SKILLSEA

IMPACT ON OCCUPATIONAL PROFILES

Document D1.2.3

SKILLSEA

This report was developed through EC-funded Erasmus+ SkillSea – Future-proof skills for the maritime transport sector.

Key aims and objectives include:

- Analysing the effect of technological developments on the industry's skills requirements.
- An even better match between the industry's skills needs and the education and training of maritime professionals.
- Overcoming barriers to the mobility of maritime professionals.
- Improving cooperation and synergy between education providers, maritime authorities and the industry.
- Ensuring that Europe retains world-leading access to maritime skills and experience for improved competitiveness.

Document information	
Short description	In this report, we present the impact on occupational profiles.
Work Package	WP 1.
Workflow	Previously, we presented our results from D1.1.2 and D1.1.3, which might impact the occupational profiles. In addition, we conduct document analysis to triangulate our results. Detailed methodological information can be found in D1.1.1 Methodology WP1. Occupational skills profiles methodology → ← Document analysis
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1 EXECUTIVE SUMMARY

In this report, we suggest competence updates to current occupational profiles.

We have aligned the STCW positions and Certificates of Competence with ESCO occupations for the seagoing positions. We find that ESCO is missing some occupations. We also find that none of the positions connected with Competence of Proficiency (CoP) for special ship types or regions, such as the CoP for "Masters, officers and ratings, basic oil and chemical tankers", are not covered in ESCO.

We also find that the various competences listed in the STCW B section are absent from ESCO. This covers well-defined roles in the shipping industry, such as *§ B-V/f Guidance on the training and experience for personnel operating dynamic positioning systems,* leading to the position of Dynamic Positioning Officer (DPO), which is well established worldwide. The training for this position is handled mainly by the Nautical Institute (NI), which acts as a de facto global regulator. It has authorised 86 training centres to conduct and issue DP certification for seafarers to hold the role of DPO.

Seafarers have for decades contributed operational maritime experience and knowledge to companies in the maritime sector. They are crucial for realising much of the maritime industry's innovation potential. Some seafarers must be encouraged to transition to land-based occupations by acquiring transverse skills to make this happen. The European shipping industry directly employed 685,000 people in 2018; 115,000 shore-based and 555,000 at sea[1]. With indirect employment included, it is estimated that the EU shipping industry generates 2 million jobs. Therefore, a possible shortage of maritime professionals may be considered a significant risk for the long-term sustainability and competitiveness of the industry, especially if available human resources needed by the industry fall below a certain level.

A key finding from the expert group in the Future Skills report D1.1.3 is the importance of transversal skills within future maritime competences. These skills are vital to moving from one value chain to another. Lifelong learning programmes are needed to enable seafarers to work across industries and services in the maritime shipping sector. Mobility and the possibility to enter a variety of occupations are also needed to attract talented young people.

The STCW Convention aims to achieve the minimum international level to operate ships safely. Additional skills are needed to achieve a higher standard of skills within digitalisation, green technologies, leadership, and other transversal skills. Actual workload and needed skills greatly depend on the type of vessel, market segment, route and traffic, the technology supporting the crew, etc. Therefore, the shipowner must make recurrent assessments of the vessel's manning. Digital transformation does affect how work tasks can be distributed between the crew and technology, and between the ship and land-based organisation. Increased use of distributed maritime capabilities will challenge crewing and skill needs.

Finally, we have addressed new skills for the sea-based and land-based occupational profiles.

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1   Oxford Economics - The Economic Value of EU Shipping - Update 2020 - Report.pdf

Figures

Tables

SkillSea WP1 reports

Work Package 1 delivers the following reports: (**D** denotes Deliverable)

Number	Name	Content
D 1.1.1	Methodology	Outline of the methodology used in reports

D 1.1.2	Current skills need
	
	Also referenced as:
	
	  - Current needs
	  - Current skills
		Skills needs as found by surveying maritime professionals

D 1.1.3	Future skills and competence need Also referenced as: Future skills Future needs	Skills needs as perceived by industry leaders and visionaries
D 1.2.1	Skills and competence gap, current and future. Also referenced as: - Skills and competence gap	Summary of 1.1.2 and 1.1.3 above
D 1.2.2	Identification of mismatches on a structural basis	Reviewing findings in previous reports and relating them to the structure of obtaining skills in the shipping industry
D 1.2.3	Impact on occupational profiles	How findings in previous reports impact occupational profiles
D 1.3	Recommendations for Education and Training. Short: Recommendations for MET	Summary of findings of previous reports and impact and recommendations for METs

Table 1: Overview of SkillSea WP1 Deliverables

References to reports will be with name and number or name alone or number alone, depending on context.

Glossary

This glossary does not provide official definitions but explanations based on recognised information sources.

Term	Definition
AI	Artificial Intelligence
BIMCO	The Baltic and International Maritime Council
BSc	Bachelor of Science
CBT	Computer-based Training
CoC	Certificate of Competency
CoP	Certificate of Proficiency, maritime competency additional to CoC
CRM	Crew Resource Management
DNV	Det Norske Veritas, The worlds largest classificatioin society
DP	Dynamic Positioning
DP	Dynamic Positioning Operator
ECDIS	Electronic Chart Display and Information System
ECTS	The European Credit Transfer and Accumulation System
EMSA	European Maritime Safety Agency
EQF	European Qualification Framework
ESCO	European Skills, Competences, and Occupations
EU	European Union
GDP	General Data Protection
GMDSS	General Maritime Distress and Emergency Signalling System
HR	Human Recources
HSC	High Speed Craft Code
ICS	International Chamber of Shipping
IFSMA	International Federation of Ship Masters' Associations
IGF	International Code of Safety for Ship Using Gases or Other Low-flashpoint Fuels
IGP&I	International Group of P& I Clubs

Content

2 Introduction

This document draws upon previous documents and investigates possible occupational profiles and updates emerging from the skills gap found in previous reports.

In the application, we stated:

> *Occupational profiles will be suggested based on 1.2.1 and 1.2.2 above and related to the drivers listed in 1.1.3*
>
> *It is expected that these trends and drivers will cause a demand for a number of new competences leading to new occupational profiles.*

The statement above can be interpreted in two ways:

    a.   To suggest competence updates to current occupational profiles and

    b.   To suggest new occupational profiles

In our D1.2.1 report, we arrived at challenges and suggested measures to respond to the findings in our current and future reports D1.1.2 and D1.1.3. We align these with the occupational profiles of IMO STCW outlined in our D1.2.2 report. This report adds ESCO occupational profiles and compares them to the above, highlighting possible missing profiles and possible missing competencies in current occupational profiles.

While developing the survey to map the current and future skills gap (report D1.1.2 and D1.1.3), we established the categories of the shipping industry to be targeted with the questionnaire and mapped relevant company names from partner countries to target. **We use these categories when recommending changes to land-based occupational profiles.**

Seagoing positions are highly regulated through certification as per the STCW. Here we have found in report D1.2.2 that the STCW Convention specifies a Certificate of Competency (CoC) as the starting point and, in addition, a range of competencies for positions onboard as mandatory for certain ship types and regions. In addition, the STCW Code recommends a range of competencies in Part B (connected with ship type, the purpose of the ship and sailing area) that is widely delivered by the shipping industry to its members and, in effect, make up de facto occupational profiles. Also, in D1.2.2, we found that the maritime industry requires many additional competence programmes as part of competence profiles. See report D1.2.2, chapter 2.9 Competence matrix.

We review the measures recommended in previous reports and identify which competencies are applicable for which target groups, arriving at recommendations for occupational profiles.

3 OCCUPATIONAL PROFILES AT SEA

3.1 STCW certification and applicability

The STCW Code lists in sections AI–AVIII the requirements for a Certificate of Competence (CoC) and Certificate of Proficiency (CoP) (see chapters 8.1 & 8.2) for seafarers, as shown below.

These can be considered occupational profiles as they qualify with the minimum mandatory competence for a position on ships. As a rule, CoC is a mandatory minimum, and CoP is optional/additional, required for certain ship types or positions. Marked in blue are the mandatory minimum CoCs and the CoPs that have become part of the mandatory minimum competency requirements (basic GMDSS, medical, lifeboat, and safety training). Those in white are CoPs or others. Note that some CoPs are mandatory minimums for certain ship types, which is not the same as a mandatory minimum.

Although STCW regulates most occupational profiles at sea in the form of CoCs, CoPs and recommendations, alongside the Convention there are several IMO codes of which some are reflected in STCW, and some are not. The IGF and Polar Codes are separate codes covered in STCW. The HSC and IMDG Codes are not covered but still set competence requirements for seafarers.

Section A	Man. min[2]	ESCO	Description
Chapter 1: General Provisions			
STCW I/1:			Definitions and clarifications
STCW I/2:			Certificates and endorsements
STCW I/3:			Principles governing near coastal voyages
STCW I/4:			Control procedures
STCW I/5:			National provisions
STCW I/6:			Training and assessment
STCW I/7:			Communication of information
STCW I/8:			Quality Standards
STCW I/9:			Medical Standards, including Minimum In-service Physical and Eyesight Requirements for Seafarers
STCW I/10-16			Certificates and training
Chapter 2: STCW Code for Standards Regarding the Master and Deck Department (Certification)			
STCW II/1:	CoC	X	Officers in Charge of a Navigational Watch on ships of 500 gross tonnage or more
STCW II/2:	CoC[3]	X	Masters and Chief Mates on ships of 500 gross tonnage or more
STCW II/3:	CoC	X	Officers in Charge of a Navigational Watch and Masters on ships of less than 500 gross tonnage, engaged on near-coastal voyages
STCW II/4:	CoP		Ratings Forming Part of a Navigational Watch
STCW II/5:	CoC	X	Ratings as Able Seafarer Deck

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2   Mandatory minimum requirement for a position

3   II/2 applies to the Management level, II/1 to operational level. Separate requirements for ships over 3,000 GT were added in the 2010 Manila Amendments where it was noted that administrations could add national requirements and minimum sea time as chief mate of 12 months and master of 36 months was added.

Chapter 3: STCW Code for Standards Regarding Engine Department (Certification)			
STCW III/1:	CoC	X	Officers in Charge of an Engineering Watch in a manned engine room or as designated duty engineers in a periodically unmanned engine room
STCW III/2:	CoC		Chief Engineer and Second Engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more.
STCW III/3:	Coc		Chief Engineer officers and Second Engineer officers on ships powered by main propulsion machinery of between 750 kW and 3,000 kW propulsion power
STCW III/4:	CoP		Ratings Forming Part of an Engineering Watch in a manned engine room or designated to perform duties in a periodically unmanned engine room
STCW III/5:	CoP	X	Able Seafarer Engine in a manned engine room or designated to perform duties in a periodically unmanned engine room.
STCW III/6:	CoC		Electrotechnical Officers
STCW III/7:	CoP		Electrotechnical Rating
Chapter 4: STCW Code for Standards Regarding Radio Operators (Certification)			
STCW IV/2:	CoC		Mandatory minimum requirements for certification of GMDSS Radio Operators
Chapter 5*: STCW Code for Standards Regarding Special Training Requirements for Personnel on Certain Types of Ships			
STCW V/1-1-1:			Masters, officers and ratings, basic oil and chemical tankers
STCW V/1-1-2:			Masters, officers and ratings, advanced oil tanker cargo
STCW V/1-1-3:			Masters, officers and ratings, advanced chemical tanker cargo
STCW V/1-2:			Masters, officers and ratings on liquefied gas tankers
STCW V/1-2-1:	CoP		Masters, officers and ratings on basic liquefied gas tankers cargo ops
STCW V/1-2-2:			Masters, officers and ratings on advanced liquefied gas tankers ops.
STCW V/2-1:			Masters, officers, ratings and other personnel on passenger ships, crowd control
STCW V/2-2:			Masters, officers, ratings and other personnel on passenger ships, crisis management
STCW V/3-1:			Masters, Officers and Ratings on ships subject to IGF Code Advanced training
STCW V/3-2:			Masters, Officers on ships subject to IGF Code Advanced training
STCW V/4-1:	CoP		Masters and deck officers on ships operating in polar waters, Basic Training (Polar Code)
STCW V/4-2:			Masters and deck officers on ships operating in polar waters Advanced training (Polar Code)
Chapter 6*: STCW Code for Standards Regarding Emergency, Occupational Safety, Security, Medical Care and Survival Functions			
STCW VI/1:	CoP		Safety familiarisation, basic training, and instruction for all seafarers.
STCW VI/2-1:	CoP		Issue of certificates of proficiency in survival craft, and rescue boats other than fast rescue boats.
STCW VI/2-1:	CoP		Issue of certificates of proficiency in fast rescue boats.
STCW VI/3:	CoP		Training in advanced firefighting.
STCW VI/4:	CoP		Mandatory minimum medical first aid and medical care

STCW VI/5:	CoP		Issue of certificates of proficiency for ship security officers.
STCW VI/6:	CoP		Security-related training and instruction for all seafarers.
STCW Code - Additional Resources under STCW Convention			
SECTION B			Sections B-V/a, B-V/b, B-V/c, B-V/d, B-V/e, B-V/f - additional special training requirements for personnel on certain types of ships
Other IMO codes alongside the STCW (some samples)			
HSC Code	CoP		Proficiency as deck/engine officer on high-speed craft
IMDG Code	CoP		Proficiency in classification, packing, securing, segregation, documentation, marking, labelling, stowage, and risks with dangerous cargo shipment
ISPS Code	CoP		Proficiency as a ship security officer
ISM Code	CoP		Proficiency in security-related equipment (ECDIS type-specific training)

Table 2: STCW codes.

The natural progression is that competency requirements appear due to new operational requirements or new equipment on ships. When this starts getting adopted in numbers it is incorporated in IMO as a convention and code, and may thereafter be incorporated into STCW. This happened to the ISPS Code:

IMO STCW 2010 Regulations - Mandatory Minimum Requirements for the Issue of Certificates of Proficiency for Ship Security Officers.

Chapter VI of the STCW Convention has been amended with a new Regulation VI/5 requiring all persons designated as Ship Security Officer (SSO) to be issued with a certificate of proficiency. Onboard all ships which are required to comply with the provisions of the ISPS Code, a Ship Security Officer (SSO) must be designated. [4]

3.2   The occupation profiles in STCW vs ESCO

For the seagoing positions, we align the ESCO occupations with STCW positions to see if the positions corresponding to the CoC positions are found in ESCO. We find that some key positions are missing from ESCO. We also find that none of the positions connected with CoP for special ship types or regions, such as the CoP for "Masters, officers and ratings, basic oil and chemical tankers", are presently included in ESCO.

We also find that the various competences listed in the STCW B section are absent from ESCO. This covers well-defined roles in the shipping industry, such as *§ B-V/f Guidance on the training and experience for personnel operating dynamic positioning systems,* leading to the position of Dynamic Positioning Officer (DPO), well-established worldwide. The training for this position is handled mainly by the Nautical Institute[5] (NI), which acts as a de facto global regulator. It has authorised 86 training centres to conduct and issue DP certification for seafarers to hold the role of DPO[6].

Another position is *§ B-V/e Guidance regarding training and qualifications of masters and officers in charge of a navigational watch onboard offshore supply vessels*, a market with 5,300 vessels worldwide[7].

The B section of STCW lists guidance on subjects a-f, 6 in all that is not described in the A section. These competencies clearly migrate into the areas where the shipping industry provides the competence either as in-house training or through a professional MET provider. See *D1.2.2 Identification of mismatches on a structural basis. From D1.2.2,* we look at the competencies listed in chapter *2.9 Competence Matrix and* see that the positions marked with o are not listed in ESCO, provided here for reference.

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4 https://www.edumaritime.net/virsec/stcw-ship-security-officer-sso-training-certification

5   https://www.nautinst.org

6   https://www.nialexisplatform.org/media/1493371/accredited-dp-centre-list-november-2019.pdf

7   https://www.clarksons.com/services/broking/offshore-support-vessels/

Example: additional competence for a tanker (beyond STCW)
ECDIS Transas 4000 Maker Specific
Ex and Exi Basic
Ice Navigation Course
Safety Officer Course
Ship's Manoeuvring and Handling
Basic Instrumentation & Process Control (In-H...
Bridge Equipment Familiarization (In-House)
Electrotechnology Course
In-House Anti-Piracy Awareness Training
In-House Bridge Simulator Steering Course
In-House Hydraulics & Pneumatics
In-House Refrigeration
ISM Course
Liquid Cargo (In-House)
Navigation for Deck Officers (In-House)
PEOS and HR
Ship handling (In-House)
Ship's Catering Services - NC2
Ship's Catering Services NC1
Work Attitude and Value Enhancement Seminar

Table 3: Additional competence for a tanker beyond STCW - an example

SEA		
ASSOCIATION	ESCO OCCUPATION	STCW REFERENCE
DECK		
Officers in charge of a navigational watch Chief mate	Deck officer	A-II/1 A-II/2
Master mariner	Ship captain	A-II/2
Officers in charge of a navigational watch	Helmsman	A-II/1
Officer of the watch	Maritime pilot	Master, Chief mate A-II/2
Master mariner	Skipper	Master, A-II/2
ENGINE		
Officers in charge of an engineering watch	Ship duty engineer	A-III/1
Chief engineer officers and second engineer officers	Marine chief engineer	A-III/2
Officers in charge of an engineering watch	Ship assistant engineer	A-III/1
Electrotechnical officers	Not listed	A-III/6

RATING		
Ratings as able seafarer engine	Engine minder	A-III/5
Ratings as able seafarer deck	Matrose	A-II/5
	Ordinary seaman	
	Sailor	
Ratings forming part of a navigational watch	Not listed	A-II/4
Ratings forming part of a watch in a manned engine room	Not listed	A-III/4
Electrotechnical ratings	Not listed	A-III/7
Masters, officers and ratings, basic oil and chemical tankers	Not listed	STCW V/1-1-1:
Masters, officers and ratings, advanced oil tanker cargo	Not listed	STCW V/1-1-2:
Masters, officers and ratings, advanced chemical tanker cargo	Not listed	STCW V/1-1-3:
Masters, officers and ratings on liquefied gas tankers	Not listed	STCW V/1-2:
Masters, officers and ratings on basic liquefied gas tankers cargo ops	Not listed	STCW V/1-2-1:
Masters, officers and ratings on advanced liquefied gas tankers ops.	Not listed	STCW V/1-2-2:
Masters, officers, ratings and other personnel on passenger ships, crowd control	Not listed	STCW V/2-1:
Masters, officers, ratings and other personnel on passenger ships, crisis management	Not listed	STCW V/2-2:
Masters, officers and ratings on ships subject to IGF Code Advanced training	Not listed	STCW V/3-1:
Masters, officers on ships subject to IGF Code Advanced training	Not listed	STCW V/3-2:
Masters and deck officers on ships operating in polar waters, Basic Training (Polar Code)	Not listed	STCW V/4-1:
Masters and deck officers on ships operating in polar waters Advanced training (Polar Code)	Not listed	STCW V/4-2:

Table 4: ESCO vs STCW positions

From STCW, there are a number of further competencies that are not listed in ESCO, such as six CoPs in part B and the High-Speed Craft operational requirements, listed in the separate International Code of Safety for High-Speed Craft, Polar Code, IGF Code, Tanker requirements etc. see table 2 above.

4 LAND-BASED OCCUPATIONAL PROFILES

Seafarers have for decades contributed operational maritime experience and knowledge to companies in the maritime sector. They are crucial for realising much of the maritime industry's innovation potential. To make this happen, some seafarers must be encouraged to make the transition to land-based occupations by acquiring transverse skills. It is estimated that some 70% of shipping-related shore jobs[8] are knowledge-intensive, high-quality jobs. Therefore, a possible shortage of maritime professionals may be considered a significant risk for the long-term sustainability and competitiveness of the industry, especially if available human resources needed by the industry fall below a certain level.
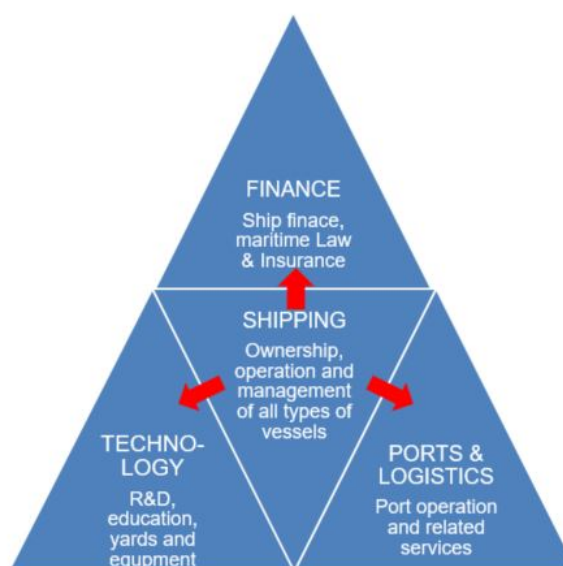
Figure 1: Shipowner/operator and related industries

We look at the occupational profiles listed in the ESCO framework and find that there are 41 profiles listed. By looking at a small sample of shipping industry companies on LinkedIn, we find from 260 job listings of seven companies 237 unique job titles (see Attachments). The most frequent ones are Lead Auditor – Aquaculture (10x DNV), Customer Experience Agent/Manager (7x Maersk), Sales Executive (4x Lloyds Register) and Dynamics 365 CRM Customer Service – Developer (4x Mediterranean Shipping Company). It is immediately apparent that the number of possible occupational profiles in the shipping industry far exceeds the profiles listed in ESCO. It will most likely not be helpful to list them all as they appear very company-specific.

The roles listed in ESCO and the roles found on LinkedIn do not align very well. Surveyor appears five times in the LinkedIn sample, and engineer appears 14 times as part of a position but not as in ESCO where **Marine Engineer** is listed. Similarly, in LinkedIn engineer appears in various other contexts such as **Approval Engineer, Hydraulics Engineer, Structural Engineer, and Hull Approval Engineer** and it is clear that these positions are very different from Marine Engineer and do not match very well.

It should be noted that shore-based shipping industries, such as ship construction and ship operation, are extensively regulated by other IMO codes, including MARPOL, SOLAS and others. Some set standards ashore, such as the IMDG Code made mandatory in 2020, where chapter 3.1 specifies training for shore-based personnel. [9] This does not constitute an occupational profile but absolutely states that some shoreside positions must have this competence.

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8 Data on shipping-related jobs and relevant economic values can be found in Oxford Economics' THE ECONOMIC VALUE OF THE EU SHIPPING INDUSTRY - 2017 update. A report for the European Community Shipowners Associations (ECSA).

9 IMO IMDG Code: Ch. 1.3: Shore-based personnel* engaged in the transport of dangerous goods intended to be transported by sea shall be trained in the contents of dangerous goods provisions commensurate with their responsibilities.

LAND	
ASSOCIATION	ESCO OCCUPATION
SHIP OWNER/ -OPERATOR	Forwarding manager
	Freight inspector
	Maritime water transport general manager
	Ship planner
	Inland water transport general manager
	Vessel operations coordinator
	Water traffic coordinator
LOGISTICS	Freight transport dispatcher
	Intermodal logistics manager
	Marine cargo inspector
	Dangerous goods safety adviser
	Non-vessel operating common carrier
MARITIME INDUSTRY	Marine engineering drafter
	Marine engineering technician
	Marine mechanic
	Vessel engine assembler
	Vessel engine inspector
	Vessel engine tester
CLASS SOCIETY	Marine surveyor
SHIPPING CONSULTANTS	Naval architect
	Shipbroker
PORT OPERATIONS	Port coordinator
	Stevedore
	Stevedore superintendent
	Ship pilot dispatcher
NON-CERTIFIED CREW	Ship steward/ship stewardess
	Decksman
SHIPS AGENTS	Shipping agent
SHIPYARDS	Vessel assembly inspector
	Vessel assembly supervisor
	Wood caulker
	Marine electronics technician
	Non-destructive testing specialist

	Marine electrician	
	Marine engineer	
	Shipwright	
	Marine upholsterer	
	Material stress analyst	
GOVERNMENT	Transport health and safety inspector	

Table 5: ESCO land-based occupational profiles

5 CONNECTING NEW SKILLS TO OCCUPATIONAL PROFILES

5.1 Challenges identified

The challenges below have arisen from the drivers identified in the D1.1.2 Current Skills and D 1.1.3 Future Skill document (New technologies, globalisation, maritime labour market, social transformations).

From the 1.2.1 report, we have consolidated our findings into eight challenges with characteristics. We now connect these with occupational profiles on sea and land.

1. Shortage of maritime professionals (developing career paths)

   In the Current Skills analysis, seafarers' education, although complying with STCW, does not consider a variety of needs in the shipping industry that can be fulfilled through higher education, such as BSc & MSc programmes. Future analysis confirms there will be a strong need, at sea or in corresponding roles to seagoing, for seafarers educated beyond STCW in leadership, communications, culture and diverse technologies, including green, sustainable, and digital.

2. Mobility issues and talent attractiveness

   In the Current Skills analysis, the desire for mobility emerges from the seafarer standpoint, but recognition of maritime qualifications and career paths are not accessible. Future analyses confirm a matching need on the shoreside for the seagoing experience of seafarers transitioning through higher education to fill landside roles in the shipping industry.

3. Communication, culture, and language issues

   The Current Skills report reveals seafarers experiencing inadequate capabilities in human factor areas such as: D1.1.2 conclusions 27: teamwork, personal communications and problem-solving & 28: maritime economy and business, safety and risk management, ship operations and crew management, and marine operation and maintenance management, while future investigation confirms the shipping industry will need people with seagoing experience that have these skills.

4. Core shipping management skills, including leadership

   These skills are identified as missing by seafarers, and notably concerning maritime economy, business, law and ship technology, mainly because there is no such requirement in the STCW. The shipping industry confirms the need in the future analysis, e.g. chapter 7.4.4 of D 1.1.3 Key findings from focus groups, highlighting the need for *leadership, language skills and communication skills.*

5. Digital skills

   Both reports point to digital skills being in great demand. Current skills point mainly to maritime professionals' ability to interact with computer programs, focusing on data analysis, computing skills, and data representation. Future skills point more to the understanding and competence of handling integrated computer systems, such as control centres, as well as integrated process control, such as power management systems and fuel optimisation systems. Cyber security is added as a future requirement from the Future Skills study.

6. Operation in highly digital and automated environments

   The current skills survey does not identify this but it emerges from the future skills report. Seafarers are becoming system managers. In-depth skills to understand complex systems, onboard and onshore, are needed to serve all systems' redundancy requirements.

7. Transversal skills

Transversal skills have different definitions in the STCW Convention and the EU[10] (see pages 77 & 78 of the Current Skills report). The Current Skills survey shows that almost all transversal skills defined by the EU are missing, and the current level is below industry requirements. This is confirmed through the Future Skills study, which especially points to the need for future maritime professionals to have the skills to move from one value chain to another.

8. Green skills

In the Current Skills survey, seafarers are unaware of the need for green skills. This is much more apparent in the Future Skills study. Here it is emphasised that knowledge concerning zero-emission and green technologies, such as new fuels, as well as new operational modes, such as autonomous operation and its various degrees of autonomy, will be in great demand in the future.

The skills derived from our previous reports outlined above are clearly going to be key requirements in future new and updated occupational profiles. However, it is clear that for seagoing and shoreside professionals the STCW certification requirements will continue to govern the content of occupational profiles. In practical terms, this means that the mandatory STCW certification requirements dictate the occupational profiles for all positions at sea. For shoreside positions, there is more room for additional competence to provide an advantage for the professional, but we see little concrete in specific occupational profiles.

5.2   A note on talent attractiveness

Talented and skilled individuals have a key role to play in countries' future prosperity. They hold jobs that are key to innovation and technological progress and ultimately contribute to more robust economic growth with other employment opportunities and better living conditions. Organisation for Economic Cooperation and Development (OECD) countries increasingly compete to attract and retain talented workers, notably by adopting more favourable migration policies for the best and the brightest. This should be mitigated by ensuring enough competent and attractive talent enters education and becomes available to the shipping industry. For some groups of prospective students, integrated employment programmes in which a career moves from sea to land would be attractive.

Globalisation has impacted people and communities worldwide and is a major driving force of societal change. Energised by changes in technology and mobility, globalisation has dramatically changed economies and has made our world more interconnected.

Cities already generate 80% of global GDP, and the importance of cities and surrounding regions will grow. Cities provide efficiency benefits, which result in gains in productivity and competitiveness. Cities are the centres of knowledge, innovation and specialisation of production and services. In today's world, cities are increasingly competing to attract the best companies and most talented people.

How can landside and seagoing maritime professions attract the best talent?

- Core maritime capitals are expected to grow as a part of globalisation. Cities with good maritime education combined with surrounding industrial clusters of advanced companies

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10   There are numerous categorisations of the transversal skill.

According to UNESO "'transversal competencies' has six domains: 1) critical and innovative thinking, 2) interpersonal skills, 3) intrapersonal skills, 4) global citizenship, 5) media and Information literacy, and 6) others. The domain 'others' was created as a way for researchers to include competencies, such as physical health or religious values that may not fall into one of the other. Source: UNESCO Bangkok 2016, Asia-pacific, https://unesdoc.unesco.org/ark:/48223/pf0000244022.

European Parliament and Council set out a recommendation on the key competences for lifelong learning. In the recommendation, they defined eight key competences that are considered important for every European to develop and update throughout their lives to be able to adapt to change. They are based on the need for personal fulfilment and development, active citizenship, social inclusion and employment: 1) Communication in mother tongue, 2) Communication in foreign languages, 3) Mathematical competence and basic competences in science and technology, 4) Digital competence, 5) Learning to learn, 6) Social and civic competences, 7) Sense of initiative and entrepreneurship, and 8) Cultural awareness and expression

The Convention lists the following transversal skills: 1) Ability to apply task and workload management, including planning and co-ordination, personnel assignment, time and resource constraints and prioritisation. 2) Knowledge and ability to apply effective resource management: allocation, assignment, and prioritisation of resources; effective communication onboard and ashore; decisions reflect consideration of team experiences; assertiveness and leadership, including motivation; obtaining and maintaining situational awareness. 3) Knowledge and ability to apply decision-making techniques: situation and risk assessment; identify and consider generated options; selecting course of action; evaluation of outcome effectiveness.

will have a precondition to developing new competencies for the maritime industry's future workforce. New competence programmes in step with industry needs will be attractive as they will ensure employment at the end of the educational programme and are likely to be highly valued. There are also indications that jobs that impact the world are becoming attractive. [11]

- The quality and variety of maritime education institutions and industrial clusters with the necessary density of companies are key to attractiveness. Clusters of companies competing and cooperating support innovation and attract talent.

- Close links between educational centres, shipowners and manufacturers are critical for strengthening R&D development and a competitive strategy (D1.1.3).

- Clear and visible career paths from seagoing occupations to land-based occupations will be of particular importance to talented young people who consider the seagoing career a step in a continuously changing career.

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[11]   Danish study on young people wanting to impact the world

6 SKILLS UPDATE

6.1 Seagoing occupations impact

From D1.2.1, we have listed challenges and possible measures. We analyse the measures and identify the affected positions and what kind of competences are involved, first for seagoing positions and next for the landside.

Challenges	Possible measures (Abbreviated from D 1.2.1)	Skills update	Target group
Shortage of maritime professionals	The study programme offered by MET institutions should include topics/courses covering subjects beyond and above STCW **minimum** requirements.	- Mobility - Transversal - Leadership, culture & communications - Green skills - Operations in a digital world - Digital	Seafarers
	Maritime professionals should have easy access to lifelong learning programmes that enable them to move between value chains and work across industries and services in the maritime shipping industry	Lifelong learning	Seafarers
Communication, culture and language issues	EU-wide, regional or national programmes of measures aiming to increase cultural awareness should be considered	Cultural skill with an assessment as part of the seafarer certificate or diploma	Seafarer certificate or diploma
	Courses aiming to upgrade leadership skills	Leadership skill with an assessment as part of the seafarer certificate or diploma	Seagoing officers
Core shipping management skills, including leadership	Courses aiming to upgrade the knowledge and skills of seafarers. Courses should be modular and flexible regarding duration, scope, and delivery. Degrees awarded should be comparable and based on the ECTS system	- BSc in Shipping Management, with work-based learning and additional LLL courses conducted as distance learning - Mobility - Transversal - Leadership - Culture & comms. - Green - Operations in a digital world - Digital	Seafarers
Core shipping management	Courses aiming to upskill seafarers in the use of integrated and complex systems	Qualifications in integrated and complex systems	Seagoing officers

skills, including leadership	Courses aiming to upskill seafarers' analytical skills	Analysis, critical thinking, systems engineering (transversal skills)	Seagoing officers
Digital Skills	Courses aiming to upskill seafarers in the use of standard software tools in accordance with the standard EU set of skills	Skills using standard software tools	Seagoing officers
	Courses aiming to upskill seafarers in remote monitoring, surveillance and control technologies should be developed and promoted in WP2	Remote monitoring, surveillance and control technologies	Seafarers
	Courses aiming to upskill seafarers in using new technologies/methods, i.e., VR, simulators and so on	New technologies/methods, i.e., VR, simulators, etc	Seafarers
	Courses aiming to upskill seafarers in data analysis, computing skills, and data representations	Data analysis, computing skills, and data representations	Seafarers
	Courses in cyber security for seafarers and shore-based employees	Cyber security skills	Seafarers
Operation in highly digital environments	Curses aiming to upgrade or re-skill workers associated with complex systems, for example, automation systems and autonomy	Complex systems, for example, automation systems and autonomy	Seafarers
	Courses aiming to upskill seafarers in interaction with advanced socio-technical systems to respond to challenges in the operations of autonomous ships	Advanced socio-technical systems to respond to challenges in the operations of autonomous ships	Seafarers
	Courses supporting distributed maritime capabilities where knowledge and competence are distributed to technology, procedures, and regulations as well as shared between the seafarers and land-based organisation	Supporting distributed maritime capabilities	Seafarers
	Courses aiming to upgrade service and repair (equipment) in cooperation with real-time	Upgrade service and repair (equipment)	Seafarers

	cooperation with land-based suppliers		
Transversal skill[12]	Courses aiming to upskill seafarers in the human element and leadership skills beyond those already outlined in the STCW Convention	The human element, leadership	Seafarers
	EU-wide programmes of measures aiming to promote "learning to learn" attitudes	"Learning to learn."	Seafarers
	Courses aiming to widen seafarers' skills in collaboration with land-based personnel	Workload management, communication, decision making	Seafarers
Green skills	EU-wide programmes of measures aiming to increase environmental awareness	Environmental awareness	Seafarers
	Courses aiming to upskill seafarers in procedures and operations of complex hybrid types of machinery	Complex hybrid types of machinery	Seafarers
	Courses aiming to upskill seafarers in how to handle a variety of fuels (for example, hydrogen and ammonia) and battery-related risks	How to handle a variety of new and zero-emission fuels	Seafarers

Table 6: Skills update for seagoing occupations

These strategic deliveries are passed on to later WPs, especially WP2 and WP3, for implementation.

6.2 Skills update that impacts landside occupations

Challenges	Possible measures (Abbreviated from D 1.2.1)	Skills update	Target group
Shortage of maritime professionals	The study programme offered by MET institutions should include topics/courses covering subjects beyond and above STCW minimum requirements	- Mobility - Transversal - Leadership, culture & comms. - Green skills - Operations in a digital world - Digital	MET academics

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12 The STCW Convention lists the following transversal skills: 1) Ability to apply task and workload management, including planning and co-ordination, personnel assignment, time and resource constraints and prioritisation. 2) Knowledge and ability to apply effective resource management: allocation, assignment, and prioritisation of resources; effective communication onboard and ashore; decisions reflect consideration of team experiences; assertiveness and leadership, including motivation; obtaining and maintaining situational awareness. 3) Knowledge and ability to apply decision-making techniques: situation and risk assessment; identify and consider generated options; selecting course of action; evaluation of outcome effectiveness.

	Maritime professionals should have easy access to lifelong learning programmes that enable them to move between value chains and work across industries and services in the maritime shipping industry	Lifelong learning	MET teachers Shipping industry HR employees
Mobility issues	Courses aiming to upgrade or re-skill shore workers associated with the maritime industry	- Mobility - Transversal - Leadership, culture & comms. - Green - Operations in a digital world - Digital	MET teachers Shipping industry employees
	Student exchange between MET institutions across the EU to facilitate an appropriate understanding of different cultures		MET teachers and educational authorities need competence in mobility
	Academic staff exchange should be further promoted to accelerate the update of study programmes. They should be encouraged to gain the ability to use new teaching methods to upskill the workforce, i.e., an e-learning platform		MET teachers need competence in new teaching methods (suitable to reach seafarers/seafarers' needs)
	EU-wide standards of proficiency in language skills available for people working in the maritime industry should be considered	Language skills with assessment as part of the seafarer certificate or diploma.	Language skills with assessment required for land-based positions
Core shipping management skills, including leadership	Courses aiming to upgrade the knowledge and skills of the maritime industry workforce should focus on linking up the interactions between seagoing positions and land-based occupations. Courses should be modular and flexible regarding duration, scope and delivery	For example, BSc in Shipping Management, with work-based learning and additional LLL courses conducted as distance learning. - Mobility - Transversal - Leadership, culture & comms. - Green - Operations in a digital world - Digital	Maritime industry workforce
	Courses aiming to upgrade business management, economics and law	- Transversal - Leadership, culture & comms. - Green	Legal Finance
Digital Skills	Courses aiming to upgrade shore-based employees' skills in	Maritime information and control systems	Shore-based employees

	maritime information and control systems		
	Courses in cyber security for seafarers and shore-based employees	Cyber security skills	Shoreside employees
Operation in highly digital environments	Curses aiming to upgrade or re-skill workers associated with complex systems, for example, automation systems and autonomy	Complex systems, for example, automation systems and autonomy	Shoreside employees
	Courses supporting distributed maritime capabilities where knowledge and competence are distributed to technology, procedures, and regulations as well as shared between the seafarers and land-based organisation	Distributed maritime capabilities	Shoreside employees
	Courses aiming to upgrade service and repair (equipment) in cooperation with real-time cooperation with land-based suppliers	Digital: - Augmented reality - Virtual reality - Digital twins - To upgrade service and repair equipment	Shoreside employees
Green skills	EU-wide programmes of measures aiming to increase environmental awareness	Environmental awareness	Shoreside employees
	The courses aim to upgrade or re-skill in sustainable and green skills shoreside workers associated with the maritime industry		Shoreside workers

Table 7: Skills update for land-based occupations

6.3 Impact of main trends on Occupational Profiles (OPs)

In a survey targeting European and international maritime business employees, we have examined the need for new and updated occupational profiles. A total of 323 European and 672 international employees in the shipping industry participated.

6.3.1 European respondents

The results from European respondents strongly indicate a need for a professional with an expressed role as ship security officer onboard ships, with 60% of respondents attesting to this as a new role and 55% as an update to existing occupations. The fact that any SOLAS ship must have a ship security officer onboard does not change this. It is usually one of the deck officers. Each company must appoint one person as a company security officer. When, as stated above, 60% and 55% ask for a role that, in most cases, is already there suggests that the role in its present form is not known to fellow seafarers or is not visible.

The role of environmental officer ashore is indicated as a new occupational profile by more than 50% of respondents, while the same role at sea is stated by 20% of respondents.

Also, close to 40% say onboard positions must be updated to environmental officers, while 35.6% say new OPs are called for.

The digital/cyber security officer similarly is pointed at as a new role ashore by 51.4 % and an updated role ashore by 40%. Ony 21% and 25% of respondents consider it to be an onboard role.

A compliance officer is a role that could be emerging more clearly since the the pandemic and is confirmed as a new shoreside OP by 42.8% of respondents and as an updated profile by 32%. The seagoing profile is not so clear, with 24% stating new, and 28% stating the need for updated OP.
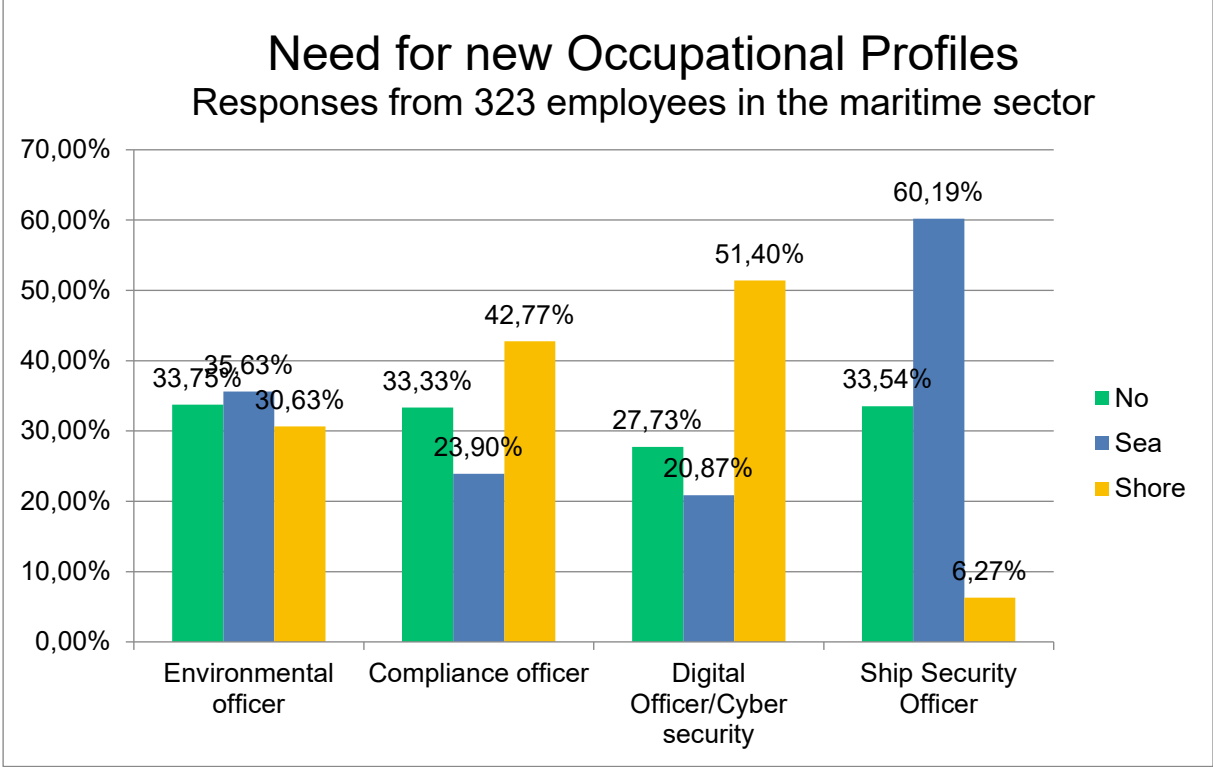
Figure 2a: Responses from European employees on possible new occupational profiles

Need for updated Occupational Profiles
Responses from 323 employees in the maritime sector
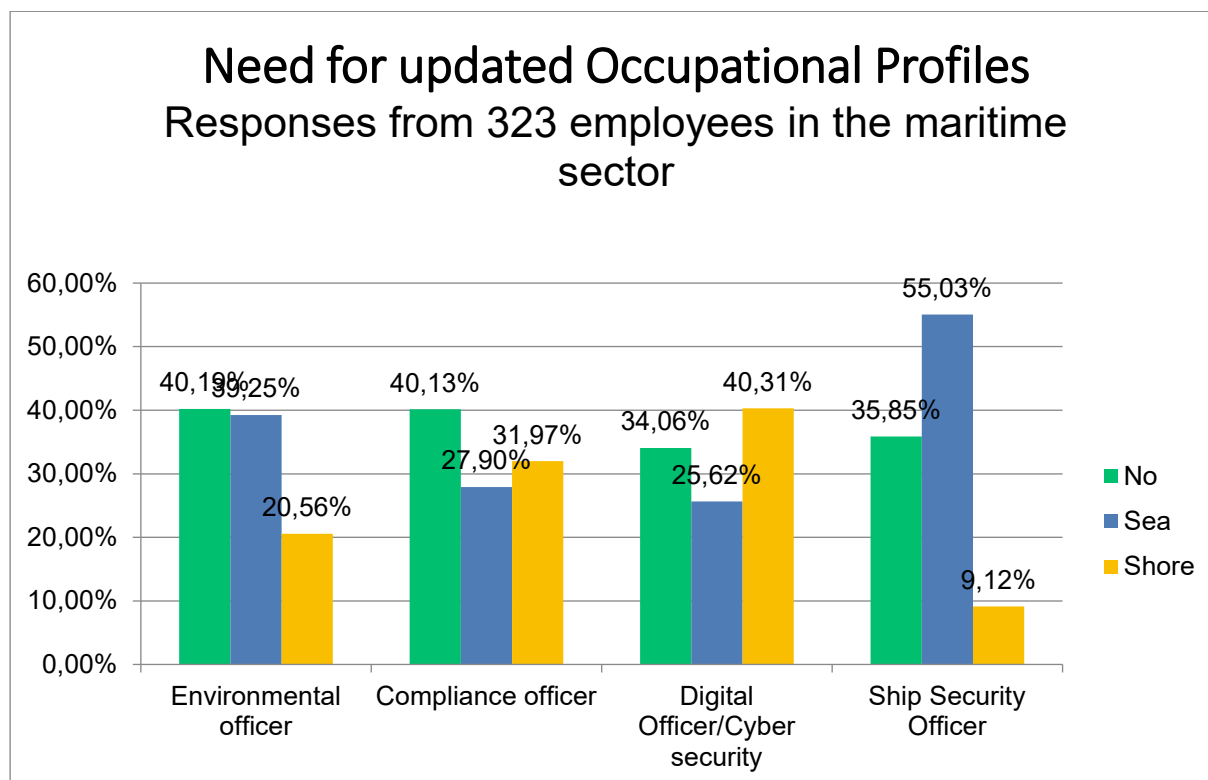
Figure 2b: Responses from European employees on possible updated occupational profiles

6.3.2   International respondents

From the 672 international respondents, we have similar results. However, the feedback is even more conclusive that all the suggested occupational profiles are needed at sea, either as new or updated. The ship security officer achieved the highest scores of 69.2% and 66.6%, respectively, for new and updated. Also, the ship security officer is not considered a shoreside profile, with low scores of 8% and 7.4%.

New Profile	No	Sea	Shore
Environmental officer	26.95 %	51.65 %	21.41 %
Compliance officer	28.72 %	44.36 %	26.92 %
Digital officer/cyber security	26.47 %	37.14 %	36.39 %
Ship security officer	23.46 %	69.17 %	7.37 %

Table 8a: Non-European respondents on new occupational profiles

Updated position	No	Sea	Shore
Environmental officer	30.28 %	56.82 %	12.89 %
Compliance officer	30.63 %	45.20 %	24.17 %
Digital officer/cyber security	26.96 %	43.22 %	29.82 %
Ship security officer	25.45 %	66.57 %	7.98 %

Table 8b: Non-European respondents on updated occupational profiles

7 HIGHER-LEVEL SKILL STANDARD

7.1 STCW minimum vs higher standard

Maritime education conforming to the STCW Convention is designed to achieve the minimum international level to operate ships safely. Basic maritime training must reflect this to achieve a higher standard of skills within digitalisation, green technologies, leadership, and other transversal skills.

Currently, in some countries, the STCW requirement to become a navigator or engineer at the management level is achieved in a minimum of two years of education plus sea time. (see report D1.1.2). More extended educational programmes are available where the STCW minimum requirements for a navigator or engineer officer are part of a three-year bachelor's degree programme. A small number of Master's programmes of this kind are available (report D1.2.2).

It is believed, and likely that traditionally, a shorter education is more attractive than a more comprehensive education for the student candidates aspiring to become seafarers – provided that the same level of formally required seagoing competence is reached. This pattern is not so clear concerning genders. In Norway, a trend of females choosing more comprehensive education over shorter programmes has led to a higher number of females with higher education than males since 2017[13]. This can be seen from the data collected in D1.2.2, where the ratio of candidates completing BSc degree programmes vs non-BSc degree programmes is one to three. There seems to be no significant difference between the two educational programmes in what level – operational or management – is a possible outcome. Being at the very beginning of their career, it is not likely that all students foresee a development where they want to transition to land-based jobs.

In this scenario, we know that for the maritime industry to stay competitive in the future, more seafarers need to make the transition to land-based jobs and that this transition must be supported by suitable competence programmes delivered to the seafarers either during their primary education or as additional training while working at sea.

A longer education is necessary to reach a higher competence level during basic education, lasting three or four years. It should not be made mandatory. The shortest possible route to becoming a seafarer should not be removed. However, the advantages of longer education enabling a smooth transition to land-based shipping industries should be promoted. Its rewards should be highlighted to prospective student candidates.

Additionally, employees that acquire a broad set of competencies – whether updating or upgrading their skills – are more likely to achieve their full potential[14]. In our reports D1.1.2 and D1.1.3, we have researched current and future skills needs, summarised in report D1.2.1, and it is clear that the training programmes for seafarers need to change to accommodate the findings to meet future needs. This does not mean that all seafarers should aquire the broader set of competencies, but rather that there need to be two educational paths – a shorter one that fulfils the minimum requirements and a longer one, as outlined in this report.

7.2 Sharing of work tasks and distribution of skills

In 1997, IMO adopted a resolution setting out its vision, principles, and goals for the human element. The human element affects maritime safety, security and marine environmental protection involving the entire human activities performed by ships' crews, shore-based management, regulatory bodies, and others. All need to cooperate to address human element issues effectively.

The resolution. Principles of safe manning. Note that safe manning is a function of the number of qualified and experienced seafarers necessary for the safety and security of the ship, crew, passengers, cargo and property and the protection of the marine environment.

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13 https://forskning.no/kjonn-og-samfunn-ntb-skole-og-utdanning/utdanningsgapet-mellom-kvinner-og-menn-oker/1277779

14 Communication from the Commission to the European Parliament, the Council, the European economic and social committee, and the committee of the regions: a new skills agenda for Europe Working together to strengthen human capital, employability, and competitiveness.

The actual workload onboard a ship may vary greatly depending on the type of vessel, market segment, route and traffic, the technology supporting the crew, etc. The shipowner, therefore, has a duty to assess the vessel's manning repeatably.

Digital transformation does affect how the work tasks can be distributed between the crew and technology and between the ship and land-based organisation.

Advancements in wireless communication, sensor technology, and advanced analytics fuel the digital transformation. Connectivity is undergoing an evolutionary change in most parts of the world, and enhanced satellite communications open up the potential for successful cooperation between ships and land-based organisations. Increasing ship-to-shore connectivity creates vast amounts of data from which shipping companies can extract insight and value to make data-driven business decisions and optimise operations. Every aspect of operations at sea, at the port and across the fleet can be optimised – from vessel tracking and predictive maintenance to crew safety and welfare.

Increased automation, autonomy and remote operations will also affect our work tasks and how we organise the work. The IMO has suggested the term Maritime Autonomous Surface Ships (MASS) as a general name for these new ship types. A MASS has been defined as a ship that can operate independently of human interaction to a varying level. Maritime professionals are thus becoming system managers and in-depth skills to understand complex systems, onboard and onshore, are needed to serve the needed redundancy of all systems.

Distributed maritime capabilities where knowledge and competence are increasingly distributed to technology, procedures, and land-based organisations will change the work tasks of individual maritime professionals. For example, vessel positions, manoeuvres, speed, fuel consumption, cargo condition, and so on can be monitored in control centres. Fleet managers will then be able to analyse this data, enabling them to advise the captain and crew on navigation, weather patterns, fuel consumption and port arrival. We will have distributed maritime capabilities and dispersed ship crew with other roles and responsibilities than we can see in current operations. Soft skills are needed to master communication throughout the value chain.

Also, sensor data from onboard integrated machinery systems is increasingly transferred to shore centres. Digital twins enable real-time data analytics using AI and machine learning tools to support rich management and operational view of the entire supply chain. This technology will enable high-streamlining operations from ship control centres.

The fixing of malfunctions onboard often requires outside expertise from the suppliers. While ships were traditionally autonomous organisational systems that the maritime professionals onboard mastered alone, they are now increasingly part of large networks of ships, several internal and external IT systems, control centres, yards, certification agencies and regulations. Common broker platforms and e-commerce will simplify and secure the supply chain and reduce the amount of paperwork in the value chain under blockchain technology. These advances enable the integration of the business process and reduce transaction costs.

The complexity of socio-technical systems into which ships are increasingly woven requires complex control systems. We have coined this transition distributed maritime capabilities and the use of dispersed teams.

8   CONCLUSIONS

8.1   Occupational profiles at sea

STCW Convention requirements dominate occupational profiles at sea. All positions connected to operating the ship and ship safety are regulated through STCW certification to a very detailed level. Competence onboard a ship can be grouped into the following categories:

QUALIFICATION	ORIGIN	IN ESCO
Certificate of Competence (CoC)	- Required by STCW to hold a position onboard (mandatory minimum) A-II, A-III, A-IV	YES
Certificate of Proficiency (CoP)	- Required by STCW to hold a position onboard (mandatory minimum) A-VI - Required by STCW on certain ship types A-V	NO
Competence with STCW guidance	- Required by industry/regional/national guidelines B-V/a-f	NO
Additional competence not specified in STCW	- Required by the shipping industry, appendix in D 1.2.2	NO

Table 9: Occupational profiles at sea

We have found that CoC profiles are primarily reflected in ESCO with few exceptions. However, hardly any of the profiles connected with CoP and other competence can be found in the ESCO framework. If these profiles were reflected in ESCO, it would be a step towards making more of the seafarer competence a part of formal occupational profiles and contributing to the competencies becoming part of a future formal framework where seafarer competence would be credited with ECTS or a similar credit system.

8.2   Recommendations for new and updated profiles

New profiles

Position	ESCO	STCW
Ratings forming part of a navigational watch	Not listed	A-II/4
Ratings forming part of a watch in a manned engine room	Not listed	A-III/4
Electrotechnical officers	Not listed	A-III/6
Electrotechnical ratings	Not listed	A-III/7
Digital/cyber security officer	Not listed	None

Table 10a: New profiles

Updated profiles

Current Position/Role	Added Role	STCW
Deck officer	Environmental officer	A-II/1, A-II/2
Deck officer	Compliance officer	A-II/1, A-II/2
Deck officer	Ship security officer	A-II/1, A-II/2

Table 10b: Updated profiles

*The added role could be a full-time position for some ships.

8.3 Occupational profiles ashore

The IMO STCW Convention contains little to regulate the occupational profiles of the shipping industry ashore. We have investigated positions listed in ESCO and compared them with a representative sample of available positions listed by shipping industry companies on LinkedIn. We also found an overwhelming variety of occupational roles not present in ESCO.

8.4 Higher standards and impact on occupation profiles

To meet the needs of the maritime shipping industry now and in the future, seafarers' education should be upgraded to achieve higher standard skills within digitalisation, sustainable technologies, and leadership.

Basic maritime education should provide mandatory education to achieve the certificates according to STCW. Our analysis show that "competence according to higher standards" as well as competence that prepares for land-based occupations are necessary to meet the needs of the maritime shipping industry now and in the future. These needs can be met by establishing the necessary competency programmes and by qualifying a sufficient number of seafarers. The needed competences are not likely to be implemented into the STCW tables but, if so, probably only in the B section. If the competences are included in STCW the problem is solved. A more likely solution is that such higher standards are established in an additional programme outside STCW which would need collaboration to develop.

Not all topics listed as Higher Standard are important for all occupations. Typical skill updates for seagoing occupations are listed in Table 6. Typical skill updates for shore-based occupations are listed in Table 7.

Seafarers have for decades contributed operational maritime experience and knowledge to companies in the maritime sector. They are crucial for realising much of the maritime industry's innovation potential. The skills and experience from the sea are needed and appreciated in land-based positions.

Fluent and visible career paths from sea-based positions to land-based positions will also attract new talent to enter maritime careers.

Finally, the digital transition opens new possibilities for sharing work tasks. Distributed maritime capabilities where knowledge and competence are increasingly distributed to technology, procedures, and land-based organisations will change the individual maritime professional's work tasks and skills. For example, vessel positions, manoeuvres, speed, fuel consumption, cargo condition, and so on can be monitored in control centres. Such developments will create a need for updated skills in a broader part of the shipping organisations.

9 ATTACHMENTS

9.1 STCW definitions

9.1.1 STCW Certificate of Competence - CoC

In Attachment 1 to the STCW Convention, updates are listed, including clarification of the Certificate of Competence – CoC:

Certificate of Competence means a certificate issued and endorsed for masters, officers and GMDSS radio operators in accordance with the provisions of chapters II, III, IV, or VII of this annexe and entitling the lawful holder thereof to serve in the capacity and perform the functions involved at the level of responsibility specified therein.

As deck officers commonly hold the GMDSS radio operator duty, the statement above can be read as *masters and officers*

In other words, a CoC is required to qualify for a position as an officer onboard. From this definition, ratings are required to have a CoP.

9.1.2 STCW Certificates of Proficiency - CoP

In Attachment 1 to the Convention, updates are listed, including clarification of Certificate of Proficiency – CoP:

STCW Certificates of Proficiency means a certificate, other than a certificate of competency issued to a seafarer, stating that the convention's relevant requirement of training, competencies, or seagoing service has been met.

A CoP is additional to a CoC for officers.

In other words, CoP are documents additional to CoC issued to the officer to certify that they have met the required standard of competence in a specific duty. These certificates include certificates for personnel serving on certain types of ships (tankers and passenger ships) and those assigned with safety, security, and pollution prevention duties. It certifies that the holder meets STCW standards of competence in specific functions related to safety, care of persons, or cargo.

9.2 Positions listed on LinkedIn for EU area on January 28 2022

9.2.1 DNV
- Analysis Engineer
- Approval Engineer
- Cyber Security Consultants
- Cyber Security Consultants
- Digital Transformation Consultant
- DNV Summer Job 2022
- DNV Summer Project 2022
- Employer Branding Consultant
- Engineer, E&I
- Engineer, Hydraulics
- Engineer, Structural
- Engineers Control & Bridge Systems
- Global Aquaculture Manager
- Global HR & Talent Manager

- Global Manager, Business Systems and Applications
- Global Topic Owner – People Reporting & Analytics
- Graduate positions in DNV's Maritime Advisory unit in Trondheim
- Healthcare Cyber Security Consultant
- Hull Approval Engineer
- Hydraulic Engineer
- Hydrodynamic Analysis Engineer
- Junior Engineer – Pipeline Integrity Software
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Lead Auditor - Aquaculture
- Maritime Advisory Consultant
- Medical Device Assessor / Lead Auditor - Active
- Medical Device Assessors & Lead Auditors - Non-Active
- Method Engineer Analysis and Calculations Verdal
- Method Engineer Multidiscipline Verdal
- Microsoft Word Specialist / Key contact - global templates
- People Manager
- Principal Sustainability Consultant
- Principal Engineer Windows Backend
- Project Engineer - onshore wind Nordics
- Project Manager
- Project Manager for DNV Renewables Certification (RC)
- Quality Manager - Product Assurance
- Regional Finance Manager
- Researcher within Ship Autonomy
- Researchers within Maritime Decarbonization
- Senior Aquaculture researcher
- Senior Engineer, E&I
- Senior Engineer, Mechanical
- Software Developers and Solutions Architects
- Software, Cyber Security & Digital infrastructure Engineers to our Cyber Team
- Structural calculations – Stavanger
- Sustainability Team Lead / Principal Consultant
- Team Lead Pipeline Operations Norway
- Technical Authority Level 1
- Wind Turbine Structural Dynamics Developer

9.2.2 Lloyds Register

(95 listings, first 60)

- Administrator Marine and Offshore (m/w/d)
- Business Development Executive
- Business Development Executive
- Business Development Manager
- Business Development Manager - Marine
- Business Development Manager Central & Eastern Europe
- Business Development Manager, MPS
- Commercial Bid Manager
- Diversity & Inclusion Project Specialist
- Freelance Auditor Information Security
- Freelance Auditor Kwaliteit, Milieu en Veiligheid
- Freelance Lead Assessor ISO 9K 14K 45K
- Freelance Lead Auditor - Feed
- Freelance Lead Auditor Gezondheidszorg
- Freelance lead auditor VCA / NVVK
- Freelance Lead Auditor Zorg & Welzijn
- Freelancer Lead Auditor 9001
- Freiberufliche Auditor für die Lebensmittelindustrie
- IATF Lead Auditor
- IMS Lead Auditor
- Lead Auditor
- Leiter ZÜS
- Lloyd's Register logo
- Marine Surveyor
- Marine Surveyor
- MMS Auditor
- New construction / Marine Equipment and component Surveyor
- Project Manager
- Prüfingenieur / Inspektor (m/w/d); Berlin / Brandenburg
- Prüfingenieur / Inspektor (m/w/d); Leipzig / Sachsen
- Prüfingenieur ZÜS Ex-Schutz
- Regional Business Development Manager - Fuel Testing
- Retail & Hospitality Assessor (Germany)
- Retail Assessor (Poland)
- Sales Executive
- Sales Executive
- Sales Executive East Germany
- Sales Executive South Germany
- Sales Executive South Germany
- Sales Manager Italy
- Sales Manager, Maritime Solutions
- Security Consultant - Penetration Tester

- Security Consultant - Penetration Tester - Accelerator Programme
- Security Engineer - Managed Security Services
- Senior Business Development Manager
- Senior Electrotechnical Specialist
- Senior HR Advisor
- Senior HR Advisor
- Senior Security Consultant - Red Team
- Senior Specialist
- Service Delivery Technical Assistants - North-Eastern European Area
- Software Developer
- Sub-contractor: Tutor
- Subcontractor Auditor Aerospace
- Subcontractor Auditor Integrated Integrated (QEH&S)
- Subcontractor Auditor Integrated Integrated (QEH&S)
- Subcontractor Lead Auditor
- Subcontractor Lead Auditor VCA
- Subcontractor Verifier
- Surveyor Inland Waterway
- Surveyor Marine & Offshore Germany North East Area
- Surveyor Marine Equipment & Components Vienna area
- Team Lead Outfitting
- Team Lead Outfitting
- Team Lead Outfitting
- Team Leader Outfitting (German-speaking)
- Technical Consultant
- Technical Sales Manager
- Welding Product Leader

9.2.3 Wilhelmsen:
- Inside Sales Advisor
- Head of Fleet Performance
- Vessel Manager (m/f/d)
- Inside Sales Advisor
- Improvement Agent
- Customs Operator IDC
- Fleet Manager (m/f/d)
- Quality Checker
- Mechanic
- Area Inventory Planner
- Pricing Analyst
- Pricing Coordinator

9.2.4 Maersk

330 listings, 60 first:

- A.P. Moller - Maersk logo
- Account Executive - National Sales Benelux
- Application Manager
- Area Head of Customer Implementation
- Business Performance Partner, Government Contract Execution (GCE) – EUR/AFR
- Business Performance Partner, Government Contract Execution (GCE) – EUR/AFR
- Business Product Owner - Carrier Haulage, Landside Transportation
- Customer Communications Specialist Europe
- Customer Communications Specialist Europe
- Customer Experience Agent
- Customer Experience Agent - Bremen
- Customer Experience Agent - Hamburg
- Customer Experience Agent Pharma
- Customer Experience Agent Pharma
- Customer Experience Agent Pharma
- Customer Experience Manager - Ocean
- Customer Experience Manager - Single Carrier
- Customer Experience Manager - Single Carrier
- Customer Experience Manager - Single Carrier
- Customer Experience Manager - Single Carrier
- Customer Experience Team Leader
- Customer Experience Team Leader
- Customer service agent by Maersk via SUSA, Rotterdam
- Customer Service Associate
- Customs Services Team Leader
- Director of Growth
- External Sales
- Global Client Development Manager
- Growth Enablement Manager
- Head of IT
- HSSE Manager in Area NWC
- Inland Customer Experience Agent
- Innovation Consultant
- Inside Sales
- Inside Sales
- Key Account Manager
- Key Client Coordinator
- Key Client Manager
- Local Client Manager
- Marine Culture Lead
- Marine People Program Manager
- Marketing Manager

- Multicarrier Customer Service Associate
- Multicarrier Customer Service Associate
- Outside Sales Executive
- Outside Sales Executive
- Payroll Team Lead
- People Advisor
- People Partner
- People Partner
- People Partner
- People Partner Germany
- Project Manager Valmetrics
- Project Office & Risk Manager
- Safety & Operations Manager
- Sales Executive
- Sales Manager for EEA Sealand
- Sales Support
- Sales Support
- Senior Business Analyst - Portfolio Partner
- Senior Business Product Manager
- Student Assistant to the Communications Team
- Talent Acquisition Associate - Lisbon
- Talent Attraction Manager (Europe & Africa)
- Trade and Customs Consultant

9.2.5   Mediterranean Shipping Company
38 listings

- .NET - C# Developer
- Barge Planner
- BI Microsoft Specialist
- Booking Care Agent Export
- Commercial Traineeship
- Coordinator Cost Control (m/w/d)
- Corporate Legal Compliance Team Leader
- Customer care agent export
- Customer Service Agent Export
- Customer Service Agent Import
- DANGEROUS GOODS AGENT
- Data Controller & Cargo Coordinator
- Disponent Intermodal Transports (m/w/d)
- Dynamics 365 CRM Customer Service - Developer
- Dynamics 365 CRM Customer Service - Developer
- Dynamics 365 CRM Customer Service - Developer
- Dynamics 365 CRM Customer Service - Developer
- Facility Assistant

- Forwarding Agent
- Human Resources Coordinator
- Import Administratief co-worker
- Import Customer Service co-worker
- IT Security Solution Engineer
- IT Workplace specialist
- Junior Legal Counsel
- Legal Counsel Data Protection
- Neodiplomati/neolaureati ICT - appartenenti alle categorie protette
- Networking Engineer
- Operations Assistant
- PRACOVNÍK ZÁKAZNICKÉHO SERVISU EXPORT A IMPORT
- Reefer Commercial
- Release and CI-CD Specialist
- Release Management / CI-CD Specialist
- Senior IT Project Manager
- Trainer
- Web Developer

9.2.6 V-Ships
- Assistant Fleet Superintendent
- Assistant Fleet Superintendent
- Finance Manager
- Fleet Assistant
- Fleet Procurement Officer
- Fleet Superintendent
- Fleet Superintendent
- IHM Executive
- Invoicing Officer
- Key Account Manager
- Key Accounts Manager
- Marine Stores Officer
- Marine Superintendent
- Marine Superintendent
- Procurement Officer
- Travel Consultant

9.2.7 Finance, Ince & Co
- Digital Marketing Executive
- Private Client Associate/Managing Associate

9.4 IMO MANDATORY CODES

These regulate mainly shoreside shipping industries such as ship design, shipbuilding, and ship operation, but some contain elements of competence required for seafarers. Other IMO codes should also be considered*. (TBA = to be analysed)

CODE	SEA	LAND
ISM Code	Competence in security-related equipment such as winch and ECDIS	
ISPS Code	Ship security officer	
2000 HSC Code	High-speed specific training - BRM	
1994 HSC Code	High-speed specific training – BRM	
IBC Code (CHEMICAL Carriers)	STCW V/1-1-3:	
IGC Code (LIQUEFIED GAS carriers)	STCW V/1-2:	
Intact Stability Code, 2008	STCW A/ii	
Grain Code	TBA	
NOx Technical Code	TBA	
FSS Code	TBA	
2010 FTP Code	TBA	
FTP Code	TBA	
LSA - International Life-Saving Appliance Code	TBA	
ESP - International code on the enhanced programme of inspections during surveys of bulk carriers and oil tankers	TBA	
IMSBC Code	TBA	
IMDG Code 2020	The international maritime dangerous goods code 2020 edition	
IMDG Code 2022	The international maritime dangerous goods code 2022 edition	
IMO Instruments Implementation Code (III Code)	TBA	
Polar Code	A-V/4 section on competence in STCW	
IGF Code	A-V/3 section on competence in STCW	
BWMS Code	TBA	
Cargo Stowage and Securing (CSS) Code	TBA	
Code on Noise Levels Onboard Ships	TBA	
RO Code	TBA	
Casualty Investigation Code	TBA	
Code for the safe carriage of INF, plutonium and high-level radioactive wastes in flasks onboard ships	TBA	
INF Code	TBA	
BCH Code	TBA	

Table 11: IMO Mandatory Codes

*There are a number of IMO codes that should be reviewed with reference to requiring seafarer competence.

9.4.1 Example of training arising from mandatory IMO codes outside of STCW

For the IBC code, chapter 16.3 Personnel Training states:

16.3.1 All personnel shall be adequately trained in the use of protective equipment and have basic training in the procedures appropriate to their duties necessary under emergency conditions.

16.3.2 Personnel involved in cargo operations shall be adequately trained in handling procedures.

16.3.3 Officers shall be trained in emergency procedures to deal with conditions of leakage, spillage or fire involving the cargo and a sufficient number of them shall be instructed and trained in essential first aid for cargoes carried, based on the guidelines developed by the Organization*.

_____
* Refer to the *Medical First Aid Guide for Use in Accidents Involving Dangerous Goods* (MFAG), which provides advice on the treatment of casualties in accordance with the symptoms exhibited as well as equipment and antidotes that may be appropriate for treating the casualty and to the relevant provisions of the STCW Code, parts A and B.

Similarly, the IGC Code states:

18.7 Personnel training

18.7.1 Personnel shall be adequately trained in the operational and safety aspects of liquefied gas carriers as required by the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended, the International Safety Management Code and the Medical First Aid Guide (MFAG). As a minimum:

1. all personnel shall be adequately trained in the use of protective equipment provided on board and have basic training in the procedures, appropriate to their duties, necessary under emergency conditions; and

2. officers shall be trained in emergency procedures to deal with conditions of leakage, spillage or fire involving the cargo and a sufficient number of them shall be instructed and trained in essential first aid for the cargoes carried.

Another example is the "Intact Stability Code" (from IMO):

INTRODUCTION

Purpose

1.1   The purpose of the Code is to present mandatory and recommendatory stability criteria and other measures for ensuring the safe operation of ships, to sminimise the risk to such ships, to the personnel on board and to the environment. This introduction and part A of the Code address the mandatory criteria and part B contains recommendations and additional guidelines.

1.2   Unless otherwise stated, this Code contains intact stability criteria applicable to ships and other marine vehicles of 24 m in length and above, as listed below. The Code also provides intact stability criteria applicable to the same ships and marine vehicles when engaged in certain operations:

-    7

1.3   Administrations may impose additional requirements regarding the design aspects of ships of novel design or ships not otherwise covered by the Code.