Jürgen Neff (Ed.)

IMPROVING BRIDGE RESOURCE MANAGEMENT

Human Factors in Maritime Safety

eBOOK INSIDE

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Foreword

"Master next God" – this symbolic image of the omniscient, strong leader and infallible master is still embedded in many minds. Without a doubt, the following still applies today: the master runs the ship, is responsible for crew and cargo and assumes the central role on board.

But is the "godlike" position of the shipmaster still appropriate in modern maritime shipping? Certainly not!

Every human being is fallible. Even an experienced, highly competent master can forget, be distracted, do too much at once and thus lose sight of the bigger picture. The technology of modern bridge equipment provides such a wealth of information that an individual can be overwhelmed in critical situations and then possibly make the wrong decisions. To err is human – but in maritime transport in particular, errors can have immense consequences for people and the environment.

The era of the reticent lone warrior in maritime shipping is finally over. Today, the master is part of the bridge team that gives feedback, critically examines assessments, is self-monitoring and reaches joint decisions. This is exactly what Bridge Resource Management is all about. Originally developed in the aviation sector, Bridge Resource Management has also become a decisive component for increasing safety in shipping. Since 2010, Bridge Resource Management has been anchored in the international STCW Convention and is now an integral part of the training of navigational officers and masters.

Bridge Resource Management means the effective management and use of all human and technical resources available to the bridge team to ensure safe navigational ship operation. This rather prosaic definition conceals a number of practical aspects: effective communication with one another, an open error culture ("no-blame culture"), efficient teamwork, intercultural awareness, joint decision-making, the use of all navigational and technical resources (including looking out of the bridge window at regular intervals), the ability for self-reflection, knowledge of one's own limits and those of the technology – and last but not least: common sense.

Bridge Resource Management is demanding. It requires all members of the team to question decisions, even if they are made by higher-ranking individuals. By moving away from the traditional hierarchy on board, the master retains his "overriding authority", but the other navigational officers on the bridge are involved in decision-making on an equal footing.

Bridge Resource Management also means learning from mistakes and accidents. A higher safety level is achieved not by punishing people, but by learning to do better next time. Bridge Resource Management shares this goal with the International Safety Management Code, for which we, as BG Verkehr, are responsible for the German Flag. Above all, the aim is to avoid human error and thus ensure greater ship safety.

As the German Flag, we have always stood for safe seagoing vessels and well-trained seafarers. Bridge Resource Management that is applied in practice is a key component of this.

With this in mind, I hope this book will attract many interested readers and I wish ships' crews a safe voyage!

Kai Krüger

Head of the Ship Safety Division
German Social Accident Insurance Institution for Commercial Transport, Postal Logistics and Telecommunication (BG Verkehr)

Preface

The challenges of complex systems

Man is an inventive being. He has created machines, automobiles, trains and ships, aircraft and rockets that enable him to get to places he could never otherwise have visited, and to travel distances he could not have covered without these inventions, at speeds he could never have attained by his own physical strength. These speeds and the constantly increasing advance of technology lead to the risk of man becoming overloaded, however. The more highly automated a system is, with growing networking of the system components, the harder it is for the individual to keep an eye on all these components. Although the rising level of technicalisation results in ever more data being available to him, enabling him to assess situations more clearly and in a more proactive manner, it also means that a single person can no longer manage this wealth of information alone. Thus the individual can no longer master a system by himself. Why? Because no system is perfect and no system is ever manageable in its entirety.

In this book we understand a **system** as a **part of the world**, which is ***complex***, with ways of reacting that are ***interlinked***, which changes at any moment and is therefore ***dynamic*** and which exceeds the comprehension not only of an individual, but potentially of an entire competent team and thus remains ***untransparent*** to an undefined extent.

Just as every individual per se is flawed, so are the man-machine and man-man interfaces of which he forms a part. Even with the most up-to-date technology we can never have a complete overview of any system of complex interrelationships.

It is now generally recognised that a large number of anomalies and accidents are attributable to “human failure” or human error. This is demonstrated by accident analyses of all high-security industries, including the shipping industry: despite the plethora of safety equipment and technical aids, every system is susceptible to error. There are no error-free systems.

What exactly does it mean, however, when it is stated that the preparedness of an individual or team was not up to the mark in an incident – that a crew reacted too slowly, too late, inadequately or in a manner inappropriate to the situation? If these questions remain unanswered when analysing an incident, it is not really clarified whether the design of a piece of equipment was at fault, or whether the mental overload of an individual played a part, or whether there was a failure to process and communicate information or it was incorrectly processed and passed on. And so, no specific learning gain is achieved.

“A human error is an **action** or **decision** which was **not intended**, which involved a **deviation from an accepted standard**, and which led to an **undesirable outcome**”.[1]

1 https://www.hse.gov.uk/pUbns/priced/hsg48.pdf, p. 13

As long as we stick with the bald statement that the cause lies in the wrongdoing of individuals – that they acted erroneously, deliberately took too great a risk, were too poorly trained or were overburdened, the complete error chain will not be identified. Our sophisticated systems usually have sufficient redundancy nowadays to compensate for such individual errors. That is the basic theory behind James Reason's Swiss Cheese Model (cf. p. 49): an incident only happens when a number of redundant resources fail.

"In short, we have to engage with the complexity of the world if we want to learn from it; we have to resist the hardwired tendency to blame instantly, and look deeper into the factors surrounding error if we are going to figure out what really happened and thus create a culture based upon openness and honesty rather than defensiveness and back-covering."[2]

This open culture is necessary for a systematic approach to error, to recognise it as a consequence of complex processes and the failure of a number of redundant system components and protective mechanisms. It is our fundamental attitude to errors that dictates whether we learn from them or not.

One industry that was quick to recognise the necessity of accurate error analyses is the aviation sector. For over 30 years, it has been reconstructing incidents exactly, documenting the causes in detail and making them accessible to the industry as a whole. This is not with the aim of punishing individuals or to obtain grounds that are as precise as possible for any legal proceedings or claims for damages, but in order to learn from these errors for the future and to close another gap in the system. The goal is to increase the resilience of the system as a whole for dealing with unexpected moments of crisis, or even to make the development of such crises impossible.

Here, too, the fundamental attitude to errors is crucial. If we see these less as examples of individual failure and more as a source of information for avoiding future errors, then it becomes clear that precise analyses and transparency serve to make the operators of a system aware of the potential for errors, of how imperative training in communication and the promotion of teamwork and effective cooperation are, and how vital it is to school staff in stress avoidance strategies and to consider and advance all other so-called non-technical skills such as situation awareness, decision-making or advocacy and assertiveness.

In the shipping industry also, awareness that the human element constitutes the neuralgic factor is becoming increasingly widespread.

"Analysis of shipping disasters in recent years has produced an increasing awareness of the central importance of the human element. The loss of life, the impact on company profits and credibility, and the vast environmental damage that can result from the loss of a vessel remain clear and present dangers."[3]

Following the example of aviation, awareness is growing in the shipping world that not only technical training, but also strengthening the mental state of the workforce is particularly important. A team wins or loses on the level of communication, joint situation awareness and the proactive error culture within the group.

Although human factors training can produce a notable reduction in the error rate and has already gained acceptance in other safety-relevant sectors such as medicine, the military or the police, it took some time for the initial signs of it to appear in the shipping industry. Even now, although the international regulations of 2018 (STCW: Standards of Training, Certification and Watchkeeping for Seafarers, supplemented by the so-called "Manila Amendments" of 2010) include the general obligation to carry out human factors training, they do not provide

2 Matthew Syed 2015, Black Box Thinking: The Surprising Truth About Success, p. 270
3 Dik Gregory/Paul Shanahan 2010, The Human Element: A Guide to Human Behaviour in the Shipping Industry, MCA, p. 7

any clear stipulations on this despite its considerable relevance. The maritime industry still lacks standardisation with regard to its precise content and methods for how crews are to be trained particularly in BRM and human factors (cf. Chapter 15).

Nor has the realisation yet permeated the shipping industry as a whole that bridge resource management not only poses questions and makes individuals aware of counterproductive effects, but it also provides answers to how the probability of errors can be minimised and how nautical personnel can deal with negative effects in practice.

This is demonstrated by the fact that there is as yet no coherent book on the subject of human factors in shipping and on bridge resource management, nor is it yet an autonomous integral constituent of the training at all higher education institutions. If I am able to drive a car, I am not automatically able to avoid some accidents. In our view, there should be an even greater focus in the education of seafarers on considering error management and the man-man and man-machine interfaces, thus reflecting on human factors.

Our book is intended to contribute to this. We believe that man, with his ability to anticipate risks, to react creatively to abnormal situations and to take timely preventive action, continues to assume a key role in safety management. The focus in this book is therefore on man as process controller in the interaction with technical systems and with his environment. Mental, organisational, procedural and strategic factors are highlighted here. We understand BRM above all as a process.

> BRM is an **interactive strategic orientation of action** by individuals and groups in using all available resources to reduce risks of human errors and proactively increase safety and efficiency.

These strategies for minimising risk and the probability of errors form the subject of the book. If BRM is understood as a set of *behaviours* for observing the risk posed by the human element and improving the safety standards in interacting with a complex environment, systems and teams, then the aim of such a book should be to offer practitioners proactive tools that enable them to be masters of the process.

Improving Bridge Resource Management: mastering the system

Our book therefore deals with the causes of accidents in the “security industry” of shipping and shows what bridge resource management training should include to achieve preventive minimisation of error sources and risk potential. Aspects of human factors that are critical for bridge and engine room staff are discussed in simple and descriptive terms. It is shown how communication gaps can be closed and decisions taken faster and more reliably, how teams are brought together emotionally, friction losses are and the potential for error is reduced to a minimum. The benefit and the necessity of BRM as a proactive safety management tool thus become clear for the individual, for teams, for organisations and for the entire sector.

The authors are experts in human factors research, BRM trainers and serving ship’s officers. In their presentation of individual psychological and system-organisational aspects, they deliberately concentrate on easily understandable models and focus mainly on the practical management of these. Their contributions not only aim to illustrate the key factors of safe action in the complex system of seafaring, but also endeavour to offer specific solutions, present practical tools for action and provide recommendations suitable for use in everyday work. A book has thus been created that is suitable as much for self-study as it is as a basis for BRM training. It has been written taking daily working life at sea into account with the following aims:

– creating awareness of the necessity and benefit of BRM generally as well as of the industry-specific risks of maritime shipping and of the requirements of BRM,
– offering strategies for action and tools for avoiding negative effects and for simplifying and speeding up routines and decision-making processes,
– providing specific recommendations for management staff, teams, individuals and trainers on how to promote these tools and incorporate them into daily life on board.

The book has been written primarily for the seafarer to use for self-study and for thinking about his own daily routine, environment and daily challenges. It is also aimed at teams and team leaders and at those in responsible roles in organisations and shipping companies to help them understand exactly what is required on the bridge and in the team to act in a risk-aware manner, to minimise the probability of risk and to intercept errors. It is intended to demonstrate to all levels of an organisation that they need a basic error culture in the system overall and an open and objective approach to errors. For this reason it addresses the individual, the team and the organisation as a whole right up to shipping company management level, and ultimately the entire industry.

The book has also been written for BRM trainers. It should help them to consider and discuss all the relevant mental aspects, aspects of the working relationship and team communication together with their trainees. It should also illustrate possible gaps and error sources and provide trainers with directly beneficial tools that can be installed permanently by teams and in teams and can be integrated into the daily routine.

Error and safety culture: attitude is crucial

Attitude before method: a team-oriented safety culture can only work if the conditions have been created for this, if they are applied throughout the system and the right attitude is adopted with equal self-assurance at all levels. System deficits must be handled transparently. What is needed above all is an open attitude to errors. From the system viewpoint these are not personal shortcomings, but gaps that need to be identified and closed. This is because behaviour results only from a certain attitude.

BRM is an attitude: We understand BRM as a **distinct attitude to errors** and error management; the shared conviction that **errors are normal**, that they **inevitably and always occur** in a dynamic and complex system, and that **permanent monitoring of the process** by several system operators is therefore **necessary**, that back-ups must be created and the redundancy of the system must be secured by as many safety barriers as possible.

With the attitude to errors favoured here, it is possible for every individual in the team to express doubt – because safety management is understood to be a participative process, in which the key components of speaking up and advocacy and assertiveness only pose a minor obstacle.

This book describes fundamental aspects of human behaviour that are relevant for the maritime sector and thus make it clear that human behaviour and non-technical skills are by no means secondary or marginal elements, but are extremely crucial factors in reducing risks. It shows that the management of skills and teams must be at the heart of successful bridge management as well as at the core of an organisation.

Agile teams of the future

Given the growing level of automation of our installations and the increasing complexity of the systems, good seamanship depends all the more on people working flexibly together in a team, on hierarchies playing a subordinate role to collective responsibility and on shared vigilance. This book helps to communicate this message and shows that the assessment and training of non-technical skills constitutes a tool for proactively improving the safety of ships. To take this a step further, the industry should reach the stage where AUDITs not only check adherence to safety standards and look at procedures, but where bridge resource management and the non-technical skills of the personnel are also examined as an integral and obligatory standard parameter.

Finally, a point should be reached where bridge resource management becomes a matter of course throughout the shipping industry, and the human factor is acknowledged for what it is according to the statistics: the decisive factor in safety management.

Hamburg, May 2020

Jürgen Neff

Editor

Content

1 Managing Risks by Bridge Team Management

Thomas Jung

1.1 Incidents and accidents in shipping

1.1.1 Frequency and consequences

Maritime shipping is considered one of the high-risk industries. In the period from 2009–2018, 1036 total losses of ships were recorded by AGCS (Allianz Global Corporate & Specialty) [1]. Of this number, 805 were classed as foundered, wrecked or collided ships. Collisions, groundings and sinkings result for the most part from a failure of ship command and inadequate bridge team management. These figures only reflect losses of ships and are thus the tip of the iceberg of all incidents and accidents; a large number of collisions and groundings that do not result in losses are not included. The graph indicates a declining trend in losses of ships, which should not obscure the fact that the number of incidents and accidents is still high.

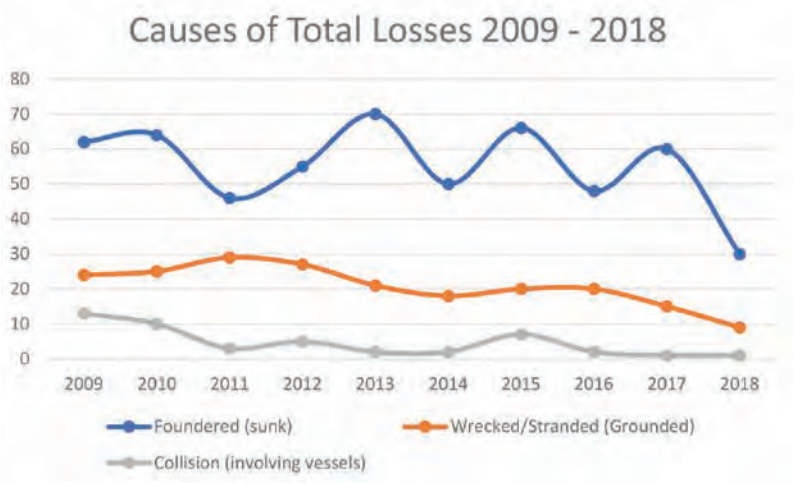

Fig. 1.1: Causes of total losses 2009–2018 [1]

The UK P&I Club has analysed the causes of its large ship failure claims and has found that for decades the proportion of human error by deck officers, crew, engineering officers and pilots has been more than 50%. While the proportion between 1987 and 1989 was still 60%, it fell to 53% in the period 2008–2010. In both periods, technical failures accounted for around a third of all causes. Human error continues to be the main fault source.

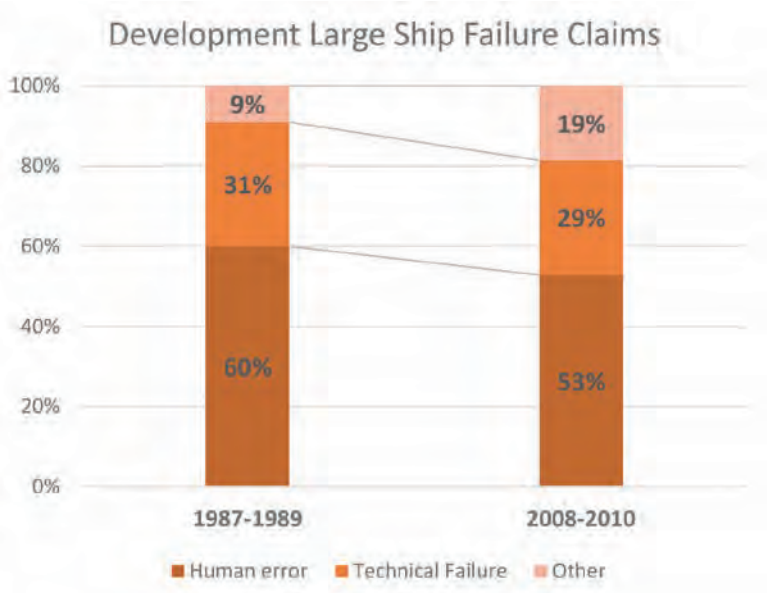

Fig. 1.2: Development of large ship failure claims (UK P&I Club, 2014)

Studies by EMSA reveal similar trends. On cargo ships, human actions were the biggest contributory factor to 2273 accidents in 2011–2018, accounting for 68.6%. Equipment failures follow at 16.2%. The causes of accidents attributable to human actions are chiefly to be found in shipboard operations. These relate to shipboard operations as a whole and are not all based on operations on the bridge. When broken down further, however, significant human error causes were demonstrated that could be influenced by bridge team management (BTM). These include inadequate communication or procedures, lack of skills and knowledge, a less than adequate mental and psychological state and poor safety awareness. [2, 48 ff]

In recent decades the introduction of the ISM Code and the implementation of consistent port state controls have reduced the number of incidents and accidents, and a marked decline has been recorded. This trend is underpinned by the implementation of appropriate company policies by shipping companies to improve safety. Awareness of the need for greater safety has been promoted through P&I Club policies and inspection programmes such as SIRE, TMSA or OVID in individual shipping markets. Even if the absolute number of incidents and accidents is declining, more efforts are nevertheless necessary to improve safety at sea further.

Bridge team management is geared towards making bridge operations safe. Here the focus is on reducing the rate of human error. The bridge of an ocean-going vessel is where all safety-relevant nautical decisions are made, and thus a large number of the reasons for accidents lie in decisions taken on the bridge and translated into action. It is clear that efficient bridge team management makes a significant contribution to reducing the risks to people, vessels and cargo as well as to the environment [3]. This is all the more important because the amount of damages arising in particular due to environmental pollution is spiralling; it is assumed that human error (based on analysis of 15000 marine liability claims between 2011 and 2016) was responsible for $1.6 bn of damages [1].

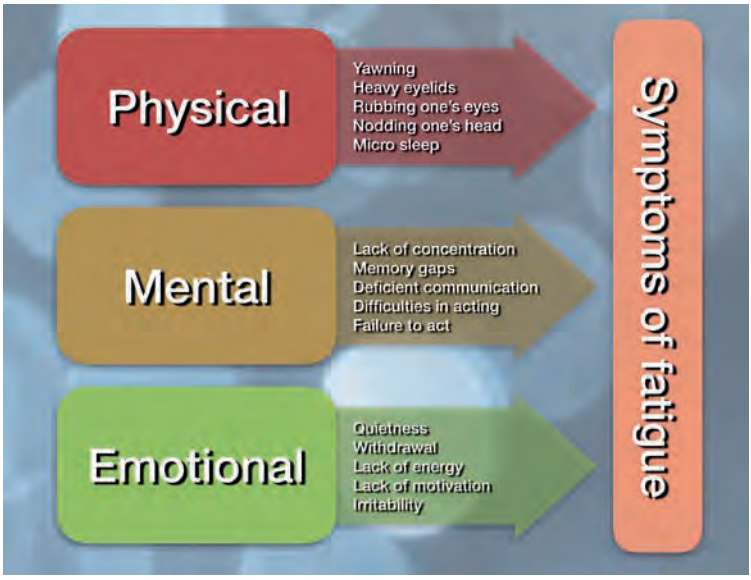

Fig. 5.8: Symptoms of fatigue (Source: Jürgen Neff)

! Only good-quality sleep in a sufficient quantity will enable you to perform your work in a safe and healthy manner. People suffering from disturbed sleep often don't notice themselves how adversely this affects them. It is important for watches to be limited and not stretched out. Statutorily prescribed working hours and break arrangements must be observed, because these are based on the findings from occupational medicine.

5.5.2 Micro sleep

Suddenly nodded off at the helm? Nearly everyone working night shifts is familiar with this phenomenon. Monitoring instruments, especially at night and under monotonous conditions, causes many people to drop off momentarily. [30] This has been studied on pilots in the aviation industry. [29] In the trucking industry, an effort has been made to counteract the hazardous micro sleep by means of driver assistance systems.

Tiredness cannot be combated by willpower – this is an overestimation and thus an erroneous belief. The decline in vigilance is no longer noticed by the crew itself. In an advanced stage this inevitably leads to micro sleep attacks and can only be avoided by sleep and rest breaks. The far-reaching consequences of over-tiredness can be seen from the Exxon Valdez tanker disaster and countless plane crashes.

! Tiredness cannot be combated by willpower. When a person is tired, his eyes will close at some point and dangerous micro sleep ensues.

Fig. 5.9: Vicious circle of sleeplessness

Tip 1: The right food can make a major contribution to awareness and maintaining health. Do not eat any fatty meals or any raw fruit and vegetables during the night shift: both are too difficult to digest. Light meals including rice, soups etc. are more digestible and make you more alert. Drink plenty of water, as it increases alertness and contains no calories.
Tip 2: Performance levels are at their lowest between 2:00 and 5:00 am. If you are feeling cold and tired, you should have a hot cup of tea or some soup. This will revive you and increase alertness.
Tip 3: If you are still fired-up after the night shift, you should apply breathing techniques. These lower the pulse and heart rate.

5.5.3 Healthy sleep

Sleep provides us with both physical and mental regeneration. It is central to recovery, for memory, growth, mood and the immune system, because while we are asleep, a large number of processing operations take place in our bodies.

Tip 4: During the onset of sleep and the light sleep phase, sleep is only superficial and thus susceptible to interruption. In these phases even the slightest of disturbing factors, such as noise or light, can awaken us. Blocking out light is therefore just as important as eliminating any noise.

For restful sleep it is important to be able to pass through all sleep phases undisturbed. An average of roughly seven hours' sleep is healthy, but what is crucial is not only the length of sleep, but above all sleep quality.

5.5.4 Shift work and age

The older a person is, the greater the toll alternating shift work takes. Increasing age means that the organism copes less well with the change between day shifts and night shifts, having an impact on sleep quality, the cardiovascular system and on fat metabolism. In addition, in the second half of life the proportion of deep sleep diminishes in favour of an increased proportion of light sleep with an increased tendency to awaken, leading to a reduced ability to regenerate.

CASE
What happened: A young 3/O had the watch as OOW. In dense traffic a close-quarter situation suddenly occurred. A collision nearly happened.
Why did it happen: Several minutes prior to the situation, the Master joined the bridge to deal with some paperwork. He asked the Mate about the traffic situation, then turned to a workstation. The Mate assumed that the Master had taken the conn and stopped navigating. He did not speak up or confirm this loudly and clearly.
Main reason: The differences between responsibilities (command, charge, conn) were not understood. No procedure for taking over the responsibility was commonly practised on the ship. No closed-loop communication was established to confirm. The behaviour of the Master in normally emphasising his rank contributed to the development of the situation.
How to avoid: Definition, documentation and training to understand roles and responsibilities.

Avoid unspecific responsibilities!
Do not tolerate misunderstandings!

The responsibilities should be defined clearly in the SMS or a bridge manual to avoid independent interpretations. If the team gains a new member, the responsibilities and handover procedures should be explicitly addressed. If anything is unclear, they should be repeated and it should be ensured that all team members understand.

Command, Charge and Conn are different responsibilities!
Determine and document the characteristics of responsibility in the bridge manual!

7.2.4 Function-oriented bridge organisation

A function is a time-limited role with a clearly defined scope of duties. It should be differentiated from a rank in the hierarchy. Ranks are constitutional, functions are operational: they include a specific list of tasks. In the hierarchy of a system, a function can only be assigned once to one person, but it is entirely possible for one person to assume several functions. To put it simply, each position can “wear several hats”, thus perform several functions.

In modern bridge team management there are various functions, the definition of which has become established in recent years. The driver for this was the cruise industry, which oriented itself to experiences from aviation. In aircraft there is a “pilot flying” and a “pilot monitoring”. The flight captain and 1st officer exchange these roles on each flight. This basic idea was transferred to shipping and signifies the introduction of function-oriented bridge organisation [5].

The bridge organisation oriented towards the captain is thus transformed into a team-oriented set-up.

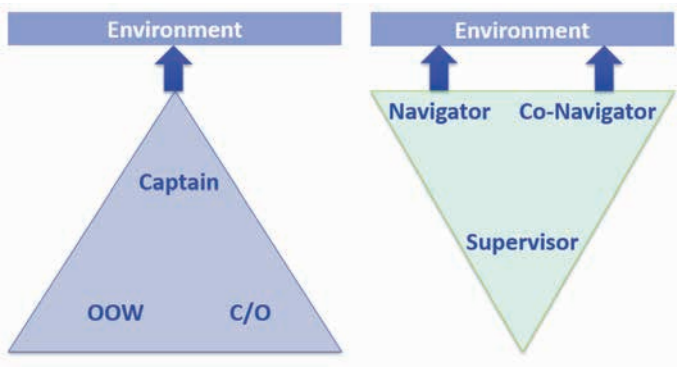

Fig. 7.9: From hierarchy to team-based functional bridge team organisation

The functions of the team-oriented set-up can be transferred to various forms of bridge manning, with more or fewer persons, and are thus generally applicable. The following can be defined as functions:

Navigator	Has the CONN, drives the vessel.
Co-Navigator	Supports the navigator in navigation, assumes other tasks apart from navigation, challenges the navigator.
Supervisor[1]	Assumes the charge, supports and coaches navigator and co-navigator, takes over workload management.
Administrator	Deployed in situations with a high workload, takes over additional duties, for example additional position fixing or keeping the bell book.
Pilot	The pilot is integrated into the team as advisor, or can take over the CONN.
Helmsman	Crew member at the wheel, responsible for proper steering of the vessel
Outlook	Supports maintaining situational awareness in the vicinity of the ship.

These functions in the sense of "Who is wearing which hat?" are assigned to the positions on board according to the situation. Experience and ability naturally play a role in this. To put it simply, the aim is that any mate can take the ship safely from berth to berth. The role of the captain tends to be that of a coach, who leads the bridge team and can intervene in the distribution of duties if required. He is thus no longer the "the only one and best on board", but he shares his experience and passes it on. For many captains this is an extreme paradigm shift and faces them with the major challenge of leaving even the junior officers more "at the helm". With the distinction between operational function and constitutional rank in the hierarchy it should be clear, however, that the captain is not surrendering the responsibility, but only the operation. He remains always and in principle in COMMAND, but can also assume CHARGE and CONN at any time. He does not relinquish any fundamental influence, but just temporarily assigns operational decision-making power.

The basic idea behind this does not therefore constitute any hierarchical "disempowerment" of the captain, but is simply an operational safety barrier for increasing redundancy.

1 In the cruise ship industry usually named as Operations Director.

The fundamental background to this is that every system, such as a bridge team, develops a collective self-image. This results in a certain image of the team, which is created from experience and from stories from the past and present. This image determines one's own perception of status and the expectation of the possible future. Everyone is aware of the complaints about the management, the gossip about colleagues or the moaning about the workload. It is logical that such communication regarding negative aspects results in these aspects being reinforced and producing a negative self-perception of the individual or of the team. People then tend to become defensive, wish to justify themselves or are offended. This leads to instances of resistance right down to the surrender of the individual, which poses a direct and strong danger to team performance.

"Appreciative Inquiry" starts out from blanking out the negative as far as possible and focusing attention on the positive aspects. This promotes positive development. It doesn't mean that problems or errors are not addressed; it is more a case of how they are addressed. This is why operations that are completed successfully are rarely communicated positively and praise is often only given in passing.

Building on appreciation, it is possible to cite even potential for development positively. Opportunities for development should be pinpointed together and elaborated, while targeted questioning helps potential to be recognised and accepted. It isn't a blame culture - those affected are not made to look foolish. The path is to:

– discover the strengths and potential together in a positive mood
– identify together how the positive and improved future should look
– design the steps to meet the goals in the team
– determine and allocate tasks and activities and start

How is appreciative inquiry manifested in practice? When you perform a mooring manoeuvre, a mooring line is hold too quickly and it breaks. You hear: "The manoeuvre was a disaster again, where did you learn that? Another mooring line broken! Call yourself a competent deck officer?" How do you feel now – looking forward to the next manoeuvre? And how would you feel if the captain were to say to you instead: "You began the manoeuvre nicely. Your strategy was clear as to how you wanted to do it. What happened for the mooring line to break and how can you avoid that happening next time?"

Give positive feedback and praise!
Discover errors and mistakes in a positive manner!
Develop the line of questioning in the desired direction!
Ask for desired outcomes! Focus on improvement!
Determine measures for optimisation together!

10.7 Focus on outcomes

10.7.1 Setting objectives

Management by objectives is not a new method. It is often practised in companies and teams and is an important instrument in leading people and teams.

A distinction should be drawn between higher-level objectives, such as e.g. implementation of a certain procedure in the team, and personal objectives, such as e.g. what skill is to be improved in a period of time.

The objectives should be developed jointly with the individual or with the team. It should then be ensured that these are communicated to and understood by everyone. The team thus has common, communicated objectives, such as arriving at the port of destination on time without any accidents.

The team sticks together and each member continuously supports the common objective. Current information and updates are provided on the objectives of the voyage and the realisation of tasks. Everyone is kept in the loop!

Achieving an objective should be acknowledged and communicated. Objectives call for attention so that they can be pursued seriously. Successes should be celebrated, even praised highly!

An objective can be changed if circumstances dictate this. If the destination port changes, objectives such as efficient operations should be reformulated and tasks and responsibilities reallocated if necessary. Repeatedly changing and adapting objectives should be avoided, however, as the trust of the participants will be eroded and objectives will eventually no longer be taken seriously.

Objectives must be SMART and satisfy the criteria associated with this [5]:

S – specific	(clearly determined and communicated)
M – measurable	(outcomes can be verified objectively)
A – achievable	(possible to reach, available resources)
R – realistic	(appropriate to overall situation)
T – time-bound	(time for completion as duration, time limit or date)

Leadership without objectives leaves those who are being led with no sense of direction. Objectives provide a goal that everyone works together to reach.

OBJECTIVES
Develop together!
Communicate the objectives and how to achieve them in the team!
Follow up and update!
Communicate the status continuously!
Praise successful outcomes!
Change objectives only if necessary and appropriate!

10.7.2 Briefings and debriefings

Leadership of teams calls for integration and communication. Bridge team briefings are an excellent tool for realising these and offer a host of advantages [12].

Briefings before all significant operations make sense. In the context of bridge resource management, briefings are advisable

- before each arriving in a waterway or port
- before commencing a voyage
- before each departure
- during the voyage if necessitated by the situation (e.g. heavy weather)
- before each maximum manning level
- before each special operation.

Briefings should be conducted in principle by the ship's management, thus by the captain or a person appointed by him.

The purpose of a briefing is to run through the forthcoming actions or manoeuvres jointly with the entire bridge team. The cohesion of the team (team building) is promoted and the functions (see chapter 7.2) are assigned. The conditions are discussed, such as the wind and tide conditions to be expected and the local situation, and the expectations of the team can be communicated by the ship's management. In a briefing all participants have the opportunity to ask questions or offer advice and recommendations. Any doubts or reservations can be expressed in a positive atmosphere and taken into account. The ship's management has a duty to create a conducive climate for questions and answers.

BRIDGE TEAM BRIEFINGS
All operational team members participate!
Start early before operations, ensure enough time!
Interact and communicate in all directions!
Keep it open and friendly!
Enforce attention and active listening!
Use all available equipment and material!

After the previously discussed operations, debriefings should be held, as only then can the closed loop of improvement be achieved.

The outcome of the operations will determine how the debriefing proceeds and its level of intensity.

If the operations were accomplished with a high degree of success, the debriefing can be geared to the positive result. The entire operational bridge team including the helmsman and lookout should be asked whether anything could be improved and possible improvements should be considered. It is advisable to start with the lowest-ranked team members here to encourage them to answer; if the highest-ranking go first, those following will say little. The aim of this debriefing is to foster thinking as a team and encourage a positive underlying mood.

In the case of experiences that posed a particular challenge, the team debriefing should also be used to analyse these and be focused more on deriving measures for improvement. The extended bridge team should certainly be involved in this, including the officers who were at the mooring stations, for example, to ensure that everyone participates in the experience. The ship's management first highlights the positive aspects. The course of events during the action performed, such as e.g. a difficult mooring manoeuvre, should be analysed in a neutral manner using all the available aids. Replays of ECDIS, charts, or camera shots if available can be used. All team members are then asked about improvements that can be made. The entire team should be involved in this. As a result, measures are compiled, people are assigned responsibility for implementing these and this is recorded. These measures should be taken up in subsequent briefings to pick up on their implementation and to modify them if necessary. Routines will only be improved if experience is actually applied in practice.

10.8 Conclusion

Successful leadership takes account of a variety of aspects and can be developed and put into practice systematically.

It is first necessary to understand people's behaviour. Motivating factors play a major role in this. If an understanding can be gained of the behaviour observed, this can then be addressed with a sense of proportion.

The practice-oriented book **Improving Bridge Resource Management** deals with the causes of accidents in the "safety industry" of shipping, presents sources of error and risk potential and shows what bridge resource management training should include in order to minimise them preventively. Crucial aspects of human factors for bridge and engine personnel are discussed in a simple and clear manner. It is shown how communication leaks are closed and decisions are made faster and more confidently, how teams can be brought together emotionally, friction losses reduced and error potentials minimised. The benefits and necessity of the proactive security management tool BRM are also made clear.

The authors are experts from human factors research, BRM trainers and practitioners from the maritime industry. In presenting organisational, systemic and psychological aspects, they focus on catchiness and practical handling. The book is equally suitable for self-study and as a basis for BRM training. It is written with nautical everyday life in mind: There are concrete recommendations for leaders, teams, individuals and trainers to promote BRM and integrate it into everyday life on board.

Extra: Free e-book included. Users who have a PDF reader installed on their device (PC, tablet, smartphone) can access the content of the book electronically including a search function.

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