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DEPARTMENT OF MARITIME STUDIES

M.Sc. IN SHIPPING MANAGEMENT

AN ENQUIRY INTO THE IMPORTANCE OF SOFT SKILLS FOR SHIPPING OPERATIONS WITH REGARD TO OIL COMPANIES INTERNATIONAL MARINE FORUM'S (OCIMF) TANKER MANAGEMENT SELF-ASSESSMENT (TMSA) PROGRAMME FOR TANKER SHIP MANAGEMENT COMPANIES AND THE IMPLEMENTATION OF SOFT SKILL-RELATED PRACTICES TO THEIR SAFETY MANAGEMENT SYSTEM (SMS)

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Dissertation
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List of Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
ALARP	As Low As Reasonably Practicable
BBS	Behavior-based safety
BIMCO	Baltic and International Maritime Council
BMP	Best Management Practices
BRM	Bridge Resource Management
BTM	Bridge Team Management
CBT	Computer Based Training
CEEMP	Company Energy Efficiency Management Plan

CEO	Chief Executive Officer
COSWP	Code for Safe Working Practices
CSR	Continuous Synopsis Record
DOC	Document of Compliance
DPA	Designated Person Ashore
DTSA	Defend Trade Secrets Act
DWT	Deadweight tonnage
ECDIS	Electronic Chart Display and Information System
EnPIs	Environmental Performance Indicators
EPA	Environmental Protection Agency
ERM	Engine Resource Management
ESCA	European Secretariat for Cluster Analysis
EU	European Union
FAL	Facilitation Committee
FFE	Fire-Fighting Equipment
GSC	Generic Skills Competencies
GT	Gross Tonnage
H&M	Hull and Machinery
HIV	Human Immunodeficiency Virus
HO/HA	Holds/hatches
HR	Human Resources
HRA	High Risk Area
HSQE	Health, Safety, Quality and Environmental
HSQEMS	HSQE Management System
HSSE	Health, Safety, Security and Environment
HSSQEE	Health, Safety, Security, Quality, Energy and Environmental
HVPQ	Harmonized Vessel Particulars Questionnaire
IACS	International Association of Class Societies
IAMU	International Association of Maritime Universities
ICAO	International Civil Aviation Organization
ICS	Institute of Chartered Shipbrokers

IG	Inert Gas
ILO	International Labour Organisation
IMCO	International Maritime Consultative Organisation
IMDG	International Maritime Dangerous Goods
IMO	International Maritime Organization
IMSBC	International Maritime Solid Bulk Cargoes
INTERCARGO	International Association of Dry Cargo Shipowners
INTERTANKO	International Association of Independent Tanker Owners
IOPC	International Oil Pollution Compensation Funds
IQ	Intelligence Quotient
ISGOTT	International Safety Guide for Oil Tankers and Terminals
ISM	International Management Code
ISO	International Organization for Standardization
ISPS	International Ship and Port Facility Security
ISWAN	International Seafarers Welfare and Assistance Network
ITF	International Transport Federation
ITOPF	International Tanker Owners Pollution Federation
KPIs	Key Performance Indicators
LI	Leading Indicator
LLL	Lifelong Learning
LOA	Length Overall
LR1	Large Range 2
LR2	Large Range 2
LSA	Life Saving Appliances
MARPOL	International Convention for the Prevention of Pollution from Ships
MBA	Master of Business Administration
MEPC	Marine Environment Protection Committee
MHB	Materials hazardous only in bulk
MLC	Maritime Labour Convention
MOC	Management of Change

MoU	Memorandum of Understanding
MR1	Medium Range 1
MR2	Medium Range 2
MRM	Management Review Meeting
MSC	Maritime Safety Committee
MT	Metric ton
NC	Non-Conformity
NGO	Non-Governmental Organization
NM	Near Miss
NOX	Nitrogen Oxides
NTNU	Norwegian University of Science and Technology
OCIMF	Oil Companies International Marine Forum
OECD	Organization for Economic Co-operation and Development
OHSAS	Occupational Health and Safety
OOW	Officer of the Watch
OPA90	Oil Pollution Act 1990
OVID	Offshore Vessel Inspection Database
P&I	Protection and Indemnity
PI	Performance Index
PMS	Planned Maintenance Systems
PPE	Personal Protection Equipment
PSC	Port State Control
PSF	Performance Shaping Factor
QCM	Qualified, Certified and Medically fit
QMS	Quality Management Systems
RA	Risk Assessment
RMIT	Royal Melbourne Institute of Technology
RO	Recognized Organization
SCT	Safety Critical Task
SCTA	Safety Critical Task Analysis
SEEMP	Ship Energy Efficiency Management Plan

SIGTTO	Society of International Gas Tanker and Terminal Operators
SIRE	Ship Inspection Report Program
SMC	Document of Compliance
SMCP	Standard Marine Communication Phrases
SMS	Safety Management System
SOLAS	Safety of Life at Sea
SOX	Sarbanes-Oxley
SPI	Shipping Performance Index
SPM	Single Point Mooring
SPM	Single Point Mooring
STCW	Standards of Training, Certification and Watchkeeping
SWA	Stop Work Authority
SWL	Safe Working Load
TCC	Technical Co-operation Committee
TML	Transportable Moisture Limit
TMSA	Tanker Management and Self-Assessment
TOVALOP	Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution
TQ	Total Quality
TSS	Traffic Separation System
TSS	Traffic Separation System
UK	United Kingdom
UNCTAD	United Nations Conference on Trade and Development
USCG	US Coast Guard
VERP	Vessel Emergency Response Plan
VGP	Vessel General Permit
VIQ	Vessel Inspection Questionnaire
VLCC	Very Large Crude
VLOC	Very Large Ore Carriers
VOC	Volatile Organic Compounds
VPQ	Vessel Particular Questionnaire

Abstract

This thesis is a study of the importance of soft skills in terms of promoting a safer and more efficient work environment regarding shipping operations, both onboard and onshore. This paper investigates the importance of the human element in shipping and reviews the penetration of behavioural management practices – pertaining to the adoption of soft skill-oriented processes – in the safety and quality management systems of ship management companies and suggests paths toward regulatory compliance and best practices for the future.

In the first chapter of the dissertation, the regulatory framework within which shipmanagement companies are required to operate is presented. In identifying the pieces of legislation that underpin modern ship management, light is cast upon key international conventions including, *inter alia*, the four pillars of ship management, i.e., SOLAS, MARPOL, STCW and MLC. Furthermore, mention is made to those regulatory bodies directly involved in tanker ship management. The above will serve in introducing TMSA into the thesis.

Having considered the regulatory scheme, the second chapter gives a definition of what soft skills entail. The analysis aims at establishing how to successfully manage interpersonal relationships and getting one's message across. Therefore, it is argued that on-the-job interplay in a modern workplace environment is the driving factor behind business outcomes. In that regard, it is also argued that a workforce instilled with solid knowledge of soft skills leads to tangible results that are echoed in an organisation's productivity, revenues, and overall profitability.

Building upon the state of practice concerning the adaptation of soft skills in other industries, soft skills in shipping operations are them examined, namely the nature of soft skills required for onboard and onshore operations. Tying with the aforementioned regulatory framework they way soft skills manifest in legislation relevant to shipping operations is also discussed.

The third chapter of the dissertation introduces and discusses the OCIMF's paper on the Behavioural Competency Assessment and Verification for Vessel Operators. It discusses the necessary actions that a tanker ship management company should undertake to achieve compliance with TMSA 3 standards and adopt industry's best practices, again with the vantage point being the adoption and implementation of soft skill-related practices as manifested in a company's safety and quality management system, including the ISM Code.

The fourth chapter is heavily influenced by OCIMF's report and relies heavily on the work material and issues discussed in the previous chapters. Here, focus lies on explaining the possible ways that a shipmanagement company can build a behavioural competency framework in the context of its safety and quality protocols.

This TMSA 3- and soft skills-centred dissertation's goal is to disambiguate the meaning of soft skills and enquire into their importance in the context of a ship management company's operations. Having addressed both questions, this work suggests ways and methods that a shipmanagement company may embrace to exceed the TMSA 3 soft skills mandates, transcend minimum level of compliance and incorporate soft skill-related practices to its processes.

Finally, this assignment is performed in accordance with the instructions received, and care and attention have been directed toward the proper citation of the referenced sources.

Key Words: soft skills, human element, shipping operations, safety and quality systems

Περίληψη

Αυτή η διπλωματική εργασία ερευνά την σημασία των soft skills – των επικοινωνιακών και διαπροσωπικών δεξιοτήτων – στο εργασιακό περιβάλλον της ναυτιλίας, το οποίο σε καμία περίπτωση δεν περιορίζεται στα γραφεία των διαχειριστριών εταιρειών αλλά κυρίως επεκτείνεται και περιλαμβάνει το πλοίο και τους ανθρώπους του. Με τα soft skills να αποτελούν το μείζον θέμα και πεδίο ερευνητικής ενασχόλησης της εργασίας, αναγνωρίζεται ότι μια εκτενής συζήτηση γύρω από τον ανθρώπινο παράγοντα (human factor/element) πρέπει να προηγηθεί της αναφοράς στα soft skills.

Έτσι, προκειμένου να θεμελιωθεί η εργασία και να οριστεί η σημαντικότητα των soft skills στο χώρο της ναυτιλίας προηγείται η αναγνώριση της κεφαλαιώδους σημασίας του ανθρώπου – των ναυτικών και του προσωπικού στη ξηρά – για την ασφαλή περάτωση των λειτουργικών δραστηριοτήτων τόσο εν πλω όσο και στη ξηρά. Με την έννοια ασφάλεια υιοθετείται η αγγλική ερμηνεία του όρου η οποία είναι διττή περιλαμβάνοντας τόσο στοιχεία του safety όσο και του quality. Ομολογουμένως όμως η εργασία αυτή κυρίως επικεντρώνεται στην αλληλεπίδραση των soft skills και της κουλτούρας ασφάλειας (safety culture) των ναυτιλιακών εταιρειών. Μνεία ωστόσο γίνεται και στο καθεστώς ασφάλειας ως security.

Οροθετείται αρχικά η συζήτηση για τα soft skills γύρω από τους τέσσερις πυλώνες της ναυτιλιακής νομοθεσίας, ήτοι τις συμβάσεις SOLAS, MARPOL, STCW και MLC. Αναζητείται που και πως γίνεται αναφορά σε πρακτικές όπου εντοπίζεται η ανάγκη ανθρώπινης αλληλεπίδρασης, εφαρμογής διαπροσωπικών δεξιοτήτων και απαιτείται η ανάπτυξη δομών εκπαίδευσης των ανθρώπων σε θέματα που ξεπερνούν την αυστηρή τεχνοκρατική κατάρτιση και άπτονται των ανθρώπινων σχέσεων και διαπροσωπικών αλληλεπιδράσεων. Με βάση τα παραπάνω, η εργασία αναζητά τη σημασία και την εφαρμογή των soft skills στο πρόγραμμα Tanker Management Self-Assessment (TMSA) του OCIMF, αναγνωρίζοντας τα βήματα που έχει πραγματοποιήσει ο οργανισμός στην εισαγωγή των soft skills στο καθημερινό λεξιλόγιο της ναυτιλίας και στις δομές ασφαλούς διαχείρισης.

Σε συνέχεια των παραπάνω γίνεται προσπάθεια ύστερα να αναζητηθεί η σημαντικότητα των soft skills σε άλλες βιομηχανίες με αναφορές σε πρακτικές άλλων κλάδων και ανάλυση του βαθμού υιοθέτησης και διασποράς των soft skills στην λειτουργία τους. Τέλος, έχοντας αναφέρει τα παραπάνω, αναφέρονται τα soft skills που βρίσκουν άμεση εφαρμογή στο χώρο της ναυτιλίας και επιχειρείται να προταθεί μια μεθοδολογία για την εισαγωγή πρακτικών που βασίζονται σε αυτά στις δομές διαχείρισης και στα πρωτόκολλα ασφαλούς διαχείρισης των διαχειριστριών ναυτιλιακών εταιριών.

Τα soft skills – οι δεξιότητες των ανθρώπων που επιτρέπουν την επιτυχή αλληλεπίδραση με τον κοινωνικό τους ιστό και τη μετάδοση μηνυμάτων, εντολών και συναισθημάτων – έχουν εισχωρήσει στο σύγχρονο λεξιλόγιο του εργασιακού περιβάλλοντος. Οι απολήξεις τους ξεφεύγουν από τον εργασιακό χώρο με τη συζήτηση για τη σημασία των soft skills και την εκπαίδευση πάνω σε αυτά να βρίσκει γόνιμο έδαφος σε διαφορετικές εκφάνσεις της ζωής μας όπου η αλληλεπίδραση μας με άλλα άτομα είναι αναγκαία.

Λέξεις Κλειδιά: επικοινωνιακές και διαπροσωπικές δεξιότητες, ανθρώπινος παράγοντας, λειτουργική διαχείριση, συστήματα διασφάλισης ποιότητας και ασφαλούς διαχείρισης, έλεγχος και αυτοαξιολόγηση

Chapter 1: The importance of the human element in the safety of shipping operations.

If we were to give a simple definition of the shipping industry, we would have to mention that the demand for shipping services is derived from the demand of the goods and commodities that ships are employed to carry. Of course, this would have to be the first prong of our definition, and one expressed from the vantage point of the economics of the industry. However, since antiquity, shipping always involved the participation of many in a common venture. In that regard, a definition of the shipping industry as the employment of ships in exchange of payment has to be supplemented to include mention to the human element.

The International Maritime Organization (IMO) suggests that the human element is a complex-multidimensional issue that affects maritime safety and marine environmental protection. It [the human element] involves the entire spectrum of human activities performed by ships' crews, shore-based management, regulatory bodies, recognised organisations, shipyards, legislators, and other relevant parties, all of whom need to cooperate to address human element issues effectively.

The human element plays a most significant role in the safe prosecution of a voyage, as it also unfortunately does in errors that can result in collisions or groundings, minor or catastrophic to name a couple of types of accidents. Ships' crews today are, more often than not, of a mix of nationalities, languages and cultures, and, again, oftentimes of a different nationality to shore based employees. The need for clear understanding and fluent channels of communication has never been more important.

Even at our age and the times heralded to come, ever-increasing levels of automation, onshore and onboard applications of artificial intelligence and Big Data analysis do not lessen the importance of educated personnel that boasts an acute sense of responsibility and empathy, and has the capacity for clear verbal communication, team working, decision making and complex problem solving.

1.1. Scope and definition of shipping operations

With so many different types of ships, the requirements to operate them safely and effectively are undoubtedly demanding. Some argue that first and foremost a competent Master and crew are needed. They are the people who will work on board, cater for the ship, meet charter party requirements, raise the standard of the ship's maintenance, and are instrumental in reducing the cost of running the ship. All of the above must be achieved without jeopardising the standard of safety and security on board. Ship managers need to support the crew, and, in many cases, this cannot be achieved without them understanding the operation of the ship type for which they are responsible.

In addition, ship operators must be able to speak in two languages when items of concern are raised, the languages of money and things. The management and especially the senior management of the company talk in the language of money. The Master and crew talk in the language of things. It is the responsibility of the operations department to be able to convert the languages being used from one to the other so that the items under discussion are fully understood by the other party. This applies not only to the ship manager but also to the Designated Person Ashore (DPA). It must not be overlooked as in the past, as well as nowadays, this failure to understand where the other party is coming from has resulted in miscommunication, delays for ships and vessels senselessly exposed to the perils of the sea.

In greater detail, it has been argued that ship management companies fall into two main categories. One type is the shipowning company that manages its own ships and offers the same service to the other shipowners. The other is a company that has no ships of its own and solely provides ship management services to shipowners.

Either way, the ship management function is the same and has the following seven components:

- Crewing

- Storing

- Technical

- Insurance

- Operations

- Commercial

- Training

With the above in mind, it can also be argued that an essential task of shipping operations is to ensure that the ship carries out the tasks to which it has been committed by the commercial staff, i.e., the chartering department, who arranged its employment. Employment can involve carrying in-house cargoes, operating in the spot market or may even involve operating on a liner service, although that will rarely be the case for oceangoing bulkers and tankers.

The operations department will know from the technical department that the ship is ready to carry out revenue-earning work and the commercial staff will have explained what the commitment is. It is then up to the operations staff to carry out all the many tasks needed to fulfil this commitment. For example, an essential job is to ensure that the ship is sent to the right place at the right time and then told where to go next.

Decisions have to be made as to how much bunker fuel will be the ideal quantity and where this should be taken on board. Similarly, it needs to be ensured that the agents at all ports of call are advised and act upon the instruction received and within the scope of their authority. Crew changes have to be organised at the appropriate intervals and careful planning can avoid expensive air travel for crew members leaving or joining the ship.

Bunkering is another key area of operating ships. Bunkering, i.e., arranging fuel for ships is not a task to be undertaken lightly because lack of skill and attention could have adverse effects ranging from mere loss of profit to severe damage to the machinery and even to major disaster. There are three aspects of bunkering; quantity, quality and cost

and they are all interdependent. It can also be argued that there is a fourth consideration, time.

As mentioned previously, crewing is of course another activity central to shipping operations with the human element lying at its very centre. The number of a ship's officers and rating will vary depending on the size of the ship, but other factors can also influence the number of seafarers onboard the ship. Administering a ship's crew demands a well-disciplined organisation. Apart from the recruitment of the crew members, the task of ensuring they get the correct wages at the correct time is vital. Even minor issues or mistakes committed by the crewing department can become sources of irritation and consequent poor morale. The department should therefore be well founded so that data about basic pay, overtime, bonuses and so on feeds into the system smoothly.

In fact, even with fist-class departments in the ship manager's office, and despite all the technological advances made over the last century, a ship's eventual success or failure will depend on its officers and crew. This is a very actual concern since as we write these lines, more than 300,000 commercial ship workers, the lifeblood of global commerce, are now stranded on vessels because virus control measures and travel restrictions have prevented crew rotations. With about 80 per cent of trade carried by ships, the world's two million merchant seafarers are vital to deliveries of everything from oil, gas, and iron ore, to grain, fresh fruit, TVs, and automobiles.

Apart from maintaining basic efficiency, a crew department can make a positive contribution to the company's profitability. Most contracts with crew members are for specific periods of time with appropriate leeway to allow time for a voyage to complete. Careful coordination with the timing of voyages can ensure that crew changes take place at the shortest travelling distance away. Precise timing can save accommodation costs for crew members arriving too early, or worse still, holding the ship up for a crew arriving too late. Even shopping around for the best deal from an airline or travel agent can make a worthwhile contribution to the crew department's budget.

Precise record keeping of seafarers' certificates and their validity periods is another essential particularity as this is an aspect often targeted by port state control inspectors. A ship can be detained for the simple reason that one of the crew's competency or medical certificates has expired. To avoid such events, a crew department will need to ensure that the appropriate action to renew certificates is taken in good time.

As well as certificates required under the STCW, crew members on ships visiting certain countries will need to obtain visas in advance of arrival if they wish to be permitted to go ashore during port stays. Similarly, some ports are situated in areas where diseases such as yellow fever are prevalent. Crew should be vaccinated against these diseases before visiting such ports and may be required to prove that they have been vaccinated by authorities at subsequent ports of call.

Being the focus of this report, the shipping industry depends on competent, well-trained seafarers to ensure the safety of life at sea, maritime security, the efficiency of navigation and protection and preservation of the marine environment. It has been established that the human factor is the main culprit in maritime disasters; qualified, certified and medically fit (QCM) personnel in line with the standards set by the international conventions mitigate the potential to cause catastrophic damages that could bankrupt the company and even merit criminal liability for its senior management.
Continuing with what is included under the scope of shipping operations, stores (supplies) fall into two classes: those items concerned with the crew and those concerned with the operation of the ship. Some of the latter will be the responsibility of the technical department.

For the crew, the obvious items are food and drink, which some still call victualling, but now are more usually termed provisioning. This can be a demanding task, as each nationality has its own food preferences, often determined by religious or cultural needs. In many cases, the ship's command is given a budget within which it has a high degree of control over buying supplies. Nevertheless, close supervision is essential. Other stores for the crew include such things as bed linen, cleaning materials and cooking utensils.

For the ship itself, stores further divide into two categories: deck and engine room. Deck stores include materials needed for cargo operations such as ropes for lashing, and timber for dunnage. Specialist items such as tank cleaning and refrigeration materials, and also paints and other materials for routine maintenance, fall under the deck stores heading. Engine-room stores include lubricants, but spare parts are usually the responsibility of the technical department.

Mention has already been made to the technical department which is often subdivided into two sections. One will be under the management of the marine superintendent, usually a former master mariner. The other will be managed by the engineering superintendent, generally a former chief engineer. The former is responsible for the fabric of the ship and for keeping the classification surveys up to date, while the latter are concerned with the ship's machinery, including the cargo-handling equipment and sometimes also electronic devices.

Close cooperation between the technical people and the other departments is essential for the success of shipping operations. For example, routine drydocking is another major activity which must be harmonised with commercial commitments. While many specialist tasks can be passed to the appropriate departments, the operations staff have to co-ordinate it all.

Ship operators require good communication skills to be effective at their job. They need to be able to understand what is being said by the people onboard the ship. They talk in the language of things and translate it into a language that will be readily understood by the senior management of the company. That can be said to be the language of money. If ship managers present a message from another party in the wrong language, then it will be misunderstood, and its effectiveness or impact will be lost. So being able to visualise the language to be used to ensure a successful conclusion is of paramount importance.

1.2. Successful shipping operations; the role of the human factor on board and onshore

Lloyds Register accepts that there is no accepted international definition of the human element, whereas the USCG defines it *as human and organisational influences on marine safety and maritime system performance*. Expanding the USCG's definition and in the context of shipping business, the human element can be taken to embrace anything that influences the interaction between a human and any other human, system, or machine onboard the ship and onboard.

Although the phrase *human element* may be new, the effects of people on maritime safety have been evident as long as mankind sailed the seas. The people, systems and machines have changed, through the increase in technology, developments in legislation and the drive to reduce operating costs. This has resulted in a reduction in manning scales and the employment of multinational, multicultural and multilingual crews.

It is widely accepted by both academia and practitioners that the human element issues need attention across the maritime industry, as they are becoming critical for the following reasons:

- The norms of past experience amongst the seafaring population are not immediately transferable to computer-based systems and other new technologies.
- Competition is shipping services has reduced manning levels so that back up may not be available in critical situations.
- Ships are operating to tighter schedules and to more critical tolerances.
- Ships are becoming more integrated into transport chains, so the consequences of failure are greater.
- There is growing international public pressure to protect the marine environment.
- The majority of the crews are employed from supplier countries which may have different cultures and languages, and differing attitudes towards lifestyle, training and education, compared with the operator.

- Shipyards and equipment manufacturers are concerned with optimising their production methods and do not always work together to develop integrated, operator-focused systems.
- Lack of attention to the human/system interface, in terms of design, layout and integration of systems, and training in their use, is the root cause of many accidents.
- Ships trials do not fully test all the ship systems.
- Competence requirements are not keeping pace with changes in regulation and technology.
- International regulation lags behind the operational needs of modern ship systems.
- There are ship types (container, passenger, gas etc.) that are getting larger, such that the consequences of a single failure are more significant.

Furthermore, it can also be argued that there are four considerations about human resources when it comes to successful shipping operations:

- <u>Personnel</u>: the company ensured the correct mix of people onboard to operate and maintain the ship and its systems.
- <u>Manning</u>: the company ensures ships have the number of people required for the safe operation and security of the ship and for the protection of the marine environment in both normal and emergency situations.
- <u>Training</u>: the company continues to ensure personnel are competent and familiar with the ship and its systems.

Whereas personnel, manning and training refer to human resources, the discussion about the human element can also include several considerations about the human factors that a ship management company should bear in mind, cultivate and cater for in the course of the safe and successful operation of its fleet:

- Habitability: the company ensures accommodation, washing and toilet facilities, messrooms, group meeting and exercise areas are comfortable, clean (or cleanable) and convivial.
- Manoeuvrability: the company ensures its ships have the most appropriate manoeuvring capabilities.
- Workability: the company ensures its ships and systems are appropriate for the work situation.
- Maintainability: the company ensures operational maintenance tasks, manuals, diagnostics, and schematics are rapid, safe, and effective to allow equipment and systems to achieve a specified level of performance.
- Controllability: the company ensures appropriate integration of people with equipment, systems, and interfaces.
- Survivability: the company ensures that there are adequate firefighting, damage control, lifesaving and security facilities to ensure the safety and security of crew.
- Occupational health and safety: the company ensures appropriate consideration of the effect of work, the working environment and living conditions on the health, safety and wellbeing of seafarers.
- System safety: the company ensures appropriate consideration of the risks from people using (or misusing) ship systems.

Lloyd's Register's *The Human Element: Best Practice for Ship Operators* suggests that a four level categorisation of ship management companies depending on the involvement of the human factor in their operations.

- Level 1 - Reactive: feedback on human element issues is gathered, the company listens to issues, reviews them and acts on them.
- Level 2 - Proactive: the ship operator seeks out human element issues, takes action to gather data, and then acts on it.
- Level 3 - Managed: human element issues are addressed as part of a plan, and there is a managed programme of work considering them.

- Level 4 - Optimised: the ship operator is able to consider human element issues as part of the business strategy and to make costed trade-offs between topics such as manning, automation and operations.

From the above, it can be inferred that successful shipping operations have the human element – the capacity of the people to interact – at their core.

1.2.1. Bulkers

Bulk carriers are the world's primary transportation means for dry bulk commodities. Bulk carriers come into two basic types, namely geared and ungeared. Geared bulk carriers, oftentimes Handysizes up to Ultramaxes, carry more varied cargoes and may trade to ports where there is little to no infrastructure for handling cargo. Most of the smaller vessels have a maximum of five holds and hatches. These vessels will usually be equipped with four cranes of up to 30MT safe working load (SWL) placed between the hatches. The hatches will be hydraulic, stacking vertically at each end of the hatch coamings. In most geared bulk carriers, tank tops will be strengthened for grab discharge and the vessel might have its own grabs for use where needed.

Type	DWT	Geared	LOA	Beam	Draft	HO/HA
Handysize	20-40,000	Y	175,00	29,40	9,64	4 or 5
Handymax	40,52,000	Y	189,00	31,00	11,37	5
Supramax	52-60,000	Y	189,90	32,26	12,52	5
Ultramax	60-68,000	Y	199,99	32,26	13,00	5
Panamax	68-80,000	Y & N	225,00	32,26	14,15	7
Kamsarmax	80-84,000	N	229,00	32,26	14,60	7
Post-Panamax	84-125,000	N	235,00	43,00	12,88	7
Capesize	145-190,000	N	292,00	45,00	18,22	9
Newcastlemax	205-210,000	N	299,70	50,00	18,23	9
VLOC	220-450,000	N	327,00	55,00	21,40	9

Table 1. Characteristics of bulk carriers

Larger bulk carriers, Panamaxes and Capesizes are not geared. Large bulk carriers tend to carry limited cargoes such as grains, iron ore, coal and bauxite, and generally ply between ports that have equipment for loading and discharge. Panamax vessels may have either side rolling or fore- and aft-rolling hatches although the latter is more common. They will generally have seven holds and hatches. Capesize vessels generally have nine holds and nine side-rolling hatches, Notably, some of the largest Vale vessels only have seven. Bulk carriers of the largest sizes of the deadweight spectrum generally do not have gear.

In a joint publication, Lloyds Register, UK P&I Club and INTERCARGO note that the carriage of solid bulk cargoes involves serious risks, which must be managed carefully to safeguard the crew and the ship. These risks include reduced ship stability (and even capsizing) due to cargo liquefaction, fire or explosion due to chemical hazards and damage to the ship structures due to poor loading procedures.

The main legislation governing safe carriage of solid bulk cargoes is the International Maritime Solid Bulk Cargoes (IMSBC) Code, which became mandatory on January 1, 2011 under the SOLAS Convention.

The IMSBC Code categorises cargoes into three groups:

- **Group A** – cargoes which may liquefy if shipped at a moisture content exceeding their Transportable Moisture Limit (TML). Liquefaction means that a cargo becomes fluid (liquefies). On ships, this happens when the cargo is compacted by the ship's motion. Cargoes which are prone to liquefaction (mineral concentrates; including copper, iron ore, lead, nickel and zinc concentrates, nickel ore and coal) contain a certain quantity of moisture and small particles, although they may look relatively dry and granular when loaded. Liquefaction can lead to cargo shift6 and even to the capsize and total loss of the ship and can occur even when cargoes are cohesive and trimmed level.

- **Group B** – cargoes which possess a chemical hazard which could give rise to a dangerous situation on a ship. Group B cargoes are classified in two ways within the Code: 'Dangerous goods in solid form in bulk' (under the International Maritime Dangerous Goods (IMDG) Code; and 'Materials hazardous only in bulk' (MHB). Cargoes that are usually classified under the Group B status include coal, direct reduced iron, metal sulphide concentrates, ammonium nitrate-based fertilisers.
- **Group C** – cargoes which are neither liable to liquefy (Group A) nor possess chemical hazards (Group B). Cargoes in this group can still be hazardous. Examples of Group C cargoes are iron ore and other high-density cargoes that can overstress the tanktop, sand and fine particles that can easily be inhaled and result in respiratory disease and cement.

1.2.2. Tankers

Oil tankers generally fall into two types: smaller vessels up to Panamax which carry products and larger vessels which generally carry crude, but both of these share a lot of common characteristics. All oil tankers are double hull with segregated ballast tanks, manifold systems, hose-handling cranes and venting systems, and all over 20,000 dwt are fitted with inert gas (IG) systems. Most modern vessels are fitted with cargo heating systems consisting of heating coils. The cargo compartment of the majority of tankers is, like the bulk carrier, divided by a series of transverse bulkheads into cargo tanks numbered from the bow.

Type	DWT	Coated	Coiled	LOA	Beam	Draft	Tanks
Handysize	20-40,000	Y	Y	175,50	29,20	9,50	12
MR1	40-50,000	Y	Y	179,99	32,23	12,61	12
MR2	50-55,000	Y	Y	186,00	32,23	13,02	12
LR1	65-80,000	Y	Y	228,00	32,24	14,47	12
Panamax	60-80,000	N	Y	228,60	32,26	14,52	12
LR2	80-120,000	Y	Y	243,96	42,00	14,92	12
Aframax	80-120,000	N	Y	228,60	42,03	14,80	14

| Suezmax | 140-180,000 | N | Y | 275,00 | 50,00 | 16,00 | 14 |
| VLCC | 250-340,000 | N | Y | 332,00 | 60,00 | 22,00 | 15 |

Table 2. Characteristics of tankers

Owing to the sensitive nature of the cargo being transported (crude oil, gasoline, diesel fuel, fuel oil and petrochemicals), tankers have usually been the instigating factor leading to the adoption of key pieces of maritime legislation, usually in the wake of a high-profile accident involving pollution to the environment by the escaping liquid cargo.

For example, in the beginning in the 1960s, great concerns about pollution were raised by a series of disastrous accidents involving tankers, including the 1967 grounding of the *Torrey Canyon* off Cornwall, England, the 1978 breakup of the *Amoco Cadiz* off Brittany, France, and the 1989 grounding of the *Exxon Valdez* off Alaska, U.S. The oil spills from these vessels caused great damage, and political reaction led to strict rules on the construction and operation of oil tankers.

Most notably, in 1973 the International Convention for the Prevention of Pollution from Ships (known as MARPOL) was adopted by the International Maritime Organization, an agency of the United Nations to which some 170 countries belong. A series of amendments to MARPOL have worked toward establishing a worldwide tanker fleet in which all but the smallest ships have double hulls or some suitable equivalent. In a double-hulled ship, the sides and bottom consist of two layers separated by a space sufficient to reduce the chance that an incident breaching one layer will breach the other. After 1996 all new tankers were delivered with double hulls or some alternative, and by 2026, according to the terms of the MARPOL amendments, all but the smallest single-hulled tankers are to have been rebuilt to a double configuration or are to be retired.

A more in-depth analysis of the regulatory framework and the conventions that underpin modern tanker ship management will follow in the next paragraphs of this chapter. However, it should be made clear that the idiosyncrasies of tanker shipping operations, as opposed to those of bulkers, which in their majority to do not transport cargoes harmful

to the environment, have led operators to adhere to a stricter regime when it comes to safety and security. This is an environment that has fostered the adoption of sophisticated ship management practices and has allowed for a learned discussion on soft skills.

1.3. Regulation pertaining to tanker shipping operations.

The Four Pillars of Maritime Law play an important role in the levels of safety and environmental protection seen present across the shipping industry today. These standards would not be possible without a mutual, global effort to uphold the cconventions and drive further improvements.

To monitor for compliance of each of the four pillars, Port State Controls (PSCs) of member flags may inspect a ship from a different flag state (and MoU) if there are clear grounds for believing that the ship, its crew, equipment, or certification do not comply with the requirements of the SOLAS, MARPOL, STCW and MLC Conventions.

Ongoing work is completed by the relevant governing bodies, with the support of the wider maritime industry, to ensure each of the Conventions remain up to date in addressing current maritime operations, procedures, technologies, and concerns.

1.3.1. International and supranational legislation.

IMO – International Maritime Organization

Since its founding in 1948, the International Maritime Organisation (IMO) has played a key part in the structuring of policy and procedure across the global maritime industry. Alongside its sister-agency, the International Labour Organisation (ILO), several crucial, internationally recognized agreements have been enforced.

The IMO is the United Nations (UN) specialised agency with responsibility for the safety and security of shipping and the prevention of marine pollution by ships. Initially

established as the International Maritime Consultative Organisation (IMCO) in 1948, it achieved full status as an agency of the UN in 1958. Its headquarters are in London.

The governing body of the IMO is the Assembly, which meets once every two years. The Assembly consists of 171 member states and three associate members. A Council of 30 member states elected by the Assembly, acts as IMO's governing body, known as the Council between the Assembly sessions.

In addition to the Assembly and Council there are five main committees: The Maritime Safety Committee (MSC), the Marine Environment Protection Committee (MEPC), the Legal Committee (LEC), the Technical Co-operation Committee (TCC) and the Facilitation Committee (FAL). Several subcommittees support the work of the main technical committees.

The committees have contributed to promoting the adoption of some 30 conventions and protocols which fall under three main groups: maritime safety, the prevention of marine pollution and liability and compensation, especially in relation to damage caused by pollution. Outside the three major groups are several other conventions dealing with facilitation, tonnage measurement, unlawful acts against shipping and salvage. IMO has produced more than 600 codes and recommendations on related matters.

The IMO itself has no direct power to enforce its conventions. When they are adopted, they will be incorporated into the laws of the flag state, who are then responsible for ensuring compliance. The work of surveying and the issuing of certificates of compliance is dealt with by classification societies. Inspection and enforcement are undertaken by flag state coastguard agencies and port state control organisations.

With the key goals of improving safety to ships, their operation and lives that sail upon them, in addition to improving the protection of the marine environment from pollution caused by routine operations and accidental damage, four key Conventions have been put in place to mandate requirements and standards surrounding safety procedures,

pollution prevention practices, seafarer training and qualification, and labour laws of the maritime industry.

SOLAS – Safety of Life at Sea

Overview

With one of the industry's main concerns being the safety of crew and personnel on board vessels, SOLAS – Safety of Life at Sea – is generally regarded as the most important of all international Conventions.

The international SOLAS Convention sets minimum safety requirements for the construction, equipment, and operation of merchant ships. The 14 chapters currently included in the SOLAS Convention consist of a range of codes and regulations which specify the minimum safety standards for the area mentioned above.

The SOLAS Convention does not apply to all ships. Only vessels travelling international waters (excluding warships, cargo ships of less than 500 GT, non-propelled ships, wooden ships, non-commercial pleasure yachts and fishing vessels) will be held accountable to the standards enforced by SOLAS.

All signatory flag states must ensure all ships registered under their flag comply with the standards set out under SOLAS. Certificates are issued to a ship to confirm that these standards have been met.

Brief History

Originally actioned in 1914 in response to the sinking of the *RMS Titanic*, recommendations were incorporated into the International Conference on Safety of Life at Sea (SOLAS). Among other items, these recommendations included lifeboats, lifeboat drills and inspections to ensure the lifesaving equipment and crew knowledge

were in place, should the need arise. This was the first major industry-wide safety Convention.

The SOLAS Convention has witnessed various versions over the years (1929, 1948, 1960). The latest version was introduced 1974, when a completely new Convention was adopted. One of the biggest changes meant that any amendments to SOLAS could now be implemented in a vastly reduced time frame to that previously enforced; the 'tacit acceptance procedure' permitted amendments to be enforced on a specified date, unless a certain number of objections were received.

Current Operation

Still maintained by the IMO, today the SOLAS 1974, as amended, Convention continues to mandate basic safety aspects for ships travelling in international waters, such as machinery, fire protection, and lifesaving appliances. The SOLAS Convention is regularly updated and amended to remain abreast of the changing needs, technologies, and risks of the maritime industry.

An up-to-date, detailed outline of the SOLAS Convention chapters can be found on the IMO website.

ISM CODE

The International Management Code for the Safe Operation of Ships and for Pollution Prevention (ISM Code) is also part of the SOLAS Convention. The background of to the introduction of the Code was a series of very high-profile maritime losses during the 1980s and early 1990s. The loss of the Dover-Zeebrugge ferry *Harald of Free Enterprise* in 1987 with a large passenger death toll was almost entirely the result of a lack of safety management procedures. This was followed shortly after by the loss of the ferry *Estonia* in the Baltic and, although there was more doubt about the proximate cause, safety

management was certainly a factor. There were other ferry incidents, not only in Europe but around the world.

However, although many of the total losses that occurred during this period were less high profile, a significant number were bulk carriers seriously or lost, sometimes without trace of vessel and crew. These were mostly large bulk carriers but there were also some new and well-maintained container ships. In some of these cases, there were failures of side shell plating owing to corrosion, particularly in the areas of the side shell frames. In other cases, the losses were because of failures in risk recognition and subsequent management.

The stated objectives of the ISM Code are set out in the preamble, paragraph I:

1.2.1 The objectives of the Code are to ensure safety at sea, prevention of human injury or loss of life, and avoidance of damage to the environment, in particular to the marine environment and to property.

1.2.2 Safety management objectives of the Company should, inter alia:

- *provide for safe practices in ship operation and a safe working environment*
- *assess all identified risks to its ships, personnel and the environment and establish appropriate safeguards and*
- *continuously improve safety-management skills of personnel ashore and aboard ships, including preparing for emergencies related both to safety and environmental protection*

1.2.3 The safety management system should ensure:

- *compliance with mandatory rules and regulations; and*

- *that applicable codes, guidelines and standards recommended by the Organization, Administrations, Classification Societies and maritime industry organizations are taken into account.*

The ISM Code now requires that records of the recruitment of key personnel be kept and that training records are up to date. Crew training is a requirement of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (SCTW).

In respect of the Master, section 6.1 of the ISM Code states:

6.1 The Company should ensure that the master is:

- *properly qualified for command*
- *fully conversant with the Company's SMS; and*
- *given the necessary support so that the master's duties can be safely performed.*

6.2 The Company should ensure that each ship is:

- *manned with qualified, certificated and medically fit seafarers in*
- *accordance with national and international requirements; and*
- *appropriately manned in order to encompass all aspects of maintaining safe operations on board.*

The Company has a clear responsibility to employ properly qualified and medically fit seafarers and be satisfied that they are familiar with the management system in operation. The Company should be able to satisfy the auditors, by whatever means, that this requirement of the Code is being adequately addressed.

This is also a requirement under MLC 2006. Copies of certificates may be held on file in the office, or it may be necessary to have a random sample of certificates e-mailed from

a cross section of the fleet. Some companies maintain electronic databases as opposed to a paper filing system. In this case a random sample of certificates should be obtained to verify the accuracy of the database.

The manning of the ship should cater for all operations on board while the ship is at sea, anchor or alongside, loading / discharging or carrying out any other activity e.g. tank cleaning, gas freeing, etc.

Actual compliance with the ISM Code is the responsibility of the shipowner and the ship manager to whom the owner has entrusted the vessel. There are, however, some significant implications for the charterer.

The introduction of the ISM Code was intended to create a new culture of safety at sea, whereby accidents, and particularly pollution incidents, would not be tolerated. When an accident happens in high profile waters, the public want someone made accountable. In the case of the loss of the tanker Erika off the coast of France in 2000, much of the blame for the serious oil pollution of the French holiday beaches attached to the charterer, the French oil company Total, because, unlike the owners, it had a very obvious public image.

The ISM Code requires formal procedures for all activity relating to the safe management and operation of the vessel, both in the office and in the ship afloat. In the same way as in other quality systems, the procedures need to be fully documented. While documented ship and safety management systems can be bought off the self, these will still need to be substantially tailored to the requirements of the individual company, the types of vessels it operates and even the trade routes with which it is involved. The best practice is to write the procedures in-house so that they reflect the best actual practice used in the company. All employees, both ashore and afloat, need to be inducted into the system, although the degree of involvement will vary greatly with seniority and areas of responsibility.

The ISM Code recognises that all ship-operating companies differ in their organisation and size and so does not seek to lay down specific tasks. It does, however, require all companies to nominate a designated person ashore (DPA), who will be the link between each ship and the highest authority within the company. Usually, the DPA will be a senior superintendent, but other than their role as the link with the directors or owners of the company, the ISM Code itself is silent on what experience is needed to perform the task. According to some legal opinion, it is not necessary for the DPA to even have seagoing experience.

An important aspect of any management system is identifying and reporting non-conformities. This is particularly the case with accidents, near misses and navigational discrepancies which may be seen to bring into question a particular officer's competence. These may occur because the system is not being followed, in which case corrective action needs to be taken to prevent reoccurrence. However, non-conformance is often the result of a badly written procedure which does not reflect the reality of the activity. In such cases, the procedure needs to be changed to reflect the reality. Reporting and investigation of non-conformance in at the heart of systems' improvement.

When a safety management system has been approved for the first time, the company is issues with a document of compliance (DOC) for its whole system and, as each ship is audited and approved, it is issues with a safety management certificate (SMC). The ship's SMC becomes invalid immediately when the ship is either sold or the management is entrusted to a new manager.

As stated above, the DPA is responsible for being the link with the ship and shore and will have direct access to the senior management. They shall be properly resourced and supported. Their role is important as it is key in the development and implementation of the SMS within the company so as to ensure safety at sea, the prevention of injury and death and avoiding environmental damage, in particular the marine one.

The DPA occupies a unique position in the company, so does not report to any department head, which prevents their roles being subordinate to that department's requirements. They can intervene at any point to stop something happening or ensure that something does happen if, in their judgement, this is necessary for the proper operation of the SMS.

Although this is not mandatory, the person chosen to be the DPA should preferably have seagoing experience as a certified ship's officer and at a senior rank. They should have operational experience in ship management at a senior level and some shore-based qualification relevant to the role and the marine industry. As their role will be to report directly to senior management, they should have the necessary skills to do this while having a hands-on attitude to dealing with officers and crew who look to them for guidance. They should have a good technical or operational knowledge of safety management and appropriate knowledge of shipping and shipboard practices. They should also be familiar with carrying out an audit of the safety management system.

As their responsibilities their responsibilities include the development of the SMS, they should be fully familiar with the ISM Code and should be able to determine if the SMS meets the requirements. They should be able to assess its effectiveness by a process of audits and reviews and keep a proper record of this. They should fully endorse the safe practices recommended by the different organisations such as the Classification Societies, IMO and the other international bodies and see that these have been included within the SMS.

They should also analyse information and data from accidents, hazardous situations, near misses and incidents to apply the lessons learned from these.

- Communication and implementation of safety and environmental policies.
- Carry out internal audits of both the office and the vessels on six-monthly basis or more frequently if required to ensure that, through visits to the vessels and the

offices, all personnel are following the requirements of the SMS and are monitoring this.

- Arrange external audits by flag, class or recognised organisation (RO) annually or at specified intervals.
- Follow up on shipboard recordings of safety audit reports and familiarisation with recording these.
- Monitoring and periodic tests of ship's safety equipment.
- Organise safety and training meetings.
- Ensure that orders for spares and stores for SMS are properly followed up.
- Review Masters' reports and internal audits.
- Continuous monitoring and review of SMS.
- Reporting and analysis of non-conformities, accidents, and hazardous occurrences.
- Make appropriate revisions to the SMS and ensure that adequate resources and shore-based support is provided to achieve all the above.

Every vessel should have the following documents to show compliance with the ISM. A

An SMC (Safety Management Certificate) and a copy of the DOC (Document of Compliance) appropriate for the type of vessel are mandatory and they signify that the management system for the vessel and for the company meets the requirements of the ISM Code and the vessel is operated under its precepts.

The SMC and DOC are issued by the flag state or by an organisation recognised by the government or by another contracting government at the request of the flag state administration. They are issued under the authority of the IMO.

The SMC will be issued to the ship by the flag state after verifying that the manager and ship operate in accordance with approved safety management systems. It is valid for five years but with an intermediate verification after approximately 2.5 years to ensure the

vessel is still compliant or more frequently if there is reason to do so as, for example, a number of reported non-conformities. The SMC loses its validity if the vessel is sold.

The DOC will be issued to every manager whose SMS has been audited and complies with the ISM Code. It will be issued by the flag state or by an organisation recognised by the flag state. A copy of the DOC will be kept on board for production by the Master. It is valid for five years with annual verification to show that it remains compliant. A DOC is required for each type of vessel the manager operates. If it has a mixed fleet of tankers, gas carriers and chemical tankers it would require three DOCs, one for each type.

In addition to the above, the vessel and the manager will need to be able to show the following during a verification and inspection to show that the SMS is in operation as envisaged.

- **Records of audits**: as it says, a complete record of the audits, which should show objective evidence that the SMS is being implemented by the shipping company and its vessels. The objective evidence is based on observations, measurements or tests that are made during an audit and which can be verified.
- **Records of non-conformities**: when objective evidence indicates that a specific requirement stated by the SMS is not being fulfilled, it is considered that a situation of non-conformity has occurred. An audit or inspection may reveal a number of minor non-conformities which will require remedying in a short time period. A major non-conformity is an extremely serious situation which poses a serious threat to the safety of personnel, the ship or the environment. It will require immediate corrective action to be taken by the ship's management. It indicates a major lapse in effective and systematic implementation of the ISM Code.
- **Details of officers' training**: this will be as required by the STCW and all officers will need to be fully certified as necessary; their certificates must be revalidated at regular intervals.
- **Continuous synoptic record**: a form of logbook that stays with the vessel for its whole life, and records all changes of owner, class, flag, name, ISM etc. A ship

must keep its copy of the whole CSR aboard whatever changes, even its management, and the original documents must not be modified, deleted, erased or defaced. It will always be inspected by auditors and port state inspectors.

The object of the ISM Code is safety management coupled with continuous improvement. There must be an audit trail to prove this and the management office is audited annually by external auditors authorised by the flag country. Each vessel must be audited twice every five years. Between these external audits the managers must undertake internal audits to ensure that there is continuing compliance and must retain the documentary evidence of the internal audits. The audits have to show that what is written in the procedures actually takes place in practice and that there is evidence to support this.

MARPOL – The International Convention for the Prevention of Pollution from Ships

Overview

MARPOL – The International Convention for the Prevention of Pollution from Ships – is the main international maritime Convention covering the prevention of environmental pollution by ships. MARPOL covers pollution prevention from a routine operational and accidental perspective.

In addition to setting standards for the discharge and cleaning processes of operational shipping waste, the MARPOL Convention also sets standards for the stowing, handling, and transfer of hazardous cargoes.

Unlike SOLAS, the MARPOL Convention applies to vessels of all types flagged under a State member of the Convention, or that operate within its jurisdiction, regardless of where they sail. Signatory flag states are obliged to incorporate MARPOL requirements into domestic law.

Brief History

MARPOL was brought in to address the issue that large amounts of ocean are not under the jurisdiction of any one country or government. Due to this fact, monitoring for or proactive actions to protect against pollution were the responsibility of no one body.

The *Torrey Canyon* disaster in 1967 was the biggest oil spill to date and was the tipping point which put in motion the development of a Convention to address pollution prevention. Following this event, the IMO established MARPOL in 1973, putting in place an international agreement on the prevention of pollution to the marine environment by ships from operational or accidental causes.

However, the 1973 MARPOL Convention was not enforced, and following a number of further incidents between 1976-1977, the 1978 MARPOL Protocol was added to the original MARPOL Convention. The combined Convention entered into force in 1983. MARPOL initiated changes to ship design and standard of construction, with the aim of mitigating any potential treat of spillage, following incidents at sea.

Current Operation

MARPOL remains under the governance of the IMO and has undergone further amendments over the years. Six technical annexes continue to specify regulations aimed at preventing and minimizing pollution from ships. One of the most recent updates to come into force was the IMO 2020. Under Annex VI, regulation 14 of the MARPOL Convention, the IMO set a limit for the Sulphur content in fuel oil used on board ships.

The new limit of 0.50wt% will significantly reduce the amount of Sulphur oxide produced by ships, resulting in far-reaching health and environmental benefits. The new regulation applies to all ships of member states, regardless of size, operation, or destination. An up-to-date, detailed outline of the MARPOL Convention Annexes can be found on the IMO website.

STCW – Standards of Training, Certification and Watchkeeping

Overview

The STCW – Standards of Training, Certification and Watchkeeping for Seafarers – sets minimum qualification standards for personnel and crew of all levels on board a ship, including masters, officers and watch personnel.

Similar to the other pillars, the main purpose of the international Convention is to promote safety at sea, alongside the protection of the marine environment. STCW is helping to further achieve these goals through a common agreement which ensures similar programmes of training with equal standards are carried out by all seafarers of equal role and rank globally. The STCW Convention requires that training leading to the issue of certification is provided by an approved source.

The STCW standards apply to all ships greater than 24 meters in length and apply to all crew members. Certificates, minimum sea-time, and refresher courses are required for some roles. Unlike other Conventions, the STCW applies to ships of non-Party States when visiting ports of States which are parties to the Convention.

Brief History

In 1978, the STCW Convention established basic requirements of training, certification and watchkeeping for all seafarers on an international level. Prior to this, any such standards were set by individual governments. With each country abiding by national requirements, standards of training, expected knowledge, and experience varied widely throughout the world.

Major amendments were made to the STCW in 1995 and again in 2010, to address concerns with the existing Convention and incorporate updates to meet modern day training requirements.

<u>Current Operation</u>

Like the SOLAS and MARPOL Conventions, STCW remains governed by the IMO. The STCW Convention is made up of the STCW Code and Chapters. The Code is split into Part A and Part B. Part A provides mandatory standards regarding the STCW Convention and its annex, while Part B details recommended guidance. The Annex is comprised of 8 Chapters, which are divided into Regulations.

An up-to-date account of the STCW Convention Annexes can be found on the IMO website.

MLC – Maritime Labour Convention

<u>Overview</u>

The MLC – Maritime Labour Convention – sets out minimum standards for seafarers working on a ship. The comprehensive Convention provides an internationally recognized, single source of regulation and guidance.

Under the MLC, seafarers will have minimum working and living rights covering:

- Contracts of Employment
- Pay
- Manning Levels
- Hours of Rest
- Leave Entitlement
- Repatriation
- Compensation for Ship Loss or Foundering
- Career and Skills Development

In addition to standards stipulating minimum age and medical certification, under the MLC, seafarers will need to be trained and qualified to perform onboard duties (training must conform to IMO standards) and receive personal safety training. The MLC also ensures seafarers have access to satisfactory accommodation, recreational and medical facilities, when living on onboard.

The MLC requires that seafarers' work environments on ships must undergo regular risk assessments in order to mitigate workplace accidents. A system for reporting accidents and occupational ailments must also be in place under the MLC.

The MLC does not cover seafarers serving on ships operating across inland or sheltered waters, fishing vessels, or warships and auxiliary vessels.

Brief History

MLC was established in 2006 by the International Labour Organisation (ILO). The aim of the Convention was to ensure the rights and needs of the seafarers are safeguarded and free from opportunities of exploitation. The Convention did not come into force until 2013.

The main reasons behind the Convention were due to the sheer size and spread of international maritime trade activities and the number of people employed by the sector. The ILO state that the MLC "was designed to be applicable globally, easy to understand, readily updatable and uniformly enforced".

Current Operation

Today the MLC stands as the fourth pillar of international maritime law, building on the three other key IMO Conventions (SOLAS, MARPOL and the STCW), and further promoting and supporting maritime safety and environmental protection.

The Convention demonstrates how "*international cooperation can combine constructively for the most globalized of industries to concretely address the challenges to securing decent working and living conditions for seafarers, while simultaneously helping to ensure fair competition for ship owners*," says Cleopatra Doumbia-Henry, Director of the International Labour Standards Department of the ILO. Under the MLC, the national authority of the party has the power to withdraw a ship's maritime labour certificate if requirements and conditions are found to be in breach of MLC standards. Channels are available for seafarers to open a complaint should they feel the MLC is not followed on board a vessel.

Although the Convention is not ratified globally, the MLC applies to all ships entering ports of parties to Convention. Consequences may be faced by any vessel not complying with the MLC.

1.3.2. International associations.

Whereas the most recognizable pieces of maritime legislation that are now in force have been the work of the committees of the IMO, key regulations that affect tanker ship management have originated from private organisations, the work of which reflects the interests of the members that they represent.

INTERTANKO

INTERTANKO (the International Association of Independent Tanker Owners) is a trade association that has served as the voice for independent tanker owners since 1970, representing the interests of its Members at national, regional, and international levels. The organization champions an industry dedicated to support global energy networks by delivering safe, efficient, and environmentally sound transport services.

INTERTANKO actively works on a wide range of operational, technical, legal and commercial issues affecting tanker owners and operators around the world. It draws on

regular and direct contact with its Members and other industry stakeholders to develop and disseminate information and best practice, essential to the tanker industry.

As INTERTANKO is a Member-run, direct entry organisation, its strength lies in developing policies that are immediately relevant and beneficial to Members.

INTERTANKO works closely with its industry counterparts including the Oil Companies International Marine Forum (OCIMF), Chemical Distribution Institute (CDI), Society of International Gas Tanker and Terminal Operators (SIGTTO), International Association of Class Societies (IACS), International Group of P&I Clubs, the Port State Control MoUs, US Coast Guard, European Commission and many others.

A recognized Non-Governmental Organisation (NGO), it has, among others, observer status at the International Maritime Organisation (IMO), the United Nations Conference on Trade and Development (UNCTAD) and the International Oil Pollution Compensation Funds (IOPC), contributing actively to their work. Through this engagement, Members have the possibility to influence strategically important developments at the highest level.

INTERTANKO's mission is to provide leadership to the Tanker Industry in serving the world with the safe, environmentally sound, and efficient seaborne transportation of oil, gas and chemical products. Meanwhile, INTERTANKO's vision is for a responsible, sustainable, and respected tanker Industry, committed to continuous improvement with INTERTANKO constructively influencing its future.

INTERTANKO and Its Members' Goals:

- Be the representative forum of choice for all quality tanker owners and managers.
- Enhance public and political awareness of the importance and positive performance of the tanker industry.
- Promote balanced terms of trade and a competitive, transparent, and sustainable tanker industry.

- Lead the development, acceptance and implementation of uniform, worldwide international tanker standards.

- Lead in establishing and maintaining partnerships, cooperation and open and constructive dialogue with the relevant maritime authorities, organisations, associations and special interest groups.

INTERTANKO Members will:

- Lead the continuous improvement of the Tanker Industry's performance in striving to achieve the goals of:
  - Zero fatalities
  - Zero pollution
  - Zero detentions
- Deliver the highest quality services to meet the expectations of their stakeholders.
- Promote the availability and utilization of personnel with the highest quality marine skills and competencies

INTERTANKO's Four Strategic Objectives:

- To develop and promote best practices in all sectors of the tanker industry, with owners and operators setting the example.
- To be a positive and proactive influence with key stakeholders, developing policies and positions, harmonizing a united industry voice, and engaging with policy and decision makers.
- To profile and promote the tanker industry, communicating its role, strategic importance, and social value.
- To provide key services to Members, with customized advice, assistance and access to information, and enabling contact and communication between Members and with other stakeholders.

INTERTANKO's Strategic Work Plan includes major issues, high-level actions, and targeted benefits to Association Members in five Main Focus Areas:

- Safety
  - Tanker design/construction (Application of CSR Classification standards)
  - Machinery/equipment (Lifesaving appliances, Classification standards, Anchoring, and mooring systems)
  - Fuel (Quality, Sampling, Switching operations, alternative fuels)
  - Cargo (properties, safe entry into enclosed spaces, inert gas)
  - Seafarers
  - Fair treatment (Criminalization, Shore access/visas, Medical treatment)
  - Crew competence (Training requirements, Competence Management System, Officer matrix)
  - Seafarer welfare (Cadet berths, Fatigue/rest hours, Health monitoring)
- Environment
  - Emissions to water (Ballast water, Hull fouling management)
  - Emissions to air (SOX, NOX, VOC (Annex VI of MARPOL) Greenhouse gas emissions
  - Ship Recycling
  - EPA VGP Recordkeeping and Monitoring
  - Waste Management
- Operations
  - Vetting & Risk Assessment
  - Ports
  - Maritime Security (Piracy, Sanctions, Refugees, Cyber risk management)
  - Safe navigation (ECDIS, Pilotage, eNavigation)
  - Chemical tanker ops
  - Gas tanker ops
  - Port State Control
  - Places of Refuge
- Commercial Sustainability

o   Payment Performance

o   Charter party terms & documentation

o   Worldscale

o   Insurance & Liability (Compensation, Liability limits, Marine insurance)

Further to the above, INTERTANKO produces a wide range of guidelines and commentaries on issues related to technical, marine, operations, environmental, commercial and charter party issues. Many of these guidelines are an essential complement to government and operational regulations.

Some of them are:

- Guide to the Vetting Process, 13th Edition, October 2019.
- Guide to Port State Control - 2019.
- Guide to Terminal Conditions of Use – June 2018.
- Safety Management Initiatives in Shipping – October 2016.
- Guiding Principles to Emergency Management and Crisis Communications- January 2004.

INTERCARGO

INTERCARGO is an acronym for the International Association of Dry Cargo Shipowners. It was established in 1980 following recognition for the need of an international organisation to represent the interest of shipowners in the bulk dry cargo sector. It followed the development of Intertanko, which has shown what could be done for independent owners of tanker tonnage.

The first meeting, held in 1980, composed of founding members drawn largely from Greece with a small number from Scandinavia and Hong Kong. Over 35 years, membership has grown to more than 160 companies and groups who operate ships engaged in the transport of dry bulk commodities such as iron ore, coal, grain, timber,

steel and other similar cargoes. The importance of the dry bulk industry is that, without the estimated 500 million deadweight tonnes of dry bulk shipping, global trade, industry and ultimately modern lifestyles could not be maintained.

INTERCARGO is the only international shipowners' group whose objective is the promotion and protection of the interests of private, independent owners in the dry bulk sector. It considers policy issues of a governmental or commercial nature which affect the overall health of the sector. It recognizes that many issues involving the operation of bulk carriers are dealt with by other organisations. Under its constitution, INTERCARGO will not duplicate the work of others.

Services provided by INTERCARGO to its members include an information service, advice, guidance, and representation. An active committee structure covers policy, technical and commercial issues. It participates in the work of the International Maritime Organisation (IMO).

OIL COMPANIES INTERNATIONAL MARINE FORUM (OCIMF)

OCIMF was formed in April 1970 in response to the growing public concern about marine pollution, particularly by oil, after the Torrey Canyon incident in 1967.

In the early 1970s, a variety of anti-pollution initiatives were starting to emerge nationally, regionally and internationally, but with little coordination. Through OCIMF, the oil industry was able to play a stronger, coordinating role in response to these initiatives, making its professional expertise widely available through cooperation with governments and intergovernmental bodies.

OCIMF was granted consultative status at the IMO in 1971 and continues to present oil industry views at IMO meetings. Since then, its role has broadened to take account the changing maritime activities of its membership. Its remit now covers safety, health,

security, and the environment pertaining to tankers, barges, offshore vessels, and terminal interfaces.

The current membership of OCIMF comprises well over 100 companies worldwide.

Today, OCIMF is widely recognized as the voice of the oil industry providing expertise in the safe and environmentally responsible transport and handling of hydrocarbons in ships and terminals and setting standards for continuous improvement. Membership is extensive and includes every oil major in the world along with the majority of National Oil Companies.

OCIMF has much to be proud of. Not only has it contributed to a substantial quantity of regulation at the IMO aimed at improving the safety of tankers and protecting the environment, but it has introduced important new guidance on pressing current issues such as piracy and Arctic shipping. With the process of introducing new internationally accepted regulation necessarily slow as it crosses many individual countries and jurisdictions, OCIMF is in the unique position of being able to leverage the expertise of its membership to press ahead with much needed guidance on important industry issues. This provides the means to improve practices in the membership and in the wider industry and serves as a valuable reference for developing regulation.

In addition to its extensive publications library, OCIMF has a rich portfolio of tools including its Ship Inspection Report (SIRE) programme and Tanker Management and Self-Assessment tool (TMSA), both of which have gained worldwide recognition and acceptance. It continues to develop new tools, with OVID the latest to be launched in January 2010, and a new Terminals inspection tool in development.

OCIMF's Vision: A global marine industry that causes no harm to people or the environment.

OCIMF's Mission: To lead the global marine industry in the promotion of safe and environmentally responsible transportation of crude oil, oil products, petrochemicals and gas, and to drive the same values in the management of related offshore marine operations. We do this by developing best practices in the design, construction and safe operation of tankers, barges and offshore vessels and their interfaces with terminals and considering human factors in everything we do.

OCIMF have identified three objectives, or goals, which will help the organization deliver on its mission and vision

Objective 1: Concentrating on four high-impact risk-related priority areas of publications, advocacy, programs and member collaboration.

Objective 2: Realigning the committee structure to deliver more effectively on the four priority areas and enhance engagement with all stakeholders.

Objective 3: Enhancing operational efficiencies to deliver outcomes effectively and remain relevant to evolving risks across the marine industry now and in future.

As with organisations, OCIMF contribution to the shipping business can largely be understood by taking a look at the scope and breadth of its publication. Some of them are:

- Ship Security – Hull Vulnerability Study, 2019 (OCIMF)
- BMP5, 2018 (OCIMF and other industry associations)
- Global Counter Piracy Guidance for Companies, Masters and Seafarers, 2018 (OCIMF and other industry associations)
- The Guidelines on Cyber Security Onboard Ships, 2018 (OCIMF and other industry associations)
- Guidelines to Harden Vessels, 2018 (OCIMF)

- Regional Guide to Counter Piracy and Armed Robbery Against Ships in Asia, 2016 (OCIMF and other industry associations)
- Ship Security – Bridge Vulnerability Study, 2014 (OCIMF)
- Guidance for Oil Terminal Operators on the IMO International Ship And Port Facility Security (ISPS) Code, 2003 (OCIMF)
- Piracy and Armed Robbery Against Ships, 1st Edition, 2000 (OCIMF)

THE INTERNATIONAL TANKER OWNERS POLLUTION FEDERATION (ITOPF)

ITOPF was established in 1968 in the wake of the *Torrey Canon* oil spill. Its original function was the administration of an oil spill compensation scheme.

The *Torrey Canon* was one of the world's first supertankers. In 1967 it grounded off the south west coast of England and spilled 119,000 tonnes of crude oil. This was the biggest oil spill to date and focused world attention on the problems associated with major tanker incidents. At that time, the law relating to oil pollution was undeveloped and recovery of costs and claims for pollution damage depended broadly on proving that the ship owner was negligent.

The pollution damage and publicity following this incident provided the catalyst for the world's tanker owners to create a voluntary scheme to ensure that compensation was available to those affected by oil pollution. The scheme was set out in an agreement known as the Tanker Owners Voluntary Agreement concerning Liability for Oil Pollution (TOVALOP). ITOPF was originally established for the purpose of administering this scheme.

The administration of TOVALOP remained an integral part of our activities for more than 25 years until the scheme's termination in 1997.

During the 1970s, ITOPF developed its technical services function and established a team of well qualified scientists able to offer around the clock technical support to tanker owners, their P&I insurers and other groups.

This was prompted by the high incidence of major tanker spills, which underlined the need for a specialized group to provide advice on the fate and effects of oil spills and response techniques. This work also included objectively assessing the technical reasonableness of clean-up measures and claims for compensation.

Despite the dramatic reduction in major oil spills since the end of the 1970s, growing environmental concerns and media coverage meant that demand for ITOPF's expertise and impartiality in this field remained strong.

ITOPF's experience also led to a broadening of its work to include advisory services (such as assisting governments and industry with contingency planning), training, education, and the provision of information.

ITOPF has been providing its key service of emergency response to tanker owners since the 1970s. From 1999 this service was formally extended to the owners of other types of ship as well.

During the 1990s the growing awareness of oil pollution from container ships, general cargo ships and other non-tank vessels, plus the development of the Bunkers Convention, led to a change in our structure and funding.

From February 1999, owners of ships other than tankers were eligible to become Associates of ITOPF and have access to our technical services.

More recently, the pollution potential of substances other than oil, primarily chemicals, and the development of corresponding international conventions, e.g. the HNS Convention, has led to an increase in demand for our expertise in these areas.

Over the years, we have also provided advice on spills of other substances, including vegetable oils, cereals, coal, and containerized cargoes.

During the last half century, ITOPF has attended over 800 incidents in 100 countries, including landmark cases such as the *Amoco Cadiz*, *Exxon Valdez*, *Braer*, *Sea Empress*, *Erika*, *Prestige* and *Hebei Spirit*.

1.4. Tanker Management Self-Assessment (TMSA).

The introduction of the International Safety Management (ISM) Code in July 1998 required companies to develop and implement a safety management system (SMS) for vessels within their fleet. This was intended to standardise and document management processes that would assist with the reduction in the number of accidents on board and help to protect the marine environment.

However, within the tanker sector, inconsistencies in the application of the Code from one company to another soon became apparent to vessel inspectors and oil company ship vetting departments. To help address this imbalance the Oil Companies Marine Forum (OCIMF) introduced the Tanker Management Self-Assessment (TMSA).

1.4.1. Definition and history

Historically, Tanker Management and Self-Assessment program was released in 2004 by OCIMF as a tool for tanker operators to measure, improve and evaluate their safety management systems. The initial version of the TMSA was originally intended for tankers of at least 500 GTT following the 1974 SOLAS Convention requirements, and as that, of the ISM Code.

Four years of experience and comprehensive feedback from the oil industry brought about the publication of TMSA 2 in 2008. TMSA 2 was updated to widen its application to all tank vessels, irrespective of size. The third edition of TMSA (TMSA 3) was introduced in April 2017. TMSA 3 revised and updated all the twelve existing elements and introduced a thirteenth: "Maritime Security". This latest edition has been updated to

provide clarity of wording, improve consistency of language, and make conducting the self-assessment much easier. This edition of TMSA reflects current legislation, emerging issues and incorporates feedback from shipping companies worldwide. All thirteen key elements of TMSA refer to aspects of ship management and operational activity that should feature in every safety management system.

The introduction of TMSA 3 coincided with the integration of the TMSA system directly into the Ship Inspection Report Program (SIRE) application. Previously, the SIRE and TMSA systems had been operated separately. The new combined SIRE/TMSA program provides an improved, single area to maintain all data related to a tanker's technical operator.

1.4.2. Scope

TMSA system is designed to help companies continually improve their SMS through developed phased improvements, determined from self-assessment and audit results. Mainly, the TMSA provides a standard framework of self-assessment of a company's SMS which is a basic pillar of the guidance and aids the understanding of the nature of the guidance as well as its orientation. The process of a company's self-assessment is conducted according to the listed key performance indicators and best practice guidance on how to acquire appropriate standards of safety performance. The results from this assessment can then be used to develop an improvement plan, using the stages of achievement described in the program, to achieve safety and environmental excellence.

1.4.3. Analysing the basic elements

Element 1 and 1A – Leadership and the Safety Management System

A statement of commitment from the company chief executive is a fundamental foundation of any safety management system. Element one acknowledges this fact and outlines the responsibilities of company management to develop and maintain a dynamic

SMS that promotes excellence in the fields of health, safety, security, and the environment (HSSE). Furthermore, management's commitment is to provide clear and concise documented procedures that identify the roles, responsibilities for all staff, ashore and onboard. Also, procedures for efficient communication between shore-based management and the fleet must be established. This commitment from the company is paramount for any safety management system to meet TMSA 3 standards and key performance indicators.

Element 2 – Recruitment and Management of Shore-Based Personnel

A mechanism to control the assessment of competence and certification of seafarers has, to some extent, been addressed with the introduction and continued revision of the IMO 1978 Standards of Training and Certification and Watchkeeping (STCW) Regulations (as amended). Element two of TMSA identifies the need for a similar approach to the qualification and appointment of shore-based personnel.

A formalised pre-employment process should determine the suitability of applicants for all appointments to shore-side posts. The selection process should ensure that candidates are medically fit, technically competent, suitably qualified and experienced to undertake the roles for which they are recruited. Appraisal, training, continuous development, and succession planning programmes should be integral parts of the SMS. Personnel continuity, with an emphasis on staff retention and development are key factors in ensuring effective committed and motivated shore management. Personnel records should include a training portfolio for each member of staff, which can be used to ensure that they are kept up to date on recent developments within the industry.

Element 3 and 3A – Recruitment Management and Wellbeing of Vessel Personnel

The competence, motivation health and well-being of a ship's crew are critical factors in ensuring the safe and efficient operation of any vessel. Pre-recruitment checks by the employer need to determine the accuracy of an applicant's qualifications and experience.

Pre-employment medical screening of crew members, such as those offered by the Association have been shown to significantly reduce claim costs for medical and repatriation expenses.

Regular crew appraisal procedures adopted by an employer will help identify those individuals who work well as team and can be used to ensure crew members are provided with programs of continuous professional development suitable for their own, and the company's objectives. Continuous appraisal should be used to identify and correct weaknesses in competence and to encourage and develop candidates for promotion.

In situations where manning agents are used, regular audits of those agents should be conducted to ensure company procedures are reflected in operating practices. Adequate resources should be allocated to ensuring that the personal needs and well-being of sea-staff are satisfactorily addressed.

Element 4 – Vessel Reliability and Maintenance including Critical Equipment

Robust and well applied repair and maintenance procedures are important in ensuring safe, efficient, and reliable vessel operation. The ISM Code calls for additional control measures to be established for mechanical, electrical, and other items of equipment that could, in the event of failure, result in a hazardous situation. This 'critical equipment' may include, but not be limited to main propulsion systems, steering gear, and cargo handling equipment.

Efficient planned maintenance systems (PMS) that incorporate defect reporting and close-out procedures will assist with maintaining a vessel's classification status. Effective PMS should also ensure that suitable spares are available for the timely completion of planned work.

There should be a close working relationship between a vessel's crew and the designated superintendent. Regular vessel visits, including sailing visits, by superintendents reinforce

this relationship. Procedures for out-of-service repair periods, e.g., dry-dockings, should be formally developed and involve close collaboration between ship and shore staff.

Element 5 – Navigational Safety

Although the master is ultimately responsible for the safe navigation of the vessel, the company is obliged to establish and maintain navigational procedures that ensure the safety of the vessel. These are likely to reflect the content of publications such as the International Chamber of Shipping publication 'Bridge Procedures Guide' and ensure that navigational techniques appropriate to the circumstances of the voyage, are implemented fully. Implementation of industry best practices would include the regular conduct of comprehensive navigational audits, conducted on passage by suitably qualified and experienced personnel from the company. Company audits should be backed-up by and bench-marked with, independent audits performed by suitably qualified, specialist contractors.

Element 6 and 6A – Cargo, Ballast, Tank Cleaning, Bunkering, Mooring and Anchoring Operations

The driving factor behind TMSA Elements 6 and 6A is the desire to ensure that on board operations associated with cargo, bunkering and mooring are conducted safely and efficiently. To that end, comprehensive procedures covering all aspects of the applicable operations need to be in place. Furthermore, those procedures need to be understood and applied by all relevant staff.

Junior officers should be actively engaged in the planning and execution of cargo, bunkering and mooring operations, as part of their personal development plans. Crew members should receive suitable training prior to being placed in charge of cargo and ballasting operations, this may include the use of computer based or simulator training ashore. Mooring operations are a frequent source of personal injuries. These accidents are often caused by poor working practices and a lack of a proactive safety culture.

Element 7 – Management of Change

Change of any description within an organization or on board a ship introduces the possibility of additional risk. An evaluation of the impact that change may have on operational matters and procedural tasks will assist in identifying those areas that will be affected most. Suitable risk assessments will then be necessary to control the implementation of this process. COSWP Chapter 1 - 'Managing Occupational Health and Safety' – Annex 1.1 'Management of change' - provides detailed instructions on how this should be carried out.

Technical changes may require the provision of revised drawings, plus revisions to operational and technical manuals. Required changes need to be properly recorded and effectively linked with the vessel's document control system. In this way important controlled documentation will remain relevant and up to date.

There should be a periodic review of all implemented changes, to evaluate the outcome of those changes and to measure the extent to which planned objectives have been met

Element 8 – Incident Reporting, Investigation and Analysis

The fundamental underpinning principle of Element 8 is that all incidents are preventable. Therefore, the company needs to have procedures in place that incidents and near misses are always reported, investigated, and analysed, to prevent recurrence. Incident investigation needs to delve down into the actual root causes. Measures to effectively eliminate the causes and prevent further incidents need to be implemented and promulgated.

Element 8 highlights the importance of crew and shore staff involved in accident investigation receiving suitable training and support from the company and third-party subject specialists.

Training programs should include suitable refresher training, and this should form part of the individual's personal training program. Company reflection and review practices must ensure that incident information and analysis findings are promulgated efficiently to the other vessels within the fleet and details are discussed with crew members during safety committee meetings and onboard training drills.

Element 9 and 9A – Safety Management

TMSA principles are intended to enhance the implementation of the spirit of the ISM Code and the adoption of a proactive safety culture on board.

Monitoring the implementation of safety management systems requires a review by shore-based managers of working practices carried out on board. Completed risk assessments should be reviewed by technically competent company representatives. Common risk assessments should be introduced throughout the fleet. A comprehensive programme of near miss reporting should be adopted. All these measures serve to promote the safety culture on board.

Best practices include the implementation of concentrated safety awareness campaigns, detailed procedures for the management of third-party contractors and the employment of fleet safety trainers to conduct onboard training and to promote company values and safety culture.

Element 10 – Environmental and energy management

The 10th Element, which focuses on environment and energy management, is the critical practice of identifying and assessing pollution generated from maritime operations as well as the safe reduction and disposal residual waste. TMSA 3 encourages reporting procedures & contingency planning to be implemented to cover hazardous incidents. It is a requirement that a maritime organization monitors its performance quarterly and

provides benchmarks across the fleet to ensure environmental action plans meet standards such as ISO 14001 & MARPOL Annexes.

Element 11 – Emergency preparedness and contingency planning

The 11th Element of TMSA 3 looks at the requirements of implementing an effective response in dealing with onboard emergencies where a vessels crew is required to undertake training exercises-based merchant shipping legislation. Maritime organizations are required to develop safety procedure drills along with shore-based response teams to partake in training. TMSA 3 identifies the need for maritime organizations to undertake media training and to arrange security management.

Element 12 – Measurement, analysis, and improvement

The 12th Element is considered one of the most vital aspects of a successful safety management system. A maritime business must ensure system manuals are utilized as a part of daily operations that are analysed for their effectiveness and to ensure they have not become outdated. By giving regular audits indicates how well the safety management system is adhering to industry best practice guidelines and how well the system is performing overall, along with the connected vessels and shore support offices.

Element 13 – Maritime Security

The 13th and newest Element of TMSA 3 focuses on Maritime Security, which mainly consists of the use of Risk Assessment solutions to identify and mitigate risks. It is a requirement to adhere to BMP 4 guidelines, so it is necessary to define and maintain a stock of equipment for vessel hardening. It is also a requirement to define an Operational Security Area to monitor the number of transits of vessels. Best practice requires travel advisory and threat level circulated data sharing across a fleet as well as the verification of armed guard's qualification criteria before employing them onboard vessels.

This element mainly consists of:

- Use of Risk Assessment solution to identify and mitigate risks
- Define and maintain stock of equipment for vessel hardening as per BMP 4 guidelines
- Define Operational Security Area and monitor the number of transits of vessels as per Operation Security Reports made in the solution
- Circulate travel advisory and threat level data sharing to vessels using the document system
- Verify armed guard's qualification criteria before employing them onboard vessels using our standard measurement lists

1.4.4. Reasons that led to the implementation of TMSA

To be effective, a management system needs to be much more than just procedures. A company's management should define the values and aspirations and detail and also how the company intends to achieve the objectives of their stated policies. Management should provide adequate resources to ensure that the vessels are properly managed, crewed, operated and maintained. The management system should also include procedures which ensure that incidents and near misses are investigated to determine root causes, so that corrective and preventative actions can be implemented. There should be systems in place to analyse risk to ensure exposure to risk is considered at every level of management.

TMSA contains all of these elements and provides a structure to assist owners and operators to assess the effectiveness of their own safety management system with suitable tools; so as to measure and improve aspects identified as being sub-standard or weak.

The benefits of the TMSA to vessel operators are clear:

- Helps to drive up the standards of safety management systems, leading to fewer incidents.

- Encourages a continuous improvement approach to safety management.

- Embeds a preventative approach to maintenance, reducing unplanned stoppages and delays for repairs.

- The reduced the risk of incidents and delays/breakdowns feeds back over time into higher performance in terms of safety and environmental protection and enhances the reputation of the company.

- Companies that incorporate the TMSA guidelines into their management systems are considered to have an active assessment process, even if not being inspected under SIRE or having adopted ISM.

- Reduced risk of incidents feeds back over time into lower insurance costs and higher earnings.

- The process is not imposed upon vessel operators from outside. It is owned and managed by the operators themselves and the resulting data remains fully under their control.

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Chapter 2: Soft skills and their relation to the shipping industry.

The maritime history, to a large extend, is a history of human character against all odds. Since the creation of the first dugouts 6,000 years BC, all the way through the age of discovery, the difference between the successful and the unsuccessful voyage has laid in the ability of the crews to make decisions, stay resilient and maintain confidence amidst the fury of nature.

The ability to identify precise location or do an impeccable route planning, unthinkable at the time, became significant much later, with the introduction of complex navigation instruments and communication tools. Technical skills of the crews turned into a critical factor, as the better equipped ship and more technically knowledgeable crew meant a faster and a safer journey. Today, thanks to advancements in artificial intelligence and automation we have witnessed a process of "deskilling" - automation of many of the tasks onboard led to reduction of demand for technical skills. A new era seems to emerge, as interpersonal skills, self-management skills and ability to cope with unstructured tasks are about to become the main factor that differentiates between the low performing and the high performing crews.

TMSA 3 (new edition) tries to overhaul the measure performance process, not only with the streamline of KPIs but also with the introduction of non-financial measurements and the assessment of soft skills. Furthermore, TMSA3 introduces a different approach by focusing on the human element and behavioural safety suggesting that crew competence is the tool for crew retention and development. Humans are not simply an element like the weather. They are at the very centre of the shipping enterprise. They are the secret of its successes and the victims of its failures. It is human nature that drives what happens every day at work – from the routine tasks of a ship's rating, right through to the policy decisions of the IMO.

Moreover, the success of tanker operations depends on people carrying out their tasks reliably and safely. It is therefore essential to focus on human element and the required

so called "soft skills" that stem from human element actions. Conducting operations safely and without incidents relies on human competency, which comprises both technical skills (hard skills) and non-technical skills (soft skills). The industry's focus until now has been on developing and accessing technical skills, with the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention) being the main international convention addressing the competencies of seafarers. Any officer who holds a certificate of competency issued by a proper authority that meets STCW Convention requirements is qualified to serve in that rank. Since 2010, the STCW Convention also refers to soft skill competencies such as leadership and managerial skills, decision making, teamwork and communication.

Our research begins with David J. Deming statements at his relevant study. "*The skills and tasks that cannot be substituted away by automation are generally complemented by it, and social interaction has - at least so far - proven difficult to automate (Autor 2015). Our ability to read and react to others is based on tacit knowledge, and computers are still very poor substitutes for tasks where programmers don't know "the rules" (Autor 2015). Human interaction requires a capacity that psychologists call theory of mind - the ability to attribute mental states to others based on their behaviour, or more colloquially to "put oneself into another's shoes*" (Premack & Woodruff 1978; Baron-Cohen 2000; Camerer et al. 2005)."

In fact, soft skills and personal attributes can be just as important as technical skills. Ten of the sixteen 'crucial proficiencies for education in the 21st century' identified by the World Economic Forum are non-technical.

What is more, in terms of shipping operations, shipping industry continues to face challenges in safely moving environmentally sensitive cargo around the world. As it is stated on the Human Element guide, since 1970 the industry has made great strides in reducing the number of incidents, presenting a remarkable safety and environmental record. Unfortunately, many incidents still occur despite rules and regulations. Analysis of the contributing factors in all shipping sectors shows that the major factor is the human

element. Conducting operations safely and without incidents relies on human competency, which comprises both technical skills (hard skills) and non-technical skills (soft skills).

Discussing about soft skills, we cannot avoid referring to the diffusion with the human element. The 'human element' is misnamed. It implies something that happens at the side-lines – a piece of the picture that is hopefully being dealt with by some specialist or other. Or else it implies that it's 'just one of those things' – a bit of a mystery about which we can do little more than shrug our shoulders and hope for the best. But humans are not simply an element like the weather. They are at the very centre of the shipping enterprise. They are the secret of its successes and the victims of its failures. It is human nature that drives what happens every day at work – from the routine tasks of a ship's rating, right through to the policy decisions of the IMO. Fortunately, there is a lot that is known about human nature – and a lot of practical things that can be done to ensure people play to their strengths – while avoiding the pitfalls. So, what do we mean by human nature? In regard to shipping operations, we focus on the following aspects of human nature:

1	People make sense of things	5	People get tired and stressed
2	People take risks	6	People Learn and develop
3	People make decisions	7	People Work with each other
4	People make mistakes	8	People communicate with each other

In this chapter we will examine above human element aspects and their relation to crucial operations in shipping (more on 2.4.1). Our goal is to allocate the needed competencies and (soft) skills that enhance safety and productivity both for ashore and onshore personnel of a shipping management company. Chapter 2.1 concerns defining soft skills and competencies.

2.1. Defining soft skills

Non-technical skills have become widely acknowledged as important for workplace outcomes in addition to traditional technical skills. The Collins English Dictionary defines the term "soft skills" as "desirable qualities for certain forms of employment that do not depend on acquired knowledge: they include common sense, the ability to deal with people, and a positive flexible attitude. However, there is no universal definition for these skills. Different terminology is often used and can highlight different elements of these skills. Some examples of the various labels of non-technical skills including:

- Transferable skills: are skills that can be applied in varied contexts – for example a skill which can be developed in one job or industry but is still relevant and useful in another job or industry, even where the contexts are very different. This terminology is used by the Committee for Economic Development of Australia (2015) and is cited as being increasingly important as employees transfer to different industries more frequently.

- Employability skills: defined by the Department of Education, Employment and Workplace Relations (2002) as 'skills required not only to gain employment, but also to progress within an enterprise so as to achieve one's potential and contribute successfully to enterprise strategic directions. Some universities such as Deakin University, RMIT, and Sydney University also use the term employability skills to highlight their importance for graduate employment outcomes.

- Enterprise skills: a combination of developed problem-solving techniques and ability to think creatively to come up with new solutions and recognise business opportunities (Foundation for Young Australians 2016).

- Soft skills: often used by the business community that relate to a series of interpersonal or intrapersonal qualities necessary for individual. OCIMF and INTERTANKO at the Behavioural-Competency-Assessment-and-Verification paper, approach soft skills by a rough definition of " An ability to interact successfully with other people, systems and equipment, procedures and their environment." On the same paper, Human Element is attributed as: "The effective interaction of people with procedures, equipment and each other"

As we are going to discuss later on, soft skills vary. Stephen M. Kosslyn in his article supports that two non-routine kinds of work seem to me to be particularly common, and difficult to automate:

First, **emotion**. Emotion plays an important role in human communication (think about that physician sitting with the family, or that bartender interacting with customers). It is critically involved in virtually all forms of nonverbal communication and in empathy. But more than that, it is also plays a role in helping us to prioritize what we do, for example helping us decide what needs to be attended to *right now* as opposed to later in the evening. Emotion is not only complex and nuanced; it also interacts with many of our decision processes. The functioning of emotion has proven challenging to understand scientifically (although there has been progress) and is difficult to build into an automated system.

Second, **context**. Humans can easily take context into account when making decisions or having interactions with others. Context is particularly interesting because it is open ended — for instance, every time there is a news story, it changes the context (large or small) in which we operate. Moreover, changes in context (e.g., the election of a maverick President) can change not just how factors interact with each other but can introduce new factors and reconfigure the organization of factors in fundamental ways. This is a problem for machine learning, which operates on data sets that by definition were created previously, in a different context. Thus, taking context into account (as a congenial bartender can do effortlessly) is a challenge for automation.

Our ability to manage and utilize emotion and to consider the effects of context are key ingredients of critical thinking, creative problem solving, effective communication, adaptive learning, and good judgment. It has proven exceedingly difficult to program machines to emulate such human knowledge and skills, and it is not clear when (or whether) today's fledgling efforts to do so will bear fruit. And in fact, these are the very skills that employers across industries consistently report seeking in job candidates. For example, in one survey, 93% of employers reported that "a candidate's demonstrated

capacity to *think critically, communicate clearly, and solve complex problems* is more important than his or her undergraduate major." In addition, employers seek candidates who have other sorts of "soft skills," such as being able to learn adaptively, to make good decisions and to work well with others. These sought-after abilities, of course, fit perfectly with the sorts of things that people can do well, but are and will continue to be difficult to automate.

All of this suggests that our educational systems should concentrate not simply on how people interact with technology (e.g., by teaching students to code), but also how they can do the things that technology will *not* be doing soon. This is a new approach to characterizing the underlying nature of "soft skills," which are probably misnamed: These are the skills that are hardest to understand and systematize, and the skills that give — and will continue to give —humans an edge over robots.

- Capabilities: specify a standard expected in professional practice. They represent a holistic view of an individual's ability to perform in a range of contexts and their potential to improve (Bowles and Lanyon 2016).
- Personal attributes: describes the intrinsic traits of an individual such as loyalty or motivation. The Department of Education and Workplace Relations (2002) considered these personal attributes as separate from employability skills.
- Competencies: are the specification of the skills, knowledge, and attributes required to achieve performance standards for specific occupations (Bowles and Lanyon 2016).

Competencies can be difficult to define and assess. As behavioural competencies are vital for safe and efficient vessel operations, we should be able to define them more clearly and describe an assessment system. Further on (see chapter 2.4) we are setting up the types of behaviours (behavioural indicators) expected to ensure successful performance in different types and levels of tasks. Whether or not someone displays a particular competency will depend on their ability (do they know how to act in that way?)

and their motivation (do they desire to act in that way?), as well as the opportunity (when or in what situations they can demonstrate that behaviour).

2.2. The importance of soft skills

In our study we claim that shipping industry demands intensive social skills occupation either onboard or onshore. In fact, interpersonal skills, self-management skills and ability to cope with unstructured tasks are about to become the main factor that differentiates between the low performing and the high performing crews. Tanker Industry recognizes that more focus should be placed on soft skills. Personnel behaviour and attitude are key elements of a positive safety culture and promote a safe work environment and helps reduce incidents. At the following paragraphs we demonstrate a more holistic approach to this subject discussing soft skills importance from a broader view.

Skills, abilities, and motivation play a key role in performance at both the individual and organizational level. High performance organizations increasingly recognize that is not what people do but how they do their jobs that makes the difference in achieving objectives. It is crucial to have systems and practices in place that are geared towards defining, assessing maintaining and developing the soft skills that contribute to a culture of high performance, which can be observed through people's actions and behaviours.

As noted by the World Economic Forum, soft sills are especially relevant in the 21st century. Technology enhancements enable many routine technical tasks – like operating machinery and bookkeeping – to be automated. Yet businesses increasingly rely on critical thinking, emotional judgement, and problem-solving skills in their staff to not just understand what technology is saying, but analyse why it is saying it, and what ought to be done. And although globalisation offers businesses access to a broader customer base, it also exposes them to increasing competition.

Being able to understand the needs of customers from different geographical and cultural backgrounds, communicate meaningfully, and deal with complex and ambiguous

problems can be the key to customer service and differentiation. In this environment, the need for soft skills is going to intensify. Automation and artificial intelligence will result in a greater proportion of jobs relying on soft skills. Advances in technology have caused tasks that require hard skills to decline, making soft skills a key differentiator in the workplace. A study by Deloitte Access Economics predicts that "Soft skill-intensive occupations will account for two-thirds of all jobs by 2030".

2.2.1. Soft skills that drive business outcomes

A person with good communication skills could be easier to work with and relate better to clients, ultimately driving business outcomes. Critical-thinkers and problem-solvers can identify potential issues before they become significant and implement optimal solutions. Team members with strong self-management skills could require less oversight and be more reliable.

Ultimately, businesses value soft skills because they contribute to business success. Studies show that soft skills contribute to higher revenue, productivity, and profitability, across industries and countries. In a study of 1,100 manufacturing plants in the UK, for example, Haskell et al. (2003) find that differences in the level of soft skills of employees account for 3% of the total factor productivity gap between firms in the top and bottom deciles. This controls for a range of other factors – like age, experience, qualifications, and the firm of employment. This increase in productivity means more revenue for businesses.

2.2.2. Soft skills and the modern workplace

Skills such as active listening, collaboration, presenting ideas and communicating with colleagues are all highly valued in the modern workplace. Strong soft skills ensure a productive, collaborative, and healthy work environment, all crucial attributes for organisations in an increasingly competitive world. Moreover, LinkedIn included soft skills in its Global Talent Trends 2019 report, as the skills which impact the future of any

business. There are specific human capabilities which cannot be automated and these concern assertiveness and resilience amongst others. Furthermore, with technology applied everywhere, employees are required to have the necessary skills to collaborate and make effective decisions.

Empirical studies also show that developing soft skills increases the value of the employee. One study found that returns to investments in soft skills were equal to the return to hard skills. In a study of 1,500 employees, Balcar (2016) found that increasing soft skills and hard skills would increase the value of employees by 8.51% and 8.84% respectively. This additional value to businesses is a result of a range of factors including time savings – they can more quickly find information from others and spend less time replicating work already performed. It also improves the quality of the work produced. Further details involving the methodology of this calculation can be found in the Appendix. And the benefits of investing in soft skills can be even higher for businesses who have low levels of existing soft skills in their businesses. For example, female employees in an Indian garment factory who were randomly assigned to a soft skills training program recorded a 12% increase in productivity (Adhvaryu et al. 2016). The magnitude of this increase may be attributable to lower starting stock of soft skills, and as such may not be replicable more broadly. However, it does demonstrate that soft skills can bring significant benefits, even – and perhaps especially – in industries where these are traditionally seen as less critical.

Soft skills are becoming key indicators for significant employers. One bank's new performance framework uses a 'behaviours first approach' to ensure professional standards are maintained in every interaction with customers. The program also encourages employees to adopt a 'growth mind set' that places the onus on individual employees to self-manage individual programs and develop their own capabilities required for leadership positions. For example, at Deloitte, soft skills are used to differentiate high performing staff ready to move to the next stage of their career. According to human capital partner, Kate McDonald "When we designed our consulting performance framework, we reflected on the things that set high performers (at any level)

apart – and it came down to very much the 'non-technical' skills." For McDonald, the skills that make the difference in a high performing team include:

- Having intellectual curiosity
- Being comfortable with ambiguity and new experiences
- Demonstrating flexibility when things change
- Seeking to collaborate
- Building relationships based on empathy
- Developing self and others
- Having strong communication skills

2.2.3. The importance of soft skills in shipping.

ESCA in its EU Maritime Growth Plan for Sustainable Maritime Jobs Focuses on:

- The development of soft skills strategy, in order to ensure that EU seafarers acquire new skills as necessary as digitalisation and autonomy increase in importance
- Developing voluntary 'additional competencies and training', which may include a broader set of skills, including soft skills (e.g. shipboard management), digital skills and green skills. These could help transferability of skills and additionally prepare seafarers for management roles ashore. This would help to prepare for careers in wider maritime cluster on shore.

The increasing demands in regulation and technology makes soft skills imperative to carrying out the work of seafarers as it is today. The fact that the maritime industry is progressively adopting automation, artificial intelligence and rapidly heading towards autonomous ships, leads us to assume that the human element is becoming of lesser importance. This assumption is entirely incorrect. Across different industries, technology seems to create more jobs than it destroys. For example, in UK alone, between 2001 and 2015, technology had contributed to the loss of 800,000 jobs but it has helped to create

3.5 million more, with higher added value. The same applies to the maritime industry and the fact is that the technological evolution is merely creating a shift in job requirements for seafarers rather than making them obsolete.

Seafarers are now in need of a different set of skills, a set of soft skills, which are able to augment artificial intelligence and enable safer and more efficient operations on board. The introduction of automation may have taken away the need for technical skills but it in turn put a high emphasis on the officers' ability to process large amounts of information and make appropriate decisions based on the provided data. The decision-making skills of the officers is the key in ensuring that this is handled adequately, and this is only one example. The resurgence in soft skills does not mean that the importance of 'hard' job-specific skills will fall by the wayside. But the importance of balancing these types of skills is only set to grow alongside the rise of automation. Embracing this concept and incorporating it into your crewing process is a key to safe and successful operations of maritime industry in the era of automation and AI.

In shipping, customers and clients demand soft skills. "Charterers don't buy the boat; they buy the crew" has Knut Steinar Dyrkorn stated once. This signifies that in some segments of shipping the ship is part of Charterers basic requirements, and the crew is the competitive advantage. During a recent visit (to NTNU) from a shipping line which employs many European officers, it became clear just how significant an impact the onboard crew and its competence makes for the operational cost of the ship. It was revealed that a voyage in calm vs rough sea differed in fuel per mile efficiency by a factor of more than two. In this context, knowledge of the strategies and capability to exploit the fuel-saving opportunities are all-important and rest entirely with the crew. This shift also applies to the shore-based positions. Through lifelong learning (LLL), an improved interface between seagoing and shore-based jobs can help with building up transversal competences and skills in the maritime sectors. A possible client would demand for:

- Adapting to constantly changing teams and environments
- Long Term Planning

- Keeping calm in difficult situations.

- Working in a multi-cultural, multi-national environment.

2.3. Global industries that benefit from soft skills.

While the maritime industry is only starting to value the importance of soft skills, many leading global companies across various industries have already incorporated this concept into their core human resource management processes. In this article, we are going to see how these organisations are doing it and how it helped them to build a better performing workforce.

The 2018 Millennial Survey by Deloitte Global indicates that the top four skills employers seek to ensure long-term success are interpersonal skills, confidence/motivation, ethics/integrity and critical thinking. These happen to fall under soft skills, often referred to as essential for recruiting or evaluating and training existing employees. While reputable companies like Deloitte conduct very important surveys to further substantiate the demand for soft skills, many organisations are already using soft skills to build high-performing teams. Let's take a look at some of the largest sectors in the world that have already benefited from this.

2.3.1. Soft skills in the aviation sector

In the aviation industry, soft skills are even taught in specific workshops. This applies to Lufthansa Airlines, the largest airline in Germany and the largest airline in Europe in terms of passengers carried. Lufthansa researched soft skills and introduced online assessments for hiring, as well as for training. In this way, the company focused on the most valid candidates for the job, while ruling out the ones less likely to succeed. During training, the company conducts workshops, aiming to introduce the company and its processes as well as "valuable soft-skills" as they define them. The workshops include training regarding positive attitude, cultural diversity, communication skills, self-management and leadership tools. Likewise, marine, aviation sector is heavily regulated.

The foundation of core competencies for professional pilots as defined by the International Civil Aviation Organization (ICAO). Those are presented below:

- Communication
- Aircraft Flight Path Management - Manual Control
- Aircraft Flight Path Management - Automation
- Leadership and teamwork
- Problem solving and decision making
- Application of procedures
- Workload management
- Situational awareness

As it can be seen, most of the above, are referring to soft skills.

Communication for example is defined as a process by which information is exchanged between individuals through a common system of symbols, signs, or behaviour.

Effective leadership and teamwork aspect are mentioned regarding leadership involves teamwork - and the quality of a leader depends on how successful the leader is in building relationships with his team.

Problem solving and decision making, refers to Accurately identify risks and resolve problems. A professional pilot should use the appropriate decision-making processes.

Competency of applying procedures. It is important that pilots can study, understand and apply procedures when they go about their duties. It is the skill that demands the dentification and application of procedures in accordance with published operating instructions and applicable regulations, using the appropriate knowledge. The considerations required to operate a commercial airliner, simplified as **Workload management**.

Finally, **Situational Awareness** is a term that encompasses several elements of the pilot's knowledge regarding his/her position, the environment they are operating in and the position of other aircraft relative to their own. It also includes being aware of what your aircraft is doing at any given time and predicting possible situations that could arise in the future.

2.3.2. Soft skills in the energy sector

Global energy company Shell is one of the world's largest companies, with operations in more than 70 nations and customers from many cultures and industries. Employers rely on a range of skills their employees possess or need to develop, to successfully navigate this multinational type of business. What the company "saw" in soft skills was that they helped not only the company, but the employees themselves as well. Their people work remotely from many different countries; consequently, excellent communication skills are vital to the company's successful operations. Additionally, this is an industry which values interpersonal skills such as relationship-building and believes soft skills contribute to the exceptional internal relations of its employees. To define soft skills, the company conducts assessments during hiring processes and afterwards helps its employees to strengthen them. This tactic has helped the employees to consequently help the company to evolve.

2.3.3. Soft skills in the food sector

One of the biggest fast-food chain companies, McDonald's supports and implements the soft skills concept for its workforce. The company even carried out a campaign titled "Backing Soft Skills Campaign", to emphasise the economic importance of soft skills. Tesco, the British multinational groceries and general merchandise retailer, the third-largest retailer in the world measured by gross revenues, supported McDonald's on this soft skills campaign. "*We believe soft skills have a vital role to play in any workplace, helping individuals to realise their potential, building great teams and helping us deliver great service for our customers*". – Ms Judith Nelson, Tesco UK Personnel Director. Additionally, McDonald's released findings of its Workforce Preparedness Study where

teamwork, customer service and responsibility were found to be overwhelmingly important.

A relevant research study titled "The Value of Soft Skills to the UK Economy" points out: "*McDonald's is one of a growing number of major employers and other organisations in the UK that recognises the value of soft skills as a key component of the overall skill set of the UK workforce, and of its own 100,000 UK employees. These skills are vital to people's success in their careers and lives. They are also essential to creating high-performing and successful organisations*". "*As employers, we should re-examine which skills matter most, especially for the next generation entering the workforce. We should lay that foundation for employees to build the soft skills they need that will serve them throughout their career.*" – Melissa Kersey, McDonald's US Shipping, as well as maritime industries and services, operates in a global market and the global market significantly influences national transport systems. This mutual interaction will remain, or probably become even more important in the years ahead. Due to the nature of the industry, human capital is probably the single most important factor making the shipping industry efficient, effective and safe. Therefore, to support shipping competitiveness, its human capital needs to be strengthened.

2.3.4. Key managerial competencies for industry 4.0.

A recent study divulges the below managerial competencies that are needed from contemporary managers, in order to cope with new challenges in Industry, including all skills and abilities for general problem solving and decision making for example: analytical and research skills, conflict and problem solving, creativity. Analysis was focused on ability to make business decisions and lead subordinates within a company, include ability, negotiations tactics and response behaviour. Social competencies include an individual's social values, motivations for example: ability to transfer knowledge, leadership skills, ability to work in a team. Social competence is the foundation upon which expectations for future interaction with others are built, and upon which individuals develop perceptions of their own behaviour. Often, the concept of social competence

frequently encompasses additional constructs such as social skills, social communication, and interpersonal communication.

At this study exploration of the managerial competencies of future managers and engineers was assessed. Based on existing studies and analyses, a total of eight competencies were identified:

Creativity: Creativity is becoming key focus area for employers looking for the 21st century employee. Creativity is characterised by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions.

Entrepreneurial thinking: Entrepreneurial thinking skills refer to the ability to identify marketplace opportunities and discover the most appropriate ways and time to capitalize on them. It is more like a state of mind that opens your eyes to new opportunities.

Problem solving: Solving problems involves both analytical and creative skills. Analytical or logical thinking includes skills such as comparing, evaluating, and selecting. It provides a logical framework for problem solving. Problem solving is an essential skill in the workplace and personal situations.

Conflict solving: Resolving conflict is a key part of a manager's role. Managing and resolving conflict requires emotional maturity, self -control, and empathy. Resolving conflict in a positive manner is a skill than can be developed and practiced.

Decision making: Decision making is the process of making choices by identifying a decision, gathering information, and assessing alternative resolutions. Decision making is an integral part of modern management. Essentially, rational, or sound decision making is taken as primary function of management. According to the Oxford Advanced Learner's Dictionary the term decision making means – the process of deciding about something important, especially in a group of people or in an organization.

Analytical skills: Analytical skills are the thought processes required to evaluate information effectively. Analytical skills are the ability to visualize, gather information, articulate, analyse, solve complex problems, and make decisions.

Research skills: Research skills can be from need to be able to use reliable sources for continuous learning in changing environments. Being able to provide in depth information and advice on a given topic is an important skill. The most successful people tend to develop research skills early and use them consistently

Efficiency orientation: An 'efficiency' approach is one that stresses the efficient use of resources as the main determinant of decision and action. Efficiency orientation is inevitable.

What is more, at this study a Comparison of managerial competencies analysis between Pharmaceutical Industry and Automotive sector was performed. At the following the results are presented.

Knowledge becomes a key determinant of the development potential of enterprises Employees with entrepreneurial thinking skills stand out because they tend to think creatively and take ownership of their jobs as well as performance. This is recognized by experts from the automotive sector. Experts (practitioners) attach a very high value to competencies related to decision-making. Such thinking probably arises from the view that the ability to make optimal and effective decisions is the only way to increase efficiency and win a strategic advantage.

The development of new technologies triggers improvements in the quality of life of people and the welfare of whole societies. It is also the main driving force behind the contemporary global economy. Industry 4.0 requires basic research, new solutions implemented in the economy, monitoring of practical effects of such implementations and

identification of the potential for new implementations. For those to be possible, employee support and improvement of their competencies are necessary.

2.4. Soft skills in shipping operations.

Shipping, as well as maritime industries and services, operates in a global market and the global market significantly influences national transport systems. This mutual interaction will remain, or probably become even more important in the years ahead. Due to the nature of the industry, human capital is probably the single most important factor making the shipping industry efficient, effective and safe. Therefore, to support shipping competitiveness, its human capital needs to be strengthened. The present and future challenges faced by the maritime industry will create significant pressure on the present model of manning the maritime industry, both on ships and ashore. There are strong indications that new technologies and the resulting social interactions will significantly affect the required core skill sets, the modes of acquiring skills, and the relationships among key stakeholders, those being active at the labour market(s) as well as others. The maritime industry is a highly dynamic industry, exposed to numerous external influences.

At the same time, it is a highly regulated industry, at international, regional and national levels. The maritime industry is a highly competitive industry, thus heavily dependent on effectiveimplementation of modern technologies. Admintance of such changes will inevitably alter the required skill sets required for both on-board and shorebased jobs and positions. It is of the main pursoses of this paper to map the already spotted and regulated required softs skills set as well as identify and predict the ones required in the future. On the other hand, seafarers work in one of the most risk-aware environments. They are trained to a very high technical standard and are therefore able to contemplate risks and prevent them from becoming potential incidents. However, a focus on soft skills would enhance overall safety and further reduce incident rates.

While many of the industries around the world have already adopted and benefited from nurturing soft skills as we discussed on 2.3, the maritime industry is only beginning to accept this practice. Organizations such as Intertanko and OCIMF have already embraced the concept of psychometric assessments by including it as a requirement in the TMSA. The maritime industry is not so far behind but is only gradually beginning to gain momentum on incorporating soft skills into the core crewing processes. It is obviously seen that; technological developments will radically change the employment patterns in maritime industry in forthcoming years and similarly, skillsets and training needs required both in the immediate, medium term and long term future of the shipping industry will be different than today. The potential change in the work and the employment patterns will produce two big challenges in maritime industry. The first one will be a shortage in the supply of skilled seafarers worldwide and the second one will be the prediction of the future skills needs respect to technological developments. These challenges pull policy makers into a harsh race to spend continued efforts to invest in the skills required for the changing needs of the ships in the future and to build workforce with futureproof skill.

2.4.1. The nature of soft skills required for onboard operations.

With the spread of digitalization and automation in the shipping industry, the requirements and skills needed for individual jobs will change. In particular, an increase in shore-based jobs and reductions in the number of crew on board vessels might be expected. New and different skills and knowledge, especially in relation to information technology, will be required from seafarers if they are to assume the redefined roles on board and ashore that will be necessary to ensure the safety of vessels and efficiency of operations. Global climate changes result in severe weather conditions, where human performance is constantly tested onboard. Crews are required to have the perfect combination of technical skills to operate high-tech machinery and the soft skills to cope under pressure and quickly bounce back after an unfortunate incident. It is interesting to know that for the worst US commercial maritime disaster in 2015, the El Faro, the reason which was reported as the cause for the incident was lack of soft skills. The National Transportation

Safety Board identified the captain's decision making as the main reason for the tragedy that killed 33 people, as well as the crew's lack of assertiveness, as a contributing factor.

Seafarers are exposed to an increased number of work-related stressors: fatigue, long hours, monotony, noise, vibration, temperature changes, a multinational environment, limited recreation, isolation, long periods away from home. It has become apparent that seafarers should possess not only the knowledge but also the skills and experience which can help them efficiently deal with such stressors. Seafarers who are required to lead, perform within a diverse group of people, achieve tasks and be efficient should develop a strong skillset in a range of areas such as coping under pressure, self-management and interpersonal skills.

Coping Under Pressure: Life at sea requires mental resilience which most seafarers learn and get better at with experience. According to Gard, Every seafarer has his or her own coping mechanisms to deal with feelings of anxiety, loneliness, helplessness and depression. Certain unique aspects of life at sea can contribute to stress for seafarers, causing reactions which can jeopardise physical health, well-being, and workplace morale.The demands of work onboard, such as split shift patterns, the pressure of frequent inspections and administrative tasks all create a very demanding environment. Other challenges such as excessive responsibility, monotony, fatigue and others all affect well-being and mental health on board.The ability to cope under pressure, make decisions and maintain healthy functioning are of utmost importance to survive and thrive in such an environment. Seafarers must manage to make decisions, plan and respond efficiently to pressure and stress. How seafarers respond varies from one to the other, depending on the soft skills they possess.

Self-management: Well-being and efficiency are linked with competency and confidence. It is essential to have the knowledge and skills to perform at high standards and support self-assurance. Further, the ability to adapt to change and still thrive are critical to successful performance in a fast-paced workplace. Learning to adapt and be open to new ideas and procedures are essential to be able to maintain healthy

functioning. By being confident and capable and performing to high standards, seafarers can be considered accountable and trusted by others and thus boost the overall well-being.

Interpersonal Skills: Seafarers are one of the most isolated groups when at work as they have little contact with others, being at sea for weeks before they can reach a port. It is of utmost importance to be able to connect and work with others. Connecting with other crew members, their practices, communication, culture, and habits is vital to increase the quality of work and maintain well-being. The interpersonal skills of seafarers such as agreeableness, assertiveness and conformity play a vital role in their overall well-being. It may not be easy, but seafarers who respect and can build relationships with the fellow crew members will have improved well-being. Working onboard is a "team effort". According to Marine Insight, It is essential to enhance the interpersonal relationship between people to ensure that all jobs are done smoothly and safety.

2.4.2. Correlation between shipping operations and the human element.

Our methodological aproach includes the follwing critical operations:

Navigation: navigation in congested waters or anchorages, passage plan and monitoring, approach to pilot stations, entering or leaving a port, crossing a Traffic Separation System (TSS), bridge equipment failure, etc.

Cargo operations: cargo plan and operations, use of various pumps, inert gas system, tank cleaning, ballast/de-ballast during cargo operations, etc.

Mooring: berthing, unberthing, use of tugs, anchoring, Single Point Mooring (SPM) operation, etc.

Engineering: stand by routine maintenance and repairs, bunker operations, change of fuel, use of emergency systems, etc.

At the following paragraphs we correlate Human Aspect mentioned in 2.1 with above critical operations.

People strive to make sense of things in order to make the world sufficiently certain to support our goals, plans and activities. People also use sense-making to modify our plans when the world breaks through anyway – because these plans can never completely deal with its uncertainty, ambiguity and complexity. Inappropriate sense-making is a large and costly problem for the shipping industry – whether measured in lost profits, fines, investigation, legal and insurance costs, environmental damage, or sheer human misery. Sense-making is a significant factor in virtually all marine incidents, which remain numerous. Lloyds Register tells us that between 1995 and 2007, an average of 182 large ships were lost every single year. Over the 12 years, this amounts to 160 million gt. Cases of sense-making leading to catastrophic consequences abound in other safety-critical industrial sectors too, including Defence, Petro-chemical, Nuclear, Rail and Air.

The problem is not specific to maritime and is found wherever there is human activity. Human sense-making problems in the shipping industry arise in several ways. Firstly, there are now many practices, procedures, technologies, rules and regulations aimed at controlling the way things are done on land and at sea. They are well intended, but they can do the opposite of what they are meant to. This is because it is assumed that, ultimately, enough rules and technologies will have been created to cope with all situations. For example, accident investigators and regulators typically come up with new procedures to plug the gaps exposed by the latest incident. But, the situations aren't out there in the world. Instead they are created by people who are trying to make sense of their surroundings, informed by their current needs, constraints, purposes and past experiences. And each situation is new – not just because things never happened quite like this before, but because the pattern of human needs influencing each of the people involved is also unique.

Rules and technologies that are created to plug holes in previous operations tend to be either over-prescriptive or over-complicated, likely to conflict with each other and overload the people required to use them. At worst they don't apply because their creators did not (and could not) foresee the situation people are now in. Bigger rule books and more gadgets increase uncertainty, ambiguity and complexity – resulting in greater opportunity for more interpretations of "Automation creates new human weaknesses ... and amplifies existing ones" Lützhöft & Dekker (2002) Human Element Guide v1.0 – page 11 unfolding events. Automation in particular creates greater distance between people and the world around them, making them more isolated from it, and less able to notice or take effective action if things go wrong. People can be lulled into a false sense of security by confusing the reliability of technology with its robustness in dealing with novel or unexpected developments. The widely used expression 'radarassisted collisions' refers directly to this kind of problem.

A second problem is when insufficient attention is paid by shipping organisations to training in teamworking skills, communication skills and the true nature of human sense-making (eg as part of BRM, OOW, Rating, Deck and Engineering Officer progression training courses). Sense-making in the shipping industry is particularly vulnerable to differences in the ethnic cultures of crew members (see earlier panel, How does a person's culture affect their sense-making?). The lack of attention in this area results in increased risk of misunderstandings arising between people who depend on each other for their safety, the integrity of the environment and, ultimately, the profitability of their employers. Together, these two problems create a vicious circle. The more rules and technologies there are, the more technical training time is required to teach them. This reduces the time available for training in the true nature of sense-making.

Sensing and making sense: what's the difference? It is easy to assume that the five human senses simply capture the world and, somehow, store it in memory for later use – much like a video. If it was really like this, we would of course quickly drown in a vast sea of data. Just like a Master on a ship with a passage to make, we need the means to get our bearings, and navigate a course that has some meaning and value for us. While it is

the five senses through which information is collected, it is the context we create for ourselves that mainly controls what we pay attention to and create meaning for. Human senses are physiological marvels, but they are not of central importance in this study. Instead, our focus is on how people create context and meaning for themselves – in short, not how we sense, but how we make sense.

How do we make sense of things?

There are a number of factors that determine what we pay attention to, and how we use this information to interpret the world around us. These include:

Our personal needs: A sudden, shocking event – like a loud noise or alarm – will usually interrupt whatever we are doing so that we may decide whether to confront the threat or escape from it. This 'fight or flight' reaction automatically (and rather sensibly) grabs our full attention in an attempt to preserve our safety. It is triggered in a very old part of the brain that is also responsible for emotions, such as anger, fear and happiness. The advantage is that this part of our brain works very fast – even before we are consciously aware of what we are responding to.

Our self-concept: Each of us has a sense of who we are and what we are like. This sense of personal identity is developed through contact with family, friends, workmates, supervisors, management and, ultimately, by the working and ethnic cultures in which we live. Cultural differences are particularly relevant in the maritime world due to the involvement of several major seafaring nations. Cultures tend to differ in several important ways. These differences not only sensitise people to the world in different ways, but they also affect their interpretations of people from other cultures. Some cultures like to stay detached and focus on one thing at a time. For example, Germans, Scandinavians, Americans, Canadians, Australians and British tend to pay attention to one thing at a time, for which they like to set aside a specific time slot. They like to stick to plans, quietly follow laid-down procedures and focus on 'the facts'. They rely on information from statistics and reference materials and tend to remain job-focused and unemotional. They confront

problems with logic, use minimal body language to communicate with their colleagues, and don't like to lose face.

Some cultures like to get engaged and let things interact For example, Indians, Pakistanis, Polynesians and many Mediterranean peoples prefer to be involved in several things at once. Timetables tend to be fluid, changing as the several tasks in hand unfold. Plans change often and tasks are allowed to influence each other. Indeed, the unpredictable impact of one task on another is precisely the reason why detailed plans and schedules don't work. People depend on word of mouth and allow the relative importance of facts to change as a search is made for a balance that will best satisfy multiple goals. They often confront problems emotionally and use demonstrative body language to communicate. They don't lose face easily since failures tend to be attributed to circumstances rather than to people.

Some cultures like to be holistic and subtle. For example, Japanese, Chinese, Taiwanese, Koreans and Filipinos prefer to observe an unfolding timetable of events, respectfully listening to people while paying attention to the whole picture in order to decide upon (usually) small adjustments. They use information obtained both from reference books and first-hand contact with people. They avoid confrontation, use subtle body language, eg nods and slight movements, and pay attention at all times to protecting their colleagues from the culturally important issue of losing face.

Our past experience: The conclusions and reflections that people generate from their past experience play a big part in shaping the sense we make of the present. This past experience may consist of beliefs, mental models, rules, procedures and stories that we apply to features of the present environment to render it meaningful. The more experience people have, the more likely are to recognise the present as familiar. But note that any familiarity we notice is a projection we have made from our own past. By the same token, there is no good reason why anyone else is able to make the same projection and so attach the same meaning to a situation. Further problems can arise if we confuse experience with expertise. They are not the same thing at all. For example, a person's

experience may result in wrong conclusions and bad practice; or it may not yet be sufficient, leading to overconfidence, inadvertent risk taking and complacency. Another section of this Guide deals with the problem of risk and what factors affect our perception of it.

The goals we share with others: People are helped to make sense of a situation if they are engaged with each other in pursuing a common goal. What seems to be important is that people agree joint goals, refine their understanding, take action and maintain a balance to their activities within a shared operation such as crewing a ship or managing a shipping company. It is the shared goal-based context of these activities that provides big clues about how to make sense of what's happening at any moment.

Goal-sharing can be helped considerably by training aimed at helping people to develop shared methods, together with a realistic understanding of each other's roles and capabilities. Problems arise when the goals of people in the same organisation begin to diverge. A good example of this is when safety considerations appear to conflict with profit-making. This can happen, for example, when shareholders' shorter-term views are allowed undue significance.

When one perspective is permitted to dominate others, it not only indicates that goals cease to be shared, but that sub-goals (e.g. safety or profit; seeking to avert ambiguity or seeking a straightforward passing) are being mistaken for overall goals. If this situation is allowed to continue, failure occurs. The same is true for different organisations which are part of the same enterprise, such as the shipping industry as a whole. For example, if the regulators end up dominating the operations of the shipowners (or vice-versa), then the whole enterprise will become dysfunctional.

Our current practicalities: In any situation where we have things to achieve, we do not have infinite amounts of time and usually have a strong sense of diminishing returns In making sense of things, we usually stop when we have enough information to decide on a course of action that seems plausible. Our preference is for a working level of

understanding rather than a search for absolute truth. For example, when faced with uncertainty or too much information, an Officer of the Watch (OOW) will simplify their information needs to support a decision that seems workable in the time available. This may or may not turn out to be sufficient to deal with the reality of the unfolding event. There are many maritime examples where available information from modern bridge technology turns out to be ignored. Training can help, but it needs to be highly effective to overcome people's overwhelming need for simplicity in times of crisis.

HUMAN ASPECT	OPERATIONS
People take risks	Navigation Cargo operations Mooring

Table 3. People take risks

Risk refers to the chance that our sense-making turns out to be inadequate to deal with the world safely and effectively. Our perception of risk has little to do with the actual probability of something bad happening (see panel, Are risk and probability the same thing?). The problem is not a matter of calculating probability – though that is difficult enough for most of us Just as there are a number of factors that affect the sense we make of things, so there are a number of factors affecting our assessment of the risks we take. There are three main factors that influence our sense of risk:

The amount of control we think we have: The more control people believe they have, the less risk they believe they are taking. In the maritime industry, shorebased staff believes the risk of ship incidents is twice as great as crew members do as Bailey has shown. The high degree of control a person thinks they have may be real – due to a well-calibrated sense of their own well-developed skills, together with a highly pertinent assessment of the situation they are in. At the other extreme, it may be far from the truth – due to over-

confidence, lack of appreciation of missing skills or knowledge, stress or fatigue – amongst other influences.

The amount of value something has for us: The more a course of action appears to support a goal that we regard as important or highly desirable, the less risky it will appear to be (or the more we will overlook the risk normally associated with it). For example, one foggy morning, the Master of a passenger ship decided to leave his berth 10 minutes before a cargo ship cleared the same channel. He was already running late and his company and his passengers were all keen to avoid further delay. After the collision that followed, 17 passengers were hospitalised.

The extent to which things are familiar to people: The more a circumstance or action seems familiar, the less risky it will appear to be. Complacency is a much mentioned problem in the shipping industry and is often attributed to people who allow familiarity to blunt their sensitivity to risk. Likewise Human error, complacency is better seen as an effect rather than a cause.

The important thing about these three factors is that their overall mix is determined by the person who is exposed to risk. The actual risk any one of us takes is a combination of our personal mix on the one hand and, on the other, the problems in the outside world that really do have nothing to do with us, eg metal fatigue, instrument failure, or a severe storm. It is no wonder that risk and its assessment is such a challenging topic. Dealing with the perception of risk is not really about spotting dangers in the external world and avoiding them. It is much more about spotting weaknesses in our own assumptions about the world and managing the relationship between the world and our own imperfect knowledge of it.

HUMAN ASPECT	OPERATIONS
People make decisions	Navigation Cargo operations Mooring

	Engineering

By decision making, we mean the proccess of <u>rational decision making</u>. In fact fully rational decision making is considered impossible as it faces with two major problems:

- First, the practicalities of our ongoing tasks mean that we do not have time to do it. Instead we must rely on an alternative approach which produces the best decisions using the available information in the available time.

- Second, we live in an uncertain world where complete information is never available.

Rational decision making proccess in its purest form, it depends on:

- Having complete information about all the alternatives: As you we discussed see on the aspect of Making sense of things, people only use a fraction of the information that is available to us: perception involves an active search for information whose relevance is determined by a series of mental filters. If people in operational settings such as seafaring do not have either the time or the information to make purely rational decisions, what are they doing?

- Being able to distinguish and understand all the relevant differences between the alternatives.

- Using comprehensive criteria – that will be relevant throughout the life of the decision's consequences – for rank ordering all the alternatives.

- Efficiency vs thoroughness: If safety and quality are paramount to an organisation or the individuals within it, thoroughness will tend to be favoured by individual decision makers. If production targets and output are emphasised, then efficiency

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will be favoured. In practice, most organisations must be both safety conscious and profitable. However, the fact that efficiency and thoroughness are trade-offs means that it is impossible to maximise both at the same time. This tension is the source of a huge organisational problem. Simply stated, the problem is that every decision made is always a compromise. The amount of unnecessary risk – either to profits or to safety – signified by a particular decision depends on the extent to which the decision maker is accurately aware of the real (not just perceived) risks they are dealing with. Appropriate thoroughness is produced by training, mentoring, and properly debriefed job experience, acquired over time. Such training and experience also produces a natural efficiency of performance that arises from expertise and good judgment. A less natural kind of efficiency arises when organisational requirements to be profitable and competitive start to influence decision making against an individual's better judgment. If people are not sufficiently trained or, alternatively, if they perceive organisational expectations as too demanding, then the risks they take in their decision making will increase. Furthermore, we and our colleagues will often not know the extent of this increased risk until the illfounded assumptions or undue pressures that underlie our decisions are catastrophically tested. Generally speaking, people want to make decisions that allow them to carry out a stream of work as efficiently as possible. Usually this is because people want to maximise the time available for the next thing they have to deal with – whether this is a planned activity or because we need to plan for the unexpected. The amount of training and properly managed experience people have had will help them apply due care and attention (ie thoroughness). Inappropriate organisational pressure will tend to decrease such diligence. We might expect this to be a particular problem for anyone who has not received the right training and experience.

- Having the time to do all of the above: The time available for people to think and act is a major determinant of the decisions they make. Experienced people often appear to have more time, resulting in smoother performance. Experienced people

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who are also experts perform not only more smoothly in the available time, but also perform more effectively and more safely over time.

In shipping operation practicality seems to drive most of peoples decisions. Professor Robert Full, a biologist at the University of California at Berkeley, has observed that "nature works on a 'just good enough' principle, not a 'perfecting' principle". This is also true of human nature. Here are 10 'good enough' rules that seem to govern our behaviour in the workplace.

- It looks fine or It's not really important – so we can skip this step. Aka, If it ain't broke, don't fix it.
- It's normally OK or It's much quicker this way. Aka, We've done this millions of times before, so trust us.
- It's good enough for now. Aka, It's good enough for government work. ie it exceeds some requirement that passes as minimal in this organisation.
- It was checked earlier/will be checked by someone else later – so we can skip this check now and save ourselves some time. Particularly dangerous if used in combination!
- There's no time (or no-one) to do it now ie don't worry – we'll do it later – and trust we don't forget!
- I can't remember how to do it'– and have no time to look it up – but this looks like the right way. Aka, When all else fails, look in the manual.
- We must get this done in time – so we can't afford to follow all the procedures on this occasion.
- It looks like something we know, so it probably is. This assumption makes things convenient, since we then know what to do next.
- If you don't say anything, I won't either ie I've bent the rules to your (or our) advantage, so in return, I'll trust you to keep quiet about it.
- I'm not the expert, so I'll let you decide ie I will take comfort in someone else taking responsibility for what happens next. This also gives us more time to attend to other things we have to do.

Culture affects decision making: Vessel's work place is influenced by two different sets of cultural issues. The first of these relates to differences due to a person's cultural background.A person's cultural origins may make them more or less likely to break with laid-down procedures, defer to expertise, or more generally, prefer efficiency to thoroughness (or vice versa). A person's ethnicity may also make them more or less sensitive to the demands of the second set of cultural issues – the organisational culture in which the decision makers are embedded. The panel, How does organisational culture influence decision making?, describes some of the main efficiency-thoroughness tradeoffs that work at cultural levels within organisations.

How does organisational culture influence decision making?

Organisational policy may be written down or informally transmitted by what people see each other do. Either way, it exerts powerful influences on decision making – usually by emphasising efficiency over thoroughness. Here are five common mechanisms.

- Incident reporting policy Many organisations now have incident reporting schemes in which people are asked to report things that go wrong. One problem arises when such reporting conflicts with performance targets on which reputations, opportunities and bonuses depend. Another problem is that the absence of reports may be innocently taken to mean that all is well. Either way, the focus on reporting incidents may improve efficiency but, ironically, not necessarily safety.
- Management policy Managers tend to favour the efficiency of meeting their administrative deadlines rather than the thoroughness of maintaining high visibility with their teams. This is because it is their non-efficiency that the organisation will notice first, and if things go well, they will be praised for their efficiency. Of course, if they do not, they will be blamed for their lack of thoroughness.
- Subcontracting policy Subcontractors often feel under pressure to meet their client's safety standards for openness and reporting. But they may also believe that they will suffer if they report too many things compared with their competitors.

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This tension may be resolved by reporting enough to sound credible but not so much that the contract is lost, which favours efficiency over thoroughness.

- Cost policy Understandably, organisations like to reduce unnecessary costs. The problem is in the interpretation of 'unnecessary' and who does it. It is often used to improve efficiency over thoroughness.

- Policy integrity Organisations often say that safety (which requires thoroughness) is the most important thing for them but implement policies and performance measures that require efficiency. Adapted from Hollnagel (2009).

In making decisions, we differ in terms of the amount of situational awareness we have and the amount of situational familiarity we can recognise. Decision makers are dependent on their training and experience for the quality of their decisions. In particular, in making decisions, lots of relevant experience allows us to be better tuned to the real risks of the situation we think we are in. A large amount of research points to two main ways in which experts and novices differ:

The first of these is the accuracy of the mental picture of what's going on – and what can happen next. This is often referred to as situational awareness. Good situational awareness depends on three levels of mental activity – all of which take place simultaneously, and all of which are subject to the active mental filters described in the aspect of Making sense of things. These three levels are:

- Perception: In making decisions people must be able to pick out all the pieces of information in their environment that are relevant to our goals. Some of these may be very subtle, such as small changes over time in what an instrument says or the sea state. Some may rely on memory, such as what someone told them on watch handover. And some will be very obvious, such as a bridge alarm. In complex situations, many disparate information sources may be relevant and they all may be simultaneously competing for our attention. They may also be hidden away, requiring a deliberate search to find them.

- Comprehension: However disparate or numerous the relevant individual information elements are, in making decisions people must be able to integrate them in a way which allows us to form a coherent picture of what is going on around us. It is here that people establish the meaning, significance and priority of the information relevant to their goals. For example, if a chief engineer sees warning lights and hears unusual engine noises while under assisted tow in a restricted channel, the extent of the problem must be quickly evaluated to work out the implications for the ship and the accompanying tugs.

- Projection: Projection requires us to have good mental models of the dynamic relationships between the relevant parts of our environment over time. Experts focus a lot on creating their own futures via present decisions. In turn, these decisions are formed out of their comprehension of the likely interactions of all the elements they deem both relevant and important.

The second is the directness with which experts are able to arrive at good decisions – often under extreme time pressure. This depends on situational familiarity. Experts try to recognise important elements of the current situation from previous experience. For example, a fire chief called to an apartment fire noticed billboards on the roof and remembered a previous case when their supports caught fire, sending the boards crashing down on the crowds below. He moved the onlookers back and saved many lives on this new occasion. If experts are faced with a novel situation, they might borrow an idea or plan from another set of circumstances in their experience that was similar in some way. Whether faced with routine or novel problems, expert decision makers spend time mentally running through their plan for the current situation, projecting a story into the future, altering details as they go, until they can see the outcome they want. They then act.

As a result, their experience of the decision process is a relatively smooth, direct and continuous stream of thought, driven by a recognition of similarities between the current situation and their previous experience. For expert decision makers, it is usually obvious what to do. For non-experts, it is hardly ever obvious. If time permits, they must rely on

their knowledge of the rule book, or more likely where to find it so they can look up the relevant procedure. Very often, however, there is little time for this. If they cannot consult with a mentor, they will do whatever makes the most sense based on their limited experience.

HUMAN ASPECT	OPERATIONS
People make mistakes	Navigation
	Cargo operations
	Mooring
	Engineering
Table 5. People make mistakes	

The real problem in safety-critical industries like seafaring is that some mistakes have such serious consequences that they need to be caught before they have a chance to develop into disasters. Most of the time, seafarers catch their own (and each other's) mistakes quite successfully. However, sometimes they don't and because of the nature of what they do, the results can be very serious. It is widely reported that human error continues to be responsible for most maritime and offshore casualties. What is the nature of people's mistakes?

There are three main sorts of activity in which people make mistakes:

Skill-based activity: Where people are well practised in what we do. Here, because we can work without thinking too much about it, we can find ourselves doing something familiar (eg operating a well-used panel switch) when we should be doing something else (eg operating a less frequently used, but adjacent, panel switch). Or else, people can suffer a memory lapse (eg suddenly forget what we were going to do next).

Rule-based activity: Where people have more conscious involvement with the task, and need to apply rules and procedures to what we are seeing and doing. Here, people can

make a mistake by failing to apply a rule correctly, or at all (eg assuming that give-way vessels will always give way, or not realising themselves to be the give-way vessel).

Knowledge-based activity: Where people must have even more conscious involvement with our task (eg where people are attending a fire and must make decisions in novel circumstances). Here, the kind of mistakes people make are often to do with the way we make sense of the situation.

Factors contributing to mistakes. There are a number of factors that increase the likelihood of mistakes. Some of these factors operate at an individual level, while others are organisational.

Individual influences on mistake-making:

- Inadequate rest or high stress levels: Fatigue and stress reduce attention, concentration and response times.
- Insufficient training and experience: Poor training or lack of experience may result in attempting to do tasks with insufficient knowledge ('a little knowledge is a dangerous thing') or else a failure to prevent a dangerous situation developing). Lack of investment in training and structured experience also contributes to a poor safety culture by sending strong signals to the workforce that they are not valued.
- Inadequate communications: Successful communication is not simply a matter of transmitting messages clearly. It entails empathy on the part of the messenger to assure the listener's readiness to hear, and active listening on the part of the hearer (see section on Communicating with others). Much communication depends on both parties' ability to make sense of the situation they share (see section on Making sense of things).

Organisational influences on mistake making:

- Inadequate time: If there is not enough time to get everything done, people look for ways to be more efficient at the expense of thoroughness. people are also likely to experience high workload levels, which increases stress levels and accelerates fatigue.

- Inadequate safety culture: The most influential source of a good safety culture is the seriousness with which senior management approaches it via training, staff investment and the implementation of work processes that accommodate the time that safe practices take. Workforce mistakes increase not just because of the absence of this investment, but also because of the meaning people attach to the absence of the investment by their senior management.

Systems Thinking: As made clear in the aspects of Making decisions and Taking risks, people's behaviour – at all organisational levels – is more like a deft, smooth flow around the obstacles they encounter. This flow makes perfect sense at the time to all involved. It is only later, when things have gone wrong that some of their decisions and actions are re-interpreted as mistakes. The World of shipping operatons is not completely predictable as a series of causes and effects. The question raises: how can it be understood sufficiently well to stop serious mistakes in their tracks? Doing so requires a shift of view – driven by a number of observations about the way in which the world has changed in recent years. This shift of view emphasises the maritime world as a complex system of interacting, circular relationships. This is also known as <u>systems thinking</u>. It is out of these interactions that behaviour – both good and bad – emerges. This systems view brings into focus a number of important points relating to humans and the organisations they create. Here are four.

Humans create safety: In the systems view, people are not seen as sources of error so much as the creators of safety (see panel on previous page, Where is safety – in people or in rules?). This view recognises that there will always be gaps in any system because designers and rule makers cannot envisage all situations and contingencies. This means that human operators must be given some degree of freedom to cope with the

unexpected. In turn, this increases the need for the human operator to identify and manage the risks that arise.

Organisations are actually organic: In the systems view, organisations are not static, and safety emerges continuously from the overall behaviour of an organisation's interacting components – including its people. Many forces, such as political or economic concerns, can cause an organisation to drift away from safety. A good safety record can promote complacency, allowing risks to grow unseen. Perhaps the most common threat to safety is when change in one part of an organisation's functioning unwittingly disturbs functioning in some other part of the organisation.

Organisations create the behaviour they get: Assessment of the risks of operational error or adverse events often miss the point that the real risk to safetycritical operations is in the interfaces – the natural fault lines – between an organisation's different parts. These include the 'fault lines' between training and practice; managers and operators; designers and users; shipowners and crews; officers and ratings; efficiency and thoroughness. Focusing on the real risks is one challenge. Another is knowing how these risks are changing over time and, in particular, how far the organisation is drifting towards dangerous levels of behaviour.

Decision making must be based on systems thinking: All safety-critical industries are formed of different organisations which must interface successfully. In the maritime industry, these include shipbuilders, shipowners and managers, Masters and crews, port authorities, flags, insurance clubs and so on. In the absence of applied systems thinking, organisational decisions are taken that are locally optimised (ie too narrowly-focused on a small part of the problem) at the expense of global effectiveness. There are countless examples of this in the maritime industry – mostly driven by apparent opportunities to save money in the immediate future.

It is clear that it is normal for people to make mistakes. It is also clear that wider organisational factors play a huge part in helping to create our behaviour – including our

mistakes. These twin realisations have allowed a new approach to safety management to emerge in recent years. The key insight has hinged on the need for safetycritical organisations to shift from a blame culture to a 'just culture'.

A 'just culture' is founded on two principles , which apply simultaneously to everyone in the organisation:

- Human error is inevitable and the organisations' policies, processes and interfaces must be continually monitored and improved to accommodate those errors.
- Individuals should be accountable for their actions if they knowingly violate safety procedures or policies.

<u>Steps towards a 'just culture'</u>

- Address corporate and legal issues
  - o Need to obtain unambiguous boardroom commitment
  - o Need to create indemnity for incident reporters against legal proceedings – this may require changes to existing legislation
  - o Need to separate reporting system staff from disciplinary staff
- Design and integrate reporting system
  - o Need to identify responsibilities and incident report investigators with domain expertise in safety, operations, management and HR
  - o Need to create a rapid, efficient reporting process that captures and yields useful information at the right level of detail
  - o Need to create clear, easily-accessible process that will be used and trusted
  - o Need to decide if new process will be integrated with current incident-reporting procedure
  - o Need to create investigative and assessment processes for deciding accountabilities and action
- Develop, promote and roll out reporting system
  - o Need to identify and assign development resources

- Need to identify champion(s) and communications strategy • Need to educate users
- Need to collect feedback from users
- Need to feed back useful results to users at all organisational levels – including impact on production, efficiency, communication and cost benefits

HUMAN ASPECT	OPERATIONS
People get tired and stressed	Navigation
	Cargo operations
	Mooring
	Engineering
Table 6. People get tired and stressed	

Seafaring and fatigue go hand in hand. The widely-shared belief that fatigue played a significant part in marine incidents had been made official. Issues of reduced manning, increased workload and resulting fatigue have continued to play a major role in many maritime accidents to the present day. Reduced manning is an organisational policy aimed at increasing efficiency. It is often made possible by the introduction of automation. increased efficiency usually means a corresponding decrease in thoroughness.

Automation solves some problems at the expense of creating others. In the case of the unfortunate crew on Exxon Valdez, the demands placed on them increased fatigue to the point where it became a serious threat to safety. Rather obviously, people get tired when they have been awake too long. But how long is "too long"? Several factors affect this, as follows:

- **Workload**: The harder people work, the sooner they need time to recover from it. Workload itself is influenced by the design of the tools, equipment and procedures people must use, and the expertise they have acquired through training and experience. In fact, the problem of workload and its measurement is a little more

complicated than it looks at first sight. This is because it is the result of a mix of external and subjective factors.

- **Sleep debt**: People need enough sleep of the right sort to recover from their wakeful activities. In its absence, they build up a 'sleep debt' which severely affects their ability to stay alert. Sleep debt causes people to misread situations, overlook key information and fall asleep even when they know it will put them and their colleagues at extreme risk. There are two main causes of sleep debt:
  - o Disruptions to sleep itself – such as loud noises, bright light, cold, heat, motion, sickness, chronic pain and infection.
  - o Disruptions to natural sleep patterns, such as shift work, operational demands (eg paperwork, ship inspections, drills and emergencies), personal worries, and inadequate, inappropriate or badly-timed food and fluids. One of the most distressing things for someone who is tired is to be given the opportunity to sleep, but to be unable to. Insomnia can be both a cause and an effect of increasing sleep debt, forming a vicious circle that must be broken before the effects of fatigue create serious consequences.

- **Perceived risk or interest**: If people are stimulated by their sense of risk or interest in what they are doing, they can stay awake and alert for longer. However, the time they then need to recover from sustained activity will also get longer. If people are engaged on tedious or boring tasks, they will feel tired sooner. People often increase their exposure to risk in order to create the levels of interest and alertness they need.

- **Diet**: Inadequate levels of nutrition accelerate the onset of fatigue. Different foods also affect alertness. For example, heavier meals dominated by carbohydrates encourage sleepiness, while lighter, protein-based meals encourage wakeful alertness.

- **Fitness and movement**: People who are overweight and/ or lacking in exercise will tend to feel fatigued earlier than their leaner, fitter or more active colleague.

- **Time of day**: People live by natural daily rhythms, which means that they feel least alert in the small hours of the morning and most alert in the period before midday.

- **Environment**: People become more fatigued in environments with bad levels of light, noise, vibration, temperature and motion. Research has shown that some aromas, such as lemon scent, encourage alertness. As part of the Human Factors Integration Plan, the specific design activities relevant to avoiding undue fatigue relate to the following environmental factors:

  o **Lighting**: Ship lighting systems are not powerful enough to overcome the natural human slow-down in the early morning that is associated with sleep. It has been found that installing special lighting systems that generate 1,000 times the light of normal systems helps people to adjust to night shift working by resetting the body's normal rhythm.

  o **Noise**: High levels of noise can impair hearing either permanently or temporarily and ship designers generally take account of this. However, continuous exposure to lower levels of background noise, eg from distant diesel engines, is a source of stress (see later in this section). Lower levels of continuous noise accelerate the onset of fatigue, disrupt restorative (deep) sleep and produce other tell-tale signs of stress such as high blood pressure and digestive problems. Noise levels of 40 to 50 dBA start to interfere with sleep. 70 dBA significantly disrupts sleep for almost everyone. Over and above the 'safe' limits, ship designers need to pay attention to the sources and pathways of noise and aim for quieter equipment, and better noise isolation, dampeners, barriers and absorption.

  o **Vibration**: Vibration from a ship's onboard machinery and ship movement affects everybody onboard. The crew are always in contact with one or another ship's surface, through which vibration is transmitted. Even quite brief exposure to vibration leads to fatigue and stress. Ship designers avoid levels of vibration known to lead directly to physiological damage. However, the recommended maritime limits of vibration guidelines are still high enough to significantly disrupt sleeping patterns, leading to the dangerous accumulation of sleep debt. The bad effects of even 'safe' levels vibration are wideranging. Physiologically, they include changes to heart rate, breathing, blood flow and pressure. Seafarers can experience pain, nausea

and problems with visual focusing, coordination and altered perceptions – all of which are sources of fatigue and stress. To reduce this problem, ship designers need to pay attention to increased dampening and isolation to reduce vibration to well below the current recommended levels.

o **Indoor climate**: This includes temperature, ventilation and air quality. Safe limits for all these aspects are well known and already available to ship designers. Like noise and vibration, however, the recommended levels tend to be focused on preventing harm, rather than fatigue. Getting too hot makes us feel tired and sleepy, reduces what we are able to do and leads us to make mistakes. Getting too cold lowers our levels of alertness and affects our ability to focus on.

o **Ship motion**: This is also a known source of fatigue and stress for seafarers. The problems of disrupted sleep through pitching and rolling are worsened by joint soreness caused by compensating movements of the lower back, knees and ankles during wakefulness.

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The connection between fatigue and stress: Fatigue is a normal human response to normal human activity. Similarly, sleep is a normal human response to tiredness. The daily cycle of work/fatigue/sleep is a normal, healthy part of human life. As people pass through this cycle, their level of arousal fluctuates, which in turn helps to determine how alert they can be to their surroundings. When people are faced with very few demands, their arousal levels tend to be very low. As a result, their alertness suffers, and they will often feel bored and tired. As the demands around them increase, people become more aroused in order to cope with them. Their alertness levels increase and, unless they are suffering from a severe sleep debt, their feelings of fatigue can disappear.

The problem comes if demands go on increasing. Stress is produced when the demands on people (perceived or real) consistently exceed their ability to meet them. Stress produces a complicated series. One of the first signs of chronic stress is difficulty in sleeping, which can then contribute to the development of sleep debt. The inability of people to repay their sleep debt through stress-induced insomnia can itself become a

source of stress. This creates a particularly vicious circle in which stress increases sleep debt which increases stress level, with the result that performance levels decline ever faster. So, normal fatigue is not stress. However, the inability to deal effectively with fatigue can become a source of stress, as can the sleep debt that results. In addition, stress can increase fatigue by stimulating too much production of adrenalin – the source of the human 'fight or flight' reaction.

Causes of stress: Stress can be caused by a large number of factors. Some of these factors are work-related while others may belong to the private lives of the person affected. Seafarers are particularly vulnerable to both sources since their work brings them into contact with many known work-related stressors as well as removing them from their home lives and countries for long periods. The panel, Common sources of seafarer stress, summarises the research findings as they relate to seafarers in particular.

HUMAN ASPECT	OPERATIONS
People learn and develop	Navigation
	Cargo operations
	Mooring
	Engineering

Table 7. People learn and develop

Learning is a fundamental survival mechanism of all mammalian species, and humans are particularly good at it. So the question for safety-critical organisations like the maritime industry is not whether people learn, but what they learn – and by what means. The answer to these questions is more – or less – in the control of their managers and employers. As a result, it is less – or more – of a danger to everybody concerned, for without the right guidance, people learn the wrong things.

How do maritime people learn? A common, but incorrect, view of learning is that it involves transmitting information from outside the individual to inside their head. This view places emphasis on the skill of the teacher or the appeal of the learning materials, the

better for the learner to 'absorb' them. While instructional skills and content formats are certainly important, learning is an activity exclusively carried out by the learner. No-one else can do it for them, and it doesn't happen by absorption. Fundamentally, people learn by actively creating meaning for new things in relation to things that already have meaning for them.

Formal or Informal Learning? People informally learn what our colleagues do, what the shortcuts are, what seems to make sense to them, and what behaviours are rewarded. Informal learning may or may not result in safe behaviour. Often, the organisation will not find out until an unsafe behaviour is transformed by a host of other circumstances into injury, loss or worse. People form attitudes towards their organisation – and the industry as a whole – about the quality (low or high) of the effort to provide them with the information they need. And whatever people learn, they in turn transmit to others, helping to define and maintain the nature of the overall culture to which they belong.

Education or training? The aims of education and training are quite different. Education is aimed at widening and extending people's horizons. Its goal is to increase the number of future possibilities for the individual, and to increase the number of potential ways that the individual can approach each of those possibilities. By contrast, the aim of training is to constrain the possibilities, focusing the trainee on the particular responses and behaviours required to achieve specific and consistent operational performance standards. However, the differences between the two are really just a matter of scale. Both education and training demand a large increase in a person's mental and behavioural repertoires. The difference is that with education, the increase is with respect to the whole universe of possibilities, while with training it is going into much more detail in a highly constrained corner of that universe. In both cases, however, the same fundamental learning process is required for a person to engage with them.

HUMAN ASPECT	OPERATIONS
People work with each other	Navigation Cargo operations

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	Mooring
	Engineering

Table 8. People work with each other

When it comes to working with others, the jobs of most seafarers fall into two different sorts of activity. The distinction rests on whether the goals of the activity are individual and independent, or else team-based and shared:

- **Working with individuals**: Individuals with independent goals must work with each other to trade information and evaluate its meaning. The resulting decision – arising from, say, a selection interview – will affect the goals of both. The same applies to two people in a job appraisal interview or other formal staff discussion, between accident investigators and witnesses, or between different parties who are in negotiation with each other. In all of these cases, people need sets of interaction skills that will best serve their own, individual goals.

- **Working in teams**: In a team task, people must work with each other in mutually supportive ways to achieve a shared goal. Many seafaring jobs require people to work with each other as team members, each of whom contributes their effort to an objective that is bigger than any one of them. In these situations, people need skills that permit not just effective interaction between people, but good teamwork. A team is more than a group. While a group may be united by a common location (eg a group of bystanders), or common interests (eg members of a club), a team is united by a common goal, with each member having a defined role to play in achieving it. This means that each team member must have not only the technical skills to carry out their role, but the necessary team skills to carry out the role in concert with other team members.

Research over many years in a number of different safety critical industries has revealed five main types of team skill that are essential to team effectiveness. They are as follows:

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- **Team leadership**: This includes motivating, directing and coordinating team member activities, and assessing and developing team members' knowledge and skills. Good team leaders clarify team roles and performance expectations and engage team members in planning and feedback sessions. They also spend time synchronising individual contributions and seeking information that affects overall team performance.

- **Mutual monitoring**: This is concerned with the ability of team members to monitor each other's performance within a common understanding of the constraints and opportunities of the environment in which they must work. Team members who are good at mutual monitoring identify mistakes in their colleagues' actions and provide feedback that helps them to correct themselves.

- **Back-up behaviour**: This refers to the ability of team members to understand each other's tasks and responsibilities sufficiently well that they can anticipate problems (eg unacceptably high workload) in each other's tasks and even take over if necessary. Team members who are skilled in back-up behaviour, work continually to avoid problems for their colleagues or take some of the load, since they know that failure to do so will lead to problems for the whole team.

- **Adaptability**: This refers to the ability of team members to respond to continuous changes in the environment that affect their plans. Adaptable teams can identify external changes, understand their implications and develop new plans accordingly. They can also create new and better ways to accomplish routine tasks while remaining vigilant about the impact of such procedural changes on their safety.

- **Team orientation**: This refers to the degree to which team members are able to see themselves as team members with a common goal, rather than individuals with independent goals. Team members who are highly team oriented are very receptive to the suggestions of their colleagues. They also involve each other in setting goals, and then choosing strategies and sharing the information needed to achieve them.

People need to use all of these five types of team skill if they are to function as an effective team. However, to assure success, they must also employ three types of 'team glue'. This glue serves to keep team members together through updates on their progress and performance as they carry out their roles. The three types of 'glue' are:

- Similar mental models – so that team members have an agreed understanding of each other's situations and responsibilities, and how they each contribute to team goals and strategies.
- Mutual trust – so that each team member feels that their actions, misgivings and mistakes will be responded to efficiently and constructively with due regard to overall team goals.
- Effective communication – so that messages between team members are delivered with as much completeness and certainty as possible within the prevailing conditions (see the section Communicating with others).

HUMAN ASPECT	OPERATIONS
People communicate with each other	Navigation
	Cargo operations
	Mooring
	Engineering
Table 9. People communicate with each other	

Human communication is the process of influencing a human receiver to create thought and action that is consistent with, and responsive to, the sender's purpose. A common language, context and culture always increases the speed and bandwidth by which intended communications can occur. However, these commonalities do not eliminate the construction of unintended meanings. Many communication failures arise precisely because people fail to recognise that they are exchanging signals that have as many possible meanings as can be constructed by the receiver, and not just the single meaning intended by the sender. If the communication takes place between team members, then any command or response always takes place in the context of the team's greater

purpose. This means that effective communication in a team requires every team member to understand not only their own communication needs, but also how these dovetail with the communication needs of other team members.

Requirements for successful human communication: people must have different perspectives

- Both parties experience the world differently, but with enough similarity to be able to explore the differences. If their experience was identical in every respect, no communication would be needed. At the other extreme, if there were no similarities, there could be no common starting point to explore their differences
- People must have a shared means to explore the differences. We all have different points of view. For communication to be successful, we must have the means to realise that we do – and understand the differences between them. We can achieve this through a common dialogue in which we ask questions, provide answers, give commands, make responses and demonstrate agreements.

Why does human communication fail? As we have seen, people need to have different points of view in order for communication to be required at all. This requirement is easy to meet since it is in an inevitable part of being human that people form their own individual views from the information available to them. However, these differences in perspective are also the source of misunderstandings if dialogue is interrupted – or omitted – before shared meaning can be established. There are two main reasons why human communications fail:

- Insufficient dialogue – where an important difference between people's understanding remains undetected.
- Insufficient opportunity for dialogue – where a difference is suspected, or detected, but is not resolved in time.

How can communication failures be prevented?

- **Lack of media skills and knowledge**: People may know what needs to be communicated, when, and to whom, but are physically unable to do so. This may be due to operations in a noisy environment, lack of training in the use of the communications equipment, or the failure to share (enough of) a common language. These factors are best addressed by appropriate recruitment and selection policies, procedural training courses, and procedure-based manuals. Training in Standard Marine Communication Phrases (SMCP) is an essential foundation for ensuring clearer safety-related verbal communication at sea.

- **Lack of task skills and knowledge**: People may not have enough training or experience in their own job to know what information it is important to communicate and when. This is best addressed by task training to defined performance standards, with appropriate refresher training to prevent skill fade. Particularly important in the maritime industry is the provision of well-designed, properly translated shipboard documentation and procedure-based manuals that can be understood by their target audience.

- **Lack of social skills or cultural knowledge:** People may not possess the personal skills needed to engage effectively with other people. This includes knowing how to overcome personal differences or incompatibilities so that they do not interfere with effective performance. It also includes knowing how to get the best out of people, motivating them and encouraging them to work with each other (see section on Working with others). Or people may not appreciate how cultural differences affect people's understanding of different communication styles. This is best addressed by personal skills, leadership, cultural awareness and diversity and equality training programmes.

- **Lack of communications process skills and knowledge**: People may not understand enough about their own – and others – mental processes involved in successful communication. As a result, they may not be sufficiently disciplined in their assessment of the information quality they receive, or in the inferences and associated risks they take before using it. This is best addressed by training in leadership and critical thinking.

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- **Lack of time**: People may be surprised by fast-moving, sudden or emergency conditions. Lack of time can also arise through high workload, leading to slips and lapses: people can simply forget to communicate or be distracted by having too much to do. This is best addressed by good job design, mentoring, task and team training programmes across a wide range of scenarios, and regular team-based emergency drills.

2.4.3. Seafarers generic soft skills and competencies overview

From the perspective of maritime industry, as a one of the most important research, International Association of Maritime Universities (IAMU) were conducted a survey in March 2018 to figure necessary seafarer skills under for Industry 4.0. The survey has 214 respondents from all regions of the world and diverse work areas of the maritime industry. According to the result of IAMU survey, the competencies presented in in Table x deemed to be of the most important competencies in short, medium of 5-10 years and long term of 20 years. Technical competencies regulated in STCW still play significant role in maritime industry in short, medium and long terms. On the other hand, technological awareness, computing and informatics skills, and environmental/sustainability awareness/concern will be essential competencies for the future seafarer with the effects of emerging challenges in Industry 4.0.

A PWC report stresses that: "*regulation is increasing, so ship's officers will need to keep up-to-date on new laws and regulations. Work-related stress is increasing too, so more training on stress and time management will be important. Piracy is also on the rise, so ship's officers will need to be briefed on how to deal with a crisis. Companies should also have support systems in place to help cope after a traumatic event*" At the same publication, they describe Ship's officers needed skills as follows:

- strong social skills
- ability to work with people of other cultural and ethnic backgrounds
- time management

- stress management

In regard to previous analysis of human aspect in shipping operations, and combining above matrices, we present a suggested scheme of generic skills and competencies for a typical tanker personnel. Before assesing those, we present a typical levels of authority and lines of communication of on shipboard chart.

For the needs of our research we are stressing the top 5 of them as to provide readers and other researches an generic approach. We focus on Deck and Engine Officers. Firthermore we *discuss Aspects of Seafarers' Wellbeing Onboard.*

DECK

Ship Master: The Master has overall command and control of the ship's crew, navigation, manoeuvring, cargo handling and stowage, communications and safe handling of the ship while ensuring compliance with the local and international laws, as well as the port state and flag state policies. He/She must adhere to the budget assigned for the voyage, and is responsible for delivering the cargo safely. He oversees search and rescue operations, and is an organised person with a strong eye for detail. The Ship Captain/Chief Mate must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

2nd/3rd Chief Officer: The 2nd/3rd Officer is responsible for maintaining the bridge navigational and communications equipment and safety equipment related to saving lives and fighting fires on board. He/She reports to the Master and is primarily responsible for safe route planning, maintaining charts and publications. He also assists in emergencies by responding to search and rescue operations, while exercising sound judgment during emergencies and crises. The 2nd/3rd/4th Mate must pass a colour vision test and must fulfil the requirements stipulated in the Standards of Training, Certification and

Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

ENGINE

Chief Engineer/2nd Engineer: The Chief Engineer/2nd Engineer oversees the marine engineering department on the ship and is responsible for the maintenance and operation of all engineering equipment on board ships powered by main propulsion machinery. He/She ensures that the engine-room is suitable for inspection by port authorities and maintains an inventory of fuel and spare parts. He is highly organised and is able to work under pressure and time constraints during an emergency. The Chief Engineer/2nd Engineer must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

3rd/4th Engineer: The 3rd/4th Engineer acts as an Engine Watch Officer in a manned engine-room or as designated duty engineer in a periodically unmanned engine-room of ships powered by main propulsion machinery. He/ She oversees the operation, maintenance and repairs of the engine-rooms and is responsible for the maintenance of the ship's safety and emergency equipment. He is an organised person who is able to multi-task at times and is cognisant of the regulatory requirements of manning engine-rooms. The 3rd/4th/5th Engineer must pass a colour vision test and fulfil the requirements stipulated in the Standards of Training, Certification and Watchkeeping for Seafarers (STCW) issued by the International Maritime Organisation (IMO).

Aspects of Seafarers' Wellbeing Onboard: Seafaring is a very challenging profession and life onboard has its own unique characteristics. Seafarers are far away from home, family and friends and they lack access to many facilities. They are isolated and have to deal with difficult circumstances at their job. All these can have an effect on their wellbeing. Lately, the maritime industry has shed its focus on finding ways to address and improve the wellness of seafarers. Wellness of seafarers is a multi-dimensional holistic

concept that combines social, emotional, physical and spiritual wellness. All these different features have to be in balance to ensure healthy, quality of life and wellness.

Social Wellness: Socially, seafarers face many challenges on board. They are away from friends and family for a long time and many of them live isolated lives while onboard. The automation onboard ships has led to smaller crews with diverse backgrounds. Thus, communication may be difficult leading to loneliness and the crew may be vulnerable. Humans are social animals and it is important to have a sense of community.Seafarers constantly talk about the importance of social events onboard, such as movie nights, BBQs or even videogame competitions. These events give them the opportunity to chat with others and break free of the work and cabin cycle. It is important to fit the crew together to build a positive environment. This is a foundation of social wellness. Interpersonal skills are crucial to help them communicate with others onboard and deal with diversity competently. A greater understanding of one other significantly improves life on board.Further, seafarers mention how important is for them to be able to connect with their families and friends and have good quality internet access. All these, help them improve and maintain social wellness on board the vessel. The social aspect is as much of the shipping industry as is the navigation of a ship.

Emotional Wellness: There are several factors that can impact seafarers' mental health, such as job stress, family pressures and limited shore leave. Being away at mean you may miss important family moments, which can have a negative impact on your emotional wellness. It is never easy to be away from home for extended periods of time. More than a quarter of seafarers suffer from depression and nearly 6% of deaths at sea are attributable to suicide. Therefore, one can understand how important emotional wellness at sea is. Thus, it is of utmost importance to help seafarers find meaning, purpose and accomplishment in life, both on and off-shore wellbeing. They should feel confident to handle the challenging situations at sea and to be empowered to understand and manage their emotions while onboard. They should communicate and be connected with other crew members and their families in order to feel and understand that they are not alone.

Further, it is important for them to have people to discuss and share their thoughts and feelings. Thus, social activities will enable them to maintain their emotional wellness too.

Physical Wellness: It is also important that seafarers look after their own health. Where possible, they should try to make nutritious and healthy food choices and ensure a healthy diet. It seems that a balanced diet means a lot for seafarer's wellness since food quality and catering proficiency are foundations for a happy crew. Thus, access to healthy food options and variation is a foundation for physical wellness. Proper nutrition, along with exercise and adequate rest and sleep help to prevent diseases and improve physical health. Exercise is a proven wat to release the 'happy hormones' serotonin and endorphin which make us feel happy, satisfied and enhance well-being. Exercising and sports also encourage team-building through social interaction and as a result enhance social wellness. Attention should also be given to sleep and rest period in order to have fresh and fully rested seafarers on board. Due to the fact that fatigue seems to be affecting seafarers' wellbeing, leading to maritime incidents, it is important to acknowledge the severity of fatigue and help seafarers rest and sleep properly. Thus, seafarers should keep a healthy diet, exercise regularly and rest properly to empower their physical wellness.

Intellectual Wellness: Intellectual wellness relates to how one engages in creative and stimulating activities and expands knowledge outside of the traditional knowledge relevant to seafaring. It is important for seafarers to spend time to empower their intellectual wellness while on board. They should spend time being informed and updated with issues related to them. This can include knowledge about seafarers' rights and others. Knowledge about such matters will help them know their rights and negotiate in a better way with confidence.Further, seafarers should aim to engage in creative and stimulating activities such as reading, listening to music, watching movies or playing games. These activities will also offer opportunities for social activities and will help to maintain intellectual wellness.

Spiritual Wellness: Spirituality is also vital since it can serve as a factor to alleviate stress and as a result enhance wellness. Seafarers should spend time to their spiritual needs. They should create an awareness of their own beliefs but also for other crew members beliefs and respect them. These beliefs guide their responses and actions so they should be aware of them.. It is vital for seafarers to share their beliefs and thoughts with other crew members. These will help them maintain their wellness onboard the vessel. The spirituality of seafarers will help them acknowledge others' point of view, respect them, and comprehend and react appropriately to life experiences at sea.A seafarer acts as an organized whole and thus a holistic approach should be taken to address and improve wellness of the seafarers. Seafarers deserve to have a better life and sea. Therefore, the maritime industry should prioritise crew wellness and invest on assessing and training the non-technical skills that are important for the maintenance of wellness and optimal performance on board the vessel.

2.4.4. Onshore personnel generic soft skills and competencies overview

In order to define On Shore Personnel Generic Soft Skills and competencies as we conducted on previous subchapter for onboard personnel, we need to describe a typical shipping company departmentalization structure, thus the job description that derives from this model. In the following paragraphs, departments and their basic main principles and objectives are defined; soft skills and competencies for employee is following. As Theotokas has pointed out: *"Departmentalization is the division of the totality of the work into specialised jobs and the organisation of these jobs into separate departments. The objectives sought by departmentalization are effective management, co-ordination, the achievement of synergy and economies of scale, the effective use of resources, co-operation and job satisfaction on the part of employees.* In Our study we consider a functional structure, as activities are grouped on the basis of their functional specialisation and Jobs related to the same process are located in the same department. Functional structure is the traditional form of organisation in shipping companies. The traditional functional structure can be effective because it brings together personnel with the same

specialisation, ensuring at the same time their unification at the top level of the hierarchy. At the following page we present a typical structure that includes departments:

- o HSQE
- o Legal
- o Chartering
- o Technical
- o Operations
- o Crew
- o Training

- o New Buildings
- o Vetting
- o Personnel
- o Security
- o IT
- o Purchasing
- o Accounting

CEO - Managing Director/General Manager

Conveys the Company's policy to all Departments, follows its implementation and coordinates all activities in the operation and management of the vessels as per Company's stated policies, i.e., in a manner that encourages a) Safety and Environmental Protection, b) Efficiency and Cost-effectiveness. He/She Reports to the board of Directors. Her/His Objective is to attain and implement the Company's General Management Policies and Principles. He/She oversees the organisation's strategic priorities in shipping, chartering and fleet management. He/She inspires the organisation towards achieving business goals and fulfilling the vision, mission, and values, while inspiring a culture of innovation and process improvement. He/She is a strategic thinker who solves highly complex problems with informed, timely and decisive actions. He/She is Substituted by the Operations Manager

The CEO is responsible for:

- Overseeing the shore / ship implementation of the Company's stated policies, as per the HSQE Management System Manuals; encouraging HSSQEEn awareness, compliance, and commitment by all personnel.
- Co-ordinating tasks among the Company's Departments

- Ensuring the proper manning of the Company's shore/onboard operations with qualified personnel and crew.

- Ensuring that all vessels fulfil all National, International, Industry and Company requirements and standards.

- Providing full support, consultation and guidance to the DPA during the development, implementation and corrective action-taking of the Company's HSQE Management System.

- Monitoring, motivating, and encouraging all Company personnel that is related to HSQE for their active participation in the implementation of the Company's Safety, Quality and Environmental policy and other issues outlined in the HSQE Manual.

- Performing management reviews of the HSQE Management System at appropriate time intervals.

- Following-up all new developments that take place in the various Maritime Organisations and all technological innovations related to Shipping.

- Establishing good relationships with Classification societies, Shipyards, Sub-contractors, Suppliers, Oil Majors and Charterers.

- Approving realistic annual budgets and overseeing Company's results.

Authority: The CEO may undersign all Company Correspondence and sign for all expenses and procurement

Qualifications (minimum):

- A degree from an Institution of higher education, (University degree) recognised by all appropriate State and National Authorities, or a valid Ship Master's license, recognised by State and National Authorities.

- Working knowledge of the English language.

- At least 10-year experience in managerial position in Shipping Enterprises and Organisations (to be decided at the time of employment).

- Strong knowledge of maritime legal & industry requirements

- Interpersonal skills, leadership, and extensive management experience.

HSQE Department

To assist the Company's top management on all issues relating to Safety and Pollution Prevention and to be responsible for the establishment of a Quality Safety Environmental Management System according to the ISM Code/ISO9001/ISO14001/ISO45001/ISO50001; to bring to the attention of the appropriate Departments reporting of non-conformities and suggestions for improvement to current procedures, to carry out internal audits ,record ashore and onboard practices that may violate the Company's policies and propose changes of respective procedures to the appropriate Departments; to follow-up the implementation of Safety Management principles and communicate all requirements ashore and onboard Company Ships.

HSQE Manager/ Designated Person Ashore (DPA)

Member of Company's management reports to CEO and he/she is substituted by 1st Deputy: Assistant Designated Person Ashore the responsibilities of whom are same as of DPA, 2nd Deputy: Operations Manager. 3rd Deputy: Technical Manager. Rregardless of his other assigned duties, if any, is responsible for the following:

Quality Management System Requirements (*Management Representative)*

- Ensuring that HSQE Management System is established, implemented and maintained in compliance with the requirements of the ISM, ISO 9001, ISO 14001, ISO 45001, ISO 50001 Standards, requesting CEO's support as necessary.
- Ensuring understanding and commitment of Company employees (in co-operation with department heads) with Company's Quality, Occupational Health, Security, Safety, Environmental and Energy policies.
  - o Promoting the concept of HSSQEEn excellence throughout the Company's organization.

- Co-ordination of preparation (in co-operation with other department heads), maintenance and issuance of the HSQE Management System documentation, in accordance with document and data control procedure.

- Carries out the faction of Management Representative according to ISO 9001

- Ensuring (in co-operation with other department heads), that vessels are supplied with latest known publications on legislation, rules, and regulations as well as on operational, technical and safety relevant matters required to be carried on board.

- Distribution of controlled copies of HSQE Management System documentation as per Master Distribution List of each document.

- Reporting to CEO on performance and effectiveness of HSQE Management System, for purpose of reviewing and as a basis for further system improvement.

- Participation in Management Review Meetings with responsibility for ensuring that MRM is carried out in accordance with the Company's Management Review Procedure.

- Investigation of non-conformities pertaining to the HSQE Management System in co-operation with other department heads and verification/follow-up on the agreed corrective action.

- Ensuring that internal Audits are carried out in accordance with defined schedule and relevant procedure, to verify implementation and effectiveness of the HSQE Management System.

- Required liaison with external bodies on matters pertaining to Company's HSQE Management System.

- Approving the supply of Nautical books, publications and Charts (in Digital or paper form).

- Arranging the inspections by P&I Clubs, flag states and Port/State Controls, in co-operation with Operation Manager.

Safety Management System Requirements *(as Designated Person Ashore):*
- Required liaison with external bodies on matters relating to company's Safety Management System, as required.

- Provide a link between shore and ship-based management concerning safety and pollution prevention.
- Ensure that adequate resources and shore-based support are applied to the vessel, as required.
- Monitor and verify that the HSQE management system is implemented and effective.
- Reviewing the implementation and maintenance of nautical standards and analysing results of navigational audits for the identification of trends, communicating them to the Management Review Committee Meetings.
- Reviewing navigational practices and procedures to ensure navigation standards are maintained by adopting improved navigation practices, equipment, training and procedures
- Monitor managed vessels with regard to safety and pollution prevention.
- Submit proposals to the CEO for improvement of the HSQE Management System.
- Forward report for deficiencies, accidents and non-conformities pertaining to the HSQEMS to the CEO and appropriate department heads.
- Monitor and verify / follow-up on corrective action pertaining to the restoration of deficiencies, accidents, incidents, and non-conformities pertaining to the HSQEMS.
- Monitor and co-ordinate the issue, modification and revision of documents pertaining to the HSQEMS.
- Co-ordination of Management Review Meetings on matters pertaining to safety and pollution prevention.
- Monitor and verify that shore - based and shipboard personnel implement Company's training program in matters pertaining to safety and pollution prevention.
- Forward reports of Health and Safety Committee Meetings carried out on board managed vessels to the appropriate level of management.
- Monitor and follow - up to ensure that measures / corrective actions, in response to HSQE Committee Meetings are undertaken in consultation with the Vetting Manager.

<u>Authority:</u> The DPA may undersign all Correspondence related to the Department's activitiea2s and sign for the procurement of supplies and provisions in accordance with ad hoc decisions of the General Management

<u>Qualifications (minimum):</u>

- Qualifications from a tertiary institution recognized by the Administration or by the recognized organization, within a relevant field of management, engineering, or physical science, or
- Qualifications and seagoing experience as a certified ship Officer pursuant to the STCW, as amended, or
- Other formal education combined with not less than 3-years practical senior level experience in ship management operations.
- Minimum five (5) years' experience in the implementation of Management Systems in Shipping.
- Good knowledge of the National and International shipping legislation and best practices.
- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards
- Working knowledge of the English language.
- Skilled organizer and with abilities to convince and motivate people.
- Team leadership skills.

Vetting Department

Arranging the vetting of the vessels by Oil Majors, follow-up Port State control inspections, as well as flag inspections and keeping records of same.

Vetting Manager

Reporting to CEO, his/he main objective is to work in conjunction with other Operations staff towards achieving the department's staff principles and objectives. He/She is substituted by other Vetting Port Captain.

Responsibilities: The Vetting Manager is responsible for:

- Arranging the vetting of the vessels by Oil Majors, follow-up Port State Control inspections as well as Flag inspections and keeping records of same
- Verifying, through Port Captains, Superintendents Engineers and personal visits that all activities and procedures required by the HSQE Manuals are properly carried out and that Company's commitment to high ethical standards, legal compliance, and integrity is reflected in the safety and environmental policies and practices.
- Keeping records of the functioning and condition of all instruments and equipment onboard, relating to safety.
- Monitoring the compliance of the safety and pollution prevention aspects of the operation of Company's vessels on a continuous basis by examining whether all safety-related forms (described later to this manual) are filled out properly and sent to Company Headquarters on a regular basis.
- Organising the supply and distribution of adequate resources and shore-based support in case of emergency.
- Proposing and issuing Circular letters in relation to HSQE, in cooperation with Safety and Training Manager.
- Briefing and debriefing onboard personnel on Safety and HSQE policies prior to joining and after signing off duty.
- Reporting to the DPA on matters that have slipped attention by the Safety Management System.
- Demonstrating his commitment to HSSQEEn excellence, by his behaviour.

Authority: The Vetting Manager may undersign all Correspondence related to the Department's area of the responsibility

Qualifications (minimum):

- A valid Ship Captain's license recognised by State and National Authorities.
- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards
- Working knowledge of the English Language.
- At least 5-year experience in Tanker Industry in managerial position and proven track record of in a related field and discipline (to be determined at the time of employment).
- Excellent communication & interpersonal skills.
- Team leadership skills.

Port captain

Reporting to Vetting Manager, his/he main objective is to ensure the safe and efficient operation of Company's vessels in accordance with HSQEMS. He/She is substituted by other Vetting Port Captain.

Responsibilities: The Port Captain is responsible for:

- Assisting the Vetting Manager in his duties.
- Maintaining nautical standards onboard vessels and implementing suitable controls by adopting improved navigation practices, equipment, training, and procedures.
- Supervising and monitoring all aspects of assigned vessel operation including navigation, cargo/ballast handling, safety, and environmental protection aspects, etc. to ensure that these are carried out in compliance with the Company's requirements and maritime rules, regulations, and Industry Standards for a flawless, efficient, competitive and customer focused operation.

- The effective implementation of preventive maintenance of the vessel's hull, deck equipment, etc, as described in the PMS and set by the Class/Flag State requirements.

- The timely correction/rectification of any outstanding items related to the HSQEMS.

- Inspecting managed vessels in port and en-route and providing specific instructions to the Officers for issues pertaining to the HSQEMS.

- Making recommendations for rectification of deficiencies or improvements to the existing situation.

- Monitoring of the Flag State and PSC requirements and following-up of third-party inspections' results.

- Checking the passage plans of the vessels.

- Tracking and analysing shipboard navigational audit reports and addressing the findings to the HSQE Manager.

- Close monitoring/assessing of pre-loading/pre-discharging plans, as well as of the ballast management plans.

- Matters related to cargo nature, hold/tank cleaning and approval from authorities, safe navigation, etc.

- Monitoring the inventories of mooring equipment, safety equipment, lifesaving, firefighting equipment and portable instruments.

- Attending Vetting and third-party inspections.

- Demonstrating his commitment to HSSQEEn excellence, by his behaviour.

Authority: The Vetting Manager may undersign all Correspondence related to the Department's area of the responsibility

Qualifications (minimum):

- A valid Ship Captain's license recognised by State and National Authorities.

- Proper qualified to carry Internal Audits as per the requirements of ISM/ISO Standards

- Working knowledge of the English Language.

- Theoretical and practical experience in ship's operation.

- At least 5-year experience in Tanker Industry in Similar Position and proven track record of in a related field and discipline (to be determined at the time of employment).

- Excellent communication & interpersonal skills.

- Excellent knowledge of SIRE Vetting Inspections.

Training Department

Responsible to monitor the compliance of the safety and pollution prevention aspects of the operation of Company's vessels; to screen industry training programs; to overlook onboard personnel performance on Safety and HSQEMS issues; to carry out all activities of Class Certifications, Company's in-house Marine Training Centre, as per Maritime Training Centre's Management System Manual.

Training Manager

Reporting to CEO, his/her main objective is to attain and comply with the Training Department's stated principles and objectives. Captain.

Responsibilities:

The Training Manager has the following responsibilities:

- Ensures that Company's HSQE Protection Policy and associated procedures are implemented by Company managed vessels and verifies that company's commitment to high ethical standards, legal compliance and integrity is reflected in the safety and environmental policies and practices.

- Attends vessels to ensure overall condition performance of maintenance and repairs and provides training and advice to shipboard personnel.

- Verifying that navigation and onboard safety operations are carried out with commitment to Company's Quality, Occupational Health, Security, Safety & Environmental Protection Policy as per the HSQEMS stated requirements

Marine Manager

The Marine Manager provides marine-related input and advice, coordinates ships managed by the organisation and liaises with others to achieve annual key performance indicators. He/She develops a framework to manage risk in the organisation and oversees the implementation of workflow improvements. He manages and motivates a team of Marine Superintendents/Senior Marine Superintendents and is a self-starter in the improvement of marine operations and management of the organisation's ships.

Senior Marine Superintendent

The Marine Superintendent/Senior Marine Superintendent ensures the safe operation of ships and compliance to the statutory requirements of the International Safety Management (ISM) Code and International Ship and Port Facility Security (ISPS) Code. He/She assists in the implementation and upkeep of the Safety Management System, analyses risk and ensures compliance to the organisation's risk management framework. He provides guidance to the Master on board for nautical matters and conducts incident investigation on board the ship, while promoting a culture of continuous improvement.

Technical Department

Responsible for all technical matters pertaining to the performance, purchasing of machinery spares and engine stores, on board safety aspects of each vessel in such a way that the vessels' equipment and machinery are best protected from accidents and abnormalities and operated safely, efficiently and in compliance with all mandatory rules and regulations. Cooperates with the Operations Department, in fulfilling the vessels' commercial obligations. It is technical Manager responsibility to ensure that each fleet is

consisting of at least two technical superintendents, one with a degree from a technical institution of higher education (technical university) and one with an equivalent chief engineer's license with a minimum of three (3) years tanker experience of a ratio 1/1.

Technical Manager

The Technical Manager has the ultimate responsibility and accountability for the safe, efficient, and cost-effective performance of ships assigned. He/She advises on the ship's maintenance to ensure its seaworthiness and compliance to regulatory and organisation risk management procedures and requirements. He possesses good analytical, problem-solving, time management, project management and decision-making skills.

Technical Superintendent/ Senior Technical Superintendent

The Technical Superintendent/Senior Technical Superintendent oversees the safe, economic, and efficient operation of ships assigned, and ensures ships are managed and operated in accordance with organizational policies, operating procedures, and management systems. He/She analyses risks and ensures that all procedures are adhered to and comply with International Safety Management (ISM) Code and classification rules. He is well organized, is able to work in a team and may occasionally be required to sail on-board ships

Operations Department

Responsible for all Operational and Onboard Safety operations of all Company's vessels, performing in accordance with commercial and legal commitments.

Senior Operations Manager

The Senior Operations Manager oversees ship operations, as well as the safe and efficient operations of ships while ensuring operational costs are kept to a minimum and

compliance to regulatory requirements. He/She develops departmental plans, oversees risk management for the business and manages resources. He establishes systems and practices to encourage workflow improvements to enhance the business unit's productivity and can work independently.

Operations Manager

The Operations Manager provides advice to ships and management on cargo requirements, tank cleaning, stability and stress and maintains all statutory requirements for the ships. He/She analyses operational data to help improve inefficiencies and to predict operational problems and develops action plans for resource utilization. He is a good communicator, has strong problem-solving and analytical skills and may be required to work irregular hours.

Ship Operator

The Ship Operator acts as the primary communications link with the ship's crew and is accountable for the monitoring of ship movements and cargo transfer operations. He/She assists with the planning of cargo intakes, liaises with regulatory bodies, maintains customer contact, and responds to problems that may arise in the course of executing shipping operations. He has excellent communication skills and is able to juggle the demands of multiple parties at any one time.

Post Fixture Manager

The Post Fixture Manager monitors the timely issuance of invoices and collection of receivables and is responsible for the achievement of the department's key performance indicators. He/She has a sound understanding of operational issues and their implications and serves as the contact point for complex claims, handling disputes related to them, and ensuring adherence to the organisation's risk management procedures. He is adept

at negotiations and has excellent analytical and problem-solving skills, with the ability to communicate with various stakeholders.

Post Fixture Executive

The Post Fixture Executive monitors a ship schedule and its status before arrival at the ports, the delivery and re-delivery notices for ships and arranges for hire payments. He/She ensures timely payment of receivables and oversees the processing of brokering commissions to brokers. He has strong organizational skills and possesses strong analytical and numerical skills, complemented with good communication skills.

Chartering Department

Responsible for the chartering of all Company's vessels

Chartering Manager

The Chartering Manager manages the chartering function and oversees a team of Charterers and Senior Charterers in the execution of the organisation's chartering business, which includes conducting complex negotiations. He/She evaluates potential business development opportunities and is able to synthesize complex concepts and information to distil them into actionable propositions. He is a self-motivated individual who works independently to lead a team and support their efforts in accomplishing goals and provides guidance where necessary.

Senior Charterer

The Senior Charterer handles all aspects of chartering activities and ensures the profitable employment of operated ships, while monitoring adherence to the organisation's risk management procedures. He/She analyses market research, identifies business development opportunities for the business unit and has a sound understanding

of the ship chartering market with a strong drive to succeed. He has excellent analytical and problem-solving skills, with the ability to communicate with various stakeholders.

Senior Chartering Broker

The Senior Chartering Broker oversees the chartering business, develops department and resource plans, and oversees risk management for the business while monitoring and managing the business' performance. He/She undertakes research and competitor analysis to create a market advantage and demonstrates a sound understanding of business imperatives to offer solutions with real competitive advantage. He is a self-motivated individual who works independently to lead a team and provides guidance. He possesses excellent communication and interpersonal skills and leverages on them to conduct complex negotiations.

Chartering Broker

The Chartering Broker acts as an intermediary between charterers and cargo owners and is responsible for arranging the best possible deal for cargo rates, while ensuring compliance with legal and regulatory requirements. He/She assess the viability of new business opportunities and maintains a strong working relationship with existing clients and customers to ensure service standards are adhered to. He solves issues and oversees the implementation of workflow improvements, guides and provides on-the-job coaching to junior colleagues.

Assistant Chartering Broker

The Assistant Chartering Broker monitors the freight, ship hire and cargo rates closely, identifies ships available for charter and prepares contracts aligned to the client's requirements. He/She sustains the organisation's relationships with existing clients by ensuring that service standards are met and assesses market data to identify potential clients to management. He has initiative and with a flair for numeracy and accuracy.

Senior Sales and Purchase Broker

The Senior Sales and Purchase Broker oversees the ship sales and purchase brokering business, develops department and risk management plans while monitoring and managing the business' performance. He/She oversees compliance to all legal and regulatory requirements and possesses an in-depth knowledge of ships while recognising potential business opportunities and clients in order to grow the business. He manages a team and instils a culture of innovation to encourage workflow improvements.

Sales and Purchase Broker

The Sales and Purchase Broker acts as an intermediary between buyers and sellers of ships and is responsible for overseeing the sale and purchase of ships while ensuring compliance with legal and regulatory requirements. He/She assesses the viability and risks of pursuing new business opportunities and analyses risk management data to highlight potential areas of concern to management. He guides and provides on-the-job coaching to junior colleagues in their daily work.

Accounting Department

To be responsible for preparing Budget & Projected Cash Flows, invoicing, cost-control management, collection, and payment of all due sums to ships and third parties.

Crewing Department

Responsible for all crewing and onboard safety aspects of all company's vessels.

Legal, Insurance and Claims Departments

To provide the best possible legal advice to the company's management whenever the opportunity arises; to approve contracts and agreements between the company and third parties.

Purchasing Department

Responsible for the purchases of stores and spares for all company vessels.

Personnel Department

Responsible for all personnel matters within the company.

Security Department

Responsible for all security matters of all company's vessels

New Buildings Section Department

Responsible for all new acquisitions' matters within the company.

In maritime industry, employment of highly qualified human resources/seafarers plays a crucial role to ensure and to enhance the safety on board ship. At that point, functional competencies are highly important to manage the critical operations on board ship in safe manner. Additionally, behavioural competencies like communication skills, teamwork skill, leadership and language ability are other important competencies which contributes the safety concern on board ship. Also, future seafarers are expected to be professional with ethical behaviour, discipline and responsibility. It is therefore Behavioural Competency System needed in order to monitor and assess. This need we are going to cover in chapter 3.

Chapter 2 - Works cited

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Chapter 3: A Behavioral Competency Assessment System

As discussed at 2.1 the behavioural competencies are vital for safe and efficient vessel operations. In this part, we are approaching a definition based on OCIMF and Intertanko at the Behavioural-Competency-Assessment-and-Verification paper. The behaviours have been organised in a hierarchical structure:

Competency domains: broad categories of behaviour. The competency framework consists of six competency domains:

- Team working
- Communication and influencing
- Situation awareness
- Decision making.
- Results focus
- Leadership and managerial skills

Elements: narrower categories of behaviour that form part of the higher-level domains. For example, participation is an element in the competency domain team working.

Each of the above domains has been defined with elements identified for each domain. Each element has a non-exhaustive list of behavioural indicators, i.e. observable behaviours that relate to the competency.

Behavioural indicators: the positive and negative observable behaviours associated with each element.

A list of negative behavioural indicators has also been provided for those that would like to adopt negative marking. The essential concept is that this system can achieve an objective assessment of seafarers' soft skills. Indicators are there to help the assessment by providing examples of some behaviours that are easy to understand and observe and therefore help the assessment of competency domains and elements.

In general, behavioural competencies apply to all seafarers. Good communication, situation awareness and accountability are elements that all officers should demonstrate. However, the level depends on rank, e.g. a different level of leadership is expected from the Master compared to the 2nd Officer as we have already suggested at 2.4.2 chapter.

3.1. Team Working

Works effectively in a team, building productive working relationships through cooperation with colleagues, treating others with respect, resolving conflicts among team members and balancing individual and team goals.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Participation	★ Actively participates in team tasks. ★ Establishes an atmosphere for open communication and participation. ★ Encourages input and feedback from others. ★ Builds rapport and establishes a common bond with others. ★ Encourages idea generation	∅ Blocks open communication. ∅ Creates barriers between crewmembers. ∅ Competes with others. ∅ Supports individualistic or silo ways of working
Inclusiveness and Consideration of Others	★ Helps others feel valued and appreciated. ★ Welcomes and includes others. ★ Demonstrates respect for others and their differences. ★ Shows understanding of others' perspectives and personal situations. Notices the suggestions of other crewmembers. ★ Gives detailed and constructive personal feedback	∅ Displays little appreciation for others' contributions and perspectives. ∅ Ignores suggestions of other crewmembers. ∅ Shows a lack of concern for others' problems. ∅ Shows a lack of respect. ∅ Treats some crewmembers more favourably than others
Supporting Others	★ Helps other crewmembers in demanding situations. ★ Shares expertise with others.	∅ Hesitates to help other crewmembers in demanding situations. ∅ Creates reasons resources and support cannot be shared. ∅ Withholds information and refuses to share knowledge that would help others do a better job.
Conflict Resolution	★ Keeps calm in conflicts. ★ Suggests solutions to resolve conflicts.	∅ Overreacts emotionally in interpersonal conflicts. ∅ Reluctant to consider a compromise or solution to a

	Positive Behavioural indicators	Negative Behavioural indicators
	★ Expresses disagreement constructively by giving alternative or different perspectives.	conflict, thus allows it to escalate. ∅ Blames other crewmembers for the conflict situation. ∅ Unable to deal objectively with conflicts and disputes when they arise. ∅ Avoids challenging inappropriate language or behaviours

Table 10. Team working behaviour indicators

3.2. Communication and influencing

Gives and receives communication clearly, precisely and in a convincing way to groups as well as individuals at all levels, including senior/line managers, colleagues and subordinates. Interacts with others sensitively and effectively in a risk- and time-sensitive environment.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Shared Understanding	★ Clearly explains plans, expectations, and roles to each person, ensuring that they understand them. ★ Gives clear and concise briefings and updates at appropriate times. ★ Asks questions and observes others to confirm their understanding. ★ Uses a range of communication methods (such as spoken, written, hand signals, etc.) to suit the message and the intended recipients.	∅ Blocks open communication. ∅ Does not clearly communicate plans, expectations, and roles. ∅ Briefings are unclear, lengthy and/or delivered at inappropriate times. ∅ Does not check whether plans and expectations have been understood. ∅ Communication is one-way and does not seek feedback or encourage questions
Style of Communication	★ Uses language appropriately, e.g., clear phrasing, terminology, and speed of delivery. ★ Acknowledges cultural diversity in communications.	∅ Uses inappropriate or unacceptable language or communication methods, e.g., jargon, body language, tone. ∅ Fails to consider cultural diversity in communications.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
	★ The amount of communication is appropriate for the situation. ★ Clearly puts forward views and personal position while listening to others. ★ Uses the right medium to deliver the message (face-to-face, radio, email, telephone, etc.)	∅ Provides too much, too little, or vague communication. ∅ Communication is one-way and fails to allow or encourage questions or feedback. ∅ Communication is not tailored to individual needs, e.g., style, method, timing
Feedback	★ Actively seeks and acts upon feedback. ★ Receives feedback constructively	∅ Does not seek or welcome feedback and does not act on feedback. ∅ Reacts defensively or aggressively to feedback.
Persuasion	★ Keeps calm in conflicts. ★ Influences others in a way that results in acceptance, agreement and/or behaviour change. ★ Communicates in a way that elicits appropriate action from others.	∅ Fails to gain buy-in to important messages. ∅ Pushes through own agenda, rather than acting in line with company objectives.

Table 11. Communication and influencing indicators

3.3. Situation awareness

Accurately perceives the immediate environment (system or task) and external factors that may have an impact. Understands surroundings and predicts their status in the near future. Develops effective strategies to manage threats.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Awareness of Vessel Systems and Crew	★ Monitors, cross-checks and reports changes in vessel system states. ★ Monitors, probes and reports signs of changes in the state or behaviour of other crewmembers ★ Acknowledges entries and changes to vessel systems	∅ Does not ask for updates on different vessel systems and other crewmembers. ∅ Does not signal awareness of changing systems. ∅ Does not look for or signal awareness of crewmembers' deteriorating state or behaviour.

Awareness of external environment	★ Maintains awareness of the present state of the vessel systems and environment (position, weather, shipping traffic, terrain). ★ Contacts outside resources about the environment when necessary. ★ Shares information about the environment with others.	Ø Does not enquire about environmental changes and their impact on vessel systems. Ø Unaware of changes in the external environment. Ø Does not seek regular and timely updates on position, weather, traffic, or terrain. Ø Ignores external reports about changes to the environment or status of other vessels. Ø Does not interrogate, verify, or cross-check external information about the environment against information from internal vessel systems or crewmembers' reports
Awareness of time	★ Anticipates future states, threats, and their consequences. ★ Discusses contingency strategies. ★ Uses all available resources to manage threats. ★ Takes timely and mindful actions.	Ø Unable or unwilling to make predictions of future states and threats. Ø Does not discuss the relationship between past events and the present/future. \ Ø Is surprised by outcomes of events, with little or no contingency planning.
Table 12. Situation awareness behavioural indicators		

3.4. Decision making

Reaches systematic and rational judgements or chooses an option based on relevant information by analysing issues and breaking them down into their discrete parts. Demonstrates readiness to make decisions and take action.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Problem Definition and Diagnosis	★ Gathers information and identifies the problem. ★ Reviews causal factors.	Ø Does not clearly state or define the problem. Ø Fails to diagnose the problem correctly.

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	★ Consults those with specialist expertise or local knowledge when required	∅ Does not discuss probable causes with crewmembers. ∅ Allows commercial pressure (whether real or perceived) to influence course of action. ∅ Makes decisions without recognising or acknowledging own limitations or lack of experience
Option Generation	★ Generates multiple responses to a problem. ★ Encourages idea generation and challenges existing norms ★ States alternative courses of action	∅ Focuses on a narrow range of responses to problems ∅ Does not search for alternative courses of action
Risk Assessment and Option Selection	★ Assesses and shares the risks and benefits of different courses of action through discussion. ★ Selects the best response to the problem. ★ Confirms selected course of action and implements in a timely manner. ★ Considers options from external advisers, e.g., Pilot, but retains decision-making responsibility and accountability	∅ Evaluation of possible actions is inadequate. ∅ Selects a course of action without a clear risk analysis. ∅ Fails to inform crew of decisions taken. ∅ Has difficulty making decisions when faced with complex or ambiguous data. ∅ Constantly changes decisions when not justified by new information. ∅ Normalises risk ("This is the way it has always been done here"). ∅ Risk assessment of options from external advisers, e.g., Pilot, is inadequate
Outcome Review	★ Checks the outcome of a solution against goal or plan. ★ Reviews the quality of the decision made	∅ Fails to check selected outcome against goal. ∅ Shows little consideration for the quality of decisions made
Table 13. Decision making behavioural indicators		

3.5. Results focus

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Focuses on achieving desired results and how best to achieve them. Takes conscientious action to get the job done, using initiative and energy, and demonstrating flexibility and emotional toughness.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Initiative	★ Identifies what needs to be done and initiates appropriate action. ★ Implements new ideas and better ways to do things; finds solutions to problems. • Puts in extra effort to achieve objectives. ★ Challenges accepted risks, processes, or measurements	Ø Seldom takes action to improve outcomes, processes, or measurements. Ø Seldom seeks out or accepts additional responsibilities in the context of the role. Ø Avoids all but what is directly asked of them. Ø Frequently requires supervision to complete routine tasks.
Determination	★ Pushes self and others to reach milestones. ★ Renews and increases effort to achieve goals, persisting in the face of problems. ★ Has a sense of urgency about solving problems and getting work done. ★ Looks for opportunities to help achieve team objectives. ★ Willingly puts in extra time and effort in crisis situations Seldom seeks out or accepts additional responsibilities in the context of the role. ★ Avoids all but what is directly asked of them. ★ Frequently requires supervision to complete routine tasks.	Ø Fails to sustain pace and progress over a period of time. Ø Performance suffers substantially when working long hours. Ø Allows work to drift away from priorities.
Flexibility	★ Responds positively to change, embracing new ideas or practices to accomplish goals and solve problems. ★ Adapts to changing business needs, conditions and responsibilities. \	Ø Sticks to outdated methods, puts off making changes for as long as possible or finds excuses for not doing things differently. Ø Does not respond to the changing demands of the situation.

	★ Adapts approach, goals and methods to achieve solutions and results in a changing environment. ★ Shows others the benefits of change.	∅ Makes little or no attempt to promote change positively. ∅ external advisers, e.g. Pilot, is inadequate
Emotional Toughness	★ Recovers quickly from setbacks and responds with renewed and increased effort. ★ Persists in the face of difficulty and finds alternative ways to complete tasks and goals. ★ Handles high workloads, competing demands, vague assignments, interruptions and distractions with composure Stays calm and maintains focus in emergency situations	∅ Constantly thinks about past disappointments or failures. ∅ Struggles to maintain focus and perseverance in the face of obstacles. Is unable to perform mentally or physically taxing work effectively. Panics, reacts inappropriately or with hostility to stressful situations
Accountability and Dependability	★ Effectively manages their time and resources to accomplish tasks, prioritizing the most important ones. ★ Takes personal responsibility for the quality and timeliness of work and achieves results with little need for supervision. ★ Shows up to work on time and follows instructions, policies and procedures. ★ Stays focused on tasks and meets productivity standards, deadlines and work schedules. ★ Acknowledges and corrects mistakes, taking personal responsibility when appropriate	∅ Struggles to use time efficiently. ∅ Fails to prioritize or plan ahead; completes least important tasks first. ∅ Often slow to respond or to adjust priorities. • Becomes distracted or unable to complete tasks when confronted with challenges. ∅ Misses deadlines or leaves tasks unfinished. ∅ Defers authority and decision making to others, e.g., terminal staff/pilots, rather than take responsibility,
Table 14. Results focus behavioural indicators		

3.6. Leadership and managerial skills

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Inspires, motivates and empowers personnel to perform at their best to achieve goals. Adjusts leadership style to situations, including those that develop suddenly or change rapidly.

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Setting Direction	★ Communicates clear expectations ★ Considers the bigger picture and long-term needs before committing to a course of action. ★ Translates the vision into clear strategies and work programmes.	∅ Fails to create direction for the team. ∅ Demonstrates a lack of knowledge and insight into wider issues, developments and long-term impact.
Empowerment	★ Supports others to have a level of independence in how they do their work. ★ Creates and maintains an environment of open and frequent communication with clear and direct flow of information. ★ Encourages others to acquire new skills and develop themselves. ★ Recognizes, appreciates and supports others' contributions. ★ Develops cooperative and respectful relationships with others. ★ Understands the needs of crewmembers and cares about their welfare. ★ Creates a feeling of achieving results together as one team	∅ Micromanages direct reports. ∅ Does not support crew to develop their own initiative and judgement. ∅ Fails to motivate or support the team or applies inappropriate pressure. ∅ Does not show appreciation for others. ∅ Takes credit for others' achievements. ∅ Delegates without giving responsibility or authority,
Authority and Assertiveness	★ Creates a culture that enables challenge and participation while maintaining command authority. ★ Encourages crewmembers to review, raise concerns or challenge plans of actions. ★ Creates a safe and trusting environment for crewmembers, supporting them to openly share lack of	∅ Avoids challenging inappropriate language or behaviours. ∅ Hinders or withholds crew involvement. ∅ Is passive and waits for others to take the lead or make decisions. ∅ Does not take a clear stand, with own position not recognizable.

	knowledge and to speak up without hesitation. ★ Takes decisive action as required. ★ Takes command if the situation requires. ★ Advocates own position personal responsibility for the quality and timeliness of work and achieves results with little need for supervision.	∅ Blames the team if things go wrong. ∅ Leaves team members to cope alone in difficult situations. ∅ Tolerates behaviour that negatively affects the performance, development, and morale of others.
Providing and Maintaining Standards	★ Demonstrates high ethical and moral standards, setting a personal example of what is expected from others. ★ Ensures compliance with policies and procedures and intervenes if crew members deviate. ★ Uses appropriate tools and notifications when dealing with non-routine operations. ★ Challenges current processes to find new and innovative ways to improve the team's work and vessel operations.	∅ Is a poor role model to others in terms of personal ethics and standards, e.g. does not comply with company policies and procedures? ∅ Does not monitor crew for compliance or intervene when crewmembers deviate. ∅ Applies non-standard procedures without thorough risk assessment or communicating with crewmembers. ∅ Sets standards that are unclear, unrealistic or too challenging. ∅ Avoids tackling performance issues or sticks to ineffective ways of working.
Planning and Coordination	★ Organizes tasks, activities, and resources. ★ Sets achievable goals, makes plans and establishes measurable milestones with timescales and quality standards. ★ Encourages shared understanding and participation among crewmembers of planning and task completion. ★ Monitors plans for achieving targets. ★ Delegates to achieve top performance and to avoid workload peaks and troughs. ★ Reviews and communicates plans and intentions clearly to the whole crew, changing plans if necessary.	∅ Plans only for themselves and does not involve crew. ∅ Changes plans without informing crew. ∅ Follows plans strictly despite circumstances demanding a different approach. ∅ Panics about deadlines. ∅ Makes short-term demands.

Workload Management	★ Defines clear roles and responsibilities for crewmembers for both normal and abnormal situations, including workload assignments. ★ Prioritizes and manages primary and secondary operational tasks. ★ Distributes tasks appropriately among the crew, balancing the needs of every team member. ★ Recognizes work overload and signs of stress and fatigue in self and others; acts promptly to deal with it. ★ Uses available external and internal resources to complete tasks on time	∅ Inadequate workload planning. ∅ Delegates work unequally across the team. ∅ Sets unrealistic deadlines. ∅ Lacks awareness or consideration of how much pressure team is under.

Table 15. Leadership and managerial indicators

To conclude this chapter, it is quite clear that soft skills are starting to take over the world by storm. It comes as no surprise as these skills are the underlying factor in building the teams that are equipped to tackle the challenges of the modern, technologically advanced and critical in regard to safety, working environment. Companies that have already taken this step have gained a strong and competitive advantage and the rest should only follow the prime example that they have set to ensure success of their operations and the well-being of their employees.

Shipping companies that attempt to comply with regulatory bodies guidance's and suggestions (TMSA, ISGOTT, etc.) can perceive a competitive market advantage as well as developing soft skills is about changing behavior. The problem stems from the fact tht in shipping business human behavior is nuanced. Getting team members to communicate with each other in a more productive and safer way isn't a simple matter of incentivizing that communication, or alternatively, punishing failure to do so. A safety culture should be built or adopted and evaluated in practice.

Further on the next chapters we discuss the needed compliance with existing regulatory schemes and guidance proposed by regulatory bodies. We should stress that TMSA3 introduced a different approach by focusing on the human element and behavioral safety, suggesting that crew competence is the tool for crew retention and development.

On the whole, the TMSA3 addresses issues regarding performance management. The method that a shipping company uses to measure performance is a prominent topic for discussion within the maritime industry. The new edition makes an effort to overhaul the process, not only with the streamline of KPIs but also with the introduction of non-financial measurements and the assessment of soft skills. In the latest edition, special focus has been given on the continuous improvement cycle by taking into consideration additional KPIs towards effective performance management. At next chapter, chapter three, our analysis commences by identifying the gaps in TMSA 2 & TMSA 3 in the elements related to human element aspects. Subsequently, we enlighten the needed actions required to meet both on and offshore personnel soft skills requirements.

Chapter 3 - Works cited

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Chapter 4: Exceeding the TMSA 3 soft skills mandates

The move toward TMSA 3 marks a swift from machine-centred regulatory compliance to the realisation that the human element, i.e., the individual, their education, experience, disposition and interaction with others, is paramount to the safety and the security of onboard shipping operations.

In this respect, soft skills are essential to both onboard and onshore personnel in order to interact efficiently, effectively and coherently with various people, within and outside the boundaries of the organisation; be it the ship management company or the ship, in an array of diverse situations.

Chapters 2 and 3 of this paper were dedicated to the degree that TMSA 3 introduces the notion of soft skills into its decrees. Evidently, the question that arises next is one of what the future has in store for soft skills-related regulation in shipping and how tanker shipmanagement companies may exceed the TMSA 3 mandates and proactively place themselves at the forefront of developments.

In exceeding the so-called TMSA 3 soft skills mandates, two prerequisite conditions ought to be met. First of all, we suggest that the implementation of soft skills-related practices should be an approved and trialed exercise, either by a relevant shipping body or by an experienced and competent body that carries the experience and know-how of another industry. Second of all, any effort to introduce novel practices requiring a greater degree of people, communication and social skills to a company's operations should be in conformity with the existing safety and quality regime of the ship management company.

4.1. Behavioural management onboard and onshore

In a September 2018 article in the Financial Times, soft skills were identified as the most important skills that leading employers worldwide seek from MBA graduates. The article

also suggested that soft skills include the ability to work within a team and with a wide variety of people as well as the ability to build, sustain and expand a network of people.

Moreover, according to the same article, the most difficult skill to recruit is the ability to influence others, which also falls within the scope of soft skills. What applies to the dynamics of the job market for MBA graduates, applies, by analogy, to the thousands of seafarers and shipping's white-collar workers.

In her paper, *Definition, Development, Assessment of Soft Skills and their Role for the Quality of Organisations and Enterprises*, Barbara Cimatti of the University of Bologna argues that the teaching of soft skills is a fundamental educational activity that ought to start from a very young age at primary school and not only arise as an issue in universities and enterprises. Furthermore, again quoting the same paper, the development of soft skills can be said to start within the family; that is even earlier than when a child goes to school. As was mentioned in the FT article, schools and universities are mostly geared toward predicting the labour market of the future and accordingly adapting their curricula to provide the hard skills that will then be on demand. However, soft skills are not only necessary to work, but they are also essential for everyday life.

Whereas hard skills, i.e. technical skills, are traditionally taught on university and cadet school courses, education on soft skills has largely not entered the curriculum of mainstream institutions. Oftentimes educational institutions treat education as though its primary goal were to teach students to be economically productive rather than to think critically and become knowledgeable and empathetic citizens.

Moreover, it is argued that soft skills give hard skills the required plasticity for one to develop and keep up to date in changing circumstances. That said, soft skills are closely related to plastic, elaborating abilities, i.e. the capacity for abstract thought.

In an effort to elaborate on the above, abstract thinking is considered a high-order reasoning skill. People us it when they:

- Create things

- Speak figuratively

- Understand concepts

- Analyse situations

- Form theories

- Put things into perspective

In other words, whilst hard skills allow someone to be an engineer, an accountant or a seafarer, soft skills operate in a direction that is rather separate from the role of the individual and go beyond the strict demands of one's profession. Empirical evidence suggests that when formal education touches upon soft skills, mention is almost entirely made in the leading or management skills, namely, analysing, planning, making decisions and strategizing.

Having the safety and security of shipping operations in mind, especially with regard to tankers and wet cargoes, the shipping world gradually gears its attention toward the need for maritime personnel to boast skills belonging to the soft side of leadership. These skills are mainly centred around the capacity to inspire, motivate and persuade others, build good working relationships, networking, rallying and cajoling.

TMSA 3 and OCIMF's work are unique in that they transcend the dependence on minimum levels of compliance that the previous two editions fostered, and, instead, focus on the human factor and behavioural safety.

Behavioural management onboard and onshore begins with the introduction of soft skills-related practices to a ship management company's safety and quality procedures. Here, it is also imperative that we should disambiguate the meaning of soft skills-related practices. As soft skills-related practices we define those core ship management activities, such as navigating, bunkering, mooring, loading and discharging of cargo, which involve the interaction of a number of different groups of people in order to be

successfully carried out. The fact that communication with other individuals, on board the ship and on shore, whether in the offices of the ship management company or at a port or terminal installation, is a prerequisite, allows for the promotion of soft skills into activities that are described as procedures within a company's safety and quality protocols.

Hereby, mention is made to nineteen core soft skills that a ship management company may contemplate incorporating into its practices while drafting its TMSA 3-related procedures.

1. Adaptability

Adaptability skills are skill sets that encompass a person's ability to adjust to changes in their environment. Being adaptable in the context of a professional career may mean that one is able to respond quickly to changing ideas, responsibilities, expectations, trends, strategies, and other processes at work. Being adaptable also means possessing soft skills like interpersonal, communication, creative thinking, and problem-solving skills.

Being adaptable in the workplace can be important when working on projects, developing strategies, and implementing different approaches to carrying out work-related tasks. Employees that display adaptability skills are revealing how motivated they are to try new things and learn new skills.

Examples of adaptability skills

Adaptability skills can include a variety of skill sets that can essentially help someone adapt to and deal with change in a positive and proactive way. Some of these important soft skills include:

- Communication skills
- Interpersonal skills
- Problem-solving skills

- Creative and strategic thinking skills

- Teamwork skills

- Organizational skills

2. Problem Solving

Problem-solving skills help someone determine the source of a problem and find an effective solution. Although problem-solving is often identified as its own separate skill, there are other related skills that contribute to this ability.

Some key problem-solving skills include:

- Active listening

- Analysis

- Research

- Creativity

- Communication

- Dependability

- Decision making

- Team building

Problem-solving skills are important in every career at every level. As a result, effective problem solving may also require industry or job-specific technical skills. For example, a registered nurse will need active listening and communication skills when interacting with patients but will also need effective technical knowledge related to diseases and medications. In many cases, a nurse will need to know when to consult a doctor regarding a patient's medical needs as part of the solution.

Problem-solving skills examples

To solve a problem effectively, one will likely use a few different skills. Here are a few examples of skills employees and seafarers may use when solving a problem:

- Research
- Analysis
- Decision-making
- Communication
- Dependability

3. Decision Making

Decision-making skills show workers' proficiency in choosing between two or more alternatives. One can make decisions once they process all the information available to them and speak with the right points of contact involved in a certain situation. Overall, it is important to identify processes that help toward taking the right decision on behalf of the organization and make a concerted effort to uncover biases that may affect the outcome of it.

Examples of decision-making skills

- Problem-solving
- Leadership
- Reasoning
- Intuition
- Teamwork
- Emotional Intelligence
- Creativity
- Time management
- Organization

4. Crisis Management

Crisis management is centred around the ability of a person to identify and deal with threats. Whether it is a natural disaster, a lawsuit against the company's product or services, or the tumbling employee morale, they all are capable of damaging the viability of the business operations.

Crisis management can be divided into three phases:

- pre-crisis,
- crisis response,
- post-crisis.

The pre-crisis phase is concerned with prevention and preparation. The crisis response phase is when management must actually respond to a crisis. Finally, the post-crisis management refers to one's ability to draw upon the experiences of the crisis, analyze the root causes that gave rise to the crisis in the first place and take the appropriate steps to prevent a similar crisis from arising in the future.

5. Emotional Intelligence & Emotion Management

Emotional intelligence is the one part of the human psyche that people can develop and improve by learning and practicing new skills.

Elements of Emotional Intelligence include:

- Self-awareness
- Self-regulation or self-management
- Motivation
- Empathy
- Social Skills

6. Stress Management

Stress affects individuals, but it also has knock-on effects on relationships within teams and with customers.

High levels of stress in the workplace can lead to:

- Poor decision-making by individuals.
- An increase in mistakes, which in turn may lead to customer or client complaints, something that is likely to produce more stress.
- Increased sickness and absence, with ongoing costs to the organisation.
- High staff turnover.
- Poor employee/workplace relationships.

7. Tolerance of Change – Management of Change

Change management is a systematic approach that includes dealing with the transition or transformation of organizational goals, core values, processes or technologies.

The purpose of every change management initiative is to successfully implement strategies and methods for effecting change and helping people to accept and adapt to change.

As organizational changes in the agile workplaces happen daily, change management teams have become crucial performance drivers for many companies.

Must-Have Skills for Change Management include:

- Communication.
- Leadership,
- Vision,

- Strategic analysis and planning,

- Knowing change management principles and best practices,

- Digital literacy

8. Building Resilience

Resilience is a capacity that ingests other soft skills. Stress management, optimism, motivation, flexibility, adaptability, creativity – a resilient individual brings together many other faculties to overcome his or her traumatic episode and to continue to do the job effectively.

Resilience is made up of five pillars: self-awareness, mindfulness, self-care, positive relationships & purpose. By strengthening these pillars, people in turn, become more resilient.

9. Work – Life Balance

Defining work-life balance involves looking at how working people manage time spent at and outside of work. Time outside of work may include managing relationships, family responsibilities, and other outside interests and hobbies.

Skills that are easily learned, all of which will help with balancing work – life:

- Learn to say no
- Better time planning
- Learn to become less perfect
- Learn to become physically healthy
- Learn to socialize better

10. Effective Communication and Feedback

The ability to communicate effectively with superiors, colleagues, and staff is essential, no matter what industry you work in. Workers in the digital age must know how to effectively convey and receive messages in person as well as via phone, email, and social media.

Must have communication skills include:

- Listening
- Nonverbal communication
- Clarity and concision
- Friendliness
- Confidence
- Empathy
- Open-mindedness
- Respect
- Feedback
- Picking the right medium

11. Coaching and Mentoring Tools for Managers

- Eye contact, full focus on the other person
- Mirroring body language
- Posture
- Talking less, questioning more
- Listening for understanding
- Deliberate, mindful speech
- Positive reinforcement
- Remembering what was spoken
- Paraphrasing, clarifying, and reflecting back what was said
- Providing feedback with permission

Compassion is another coaching skill that is much needed in the workplace. Employees are human beings. A leader who sees them as such, while still expecting the bottom line to be protected, will find a more connected team.

12. Teamwork & Team Building

Teamwork skills are essential to achieving success at work, no matter the industry or job title. Working well with clients, colleagues, managers and other people in the workplace can help one complete tasks efficiently while creating an enjoyable environment both for yourself and others. An organization that emphasizes good teamwork skills is typically a healthy, high-functioning workplace.

Examples of teamwork skills:

- Communication
- Responsibility
- Honesty
- Active listening
- Empathy
- Collaboration
- Awareness

13. Presentational Skills – Public Speaking

Public speaking is a soft skill that requires excellent communication skills, enthusiasm, and the ability to engage with an audience. Public speakers make presentations to a group.

Presentations range from speaking to a small group of employees to presenting to a large audience at a national conference or event. The same skillset and ability to be comfortable speaking in public are required regardless of the size of the group.

Public speaking skills:

- Clear articulation
- Engaging presentation style
- Assessing the needs of the audience
- PowerPoint skills
- Composition skills

14. Leadership Skills

Essential leadership skills and practices

- Self-development
- Team development
- Strategic thinking and acting
- Ethical practice and civic mindedness
- Innovation

15. Negotiating Skills

Negotiation skills are qualities that allow two or more parties to reach a compromise. These are often soft skills and include abilities such as communication, persuasion, planning, strategizing, and cooperating. Understanding these skills is the first step to becoming a stronger negotiator.

Examples of negotiating skills:

- Communication,

- Persuasion,

- Planning,

- Strategizing

16. Cultural Diversity & Interpersonal Skills

Diversity comes in many different forms in business. Gender roles, race, different culture groups – and even migrant workers – are represented in diverse workplaces.

Interpersonal communication is the process of face-to-face exchange of thoughts, ideas, feelings and emotions between two or more people. This includes both verbal and nonverbal elements of personal interaction.

Some examples of interpersonal skills include:

- Active listening

- Teamwork

- Responsibility

- Dependability

- Leadership

- Motivation

- Flexibility

- Patience

- Empathy

17. Business Ethics and Cultural Awareness

To understand cultural differences and being aware of different cultural values, beliefs, and perceptions. Considered to be an important business skill, it has been shown to enhance communication in the workplace. The knowledge of, understanding of and

experiences with one's own culture as well as others' cultures enhance one's ability to navigate new experiences.

Seven practices a company can implement to increase cultural awareness in the workplace include:

- Getting training for global citizenship
- Bridging the culture gap with good communication skills
- Practicing good manners
- Celebrating traditional holidays, festivals, and food
- Observing and listen to foreign customers and colleagues
- Paying attention to differences in culture
- Being aware of different time zones

18. Time Management

The ability to manage time effectively is important. Good time management leads to improved efficiency and productivity, less stress, and more success in life.

Here are some benefits of managing time effectively:

- Stress relief
- More time
- More opportunities
- Ability to realize goals

Tips for Effective Time Management:

- Set goals correctly
- Prioritize wisely
- Set a time limit to complete a task

- Take a break between tasks

- Organize yourself

- Remove non-essential tasks/activities

- Plan ahead

19. Critical Analysis

Critical thinking is a process of objective evaluation of facts and includes the consideration of possible solutions to problems. Critical thinking is important because it helps individuals and teams to more effectively diagnose problems and identify possible solutions that are not entirely obvious at first. In addition, critical thinking can help resolve conflicts in the workplace.

Ways to promote critical thinking in the workplace:

- Hire and promote critical thinkers

- Build a culture of learning

- Avoid jumping to conclusions

- Create internal forums

- Teach and train

4.1.1. Company-induced education on soft skills.

Employers usually prefer to see a fine blend of competencies in their staff and, in addition to discipline-based knowledge and skills, adequate levels of soft skills are considered desirable for moving forward in one's career. Employers feel professional and technical skills alone cannot help in achieving organizational goals and objectives. It is because their staff will also be involved in different levels of leadership and decision-making activities.

Employees also need to communicate effectively within the organization, with their customers and other stakeholders. Soft skills refer to personalities, attributes, qualities and personal behaviour of individuals. Soft skills include certain abilities such as communication, problem-solving, self-motivation, decision-making, and time management skills.

Introducing novel elements into a shipmanagement company's operational procedures needs to be a well-thought-out and documented act that takes into account uniformity with the rest of the organisation's established processes.

Education can be defined as the discipline that is concerned with methods of teaching and learning in schools or school-like environments. Lloyds Register argues that education is as much about the development of personal attributes through upbringing and observation as it is about gaining knowledge through textbooks.

Having recognized the importance of soft skills in the execution of key safety critical tasks, most likely those in connection with the operation of the ship, a ship management company may elect to educate its personnel on soft skills.

In their effort to educate their personnel on soft skills, we suggest that shipmanagement companies need to engage with accredited educators. Education on leadership, communication and team building should form a part of the company's practices and be sanctioned by the relevant overseeing authority, most likely the Classification Society with which the company maintains its Safety Management System.

All the same, it is possible to suggest a pragmatic and conservative approach for a ship management company to develop in-house soft skill education for its personnel. To acquire soft skills, the support of more experienced people who have already achieved professional results is fundamental. Seminars with experts, coaching and tutoring are effective tools in teaching soft skills.

Having the above in mind, the mainframe of a basic learning process designed and implemented within the context of a revenue-earning organisation can be described as follows:

People need a set of certain <u>aptitudes</u> and <u>knowledge</u> to develop the <u>ability</u> to perform procedures to successfully operate <u>systems</u>. It is the role of the educational provider and the educator to build up on the <u>experience</u> of the learners and develop their <u>competence</u> and <u>train</u> them to acquire <u>skills</u> that will allow them to put the aforementioned abilities into practice. It is the role of the company to provide the <u>tools</u> that will facilitate the learning process and will subsequently allow the learners to perform the procedures.

<u>Aptitudes</u>: language, attitude, motivation, communication, personal attributes, moral values, primary education, secondary education, further education, higher education

<u>Knowledge</u>: controlling the operation of the ship, care for persons onboard, cargo and handling and stowage, marine engineering, maintenance and repair, electrical electronic and control engineering, radio communications, personal survival, fire prevention and firefighting, elementary first aid, personal safety and social responsibilities, survival craft and rescue boats, fast rescue boats, advanced firefighting, medical first aid, medical care onboard ship, safety, security, management and administration

<u>Ability</u>: aptitude, knowledge, experience, skills

<u>Systems</u>: ship and machinery control, navigation and communication, power management, cargo control, alarms and monitoring equipment, propulsion control, surveillance

<u>Experience</u>: proficiency, professionalism, continuous assessment, keeping up with technology, continuous professional development, lifelong learning

<u>Training delivery</u>: induction, on the job training, distance learning, Computer Based Training (CBT), simulation, training vessel, onboard continuation training, refresher training, task specific training, cascade training, self-education

<u>Competence</u>: operational level, management level, support level

<u>Skills</u>: awareness, communication, information management, language, leadership, management, proficiency, teamwork

<u>Tools</u>: Automatic Radar Plotting Aid (ARPA), automatic plotting devices, Electronic Navigation Charts, temperature monitoring, electronic logbooks, liquid level control, decision support software, data loggers, mimic displays

4.1.2. The role of the human operating system in the assimilation of training

In the field of computer science, an operating system is a program that manages a computer's resources, especially the allocation of those resources among other programs. An analogy can be drawn between the computer and the human mind inasmuch as it is said that humans are condemned to understand new phenomena by analogy with things we already understand.

However, brains do not come as isolated entities as do computers. They come with bodies, to which they are intimately connected. The bodies are their interface with the world, through which they learn to move, and, some would argue, there cannot be thinking without embodiment. Perception is in large part expectation and human intelligence is inextricably linked with emotions.

Recent changes in the production system and labour market have placed higher education under increasing pressure to train employable graduates. To achieve this purpose, universities must not only transmit knowledge and abilities that are specific to each discipline or occupation but must also develop so-called soft skills, meaning

dispositions and attributes that are transferable to many occupational situations and areas.

Education can also be said to be a lifelong process; we never stop learning, whether through formal education (such as degree courses and professional development) or through observation and experience.

If correctly applied, training is a planned systematic development of the aptitude, knowledge, understanding, skill, attitude and behaviour pattern required by an individual so that he or she can adequately carry out a given task or perform in a particular job.

The level of competence of the seafarer will depend not only on good education and effective training based on realistic objectives, but also on his or her ability to absorb knowledge and to understand the subject, and on the availability of opportunities to develop his or her skills and, ultimately, experience.

4.1.3. Exceeding passive learning; the move toward facilitation

People learn things all the time and most of what they learn comes from people they work with. According to the Maritime and Coastguard Agency of the UK, an organisation can be sure that people learn the right things by ensuring that everyone is trained properly. Moreover, people do not learn everything they need to carry out an organisation's business safely and efficiently simple through exposure to the job. Experience is essential, but so is learning to do the right thing in the first place.

Therefore, it is argued that knowledge acquired in training that it is not put into practice serves little to no purpose toward furthering the safety and quality management system of a shipping company.

Until now, the shipping industry's focus has been on the four pillars of maritime legislation, namely, SOLAS, MARPOL, STCW and MLC. However, one of the great challenges that

the management of a shipping company faces is to avoid education becoming a box-ticking exercise and instead indeed form part of the company's culture of safety.

Hereby, mention should be made to the International Safety Management Code (ISM) that represents the cornerstone of the International Maritime Organization's approach towards a safety culture, with the emphasis on the human element. Among industry practitioners, perceptions of the ISM Code vary from the bluntly negative to very positive, but it is clear that successful implementation requires a commitment on the part of key stakeholders – mariners, operators, owners, classification societies and flag state authorities – together with adequate preparation and training.

The reason why there is such a diverse range of experiences of ISM implementation is directly attributable to the way in which the individual SMS was designed and put into practice. Some of the common negative factors expressed by individuals involved in its implementation are:

- Too much paperwork
- Voluminous procedures manuals
- Irrelevant procedures
- Bought off-the-shelf systems
- No feeling of involvement in the system
- Ticking boxes in checklists without actually carrying out the required task
- Not enough people/time to undertake all the extra work involved
- Inadequately trained/motivated people
- No support from the company
- No perceived benefit compared with the input required
- ISM is just a paperwork exercise

The SMS can only work if those who are involved in its implementation actually want it to work. This is at the heart of the very nature of management systems and is what differentiates them for prescriptive rules and regulations.

It is worth comparing some of the common factors which emerge from those companies who appear to be operating very successful SMSs, with the above rather negative list:

- Leadership and commitment from the very top of the organisation
- Paperwork reduced to manageable levels, including procedures manuals, checklists, reports etc.
- A sense of ownership/empowerment by those actually involved in the implementation process of the SMS, i.e. the personnel on board the ship
- Two-way communication between the ship and office, with mutual respect
- Awareness of the importance to the individual and to the company of managing safety

It is out of these various attributes that a company culture and in turn a safety culture, flowed a natural consequence. When these various components are combined, they are sufficient to produce a working environment in which people take responsibility for their own safety and contribute toward the safety of others and the company as a whole. As a natural consequence of that shift in attitudes and values, accidents, incidents and consequently insurance claims, all start reducing. And there is much more efficient use of time which allows genuine efficiencies to be made with the consequence that less money is draining out of the company.

Introducing learning processes that lead to the development of soft skills within a ship management organisation is an exercise that needs to take into account the aforementioned positive factors that lead to the successful operation of SMSs, thus preventing the learning of soft skills from becoming a mundane exercise.

As suggested, learning is a combination of practice and theoretical knowledge; a principle that largely applies to soft skills as well. Moreover, many explanations have been proposed on how humans develop soft skills. Lewin (1951) believes that behaviour is the result of interaction between a person (P) and his or her environment (E)

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$$Behaviour = f(P, E)$$

Because skills are basically developed behaviours, it is a small leap to suggest that:

$$Skill\ development = f(P, E)$$

Based on this model, a person's strong desire to acquire a skill is necessary but no sufficient to its development. Favorable environmental factors must also be at play. In the context of our report, this environment should of course be provided for by the company in the form of formal education.

4.1.4. Implementing a behavioural competency framework

A ship is comprised of a number of component parts (systems) each of which will have some effect on its overall performance. The extent of this effect will depend on how critical it is to the safety of the ship and its crew.

Another variable is the extent of user involvement required in each of those systems:

- some systems may be fully automated, but they will still require a degree of intervention from the seafarer, whether it is to set the initial tolerances or to respond to alarms.
- some may require direct seafarer input for their operation and for their maintenance.
- some will require people to interact with other people.
- some may be driven by 'outside influences' such as the environment, other people, or technology.
- others involve the procedures and work instructions, which require input from the seafarer to ensure they are complete, applicable, and up to date.

Furthermore, the shipboard environment requires seafarers from a variety of cultural backgrounds to work, socialize and live harmoniously with one another.

The process of integrating the human element into this complex system starts at the conception of a ship, but it does not stop there. It is a dynamic process, which must be kept under review throughout the lifecycle of the ship to take account of changes in its operating pattern, system updates, improved technology, and new regulation. Gathering and responding to input received from the people most actively involved in the operation of a ship and its systems is an essential part of this process.

Integrating the human element into an organisation does not just happen. It requires the understanding and commitment of management at all stages of the ship's lifecycle, and the motivation and involvement of seafarers. By co-operating in this way, they can put into practice principles that increase the focus on human related activities in the design and safe operation of ships.

OCIMF's seminal report Behavioural Competency Assessment and Verification for Vessel Operators that this paper is largely based upon identifies that the behavioural competency framework consists of six competency domains. These are team working, communication and influencing, situation awareness, decision making, results focus, and leadership and managerial skills.

According to the report, each element is further divided into key elements, all, or a number of which the ship management company may implement into its practices. Being produced by OCIMF, adopting the recommendation of the aforementioned report is a logical first step toward establishing a company-wide behavioural competency framework.

To quote OCIMF's report, *competency frameworks offer a structured approach to managing, appraising and improving performance by reinforcing values and encouraging*

a common culture. A competency framework signals to personnel what the expected performance areas and levels are and which behaviours are valued and recognized.

Whereas meeting the requirements of the TMSA 1 and 2 is a task for which processes can routinely by designed and assigned to individuals; processes that are deeply deterministic in their nature, designing and implementing practices that touch on the human psyche and one's interaction with other individuals is a much harder procedure to define, describe and design.

Therefore, a ship management company ought to first define what a behavioural management framework means and entails in the context of its institution. OCIMF's report refrains from giving an absolute definition of what a behavioural competency framework is despite its thoroughness. This is, of course, to be expected as the report is not an authoritative piece of dictating companies' conduct, but a best practices guide. It is up to each and every company wishing to develop such a framework to adjust the OCIMF's recommendations to its needs and particularities.

However, in this paper, we will venture to give a definition of what a behavioural competency framework is and what it entails, and how a ship management company will be able to develop it.

In trying to build a definition of the behavioural competency framework, we elect to start by giving a definition of what behaviour constitutes in the first place. Therefore, it is possible to argue that human behaviour ranges from simple instinctive reflexes to complex sequences of actions covering extended amounts of time. A behaviour, i.e. an individual's reaction, can be spontaneous, e.g. selective in response to external stimuli or involve complex intellectual reasoning. Moreover, according to OCIMF, a behaviour is the way in which a person acts or conducts themselves and interacts with other people, systems and equipment, procedures and the environment, especially in terms of safety.

In more practical terms, OCIMF further identifies a behavioural competency framework as a reference document that provides a common language or understanding of the competencies required. In that regard the competencies are thought to be the combination of skills, knowledge and behaviours that a person brings to a position that enables them to perform their task efficiently, safely and effectively.

The implementation of a behavioural competency framework can follow a plan of four stages.

Stage I: Before a shipmanagement company can implement a behavioural competency framework, a person or team should be appointed to the project.

Stage II: The team in charge should gather all the relevant information to ensure that the company has all the necessary knowledge to implement the desired behavioural guidelines to its operations. Necessary information may include mandatory rules and regulations, codes, guidelines, and instructions issued by the IMO, flag administrations, classification societies and industry organisations.

- ILO Guidelines for implementing the occupational safety and health provisions of the Maritime Labour Convention, 2006 (ILO)
- ISM Code
- ILO Code of Practice on accident prevention on board ship at sea and in port
- ILO Code of Practice on protection of workers against noise and vibration in the working environment
- ILO Code of Practice on the Management of alcohol and drug-related issues in the workplace
- ILO Code of Practice on HIV/AIDS and the world of work
- ILO Guidelines on the medical examinations of seafarers (ILO)
- ICS basic advice for shipping companies and seafarers on implementing an effective safety culture

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- IMO MSC-MEPC.2/Circ.3 Guidelines on the basic elements of a shipboard occupational health and safety programme
- ISWAN Training on Board fitness Program
- The Mental Health of Seafarers
- Wellness at sea project
- Seafarers Centre Directory
- Port welfare partnership
- ITF Seafarers Health Briefings
- ITF Seafarers Balance your diet briefing
- ILO Stress Prevention at Work Checkpoints

Stage III: The information collected in Stage II should be gathered to create a behavioural management framework, working from policies down to procedures and definitive work instructions.

Again, according to OCIMF, critical operations that ought to be included in a ship management company's behavioural framework include:

- Navigation: navigation in congested waters or anchorages, passage plan and monitoring, approach to pilot stations, entering or leaving a port, crossing a Traffic Separation System (TSS), bridge equipment failure.
- Cargo operations: cargo plan and operations, use of various pumps, inert gas system, tank cleaning, ballast/de-ballast during cargo operations.
- Mooring: berthing, unberthing, use of tugs, anchoring, Single Point Mooring (SPM) operations.
- Engineering: stand by routine maintenance and repairs, bunker operations, change of fuel, use of emergency systems.

Stage IV: Once a behavioural management framework is created it is essential that the necessary objective evidence is gathered to ensure that audit by internal and external

bodies will be able to identify that the contents of the behavioural management framework are being complied with.

Review and assessment is the last part in the behavioural competency framework cycle and one of vital importance since the finding of the internal and external audits will offer the necessary feedback that will allow for the system to improve itself through (self) assessment. OCIMF suggests that there are four key principles of assessment:

- Each officer is to be individually assessed. Here we should point out that OCIMF's report is mainly focusing on a scenario-based assessment, whereby assessment is performed in the context of a hypothetical situation that refers to an on board work task, e.g. the 2nd Officer leading the aft mooring team during mooring operation. Of course, the purpose of our thesis is to extend this position by suggesting that a behavioural competency framework does not only cater to the needs of seafarers of rank but also to ratings and on shore personnel.
- It is recommended that assessors are appropriately trained and qualified.
- The system should be open to auditing or external verification. Those verifying should be appropriately qualified.
- The system must be easily incorporated into the company's existing system, e.g. a Safety Management System (SMS), training system, appraisal system etc.

OCIMF further recommends the adoption of two separate performance review templates. The first should be designed for assessment at the competency domain level, i.e. team working, communication and influencing, situation awareness, decision making, results focus, and leadership and management skills. The second template should be designed for assessing performance at a more detailed level and delve into the competency domains by enquiring the level of performance of the elements, namely those categories of behaviour that form part of the high level domains.

Further to the above, four main methods can be used to assess a behavioural competency. These include:

- Observation of work activities on site or in a simulator (if in a simulator, the assessor should have received the appropriate guidance in instructional techniques involving the use of simulators).
- Questioning techniques (oral or written).
- Projects and assignments.
- Computer-based questions or tests.

Stage IV of implementing a behavioural competency framework can be said to closely resemble the control function of management. In management theory, after strategies are set and plans are made, the management's primary task is to take steps to ensure that these plans are carried out, or, if conditions warrant, that these plans are modified.

The basic control process, wherever it is found and whatever is found and whatever it controls, involves three steps:

- Establishing standards
- Measuring performance against these standards, and
- Correcting deviations from standards and plans

By analogy, we can argue that the first of the aforementioned steps refers to the design of a behavioural competency framework, whereas the second refers to the performance review templates prescribed by OCIMF.

To that end, OCIMF suggests that during assessment, once a specific area of improvement has been identified, the best way to address the need, as well as its priority, has to be decided based on each company's training and development culture. In most cases, the area of improvement is translated into a tangible training need, the need is prioritised, and a timeframe is established.

4.2. Introducing soft skills not yet covered under the TMSA.

Initially, quality in management systems was perceived to lie in the ISO 9001 series or equivalent protocols. Nowadays, safety in shipping operations is linked to the ISM Code and, more specifically for tanker ship management companies, to TMSA. However, the ISM Code is mandatory through SOLAS 74 Chapter IX, whereas quality is voluntary and may be something that the company takes onboard to enhance its position in the industry.

In introducing soft skills that are not yet covered under the TMSA, the shipmanagement company ventures into introducing novel elements into its practices. Mastering soft skills requires persistence. It requires that you be mindful about yourself and your career. It demands that you look honestly and critically at your behaviour, as well as genuinely being open to feedback – whether good or bad.

4.2.1. An enquiry into the soft skills not promoted by the TMSA.

Two types of skills are likely to be particularly important in the future. First, with the disappearance of routine tasks, growing emphasis will be placed on skills which are more difficult to automate. In particular, there is evidence that the labour market is increasingly rewarding soft skills such as the ability to communicate, work in teams, lead, solve problems and self-organize.

Second, the importance of digital skills is increasing. While the demand for ICT specialist skills has been growing fast, the existing evidence does not suggest that major shortages are likely to arise. However, there is much more concern about individuals' ICT generic skills, such as the ability to use communication and information search or office productivity software. Here, existing evidence suggests a significant mismatch between the demand and supply of skills.

The OECD Learning Compass 2030 distinguishes between three different types of skills:

- Cognitive and meta-cognitive skills, which include critical thinking, creative thinking, learning-to-learn and self-regulation
- Social and emotional skills, which include empathy, self-efficacy, responsibility and collaboration
- Practical and physical skills, which include using new information and communication technology devices

Cognitive skills are a set of thinking strategies that enable the use of language, numbers, reasoning and acquired knowledge. They comprise verbal, nonverbal and higher order thinking skills. Metacognitive skills include learning-to-learn skills and the ability to recognize one's knowledge, skills, attitudes, and values. Social and emotional skills are a set of individual capacities that can be manifested in consistent patterns of thoughts, feelings and behaviours that enable people to develop themselves, cultivate their relationships at home, school, work and in the community, and exercise their civic responsibilities.

Cognitive skills, such as general intelligence, have long been considered the most important determinants of employment success. More recently, however, the empirical evidence is pointing towards social and emotional skills also directly affecting a variety of job outcomes, such as occupational status and income, on top of their indirect effect through educational outcomes. In fact, social and emotional skills can be equally, and in some cases even more important, than cognitive skills in determining future employment. For example, an analysis on the effects on occupational outcomes found that social and emotional skills are almost as influential as cognitive skills.

Further to the above, OECD's paper on the Social and Emotional Skills (Well-being, connectedness, and success) argues that five big domains exist under which different soft skills fall. This OECD report was produced to reflect the teaching of soft skills to high school student. However, it is possible for us to draw upon the conclusions and suggestions of this report and locate these soft skills that have not yet entered shipping's discussion about soft skills.

Domain	Skills	Description	Behavioural examples
Conscientiousness	Achievement orientation	Setting high standards for oneself and working hard to meet them	Enjoys reaching a high level of mastery in some activity
	Responsibility	Able to honour commitments and be punctual and reliable	Arrives on time for appointments, gets tasks done in time
	Self-control	Able to avoid distractions and focus attention on the current task in order to achieve personal goals	Does not rush into things, is cautious and risk averse
	Persistence	Persevering in tasks and activities until they get done	Finishes work tasks once started
Emotional stability	Stress resistance	Effectiveness in modulating anxiety and able to calmly solve problems (is relaxed and handles stress well)	Is relaxed most of the time, performs well in high-pressure situations
	Optimism	Positive and optimistic expectations for self and life in general	Generally, in good mood.
	Emotional control	Effective strategies for regulating temper, anger and irritation in the face of frustrations	Controls emotions in situations of conflict
Agreeableness	Empathy	Kindness and caring for others and their well-being that leads to valuing and investing in close relationships	Consoles a colleague who is upset
	Trust	Assuming that others generally have good intentions and forgiving those who have done wrong	Avoids being harsh or judgmental
	Cooperation	Living in harmony with others and valuing interconnectedness among people	Finds it easy to get along with people, respects decisions made by a group
Openness to experience	Curiosity	Interest in ideas and love of learning, understanding and intellectual explorations; an inquisitive mindset	Likes to read and learn outside the set training modules
	Tolerance	Is open to different points of view, values diversity, is appreciative of foreign people and cultures	Can get along with people from different backgrounds

	Creativity	Generating novel ways to do or think about things though exploring, learning from failure, insight and vision	Has original insights
Extraversion	Sociability	Able to approach others, both friends and strangers, initiating and maintaining social connections	Skilled at teamwork, good at public speaking
	Assertiveness	Able to confidently voice opinions, needs and feelings, and exert social influence	Takes charges in teams
	Energy	Approaching daily life with energy, excitement and spontaneity	Is always busy
Compound skills	Self-efficacy	The strength of individuals' beliefs in their ability to execute tasks and achieve goals	Remains calm when facing unexpected events
	Critical thinking / Independence	The ability to evaluate information and interpret it though independent and unconstrained analysis	Good at solving problems, at ease in new and unknown situations
	Self-reflection / meta-condition	Awareness of inner processes and subjective experiences, such as thoughts and feelings, and the ability to reflect on and articulate such experiences	Good work task preparation strategies, able to master skills more effectively

Table 16. Skills included in the OECD's Study on Social and Emotional Skills

4.2.2. Soft skills fostering initiative vis-à-vis compliance.

The ISM Code and the quality and safety protocols of shipping companies, as well as similar process-based management guidelines in other industries, have been criticized for leaving little to no room for individuals to deviate their actions from the defined processes. Under those systems, personnel are thought of as passively following work instructions that do not foster the undertaking of a greater degree of autonomy in one's work and do not promote creativity.

Sometimes, this reality of uncompromising acceptance of the written procedures has been associated with undesirable behaviour, even by industry bodies. For example, in OCIMF's report, under the Leadership and Managerial Skills domain, and the fifth element of Planning and Coordination, one of the negative observable behaviours is the strict following of plans despite circumstances demanding a different approach.

A discussion on soft skills, referring, among other things, to the notion of problem solving, crisis management and the modern concept of Stop Work Authority (SWA), can be said to question the stern approach of quality, security and safety protocols that want staff to execute tasks in strict accordance with written down rules and procedures.

Throughout this paper, we seek to stress out that soft skills are uniquely humane in their nature, since their very focus lies on effectively communicating with others and displaying empathy toward others. That, in combination with the aforementioned comment in OCIMF's report of circumstances demanding a different approach, compels us to question whether an increased focus on soft skills also serves as an overture to a discussion on initiative within a safety and quality management system.

Expanding on the soft skills introduced in 4.2.1. from OECD's report and using self-efficacy as an example, OECD defines self-efficacy as representing the strength of individuals beliefs in their ability to perform tasks and achieve goals. Moreover, it is argued that the importance of self-efficacy lies in the fact that people's performance in various life situations is influenced not only by their actual abilities, but also by their belief in their strength and adequacy of those abilities. In fact, people's belief in their capabilities can often be a better predictor of their performance than the actual level of their capabilities, since these beliefs determine how and to what degree they use their knowledge and skills. Research indicates that the optimal level of self-efficacy is slightly above actual ability, thus allowing individuals to choose challenging but still manageable tasks that promote learning and further development.

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5. Conclusions

In a fast changing and dynamic world, with greater competition, greater environmental awareness and perhaps a greater desire by politicians, states, and lobby groups to intervene, the world is becoming subject to an increasing number of regulations with the shipping industry being no exception.

As it was argued in the first chapter of this dissertation, maritime regulation both on a national and international level has been a relatively recent phenomenon, with efforts to introduce legislation into shipping dating back almost fifty years and being more profound in the last twenty.

It can also be argued that the adoption of maritime legislation has mostly been reactive to a calamitous event, whether that is a wreckage resulting to loss of life or damage to the environment. This has shaped the nature of maritime legislation now in force with it mainly being geared toward onboard safety, security, and protection of the environment.

By its very nature, legislation covering the subject of soft skills cannot come as a response to a single event or series of events. Soft skills have humans at their very centre and by implication their interactions with their environment. Thus, whereas legislation on

technical matters is adequate and will continue to evolve, legislation that fosters the development of soft skills in the shipping industry has not entered the mainstream.

Throughout our thesis, we have stressed out the significance of operations, both onshore and onboard, to form part of the ship management company's safety and quality system, prominently the ISM Code. Therefore, in ship management companies' efforts to adopt soft skill-related practices in their quality protocols, we argue for a four stages methodology.

In Stage I, a team of competent professionals, who either belong to the company's HSQE department or trusted third party consultants, should be appointed to undertake the tasks of describing, documenting, and designing the implementation of soft skills in the company's processes. In Stage II, the team should gather all the relevant information in relation to introducing soft skills into their operations. This information includes but is not limited to pieces of international regulation, IMO guidelines, and instructions issued by flag states and classification societies.

Stage III includes the study of the aforementioned pieces of information and the drafting of company policies, onshore and onboard procedures and specific work instructions. Finally, Stage IV suggests that once the new policies, procedures, and work instructions enter the company's SMS and put into practice, there should be processes in place and people to gather the necessary objective evidence relating to the performance of soft skill-centred practices and perform audits with the aim to self-improve.

There have been significant steps toward the greater integration of soft skill-related practices in the quality and management systems of ship management companies accompanied with an ever-increasing literature on the subject of shipping and soft skills.

OCIMF's report of the Behavioural Competency Assessment and Verification for Vessel Operators has been a seminal paper that is expected to influence companies' procedures

and the development of future soft skill guidelines. Mention to soft skills can now also be found to mainstream editions of VIQ and ISGOTT.

However, up until now, practices concerning soft skills in shipping lack the force of law. We can expect that regulation on soft skills will come about in the near future as flag states and recognised organisations will require ship management companies to demonstrate that they have taken appropriate steps in educating and catering for their personnel especially in regard to the interplay between seafarers' communication skills and safety critical situations.

Being in compliance with TMSA 3 might not be enough for those companies that wish to show a greater degree of commitment to enabling the development of soft skills within their organisation. In exceeding the TMSA 3 soft skill mandates, we recommend that companies should design and implement their soft skill-centred processes in line with the aforementioned four stages methodology and in combination with a rigorous in-house or contracted training scheme for their personnel.