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DEPARTMENT OF MARITIME STUDIES

M.SC IN. SHIPPING MANAGEMENT

TMSA 3 Analysis of the Required Soft Skills

The importance of soft skills to promote a safe and efficient work environment in the shipping industry and how a Technical Management Company provides vital guidance for the wellbeing and wellness of the seafarers and shore-based employees.

Masters' Dissertation

Submitted in partial fulfilment of the requirements of University of Piraeus for the degree of M.Sc. Shipping Management

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Thymara Maria-Argyro, HSEQ Department Assistant at Dorian LPG Management Corp.

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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
CDI	Chemical Distribution Institute
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 Compentencies
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	Harmonised 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 Quoteint
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 paper serves as an enquiry into the importance of soft skills in terms of promoting a safer and more efficient work environment with regard to shipping operations, both onboard and onshore. The work 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, focusing on key international conventions including, *inter alia*, the four pillars of ship management, i.e. SOLAS, MARPOL, STCW and MLC. The above will serve in introducing TMSA.

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, I also argue 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 the human capital in shipping and the nature of soft skills required for onboard and onshore operations were examined. Tying with the aforementioned regulatory framework I also present how soft skills manifest in legislation relevant to shipping operations.

Therefore, I focus on discussing the necessary actions that a tanker ship management company should undertake to achieve compliance with TMSA 3 standards and adopt industry's best practices, with 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 last chapter is heavily influenced by OCIMF's report on the Behavioural Competency Assessment and Verification for Vessel Operators and relies heavily on the work material and issues discussed in the previous chapters. Here, the possible ways that a shipmanagement company can build a behavioural competency framework in the context of its safety and quality protocols and delve into an enquiry into company-sanctioned education and personnel's development were explained.

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, the 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, Human performance, Efficient Work Environment Shipping Operations, Safety and Quality Systems

Περίληψη

Αυτή η διπλωματική εργασία ερευνά την σημαντικότητα 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, επιλέχθηκε να θεμελιώθει με την εργασία και να οριστεί η σημαντικότητα των soft skills στο χώρο της ναυτιλίας αφού πρώτα έχει αναγνωριστεί η κεφαλαιώδη σημασία 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 υιοθετούμε την 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.

Αρχικά συζήτηση για τα soft skills αναφέροντας τους τέσσερις πυλώνες της ναυτιλιακής νομοθεσίας, ήτοι τις συμβάσεις SOLAS, MARPOL, STCW και MLC. Αναζητούμε 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 προσπάθεια πραγματοποιήθηκε για τη σημαντικότητα των soft skills σε άλλες βιομηχανίες αναφερόμενοι σε πρακτικές άλλων κλάδων και αναλύοντας το βαθμό 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 επιχειρούμε να προτείνουμε 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: κοινωνικές δεξιότητες, ανθρώπινος παράγοντας, ανθρώπινη συμπεριφορά, αποδοτικό εργασιακό περιβάλλον, συστήματα διασφάλισης ποιότητας και ασφαλούς διαχείρισης,

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 shipping operations. 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 commend 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 are 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:

- Personnel: the company ensured the correct mix of people onboard to operate and maintain the ship and its systems.
- Manning: 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.
- Training: 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.

1.3. 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 conventions 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), a number of 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). A number of 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 a number of 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 is 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.

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. In particular 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. The roles 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 particular 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 has to 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.

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.

Current Operation

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

Overview

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.

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)

- o Seafarer welfare (Cadet berths, Fatigue/rest hours, Health monitoring)
- Environment
  - o Emissions to water (Ballast water, Hull fouling management)
  - o Emissions to air (SOX, NOX, VOC (Annex VI of MARPOL) Greenhouse gas emissions
  - o Ship Recycling
  - o EPA VGP Recordkeeping and Monitoring
  - o Waste Management
- Operations
  - o Vetting & Risk Assessment
  - o Ports
  - o Maritime Security (Piracy, Sanctions, Refugees, Cyber risk management)
  - o Safe navigation (ECDIS, Pilotage, eNavigation)
  - o Chemical tanker ops
  - o Gas tanker ops
  - o Port State Control
  - o 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.

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)

SIRE and VIQ

History of the SIRE Programme

In 1993, OCIMF established a Ship Inspection Report (SIRE) Programme, which enabled OCIMF members to submit their ship inspection reports to OCIMF for distribution to OCIMF members and certain qualifying non-OCIMF members.
Participation in the original programme, as either an inspecting OCIMF Member or a programme recipient, was strictly voluntary and each programme recipient determined independently how to evaluate the information contained in the reports received from OCIMF.

Under the SIRE Programme, the operator of any ship that is the subject of a report was given a copy of that report and the opportunity to submit written comments relating to the report, to both the inspecting OCIMF Member and to OCIMF.

Report recipients accessed the SIRE System Index by computer and this permitted the index to be viewed or downloaded. Programme recipients could order reports and any matching operator comments from the SIRE system. Reports and comments were transmitted by facsimile to the programme recipients' pre-registered facsimile numbers on request.

The original SIRE Programme was first revised in 1997 and introduced the means whereby programme recipients were able to receive reports and any operator comments electronically, as well as by facsimile.

Two major changes were also introduced in the 1997 Revised Programme. These were:[1]
- A Uniform Vessel Inspection Procedure; and,
- A Vessel Particular Questionnaire (VPQ) - Under the Original 1993 Programme, the inspecting OCIMF Member was free to choose whatever inspection protocol and report format it desired. In 1997, the Uniform Vessel Inspection Procedure changed this. The Vessel Particular Questionnaire was a newly developed OCIMF document, also introduced in 1997 and was not part of the original programme. The Vessel Inspection Questionnaire was further revised in 2000, and the Vessel Particulars Questionnaire was also revised in 2003 when a Harmonised Vessel Particulars Questionnaire (HVPQ) was introduced. Updated VIQs were published in 2004, 2005, 2008, 2009,2012 and 2014.

The SIRE Programme was again revised in 2000. The 2004 revisions made further important changes to the inspection procedure whilst also adding numerous new vessel types that are inspected under the programme. The SIRE Programme was expanded in 2005 to include the inspection of barges carrying petroleum products, chemicals, or gas, or vessels used in the carriage of packaged petroleum products or gas, or road tankers carrying the same commodities. Towing vessels that are utilised in the handling of barges carrying the above listed products may also be inspected under the SIRE Programme. The inspection of these vessels and associated questionnaires are addressed in separate questionnaires. Collectively, these are referred to herein as "Vessels". Subsequent revisions updated the VIQ questions and guidance but did not add any questions. This 2011 Edition substantially changed the focus of the VIQ to increase the emphasis of the inspection on navigation procedures and cargo and ballast handling operations. Consequently, significant changes have been made in this edition. In 2013 a further major revision of the VIQ was undertaken.

Uniform Vessel Inspection Procedure[2]

The programme requires that participating submitting companies follow a uniform Vessel Inspection Procedure. This procedure has an Inspection Element and a Report Element.

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[1] OCIMF, Vessel Inspection Questionnaire Section 1.2
[2] OCIMF, Vessel Inspection Questionnaire Section 1.3

The Inspection Element uses a series of detailed inspection questionnaires as appropriate for the type of vessel inspected. These questionnaires address issues associated with safety and pollution prevention. Inspectors who are employed or contracted by submitting companies must (with certain exceptions) answer all these questions.

The Report Element is developed from the completed electronic questionnaire that is submitted by the Inspector, either directly to the SIRE web site, or to the submitting company for further processing prior to transmission to the vessel operator and to SIRE.

Using the SIRE Vessel Inspection Questionnaires ("VIQs")[3]

The inspection questionnaires used in this programme contain a series of questions related to safety and pollution prevention applicable to the type of vessel that is inspected. These questions are consecutively numbered and are logically grouped into separate chapters. Each chapter contains a series of questions to be answered by the inspector. Questions may be accompanied by guidance, namely:

1. Guidance notes to inspectors;
2. Reference source(s) citing regulation(s) or industry guidelines pertaining to questions; and
3. An indicator to identify issues when an inspector comment is mandatory.

The above-mentioned guidance, regulatory/industry references amplify the questions, and these are provided to assist the inspector to answer the questions.
The inspector must respond to all the questions appropriate to the type of vessel being inspected. Failure to do this will mean that the inspection report cannot be transmitted to the SIRE Internet site for processing by the principal who commissioned the inspection.
Mandatory Inspection Requirements[4]

The following mandatory inspection requirements must be followed by inspectors in the conduct of their shipboard inspection in order for reports to meet the requirements of the SIRE Programme:

General Requirements.

The inspector must introduce themselves to the Master or the Master's authorised deputy, explain the scope of the inspection and discuss the preferred order in which it will be carried out, prior to commencement of the inspection. Inspectors should co-operate fully to conduct the inspection in the order that will cause the least disruption to the vessel's operations. The

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[3] OCIMF, Vessel Inspection Questionnaire Section 3.1
[4] OCIMF, Vessel Inspection Questionnaire Section 4.1.1

inspector must be accompanied by a member of the ship's staff at all times during the course of the inspection.

Inspectors may, on occasion, have observers with them during an inspection. Where the inspector has an observer accompanying them, the inspector must introduce the observer to the Master at the same time and in the same manner as they introduce themselves. Inspectors must clarify the extent and scope of the observer's role during the inspection.

The inspector must set a good example with respect to their communications, behaviour and own personal safety procedures whilst on board the vessel and in the terminal and must wear appropriate personal protection equipment (PPE) at all times.

Electrical or electronic equipment of non-approved type, whether mains or battery powered, must not be active, switched on or used within any gas-hazardous or other hazardous areas. This includes torches, radios, mobile telephones, calculators, computers, photographic equipment and any other portable equipment that is electrically powered but not approved for operation in a gas-hazardous area. It should be borne in mind that equipment such as mobile telephones and smart watches, if switched on, can be activated remotely and a hazard can be generated by the alerting or calling mechanism and, in the case of mobile telephones, by the natural response to answer the call. Any specific Terminal requirements must be adhered to.

Any Observations that the inspector intends to record in the VIQ must be pointed out and discussed 'on site' at the time with the member of the ship's staff assigned to accompany the inspector. This ensures that the nature of the Observations are fully understood and can also avoid extended discussion at the end of the inspection.

On completion of the inspection, some Submitting Companies require the inspector to provide a list of the inspection findings in the form of written observations, others do not. In either case, the inspector must discuss the inspection findings with the Master or the Master's authorised deputy before leaving the vessel. Other than to prepare these observations, however, the inspector must not remain on the vessel to complete the inspection report. It is recognised that on occasions this may not be possible, especially when leaving and joining the vessel is done by helicopter on vessels doing STS operations.

It is recommended that the inspection be completed in about 8 to 10 hours. It is also expected that documentation checks carried out as part of the inspection should not exceed 3 hours. All other time onboard should be used to conduct the inspection of the vessel, interact with crewmembers, compile the observation list if appropriate, and conduct the close out meeting. The completion of the report using the report editor software before the inspector leaves the vessel must not occur as this reduces the time that the inspector will spend conducting the physical inspection of the vessel. The inspector must leave the vessel on completion of the inspection and must not remain on board to complete entering the report details into the report editor.

The time of 8 to 10 hours specified is guidance, however the actual time taken to complete the inspection may differ. All inspectors must take into account their own rest hours including travel time and fatigue levels when conducting inspections. 'Back to back' inspections are discouraged, and inspectors should complete and submit the report for one vessel before commencing an inspection on another vessel.

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 also 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 of 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

The TMSA 3 sets out 13 elements of management practice that are important for the successful vessel's operation and for a sufficient management system. Each element defines the Aims and KPIs required to meet the main objective, together with examples of best practice for each stage of the development process. The new edition makes an effort 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, TMSA 3 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.

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 have to 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 principle underpinning 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, so as 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.

1.5. Capturing quality and designing processes; the ISO standards.

The development of management systems on the basis of optional standards relating to quality, the environment, health and safety, and energy performance is a widespread practice among companies. In today's world, quality is seen as a constituent part of services for every well organised shipping company and an important factor for its success. Shipping companies place strong emphasis on quality considering it as an important value adding attribute of their services (Lagoudis et al. 2006). Academic research into this subject is limited (Thai et al, 2014). Nevertheless, accounts given by companies confirm the benefits arising for them from the development of quality management systems for cost, internal efficiency, reputation and competitiveness.

Quality is a dynamic state associated with products, services, people, processes, and environments that meets or exceeds expectations and helps produce superior value.

- The traditional view is that quality is defined solely as meeting customer specifications. In this regard, quality is inspected into the product. The defects are an expected part of producing a product. It is considered as a separate function in the organization/ — it should be everybody's responsibility. In cases of poor-quality results, it is employers to be blamed for them.

Total quality (TQ) is an approach to doing business that attempts to maximize an organization's competitiveness through the continual improvement of the quality of its products, services, people, processes, and environments.

- The TQ view is that quality means satisfying customer needs and exceeding customer expectations. In this regard quality is determined by product and process design and achieved by effective control techniques. In TQ, the defects are to be prevented using effective <u>Control Systems</u>. Quality is considered to be fully integrated throughout the organization — it should be everybody's responsibility of the effective control systems. In cases of poor-quality results, it is believed that at least 85% of quality problems are management's fault.

In shipping, Management Systems includes practices, processes, and responsibilities, resources for establishing, developing, maintaining, and improving the **environmental** policy **quality** policy **safety** policy.
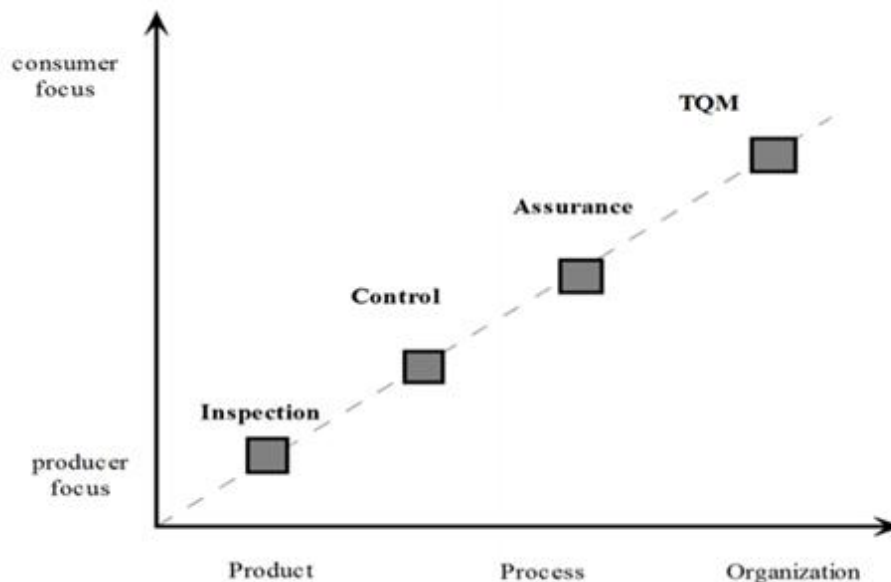
Figure 1: Total Quality Management System

In systems (Quality management systems) theory, W. Edwards Deming's played a significant role by developing the Known "Deming Cycle".

Deming Cycle was developed to link the production of a product with consumer needs and focus the resources of all departments in a cooperative effort to meet those needs. It includes the following:

1. Conduct consumer research and use it in planning the product **(plan)**
2. Produce the product **(do)**
3. Check the product to make sure it was produced in accordance with the plan **(check)**
4. Market the product **(act)**
5. Analyse how the product is received in the marketplace in terms of quality, cost, and other criteria **(analyse)**
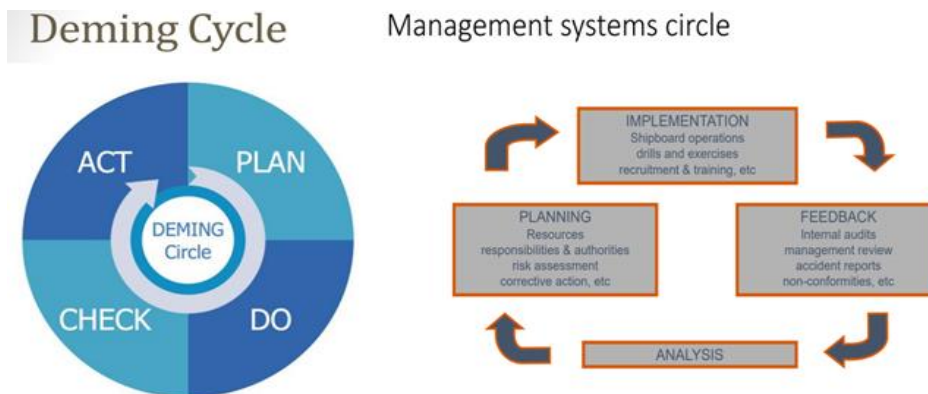
Figure 2: Deming and Management systems Cycle

 The cycle of "Plan - Do - Check - Act" is also known as the Control Circle, or PDCA. Kaoru Ishikawa has expanded Deming's four steps into six:

1. Determine goals and targets.
2. Determine methods of reaching goals.
3. Engage in education and training.
4. Implement work.
5. Check the effects of implementation.
6. Take appropriate action.
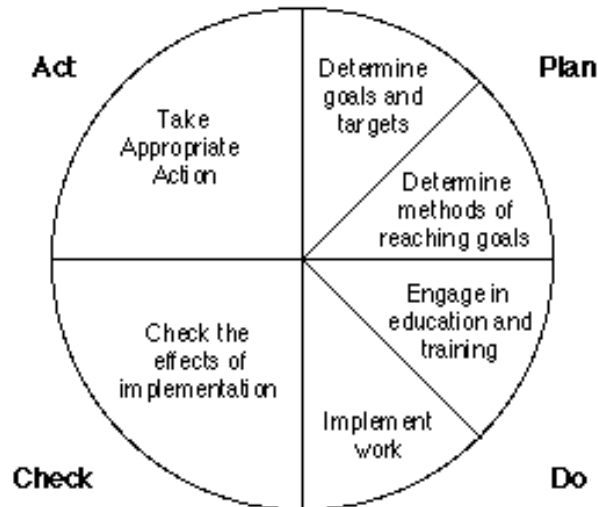
Figure 3: Kaoru Ishikawa expanded Deming's Cycle

Shipping companies are required to comply with a number of rules and regulations in connection with the protection of human life and of the environment and the ensuring of the quality of the services which they provide. The process of the management of safety, quality and environmental responsibility is connected with the efforts of the company to develop, operate and maintain management systems which safeguard its scheduled performance in these areas. While safety management is, in accordance
with the International Safety Management Code, mandatory for shipping companies, quality management and its certification, as well as the management of environmental responsibility and its certification, are an option for companies.

The standards **ISO 9001**, **ISO 14001**, **ISO 45001**, **ISO 50001** and **OHSAS 18001** are based on the management principles of continuous improvement, i.e., the Plan-Do-Check-Act (PDCA) cycle. These four items correspond to the steps in the Shewhart/Deming cycle, which is orientated towards continuous improvement. The Deming cycle includes a series of actions at each step. More specifically, 'Plan' involves the defining of the problem, its analysis and the taking of corrective measures; 'Do' is concerned with the implementation of the proposal for improvement by the solving of the Standards with common approach problem; 'Check' involves confirmation that the results are satisfactory, and 'Act' is about securing the benefit derived from the improvement and standardisation of the procedures (Dervitsiotis, 2005).

This leads many companies in most instances to opt for the development and certification of the quality management systems by the same organization as certifies their compliance with the ISM Code. *The code defines, a Safety Management System as a structured and documented system enabling Company personnel to implement effectively the Company safety and environmental protection policy.* Certification can be carried out on the basis of the ISO 9001 and ISO 14001 standards, respectively, which concern the safeguarding of quality

and environmental responsibility. ISO 9001 was not designed exclusively for shipping, but it can serve as a supplement to the ISM Code.

A (safety) management system provides:

1. Confidence that the company is complying with (safety and pollution prevention) requirements
2. Systematic planning and implementation of activities and operations
3. Evidence of the application of controls (with respect to safety and pollution prevention)
4. Corrective action to prevent the repetition of problems

MANAGEMENT SYSTEM MODEL

Continual Improvement of the Quality Management System

Customer Needs & Expectations

Management Responsibility

Resource Management

Measurement, Analysis & Improvement

Customer Satisfaction

Customer Requirements

Product Realization

Product or service

Input

Output
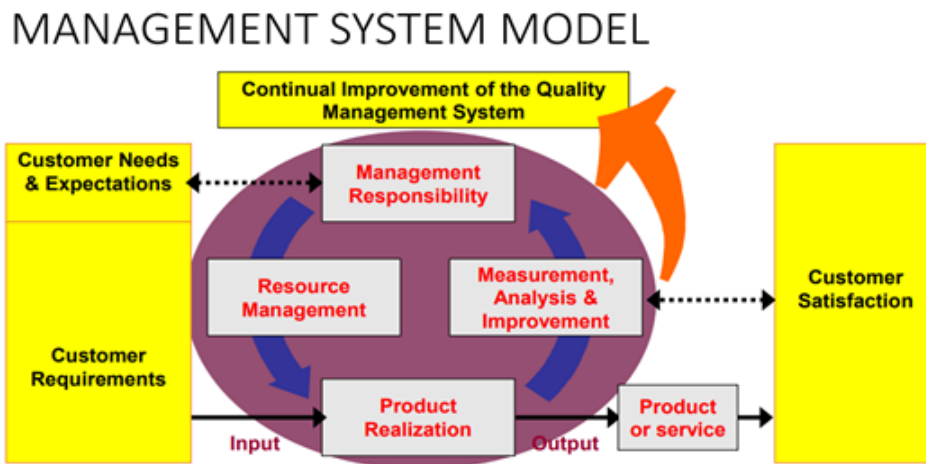
Figure 4: A Management System Model

The improvement of safety is more completely achieved when, in parallel, objectives are attained which have a connection with:

- the quality of the services,
- the management of the environment,
- health, and safety at work,
- energy performance.

The improvement of safety constitutes a central goal, which is, however, more completely achieved when, in parallel, objectives are attained which have a connection with the quality of the services, the management of the environment, health and safety at work, as well as energy performance. Studies have confirmed the compatibility and advantages of the joint development of safety and quality systems in the effective operation of shipping companies (Celik, 2009a, 2009b; Pantouvakis & Karakasnaki, 2016).

For this reason, the development of management systems on the basis of standards relating to quality, the environment, health and safety and energy performance is a widespread practice among companies. Unlike the ISM Code, which is a mandatory code exclusively for shipping,

the ISO 9001, ISO 14001, ISO 50001 and OHSAS 18001 standards are options for companies and have wider application that will be explained further at this subchapter.
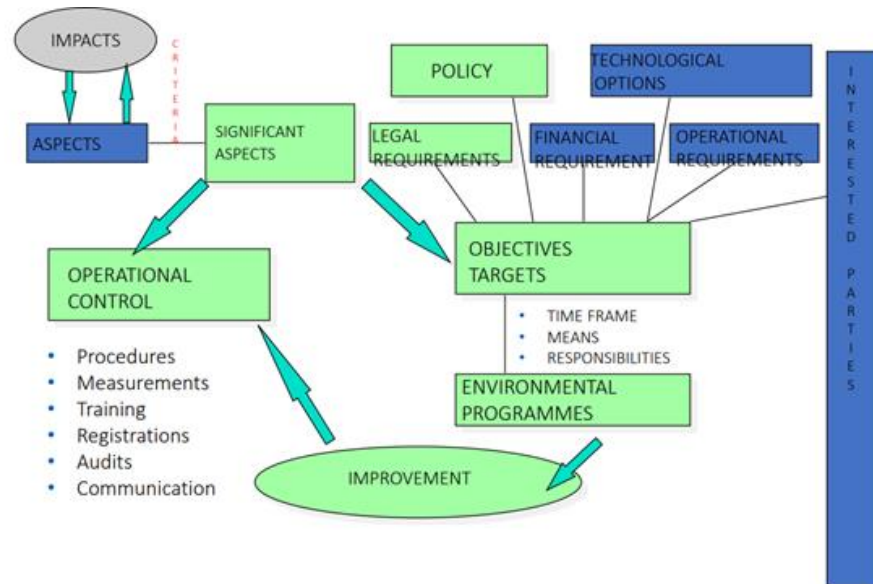
Figure 5: *ISO Systems*

The International Organization for Standardization (ISO) defines standardization as the activity of establishing, with regard to actual or potential problems, provisions for common and repeated use, aimed at the achievement of the optimum degree of order in a given context. A Standard is a document, established by consensus and approved by a recognized body, that provides for common and repeated use, rules, guidelines or characteristics for activities or their results, aimed at the achievement of the optimum degree of order in a given context. Standardisation in general and the ISO standards in particular have had a profound impact in the business world and subsequently elements of standardisation have penetrated the business of shipping.

A quality management system can be defined as a collection of business processes focused on consistently meeting customer requirements and enhancing their satisfaction. Quality management principles are a set of fundamental beliefs, norms, rules, and values that are intertwined with a company's operations and are accepted as true and can be used as a basis for quality management.

ISO identifies seven **quality management** principles:
- customer focus
- leadership
- engagement of people
- process approach
- improvement
- evidence-based decision making
- relationship management.

The ISO 9001 family of standards has had a significant impact in the design and proliferation of quality management systems in an array of diverse industries. The aforementioned seven quality management principles also demonstrate the significance **of the human element in quality management systems**. Like the ISM Code which only concerns the context of maritime industry, ISO 9001 series are generic standards that can be applied both in manufacturing (Kammoun and Aouni 2013) and services organizations (Psomas, Pantouvakis, and Kafetzopoulos 2013) and determine the basic requirements that an organization must fulfill in order to develop a quality management system. ISO 9001 standards provide guidelines for the proper systemization and formalization of companies' processes and emphasize the importance of documenting such procedures (Tarí, MolinaAzorín, and Heras 2012).

Figure 6: *ISO 9000 Management Principles*

ISO 9001:2015 – Quality Management

It sets out the requirement for a quality management system (ISO, 2015b). It is based on quality management principles of customer focus, leadership, engagement of people, process approach, improvement, evidence-based decision-making and relationship management, and helps businesses and organisations to be more efficient (ISO, 2015a)

ISO 9001:2015 establishes 5 groups of requirements:

➢ Quality management system
➢ Management responsibilities
➢ Resource management
➢ Product (service) realization 8: Measurement, analysis & improvement

In this ISO Ship Based Activities are defined as follow:

1. Navigation
2. Responsibilities
3. Cargo & Ballast Operations
4. Training & Awareness
5. Mooring
6. Documentation and Records
7. Bunkering
8. Quality Programmes
9. Port/Terminal Activities
10. Monitoring and measurement
11. Maintenance

Whereas Shore Based Activities are:

12. Purchasing, procurement and contractor management
13. Training and Awareness
14. Chartering
15. Documentation and Records
16. Manning
17. Quality Programmes
18. Office Facilities Management
19. Monitoring and measurement
20. Responsibilities

Certification on the basis of Standard 9001 can contribute to an increase in the company's competitiveness and yield; this has been confirmed by a series of studies (Dimara et al, 2004).

ISO 14001 – Environmental Management

ISO 14001 sets out the criteria for an environmental management system and can be certified to. It maps out a framework that a company or organization can follow to set up an effective environmental management system. It helps organisations improve their environmental performance through more efficient use of resources and reduction of waste, gaining a competitive advantage and the trust of stakeholders (ISO, 2015c). It specifies requirements that enable an organisation to achieve the intended outcomes it sets for its environmental management system.

Establishment of an environmental management system, should take into account the issues arising for ship operators such as:

➢ Air pollution
➢ Biological hazards
➢ Water pollution
➢ Noise
➢ Water use
➢ Community concerns
➢ Other resource use
➢ Marine life
➢ Hazardous substances
➢ Accidents and emergencies
➢ Interface with other Health and Safety Issues
➢ Waste

Environmental Aspect Element of an organisation's activities or products or services that can interact with the environment. A significant environmental aspect has or can have a significant environmental impact Environmental Impact is defined as any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisations activities or products or services

ISO 50001 – Energy Management

This is a standard which gives organisations a recognised framework for developing an effective energy management system. Its purpose is to enable organisations to establish the systems and processes necessary to improve energy performance, including energy efficiency, use and consumption. Implementation of ISO 50001 is intended to lead to reductions in greenhouse gas emissions and other related environmental impacts and energy cost through systematic management of energy (ISO, 2016).

OHSAS 18001 – Occupational Health and Safety

OHSAS 18001 is a framework for an occupational health and safety management system which can help organisations to put in place the policies, procedures and controls needed to achieve the best possible working conditions, aligned to internationally recognised best practice (BS, 2017)

- ISO 45001 enables organizations to put in place an occupational health and safety (OH&S) management system. This will help them manage their OH&S risks and improve their OH&S performance by developing and implementing effective policies and objectives.
- ISO 27001 is an international standard on how to manage information security and enables organizations of any kind to manage the security of assets such as financial information, intellectual property, employee details or information entrusted by third parties.

1.6. The move toward behavioural management

There is no reference in the ISM Code to the concept of safety culture. Nevertheless, the development of a safety culture is one of the most crucial factors for the successful implementation of a system of safety management. Safety culture is defined as "shared values (what is important) and beliefs (how things work) that interact with an organization's structures and control systems to produce **behavioural norms** (the way we do things around here)" (Uttal, 1983).

As Theotokas has pointed out[1], "*safety culture presupposes participation in the system of safety management and a knowledge of the parameters which define it on the part of the people who are involved in its implementation, a willingness to learn and constant improvement by means of observation, recording and analysis, and confidence of individuals in the system. Within this framework, the role of management and its commitment* __*to respect for the above principles is essential and a precondition for the necessary change in behaviour of individuals*__*."*

The behavioural management theory is often called the human relations movement because it addresses the human dimension of work. Behavioural theorists believed that a better understanding of human behaviour at work, such as motivation, conflict, expectations, and group dynamics, improved productivity. The theorists who contributed to this school viewed employees as individuals, resources, and assets to be developed and worked with, not as machines, as in the past.

Behavioural management broadly aims to improve health and safety performance across the business by mitigating risk taking behaviour. More specifically, it aims to:

- Engage the workforce to make contributions and recommendations towards continuous health and safety improvement.
- Create an environment where the workforce is encouraged to repeat safe behaviour, to support the business and prevent loss.
- Improve communication between management and the workforce addressing root causes and working towards permanent solutions to removing unsafe practices.
- Raise awareness of health and safety and providing training and interpersonal skills to proactively manage health and safety at all levels.
- Prevent the occurrence of further accidents/incidents by tracking behavioural data and looking at leading indicators of unsafe practices.

Understanding the root cause of the one's behaviour is essential, as without this it is unlikely that any behaviour strategy will be sustainable. There are five basic models in understanding someone's behaviour.

These include:

- **Biological**: People have a tendency to interact with the environmental influences around them and this interaction informs their behaviour.
- **Behavioural**: Behaviour can be modified through conditioning. This is achieved by another event following an action. There are two types of conditioning. Classical conditioning – a behaviour is connected with a certain stimulus, for example a people feel happy and excited on a Friday afternoon. Operant conditioning – a behaviour is connected and repeated by rewarding the positive behaviour and issuing sanctions for the negative behaviour.
- **Cognitive**: The cognitive approach helps people judge and reason effectively and have a perception of their surroundings. This means that the way in which we behave is influenced by our thinking.
- **Systemic**: The systemic approach looks at targeting the individual's behaviour within the system. These systems can include: their family, friends, colleagues, and community. The quality of these systems is a great influence on one's behaviour. This can be best demonstrated with the example of a child living in a family where domestic violence takes place will naturally struggle within another system, i.e. school. The

behaviour the child experiences at home, for example shouting, violence and/or aggressiveness, will not work in a school context which can cause problems for the child.

- **Psychodynamic**: The psychodynamic approach is one used in a clinical setting as it focuses on understanding and intervening by unravelling past conscious and unconscious experiences in order to help someone deal with them.

Improved technical standards, including more demanding survey regimes and stronger regulation enforced through a rigorous port state control system, have had a strong positive influence on safety. However, there is a limit to how much additional improvement is possible if attention is only focused on the structural, mechanical, electrical and electronic components. Further improvements will require a focus on the way that a ship is used; in other words, considering the overall ship system. This can't ignore the people operating it, often known as the 'human element'.

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) makes an effort 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 main 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)." At the same study, the importance of soft skills regarding their growth in the Labour market is demonstrated at the below Figure.
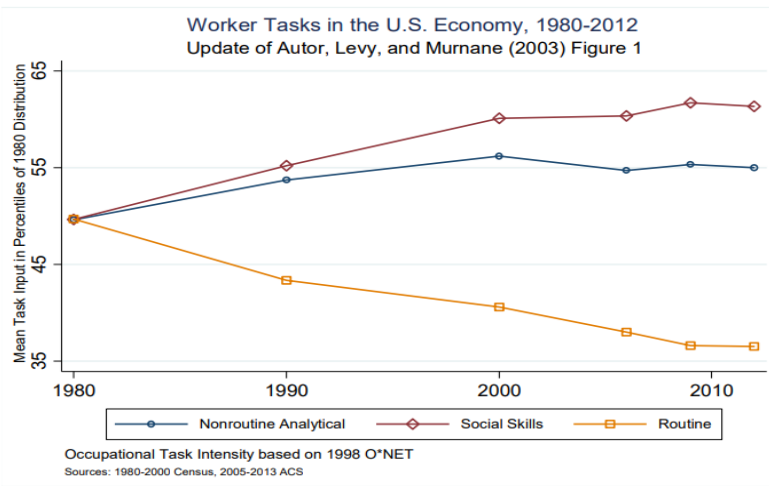
Figure 7: Worker tasks in the US Economy 1980-2012 (Levy & Murnane)

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,
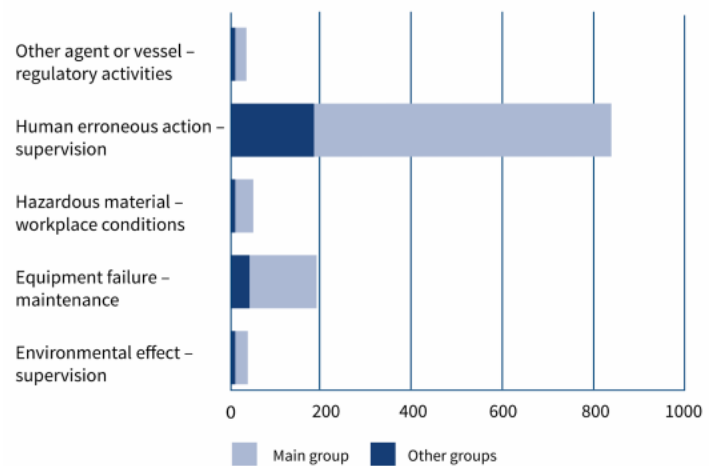
Figure 8. Groups of contributing factors 2011–2018 (Source: EMSA 2017)

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 sidelines – 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.

- <u>Enterprise skills</u>: 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).
- <u>Soft skills</u>: 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's 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 take into account the effects of context are key ingredients of critical thinking, creative problem solving, effective communication, adaptive learning, and good judgment. It has proven very 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 behavioral 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 in order 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).

Despite the variety in terminology and emphasis, there are clearly overlapping elements among these skills. For example, Figure 3 shows the overlaps between four skills frameworks – the Australian school curriculum's general capabilities framework, the employability skills listed by the Department of Education Science and Training, Deakin Co.'s list of capabilities, and core competencies listed by the OECD.

Table I: *Typologies for non-technical skills*

Skill	Australian curriculum	Department of Education, Science and Training	DeakinCo.	OECD core competencies
Self-management	✓	✓	✓	
Communication		✓	✓	✓
Teamwork		✓	✓	✓
Problem solving		✓	✓	✓
Digital literacy	✓	✓	✓	
Critical thinking	✓		✓	✓
Innovation		✓	✓	
Emotional judgement	✓		✓	✓
Global citizenship	✓		✓	
Professional ethics	✓		✓	
Enterprise skills		✓		✓

Source: Bowles and Lanyon (2016), Department of Education, Science, and Training (2002), Australian Curriculum Assessment and Reporting Authority (2016), OECD (2014).

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 behavior 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**
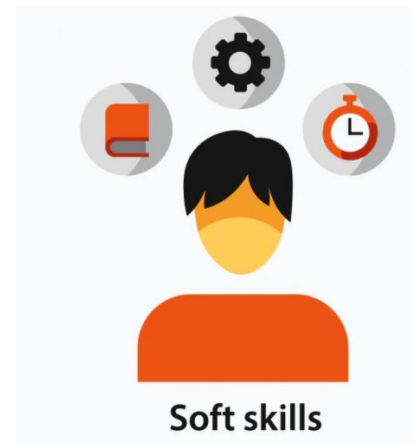
a culture of high performance, which can be observed through people's actions and behaviours.

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. Figure 4: Ways that soft skills can contribute to business success Source: Deloitte Access Economics Innovation Global citizenship Business success Collaboration Lower brand risk Customer focus Employee engagement (lower turnover) Exports and foreign investment Teamwork Emotional judgement Communication Professional ethics Problem solving Critical thinking Emotional judgement Individuals with good emotional judgement and teamwork skills could help to foster better workplace culture.

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.
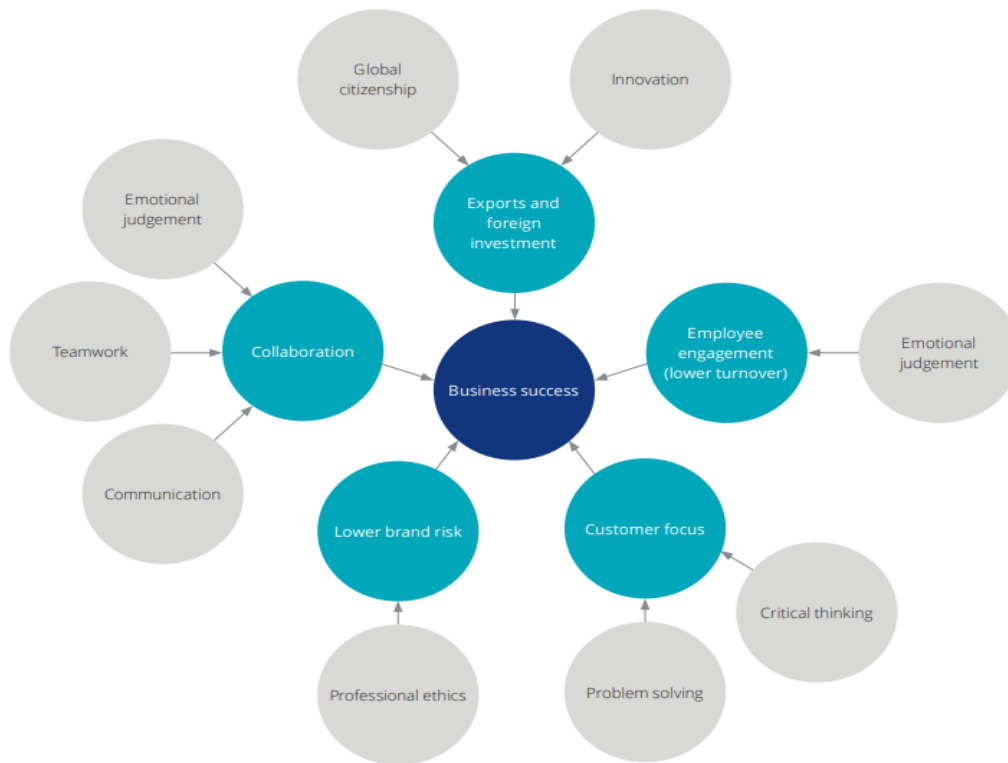
Source: Deloitte Access Economics

Figure 9: *Ways That Soft Skills can contribute to business success*

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.

Figure 10.: *Workplace Tranformation Trends*

The 4 trends transforming your workplace

Percentage of talent professionals who agree these trends are very important to the future of recruiting and HR

Soft skills	91%
Work flexibility	72%
Anti-harassment	71%
Pay transparency[1]	53%

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.

Importance of soft skills around the world

Percentages of talent professionals who say soft skills are very important to the future of recruiting and HR

Mexico	Brazil	India	Italy	Southeast Asia	Spain	Canada	China	Middle East & North Africa	Argentina	Australia	U.S.	U.K.	France	Germany	Netherlands	Northern Europe
96%	95%	95%	95%	95%	95%	94%	93%	93%	92%	91%	90%	90%	89%	88%	85%	82%
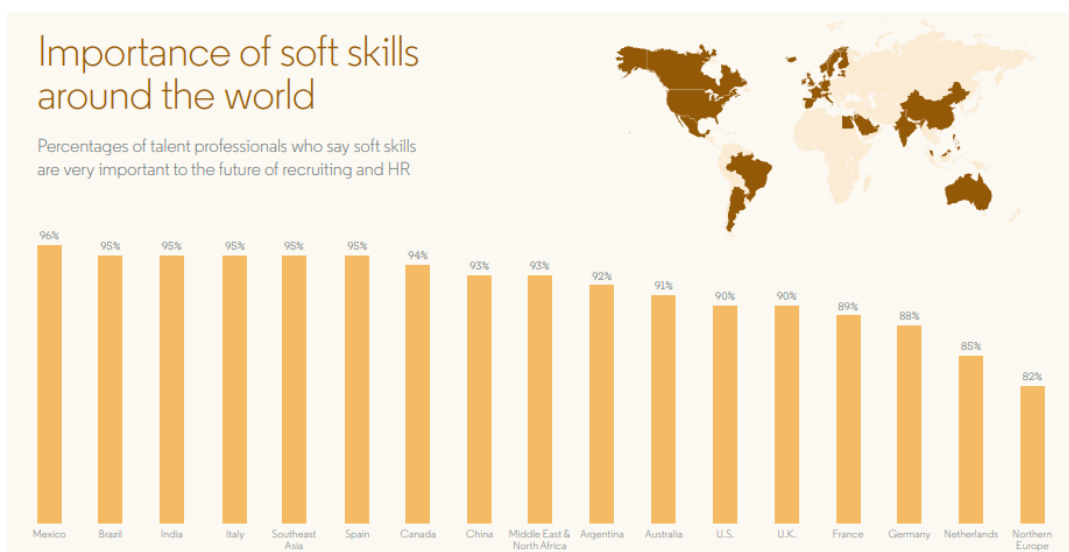
Figure 11.: Importance of Soft Skills arounf the World

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 really 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. In reality, 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 a large number of 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 definitely 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. 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.

2.3.1. 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.

2.3.2. Correlation between the 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.

HUMAN ASPECT	OPERATIONS
Making sense of things	Navigation Cargo operations Mooring Engineering

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

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 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 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. 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

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.

Steps towards a 'just culture'

- 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
    o Need to identify champion(s) and communications strategy • Need to educate users
    o Need to collect feedback from users
    o 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

Seafaring and fatigue are going 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:
    - Disruptions to sleep itself – such as loud noises, bright light, cold, heat, motion, sickness, chronic pain and infection.
    - 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.

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

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 Mooring Engineering

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:

- **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

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.
- **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.

2.3.3. 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. It is obviously seen from the Figure 8, 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.

Table II: *Top 15 competencies of a future seafarer for different time periods*

Competency	Short	Medium	Long
Technical competencies	1	2	2
Technological awareness	3	1	1
Adaptability and flexibility	7	4	4
Computing and informatics skills	9	3	3
Teamwork	2	7	8
Communication skills	4	6	8
Leadership	6	5	7
Discipline	3	9	10
Environmental/Sustainability awareness/concern	12	5	5
Learning and self-development skills	9	9	6
Complexity and critical thinking	8	7	11
Language ability	5	8	14
Professionalism and ethical behavior	9	9	9
Responsibility	5	11	13
Inter-personal and social skills	14	9	10

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

Desired Attributes and Skills in Demand: Another recent study examples of skills in demand now and in the future are presented at Figure 9. Those seeking successful careers in the Sea Transport sector can set themselves apart by developing these attributes and acquiring the skills in demand.

DESIRED ATTRIBUTES

Analytical – Enjoys analysing things from all angles and thinking of ways to solve problems

Decisive – Takes appropriate action after studying potential outcomes in unique scenarios

Meticulous – Pays attention to fine details and accuracy

Resilience – Highly adaptive to handle transformative changes

Team player – Understands that each person is part of a larger team working together to bring about success

SKILLS IN DEMAND

Automation Skills – Acquire Systems Engineering skills to play a part in new port technologies and automation efforts

Data Analytics and Cyber Security Skills – Generate business insights and upkeep cyber security of the fleet and automated systems

Green Shipping Skills – Keep abreast of new developments in green shipping

Transdisciplinary Skills – Make connections across disciplines to solve complex problems

Leadership and Management Skills – Acquire leadership and management skills to grow Singapore as an International Maritime Centre

At this stage we considered an overview of theoretical competencies and soft skills that a marine employer may be attributed with in a shipping company before we present the regulatory side (TMSA requirements). The following subchapters 2.14 &2.4.2 provide an indicative list of the top 5 Generic soft skills for each (possible) employee not only onboard but also ashore. Each skill is categorized as per its proficiency level required and its function is presented at Figures 10, 11 and 12.

Table III: *Generic Skills and Competencies*

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Communication	Convey and exchange thoughts, ideas and information effectively through various mediums and approaches.	Communicate information with others to respond to general inquiries and to obtain specific information.	Articulate and discuss ideas and persuade others to achieve common outcomes.	Negotiate with others to address issues and achieve mutual consensus.
Computational Thinking	Develop and use computational models, tools and techniques to interpret and understand data, solve problems and guide decision-making.	Use computational models, tools and techniques to identify patterns in a problem and develop a solution.	Modify existing computational models, tools and techniques to develop different solutions.	Develop and create computational models, tools and techniques to implement new solutions and apply to other problems.
Creative Thinking	Adopt a fresh perspective to combine ideas or information in new ways and make connections between seemingly unrelated fields to create new ideas and applications.	Connect ideas or information from related fields or applications to address an immediate issue.	Connect or combine ideas or information from unrelated fields or applications to generate multiple ideas to bring about a specific outcome.	Create original applications or ideas to reveal new possibilities and reshape goals through high level of innovativeness.
Decision Making	Choose a course of action from various alternatives using a reasoned process to achieve intended goals.	Make decisions of simple or routine nature to achieve intended goals using given information and guidelines.	Make decisions in a complex setting to achieve intended goals using a structured process and multiple sources of available information.	Make decisions in a volatile and ambiguous setting using a structured process and limited sources of available information to achieve intended goals.
Developing People	Help others to learn and develop their capabilities to enhance their performance and achieve personal or professional goals.	Use demonstration and explanation to teach a familiar task to inexperienced co-workers.	Provide coaching to others to develop their skills and knowledge on their jobs to enhance performance.	Provide mentorship to help others in their professional and personal development to improve performance and further their careers.
Digital Literacy	Use ICT tools, equipment and software to create, evaluate and share information digitally with others.	Perform basic functions using software programmes pertaining to computer operating systems and file management, and search online information.	Use available software features to create and edit documents, customise templates and reports and evaluate online information.	Use available software features to enhance documents, analyse and manipulate data, and use ICT to organise, share and communicate information clearly and coherently.
Global Mindset	Awareness of diversity across global cultures and markets. Seek opportunities to adopt successful practices and ideas.	Demonstrate understanding of global challenges and opportunities and how to transfer best practices across cultures. Respect cultural differences and needs of a diverse workforce.	Develop global networks and manage virtual relationships while balancing both local and global perspectives. Adopt a local and global perspective when making decisions.	Build the organisation's capabilities to compete in a global environment. Manage tension between corporate requirements, global and cultural differences.

Table III: *Generic Skills and Competencies*

GSC	GSC Description	Proficiency Levels		
		Basic	**Intermediate**	**Advanced**
Interpersonal Skills	Manage relationships efficiently and communicate with others effectively to achieve mutual consensus and outcomes.	Recognise own internal feelings and emotional states to manage interpersonal relationships in social situations.	Detect and decipher emotions of others to manage interpersonal relationships in social situations.	Influence, guide and handle others' emotions to build instrumental relationships and manage conflicts and disagreements.
Leadership	Lead others to achieve objectives in the most effective way. Provide an inclusive workplace that cultivates workplace relationships and teamwork, and foster the development of others.	Demonstrate professionalism to set a good example at peer level. Support others through own initiative and enthuse others through own positive and energetic approach.	Lead by example at team level. Encourage and guide others to adopt a point of view, make changes or take action. Provide a team environment that facilitates relationships building, teamwork and the development of others.	Lead by example at organisational level. Inspire, motivate and guide others to adopt a point of view, make changes or take action. Cultivate an open, cooperative and collaborative learning culture for the organisation.
Lifelong Learning	Seek out opportunities to enhance one's knowledge and skills. Access and acquire new knowledge and skills actively for continual learning.	Organise and manage own learning by setting learning targets. Identify learning approaches to achieve work or career goals.	Engage in collaborative learning by discussing one's learning with others and soliciting feedback to continually improve oneself.	Conduct self-reflective practices to review one's learning to facilitate continual growth in one's career or profession.
Managing Diversity	Work well with people from different ethnic, social, cultural and educational backgrounds and understand the concerns and interests of diverse work groups.	Demonstrate sensitivity to the cultural characteristics, values, beliefs, and behaviors of another ethnic or cultural group.	Build relationships with different ethnic or cultural groups by engaging in cross-cultural cooperative projects.	Manage conflicts arising from different ethnic or cultural groups and work effectively in cross-cultural settings.
Problem Solving	Generate feasible and efficient solutions to solve problems and capitalise on new opportunities.	Identify easily perceivable problems and follow given guidelines and procedures to solve the problems.	Identify less perceivable problems and use problem solving tools and techniques to solve the problems.	Anticipate potential problems beyond the current scope and apply higher order problem solving tools and techniques to turn problems into opportunities.
Resource Management	Efficient and effective deployment and allocation of resources when and where they are needed. Include planning, allocating and scheduling of resources to tasks, which typically include manpower, machines, money and materials.	Use resources to ensure optimum and efficient use of resources.	Deepen insights into the planning, allocation and deployment of resources to anticipate needs. Plan the allocation and deployment of resources efficiently and effectively.	Establish strategies for the allocation and deployment of resources efficiently and effectively.

Table IV: Generic Skills and Competencies

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Sense Making	Organise and analyse data and information accurately to identify relationships and detect patterns and trends to gain insights for decision-making.	Identify relationships and linkages within different components of data.	Interpret data to uncover patterns and trends between various sources of data.	Analyse data relationships, patterns and trends to gain important insights and make informed decisions.
Service Orientation	Commit to exceeding both internal and external customers' needs. Proactively identify customer needs and sustain a culture of service excellence within the organisation.	Exceed customer needs and expectations and handle service challenges with a positive mindset. Demonstrate an understanding of the organisation's service vision, mission and values.	Anticipate customer needs and expectations and elicit feedback from customers to improve service. Build relationships with customers to create and sustain customer loyalty.	Model, lead, train and motivate staff with a focus on sustaining a culture that encourages commitment to service excellence and high performance.
Teamwork	Work collaboratively and effectively with others to contribute to group efforts to achieve identified objectives.	Contribute to a positive and cooperative working environment by fulfilling own responsibilities and providing support to co-workers to achieve team goals.	Facilitate work team activities, provide assistance and support needed by team members and promote ownership and commitment among team members to work goals to improve team performance.	Establish teams, design and assess tasks to continually improve team effectiveness and cultivate a sense of organisational ownership and a cooperative working environment.
Transdisciplinary Thinking	Understanding of concepts across multiple disciplines, with the capacity to synthesise the knowledge and insights to guide decisions and foster cooperation.	Research and adapt concepts from outside one's field of expertise to supplement one's core knowledge and proficiency.	Co-relate material from diverse knowledge bases to guide decisions and policy making. Participate in reflective and trans-disciplinary communities within and outside the organisation.	Synthesise knowledge and insights across disciplinary boundaries to aid strategic decisions and foster cooperation within and outside of the organisation.
Virtual Collaboration	Use online collaborative communication tools to work as teams to accomplish tasks or projects.	Participate and contribute in a virtual team. Set up appropriate online collaborative tools and supporting equipment.	Use interactive collaborative tools to foster cohesion and commitment among virtual team members to achieve goals. Keep up-to-date with innovative online collaborative tools and applications to enhance one's proficiency in engaging in virtual collaboration.	Leverage on diverse team talent, latest online collaborative technologies and virtual platforms to produce collaborative behaviour and achieve technological savviness in virtual collaboration.

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.
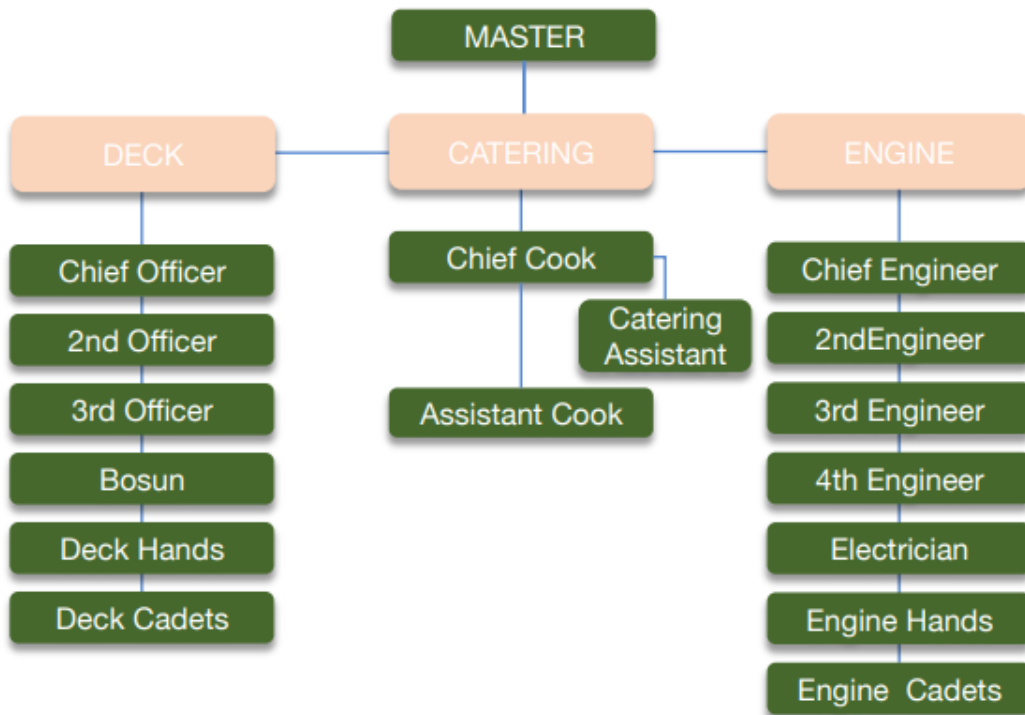
Figure 13: *levels of authority and lines of communication & shipboard chart*

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

GENERIC SKILLS AND COMPETENCIES (TOP 5)

Communication	Advanced
Decision Making	Intermediate
Global Mindset	Intermediate
Interpersonal Skills	Intermediate
Leadership	Intermediate

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

GENERIC SKILLS AND COMPETENCIES (TOP 5)

Communication	Intermediate
Decision Making	Basic
Global Mindset	Basic
Interpersonal Skills	Intermediate
Managing Diversity	Basic

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.

GENERIC SKILLS AND COMPETENCIES (TOP 5)

Communication	Advanced
Decision Making	Intermediate
Global Mindset	Intermediate
Interpersonal Skills	Intermediate
Leadership	Intermediate

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.

2.3.4. On Shore 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: *"Departmentalisation 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 departmentalisation 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[5], 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:

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[5] As Theotokas has pointed out: *"Departmentalisation 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 departmentalisation 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.*

- 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.

Table V: Critical Work Functions and Key Tasks of a Tanker Company CEO

CRITICAL WORK FUNCTIONS	KEY TASKS
Oversee ship compliance to regulatory requirements and legislation	• Ensure compliance to regulatory requirements and legislation and keep abreast of changes in compliance requirements • Institute compliance systems and practices to monitor adherence to regulations • Set directions, goals and targets to ensure achievement of organisational vision, mission, goals and objectives • Review and refine organisation strategies and targets for endorsement • Oversee the organisation's Planned Maintenance System, ship inspections, audits and dockings
Oversee crew management matters	• Oversee crew management policies and procedures • Promote engagement strategies to improve crew performance
Manage budget and expenditure	• Evaluate the organisation's financial performance • Establish key performance indicators for financial performance
Grow organisation's shipping and chartering business	• Explore new opportunities and areas of collaboration to expand the organisation's business and networks • Keep abreast of key trends and best practices in shipping and chartering business
Manage business risks	• Formulate the organisation's risk management strategy • Detect new and emerging risk areas and formulate pro-active steps to address them
Lead improvements to enhance efficiency	• Drive organisation's ship efficiency management • Build a culture of innovation within the organisation to encourage continuous improvement

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.
    - 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.

Authority: 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

Qualifications (minimum):

- 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 is able to 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 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.

Table VI: Team working behavioural indicators

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. ★ Expresses disagreement constructively by giving alternative or different perspectives.	∅ Overreacts emotionally in interpersonal conflicts. ∅ Reluctant to consider a compromise or solution to a 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

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.

Table VII: *Communication and influencing behavioural indicators*

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.	Ø Blocks open communication. Ø Does not clearly communicate plans, expectations, and roles. Ø Briefings are unclear, lengthy and/or delivered at inappropriate times. Ø Does not check whether plans and expectations have been understood. Ø 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. ★ 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.)	Ø Uses inappropriate or unacceptable language or communication methods, e.g. jargon, body language, tone. Ø Fails to consider cultural diversity in communications. Ø Provides too much, too little or vague communication. Ø Communication is one-way and fails to allow or encourage questions or feedback. Ø Communication is not tailored to individual needs, e.g. style, method, timing
Feedback	★ Actively seeks and acts upon feedback. ★ Receives feedback constructively	Ø Does not seek or welcome feedback and does not take action on feedback. Ø 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.	Ø Fails to gain buy-in to important messages. Ø Pushes through own agenda, rather than acting in line with company objectives.

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.

Table VIII: Situation awareness behavioural indicators

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.	∅ Does not enquire about environmental changes and their impact on vessel systems. ∅ Unaware of changes in the external environment. ∅ Does not seek regular and timely updates on position, weather, traffic or terrain. ∅ Ignores external reports about changes to the environment or status of other vessels. ∅ 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.	∅ Unable or unwilling to make predictions of future states and threats. ∅ Does not discuss the relationship between past events and the present/future. ∅ Is surprised by outcomes of events, with little or no contingency planning.

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.

Table IX: *Decision making behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
Problem Definition and Diagnosis	★ Gathers information and identifies the problem. ★ Reviews causal factors. ★ Consults those with specialist expertise or local knowledge when required	∅ Does not clearly state or define the problem. ∅ Fails to diagnose the problem correctly. ∅ 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

3.5 Results focus

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.

Table X: Results focus behavioural indicators

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	∅ Seldom takes action to improve outcomes, processes or measurements. ∅ 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.
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.	∅ Fails to sustain pace and progress over a period of time. ∅ Performance suffers substantially when working long hours. ∅ 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. \ ★ Adapts approach, goals and methods to achieve solutions and results in a changing environment. ★ Shows others the benefits of change.	∅ Sticks to outdated methods, puts off making changes for as long as possible or finds excuses for not doing things differently. ∅ Does not respond to the changing demands of the situation. ∅ Makes little or no attempt to promote change positively. ∅ external advisers, e.g. Pilot, is inadequate

Table XI: *Results focus behavioural indicators*

Elements	Positive Behavioural indicators	Negative Behavioural indicators
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 prioritise 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,

3.6 Leadership and managerial skills

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.

Table XII: Results focus behavioural indicators

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.	Ø Fails to create direction for the team. Ø 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. • Recognises, 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	Ø Micromanages direct reports. Ø Does not support crew to develop their own initiative and judgement. Ø Fails to motivate or support the team or applies inappropriate pressure. Ø Does not show appreciation for others. Ø Takes credit for others' achievements. Ø 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 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.	Ø Avoids challenging inappropriate language or behaviours. Ø Hinders or withholds crew involvement. Ø Is passive and waits for others to take the lead or make decisions. Ø Does not take a clear stand, with own position not recognisable. Ø Blames the team if things go wrong. Ø Leaves team members to cope alone in difficult situations. Ø Tolerates behaviour that negatively affects the performance, development and morale of others.

Table XIII: Results focus behavioural indicators

Elements	Positive Behavioural indicators	Negative Behavioural indicators
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	★ Organises 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. ★ Prioritises 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.

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 4: Necessary actions to successfully meet TMSA 3 requirements in relation to seafarers' and onshore personnel's soft skills.

In this chapter will be analyzed the actions that a shipping management company should establish in its procedures to be in compliance with the TMSA3 best practices and follow industry's continuous change from technical and technological improvements to human behaviour, soft skills and training.

Through Measurement and analysis, the company will growth efficiently and effectively meeting the customers' expectations. This can be accomplished through setting targets, estimation of the company's performance, inspections and audits, management reviews, customers' feedback and benchmarking with other identical companies and industry standards.

Taking in account all the above objectives need to be established in order the targets to be analyzed, communicated with the required personnel and the results to be incorporated with an efficient manner to companies' policies, procedures, and plans.

4.1. Safety Aspects Related to Human Element (Human Factors)[6]

Human factors are the characteristics that affect human interaction with equipment, processes, and other people. Human factors can be defined as "the ways in which the organization, the job, and the individual interact to influence human reliability in hazardous event causation". Such factors contribute to most incidents and wherever people are involved in design, construction or operation of equipment and processes there is the likelihood for human error.

Tackling underlying conditions and hard to use systems that influence human error, actions and decisions can reduce the likelihood of incidents. People in leadership play an important role in this, including ship 's officers, supervisors and terminal management. Risk assessments are an important part of safe operations and maintenance and must address the possibility that even competent and experienced people make mistakes that could:

- Lead to hazards or risk situations.
- Reduce the effectiveness of a control/safeguard relied on by the risk assessment.

[6] ISGOTT 6th Edition, Chapter 7 Section 1

4.1.1. Human Error and Error Risk Management

Human error is commonly defined as the 'failure of a planned action to achieve a desired outcome'. All people experience error on a daily basis. Most errors are harmless, although often annoying. While errors do not always result in catastrophic outcomes, errors within hazardous environments are more likely to result in significantly negative consequences. Therefore, a multiple barrier approach to hazard mitigation is essential, and why procedural controls should never be relied upon as the sole or primary barrier for incident prevention.

Human performance reliability is also of utmost importance. Non-systematic conditions or behavioural negligence impact human reliability, reducing the likelihood that an individual will perform their task as expected. Reliable behavior results in desired performance, while unreliable behavior may result in human error, which can lead to events and near misses. While it is inevitable that a workforce will experience errors, certain factors will influence the rate of error, either positively or negatively. These performance shaping factors fall into three basic categories:

- Individual factors include personality, competence and skill, mood, attitude, mental ability, and individual health factors, such as fatigue, drugs and alcohol, physical capability, and psychological health.

- Job factors include the physical working environment, human-machine interface, workload, availability and quality of procedures, the equipment being used, task requirements, and team member behaviour.

- Organizational factors include organizational priorities, decision-making and strategy, the culture of the company or team, the availability of resources, communication systems, change management, leadership behaviour, and relevant Key Performance Indicators.

This interaction is represented in the following figure:

Figure 14. Factors influencing the Human Error
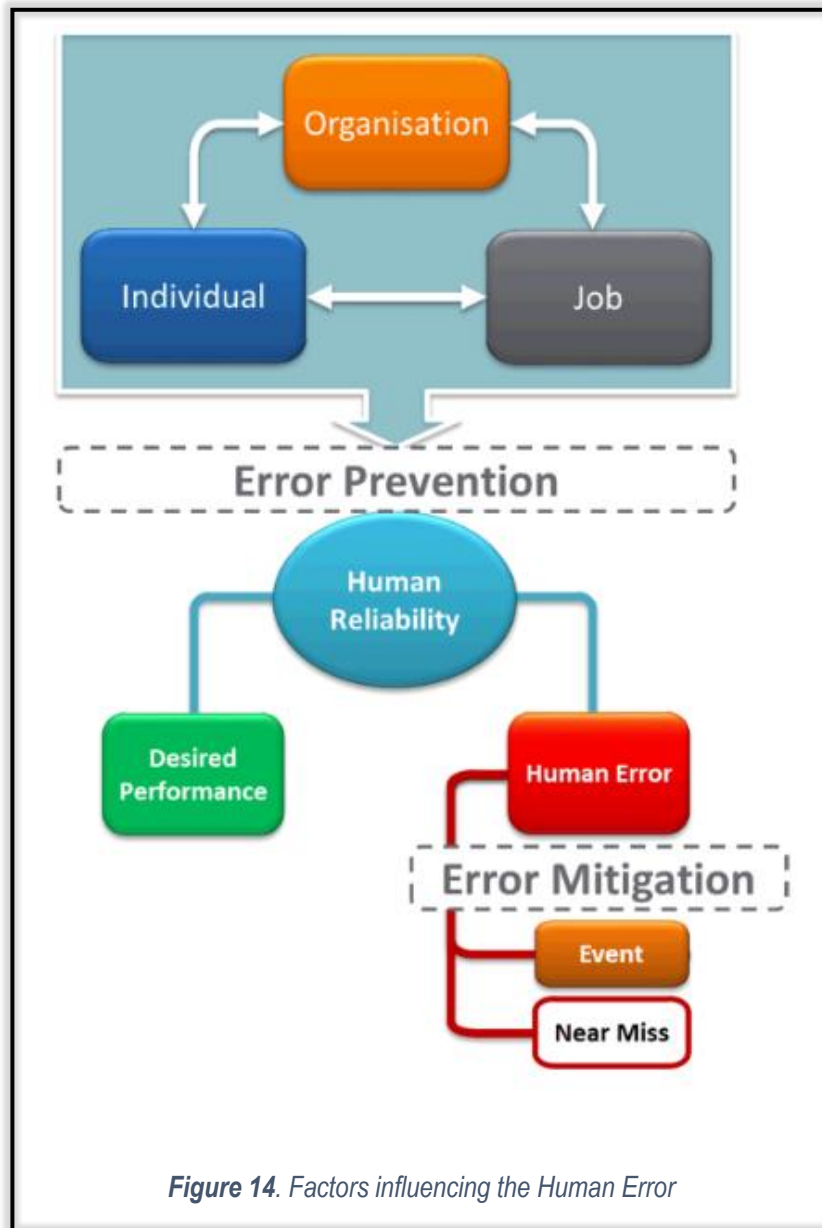
In this context, error represents a potential failure mechanism, or escalation factor, of a control measure, where that control measure involves human interaction. Control measures requiring human interaction include procedures, training and competence, supervision, permit systems, inspections, risk assessments, and other administrative controls. The potential impact of error on control measures is presented in the following figure that is based on bow tie methodology:

Figure 15: *Bow tie methodology*
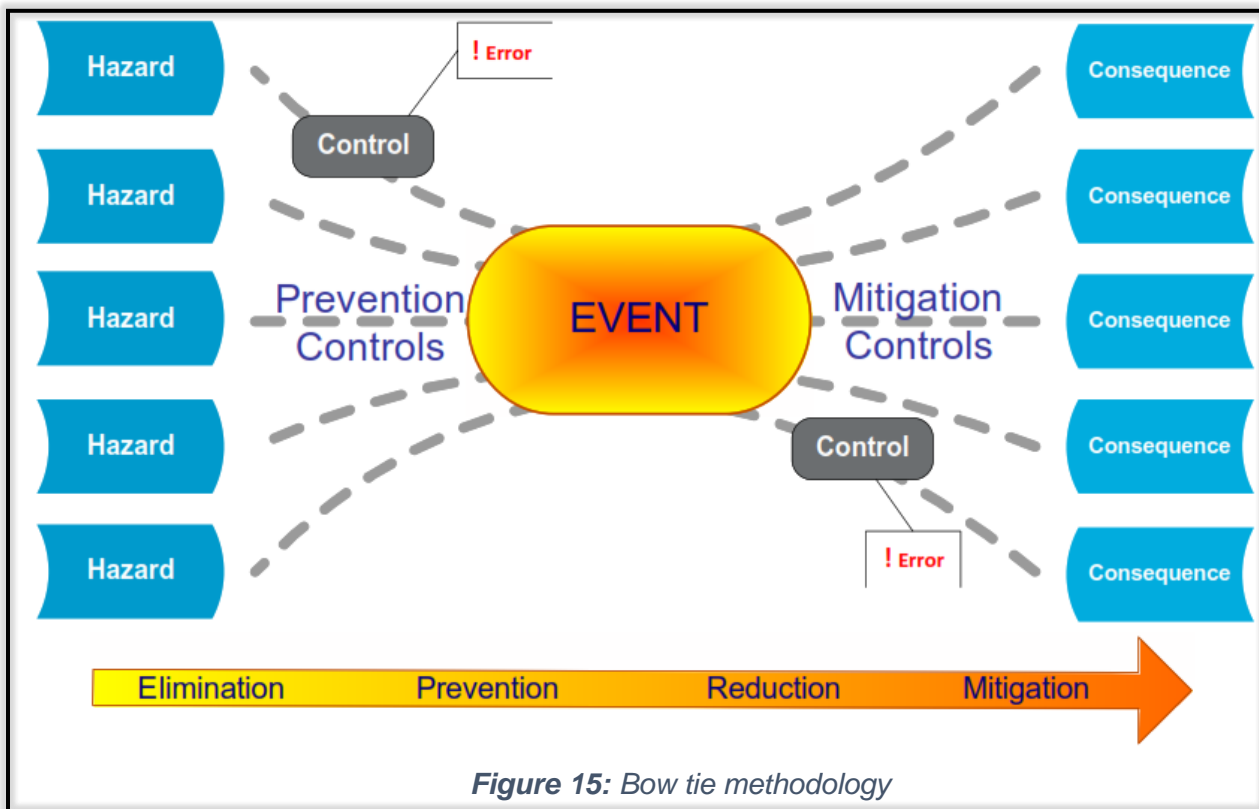
Where error has the potential to lead or contribute to a major accident, an Error Risk Management must take place, which comprises combinations of controls to be implemented to prevent and mitigate error. This approach involves performance shaping factors (PSFs) as means of improving human reliability (i.e. minimizing error likelihood); while error management strategies seek to provide opportunities for error identification and recovery, before the associated major accident is initiated.

4.1.2. Safety Critical Tasks

A Safety Critical Task (SCT) is a task related to the ship's main hazards where human error, action or inaction may cause or fail to avoid a serious incident[7]. For the SCT, specific formal safeguard must be developed, as if one relies only to the actions or decisions of a human as for protection against a serious incident, it will be a matter of time before there is a mistake and an accident.

In the above context, a SCT is a task related to the ship's main hazards where human error, action or inaction may cause or fail to avoid a serious incident.

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[7] ISGOTT 6th Edition, Chapter 7 Section 2

The Company has identified certain shipboard SCT, as they may include activities where error has the potential to lead to a serious incident, based on marine practice, Industry's standards, and accumulative experience from accidents. These SCT include:

Figure 16. The PSFs process
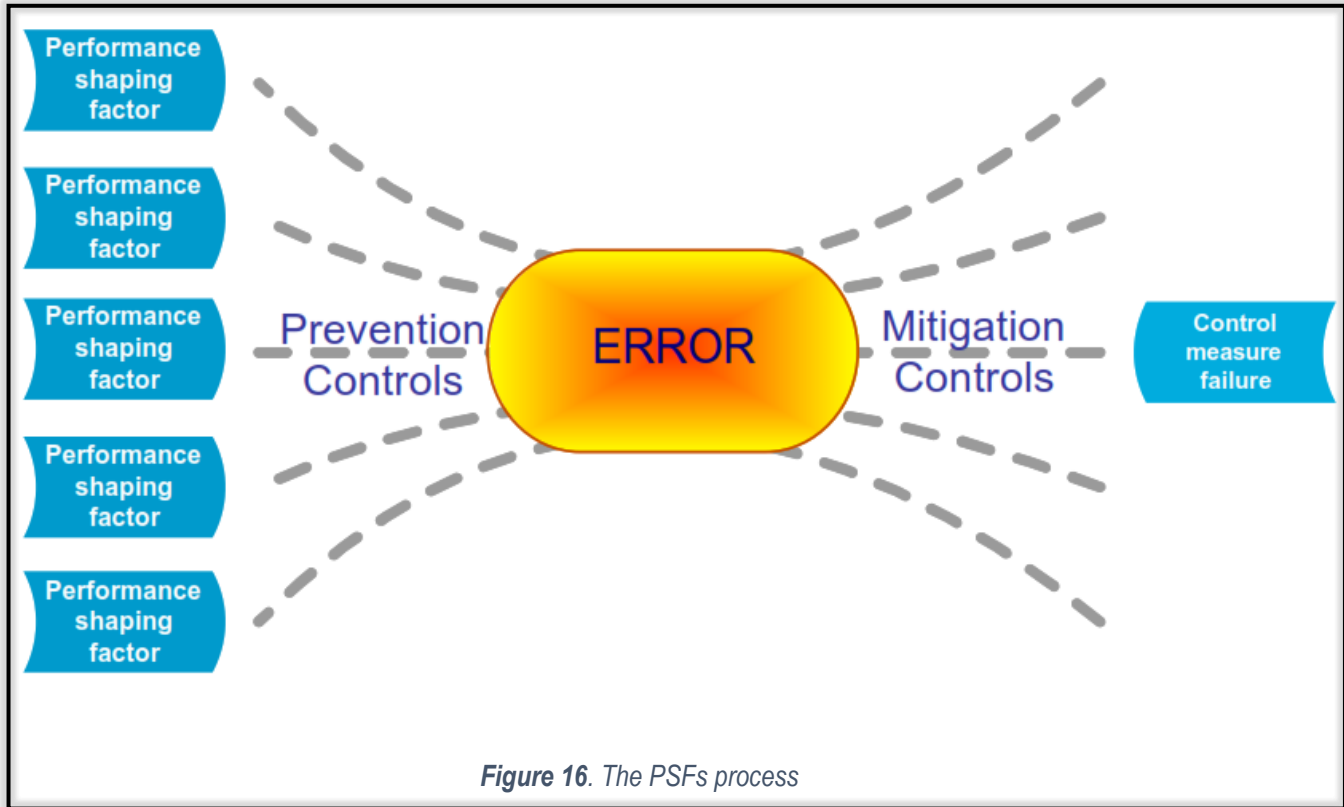
- Berthing and mooring operations.
- Cargo transfer operations.
- Operations involving interaction between ship and shore during cargo operations
- Double banking operations.
- Non-cargo related operations including tank cleaning, bunkering, storing, tanker/terminal access, tending of mooring lines.
- Navigation in confined waters
- Anchoring operations
- Hot work
- Maintenance of critical equipment.
- Enclosed space entry
- Works and operational activities for which issuance of a work permit is required.

Having identified SCT, a Safety Critical task analysis (SCTA) approach is used to identify possible errors, the things that make error more likely and ways of making tasks more resistant to error[8].

Task analysis can be broadly defined as the study of what an individual or team is required to do in order to achieve a goal and SCTA involves the application of task analysis techniques to tasks critical to safety, integrity, and environment, to facilitate the identification of uncontrolled or poorly controlled error risk.

The identification of such risk can then drive the development of more robust control measures to reduce risk to a level that is ALARP (As Low As Reasonably Practicable).

4.1.3. Reducing error risk

The following paragraphs provide an overview of a process that may be applied in order to reduce the risk posed by human error to a level that is ALARP and taken in consideration during the work planning meetings.

- **Identify critical human tasks**. Are defined as those activities people are expected to perform as barriers against the occurrence of an incident, or to prevent escalation in the event that an incident does occur, including activities required to support or maintain physical and technological barriers.
- **Identify error potential**. Once critical human tasks have been identified, the error potential associated with those tasks should be considered. The classification of error type is an important step as this facilitates the identification of appropriate controls. Following the identification and classification of potential errors, risk assessment processes can be applied to estimate the risk associated with error; that is, the severity of consequence/s of error and the likelihood that each consequence will occur. The outcomes from the risk assessment can be used to identify potential errors that pose an unacceptable level of risk. Those high-risk potential errors can then be subject to further exploration, which may lead to the development of additional control measures. This process focuses on: 1) What errors are possible? 2) What are the potential consequences of those errors?
- **Identify performance-shaping factors**. The high-risk potential errors should be evaluated to identify those PSFs most likely to contribute to error. PSFs most likely to influence error must be highlighted, leading to the development of more targeted control measures. PSFs include: 1) People-level factors, 2) Job-level factor, 3) Organization-level factors.

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[8] ISGOTT 6th Edition, Chapter 7 Section 2

The non-exhaustive list in the table below provides some examples of people-, job-, and organization-level PSFs.

Table XIV: Examples of people-, job-, and organization-level PSFs

People-level PSFs	Job-level PSFs	Organisation-level PSFs
Knowledge	Human-machine interfaces	Organisational culture
Competence	Workload	Organisational priorities
Skill	Procedures	Resource availability
Attitude	Task requirements	Communication systems
Physical capabilities/limitations	Relationships with co-workers	Policy and direction
Psychological health	Relationships with supervisors	Leadership commitment
Physical health (disease, medication, fatigue, substance abuse, etc.)	Physical environment (noise, lighting, vibration, temperature, humidity, etc.)	Workforce planning

Some controls will be relevant to many error types and can facilitate both prevention and mitigation of error. These controls include but are not limited to the following: 1) Design and construction standards, 2) Active supervision, 3) Planning and resource allocation, including manning levels, 4) Fatigue risk management, 5) Substance monitoring and control (i.e. Medications, alcohol and illicit drugs, etc.), and 6) Job observation and feedback processes.

- **Evaluate existing controls**. Are controls in place to eliminate the risk posed by the PSF and prevent error? Are controls in place to mitigate error? Is error risk ALARP or additional controls are likely to further reduce risk?
- **Develop additional controls**. Where it is identified that existing controls do not reduce error risk to a level that is ALARP, additional controls should be developed and implemented in order to: 1) Eliminate the opportunity for error, 2) Prevent – lower the likelihood of error, 3) Reduce – facilitate error identification and recovery, 4) Mitigate the consequences of error with prevention controls tailored to the type of error in question. The table below provides examples of control measures for different types of error:

Table XV: Examples of control measures for different types of error

	Eliminate	Prevent	Reduce	Mitigate
Mistake	Competency assurance	Communication conventions	Software interface logic and layout	Engineering controls
Slip of action	Design for tactile differentiation	Confirm action prompt	Error management training	Engineering controls
Memory lapse	Checklist	Independent check	Alert/Alarm	Engineering controls

Recommendations should be subject to appropriate approvals, MOC processes, tracking and closeout requirements.

4.2. Continuous improvement

The continuous improvement cycle is an essential part of TMSA, since it is a product of the actions required by management system. With the start of the TMSA cycle of continues improvement, the company should realize the benefits of identifying weakness, decide in actions to be taken to correct these weaknesses and then monitor the effects of these actions.

4.3. Measurement, Analysis & Improvement

The Company should recognize that efficient and safe management is the result of strong commitment to the policy principles and objectives set and thereafter continuously measured, analyzed with the aim of self-regulation and continuous improvement. The Organization should establish and implement appropriate measurement, review and feedback processes to focus on and drive continuous improvement.

4.3.1. Measurement

The Company should establish procedures for vessel inspections, vessel's and office's audits, reporting of accidents, incidents and hazardous occurrences and their investigation.

The twelfth Chapter of the ISM Code (Company verification, review and evaluation) requires that companies have to check and evaluate their safety management system and perform internal safety audits to assess performance and compliance with existing procedures. The safety and environmental excellence require processes to check and measure the organization's progress towards sustainable improvement. Through, this segment of the continuous-improvement cycle indicates procedural compliance, as well as implementation and improvement efforts.

Shipboard Inspections: The Company should establish a vessel inspection procedure for shore base management to carry out regular inspections to monitor vessel conditions. Inspections are made to ensure compliance with rules and regulations among all vessels managed by the Company.   The inspection procedure includes provision for recording results of all inspections and the close out of all action items.

Internal Audits: The Company should carry out internal audits to verify that both shore-based staff, shipboard personnel and contractors are consistently following the management system. Audits are made to all ships under management and all onshore support functions. Following an audit, steps are taken to verify and record the implementation and effectiveness of any corrective/preventive actions recommended as a result of the audit.

Reporting and Investigating of NCs, Incidents, Accidents and Hazardous Occurrences: The purpose of this procedure is to establish standards for the effective and timely

investigation, reporting and follow up from various undesired events like non conformities, serious near misses, accidents, incidents by the company in order to determine and analyze the causes of and the lessons to be learnt from these cases and implement appropriate preventive action against recurrence with the objective of the continual improvement of the management system and in particular the mitigation of all kinds of identified risks (including environmental impacts and/or OH&S consequences).

This procedure establishes the consistent reporting, investigating, analyzing and documenting of the following Incidents (undesired events):

- Accident: An accident is a hazardous occurrence which results in an injury to personnel (requiring more than first aid).
- Incident: An incident is defined as a hazardous occurrence which has resulted in physical damage to the ship, her cargo, property or the environment. It also includes breaches of security such as piracy and stowaways.
- Major Incident: Major incidents are considered incidents resulting to the emergencies listed in the VERP.
- Near Miss: A hazardous occurrence which does not result in an accident or incident, but a situation has arisen where an accident or incident could have happened. A serious near miss is a near miss that could have resulted to a major incident. Near misses with potential injury to one person is considered a minor near miss and to multiple persons a serious one.
- Non-Conformity: Non-Conformity means an observed situation where objective evidences indicate non- fulfillment of a specified requirement. Non-Conformities may include non-fulfillment of technical as well as operational requirements. It represents an isolated lapse of control or inadequate implementation of a procedure or regulation.
- Major Non-Conformity: An identifiable deviation that poses serious threat to the safety of personnel or the ship or a serious risk to the environment that requires immediate corrective action or the lack of effective and systematic implementation of a requirement of the ISM code.
- Crew Complaint: An expression of grievance from a seafarer caused by another seafarer or by an unpleasant situation during employment of seafarer on board company's vessel.
- Consequence: The result of the hazardous occurrence happening
- Direct Cause: This is the immediate cause of a hazardous occurrence which immediately precedes the event. Direct causes include substandard acts and substandard actions such as failure to follow rules, the use of defective machinery, poor housekeeping or inadequate lighting as examples.

Root cause: This is the cause or reason behind the direct cause; the reason why the substandard act or condition occurred. Root causes could include reasons such as lack of knowledge or inadequate supervision as examples.

4.3.2. Management Review

Formal meetings with the participation of the management review team should be conducted at specified intervals in order to review various specific aspects of the company's performance, changes affecting the organization, customer requirements and feedback, effectiveness of the management system, status on inspections, investigations and relevant actions, suggestions from improvement, progress towards company objectives etc. The meeting uses a standardized agenda designed to cover all the requirements of the various management systems, codes and standards the company adheres to either mandatorily (ISM) or on a voluntary basis (TMSA, ISO etc.). Results are communicated to all areas with responsibility on the items reviewed both onboard and ashore.

The Company's top management reviews the management system in accordance with documented procedures at specified intervals in order to determine and evaluate its continuing suitability, adequacy, efficiency, effectiveness, assessing opportunities for improvement and the need for changes to the management system, including stated policies and objectives and targets.

Input to management reviews include:

- Results, findings and trends identified from the internal and external audits and inspections, including those by Charterers, and evaluations of compliance with applicable legal requirements and with other requirements to which the Company subscribes along with status of corrective action and preventive actions
- Results of participation and consultation.
- Communication(s) from external interested parties, and customer feedback including complaints.
- The environmental and/or OH&S performance of the Company.
- The extent to which objectives and targets have been met.
- Status of incident investigations, corrective and preventive actions.
- Follow-up actions from previous management reviews.
- Changing circumstances, including developments in legal, regulatory, industry, trade and market strategies, social and environmental attitudes and other requirements related to its operations.
- Recommendations for improvement.

4.3.3. Continuous improvement

Part of the Top management established Key Performance Indicators (KPIs) to measure the quality management system effectiveness in meeting the organizational goals and objectives and regulatory responsibilities. The KPIs are used to identify areas that need attention to

ensure continual improvement in the performance of the quality management system. Follow up plans include assignment of responsibility for all improvement actions.

Recurring process of enhancing the management system in order to achieve improvements in overall performance consistent with the company's stated policies for health, safety, quality and pollution prevention, as applicable.

The company aims to continually improve itself through the effective application of the Plan-Do-Check-Act cycle. All company procedures and processes are continuously monitored by appropriate responsible persons. Based on this monitoring these persons prepare data, information and feedback that are used as input for formal reviews performed by the management review team on a quarterly basis.

The key purpose of the management reviews is to complete and re-initiate the improvement cycle by establishing and implementing appropriate and effective measurement and internal and external feedback processes to focus on and drive continuous improvement through monitoring of the activities of the company and their effectiveness against the regulatory environment and customer expectations, requirements and degree of satisfaction, taking into consideration fleet performance measured through a number of lagging and leading indicators and identifying areas where improvements are necessary or desirable in order to improve compliance, performance and / or customer satisfaction and implement these improvements effectively.

Each department, under the responsibility of its head, prepares and submits reports and other pertinent information on its activities and areas of responsibility, following the agenda in the 'Management Review Meeting Agenda & Minutes' and any other relevant documentation in the dedicated excel sheets, including updates and status of key performance indicators, objectives, targets, improvement initiatives, campaigns, if any and environmental programs. The agenda allows the discussion of any subject and only intends to organize and systematize the process.

Masters review the Company SMS at the end of their contract. In case of a vessel newly delivered to the company the Master must have completed his review before the first external ISM audit for the issuance of the full-term SMC. Comments, suggestions and any other feedback are reviewed by the DPA who advises the appropriate department(s) for the Master's suggestions and summarizes those as part of the feedback on the effectiveness of the SMS for review and any further/pending action, where and if considered appropriate.

The information as above is reviewed to identify the status of each area under discussion and plan for the period till the next review. Where progress is less than planned appropriate action is taken to realign performance with targets and objectives. All relevant targets, objectives, programs, initiatives, status of action etc. are updated accordingly.

An Action Plan is issued as outcome of Management review including a clearly defined time table of actions implementation and responsible department for each action. The action plan is reviewed during next Management Review meeting for actions implementation. Pending actions to be included in next Action Plan. Each head of department is responsible for communicating and implementing any decisions or actions within his staff and areas of responsibility.

The results of the management reviews are brought to the attention of all personnel having responsibility in the areas involved, including the shipboard management teams who take any relevant action as required and planned during the review. The shipboard management team presents the results of the shore management reviews to the whole crew during an onboard safety meeting and ensures that all crew are aware of the targets, objectives and necessary action relevant to their duties and responsibilities deriving from these results and that any action required from the crews is implemented effectively. New targets of forthcoming calendar year are added and discussed in every 4rth quarter KPI Review. Annual review data/results are included in the 4th quarter of each calendar year. Policies and procedures are reviewed on a quarterly basis, procedures on a rotation basis, and amended as necessary. This review may include feedback from Master's SMS Review, Management Review, Onboard Safety Meetings or industry information.

Shore base management representatives (Top management, Sup/dents, auditors etc.) check and verify the implementation of any actions, new or revised policies or procedures that resulted from the management reviews and any other improvement plans during their visits onboard.

Performance: Measurable (either qualitatively or quantitatively) results of the company's management of its impacts and or/risks and achievement of its objectives.

New Rules & Regulations: Legislation and regulations adopted by the Flag and/or Port States and/or IMO and/or vessel's Class including the office's DOC and vessels' SMC certifying organizations that have a mandatory application on the company and its ships. Company aims at compliance well before any due dates.

Customer Feedback: Customer feedback means any feedback received from customers either through formalized or ad-hoc/informal procedures that directly or indirectly indicates the degree of satisfaction, approval or acceptance with regard to the service rendered by the company to its customers. Vetting Inspections (SIRE/CDI etc) results both onboard and ashore (including TMSA evaluations/reviews), complaints or negative feedback including claims and terminal feedback, customer replies to relevant company questionnaires/requests for feedback on the quality of service and feedback through formal or informal meetings, discussions or exchanges with existing, past or prospective customers fall into this category.

Customer Satisfaction: Perception of the degree to which the Customer's requirements have been fulfilled.

Industry Information: Information received from industry bodies in the form of bulletins, alerts, recommendations, guidelines, best practice guidance, initiatives, newsletters etc. Industry bodies constitute organizations that represent sections or parts of the shipping industry such as OCIMF, INTERTANKO, SIGTTO, ICS/IFS, IACS, Nautical Institute, ITF, etc. Industry information may also be obtained from subcontractors, equipment manufacturers/builders, consulting companies, other ship management companies (especially through benchmarking) or trade publications.

Benchmarking: Comparison of specific aspects of the company's performance (e.g. safety, environmental, management practices etc.) to that of other companies or the industry as a whole. May be qualitative or quantitative in nature.

Trend Identification and Analysis: The process of systematically reviewing data (e.g. from internal and/or external inspections and audits) to identify whether performance in a particular area improves or declines over time and what has caused it so that effective corrective action can be taken where necessary. A systematic and detailed root cause analysis should be conducted for all non-conformities during internal, external audits, PSC inspections and incident investigation cases. The root causes of Stop Work Authority process's incidents to be analyzed also.

Internal Inspections/Audits: Internal Inspections and audits are those carried out at regular intervals by the company's Superintendents and internal auditors as described in "Internal Audits" respectively.

External Inspections/Audits: External Inspections are defined as those inspections carried out by 3rd parties such as the ship's Classification Society, company's customers (SIRE/CDI etc.), P&I, H&M, PSC and Flag Administration Inspections. External Audits are defined as the management audits for compliance with management systems or practices the company adheres to (ISM, ISPS, ISO, OHSAS, MLC, Navigational and Energy audits etc.).

4.3.4. Leading/Lagging Performance Indicators

Indicators of performance, either quantitative or qualitative that intend to enable proactive or reactive action respectively (e.g. near miss reporting against accident statistics). Leading indicators intend to show what performance can be expected while lagging indicators show the actual performance achieved.

- Leading and Lagging indicators must be measured and analyzed, both across the fleet and on an individual vessel basis, in order to identify weaknesses across the fleet and areas where the Safety Culture can be improved.

- Currently, the Company measures an array of lagging indicators, but no clear safety leading indicators exist. Measuring only the lagging indicators provides post-event information but no room for early reaction and planning.
- If a performance indicator is to be of any value, the indicator has to provide information on the progress and current status of the strategies, processes, behaviors and activities applied to mitigate hazards and risks.

Lagging Indicators

- Lagging Indicators are the traditional safety metrics used to indicate progress towards compliance with safety rules. These are the bottom-line numbers that evaluate the overall effectiveness of safety performance.
- The major drawback to only using Lagging Indicators of safety performance is that they are reactive. They do not tell you how well the company is doing at preventing incidents and accidents.
- The reactive nature of Lagging Indicators makes them a poor gauge of prevention. For example, when officers or managers experience a low injury rate, they may become complacent, when in fact there might be numerous risk factors presenting the workplace that can contribute to future injuries.

Leading Indicators

- Leading Indicators must measure the development activities influencing safety performance and continuous improvement; these measures are proactive in nature and report what improvement measures the company and its employees are taking e.g. to prevent incidents.
- Leading indicators state what you are doing trying to become better, but they don't necessarily state the impact of the initiatives taken. Doing something is not the same as achieving anything.
- Leading Indicators should measure activities believed to have a positive and developing impact on the safety performance.
- The absence of Leading Indicators on HSQE performance measurement deprives the Company of early knowledge and reaction to influencing factors on Company's culture. This results mostly in retroaction with limited effectiveness.
- The Company should enhance measurement of Safety Culture, by establishing a set of comprehensive leading indicators measuring, for example, number of Behavior-Based Safety Observations, Behavioral Competency assessment results, Stop Work Authority cases, number of Best Practices and positive issues/suggestions for improvement identified.
- Leading Indicators should measure activities designed to have a positive impact on the Company's performance and should be measured and analyzed both across the fleet and on an individual vessel basis for identifying areas where safety culture can be

improved. The analysis should be used to: 1) Identify weaknesses across the fleet, 2) Prioritize vessels for targeted training, 3) Generate Campaigns, 4) Give feedback on the current level of HSQE performance.

The Leading Indicators (LI) Program: The purpose of a LI Program is to identify which safety metrics are most strongly associated with the safety performance. This information can be used to guide actions to improve future safety performance. Some of the associated benefits are discussed below:

- Helps to identify what actions have been, or could be, successful in improving safety
- Can improve understanding of whether or not goals are being met
- Provides a tool for prioritization and a basis for improving effectiveness of safety-related expenditure and allocation of resources
- Raises employee awareness of safety-related issues
- Can identify areas of strength and weakness.

Objectives: the below Objectives is derived during our research conducted with leading shipping companies.

Communication: Communications are open and effective: Healthy communication channels exist vertically and horizontally within the organization. Managers and masters are prepared to listen as well as speak. Everyone has, and understands, all the information required for safe operations. Communication channels are monitored for their effectiveness.

Desired Activities, Attitudes, and Behaviors:

- Managers and Masters listen as well as speak.
- All of the workforce (both crew and shoreside staff) are provided with all necessary information to do their jobs safely.

Baseline Metrics: Baseline metrics form the backbone of a safety culture; they are expressed as absolutes – the presence or absence of an activity (and not as ratios, frequencies, etc.).

- Provision of a communications training program
- Provision of a Company newsletter
- Provision of bulletins, toolbox talks, or similar regarding lessons learned or alerts regarding incidents that could have fleet-wide application
- Provision for making safety communications available in native languages
- Provision of an anonymous reporting system
- Provision of communications of safe work practices
- Provision of 2-way communication
- Provision of new hire training

- HSQE policy and goals are communicated with the crew

Subsidiary Metrics: Subsidiary metrics are useful in a leading indicators program until they peak, which they may do as the safety culture takes root. For example, once "Percentage of crew who have PPE" consistently attains 100%, it is no longer useful as a metric for correlating with safety performance.

- Number of mechanisms for communicating safety to employees (e.g., newsletters, toolbox talks, meetings, training, incident findings)
- Percentage of safety training in native languages
- Frequency of safety meetings
- Frequency of toolbox talks

Core Metrics: These are suitable for inclusion in the Leading Indicators Program.

- Percentage of employees receiving communication training
- Budget for communicating safety to employees (e.g., newsletters, toolbox talks, meetings, training, incident findings)

Actions: These are actions that the company should take.

- Increase the number of mechanisms for communicating safety to employees (e.g., newsletters, toolbox talks, meetings, training, incident findings).
- Increase safety training (including printed formats) in native languages.
- Provide a mechanism for anonymous input to management so that those fearful of reprisal have an alternate communication pathway.
- Emphasize the importance of, and management's expectations for, timely and effective communication throughout the chain of command.
- Provide positive public reinforcement of communications – even the "bad news". Do not shoot the messenger.
- Provide communications training to everyone.
- Include safety messages in periodic newsletters or other communications.
- Provide access to internet sites that have regulatory activity that affects the organization.
- Disseminate relevant information from Masters' and management reviews which indicate continuance or change of direction in policies or procedures.
- Increase safety or information meeting frequency and effectiveness.
- Distribute summaries of external incidents and communicate how the lessons learned from them might apply locally.

4.4. Compliance in Legislation, Objectives, Targets & KPIs

Laws, Codes, Mandatory Rules & Regulations as well as legal requirements affecting the ships or the managing company including any changes to them are identified and monitored by the DPA, the Management Representatives and each Head of Department for their area of responsibility. Sources monitored are Flag Regulations and Circulars, Classification Societies of the managed vessels and the RO issuing the company's management certification.

Other standards, rules, systems or guidelines, not applicable by regulation but adopted within the scope of the company's policies on quality, customer satisfaction, alignment with industry best practices and continual improvement are identified and implemented within the company's SMS.

Key Performance Indicators are identified, and targets are set by the Heads of Departments. The person in charge and the supervisor of the area that has been assigned a target are informed in detail for the policy, the objectives, the targets, the time frame and the KPIs.

Compliance with these policy objectives and targets is mandatory, therefore are under the scope of the annual SMS internal audit verification. Progress is evaluated, under the scope of the management review meeting.

Corrective / Preventive Action should be identified in order to eliminate cause and avoid re-occurrence. The effectiveness of those corrective / preventive measures is verified. Once compliance with mandatory requirements and targets is achieved, Managers examine the possibility of further improving the performance as/if possible, and the continuous improvement cycle is followed.

Statistics are evaluated and targets are set, based on that evaluation. The targets are discussed with the Manager(s) of the area where the targets are set, in order to produce a feasible plan with acceptable cost. KPIs and target achievement status is monitored.

Measurement of achievement is carried out on quarterly basis, during regular management meetings according to "Management of Change" procedure. When targets are achieved, Managers examine the possibility of further improving the performance as/if possible, and the continuous improvement loop is followed.

Whenever performance targets or objectives have not been achieved, appropriate corrective action is taken to align performance with targets and objectives.

Legislation: Codes, Conventions, Rules, Regulations, Legal or any other requirements, either International or National that apply to the managed vessels or the managing company mandatorily (e.g. Flag regulations, MARPOL/STCW/SOLAS/MLC, OPA90 etc.)

Voluntary Standards: Non-mandatory standards, guidance or guidelines that the company has elected to adopt and follow in order to improve its practices above the minimum required by legislation (e.g. ISO/OHSAS/TMSA)

4.4.1. KPIs - Shipping Key Performance Indicator

A Key Performance Indicator (KPI) is a measurable value that demonstrates how effectively a company is achieving key business objectives. Furthermore, KPIs offer any assistance a company needs to be guided in accomplishing the objectives they have set and fulfill the obligations they have towards the legislative system. A management operator company should use these KPIs in order to determine in which fields of their operating activity need the greater assistant and they should focus their efforts for improvement. Management operators should also make good use of the KPIs in facilitating their efforts on building development strategies used to clarify which persons should be assigned with which responsibilities for materializing the improvements that are necessary to achieve the company's objectives and goals.

Organizations use KPIs at multiple levels to evaluate their success at reaching targets. High-level KPIs may focus on the overall performance of the business, while low-level KPIs may focus on processes in departments such as sales, marketing, HR, support and others.

The Shipping Performance Indexes are weighted averages of the used KPIs within a particular area and their objective is to give external stakeholders information about the overall performance of a ship in one of the following areas:

- Environmental Performance
- Health and Safety Performance
- HR Management Performance
- Navigational Safety Performance
- Operational Performance
- Security Performance
- Technical Performance
- Port State Control Performance

The KPIs ratings form the basis for the Shipping Performance Index (SPI) score. The KPIs can be expressed in two ways, a KPI Value which is a mathematical combination of relevant Performance Indicators Values and a KPI Rating which is an expression of the KPI Value on the scale between 0 and 100 where a high rating (100) is a result of high/excellent performance.

A KPI is:[9]

- a numerical, objective measure of performance
- key to the strategic business objective
- actionable and influenced by the relevant stakeholder/manager
- accountable to stakeholder/manager
- output oriented, not focused on input or activity
- possible to calculate with limited efforts and within limited time

The objectives of KPIs are to measure the continuous improvement, the internal and external benchmarking and to set incentives.

The PIs are the foundation of the KPI project. They are used to calculate all the KPIs and SPIs. The PIs are directly observable parameters for each ship under management, e.g. Number of dismissals, Number of collisions and Number of fire incidents. The PIs are used on the lowest level to collect the data, and therefore, these data can be used repeatedly to calculate specific KPIs. Consequently, the amount of data is reduced, and one common basis is formed which reduces the risk of continuative errors. These PIs are then consolidated to specific KPIs.
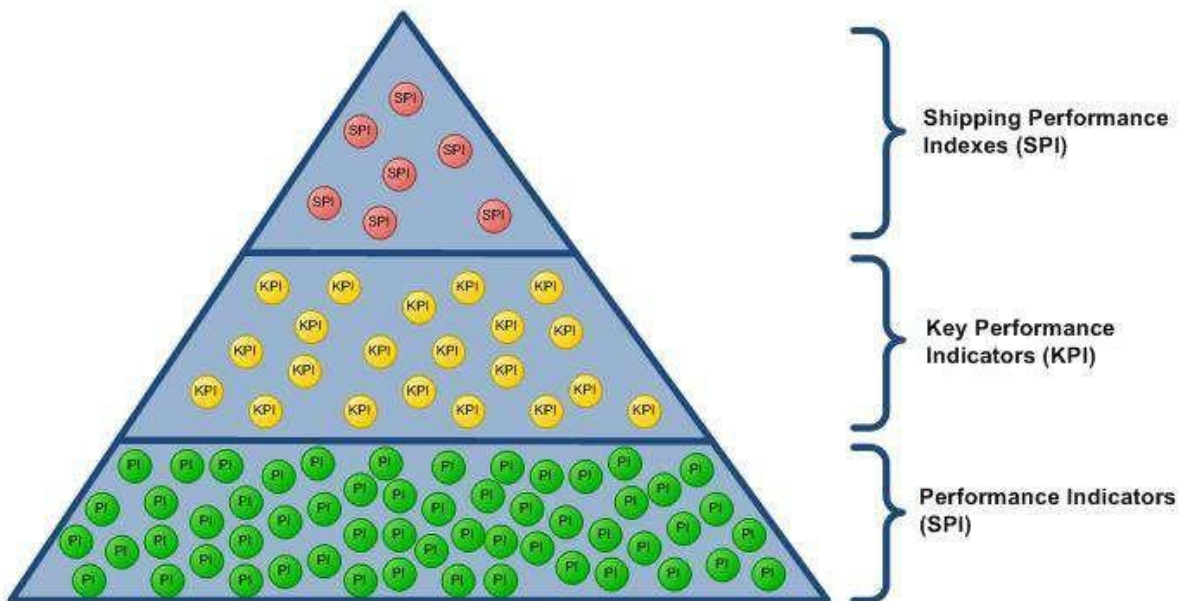
*Figure 17*. *PIs pyramid*

In the context of the TMSA, KPIs are used to measure a management system. The information contained in the documents can assess the management system and demonstrate a level of achievement that ranks from 1 to 4 for each of the 13 elements. Every KPI will not be

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[9] Hemmelskamp J. TMSA and KPI Systems Challenges in Business Performance Measurement, Chapter 4 Section 4.1.1

applicable in all cases and it is depending on company's size and structure, special trade and local regulations, custom and conditions. In addition, in case of a company decide that a KPI is not applicable; they should enter "yes" when completing the assessment online. However, the company has to justify the reason for considering the KPI is not applicable and to revert back with documentary evidence. Entering "No" will lead the TMSA software to record the element as incomplete. Since the self-assessment has been completed, the company will have a clear picture of their performance. Therefore, they can specify gaps and make plans for their improvement.

4.5. Objectives of the SMS

The objectives of the SMS are to:

- Provide for safe practices in ship operation and a safe working environment.
- Establish safeguards against identified risks.
- Continuously improve the safety management skills of Company's personnel, including preparation for emergencies.
- Comply with mandatory rules and regulations.
- Take into account the applicable codes, Guidelines and standard, recommended by the Organization, Administration, Classification Societies and maritime industry organizations, mandatory or otherwise.
- Monitor, review and adopt industry best practices that enhance health, safety and pollution prevention

The Company's management system documentation is written in English. The common working / communication language onboard managed vessels and ashore is English.

4.6. Special Training Requirements For Seafarers[10]

The need to improve the human element on-board ships have long been recognized by the IMO. In order to operate the sophisticated modern ships in an optimized manner and above all safely, the competence of seafarers is one of the most critical factors. The key to maintaining a safe shipping industry and preserving the marine environment lies in all seafarers across the world possessing high standards of competence and therefore fulfilling effectively their duties on-board. The purpose of the International Convention on Standards of Training, Certification and Watch-keeping for Seafarers of 1978 (STCW Convention) is to ensure that all seafarers on seagoing vessels are properly qualified to perform their respective duties.

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[10] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 2

The STCW Convention sets the standards and requirements of officers and ratings who will be employed on board vessels. In other words, the minimum competency standards for seafaring industry are "regulated" at a global scale by IMO through this Convention. As the main regulatory body, the IMO enforces and monitors the implementation of requirements of the rules together with the ratifying countries as national enforcing elements of the convention. The STCW Convention was adopted on 7 July 1978 and finally put in to force on 28 April 1984. Promoting safety of life at sea as well as protecting property and marine environment through common international standards of training, certification and watch-keeping are within the main purposes of the Convention.

With the participation and assistance of a variety of partners, IMO has produced a series of courses (model courses) for implementing the requirements of the convention. Those courses also facilitate obtaining the skills and knowledge required for keeping up with the fast-growing maritime technology. Each model course contains a framework to state the scope and objective of the course as well as entry standards and any other information required about the course.

4.6.1. Company-Based Trainings

Oil Companies International Marine Forum (OCIMF) has also produced a world-wide system to follow tankers' conditions through the "Ship Inspection Report" (SIRE). Besides that, INTERTANKO has created standards for self-assessing for tanker companies in terms of safe and environmental management. This has led to a transformation of mentality and safety understanding of the companies. From feeling obliged to comply with the rules, they have changed their perspective to raising their safety culture. Thus, they have started to use Tanker Management Self-Assessment (TMSA) schemes to adapt themselves with the requirements of the tanker industry and take on self-assessment of own company through this system.

Training of both ship's crew and personnel ashore, without any doubt forms the most important aspect of TMSA and OCIMF requirements. Training must be provided before, as well as in the course of employment and certain assessment tools must be included in order to ensure that the targets of the trainings are fully achieved.

Tanker companies put much effort for observing all of their employees during the recruiting procedures to make sure that the candidates have taken required education and appropriately trained for working both on board and ashore. As a follow-on effort, tanker companies provide extended trainings for the crew on board their ships as well as for their employees in the offices ashore. This way they ensure that their personnel are well educated and sufficiently trained to meet the qualifications required to perform their duties and fulfil allocated responsibilities.

4.6.2. Shore Based Trainings

Company Run Seminar[11]: most tanker companies provide shore-based seminars for their crew to keep them up to date on the numerous subjects concerning their duties. Depending on the latest information available and the developments introduced in the sector, companies produce an agenda for the seminar to cover both officer and rating level employees; an indicative, but not exhaustive list of topics is provided below:

- Changes in legislation applicable to the vessel and industry requirements,
- Management reviews,
- Safety, quality, environment, health, energy, operational matters,
- Accident/incident/ near miss and their root causes/lessons learnt,
- Customers' complaints,
- Security, cyber security,
- Company philosophy

Company In-house Refreshment Trainings[12]: Companies may also choose to perform in-house refreshment seminars for ship crews to inform them of company-based events. Those seminars also include information on latest accidents and hot topics on Health, Safety, Security, Environment and Quality (HSSEQ) issues.

The agenda covers the latest developments within the company, which may include:
- New company policies & procedures,
- Latest Accidents within the fleet, focusing on their corrective & preventive actions,
- Recent internal/external inspections & observations the company was subjected to,
- Update on environmental accidents & regulations,
- Update on resilience & reflective learning trainings,
- Latest security related matters,
- Any additional information on operational & technical matters, etc.

Shore Based Personnel[13]: New personnel before officially assuming their duties, are subjected to familiarization training which covers the company's management system as well as company policies and procedures. Depending on the company's management system (and policies) there may an incremental approach towards training for the new employees (steps).

Step 1. Familiarization / induction training: This step covers mainly organizational matters. Among these are responsibilities of departments, policies, procedures, manuals and communication methods and last but not least, equipment in hand.

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[11] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.1.1
[12] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.1.2
[13] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.1.3

<u>Step 2</u>. Departmental Training: This phase covers specific individual duties in relation to position as well as on scene trainings specific to the department concerned. Training shall be detailed and cover specific on scene training related to department and all specific duties for the position.

<u>Step 3</u>. Refreshment training: Companies also have pre-defined refreshment trainings for their staff ashore and their seagoing crew when they are on their shore leave period. An indicative content of the refreshment training is provided below:

- Accident Incident Investigation.
- Management of Change /Risk Assessment.
- Internal Auditor International Safety Management (ISM).
- Internal Auditor International Organization for Standardization (ISO) 9001 and
- Internal Auditor International Organization for Standardization (ISO) 14001.
- Maritime Labour Convention (MLC) Internal auditor.
- Cargo Ballast Handling.
- Ship Handling.
- Bridge Resource Management (BRM)/Bridge Team Management (BTM).
- Electronic Chart Display and Information System (ECDIS) Training.
- Engine Resource Management (ERM).
- Basic STCW certification.
- Media Training.
- Train the Trainer.
- Incident/Crisis Management.
- Environmental compliance and awareness.
- Security-Piracy-High Risk Area-Safeguards.
- Cyber security awareness.

Shipboard Trainings[14]: As far as the on-board training is concerned, the overall responsibility is always on the Master of the ship. The master must ensure that the trainings required by company procedures are conducted in an appropriate and timely manner. Should he/she consider so necessary, the master may make alterations of the pre-described path or conduct additional trainings.

The Master must also make sure that, drills required by international conventions and Flag state rules are performed and maintained as per the respective Drill program and that training records are kept appropriately.

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[14] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2

On board trainings can be performed in a variety of formats. Tanker companies should have the training methods provided below in place.

Familiarization Trainings[15]: All seafarers in respect to their ranks will have to be offered the familiarization trainings presented in Table 1 upon embarking a tanker ship.
- Training Given to Crewmembers within First 24 Hours On Board Vessel and Before Departure (STCW Reg. A-VI/1, SOLAS Chp III- Reg. 19.2)
- Training Given to Crewmembers within First Two Weeks on Board (STCW Reg. A-I/14.2, SOLAS Chapter III- Reg. 19.4).

Familiarization	Master	Deck Officer	Chief Eng	Engine Officer	Ratings	3rd Party Contractor
Elementary Basic Safety Familiarization	24 hour	24 hour	24 hour	24 hour	24 hour	
Specific Shipboard Familiarization	2 weeks	2 weeks	2 weeks	2 weeks	2 weeks	
Engine Room Familiarization			First week			
Cargo Control Room and Cargo System Familiarization		First week				
Bridge and Bridge Equipment Familiarization	Before first watch	Before first watch				
3rd Party contractors & visitors Familiarization						On arrival

On board Computer Based Training (CBT)[16]: Companies will produce a training matrix to cover all rank range of crew members. The matrix will include list of CBTs classified as mandatory and recommended. For successful completion of those trainings, the required equipment (dedicated PC or laptop computer) must be properly installed and ready to use. As these training should be regularly conducted, the Master or an officer designated by him/her may stop the event to make explanations when necessary. To support the training provided, relevant training videos should be available to crew after each session.

Trainings During Drills[17]: Drills on board should reflect the real-life scenarios. In this sense they should be conducted as realistically as possible. After completing the drills, a special

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[15] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.1
[16] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.2
[17] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.3

session of de-briefing should be held which will enable the ship crew to note any corrective measure required.

Through the drills the crew will enhance their knowledge and practice on the matters listed below:

- Emergency procedures of ship.
- Emergency duties & responsibilities.
- Including but not limited to following Life Saving Appliances (LSA) & Fire-Fighting Equipment (FFE) trainings in rotation over two months rolling period (as described in SOLAS III/19.4.1)
- Life Jackets, immersion suits.
- Operation and use of the ship's inflatable life-rafts.
- Problems of hypothermia, first-aid treatment for hypothermia and other appropriate first aid procedures.
- Special instructions necessary for use of the ship's life-saving appliances in severe weather and severe sea conditions.
- Operation and use of fire-extinguishing appliances.

Brief/Debrief Meetings[18]: A meeting before accomplishing any operation will provide the opportunity to participants for discussing what may go wrong and hence taking precautions beforehand. Likewise, a second meeting after the completion of the operation will enable the participants to discuss what went wrong and what measures could be taken to ensure the next operation to be better; the purpose is to maximize the training result. Meetings in form of briefings and debriefings include, but are not limited to operations listed below:

- Before and After of Voyage.
- Mooring Unmooring Operation.
- Cargo Operations (Loading/Discharging/Heating/Circulating);
- Tank Cleaning/Gas Freeing/Purging.
- Inerting Operations.
- Bunkering Operations
- Slop / Sludge / Bilge Disposals.
- Anchoring Operation.
- Ship / Office Drill.
- Any Operation which is not routine.

Training by Superintendents during shipboard visits[19]: If superintendents or trainers join the ships in various occasions and visits, they will also conduct necessary trainings to improve

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[18] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.4
[19] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.5

safety. With the overall aim of improving the performance level of the visited ship, objectives of those on-board trainings generally are:

- To raise and maintain the operational safety.
- To make sure that the crew are familiar with the Company's HSSEQ policies and Safety Management Systems.
- To provide the knowledge and experience for performing duties in a competent and safe manner.
- To improve crew's awareness on environmental issues.
- To advise any necessary corrective action/ training on un-safe practices or hazardous situations.
- To make sure, by means of training programmes, visual aids and discussions, that crew are well aware of their own responsibilities as well as health and safety, environmental protection and overall safety of the ship.
- To ensure that lessens are learned from previous accidents and necessary preventive measures are taken by the crew for possible accidents.
- To reinforce and emphasize the company's safety initiatives, campaigns and programmes.

Additional Trainings[20]: Additional trainings are provided by the company to dispense and disseminate the most up-to-date changes and to assist in dealing with future needs of the fleet and new requirements of the industry. One important additional training provided by the senior officers on board is to enhance the crew's knowledge on health, safety, environment, quality, security, and duties when necessary. Additional trainings may also cover issues concerning piracy and security issues, especially before entering high risk areas (HRAs). More additional trainings can also be conducted following a recent accident (as a remedial action), or at the company's discretion to cover "unexpected needs".

To conclude, historically, sea-going vessels have been the most important means of transport. In the 21st century with an increasing demand of trades to supply food, goods for consumption and resources that facilitate production around the globe, sea-going vessels are rightly considered the most important means of transport; vessels engaged in maritime transport activities hold the so-called "comparative advantage" over all other modalities. Safe and secure shipping activities are a prerequisite for the normal conduct of global trade, many times termed as the "backbone of globalization".

Each and every day, ships of different size and capabilities carry huge quantities of cargo and a very large number of passengers cost effectively, cleanly and safely. It is true that several maritime Conventions and Regulations stipulate both the operational environment and the training requirements for mariners/seafarers (with the importance and influence of MARPOL -

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[20] Evaluating Maritime Education and Training Needs for Tanker Shipping Companies, Chapter 3, Section 3.2.6

International Convention for the Prevention of Pollution from Ships, STCW - Standards of Training Certification and Watch- keeping, and SOLAS (International Convention for the Safety of Life at Sea) including the very influential ISM Code (International Safety Management Code), among others being well known within all members of the maritime community and many outsiders.

Maritime accidents and casualties may occur due to human errors. As past maritime accident analyses and reports indicate accidents at sea quite often are resulting into loss of human life and significant damage towards the marine environment. Analyses of those accidents have shown that a great majority of those incidents are a direct result of operational mistakes and errors as well as lack of knowledge of the crew.

Safety of ships, quality of the crew and companies and environmental protection can be sustained only through training. From this aspect, as training activities should be regarded as vitally important for the maritime sector, one way to attain safety is by seafarers who are well aware of the dangers at sea via "targeted" training offerings. This way accidents at sea will decrease. Tankers carry a variety of different cargoes and this makes them complex enough to deal with; employing well-educated and well-trained crew with a high level of awareness on board tankers should be viewed as a requirement.

4.7. Daily Work Planning Meetings / Toolbox Meetings

Daily Work Planning Meetings and Tool Box Meetings are intended to identify risks, determine the severity and likelihood of any hazard, and to ensure such risks and or hazards are mitigated, to the fullest extent possible, prior to commencing a task.

A Daily Work Planning Meeting is to be conducted the previous day of the work day to be recorded in relevant form and to be posted in both recreation rooms.

The ultimate success of a task depends upon the awareness of the people that will be involved in carrying out the task and how effective hazards and controls are communicated. A Tool Box Meeting is therefore to be conducted for all jobs, prior to the commencement of a job, so that every participant that will be involved in the job has had the opportunity to physically review the work place (where possible) of the said job. If there is an established pre-existing risk assessment for the task, then it shall be reviewed to ensure identified hazards and control measures are still relevant, prior to commencing a task. If there is a significant change to the job scope or there is a change in hazards or controls, the risk assessment shall be updated.

Toolbox meetings shall also take place at significant points throughout the job.

4.8. Stop Work Authority (SWA)

The Company's employees (including shore personnel and vessels crew), contractors and visitors have the responsibility, authority and obligation to halt an operation if the situation appears unsafe or work is being performed in what appears to be an unsafe manner, or where concerns or questions regarding the control of health, safety, security and environmental risk exist.

Persons entering any work site onboard and ashore, agree to comply with the safety rules and procedures that have been conveyed to them as part of their job or safety induction and in accordance with the Company's System.

When an employee, contractor or visitor notifies a supervisor of an unsafe act or condition, it is the supervisor's responsibility to either correct the safety issue immediately or protect the crew from the safety hazard, and also to develop a plan to eliminate the hazard.
No work will resume until all Stop Work issues and concerns have been adequately addressed.

Any form of retribution or intimidation directed at any individual or company for exercising their authority as outlined in this program will not be tolerated.

Definition: "Stop Work Authority" simply means the Right and the Obligation of any crewmember – regardless of her/his position or rank – to stop a work when an unsafe condition or unsafe act has the potential to result in an undesirable event. In general, this process involves a Stop, Notify, Correct and Resume approach and Follow up.

STOP: When a crewmember perceives conditions or behaviors that pose imminent danger to person(s), equipment or environment he or she must immediately initiate a stop work intervention with the person(s) potentially at risk.

If the officer supervisor is readily available and the affected person(s), equipment or environment is not in imminent danger, coordinate the stop work action through the supervisor.

NOTIFY: Notify the affected crewmembers or contractors and the work supervisor of the stop work action. If necessary, stop work activities that are associated with the work area in question. Make the area as safe as possible by removing personnel or other proper action.

CORRECT: Work activity should be continued when the necessary corrective actions have been taken and agreed that the condition or behavior is safe to proceed.

RESUME: All affected crewmembers and contractors must be notified of what corrective actions were implemented and that work can recommence.

FOLLOW UP: The HSE Officer should be notified and should investigate further the causes of initiation of the "STOP Work Authority" with the aim of identifying any potential opportunities for improvement. This should be discussed in the next scheduled Safety Committee Meeting. All Company's employees (including shore personnel and vessels crew), contractors and visitors are responsible to initiate a Stop Work intervention when warranted, support the intervention of others and properly report all Stop Work actions.

The DPA and the vessel's Masters are responsible for monitoring compliance with the requirements of this program; maintaining associated documents, records and training materials; identifying trends; sharing lessons learned and exchanging information within the Office and the fleet.

The Company's Managers, the heads of vessel's departments (Chief Officer and Chief Engineer) and the attending Superintendents (if present onboard) are responsible to create a culture, where SWA is exercised freely, honor request for Stop Work, work to resolve issues before operations resume, recognize proactive participation and verify that all Stop Work actions are properly reported with required follow-up completed.

4.8.1. Procedure

In general terms, the Stop Work Authority (SWA) process involves a stop, notify, correct, and resume approach for the resolution of a perceived unsafe work action or condition. Most likely to participate in such process is personnel that clearly understand how to initiate, receive and respond to a Stop Work intervention.
Some key indicators of safety and job task hazards that require an employee to Stop Work are (not limited to):

- A change: A modification or alteration that deviates from the way the job task is normally performed or from the written procedural instructions may cause unsafe work actions or conditions. For example, using a different tool, altering a standard procedure to meet new job task requirements, making a change to the work plan, or observing parameters that are outside the standard procedures.
- An unscheduled event: An unplanned event that distracts employees from the job task being performed may cause unsafe work actions or conditions. For example, inclement weather, simultaneous work occurring nearby, or a community or property owner activity following an accident or spill.
- An observation with safety impact: Whenever any person observes a condition or situation that has an impact on safety. For example, a hose lying across a walkway, a spill that has not been cleaned up, a loose handrail or a damaged tool.
- An incomplete understanding: Whenever any person involved with an operation or a coworker does not completely understand instructions, procedures or ongoing activities. For example, making assumptions about job task steps, uncertainty over the order that job steps are performed, or differing opinions about how a job task is performed.

- Relay information: Whenever a situation requires critical information to be relayed, an unsafe work action or condition may occur. For example, shift change or crew reassignment.
- Observing new hazards: Whenever a person encounters risks that have not been addressed during previous risk assessments. For example, new PPE requirements based on job task demands previously unidentified.
- A need to ask for help: Whenever a job requires additional people, or the experience level of the person performing the job task requires support, an unsafe work action or condition may occur. For example, working to meet production demands and performing a two-person procedure alone, an inexperienced worker who does not ask for help, not asking for help with a heavy lift, or needing help with reading a drawing or sketch.

The following steps should be the framework for all Stop Work interventions:

- When a person identifies a perceived unsafe condition, act, error, omission, or lack of understanding, a Stop Work intervention shall be immediately initiated with the person(s) observing and/or those who are potentially at risk.
- If the Person in Charge for the specific work is readily available and the affected person(s) are not in immediate risk, the Stop Work Action should be coordinated through the Person in Charge. If the Person in Charge is not readily available or the affected person(s) are in immediate risk, the Stop Work intervention should be initiated directly with those at risk.
- Stop Work interventions should be initiated in a positive manner by briefly introducing the identifying person's oneself and starting a conversation with the phrase "I am using my Stop Work authority because." Using this phrase will clarify the user's intent and set expectations as detailed in this procedure.
- All affected personnel and supervision should be notified of the Stop Work issue. If necessary, associated work activities should be stopped, person(s) removed from the area, the situation stabilized, and the area made as safe as possible.
- All parties involved in the specific operation shall discuss and gain agreement on the Stop Work issue.
- If determined and agreed that the task or operation is safe to proceed as is (i.e., the Stop Work initiator was unaware of certain facts or procedures) the affected persons should thank the initiator for their concern and proceed with the work.
- Proceed with the job task safely:
    - Ensure that any recommendations in the applicable Risk Assessment (RA) or management of Change (MOC), as necessary, are implemented.
    - Develop temporary procedures or revise existing procedures to accurately, safely perform the job task.
    - Confirm that everyone understands the job task as it is about to be performed.
    - Confirm that proper tools, materials, spill prevention/remediation equipment or personnel, etc. are available.
    - Confirm that the appropriate and trained workforce is available.

     ○ Determine if there is enough time to perform the job task safely.

4.8.1. Documentation and follow-up

All Stop Work interventions exercised in accordance to the present procedures shall be documented as a Near Miss utilizing the Company's controlled Near Miss Report. The Near Miss report shall refer specifically to the intervention by using the words "STOP WORK" at the beginning of the incident description in order to differentiate it from traditional Near Miss reports.

Stop Work reports shall be reviewed by the vessels' Masters (or by attending Company's representatives during dry-dockings and new-building projects) in order to:
- Measure participation.
- Determine quality of interventions and follow-up.
- Trend common issues and identify opportunities for improvement.
- Facilitate sharing of lessons learned.
- Support recognition programs.

The DPA will also regularly circulate incident details regarding the number of Stop Work actions reported across the fleet and in other worksites of interest (such as during dry-dockings and new building sites), as well as details regarding common trends and lessons learned.

Normally, it is the desired outcome of the Stop Work intervention that identified safety concerns are addressed to the satisfaction of all involved persons prior to the resumption of work.

Although most issues can be adequately resolved in a timely fashion at the job site, occasionally additional investigation and corrective actions may be required to identify and address root causes. Stop Work interventions that required additional investigation or follow-up will be handled utilizing existing procedures and documentation requirements for Incident Investigation.

In order to build and reinforce a culture in which Stop Work Authority (SWA) is freely exercised and accepted, positive feedback should be given to all affected personnel regarding resolution of the Stop Work issue and under no circumstances should retribution be directed at any person(s) who exercise, in good faith, their Stop Work authority as detailed in this program. In this context the vessels' Masters (or the attending Company's representatives during dry-dockings and new-building projects) are encouraged to positively recognize crew and contractor participation in the program, as follows:

- Informal recognition should be ensured a minimum, in the form of an expression of appreciation for a job well done, of individuals when they exercise their authority to Stop Work or demonstrate constructive participation in a Stop Work intervention.
- Additionally, formal recognition of selected examples of Stop Work interventions and those responsible should be made during regularly scheduled safety meetings.

4.8.2. Training Requirements

Training regarding this Stop Work Authority (SWA) Program shall be conducted as part of all new crew and contractors' familiarization, upon embarkation, with records maintained in the respective Familiarization Records. Additionally, a review of the SWA Policy shall be carried out as part of the MRM and regularly during the vessels' safety meetings and the Masters System's Review Reports.

4.9. Communications

Company has clearly defined the communication lines among crewmembers onboard, between shore-based staff, ship-shore communication links and its customers. To ensure full understanding and sharing of the information required to run the ship efficiently and in accordance to customer requirements without compromising the ship's safety, security and without posing any threat to the environment, the community or customer property.

4.9.1. Communication Language

Information sharing in a common language is vital for the safe and efficient operation of the fleet and adequate shore-based support.

- Official language onboard is the English language. All verbal communications between the ship and shore are made in English. Standing, Night Orders, Warnings, Notices, Posters, Logbook Entries, reports, records and all kinds of message exchanges are made in English.
- Working language between crewmembers of the same Nationality is allowed to be their "mother" language, provided that the ship is manned with personnel of the same Nationality.
- Official language ashore is also the English language. All verbal communications between the ship and shore are made in English. All reports, records, instructions, advices, memoranda and circulars are written in English.
- Working language between shore staff members of the same Nationality is allowed to be their "mother" language, provided that all staff have the same Nationality.

- All shipboard and shore-based personnel should be able to communicate in English for the execution of their routine and emergency response duties. English competency is verified prior employment.
- The Company ensures that the ship's personnel receive information on the safety management system in the English Language by providing all SMS related documents in English Language.
- Company ensures that all ships delivered for management are provided with ship and equipment specific instructions and manuals written in English Language. Whenever such information is written in a different language than English, the relevant document is translated to English (approved as/if required) and placed on board prior the commencement of relevant operations.

4.9.2. Information sharing onboard, ashore & ship support

All information necessary for the proper operation of the ship, is communicated to shipboard personnel through regular meetings and orders issued in plain and simple manner in English language.

Company has defined communicational links between the ship and shore in order to respond efficiently and timely to ship's requests by clearly defining, who's responsible to deal with, technical, operational, HSE, quality, security and emergency response issues, including dealing with the media.

Shore base information sharing is also ensured through regular and ad hoc shore management meetings.

4.9.3. Communications with Customers and Contactors

Company has established contact points for contractors functioning on behalf of the Company, in order to ensure full organizational support and efficient supervision of the outsourced activities.

Communication links with Customers are also established, in order to ensure accurate description of customer requirements, customer feedback for the quality of the services delivered and proper handling of customer complains.

4.10. Safety Management

The Company recognizes that effective safety management requires systematic identification of hazards and measures to eliminate or reduce the risks to the lowest practical level. Top Management promotes a no blame culture and motivates staff to understand and embrace the

requirements of the management system. To develop a proactive approach to safety management onboard and ashore, that includes identification of hazards (including exposure to substances hazardous to health) and the implementation of preventive and mitigation measures.

4.10.1. Shore-based Monitoring

The Company established and maintains procedures for the shore-based management to:

- Engage in a formal risk assessment program that is designed to identify potential hazards and exposures and manage operational risks, including those relating to health & hygiene.
- Periodically review and update the validity of risk assessments and their application across the fleet.
- Make regular onboard inspections to monitor the safety standards being maintained within the fleet and make recommendations to senior management based on the findings.
- Establish proactive safety campaigns

3.10.2. Shipboard Monitoring

Company established and maintains procedures that make provisions on the vessel for:

- Hazard & Exposure identification & risk assessment
- Appropriate training in the use of hazard and exposure identification techniques and risk assessment tools
- Conducting safety inspections at scheduled intervals and recording the results of these inspections
- The immediate reporting to shore-based management of significant safety deficiencies or defects that cannot be rectified by ship's staff
- Verifying compliance with the specified safety procedures

4.11. Management of Change

The Company realizes that changes to equipment, personnel, operating conditions or procedures or the introduction of third-party contractors or a new vessel may present certain risks. To establish procedures for evaluating the impact of changes to operations, procedures, ship's equipment or personnel to ensure that safety and environmental standards are not compromised and that any risks introduced or inherent to the change are effectively managed and reduced to ALARP levels.

4.11.1. Change Management

The change management system used by the Company:

- Ensures that the documentation supporting a change includes the reason for the change
- Defines the level of authority required for the approval of a change
- Provides a clear understanding of the safety and environmental implications of a change
- Ensures that all changes comply with regulations, industry standards and original equipment design specifications
- Ensures that there is an appropriate procedure in place for staff hand over and familiarization, both ashore and onboard vessels
- Includes procedure for issuing work permits before any work is carried out, or any changes are made to equipment
- Ensures that the potential consequences of a change are identified, together with any mitigation measures and that the results are communicated to those affected by the change
- Ensures that changes not carried out with the proposed time scale are reviewed and revalidated before they are completed
- Identifies any training needs arising from changes to equipment or procedures
- Ensures that appropriate drawings, procedures and other technical documents are updated following any change or modification

4.12. Marine Operations

The Company makes every effort to have each ship ready in all respects with regard to manning, equipment, maintenance and supplies for the intended trade and services. The Company established and maintains procedures to ensure that the vessel will perform without delay, damages, off hire or loss, without posing any risks to her safety, the safety and wellbeing of the crew, security of the ports, property and the environment.

4.12.1. Operations

The Company established and maintains procedures with a view to verifying that the ship is technically sound and, in a condition, to fulfill designated operations in respect of the cargo and the trade the ship is employed in.

- Company has sufficient qualified personnel to follow up the day to day operation of the vessel and monitor the efficiency and performance

- Company is prepared on request to furnish technical information to the shipboard management regarding the operational requirements of particular and special cargoes to be carried
- Company established procedures to have the ship report at scheduled intervals
- Maintains the operational condition and performance of the ship
- Receives operational problems which may arise onboard the ship and initiates action to correct operational problems
- Confirms to the ship-owner and Chartering Liaison the condition of the ship and any possible limitations as to intended trade as well as changes to the operational parameters
- Responds to Master's requests for assistance
- Assists the Master to obtain all relevant operational and commercial voyage information
- Provides guidance to the ship-owner, as necessary, regarding improvement performance, upgrading the ship and compliance with new rules and regulations to meet the requirements of specific intended trades.

4.13. Code of Businesses and Ethics

The Company confirms its adherence to the following principles:

- The Company Policies will always be in compliance with the applicable National and International Legislation.
- The Company shall not knowingly participate in activities or practices which it knows to be unsafe or illegal.
- The Company acknowledges that both the Owner and Shippers are conducting business with a view to a profit.
- The Company shall not accept business for which it does not have the necessary capability or resources.
- The Company shall allocate its resources so as to render equitable and faithful performance to each of its clients.
- Subject to all relevant provisions of the Management Agreement the Company shall advise Owners of any conflicts of interest.
- The Company shall respect the confidentiality of client Business and activities.
- The Company's Policies are emphasizing its commitment to the occupational health of its crews and staff, safety, protection of the environment, security and to the safeguarding of Owners' and Shippers' Properties.
- The Company shall whenever possible advise the Owner of any potentially dangerous or other unacceptable situations.
- The Company's Policies will promote a healthy working environment including but not limited to the provisions of safeguards against substance (ie drug) or alcohol abuse onboard the managed vessels.

- The Company shall at all times adhere to sound principles and practices with respect to the management of funds and cash.
- The Company documents and defines its policies and objectives and its general commitment to Quality.
- The Company aims to conduct its business as a provider of high-quality shipping services without causing harm or injury to any entity, human being or the environment.
- The Company Top Management establishes policies, procedures, and instructions to ensure that its mission and ethics code are fully understood, implemented and practiced at all levels within the Organization.

4.14. Occupational Health, Safety & Environmental Protection Policy

The Occupational Health, Safety & Environmental Protection Policy provides the framework for setting and reviewing quality, environmental and OH&S objectives and targets in these areas of the company's activities.

The Company establishes a proactive approach to Ship Management, both ashore and onboard, that includes identification of risks and hazards (including exposure to substances hazardous to health) and the implementation of appropriate preventive and mitigation measures while it is committed to the continual improvement of its HSSE practices and prevention of any kind of pollution.

The company's policy is established so as to be appropriate to the nature, scale and environmental impacts of the company's shore based and shipboard risks, activities and services. Every company employee both onboard and ashore is individually responsible for maintaining and complying with these company policies in all his activities and areas of responsibility, promoting awareness among their peers and colleagues as well as bringing to the attention of the company any discrepancies, problems or suggestions for improvement, as appropriate.

4.14.1. Objectives

The Occupational Health, Safety, Security & Environmental Objectives of the Company aim to promote occupational health and safety at sea, prevention of human injury, loss of life or occupational ill health, and ensure avoidance of damage to the environment; in particular to the marine environment as well as to property.

Further, key company objectives are Health, Safety, Security and Environmental excellence which are defined as zero incidents involving personal injury, zero security incidents, zero tolerance to any kind of pollution or violations of environmental laws and regulations, zero spills to sea or damage to property, zero releases to the environment, reduction in permitted emissions.

In order to achieve the objectives, the Company:

- Ensures the Master is provided with the necessary support to safely perform his duties, especially with regard to safety and pollution prevention.
- Provides instructions on safe working practices in ship operations and a healthy and safe working environment.
- Continuously improves the safety management skills of its personnel ashore and aboard ships, including preparing for emergencies including those related to safety & environmental protection and occupational health.
- Systematically identifies occupational health, safety and environmental hazards and measures to eliminate or reduce such risks to the lowest practicable level.
- Assesses all identified risks to its ships personnel and the environment and establishes appropriate safeguards.
- Promotes a transparent, no-blame culture and motivates its crews and staff to ensure that they understand, embrace and practice the management system.
- Promotes the culture of working in a safe & healthy environment as a way of life.
- Is committed to the prevention of injury and ill health and to the continual improvement of its OH&S management and performance.
- Makes its Occupational Health, Safety, Environmental and Quality Policies available to the public and the Company's customers, vendors and suppliers through the company's website while their key elements are communicated to all persons working for and on behalf of and under the control of the organization with the intent that they are made aware of their individual health and safety obligations, while ultimate responsibility remains with the management.

The Company Management System ensures:

- Compliance with mandatory rules & regulations, legal requirements, and with other requirements to which the organization subscribes that relate to its OH&S hazards and to its environmental aspects, as well as applicable codes, guidelines and standards recommended by the International Maritime Organization, Flag Administrations, Classification Societies, Port State Control Authorities and other International Recognized bodies and Industry organizations, which are embraced as appropriate.
- Specific procedures through which the occupational health, safety and environmental protection policies are implemented are defined, implemented, reviewed and updated as necessary, in view of relevant developments or internal initiatives under the general principle of continual improvement, in order to facilitate the achievement of the company's objectives.
- Duties and responsibilities and accountability with regard to Occupational Health, Safety and Environmental Protection and performance are defined both onboard and ashore.

- Contingency Plans and provisions for regularly exercising them are established, so that shore-based and shipboard organization can respond effectively at any time to hazards, incidents and emergencies involving the ship.

Shore-based monitoring:

- Every company employee at all levels comply strictly with the policies, standards, procedures and relevant instructions issued and always perform their duties within the framework of the management system with special attention to the maintenance of safe and healthy conditions onboard and with the utmost concern for protecting the environment;
- Reviews of Risk Assessments and their application across the fleet are performed periodically by the shore office and the results are communicated as required;
- Regular on-board inspections to ensure that Company standards are properly maintained at all times within the fleet are carried out and recommendations to top management based on the findings of those inspections are made;
- Environmental and OHSAS objectives are established and are available to the public and the company's customers, vendors, suppliers and other interested external parties at request.
- Proactive initiatives on health, safety & environmental protection matters are established and pursued.

Shipboard monitoring

- Occupational health, safety and environmental hazards are systematically identified, and risk assessments performed for routine and non-routine tasks.
- Training in the use of hazard exposure identification techniques and risk assessment tools, appropriate to each rank, is provided;
- A robust Work Permit System is maintained all times;
- Drills & exercises programs are established and followed;
- Focused HSE and welfare/living conditions Inspections are carried out at scheduled intervals by shore staff and ship's officers;
- Any deficiencies and defects affecting occupational health, safety and environmental aspects that cannot be rectified by ship's staff are immediately reported to shore-based management for further action
- Compliance with occupational health, safety & environmental protection procedures & Instructions is periodically verified at meetings, inspections and observation of practices
- Formal (minuted) meetings are held at specified intervals to promote awareness on occupational health, safety and environmental protection issues, review accidents, incidents and near misses and verify compliance and effectiveness with key occupational health, safety and environmental protection procedures

- Informal safety meetings (toolbox talks) are held before the commencement of daily tasks to review the hazards of the job, verify the controls, assess the risks and communicate effectively the work plan, mitigation and contingency planning to all involved personnel.

4.15. Quality Policy

The company should establish within its Safety Management System the procedures necessary to ensure that its activities and operations consistently and continuously meet or exceed the requirements of its customers. These procedures aim at the continuous improvement of our operations and performance through a closely and systematically monitored measuring & analyzing system.

The company should be certified to the ISO 9001:2015 standard and considers this as a key tool in achieving its quality management objectives and targets.

Main Objective: Top management shall ensure that customers' requirements (e.g. TMSA, Vetting criteria and requirements) are determined, closely monitored and met with the aim of enhancing customer satisfaction. The Company's management is therefore committed to providing the resources needed to enhance customer satisfaction by meeting, if not exceeding, customer requirements. This is the cornerstone of the company's business strategy.

Additionally, the Company monitors and invites feedback relating to the Customers' perception of the company's performance in order to facilitate further improvements. Customer complaints, whenever and however expressed will be dealt with the utmost urgency and priority and every effort will be made to investigate and rectify any identified problems.

Implementation: The Company's Management has established a shore organization that facilitates continuous follow up of the company's quality objectives and targets and personnel have received formal training in quality management systems.

The company's long and successful history of providing high quality transportation services to major charterers worldwide and its constant monitoring of developments in its areas of operations coupled to the management's commitment to ceaseless training of its staff both on board and ashore ensure that a wealth of experience along with the most modern management tools are combined to ensure the provision of ship management services of the highest quality.

The Company's Management is committed to ensuring that the Quality policy.
- is appropriate to the purpose of the organization as a provider of shipping services,
- complies with identified customer or industry requirements to the greatest possible degree,

- continually improves the effectiveness of the Quality Management System,
- provides a framework for establishing and reviewing Quality objectives,
- is communicated and understood within the organization,
- is reviewed for continuing suitability.

The Company has set the following objectives regarding quality management planning:

- All Company Departments will develop their Quality Targets and Objectives as appropriate to their functions and activities. Guiding principle for the departments and top management should be the concept of "we cannot manage what we do not measure".
- All company Departments shall create a system through which the relevant data and information will be obtained enabling the tracking of key performance indicators so as their activities and performance are monitored.
- All company's Departments shall maintain all data and any other records for the measured indexes.
- The Company's organizational goals and expectations shall be monitored, measured and analyzed every three (3) months to ensure that progress against the identified targets and objectives is reviewed and managers take appropriate action when necessary to ensure the company remains in pursuit of its targets and objectives. It is a company policy for these Key Performance Indicators to reflect our customer's requirements and the industry's best practices as expressed in such guidelines as the OCIMF TMSA and other similar ones.
- Where possible, the company will actively benchmark its performance and practices to those of the industry or other companies as an additional means of driving continual improvement.

4.16. Social Responsibility Policy

The Company should operate in a socially responsible manner, ensuring the safety of people and the environment, through transparent and ethical behavior, respecting the following principles:

- Accountability for the organization's impacts on society and the environment;
- Transparency in the organization's decisions and activities that have impact on society and the environment;
- Ethical behavior at all times;
- Respect, consider and respond to the interests of the Company's stakeholders and employees;
- Accept that respect for the rule of law is mandatory;
- Respect international norms of behavior, while adhering to the principle of respect for the rule of law; and
- Respect human rights and recognize both their importance and their universality.

- The Company addresses the following core subjects in order to identify the issues and priorities that are relevant for the organization: Organizational governance; Human rights; Labor practices; Environment.

4.17. Whistleblower policy

A whistleblower as defined by this policy is an employee of the Company/Organization) who reports an activity that he/she considers to be illegal or dishonest to one or more of the parties specified in this Policy. The whistleblower is not responsible for investigating the activity or for determining fault or corrective measures; appropriate management officials are charged with these responsibilities. Examples of illegal or dishonest activities are violations of federal, state or local laws; billing for services not performed or for goods not delivered; and other fraudulent financial reporting.

If an employee has knowledge of or a concern of illegal or dishonest fraudulent activity, the employee is to contact his/her immediate supervisor or the Human Resources Director. The employee must exercise sound judgment to avoid baseless allegations. An employee who intentionally files a false report of wrongdoing will be subject to discipline up to and including termination.

Whistleblower protections are provided in two important areas -- confidentiality and against retaliation. Insofar as possible, the confidentiality of the whistleblower will be maintained. However, identity may have to be disclosed to conduct a thorough investigation, to comply with the law and to provide accused individuals their legal rights of defense. The Company will not retaliate against a whistleblower. This includes, but is not limited to, protection from retaliation in the form of an adverse employment action such as termination, compensation decreases, or poor work assignments and threats of physical harm. Any whistleblower who believes he/she is being retaliated against must contact the Human Resources Director immediately. The right of a whistleblower for protection against retaliation does not include immunity for any personal wrongdoing that is alleged and investigated.

Defend Trade Secrets Act (DTSA) Compliance: "Immunity from Liability for Confidential Disclosure of a Trade Secret to the Government or in a Court Filing:

(1) Immunity—An individual shall not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that—(A) is made—(i) in confidence to a federal, state or local government official, either directly or indirectly, or to an attorney; and (ii) solely for the purpose of reporting or investigating a suspected violation of law; or (B) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal. (2) Use of Trade Secret Information in Anti-Retaliation Lawsuit—An individual who files a lawsuit for retaliation by an employer for reporting a suspected violation of law may disclose the trade secret to the attorney of the individual and use the trade secret

information in the court proceeding, if the individual—(A) files any document containing the trade secret under seal; and (B) does not disclose the trade secret, except pursuant to court order."

All reports of illegal and dishonest activities will be promptly submitted to the Vice President of Human Resources who is responsible for investigating and coordinating corrective action. Employees with any questions regarding this policy should contact the Director of Human Resources.

4.18. Energy Efficiency policy

The Company & Ship Energy Efficiency Management Plan (CEEMP & SEEMP) together with the SEEMPs have been developed with the aim to establish a mechanism for the Companies to improve the energy efficiency of ships' operation. In this respect, they have been prepared as management guidance with the aim to implement CO_2 and other emissions reducing practices and technologies, as part of a culture of fostering continuous improvement. However, for their implementation, roles and responsibilities need to be defined and targets need to be set. This Manual seeks to improve a ship's energy efficiency through four steps:

- Planning;
- Implementation;
- Monitoring and measure; and
- Self-evaluation and improvement.

These components play a critical role in the continuous cycle to improve ships' energy management. Furthermore, this Manual provides standard procedures and practices on best energy management under the various operational modes of the ship, as well as for raising awareness on energy efficiency/conservation. This SEEMP is reviewed by the Company's Top Management on an annual basis.

Energy efficiency is controlled primarily through careful ship operation and management and needs the personal commitment of everyone involved in these tasks. To be successful, energy efficiency and conservation must become a way of life than just a mere compliance with rules and regulations.

Planning; Ship-specific measures: Recognizing that there are a variety of options to improve efficiency – e.g. speed optimization, weather routing, hull maintenance, etc. – and that the best package of measures for the ship to improve efficiency differs to a great extent depending upon ship type, cargoes, routes and other factors, the specific measures for the ship to improve energy efficiency are identified in the first place. This Manual identifies energy-saving measures which have been undertaken and provides tools to determine their effectiveness.
Planning; Company-specific measures: The improvement of energy efficiency of ship operation does not necessarily depend on the Company only. Rather, it may depend on many

stakeholders including ship repair yards, charterers, cargo owners, ports and traffic management services. For example, "Virtual arrival" requires good early communication among the Company, charterers, ports and traffic management services. The better coordination among such stakeholders is, the more improvement can be expected. In this sense, the Company has established this energy management plan to manage its fleet and try to make necessary coordination among stakeholders.

Planning: Human resource development: For effective and steady implementation of the adopted measures, raising awareness of and providing necessary training and communication for personnel both ashore and onboard are an important element. Such human resource development is embraced and is considered as an important component of planning as well as a critical element of implementation.

Planning: Target setting: The last part of planning is target setting. It should be emphasized that target setting is voluntary, nevertheless we have decided to adopt some targets as to create a good incentive for proper implementation, and to increase our commitment to the improvement of energy efficiency, and timely identify deteriorating trends as well as corrective actions to be taken. The targets selected depict the quantifiable energy performance standards required by our company. If we wish we may announce our targets and/ or the results of our program to the public.

Implementation; Establishment of implementation system: After identifying the measures to be implemented, we established a system for their implementation by developing relevant procedures for energy management, by defining tasks and by assigning them to qualified personnel. Thus, the CEEMP and SEEMPs describe how each measure shall be implemented as well as the responsible person(s).

Implementation; Implementation and record-keeping: Record-keeping for the implementation of each measure is beneficial for self-evaluation at a later stage. If any identified measure cannot be implemented for any reason(s), the reason(s) should be recorded for internal use.

Monitoring: Continuous and consistent data collection is the foundation of monitoring. The energy efficiency of the ship is being monitored quantitatively. A monitoring system, including the procedures for collecting data, the assignment of responsible personnel, and Environmental Performance Indicators (EnPIs) appropriate for monitoring and measuring our ships' energy performance has been developed.

Self-Evaluation and Improvement: Self-evaluation and improvement is the final phase of the management cycle. This phase produces meaningful feedback for the coming first stage, i.e. planning stage of the next improvement cycle. The purpose of self-evaluation is to evaluate the effectiveness of the planned measures and of their implementation, to deepen the understanding on the overall characteristics of the ship's operation such as what types of

measures can/cannot function effectively, and how and/or why, to comprehend the trend of the efficiency improvement of that ship and to develop improved CEEMP and SEEMPs for the next cycle.

In this respect, internal auditing procedures for self-evaluation of the ship energy management are implemented annually. Self-evaluation shall be implemented quarterly through management reviews, by using data collected through monitoring, and shall include the identification and implementation of appropriate improvement measures where required and identify the causes of any problems identified during this process.

The company will aim at the continual improvement of its CEEMP/SEEMP through the annual review of the plans using the operational experience and any further industry or regulatory developments in the area of energy efficiency.

4.19. Harassment and Bullying Policy

The Company should ensure that every employee has the right to work in a harassment-free environment. The Company should strictly prohibit all forms of harassment, including any verbal, physical or written harassment, because of sex, race, color, creed, religion, age, sexual orientation, national origin, disability, marital status, alienage or citizenship status, genetic predisposition or carrier status, disability, veteran status or any other classification protected by law.

All Officers and department heads are held responsible for ensuring that no staff member is subject to conduct which constitutes harassment in any form. This policy extends to conduct that is made a condition of employment, used as a basis for employment decisions and/or has the purpose or effect of creating an intimidating, hostile or offensive work environment. The Company should have a zero-tolerance policy with respect to any form of harassment.

Sexual harassment has been defined as "unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature, when submission to such conduct is made, either explicitly or implicitly, a term or condition of an individual's employment; when submission to or rejection of such conduct is used as the basis for employment decisions affecting such individual; or such conduct has the purpose or effect of unreasonably interfering with the individual's work performance or creating an intimidating, hostile, or offensive work environment."

Examples of Sexual Harassment include the following:
- Unwelcome physical contact
- Requests for sexual favors
- Sexually explicit language, gestures and similar conduct of a verbal or nonverbal nature
- Uninvited, unwanted or unlawful sexual advances

- The presence of sexually explicit photographs or other materials and the telling of sexual stories or jokes in person or through use of voice mail, e-mail, interoffice mail, text messaging, etc.

Harassment on the basis of any other protected characteristic is also strictly prohibited. Under this policy, harassment may be verbal, written or physical conduct that denigrates or shows hostility or aversion toward an individual because of his/her race, color, creed, religion, sex, sexual orientation, national origin, age, disability, marital status, alienage or citizenship status, genetic predisposition or carrier status, veteran status or any other characteristic protected by law, or that of his/her relatives, friends or associates, and that: (i) has the purpose or effect of creating an intimidating, hostile, or offensive work environment; (ii) has the purpose or effect of unreasonably interfering with an individual's work performance; or (iii) otherwise adversely affects an individual's employment.

Examples of Harassment include, but are not limited to, the following:
- Epithets / slurs
- Negative stereotyping
- Threatening, intimidating or hostile acts
- Written or graphic material circulated or placed on walls, bulletin boards, faxes, e-mails, computer software, text messaging, etc.

Responsibility: The Company should not tolerate any form of harassment whether it be by Officers, Managers, Supervisors, or fellow employees. Men as well as women can be victims of harassment, including sexual harassment. Violation will lead to disciplinary action, up to and including dismissal. This policy will also endeavor to protect employees of customers, vendors, and others with whom the Company does business. Employees of the Company are prohibited from treating employees of such businesses in a manner inconsistent with the guidelines established herein.

Disciplinary Actions: Disciplinary actions against personnel for neglect, disobedience, misconduct or violation of any of the Company's Policies is to be decided by the Master at his discretion. Any complains by Crew or Officers must follow the chain of Administration to the Master who, depending on the seriousness of the offence, will decide on sanctions. The sanctions include reprimand or termination of contract. In exercising his privilege, the Master must always consider the person's dignity. Disciplinary termination of contact must be subsequently well documented by the Master and the reasons explained convincingly to the Company. No deviations from above rule will be tolerated. Similarly, the Company will endeavor to protect its employees from harassment by employees of customers, vendors and others with whom the Company does business by reporting such harassment to the offending company and taking appropriate action. Seafarers who believe they are being harassed by employees of such a Company should report it to their head of department, the Master.

Chapter 5: 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.

5.1. 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 twenty 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

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

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

Knowledge: 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

Ability: aptitude, knowledge, experience, skills

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

Experience: proficiency, professionalism, continuous assessment, keeping up with technology, continuous professional development, lifelong learning

Training delivery: 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

Competence: operational level, management level, support level

Skills: awareness, communication, information management, language, leadership, management, proficiency, teamwork

Tools: 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

5.1.2. 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.

5.1.3. 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)

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

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.

5.1.4. 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.

<u>Stage II</u>: 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
- 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

<u>Stage III</u>: 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.

5.2. 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.

5.2.1. 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
Description of the skills included in the OECD's Study on Social and Emotional Skills				

Further to the above, the World Economic Forum argues in its Future of Jobs 2020 report that the development and enhancement of human skills through education, learning and meaningful work will be key drivers of economic success, of individual well-being and societal cohesion in the years to come.

5.2.2. 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 4.1.1. 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.

5.2.3. Suggestions on the inclusion of non-TMSA soft skills to a shipmanagement company's safety and quality protocols.

The impact of the Maritime Labour Convention (MLC) 2006 has brought the subject of seafarer health, safety and wellbeing to the fore, not least because it emphasizes the rights of every seafarer to a safe and secure workplace that complies with safety standards; to fair terms of employment to decent working living conditions on board ship; and to health protection, medical care, welfare measures and other forms of social protection.

Understandably, the seafarer has to be both physically and mentally fit to cope with the demands of working and living at sea. They have to be able to cope with the loneliness and isolation of being at sea, often for lengthy contracts, with irregular contact with family at home; long hours can lead to fatigue and stress; language barriers amongst multi-national crews can lead to breakdowns in communication and homesickness, bullying and gender or racial discrimination can seriously affect self-confidence. These are all stressors, any combination of which can lead to lapses in safety. The health, wellbeing and welfare of the seafarer is crucial to the safety of any ship.

5.2.4. Suggestions on the effective implementation of non-TMSA soft skills to a shipmanagement company's safety and quality protocols.

Often, soft skills can be difficult to assess. Generally speaking, standard achievements or IQ tests cannot capture proficiency in soft skills. Some assessment instruments measure soft skills to a certain extent, using psychometric questioning to do so, though these kinds of instruments tend to focus on self-efficacy, goal-setting, social skills, and past-performance over other soft skills such as communication skills or time management. Some literature suggests, however, that many soft skills can only be effectively evaluated through on-the-job observation.

As discussed throughout this report, the vast majority of incidents occurring at sea are often attributed to human error, a term that disguises a variety of underlying problems. Fatigue, poor mental health, stress and many other issues can all affect seafarers going about their daily work. They can be the difference between safe transit and a major incident, the effects of which lead to crew attrition, risks in safety and efficiency, and costly re-routing of ships.

A rigorous safety and quality management system that incorporates soft skills into its processes needs also to combat the physical and mental health issues by addressing the wellness and wellbeing of seafarers. In that regard, Sailors' Society suggests a holistic concept made up of five specific areas of wellbeing: 1) social, 2) emotional, 3) physical, 4) intellectual and 5) spiritual.

Social wellness:
- Communication
- Interpreting and managing conflict within the workplace
- Diversity
- Relationships with family/friends at home

Emotional wellness:
- Mental health – identification and support

Physical wellness:
- HIV/AIDS
- Malaria
- Ebola
- Healthy food and hygiene
- Fitness on-board
- Dental care

Intellectual wellness:
- Basic Seafarers' Rights
- An Introduction to Welfare Organisations

- Money matters
- Piracy

Spiritual wellness:
- An inclusive approach to spirituality, allowing space to reflect on spiritual beliefs

Problems such as loneliness and separation from friends and family lead to many seafarers abandoning a seagoing career. By identifying these problems early and empowering masters and senior officers to deal with them as they arise, there is much better chance to solving this problem.

Historically, training of seafarers has been focused on occupational skills, while welfare services have mostly been reactive, coming into play once a problem arises. Today, it is argued that to ably steer a ship from point A to point B, seafarers as well as on shore personnel need cultural competence, emotional intelligence, social skills and spiritual wellbeing.

6. Conclusions

This research aimed to assess the importance of the human element in shipping, review and enhance the penetration of behavioural management practices focusing on the adoption of **soft skill-oriented processes** – driven by **TMSA 3** - in the **safety and quality management systems** of **ship management companies**. All above chapters are results of our effort **suggesting paths** towards **regulatory compliance**, and propound the **best practices** described **by international associations**, as a tool of **mapping shipping industry's future**.

The main goal of this paper was to examine the importance of soft skills in Terms of promoting a safer and more productive operation and business environment.

The Need for incorporation of a behavioural approach to management system arises due to the fact that people in organizations are possessing satisfactory level of technical competence but still there is a wide performance gap which come in the way of achieving organizational goals due to quite lower understanding on social (soft) skills in companies. What is more, the global shipping industry can be a dangerous place. Every day, it loses two ships, pays out US$4 million in claims and radically changes the lives of hundreds of people for ever. Human behaviour is the source of virtually all such loss. It is also the reason why the loss is not greater. Aspects of human role and behaviour, which together constitute what the commercial maritime sector calls 'the human element'. It makes clear that the human element is neither peripheral nor optional in the pursuit of a profitable and safe shipping industry. On the contrary, the capabilities and vulnerabilities of human beings are – and always will be – at the centre of the enterprise. In this respect, we highlight the role of the human element in shipping operations, as behavioral competencies are **vital** for **safe** and **efficient** vessel operations. New and different skills and knowledge, especially in relation to information technology, will be required from seafarers in near future, 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. **Soft skills** importance has been discussed thoughly on chapter two. Employer's strong soft skills ensure a productive, collaborative, and healthy work environment, in an increasingly competitive shipping industry. To support shipping competitiveness, it's the **human capital** that needs to be strengthened. On-board operations require a very especial soft skills package due to their multifarious nature. There are **at least 18 soft skills** to be adopted by seafarers and on-shore personell with proficiency level required, to be depended accordingly to their lever of authority and occupation.

To execute their goals, companies should align management system with Behavioural approaches to work. In this regards in chapter three we presented a **Behaviour Measurement and rectification** which assesses Competency domains/ categories of behaviour of the: **Team working, Communication** and **influencing, Situation awareness**, **Decision making**, **Results Focus**, **Leadership and managerial skills.** Those are evaluated based on narrower categories of behaviour that form part of the higher-level domains (Elements). Each element has a non-exhaustive list of behavioural indicators, both positive and negative. By following

this methodology and assessment a path towards to **behavioural Management system** can be developed. Of course, it should be premeditated and well planned before applied. Haphazard change without knowing the depth of existing management system and its root causes can have severe impact on the organizational operation and also undermine strengths of a business entity.

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.

The shipping industry has been characterized as a high-risk business activity and investment due to the amount of investing capital. During this analysis that we have completed, we have observed that a crucial factor is the human element and the human performance. The industry has focused on human factor, their culture, level of education, abilities, training etc.

In this thesis has been analyzed the actions that a shipping management company should establish in its procedures to be in compliance with the TMSA3 best practices and follow industry's continuous change from technical and technological improvements to human behaviour, soft skills and training. Through Measurement and analysis, the company will growth efficiently and effectively meeting the customers' expectations. This can be accomplished through setting targets, estimation of the company's performance, inspections and audits, management reviews, customers' feedback and benchmarking with other identical companies and industry standards.

Moreover, the underlying conditions and hard to use systems that influence human error, actions and decisions can reduce the likelihood of incidents. People in leadership play an important role in this, including ship 's officers, supervisors and terminal management. The Risk assessments are an important part of safe operations and maintenance and must address the possibility that even competent and experienced people make mistakes that could lead to hazards or risk situations and reduce the effectiveness of a control/safeguard relied on by the risk assessment.

The Non-systematic conditions or behavioural negligence impact human reliability, reducing the likelihood that an individual will perform their task as expected. Reliable behavior results in desired performance, while unreliable behavior may result in human error, which can lead to events and near misses. Major target of the shipping management company is to organize an efficient and safe management, where the result of strong commitment to the policy principles and objectives set and thereafter continuously measured, analyzed with the aim of self-regulation and continuous improvement. The Organization should establish and implement appropriate measurement, review and feedback processes to focus on and drive continuous improvement. The management company aims to continually improve itself through the effective application of the Plan-Do-Check-Act cycle. All company procedures and processes are continuously monitored by appropriate responsible persons. Based on this monitoring these persons prepare data, information and feedback that are used as input for formal reviews performed by the management review. The key purpose of the management reviews is to complete and re-initiate the improvement cycle by establishing and implementing appropriate and effective measurement and internal and external feedback processes to focus on and drive continuous improvement through monitoring of the activities of the company and their effectiveness against the regulatory environment and customer expectations, requirements and degree of satisfaction, taking into consideration fleet performance measured

through a number of lagging and leading indicators and identifying areas where improvements are necessary or desirable in order to improve compliance, performance and / or customer satisfaction and implement these improvements effectively.

The shipping management company focuses on observing all of their employees during the recruiting procedures to make sure that the candidates have taken required education and appropriately trained for working both on board and ashore providing extended trainings for the crew on board their ships as well as for their employees in the offices ashore. This way they ensure that their personnel are well educated and sufficiently trained to meet the qualifications required to perform their duties and fulfil allocated responsibilities. The companies should create and provide shore-based seminars for their crew to keep them up to date on the numerous subjects concerning their duties specified of the company's needs. Depending on the latest information available and the developments introduced in the sector, companies produce an agenda for the seminar to cover both officer and rating level employees, an indicative, but not exhaustive list of topics. On board Computer Based Training (CBT) produced by the company by adding a training matrix to cover all rank range of crew members. The matrix will include list of CBTs classified as mandatory and recommended. The Brief/Debrief Meetings are essentials for accomplishing any operation will provide the opportunity to participants for discussing what may go wrong and hence taking precautions beforehand. Likewise, a second meeting after the completion of the operation will enable the participants to discuss what went wrong and what measures could be taken to ensure the next operation to be better; the purpose is to maximize the training result. The Daily Work Planning Meetings and Tool Box Meetings are intended to identify risks, determine the severity and likelihood of any hazard, and to ensure such risks and or hazards are mitigated, to the fullest extent possible, prior to commencing a task.

Additionally, the company has clearly defined the communication lines among crewmembers onboard, between shore-based staff, ship-shore communication links and its customers. To ensure full understanding and sharing of the information required to run the ship efficiently and in accordance to customer requirements without compromising the ship's safety, security and without posing any threat to the environment, the community or customer property.

The Safety of ships, quality of the crew and companies and environmental protection can be sustained only through training. the training activities should be regarded as vitally important for the maritime sector, one way to attain safety is by seafarers who are well aware of the dangers at sea via "targeted" training offerings.

To conclude the shipping management companies have been moved from technology focused industry to Behavioral markers. *Observable, non-technical behaviours that shape performance within a work environment*.

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