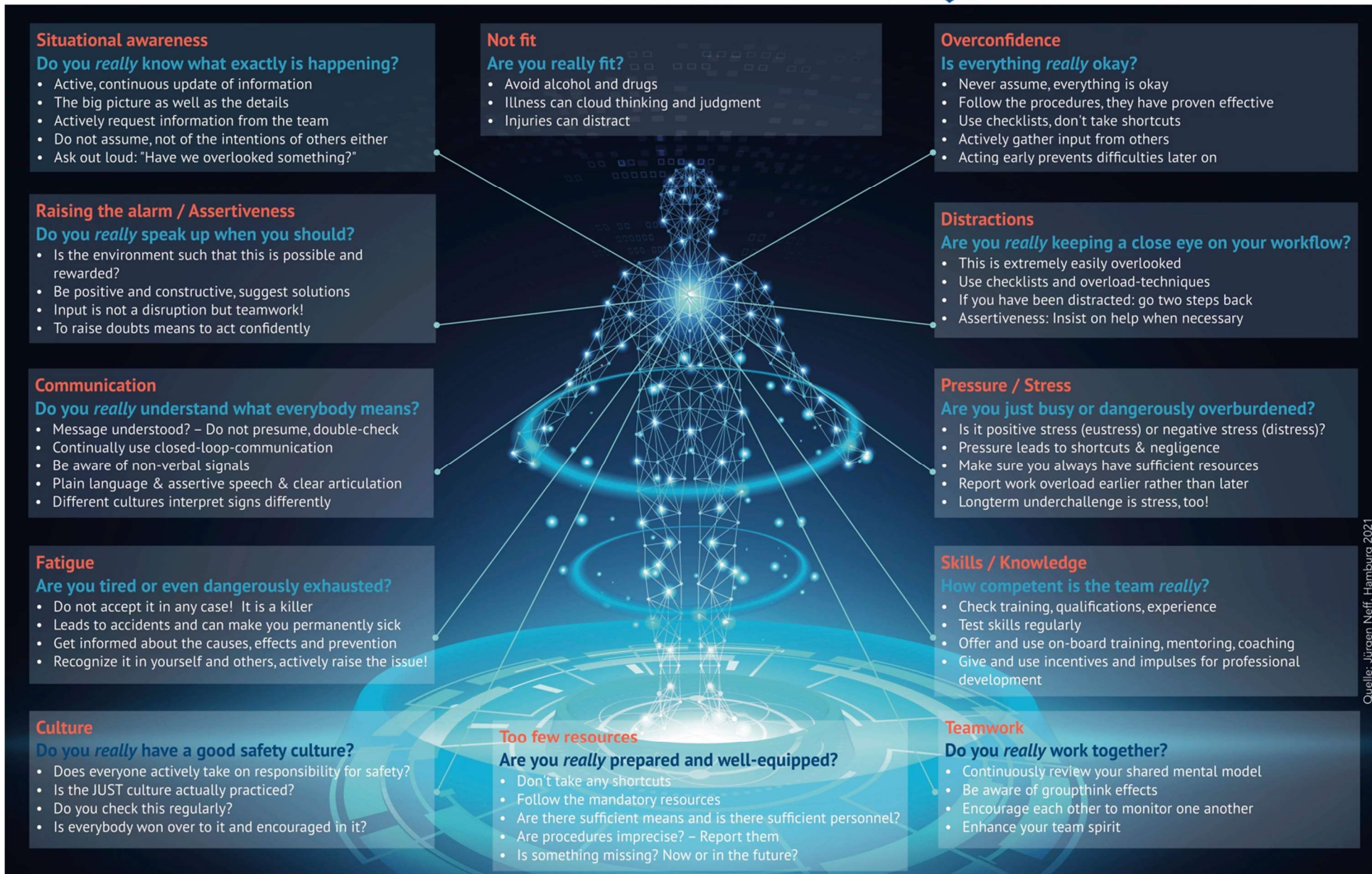
Due to its nature, maritime navigation is dominated – as are all technically oriented sectors – by dependence on knowledge, competency and operative specifications. However, even though these are legitimate reasons, safety significantly depends on the human factor as well. To deny this can be just as dangerous as it can be negligent not to acquire competence in it.

Awareness of the Dirty Dozen, their hazard potentials, as well as the ways in which these can be reduced creates assertive handling during everyday operations. However, it is crucial to create the right culture that facilitates the right inner attitude: of the team, the top management, executives of the shipping company and, ultimately, in the overall maritime sector. Conduct is based in attitude. If the right attitude regarding errors and safety is predominant, individuals will act accordingly. That is why it is that important to create awareness of the human element, not to deny it, but to actively integrate it into operative activity on all levels.



The DIRTY DOZEN

Compilation of the twelve most important human-related factors often leading to incidents at sea with tips and thought-provoking impulses to avoid leaks, manage oneself and the team effectively and reduce the potential for incidents and accidents together or increase the effectiveness of the team so that the safety of processes and operational procedures increases significantly.



Quelle: Jürgen Neff, Hamburg 2021