SKILLSEA

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TITLE: IDENTIFICATION OF MISMATCHES ON A STRUCTURAL BASIS

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Executive Summary

Deliverable: 1.2.2, version: 1.0, date: 23 February 2022

The shipping sector in Europe is of great importance to the European economy and has been a catalyst for economic development and prosperity.[1]

The IMO and the STCW Convention have been very successful in establishing a global standard for the minimum competence level of seafarers. METs, vocational schools and universities, no matter which EQF[2] levels they offer, comply with the STCW Convention and have successfully established training courses to prepare qualified seafarers in Europe. When graduating, seafarers are qualified against the same STCW standards and are equally competent concerning formal certificate requirements.

The education and training of seafarers has evolved over the years. New and improved rules have been adopted in steps, with the establishment in 1978 of the IMO STCW Convention setting a standard. Since then, the competency requirements laid down by STCW have been revised in 1995, and in 2010, the next revision was predicted to be due in the period 2021-2025 and while there is no concrete timeline set, the pressure to conduct a comprehensive review from the shipping industry is mounting[3]

We have, in the report D1.1.2 Current skill needs, identified significant gaps between qualifications according to STCW and expectations in the maritime business. Obsolete skills in the STCW Convention are identified, and important missing topics are listed.

Significant shortcomings are identified in the report D1.1.3 Future skills and competence needs. Digitalisation is transforming the shipping industry. ‘Smart’ ships are coming into service, creating demand for a new generation of competent, highly skilled maritime professionals. Such technological advances, demand for green solutions and demographic changes may disrupt the labour markets. Some jobs change or disappear, and others demand re-training where new and updated skills are needed.

We see that the shipping industry services a considerable market for training and the minimum level delivered in educational programmes.

While reviewing the entities establishing and overseeing maritime competence requirements and those delivering training programmes and educating maritime professionals, we have seen that the system has four layers:

IMO international requirements are set through conventions and codes.

National and regional authorities approve implementation of the codes and industry bodies that set additional requirements and provide solutions to them.

Maritime education and training academies and general educational institutions train seafarers for their seagoing certificates and additional skills when furthering their career at sea or transitioning to land. The last element is the least available of all.

The fourth layer is the maritime professionals' on-the-job training and accumulation of sea time on various ships and sailing areas.

[1] Oxford Economics - The Economic Value of EU Shipping - Update 2020 - Report

[2] https://www.cedefop.europa.eu/en/projects/european-qualifications-framework-eqf

[3] https://www.ics-shipping.org/current-issue/a-review-of-the-stcw-convention-2020/

In this report, to aid METs and vocational schools preparing for the future, we first present the *de facto* mismatches across European countries. We present our comparison of different levels and lengths of training programmes. Second, based on this comparison, we suggest how METs could develop the identified skill sets. Given that seafarers benefit from the diversity of METs, vocational schools, and universities, our purpose is to seek a systematic way to improve seafarers' skills. We assert that developing new curricula to meet the demand for new skill sets in current training and education programmes will empower seafarers to attain competency above baseline STCW standards. It will also reduce the (potential future) gaps due to rapid technological changes in the shipping industry, which require the highest competence.

We find the key structural mismatches to be:

1) The industry need for competence materialises and is clearly visible through a large number of training courses and programmes offered by the shipping industry and associated METs to its members and to maritime professionals in general. There is no efficient pathway to communicate in a coordinated manner; these industries need METs, maritime authorities and the IMO STCW, who are all part of establishing such new competence courses and programmes.
    a) This leads to a huge variety and high number of courses that overlap in content and purpose, and there is no coordinated recognition
2) Competence obtained in addition to the STCW minimum is not recognised by higher education institutions and does not count towards a university degree.
3) Training and certification and the IMO STCW minimum are subject to approval by national maritime authorities. They therefore can only be conducted in the country issuing the original CoC of the maritime professional. (Endorsement for education is possible but not an endorsement for additional courses)
    a) This is a barrier for internationalisation and mobility as seafarers crossing borders pose a potential burden for their employer when the certificate needs updating. The seafarer in today's system has to travel back to his/her home country to conduct additional training. This is a paradox since the seafarer working in another country than their home country/certificate issuing country is working with Endorsement of the certificate, which acknowledges the certificate based on IMO "Whitelist"[4] of countries adhering sufficiently to the code.

[4] The Whitelist: STCW regulation I/7.3.2 requires the Maritime Safety Committee to "review the list of Parties (countries) which communicated information that demonstrated that they give full and complete effect to the relevant provisions of the Convention, to retain in this list only the Parties so concerned". Also see chapter 2.3.3

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SkillSea WP1 reports

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

Table 1: Overview of SkillSea WP1 Deliverables

Number	Name	Content
D 1.1.1	**Methodology**	Outline of 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

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 upon recognised information sources.

Term	Definition
STCW	International Convention on Standards of Training, Certification and Watchkeeping for Seafarers
MET	Maritime Education and Training
EU	European Union
IMO	International Maritime Organisation
ISM	International Safety Management
EMSA	European Maritime Safety Agency
NMA	National Maritime Authority
NEA	National Education Authority
ICS	International Chamber of Shipping
MAIIF	Marine Accident Investigators' International Forum
BIMCO	The Baltic and International Maritime Council
OCIMF	Oil Companies International Marine Forum
NI	The Nautical Institute
ISF	The International Shipping Federation
IFSMA	International Federation of Ship Masters' Associations
IGP&I	International Group of P& I Clubs
IMPA	International Maritime Pilots' Association
OPITO	Offshore Petroleum Industry Training Organisation
GOMO	Guidelines for Offshore Marine Operations
NORSOK	The Norwegian Shelf's Competitive Position
COC	Certificate of Competency
CBT	Computer-based Training
CAV	Competency Assessment and Verification
EQF	European Qualification Framework

Master	Highest ranking deck officer on the ship, Captain
WBL	Work Based Learning

1. Introduction

The IMO and the STCW Convention have successfully established a global standard defining the minimum competence level for seafarers. In the report D1.1.2 Current skills need, the significant gaps between qualifications according to STCW and expectations in the maritime business are recognised. Obsolete skills in the STCW Convention are identified, and critical missing topics are listed.

Significant shortcomings are identified in the D1.1.3 Future skills and competence needs report. Accordingly, digitalisation is transforming the shipping industry. 'Smart' ships are coming into service, creating demand for a new generation of competent, highly skilled maritime professionals. Such technological advances, green solutions, and demographic changes may disrupt the labour markets. Some jobs change or disappear, and others demand re-training where new and updated skills are needed.

The reports list a range of skills identified as lacking by seafarers, professionals in shoreside shipping companies and the industry itself. These are strongly related to digital technologies, green shipping, innovation, operations in highly digital environments, sea-land mobility, and talent attractiveness. D1.1.3, chapter 3.

In the application, we stated the following:

This report outlines the mismatch of the compulsory curriculum – IMO A (and some B) in MET academies, vs the competence programmes delivered by training centres and competence provided by the maritime shipping industry and on-the=job training programmes.

To investigate this, we map European METs educational programmes covering STCW, both minimum and additional competence programmes, and a representative sample of competency programmes offered by the shipping industry that is targeting maritime professionals in addition to the STCW minimum, and relate both to structural issues. We believe these are indicators of a mismatch.

We are not assuming all training programmes offered by METs beyond STCW minimum are indicators of mismatches. It is expected that some additional training above the STCW minimum must be acceptable to avoid overloading the students with competence that is only relevant to a narrow segment of shipping.

On the other hand, if the STCW minimum delivered approximately what the industry needed, there would be a reasonable amount of additional competence for seafarers to accumulate, typically ship-specific competence, to reach a satisfactory level.

In this report, we have used the definition from the QREA report for skills mismatches[5]: "*Skills mismatches are discrepancies between the demand and the supply of skills in the labour market, where the skills that employers are looking for are different from the skills offered."*

From the QREA report, we find[5]: *"Technological change (along with globalisation and demographic change) is having a structural impact on the demand (and on the supply) of skills."*

Further, "*Identification of (skills) mismatches on a structural basis*" will be investigated in this report in the context that the mismatches are visible as training programmes offered additionally to STCW minimum.

The structural mismatch of skills is not easily identified or mitigated. The QREA[5] report further stated: "*The causes of macroeconomic skills mismatches can be both cyclical and structural."*

There may be enough graduates in this situation, but many are unable to find employment because the

[5] Quarterly report on the -Euro Area (QREA) vol 19, No. 2 (2020)

employers do not see them sufficiently capable of being hired[6]. A structural mismatch can also be present if there is systemic undersupply or oversupply of graduates that are considered qualified[7]. Then it is a challenge of educating the correct number of graduates that are also qualified.

The shipping industry has become a significant industrial segment, with a wide range of ship types relying on a wide range of equipment and technologies. According to the UNCTAD[8], in early 2019, the total world fleet stood at 95,402 ships accounting for approximate two billion deadweight tons (dwt) of capacity, and two million seafarers employed throughout the world merchant fleet. To have current and relevant competence to operate these ships, it is clear that seafarers need to train.

6 Skills mismatch measurement_ETF partner countries.pdf p8

7 Tackling regional skill shortages: from single employer strategies to local partnerships,

8 https://safety4sea.com/unctad-industry-shifting-towards-a-new-normal/

2. The education landscape

2.1 The European Qualifications Framework

To put maritime education in context, it is helpful to outline the EQF[9] framework.

Adopted in 2008, the European Qualifications Framework (EQF) sought to unify qualifications across all EU member states, providing a helpful way to cross-reference qualifications with other countries. This proved a boon for businesses seeking to employ staff from beyond the border and vice versa.

The EQF is a framework to make education across Europe comparable and transferrable. The EQF has three descriptive learning outcomes:

- **Knowledge:** in the context of EQF, knowledge is described as theoretical and/or factual.
- **Skills:** In the context of EQF, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).
- **Responsibility and autonomy:** In the context of the EQF, responsibility and autonomy are described as the learner's ability to apply knowledge and skills autonomously and with responsibility.

It consists of eight levels related to the qualification's framework of the higher education area. The Framework for Qualifications of the European Higher Education Area (EQFHA) provides descriptors for three cycles agreed by the ministers responsible for higher education such that:

EQF Level	EQF-Higher Education
EQF levels 1- 5	Short cycle
EQF levels 6	First cycle (Bachelor's Degree BSc), requiring 180 ECTS, usually a three-year study programme
EQF levels 7	The second cycle (Master's Degree MSc) requires additional 120 ECTS, usually two-year study programme
EQF levels 8	Third cycle (Doctorate Degree PhD) requiring 30 ECTS, a thesis and scientific publications.

Concerning the EQF, maritime education conforming to IMO STCW requirements is not well integrated with the above system. The METs providing a certificate of competency at a minimum level and which are not part of a BSc or MSc degree do not provide ECTS.

Neither are the additional training courses provided by the industry as the CoPs. Whether conforming to IMO STCW or not, these are not part of the EQF system (when not delivered as part of a degree programme) and do not provide any ECTS. This challenge is analysed and visualised in the report Spotlight on VET[10] by the European Centre for the Development of Vocational Training (Cedefop).

9 https://europa.eu/europass/en/description-eight-eqf-levels

10 https://www.cedefop.europa.eu/en/publications/4168

A summary is given for each European country and is visualised for Romania in figure 2 as an example but is very much similar for maritime education in EU countries.

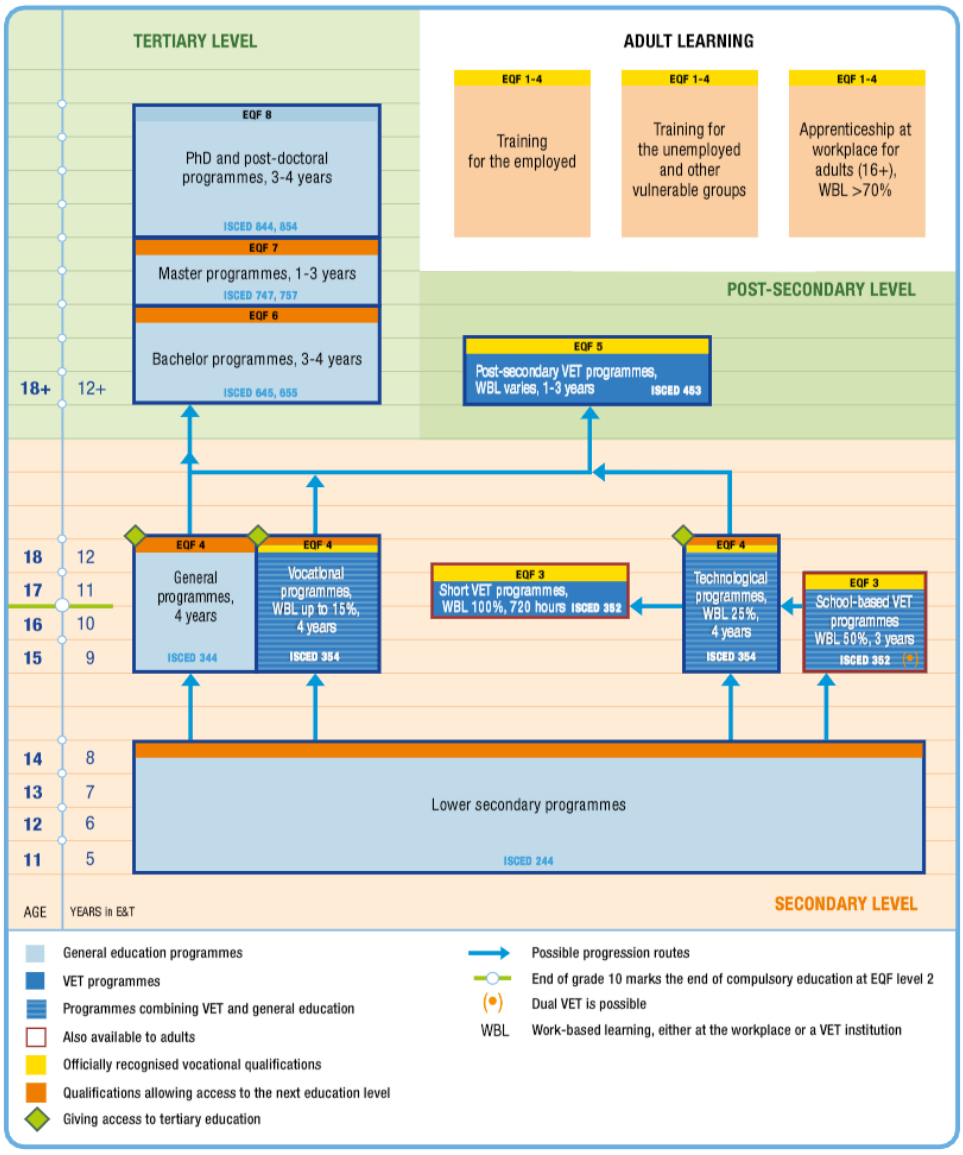


Figure 1: Spotlight on VET by CEDEFOP. Example illustrated for Romania

Although VET education does not earn the student ECTS credits, it may affect programme duration when entering a Bachelor programme in some countries. In Austria, Cyprus, the Czech Republic, Estonia, and Hungary, this is the case. In Germany, France, Latvia, Luxembourg, Malta, Netherlands, and the UK, VET is connected to a separate track of VET-based BSc and MSc with WBL content. These go parallel with academic BSc and MSc, and progression to PhD is possible except in the UK.

Seafarers that conduct their education or complete additional courses (CoP) in non-degree programmes do not earn any ECTS credits towards a first cycle/BSc degree in higher education. Still, it may shorten the length of a BSc programme for some countries.

2.2 The IMO STCW Convention and framework

General

The Convention is commonly referred to as including both the Convention and the Code since the

paragraphs in the Convention is refer to the Annex with Code.

Under the STCW Convention, all seafarers need to meet minimum standards of competence, age, medical fitness, and approved sea-going service. Each national administration sets these standards, but as a minimum, they should reflect STCW standards and STCW Code. The certificates are required to depend on rank, responsibilities onboard and the type of vessel the certificate is valid for.

To obtain an STCW certificate, it is necessary to complete a training programme approved by the issuing administration or complete an approved seagoing service period. For most certificates, a combination of both is necessary.

STCW Convention

The IMO regulations known as the STCW contain both a Convention and the Annex, including the Code. The Convention can be described as the governing principles and comprises 17 short articles covering eight pages. It also includes the attachments to the convention, Attachment 1: The 2010 Manila Amendments and Attachment 3: The Final Act of the 2010 Manila Amendments summarising the changes implemented following this meeting, covering all 50 pages. Attachment 2 is placed in the Code.

STCW Code

This section covers the detailed regulations and starts with the two pages of Attachment 2/Resolution 2 from the 2010 Manila Amendments, where updates to common goals for the STCW are stated, and dates for implementation of the main changes agreed upon in the 2010 Manila Amendments.

The rest of the Code part is Part A Mandatory Standards, 215 pages, and Part B Recommended Guidance both on the Convention and the Code covering 87 pages.

Certificate of Competence - CoC

In Attachment 1 to the Convention, updates are listed, including clarification of 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.

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, CoPs are documents additional to CoCs issued to the officer to certify that he or she has 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.

2.3 STCW Certification and applicability

The STCW code lists in sections AI – AVIII the requirements for Certificate of Competence – CoC and Certificate of Proficiency – CoP as follows.

Table 2: STCW codes, CoCs are mandatory minimum, CoPs are optional/additional for officers

STCW Chapter	Section	Man. min[11]	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	Officers in Charge of a Navigational Watch on ships of 500 gross tonnage or more
	STCW II/2:	CoC[12]	Masters and Chief Mates on ships of 500 gross tonnage or more
	STCW II/3:	CoC	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	Ratings as Able Seafarer Deck
	Chapter 3: STCW Code for Standards Regarding Engine Department (Certification)		
	STCW III/1:	CoC	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

[11] Mandatory Minimum requirement for a position

[12] II/2 applies to the Management level, II/1 to operational level. Separate requirements for ships over 3000 GT was 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.

	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	Able Seafarer Engine in a manned engine-room or designated to perform duties in a periodically unmanned engine-room.
	STCW III/6:	CoC	Electro-Technical Officers
	STCW III/7:	CoP	Electro-Technical 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:	CoP	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:		Masters, officers and ratings on basic liquefied gas tankers cargo ops
			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:	CoP	Masters, officers on ships subject to IGF Code advanced training
	STCW V/4-1:		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, 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		
STCW Sections B-V/a to B-V/f:			
			Sections B-V/a, B-V/b, B-V/c, B-V/d, B-V/e, and B-V/f - additional special training requirements for personnel on certain types of ships

STCW Table B-I/2:			
			List of Certificates or Documentary Evidence Required Under the STCW Convention

* According to 0 Certificate of Competence - CoC, only chapters II, III, IV, or VII give CoC

Sea Time

In maritime education, academies issue a diploma upon graduation, but in addition to educational qualifications, to obtain a valid certificate, the candidate must complete sea time. A minimum of 12 months sailing is required for deck and engine.

There are two issues of concern with this.

1. When is sea time conducted?
2. How is sea time organised? Is it guaranteed or is there an option that sea-time is not possible, leaving the graduate without a certificate of competence?

From the overview in the attached document "All European METs data.docx", we find that there are a number of ways to arrange this.

For *1) When is sea time is conducted,* we see a number of different models, but one of the most popular (Croatia, Spain, Sweden, Netherlands, Norway) requires six months of sea time after graduation. Training in this period is on watchkeeping duties, followed by an assessment to achieve Officer Of the Watch (OOW) certification.

Some academies have this sea time integrated into the study programme (Denmark, UK) while some arrange for students to be contracted for sea time with shipping companies before studies commence. In both these cases, sea time is guaranteed for all who are admitted to the study programme.

In many countries and institutions (such as Norway and Croatia)[13], it is up to the student to organise sea time, although they will receive support from the institution to achieve this. If the student is not successful in organising sea time, it is impossible to obtain a position at sea. This has been recognised as a problem, as it leads to some graduates never getting employment at sea.

In Norway a pilot project[14] is underway in 2022 where sea time is integrated into the study programme and will be offered to the candidate upon admission. All students have been required to find a cadet position and obtain sea time on their own initiative, which has led to a proportion of students not obtaining a certificate and thus not being able to work at sea.

STCW Endorsement

STCW Endorsement is a document issued to deck and engineer officers, either as part of the certificate or as a separate document. The purpose is to give holders of a certificate from one country a valid equivalent certificate in another country where one is seeking employment.

The certificate endorses that the national certificate has been issued in accordance with all STCW requirements. According to 2010 regulations, it is now required that the respective maritime administrations only issue all endorsements after thoroughly verifying the authenticity of any certificates and documentary evidence. Endorsements are only given to seafarers from countries on the White List. See next chapter.

[13] More data on this matter is being collected as of jan. 2022
[14] https://www.hvl.no/en/studies-at-hvl/study-programmes/courses/nab3039

Endorsement is described in Article VI-2 of the Convention:

> *The issuing administration shall endorse certificates for masters and officers issued in compliance with this article in the form as prescribed in regulation I/2 of Annex. If the language used is not English, the endorsement shall include a translation into that language.*

It is further elaborated in the Convention and the Code:

> Convention: In attachment 1, to the 2010 STCW Conference, regulation 1/2, Certificates and endorsements.
>
> Code: In Chapter, I General provisions, Section A-1/2 Certificates and endorsements.

In other words, Endorsement states that a country must accept a valid certificate from a country on the White List and issue an endorsement allowing the seafarer to work in that country.

It is a paradox that seafarers holding an endorsed certificate cannot conduct a CoP course or CoC upgrade in the country that has endorsed the certificate but must return to their country of certificate origin and conduct the CoP/CoC upgrade course there. The reason given is that the maritime administration (MA) has to approve METs that deliver CoC and CoPs, and the MA that has issued the original certificate has not approved the METs in the endorsing country.

A simple solution to this structural problem would be to mutually recognise CoP/CoC additional courses from METs across countries.

When it is possible to endorse certificates from the country of certificate origin, it should be possible to add CoP/CoC upgrade courses to the endorsed certificate. Instead of going back to the country of certificate origin, add CoP/CoC upgrade courses and re-do the endorsement.

STCW White List

The White List is a list of countries that comply with the STCW Convention in a satisfactory manner.

From imo.org,[15] we have the following description of the White List:

> *The first so-called "White List" of countries deemed to be giving "full and complete effect" to the revised STCW Convention (STCW 95) was published by IMO following the 73rd session of the Organization's Maritime Safety Committee (MSC), meeting from 27 November to 6 December 2000.*
>
> *It is expected that ships flying flags of countries that are not on the White List will be increasingly targeted by Port State Control inspectors. A Flag State Party on the White List may elect not to accept seafarers with certificates issued by non-White List countries for service on its ships as a matter of policy. If it does accept such seafarers, they will be required by 1 February 2002 also to have an endorsement issued by the flag state to show that the flag state recognizes their certificate.*
>
> *By 1 February 2002, masters and officers should hold STCW 95 certificates or endorsements issued by the flag State. Certificates issued and endorsed under the provisions of the 1978 STCW Convention will be valid until their expiry date.*
>
> *The list will be kept under review and may be added to as other countries meet the criteria for inclusion.*

[15] https://www.imo.org/es/OurWork/HumanElement/Paginas/STCW-Convention.aspx

2.4 EU and EEA METs

MET academies and universities

MET academies deliver many types of training:

1. STCW minimum mandatory level CoC and as part of a study programme, BSc or MSc, following the Bologna Process. Typically, a university of applied sciences. Public or private.
2. STCW minimum mandatory level CoC as vocational education, not part of BSc or MSc. Some or no additional subjects to STCW minimum mandatory. Typically, a vocational school or college. Public or private.
3. STCW minimum CoP for certain ship types and regions etc. These are shorter courses and not educational programmes. University, vocational academy or independent company. Public or private.
4. In addition to the STCW training, training is required for certain types of ships, regions, or operations. Most of these are private. See chapter 0 5.1 Shipping industry associations and interest groupings.
5. Those who deliver the training required by the shipping and maritime industry, in general, respond to market needs or serve the needs of its members.

MET academies are either public or private. Those who are private have ownership that ranges from independent (e.g. RelyOnNutec) that cater to all to being owned by a shipping organisation that primarily serves its members (e.g. BIMCO) or to be owned by one shipping company with the primary goal to serve that company (e.g. Maersk Training). Most, if not all, are open to participation from anyone willing to pay the participation fee.

EU MET STCW programmes and courses

We have mapped the STCW related maritime training and education programmes across Europe and found that EU member countries and EEA countries METs have listed 2075 STCW related educational programmes and courses.

In this context:

The educational programme is the education required to obtain a certificate qualifying for a position, a Certificate of Competency (CoC)

A course is some additional competence for certain ship types or regions, a Certificate of Proficiency – CoP. The CoP only gives specific qualifications when added to a CoC for officers.

Note that CoPs may be part of the STCW minimum requirements for certain types of ships and regions.

The data contains educational courses and programmes related to STCW Code and provides some good insights with sufficient accuracy16.

There are, in total listed 104 BSc MSc programmes that are interconnected with a maritime certificate. These are three- and five-year programmes, respectively. There are 1,996 other STCW-related programmes and courses, and of these, 392 refer to section A-II/1-3 and A-III/1-3 deck and engine, respectively, which means that 288 of the programs are non-degree certificate programmes. The overview

of programme totals are as follows:[16]

Educational programme or course	#	#
Total courses in dataset:		2100
Deck officer operational and management level	208	
Engineer officer operational and management level	156	
Electro Technical officer and rating (ETO, ETR)	28	
All officer programmes:	392	
Degree programmes, MSc & BSc		104
Non-degree programmes		288
Courses referring to A-II and A-III, i.e. mandatory CoC programmes		392

Mandatory CoP courses		
Courses referring to A-IV, mandatory radio training	120	
Courses referring to A-VI/1, mandatory safety training	225	
Courses referring to A-VI/4, mandatory first aid	132	
Courses referring to A-VI/2, mandatory lifeboat	91	
Total mandatory CoP courses	568	
Courses referring to A-II, A-III, COC courses not part of programs training	52	
Total mandatory minimum courses: (CoC and selected CoP)		1012
Courses referring to other STCW references, programmes not mandatory		1088

Table 3: Number of educational programmes and courses

We see that the ratio of degree vs non-degree programmes that give a CoC is 288 vs 104. In other words, three times as many programmes give non-degree education[17].

Content of programmes

We find no significant difference in programme content by comparing the data given for the BSc and MSc programmes vs the non-degree programmes. For example, maritime training and education in Italy is similar to BSc nautical studies in other countries but does not lead to a bachelor's degree.

In other words, both degree and non-degree education deliver the same STCW-minimum competence.

2.5 Bachelor's degree programmes

Although the names of the training programmes may differ, BSc programmes all contain the mandatory STCW courses to achieve a Certificate of Competence (see table 4). In addition, the study programmes may contain optional courses. For example, the mandatory minimum STCW Deck programme leading to an unlimited certificate would contain the following mandatory training content:

Mandatory minimum Deck (CoC)

These are the courses required to complete an educational programme. Together with usually 12 months of sea time, these will be sufficient to earn the Officers in Charge of a Navigational Watch certificate.

[16] Data was initially compiled from EMSA, StudyInGreece and Maritime UK. It was subsequently realised that higher quality data was desirable and all SkillSea members were engaged in updating the source material. The resulting data is available in the attachment EU METs Updates in excel format. Updates are ongoing.

[17] The educational landscape and data on the number of study places and graduates from degree vs non degree maritime studies are pending.

(Engine, Electrician and Ratings are not listed for simplicity)

STCW II/1:	CoC	Officers in Charge of a Navigational Watch on ships of 500 gross tonnage or more
STCW II/2:	CoC18	Masters and Chief Mates on ships of 500 gross tonnage or more
STCW IV/2:	CoC	Mandatory minimum requirements for certification of GMDSS Radio Operators
STCW VI/1:	CoC	Safety familiarisation, basic training and instruction for all seafarers.
STCW VI/2-1:	CoC	Issue of certificates of proficiency in survival craft, rescue boats other than fast rescue boats.
STCW VI/4:	CoC	Mandatory minimum medical first aid and medical care
STCW I/9:		Medical standards, including minimum In-service physical and eyesight requirements for seafarers

Table 4: Mandatory minimum competence (CoC) for deck officer of the watch (OOW)

Additional Deck (CoP)

Some of the STCW courses below must be completed to serve on specific ship types or regions. As seen from the attached EU METs Udates.xlsx, Degree vs no D tab, these are not offered as part of the educational programme. Here no educational programmes list any of the codes V or VI as part of the programme, as they are not mandatory minimum. Hence, these courses are added later, and the seafarer or ship owner/operator covers the cost.

CODE	Competence	Applies to
STCW V/1-1-1:	CoP	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:		Masters, officers and ratings on basic liquefied gas tankers cargo ops
		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

18 II/2 applies to the management level, II/1 to operational level.

		ships, crisis management
STCW V/3-1:		Masters, officers and ratings on ships subject to IGF Code advanced training
STCW V/3-2:	CoP	Masters, officers on ships subject to IGF Code advanced training
STCW V/4-1:		Masters and deck officers on ships operating in polar waters, Basic Training (Polar Code)
STCW V/4-2:	CoP	Masters and deck officers on ships operating in polar waters Advanced training (Polar Code)
STCW VI/2-1:	CoP	Issue of certificates of proficiency in fast rescue boats.
STCW VI/3:	CoP	Training in advanced fire-fighting.
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.

Table 5: Additional competence for deck officers - (CoP)

In addition, a wide range of competence and training recommendations are listed in the B section of STCW. These are also not typically part of the educational programmes and must be added later and the cost covered by the seafarer or owner/operator. Examples of such courses are:

- STCW section B V/f: Guidance on training and experience for personnel operating dynamic positioning systems (basic and advanced)
- STCW section B V/e: Guidance on training and experience for personnel onboard offshore supply vessels

2.6 Master of Science (MSc) degree programmes[19]

Maritime education institutions provide MSc programmes in the maritime sector, but few are connected with the certificate requirements of seafarers. We have found some exceptions to this, and it is in Belgium, Bulgaria, Denmark, Croatia, and Portugal where the maritime studies that lead to a navigator or engineering certificate[20] when completed at the BSc level can be continued with another two years of study to achieve MSc level. The candidate then emerges with both a maritime certificate from the deck department or engine department and an MSc degree.

[19] In this document we are looking into whether METs deliver Master of Science degrees that are integrated with the maritime diploma and certificate. This is not to be confused with the term Master or Ship Master which is used for the highest ranking officer operating the ship. Captain is also used instead of Ship Master.

[20] https://www.enautica.pt/en/courses-4/master-courses-10/

Table 6 Master degree programmes with CoC

Country	MET	Program name	STCW Ref.
Belgium	Antwerp Maritime Academy	Nautical science	II/2; para 1-2 MA
Bulgaria	Nicola Y. Vaptsarov Naval Academy	Navigation	II/2; para 1-2 MA, II/2; para 3-4 MA
		Marine engineering	III/2 CE
Croatia	University of Rijeka	Maritime studies	MSc in Science
Denmark	Svendborg International Maritime Academy	Senior officer – master mariner	II/2; para 1-2 MA, II2; para 3-4 MA, III/1
Denmark	Svendborg International Maritime Academy	Senior officer – dual purpose marine chief engineer and master marine	II/2; para 1-2 MA, II2; para 3-4 MA, III/2 CE
Denmark	Svendborg International Maritime Academy	Senior officer – dual purpose marine chief engineer	III/2 CE, II/1
Portugal	ENIDH - Escola Superior Nautica Infanter D. Henrique	Deck and bridge operations	II/2; para 1-2 MA
Portugal	ENIDH - Escola Superior Nautica Infanter D. Henrique	Marine Engineering	III/2 CE

2.7 Non-degree programmes

In *chapter 0, STCW White List*

The White List is a list of countries that comply with the STCW Convention in a satisfactory manner.

From imo.org, we have the following description of the White List:

> *The first so-called "White List" of countries deemed to be giving "full and complete effect" to the revised STCW Convention (STCW 95) was published by IMO following the 73rd session of the Organization's Maritime Safety Committee (MSC), meeting from 27 November to 6 December 2000.*
>
> *It is expected that ships flying flags of countries that are not on the White List will be increasingly targeted by Port State Control inspectors. A Flag State Party on the White List may elect not to accept seafarers with certificates issued by non-White List countries for service on its ships as a matter of policy. If it does accept such seafarers, they will be required by 1 February 2002 also to have an endorsement issued by the flag state to show that the flag state recognizes their certificate.*
>
> *By 1 February 2002, masters and officers should hold STCW 95 certificates or endorsements issued by the flag State. Certificates issued and endorsed under the provisions of the 1978 STCW Convention will be valid until their expiry date.*
>
> *The list will be kept under review and may be added to as other countries meet the criteria for inclusion.*

2.4 EU and EEA METs in European countries 336 out of 444 Maritime educational programmes are offered but are not part of a degree programme. These are distributed as follows. (28 ETR/ETO programmes are not included)

By tabulating these, we find as follows, see figure 2 and table 6 below:

Table 7 Degree vs no degree programmes

Country	Academic	No Degree
Belgium	3	10
Bulgaria	6	0
Croatia	8	33
Denmark	10	8
Estonia	3	7
Finland	11	8
Germany	5	2
Greece	5	2
Iceland	0	6
Ireland	3	2
Italy	0	17
Latvia	3	14
Lithuania	2	0
Netherlands	8	45
Norway	6	58
Poland	2	18
Portugal	4	0
Romania	5	8
Slovakia	0	6
Slovenia	2	2
Spain	12	9
Sweden	6	5
SUM	104	260

We note that three countries do not have any maritime education connected with a degree (Iceland, Italy, and Slovakia). Out of a total of 412 programmes, 313 are not in connection with a degree.

We also see from the listing of programme content that there is no significant difference between degree and non-degree courses concerning STCW codes. For example:

Table 8: Examples of STCW Codes references by degree and non-degree study programmes.

Country	Academy	Program	STCW	Degree
Belgium	Antwerp maritime academy	Nautical sciences	II/1	BSc
Belgium	VDAB Zeebrugge	Officer of a navigational watch	II/1	No

Finland	Etala-Ktomenlaakso Vocational College	Watchkeeping officer	II/1	No
Finland	Aland University of Applied Sciences	Bachelor's Degree in Nautical Science	II/1	BSc
Spain	University Of Laguna	Piloto de Primera de la Marina Mercante	II/2;para 1-2 MA	No
Spain	University Of La Coruna	Piloto de Primera	II/2; para 1-2 CM II/2;para 3-4 CM	BSc

From the above, we can conclude that maritime education is split between degree and no degree educations, with approximately one-quarter of study programmes in degree studies and three-quarters in non-degree programmes. Combined with the fact that non-degree maritime study programmes give little or no recognition towards academic education, this is clearly a structural mismatch in maritime professionals' opportunity to develop their careers further.

From the attached document All European METs (pdf), we have a comprehensive overview of the educational systems, including VET education of member countries. Here we see that vocational education on levels 4 and 5, and 6 are connected with the higher education system at the BSc level. This means a maritime professional, in most cases, must restart their education by starting a BSc education from scratch if they are to pursue higher competence, as their maritime education is not recognised with ECTS credits.

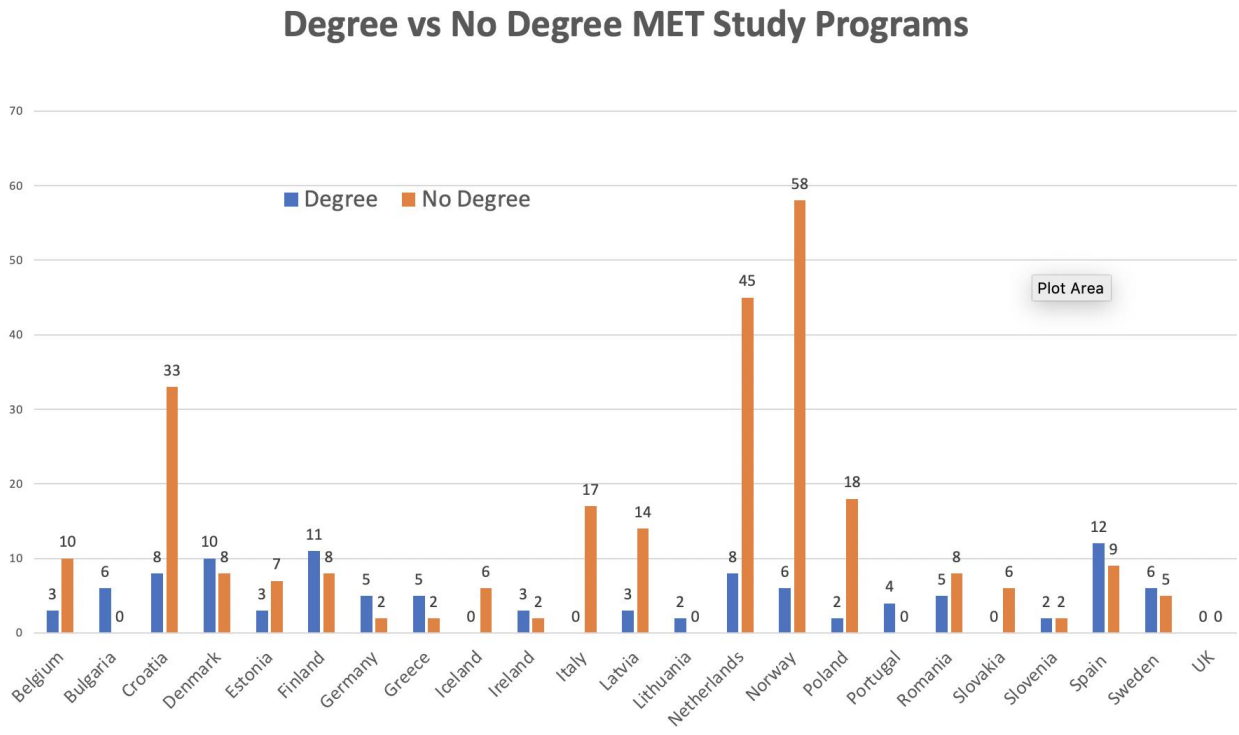


Figure 2: Maritime studies at BSc & MSc vs non-BSc/MSc level in Europe16

2.8 Training and education in addition to STCW

Many METs and maritime organisations offer maritime-related education and training in addition to the

STCW minimum, or not part of the STCW certificate requirements but closely related.

Some are valuable competencies onboard ships, and some are related to land and ship management. The courses listed below are examples and show that many training programmes are offered outside of STCW. Some of them will be candidates to become STCW courses. It shows that the STCW minimum training offered falls very much short of the industry need, and giving maritime professionals relevant courses would narrow the gap left for the industry to close.

To illustrate how the industry handles this, we list below two cases, one tanker and one cable lay vessel competence matrixes from a crewing company. Details listed in chapter ***Fout! Verwijzingsbron niet gevonden. Fout! Verwijzingsbron niet gevonden.***

2.9 Competency Matrix

General

The following competence matrixes[21] illustrate the additional competence required for a crew onboard a cable lay vessel and a tanker when employed through an international ship management company. For distribution on position, see the following page.

The table lists compulsory certificate training and additional training that must be in place before a candidate is considered qualified.

M – Mandatory concerning STCW code, either from education, CoC or additional CoP
P – Principal – required by customer/principal, CoP/additional
C – Company – required by Shipping Management company, CoP or additional
CoC – Certificate of Competence, mandatory minimum at the time the matrix was created
CoP – Certificate of Proficiency, additional training.
O – Other additional training.

Cable lay vessel

		Certificate
M	CoC	Basic Safety Certificate - STCW 95 A-VI/1
M	CoC	Chief Cook Certificate of Competency
M	CoC	Chief Engineer Officer COC - Motor - STCW Re...
M	CoC	Chief Engineer Officer End. - Motor - STCW Re...
M	CoC	Chief Mate COC - STCW Reg. II/2
M	CoC	Chief Mate End. -STCW Reg II/2
M	CoC	General Operator Certificate of Competency
M	CoC	General Operator Endorsement
M	CoC	Master Mariner COC - STCW Reg. II/2
M	CoC	Master Mariner End. -STCW Reg. II/2
M	CoC	Medical Care - STCW 95 A-VI/4.2
M	CoC	Medical First Aid Certificate - STCW 95 A-VI...
M	CoC	Officer in Charge of a Navigational Watch CO...
M	CoC	Officer in Charge of a Navigational Watch End... (
M	CoC	Officer in Charge of an Engineering Watch CO...
M	CoC	Officer in Charge of an Engineering Watch End...
M	CoC	Second Engineer Officer COC - Motor- STCW Re...
M	CoC	Second Engineer Officer End. - Motor - STCW R...

[21] *OSM Crew Management 2013/2014*

M	CoC	Profic. in Surv. Craft & Rescue Boats Cert. -...
		Training additional to mandatory minimum training
M	CoP	Profic. in Surv. Craft & Rescue Boats Cert. -...
M	CoP	Ratings forming part of a Navigational Watch...
M	CoP	Ratings forming part of an Engineering Watch...
M	CoP	Advanced Fire Fighting Certificate - STCW 95...
M	CoP	Dynamic Position Operator Certificate, Full
M	CoP	Ship Security Officer Certificate (STCW A-VI...
M	CoP	Compressed Air Emergency Breathing System In...
M	CoP	Proficiency in Designated Security Duties (S...
M	CoP	Security Awareness Course (STCW A-VI/6-1)
M	CoP	Authorized Gas Tester Level 3 OPITO Approved
M	CoC*	Bridge (Maritime Crew) Resource Management C...
M	CoP	Civil Aviation Authority Offshore Operator
M	CoP	Control of Substances Hazardous to Health (E...
M	CoC*	ECDIS Course (IMO Model 1.27)
M	CoC*	Engine Resource Management (STCW 2010) (
M	CoP	Environmental Awareness for Oil and Gas Pers...
M	CoP	Fugro Corporate QHSE Introduction (Elearning...
M	CoP	Furuno ECDIS FEA 2107/FEA 2807
M	CoC*	High voltage course
P	CoP	Hydraulic Ship Crane Operator (G20) Course (
P	CoP	Hygienic Course (Fugro)
	o	Incident /Accident Investigation / Root Caus...
M	o	K-Pos Maintenance Course
M	o	Lifting Operations and Lifting Equipment Reg...
P	o	Manual Handling -E-learning
P	CoP	Medical Emergency - First Aid (STCW A-VI/4.1...
P	o	Offshore Crane Operator G5 Course
P	o	Onboard Familiarization Course (Fugro) Portable Appliance Testing
P	o	Provision and Use of Work Equipment Regulati...
P	o	Risk Assessment Course E-learning Shipboard Safety Officer
P	o	Slinger and banksman course
C	o	Star Information & Planning System Course
C	o	Wire Rope Socketing (RESIN) Course
C	o	Working at Height (Elearning)
C	o	Basic Instrumentation & Process Control (In-H...
C	o	Bridge Equipment Familiarization (In-House)
C	CoP	Dynamic Positioning - Basic Course
C	o	Electrotechnology Course
C	o	In-House Anti-Piracy Awareness Training
C	o	In-House Hydraulics & Pneumatics
C	o	In-House Refrigeration
C	o	ISM Course
C	o	Maritime Resource Management
C	o	Navigation for Deck Officers (In-House)
C	o	P.E.O.S and H.R

C	o	Shiphandling (In-House)
C	o	Ship's Catering Services - NC2
C	o	Ship's Catering Services NC1
P	o	Work Attitude and Value Enhancement Seminar
P	o	Basic Offshore Safety & Emergency Course, OL...
P	o	Basic Offshore Safety & Emergency Course, OP...
P	o	Helicopter Landing Officer Course OLF (2 yr)
P	o	Helicopter Underwater Escape Course
P	o	Rescue at Height - Rescue Genie Course
P	o	Sparrows 3 (Offshore Crane Operator Stage 3)
P	o	Line Training - HLO OLF

* The table and matrix are from 2014, and at that time, these courses were additional CoC courses added to seafarers' education following the STCW 2010 Amendments.

- 19 competencies are CoCs and are the mandatory minimum and thus part of basic education
- 65 are COC or CoP, or others added to a mandatory minimum and need to be conducted at the expense of the shipping company or the seafarer.

Cable Lay Vessel

	Master	Chief Officer	2nd Officer	3rd Officer	Deck Cadet	Bosun	Crane Operator	Able Body Seaman	Ordinary Seaman	Chief Engineer	2nd Engineer	3rd Engineer	Engine Cadet	Electrician	Electrician Cadet	Assistant Electrician	Fitter	Chief Steward	Chief Cook	2nd Cook	Steward	Junior Electrician	Electro Trainee
Certificate																							
(N/A) Advanced Fire Fighting Certificate - STCW 95...	M	✓	✓	✓						✓	✓	✓											
(N/A) Basic Safety Certificate - STCW 95 A-VI/1	M				✓	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓	✓	✓	✓		
(N/A) Chief Cook Certificate of Competency	M																✓	✓	✓				
(N/A) Chief Engineer Officer COC - Motor - STCW Re...	M									✓													
(BS) Chief Engineer Officer End. - Motor - STCW Re...	M									✓													
(N/A) Chief Mate COC - STCW Reg. II/2	M	✓																					
(BS) Chief Mate End. -STCW Reg II/2	M	✓																					
(N/A) General Operator Certificate of Competency	M	✓	✓	✓	✓																		
(BS) General Operator Endorsement	M	✓	✓	✓	✓																		
(N/A) Master Mariner COC - STCW Reg. II/2	M	✓																					
(BS) Master Mariner End. -STCW Reg. II/2	M	✓																					
(N/A) Medical Care - STCW 95 A-VI/4.2	M	✓	✓																				
(N/A) Medical First Aid Certificate - STCW 95 A-VI...	M	✓	✓	✓	✓						✓	✓	✓										
(N/A) Officer in Charge of a Navigational Watch CO...	M		✓	✓																			
(BS) Officer in Charge of a Navigational Watch End...	M		✓	✓																			
(N/A) Officer in Charge of an Engineering Watch CO...	M											✓											
(BS) Officer in Charge of an Engineering Watch End...	M											✓											
(N/A) Profic. in Surv. Craft & Resc. Boats Cert. -...	M	✓	✓	✓	✓		✓			✓	✓	✓											
(N/A) Ratings forming part of a Navigational Watch...	M						✓	✓															
(N/A) Ratings forming part of an Engineering Watch...	M															✓							
(N/A) Second Engineer Officer COC - Motor- STCW Re...	M										✓												
(BS) Second Engineer Officer End. - Motor - STCW R...	M										✓												
(N/A) Ship Security Officer Certificate (STCW A-VI...	M	✓	✓																				
(N/A) Dynamic Position Operator Certificate, Full	P	✓	✓	✓	✓																		
(N/A) Profic. in Surv. Craft & Resc. Boats Cert. -...	P							✓	✓	✓													
Course																							
(N/A) Compressed Air Emergency Breathing System In...	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Proficiency in Designated Security Duties (S...	M			✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
(N/A) Security Awareness Course (STCW A-VI/6-1)	M														✓								
(N/A) Authorized Gas Tester Level 3 OPITO Approved	P	✓								✓													
(N/A) Bridge (Maritime Crew) Resourse Management C...	P	✓	✓	✓	✓																		
(N/A) Civil Aviation Authority Offshore Operator	P		✓				✓																
(N/A) Control of Substances Hazardous to Health (E...	P	✓								✓													
(N/A) ECDIS Course (IMO Model 1.27)	P	✓	✓	✓	✓																		
(N/A) Engine Resourse Management (STCW 2010)	P									✓	✓	✓	✓	✓									
(N/A) Environmental Awareness for Oil and Gas Pers...	P	✓	✓	✓	✓					✓	✓	✓	✓	✓									
(N/A) Fugro Corperate QHSE Introduction (Elearning...	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Furuno ECDIS FEA 2107/FEA 2807	P	✓	✓	✓	✓																		
(N/A) High voltage course	P									✓				✓									
(N/A) Hydraulic Ship Crane Operator (G20) Course	P						✓	✓															
(N/A) Hygienic Course (Fugro)	P																			✓			
(N/A) Incident /Accident Investigation / Root Caus...	P	✓	✓							✓													
(N/A) K-Pos Maintenance Course	P									✓				✓									
(N/A) Lifting Operations and Lifting Equipment Reg...	P	✓								✓	✓												
(N/A) Manual Handling -E-learning	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Medical Emergency - First Aid (STCW A-VI/4.1...	P					✓																	
(N/A) Offshore Crane Operator G5 Course	P							✓	✓														
(N/A) Onboard Familarization Course (Fugro)	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Portable Appliance Testing	P									✓				✓									
(N/A) Provision and Use of Work Equipment Regulati...	P	✓	✓							✓													
(N/A) Risk Assessment Course E-learning	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Shipboard Safety Officer	P	✓	✓																				
(N/A) Slinger and banksman course	P							✓	✓	✓	✓												
(N/A) Star Information & Planning System Course	P	✓	✓	✓						✓	✓	✓	✓	✓					✓	✓			
(N/A) Wire Rope Socketing (RESIN) Course	P							✓	✓	✓	✓												
(N/A) Working at Height (Elearning)	P							✓	✓	✓	✓												
(PH) Basic Instrumentation & Process Control (In-H...	O											✓	✓	✓									
(PH) Bridge Equipment Familiarization (In-House)	O				✓	✓																	
(PH) Dynamic Positioning - Basic Course	O	✓	✓	✓	✓																		
(PH) Electrotechnology Course	O											✓	✓	✓									
(PH) In-House Anti-Piracy Awareness Training	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(PH) In-House Hydraulics & Pneumatics	O											✓	✓	✓									
(PH) In-House Refrigeration	O											✓	✓	✓									
(PH) ISM Course	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(PH) Maritime Resource Management	O	✓	✓	✓	✓							✓	✓	✓									
(PH) Navigation for Deck Officers (In-House)	O	✓	✓																				
(PH) P.E.O.S and H.R	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(PH) Shiphandling (In-House)	O	✓	✓	✓																			
(PH) Ship's Catering Services - NC2	O																	✓	✓	✓			
(PH) Ship's Catering Services NC1	O																			✓			
(PH) Work Attitude and Value Enhancement Seminar	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Offshore Courses/Course (w/ Validity)																							
(N/A) Basic Offshore Safety & Emergency Course, OL...	P	✓	✓	✓			✓			✓	✓												
(N/A) Basic Offshore Safety & Emergency Course, OP...	P	✓	✓	✓				✓	✓	✓		✓			✓	✓	✓			✓	✓		
(N/A) Helicopter Landing Officer Course OLF (2 yr)	P	✓	✓							✓													
(N/A) Helicopter Underwater Escape Course	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Rescue at Height - Rescue Genie Course	P	✓	✓							✓													
(N/A) Sparrows 3 (Offshore Crane Operator Stage 3)	P							✓															
(N/A) Line Training - HLO OLF	–	✓	✓							✓													
Medical																							
(N/A) Health Certificate	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Yellow fever vaccination	P	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Drug and Alcohol Test	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(PH) Yellow fever vaccination	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Passport																							
(N/A) Passport	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Seaman's Book																							
(BS) Seaman's Book	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Seaman's Book	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Test																							
(N/A) Competency Evaluation System (CES)	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
(N/A) Marlins English Test	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Employment Documents																							
(PH) P. D. O. S. Certificate	M	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Internal Documents																							
(N/A) Appraisal Report (Crew Evaluation)	O	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Legend

✓ – Required on Rank

Requirement By

M – Mandatory
P – Principal
O – Owner/Operator
I – Internal

Tanker

The competency matrix for a tanker by an international ship management company21. For distribution on position see next page.

The competence from the heading “End of compulsory certificate training…..” is additional to training that can be expected from a candidate qualified through normal maritime education. Courses down to “Course” are STCW competencies that are not a mandatory part of general education and are only relevant for specific ship types or duties not found on general ships.

M – Mandatory from education

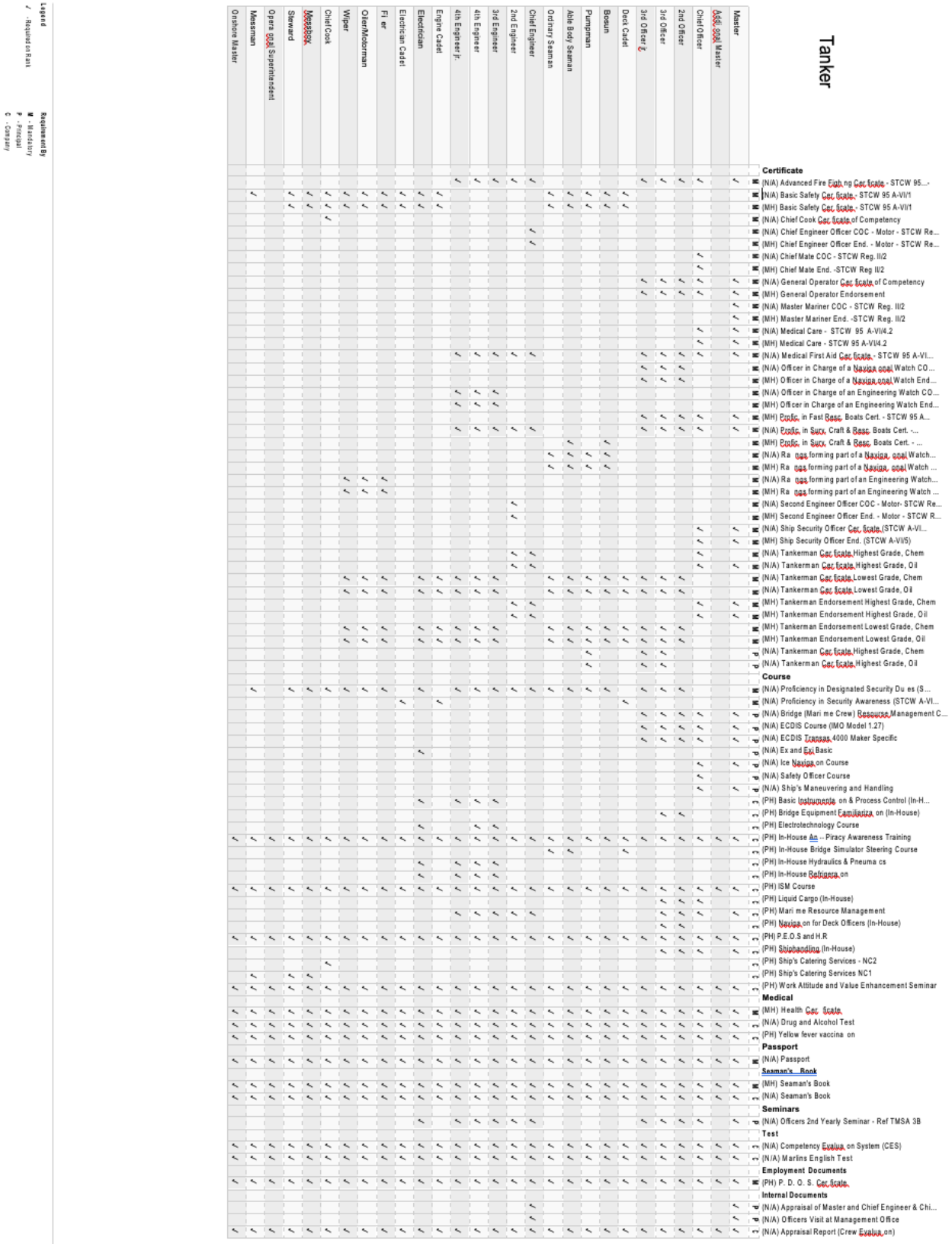
P – Principal – required by customer/principal

C – Company – required by shipping management company

		Certificate
M	CoC	(N/A) Advanced Fire Fighting Certificate - STCW 95...
M	CoC	(N/A) Basic Safety Certificate - STCW 95 A-VI/1
M	CoC	(N/A) Chief Cook Certificate of Competency
M	CoC	(N/A) Chief Engineer Officer COC - Motor - STCW Re...
M	CoC	(MH) Chief Engineer Officer End. - Motor - STCW Re...
M	CoC	(N/A) Chief Mate COC - STCW Reg. II/2
M	CoC	(MH) Chief Mate End. -STCW Reg II/2
M	CoC	(N/A) General Operator Certificate of Competency
M	CoC	(MH) General Operator Endorsement
M	CoC	(N/A) Master Mariner COC - STCW Reg. II/2
M	CoC	(MH) Master Mariner End. -STCW Reg. II/2
M	CoP	(MH) Medical Care - STCW 95 A-VI/4.2
M	CoP	(N/A) Medical First Aid Certificate - STCW 95 A-VI...
M	CoC	(N/A) Officer in Charge of a Navigational Watch CO...
M	CoC	(MH) Officer in Charge of a Navigational Watch End...
M	CoC	(N/A) Officer in Charge of an Engineering Watch CO...
M	CoC	(MH) Officer in Charge of an Engineering Watch End...
M	CoC	(N/A) Second Engineer Officer COC - Motor- STCW Re...
M	CoP	(N/A) Profic. in Surv. Crafts & Resc. Boats Cert. -...
M	CoC	(MH) Second Engineer Officer End. - Motor - STCW R...
	CoP	End of Compulsory certificate training, the start of additional training
M	CoP	(MH) Profic. in Fast Rescue Boats Cert. - STCW 95 A...
M	CoP	(N/A) Ratings forming part of a Navigational Watch...
M	CoP	(MH) Ratings forming part of a Navigational Watch ...
M	CoP	(N/A) Ratings forming part of an Engineering Watch...
M	CoP	(MH) Ratings forming part of an Engineering Watch ...
M	CoP	(N/A) Ship Security Officer Certificate (STCW A-VI...
M	CoP	(MH) Ship Security Officer End. (STCW A-VI/5)
M	CoP	(N/A) Tankerman Certificate Highest Grade, Chem

M	CoP	(N/A) Tankerman Certificate Highest Grade, Oil
M	CoP	(N/A) Tankerman Certificate Lowest Grade, Chem
M	CoP	(N/A) Tankerman Certificate Lowest Grade, Oil
M	CoP	(MH) Tankerman Endorsement Highest Grade, Chem
M	CoP	(MH) Tankerman Endorsement Highest Grade, Oil
M	CoP	(MH) Tankerman Endorsement Lowest Grade, Chem
M	CoP	(MH) Tankerman Endorsement Lowest Grade, Oil
P	CoP	(N/A) Tankerman Certificate Highest Grade, Chem
P	CoP	(N/A) Tankerman Certificate Highest Grade, Oil
M	CoP	(N/A) Proficiency in Designated Security Duties (S...
M	CoP	(N/A) Proficiency in Security Awareness (STCW A-VI...
P	CoC*	(N/A) Bridge (Maritime Crew) Resource Management C...
P	CoC*	(N/A) ECDIS Course (IMO Model 1.27)
P	o	(N/A) ECDIS Transas 4000 Maker Specific
P	o	(N/A) Ex and Exi Basic
P	o	(N/A) Ice Navigation Course
P	o	(N/A) Safety Officer Course
P	o	(N/A) Ship's Maneuvering and Handling
C	o	(PH) Basic Instrumentation & Process Control (In-H...
C	o	(PH) Bridge Equipment Familiarization (In-House)
C	o	(PH) Electrotechnology Course
C	o	(PH) In-House Anti-Piracy Awareness Training
C	o	(PH) In-House Bridge Simulator Steering Course
C	o	(PH) In-House Hydraulics & Pneumatics
C	o	(PH) In-House Refrigeration
C	o	(PH) ISM Course
C	o	(PH) Liquid Cargo (In-House)
C	CoC*	(PH) Maritime Resource Management
C	o	(PH) Navigation for Deck Officers (In-House)
C	o	(PH) P.E.O.S and H.R
C	o	(PH) Shiphandling (In-House)
C	o	(PH) Ship's Catering Services - NC2
C	o	(PH) Ship's Catering Services NC1
C	o	(PH) Work A□tude and Value Enhancement Seminar

- 19 competencies are CoCs and are the mandatory minimum and thus part of basic education
- 42 are COC or CoP or others that are additional to a mandatory minimum and need to be conducted at the expense of the shipping company or the seafarer.



Competence Matrix Crew Management Company 2013

Denotes Required on Rank, M – Mandatory, P – Principal, C – Company, I – Internal

2.10 Shipping industry

Shipowners and ship managers are organised in a number of groups, and some of them are very influential in setting training standards, including establishing their own academies. Most, if not all, of these training programmes are additional to STCW and aimed at the safety and efficiency of operations and ship management. As such, this is a strong indicator of the additional competence required by the industry that is not delivered through MET education and, as such, indicates mismatches.

3. Structural mismatches (that lead to skills gaps)

The IMO Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) is a global regime governing the minimum competence standard and certification requirements. This global regime has now been in place for over 40 years.

Though seafaring is age-old employment-generating sector, as international trade has grown, it has evolved into globalisation and this favoured collaboration in the form of clusters. The clusters enabled increased recruitment of professionals and semi-skilled human resources from different countries worldwide [22]. This has resulted in a shift from national to multinational crews. This change contributes strongly to shipping becoming more dynamic[23]. Although the IMO STCW has resulted in standardised competency requirements, the shipping industry clearly requires different additional qualifications. These new skills and competences put pressure on the IMO STCW Convention to change. However, extending skills and competencies is a key to competitiveness, so the shipping industry doesn't wait for international standards to change but instead adopts its own standards. Maritime clusters promote collaboration with private and public actors to generate this know-how that updates future skill sets[24].

As discussed in previous chapters, skills mismatches are discrepancies between the demand and the supply of skills in the labour market, where the skills needs are different from the skills offered.

We have identified significant gaps between current qualifications according to the IMO STCW Convention and the industrial need at a Higher standard. This is investigated and described in the SkillSea reports Current skills need (D1.1.2), Future skills and competence needs (D1.1.3), and a summary in Skills and competence gap (D1.2.2). The STCW Convention and its accompanying STCW Code were most recently reviewed before adopting the 'Manila Amendments' in 2010. However, despite significant reviews, our view is that the gaps between the highest standard and minimum requirements are growing.

The International Chamber of Shipping (ICS) has also considered the adequacy of the current IMO STCW regime. In 2019, the ICS Board endorsed a recommendation by the ICS Manning and Training Sub-Committee that ICS should request IMO to conduct a comprehensive review of the STCW regime[25]. Also, the ICS raises questions about whether the convention continues to meet the industry's requirements in the 2020s.

We have identified the following three mismatches discussed in the following.

1. Mismatch between the supply of seafarers with certificates according to the IMO STCW and the shipping industry demand for competence at a Higher standard

2. Competence obtained in addition to STCW is not recognised by higher education institutions and does not count towards a university degree

[22] Maritime 2050. UK Gov. Department Transport.
[23] Lee, P. and Cullinane K. Dynamic shipping and port development in the globalized economy. Palgrave Macmillan, 2016
[24] EU. Cluster ACT Cluster ACT
[25] https://www.ics-shipping.org/current-issue/a-review-of-the-stcw-convention-2020/

Training and certification in addition to the IMO STCW Convention in different countries and regions are not valid under another

3.1 Mismatch between the supply of seafarers with certificates according to the STCW and the shipping industry demand for competence at a Higher standard

The IMO and the STCW Convention have successfully established a global standard defining the minimum competence level for seafarers. When graduating from METs, seafarers have been qualified against the same STCW standards and are to a high degree seen as equally competent. The shipping sector in Europe is of great importance to the European economy and has been a catalyst for economic development and prosperity throughout its history. METs, vocational schools and universities, no matter which EQF levels they offer, comply with the STCW Convention and have successfully established training courses to prepare qualified seafarers in Europe.

The education and training of seafarers have evolved over the years. New and improved rules have been adopted in steps, with the establishment in 1978 of the IMO STCW Convention as the landmark of setting a standard. Since then, the competency requirements laid down by STCW have been revised in 1995 and 2010. The next revision is due in 2021-2025[26].

Some are calling for a revision sooner rather than later, such as the chairman of the global ship owners' organisation, the International Chamber of Shipping (ICS), who expressed in a speech in January 2019 and reported by safetyatsea.net[27]:

> *"...it was common for employers to routinely provide additional training and assessments prior to the deployment of officers holding STCW certification. He said this questioned whether the convention was "still fit for purpose in the 21st century".*
>
> *He called for a "fully revised" STCW regime that would allow the industry to adapt more effectively to fast-paced changes in technology, including increased automation. »*

The EU reviews the STCW Code and adopts the code with its own amendments, mostly to do with recognition of competency and certificates across nationalities. This is laid down in directives corresponding to the STCW Convention updates, the latest EU directive 2019[28], where the STCW 2010 Manila Amendments were implemented into EU law, with additional requirements such as a provision that member countries may set their own requirements for near-coast shipping:

> *"Without prejudice to paragraph 2 of this Article, the competent authorities of a host Member State may impose further limitations on capacities, functions and levels of competence or proficiency relating to near-coastal voyages, as referred to in Article 7, or alternative certificates issued under Regulation VII/1 of Annex I."*

This is further elaborated in the ICS publication "A review of the STCW Convention 2020"[29] Here, the powerful ICS states without reservation:

- *ICS members have concluded that a fully revised STCW regime would allow the industry to adapt much more effectively to fast-moving technological developments, including increased automation. A revised Convention could provide a structure with sufficient flexibility to meet the demands of a rapidly evolving world fleet and permit a more modular approach to competency accumulation and certification than is possible under the current regime. The arrival of new technology concerning navigation, engineering and propulsion systems (including the use of alternative fuels) is already*

26 https://safetyatsea.net/news/2019/unions-consult-members-on-possible-stcw-changes/
27 https://safetyatsea.net/news/2019/shipowners-call-for-stcw-revision/
28 EU Directive 2019/1159.pdf
[29] https://www.ics-shipping.org/current-issue/a-review-of-the-stcw-convention-2020/

changing the functions that
seafarers perform onboard ships and the competencies and training which they now require.

Most importantly, ICS believes that a comprehensive revision of the STCW Convention should seek to improve transparency and the robustness of implementation oversight with regard to the obligations of the IMO Member States that are responsible for the quality of their national training and certification systems.

In particular, this includes ensuring strict adherence by individual training institutes to delivering IMO competence standards, and a tightening of the approval process by governments of training colleges, especially those engaged in operational level ships' officer training

Unfortunately, it is still commonplace for employers to need to provide additional training and assessments prior to the deployment of many officers who have been issued with "certificate of competence"[30]

in the report D1.1.2 Current skills need we have dentified significant gaps between qualifications according to STCW minimum and expectations in the maritime industry. Obsolete skills in the STCW Convention are identified, and important missing topics are listed.

In the report D1.1.3 Future skills and competence needs significant shortcomings are identified. Digitalisation is transforming the shipping industry. 'Smart' ships are coming into service, creating demand for a new generation of competent, highly skilled maritime professionals. This level is illustrated as a Higher standard in Figure 4. Such technological advances, demand for green solutions and demographic changes may disrupt the labour markets. Some jobs changes or disappear, and others demand re-training where new and updated skills are needed. We have seen that the training market, in addition to STCW minimum level, is growing. The consequence is a mismatch between skills needed to operate and skills defined in the STCW Convention.

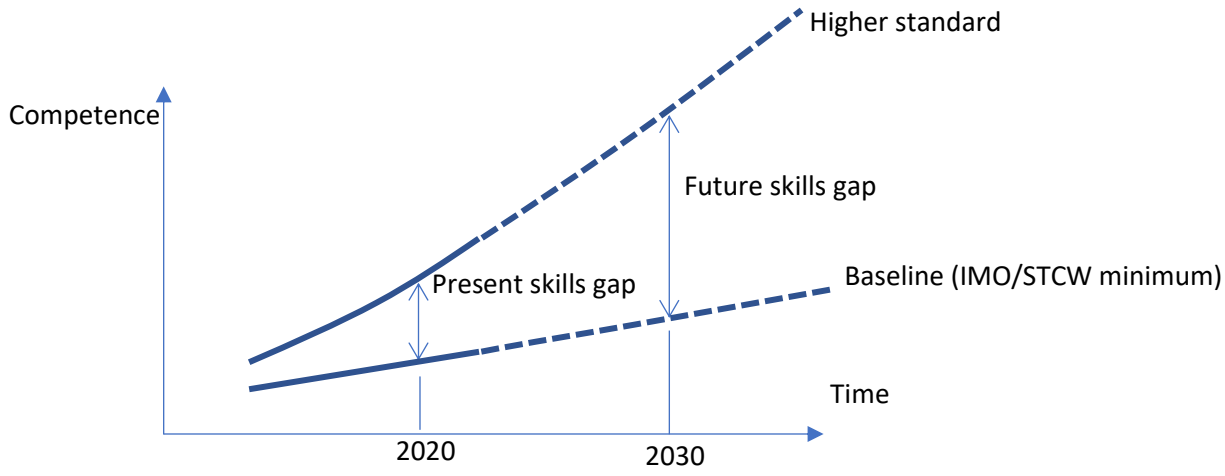


Figure 3: Mismatch of skill levels between IMO STCW and competence at a Higher standard.

Another key finding from the report D1.1.3 Future skills and competence needs is the importance of

[30] The words "Certificate of competence» is added by the author, as the source quoted seem to miss these which can be deducted from the intended meaning.

transverse skills in future maritime competencies. These are the skills needed to move from one value chain to another. Examples of transversal skills are logistics competence (transportation of heavy structures, warehouse management, supply chain management, etc.) and construction and repair of ships' steel sections. The maritime industry needs professionals who can bring their knowledge from one value chain into another to enable innovation and customer-oriented development.

3.2 Competence obtained in addition to STCW is not recognised by higher education institutions and does not count towards a university degree

Innovation is crucial in enabling European maritime industries to handle increased digitalisation, the green shift, and globalisation.

Seafarers have for decades contributed with operational maritime experience and knowledge to companies in the maritime sector. They are still crucial for realising much of the maritime industry's innovation potential. Seafarers can spot concrete innovation suggestions to shipping, ship design and equipment manufacturers, finance, port operations, and researchers who know the challenges presented by specific maritime innovations. Close interaction between users and researchers provides a faster and more precise path to new technology and solutions. If the European maritime industry continues to be a world leader, good education, research institutions, and the right competencies are crucial.

Some seafarers must be encouraged to transition to land-based occupations by acquiring transverse skills to make this happen. It is estimated that some 70% of shipping-related shore jobs[3] are knowledge-intensive, high-quality jobs. A possible shortage of maritime professionals may therefore 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.

Through mapping out the training and education programmes across Europe, we found that even though some education programmes did not lead to any formal university degrees, there was no significant difference with programmes that offered bachelor's and master's degrees to seafarers. However, both degree and non-degree education were based on the same basic competence – STCW-minimum competence.

A key finding from the report D1.1.3 Future Skills and Competence Needs is the importance of transverse skills within future maritime competencies. These are the skills needed to move from one value chain to another. Examples of transversal skills are logistics competence (transportation of heavy structures, warehouse management, supply chain management, etc.) and construction and repair of ships' steel sections. The maritime industry needs professionals who can bring their knowledge from one value chain into another to enable innovation and customer-oriented development.

Since seafarers are formally required to meet STCW requirements, their talent in a land-based role is not revealed through education. This leaves it up to the industry to discover seafarers who can make the transition to land. In this process, both sides may take a considerable risk, insofar as the seafarer is taking on tasks and obligations for which they are not formally trained on the one hand, and the landside employer in hiring a person not formally qualified for the role on the other hand.

The consequence of this is that to meet future industry needs maritime education should reveal and classify seafarers' potential to make a future transition to land-based roles. This is probably best done through Bologna process education where leadership, digital and sustainable competence programmes are included.

Currently, most maritime education and training aims to further the seagoing career, and there is little availability of transitional training programmes. Career paths towards landside occupations are almost invisible. Although classical maritime training is recognised as such in the maritime industrial community, it

fits very poorly to landside job descriptions.

Mobility and possibilities to enter a variety of occupations are also needed to attract young talents.

3.3 Additional training not recognised across member countries

Training and certification, in addition to the IMO STCW mandatory minimum (CoC), are subject to approval by national maritime authorities. They therefore can only be conducted in the country issuing the original CoC of the maritime professional. As such, training programmes (CoPs) are not recognised across countries, even though a CoC is recognised through endorsement.

Many METS and maritime organisations have established extensive training programmes, and some have established their own academies to support their members in safe and efficient shipping. These programmes are almost exclusively additional to STCW.

In the future, much more additional competence will be required, both to further the seagoing career and to transition to land. These competencies are rarely or not at all required by STCW but are coming from formal and informal sources such as industry organisations, industry best practices, new technology requirements and advanced operations.

The figure below shows the elements of maritime competence and training where:

- the red-top layer establishes the international competence requirements
- the green layer relates to national and regional requirements
- the yellow layer relates to national and local requirements within nations
- the blue layer signifies international as well as regional, and national requirements

The figure illustrates what we have found in this analysis. The top layer sets the requirements and is interpreted through two layers, green and yellow and by many different bodies on its way to the blue layer of seafarers who are then by definition at the same level of competence for the same occupational profiles. This is formally correct as per certificates even if there are differences: some educational programmes deliver STCW only while others have added BSc and even MSc, but these competencies do not count towards the STCW certification.

This model is understandably causing a number of differences in achieved competence due to the layers. The red layer setting the standard is doubly indirectly influencing standards. This causes a lot of effort from many players to supplement and add to the level of STCW. Most notably, STCW issues Guidance and Model Courses to help countries implement training to meet STCW requirements. These are only issued as supporting documentation, and many states implement the courses differently, which is perfectly fine. This has caused confusion and difficulties both for ship owners and seafarers when recommendations are suddenly treated as requirements[31]

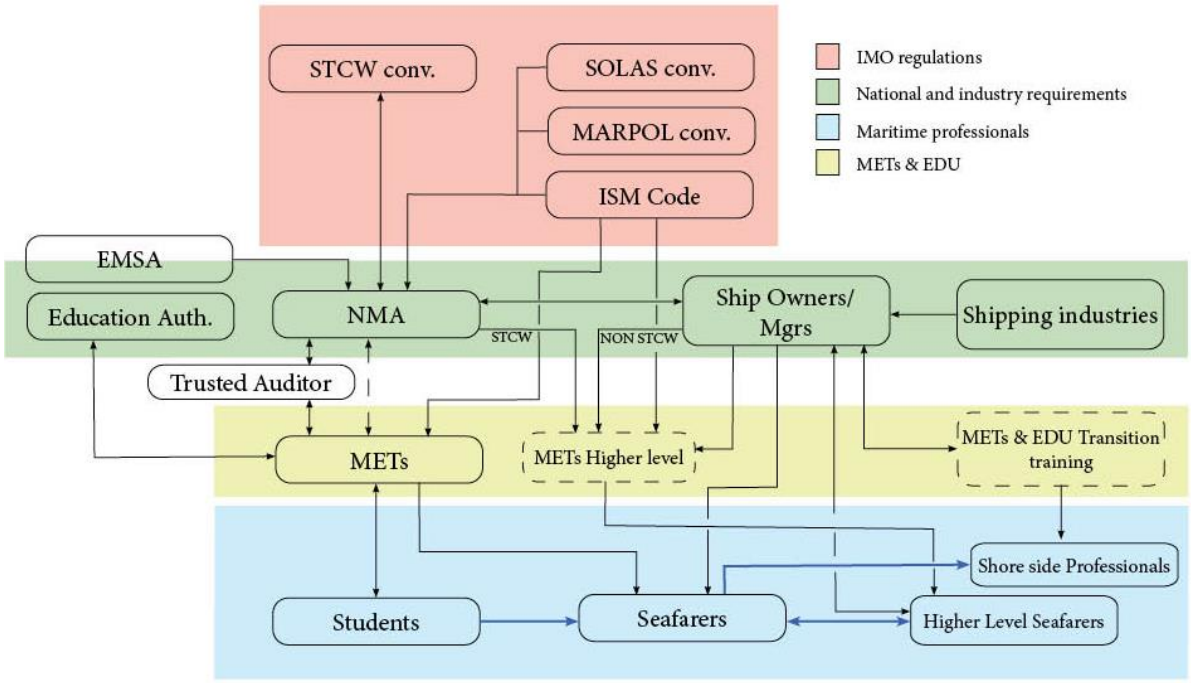


Figure 4: Maritime Training and Education Overview

As can be seen from this report, the shipping industry's response is to establish their training programmes and even training academies, where the majority of training is outside of STCW requirements. In figure 6, we have indicated with dotted lines the entities that might be capable of resolving the mismatches

4.Conclusion

The IMO and the STCW Convention have successfully established a global standard defining the minimum competence level for seafarers. When graduating, seafarers have been qualified against the same STCW standards and are seen as equally competent in formal certificate requirements. The shipping sector in Europe is of great importance to the European economy and has been a catalyst for economic development and prosperity throughout its history. METs, vocational schools and universities – no matter which EQF levels they offer – comply with the STCW Convention and have successfully established training courses to prepare qualified seafarers in Europe.

The education and training of seafarers have evolved over the years. New and improved rules have been adopted in steps, with the establishment in 1978 of the IMO STCW Convention as the landmark of setting

31 https://www.ics-shipping.org/docs/default-source/resources/safety-security-and-operations/industry-recommendations-for-ecdis.pdf?sfvrsn=6)

a standard. Since then, the competency requirements laid down by STCW have been revised in 1995 and 2010. The next revision is due in 2021-2025[1].

We have in the report D1.1.2 Current skill needs identified significant gaps between qualifications according to STCW and expectations in the maritime business. Obsolete skills in the STCW Convention are identified, and important missing topics are listed.

In the report D1.1.3 Future skills and competence needs significant shortcomings are identified. Digitalisation is transforming the shipping industry. 'Smart' ships are coming into service, creating demand for a new generation of competent, highly skilled maritime professionals. Such technological advances, demand for green solutions and demographic changes may disrupt the labour markets. Some jobs changes or disappear, and others demand re-training where new and updated skills are needed. We have seen that the training market, in addition to STCW minimum level, is growing. The consequence is a mismatch between skills needed to operate and skills defined in the STCW Convention.

In this report, we have reviewed STCW-related courses and programmes and found that out of a total of 412 programmes, 313 are not connected with an academic degree.

We find the key structural mismatches to be:

1) The industry need for competence materialises and is clearly visible through a large number of training courses and programmes offered by the shipping industry and associated METs to its members and the maritime professionals in general. There is no efficient pathway to communicate these industry needs in a coordinated manner to METs, maritime authorities and the IMO, who are all part of the process to establish such new competence courses and programmes.
    a) This leads to a huge variety and high number of courses that overlap in content and purpose, and there is no coordinated recognition
2) Competence obtained in addition to the STCW minimum is not recognised by higher education institutions and does not count towards a university degree.
3) Training and certification, in addition to the IMO STCW minimum, are subject to approval by national maritime authorities. They, therefore, can only be conducted in the country issuing the original CoC of the maritime professional. (Endorsement for education is possible but not an endorsement for the additional course)

This is a barrier to internationalisation and mobility, as seafarers crossing borders pose a potential burden for their employer when the certificate needs updating. The seafarer in today's system has to travel back to his/her home country to conduct additional training. This is a paradox, since the seafarer working in another country than their home country/certificate-issuing country is working with Endorsement of the certificate which acknowledges the certificate based on the IMO "White List", see 0 STCW White List – (list of countries adhering sufficiently to the code).

5. Attachments

5.1 Shipping industry associations and interest groupings

Below are listed some significant industry associations and interest groupings that play a part in providing competence above and beyond STCW to seafarers. This is not an attempt to provide a complete list but it does set out some key providers that organise and represent the shipping industry and a selection of training providers. Other private organisations that deliver maritime training as a business opportunity, purely responding to demand, are not listed here. These are also responding to shipping industry needs, but merely responding to such needs.

ICS – International Chamber of Shipping

ICS is the principal international trade association for merchant ship owners and operators, representing all sectors and trades and over 80% of the world merchant fleet.

The ICS chairman Esben Poulsson stated in a speech in January 2019 reported by safetyatsea.net32:

The IMO convention was reviewed in 2010, with the relatively minor 'Manila amendments' adoption, but the previous major overhaul of the STCW regime was last undertaken by IMO member states more than 25 years ago. Poulsson explained that ICS increasingly views the STCW 2010 amendments as an interim revision that added some new training and certification provisions without making the structural changes needed to accommodate developments in training or the competences that would be required to operate ships in the future.

Poulsson said it was common for employers to routinely provide additional training and assessments prior to the deployment of officers holding STCW certification. This, he said, called into question whether the convention was "still fit for purpose in the 21st century".

He called for a "fully revised" STCW regime that would allow the industry to adapt more effectively to fast-paced changes in technology, including increased automation.

ICS works on key issues relevant to their members' interests: safety and environment, employment affairs, legal, shipping and trade policy.[33]

Even though the ICS does not directly offer training programmes on its website, it is apparent from Mr Poulsson's statement that the organisation is in support of increasing seafarers' competence, be it within or outside of IMO.

The ICS document on revising STCW 2020 has since reinforced this.

Lloyds Maritime Academy

LMA offers 115 courses, with a duration of up to 24 months and covering a curriculum similar to educational programmes at higher education institutions, including MBA In Shipping and Logistics.

With over 40 years of experience and more than 1,000 graduates every year, LMA understands what each sector requires and what maritime professionals need to know, do, and deliver to succeed in their careers.

Some selected programmes:

- Diploma in Digital Shipping - 12 months
- Certificate in Petroleum economics 12 weeks
- MSc Marine Technical Superintendent - 24 months
- MBA in Shipping and Logistics – 24 months
- Certificate in international oil and gas contract law – 12 weeks
- Advanced certificate in internal auditor in shipping – 12 weeks
- Certificate in dry dock planning and management – 12 weeks

32 https://safetyatsea.net/news/2019/shipowners-call-for-stcw-revision/

33 http://www.ics-shipping.org/key-issues/all-key-issues-(full-list)

- Diploma in Heavy lift and project cargo operations – 12 weeks
- Certificate in tanker cargo operations – 12 weeks
- Certificate in offshore field development – 12 weeks
- Certificate in supply chain management – 16 weeks
- Certificate in artificial intelligence in shipping – 12 weeks
- Certificate in big data in shipping – 12 weeks
- Certificate in ballast water management – 12 weeks

Intertanko

The International Association of Independent Tanker Owners (intertanko) 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. It has 192 members, operating 4,088 ships. The strategic work plan of Intertanko makes clear statements under item 2: Crew competence, that it promotes crew competence additional to the STCW Convention.

Training requirements

- Develop and monitor appropriate training requirements for seafarers to ensure they can properly operate all new equipment and systems onboard tankers.
- Advice and guidance on training requirements for new equipment and systems are manageable, resulting in reduced training costs and improved tanker safety and pollution prevention.

Intertanko produced ICMG[34] as competency guidance covering recommended core tanker technical skills beyond STCW certificates of competency for tanker officers.[35]

e-ICMG

- Ensure your tanker officers have the technical competencies needed to perform their duties to a recognised standard
- Shaped by a steering group of some of the most prestigious tanker operators and ship managers, e-ICMG benefits from the experience of experts operating the broadest range of chemical, crude and product tanker vessels.
- e-ICMG is highly compatible with soft-skill behavioural competency assessment and can be implemented alongside OCIMF-Intertanko 'Behavioural Competency Assessment and Verification for Vessel Operators' guidelines (BCAV).
- Ocean Technologies Group have worked with Intertanko to develop a digital adaptation of ICMG, for use within your competency management system, as e-ICMG
- Produced and verified by Intertanko and its members
- Comprised of 72 technical competencies: five for navigation, nine for mooring operations, 45 for cargo operations and 13 for engine
- Covers chemical, crude and product tanker operations
- Compatible with soft-skill assessment (e.g. e-BCAV)
- Available through the Ocean Technologies Group CMS
- Fully integrated into the Ocean Learning Platform

Competency Management System

- Create and implement competency assessment and verification (CAV) and competency management guidance as tools for assessing onboard competency, training requirements and managing promotions.
- Advice and guidance to increase the competence of crews, resulting in fewer accidents, detentions and increased operational efficiency of ships. Additionally, such a system will assist in the transition from a prescriptive crew matrix to one based on competency.
- From one tanker operator (Fugro), we have as an example the competence matrix of a tanker from 2015:

34 https://oceantg.com/competency-management-system/competency-management-packs/
35 https://oceantg.com/competency-management-system/

Intermanager

Has 43 members, covering around 5,000 ships and responsible for 250,000 seafarers worldwide. Its mission statement below indicates that it supports sharing of knowledge.

- To federate and serve the needs of all companies and organisations involved in the management and crewing of ships
- To encourage the highest standards of ship operations through innovation, creativity and the sharing of knowledge
- To provide a platform for discussion on matters of common interest
- To be the common voice of ship managers in the international forums and with international regulators
- To advocate efficiency, quality and ethics in ship management
- To promote a career of seafaring

Intercargo

Training, Manpower & Human Element

The International Association of Dry Cargo Shipowners (Intercargo) represents the interests of quality dry cargo shipowners and convened for the first time in 1980 in London. It has been participating with consultative status at the IMO since 1993. Intercargo is concerned about the number of seafarers available to meet the future needs of an expanding bulk carrier fleet and where these professionals might be sourced from. In addition, the adequacy of the existing training regime for the modern safety-conscious bulk carrier sector is being considered.

Intercargo policy

Intercargo believes that it will be necessary to give far more attention to the quantum and quality of seafarers' training if the future bulk carrier fleet is efficiently operated and accidents reduced.

Intercargo has commenced the formation of a Training and Manpower Correspondence Group to consider a policy with regard to:

- Issues connected with the supply and demand of seafarers for the expanding bulk carrier fleet
- Competency issues vis-à-vis the established STCW training regime
- Issues connected with the human element and how this interacts with casualties and other negative performance indicators noted in Intercargo's Benchmarking Report.

IMCA - International Marine Contractors Association

The International Marine Contractors Association (IMCA) is a leading trade association representing the vast majority of contractors and the associated supply chain in the offshore marine construction industry worldwide.

The members play a key role in the offshore oil & gas and renewable energy industries. Principally, this is through the engineering, procurement, construction, and installation of offshore wind farms and hydrocarbon production facilities, together with the ongoing life of field support and maintenance requirements of these assets.

IMCA is fully engaged in the energy transition for a sustainable, low carbon future. IMCA plays an important role in collaborating with members and other stakeholders to address the challenges of climate change and ensure environmental sustainability, particularly in the context of our ocean resources.

IMCA was formed in 1995 through the merger of the Association of Offshore Diving Contractors (AODC), established in 1972, and the Dynamically Positioned Vessel Owners Association (DPVOA), established in 1989. Consequently, operational roots and technical credentials are second to none in this industry. IMCA uses a solid technical and safety focus to develop comprehensive best practice operating standards for the industry to improve its performance.

IMCA is the leading voice for the offshore marine contracting industry.

IMCA publishes technical and operational guidance used globally across the offshore energy industry. This work enables IMCA to be a high-profile influencer in the industry, improving performance and driving up standards.

IMCA's vision is to be the global reference for developing all forms of marine energy resources in a low carbon future.

IMCA Training:

- Diving Supervisors
- Diving Supervisors CPD
- Life Support Technicians
- IMCA D 013 Diving Supervisors and LST
- IMCA D 020 Diver Medic Training
- Training providers
- DMAC Diving Medicine Courses
- IMCA D 001 Dive Technician
- Diver & Diving Supervisor Certification (1394)
- Competence Assessment Surface Divers (799)
- Minimum Criteria Surface supplied diver training (1384)
- Diver Training Certificates – acceptance criteria (1385)

The Dynamic Positioning (DP) Practitioner Accreditation Scheme was introduced in 2019. This scheme is an output of a cross-industry workgroup consisting of DP vessel owners/operators, training providers, DP consultants, major energy companies and relevant organisations. This workgroup was tasked by IMCA's Marine Division Management Committee in 2018 to devise a scheme to improve the consistency and conduct of DP Trials. Additionally, the scheme set an industry recognised level of knowledge for DP Practitioners responsible for developing, witnessing and reporting DP Trials in addition to those responsible for the management of the DP assurance processes.

Aims

- Improve the consistency and quality of DP trials
- Set a recognised level of knowledge for DP Practitioners responsible for developing, witnessing and reporting DP trials, and those responsible for the management of DP assurance processes
- Assure that DP Practitioners attending vessels for trials are accredited to a recognised standard
- Assure that personnel conducting DP assurance duties in both vessel operator and client offices are accredited to a recognised standard
- Meet the requirement of OCIMF's Dynamic Positioning Assurance Framework (2016), which calls for verification that shore-based DP personnel and DP Assurance Practitioners are qualified, experienced and competent

Categories

There are two categories within this accreditation scheme:

- DP Trials and Assurance Practitioner – A person actively involved in producing, witnessing and assessing the results of DP FMEA proving trials and DP annual trials programmes
- A Company DP Authority – A person who manages and provides advice on DP assurance processes and is typically employed within a DP vessel operator company or a DP vessel chartering company

The Marine Accident Investigators' International Forum – MAIIF

The Marine Accident Investigators' International Forum (MAIIF) is an international non-profit organisation dedicated to the advancement of maritime safety and the prevention of marine pollution through the exchange of ideas, experiences and information acquired in marine accident investigation. Its purpose is to promote and improve marine accident investigation, and to foster cooperation and communication between marine accident investigators. It has a membership of more than 50 national marine safety investigating authorities and its objectives of MAIIF are:

- To foster, develop, and sustain a cooperative relationship among national marine investigators to improve and share knowledge in an international forum.
- To improve maritime safety and the prevention of pollution through disseminating information gained in the investigative process.
- To encourage through cooperation the development, recognition, implementation and improvement of related international instruments, where appropriate.
- MAIIF members are guided by the principles of IMO MSC Resolution MSC.255(84): The Code of the International Standards and Recommended Practices for a Safety Investigation into a Marine Casualty or Marine Incident (Casualty Investigation Code) and IMO Resolution LEG.3(91): Guidelines on fair treatment of seafarers in the event of a maritime accident.

MAIIF achievements

- Casualty Analysis Working Group and Correspondence Group
- Casualty Investigation Code Res.MSC.255(84)
- Guidelines to assist investigators in the implementation of the CIC Res.A.1075(28)
- MAIIF Investigation Manual
- Model Course in Casualty Investigation
- Development of Voyage Data Recorders - Resource
- Investigators' in-the-field Job Aid

The Baltic and International Maritime Council - BIMCO

BIMCO is an owner/operator organisation offering training programmes to cater to the members' needs. https://www.bimco.org/training.

It is one of the largest of the international shipping associations representing shipowners, with its 1,900 members in more than 130 countries, representing approximately 60% of the world's merchant shipping tonnage.

BIMCO offers three ways for shipping professionals to learn. Each relies on trainers with years of hands-on experience. The courses are highly interactive, and much of the learning is derived from discussing examples from the participant's daily work-life.

- BIMCO Masterclasses
- BIMCO Seminars
- BIMCO Shipping Schools

In addition, e-learning is offered while the coronavirus pandemic restricts travel and meeting in person.

A list of non-STCW courses is offered in Masterclass type of training and Towage and Salvage Masterclass

1. Bills of Lading Masterclass
2. Ship Management Masterclass
3. Laytime and Demurrage Masterclass
4. Offshore, Project and Heavy lift Chartering Seminar
5. Time Charter Masterclass
6. Carriage Contracts, Liabilities & Cargo Claims Masterclass
7. Commodity Trading and Chartering Masterclass
8. Maritime law academy - Shipping School
9. Voyage Chartering Masterclass
10. SUPPLYTIME, WINDTIME & Renewables Seminar
11. Charter Party Workshop Masterclass
12. Sale and Purchase Seminar

BIMCO issues guidelines such as

- *The Guidelines on Cyber Security Onboard Ships*,
- Ice Navigation and Seamanship Handbook..

BIMCO about Masterclasses:

- Duration 2-3 days.

- The topics of the BIMCO Masterclasses are broad and cover a range of issues, such as marine insurance or time chartering.
- Experienced trainers will attend the Masterclass for the entire duration. The discussions and exchange of experiences between the trainers and the participants are integral to the learning objectives.
- All Masterclasses consist of lectures combined with group case studies. The case studies will serve as a future guide for the participants to identify solutions and apply those solutions in their daily work. Case studies are done in small teams, enabling participants to brainstorm solutions, apply their current experience and share knowledge.
- Every participant is encouraged to attend a 60-minute assessment at the end of the Masterclass. It is an open book test where the participant can demonstrate her understanding of the subject. The assessment will test the participant's ability to interpret, think critically and present an organised and well-written answer.
- All papers will be marked, and each participant will receive a BIMCO certificate based on the result; Attended; Passed, Merit, Distinction.

Oil Companies International Marine Forum - OCIMF

The Oil Companies International Marine Forum (OCIMF) is a voluntary association of oil companies interested in the shipment and terminal of crude oil, oil products, petrochemicals and gas. OCIMF focuses exclusively on preventing harm to people and the environment by promoting best practices in the design, construction and operation of tankers, barges and offshore vessels and their interfaces with terminals. OCIMF has more than 100 members.

OCIMF's mission is to lead the global marine industry in promoting 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. 'This is done 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 was granted consultative status at the IMO in 1971 and continues to present oil industry views at IMO meetings. The organisation provides a number of training courses:

- OVID New Inspector Courses
- OVID Refresher Courses
- SIRE Inspector Training Course

The Nautical Institute - NI

The Nautical Institute is an international professional organisation for maritime professionals, based in the United Kingdom. It was established in 1971 and now has more than 7,000 members in over 110 countries. The NI issues standards for Dynamic Positioning training, supporting 86 METs worldwide that are accredited to conduct DP training under the NI scheme.

In addition to DP training programmes, the NI offers a range of other training courses which are both aimed at STCW certificate requirements and outside of STCW:

ON-SITE COURSES:

Navigation Assessor, Onboard Competency Assessment, Rethinking Accident, Investigations - Towards Learning and Prevention, Blockchain for Maritime Decision-makers, Improving Performance Through the Human Element, Marine Incident Investigation & Analysis, Introduction to Shipping, Onboard Assessment.

ONLINE COURSES:

Basic Life Support and AED Training, ColRegs & IALA Buoyage, Crisis Management & Human Behaviour, Cyber Security at Sea, ECDIS, Enclosed Space Entry & Emergency Awareness, Environmental Officer, Ex Awareness Training, GMDSS, ISO 14001: Environmental Management, ISO 45001 Occupational Health & Safety Management, ISO 50001: Energy Management, (ISM) Designated Person Ashore, Leadership & Management (3 part course), LNG Bunkering: Respond Level Training, Marine Environmental Awareness, Maritime Labour Convention 2006 - For Ship's Masters, Maritime Security Awareness, Onboard Trainer &

Assessor, Risk Assessment at Sea, Safe Container Operations Training, Safety Officer, Survey & examination of lifting appliances, Vessel Resource Management, Vessel Structure and Ballast Tank Inspection, Working with Tugs.

1.1.1 Global Maritime Education & Training - GlobalMET

Has 60 member METs worldwide. GlobalMET has consultative status at the IMO, carrying out activities and research in the field of maritime training and education.

The establishment of GlobalMET arose from the participants' desire to support the aims and objectives of IMO for 'safer ships and cleaner oceans' and recognition of:

- The vital importance of maritime education and training in fulfilling the needs of expanding trade and economic growth.
- There is an urgent need for collective efforts in maritime education and training to promote greater safety at sea and protect the marine environment.
- GlobalMET has contributed to establishing several IMO Model courses[36]

1.1.2 The International Shipping Federation - ISF

ISF is the identity used by the International Chamber of Shipping (ICS) when acting as the international employers' organisation for ship operators. See ICS.

1.1.3 Maersk

We include Maersk here, which due to its size and dominant position in the market, is continuously setting trends as a market leader. Maersk operates seven own maritime training centres focusing mainly on seagoing personnel. In the area of leadership, the company has 27 modules (24 + 3) that are presented in a brochure. All are additional to STCW mandatory minimum requirements. These course modules are offered to other companies to participate in.

Maersk Leadership Courses

PPP – personal and professional planning

PPA – personal and professional assessment

ICP – individual performance coaching

module 1 leader self-awareness (incl. type profile)

module 2 company leader roles & responsibilities

module 3 value implementation workshop

module 4 situational leadership (SLII – high impact)

module 5 motivating performance feedback

module 6 performance appraisals training

module 7 onboard coaching and mentoring

module 8 advanced coaching (GROW – model)

36 https://globalmet.org/work-at-imo.aspx

module 9 crew development training management modules – overview

module 10 difficult conversations training

module 11 conflict management

module 12 safety leadership

module 13 daily work planning and prioritization

module 14 finance for non-financial managers

module 15 basic project management

module 16 basic communications in operational environments

module 17 relations management

module 18 work/life balance (stress prevention and handling)

module 19 cross-cultural awareness (generic workshop)

module 20 cross-cultural awareness (nationality specific)

module 21 human factors & performance shaping factors management modules – overview

module 22 train the trainer

module 23 team acceleration course

module 24 team building

These courses have been consolidated to 22 in the last version[37]

ASK Safety

This serves as an example of a small private training provider, of which there are hundreds similar. ASK Safety is a private company providing training for both STCW and non-STCW. For the offshore energy sector, wind and oil. The following courses beyond STCW minimum training are offered:

1. Combined course HLO / Search and Rescue I small FRC - refresher
2. Conventional lifeboat basic course (OSE135)
3. Conventional lifeboat refresher course (OSE135)
4. Emergency Management – Refresher (OER109)
5. Emergency management basic course (OER 109)
6. Emergency site - refresher (OER108)
7. Emergency Site Course (OER108)
8. Fast Rescue Craft (FRC) Basic course (OSE114) without night operation Fast Rescue Craft (FRC) basic course with night operation (OSE114)
9. Fast Rescue Craft (FRC) Night Operation
10. Fast Rescue Craft (FRC) Refresher course with night operation
11. Fast Rescue Craft (FRC) Refresher course without night operation (OSE114) Fitness test
12. HLO Refresher course (OSC1141)
13. HLO, Search & Rescue, combined course - refresher
14. NOG - Basic Safety and Emergency Training Course (GSK)
15. NOG - Basic Safety and Emergency Training Refresher Course (GSK rep)
16. NOG – First aid basic course, OFA 101
17. NOG – First aid refresher course, OFA 101
18. NOG – HUET (Helicopter underwater escape training)
19. NOG - Search and Rescue refresher course, OFI 100

37 https://f.nordiskemedier.dk/2tpakl8gehavaqia.pdf

20. NOG/ GSK Basic safety and emergency refresher course tor emergency personne1(1 day)
21. OLF OF1100 Search and rescue basic course
22. OLF OSE129 Coxswain skid launched lifeboat refresher course
23. OLF OSE129 Free-fall lifeboat basic course
24. Upgrade from BOISET / Opito to Norwegian Oil and Gas (Escape chute)
25. G5 Offshore crane
26. G20 Hydraulic crane
27. G4 Traverse crane
28. Banksman & Slinger course
29. CPR resuscitation equipment
30. HSE training for shipboard personnel
31. ISPS Company security officer

RelyonNutec

This serves as an example of a sizeable private training provider, of which there are many similar. The company offers 162 courses[38] for English-speaking candidates, listing here the 30 first. For Norwegian-speaking candidates, 434 courses and for German-speaking 53 courses, etc.

1. FOET with EBS + CA-EBS (NOGEPA 0.5B /OPITO 5858+5850)
2. BOSIET with EBS+ CA-EBS (NOGEPA 0.5A /OPITO 5700+5750)
3. Gas Measurement (NOGEPA 1.4)
4. ERRV Crew Initial Training Shipboard Operations (OPITO)
5. GWO: BST - Offshore (Blended: e-learning + practical)
6. H2S Introduction (NOGEPA 0.8)
7. BT+ AFF + PSCRB (STCW 3-combi refresher)
8. GWO: BST Refresher - Offshore (Blended: e-learning + practical)
9. GWO Basic Technical Training
10. Helicopter Underwater Escape Training (with Compressed Air Emergency Breathing System) OPITO 5295
11. GWO: BST - Manual Handling (Blended: e-learning + practical)
12. GWO: BST - Onshore (Blended: e-learning + practical)
13. GWO Enhanced First Aid
14. Basic Offshore Safety Induction and Emergency Training (BOSIET) with Emergency Breathing System (EBS) Digital Delivery (OPITO 5703)
15. GWO: BST - Sea Survival (Blended: e-learning + practical)
16. GWO: BST Refresher - Onshore (Blended: e-learning + practical)
17. Basic Banksman (NOGEPA 1.9A)
18. GWO: BST - Fire Awareness (Blended: e-learning + practical)
19. Management of Major Emergencies (NOGEPA 2.14A)
20. Proficiency in Fast Rescue Boats (STCW)
21. STCW Medical First Aid & Medical Care
22. GWO Slinger Signaller
23. GWO: BST - Working at Height (Blended: e-learning + practical)
24. Helicopter Underwater Escape Training Emergency Breathing System (OPITO)
25. GWO Advanced Rescue Training (HSIBR+NTBR)
26. Major Emergency Management Initial Response Training (OPITO)
27. Refresher Management of Major Emergencies (NOGEPA 2.14B)
28. GWO: BST - First Aid (Blended: e-learning + practical)
29. Proficiency in Survival Craft and Rescue Boats other than Fast Rescue Boats (STCW)
30. Basic Helicopter Landing Officer (NOGEPA 1.1A) + Member Fire Fighting and Rescue Team Offshore (NOGEPA 2.6A)

The International Federation of Shipmasters' Associations - IFSMA

IFSMA is headquartered in London. The secretariat is located close to the International Maritime Organisation (IMO). In 1975, IFSMA was granted consultative status as a non-governmental organisation at IMO, enabling the Federation to represent the views and protect the interests of serving shipmasters unfettered and unfiltered by others. To enable IFSMA to function effectively at IMO, it is represented by the Secretary-General and a team of active or former shipmasters who attend the four main committees: the Maritime Safety Committee, Maritime Environmental Protection Committee, the Legal Committee and the Facilitation Committee. This team is also active in the nine sub-committees of IMO, their working and drafting groups, and attending the Council meetings and the assemblies.

IFSMA has a history of submitting relevant papers on various aspects to the committees and sub-committees of IMO, which often result in successful debates leading to MSC Circulars and improvements in various instruments. IFSMA is a strong supporter of the IMO in its quest for safer shipping and cleaner oceans. **The** Federation desires to assist IMO in achieving a genuinely global implementation and rigorous enforcement of its international treaties so that there is no need for any country to resort to regulatory

[38] https://relyonnutec.com/training/courses/?CountryName=Netherlands&TrainingCenters=8612,3810,3026

measures on either a national or a regional basis.

IFSMA members are provided with the facility to access the IMO documents website for research and information purposes. With prior consultation, may join the IFSMA delegation in committee and sub-committee sessions. IFSMA frequently needs subject matter experts to assist it in IMO working, drafting and correspondence groups.

International Group of P&I Clubs - IGP&I

The 13 P&I Clubs which comprise the International Group (the "Group") between them provide marine liability cover (protection and indemnity) for approximately 90% of the world's ocean-going tonnage. Through the unique Group structure, the member clubs, whilst individually competitive, share their significant loss exposures and share their respective knowledge and expertise on matters relating to ship owners' liabilities and the insurance and reinsurance of such liabilities. A qualification for the P&I industry produced by the International Group of P&I Clubs:

First launched in 2010, the International Group's P&I Qualification (P&IQ) programme has been hugely successful, with over 2,000 examinations taken and many candidates achieving the whole qualification. Providing high quality, targeted education, it has, over the years, become acknowledged in its own right within the P&I industry and the broader insurance market as a unique and challenging standalone professional qualification.

What topics does the P&IQ cover?

The P&IQ programme consists of seven modules covering the following topics:

- The Shipping Business
- P&I Insurance History, Operation and Practice
- Underwriting, Loss Prevention and Claims Handling
- People Risks
- Cargo Risks
- Collision, FFO & Pollution
- Towage, Salvage, General Average & Wreck Removal

What qualifications will I receive?

Candidates can gain three levels of qualification tailored to suit all levels of knowledge and experience as follows:

- The P&IQ Certificate is an introductory qualification ideal for candidates new to the industry or those seeking to enhance existing knowledge or looking for a general background qualification. The P&IQ Certificate is achieved by successfully completing online examinations in Modules 1, 2 and 3 and must be completed before a candidate can move on to take the P&IQ Advanced Certificate.
- The P&IQ Advanced Certificate is of a more specialist nature and builds on the knowledge gained in studying for the P&IQ Certificate. The P&IQ Advanced Certificate is achieved by successfully completing online examinations in Modules 4, 5, 6 and 7 and must be completed before a candidate can move on to take the P&IQ Diploma.
- The P&IQ Diploma is the highest level of qualification. It takes the form of an additional rigorous Module 8 written examination, which will test the ability to apply all the knowledge gained in the previous two levels of qualification to practical scenarios faced by those involved in the P&I Industry. A candidate must have achieved the P&IQ Certificate and Advanced Certificate before moving on to study for the P&IQ Diploma.

How is the programme delivered?

- P&IQ is delivered online, providing professional learning materials for self-study, eliminating the costs associated with attending training sessions or seminars.
- All exams are delivered directly to candidates via state of the art remotely invigilated exams. This allows candidates anywhere in the world to undertake exams from the convenience of their own office on a software platform, which provides dynamic, auto marking questions without compromising the quality and rigour of the qualification.

International Maritime Pilots' Association - IMPA

The association was formed on the initiative of pilots' associations from the five continents whose representatives met in Kiel, Germany, in June 1970. IMPA was officially launched in Amsterdam in May the following year. To date, it represents over 8,000 pilot members in 49 countries.

PILOT TRAINING AND CERTIFICATION

- The IMO Assembly in 2003 adopted resolution A.960(23) Recommendations on training and certification and operational procedures for maritime pilots other than deep-sea pilots, which includes Recommendation on Training and Certification of Maritime Pilots other than Deep-sea Pilots and Recommendation on Operational Procedures for Maritime Pilots other than Deep-sea Pilots.
- IMO Resolutions encouraging the use of pilots onboard ships in certain areas.
- IMPA has developed an extensive guide on "Recommendations on training and certification and operational procedures for maritime pilots".

Offshore Petroleum Industry Training Organisation - OPITO

OPITO is the global, not-for-profit, skills body for the energy industry. More than 375,000 people are trained to OPITO standards every year in more than 50 countries through 200 accredited training centres. With operation centres in four regions - UK and Europe, Middle East and Africa, Asia Pacific and the Americas - OPITO is driving safety and competency improvements to benefit the industry. The industry-owned organisation also works with governments, national oil companies, operators and contractors, offering a range of services and products to meet international skills needs and support workforce development.

In partnership with industry stakeholders[39], OPITO identifies the needs and requirements for new and improved training and competence standards for both onshore and offshore. OPITO produces world-class, industry-driven standards recognised globally and ensures that approved training providers deliver training in compliance with these standards. The training programmes are mainly in the areas of maintenance, operation and emergency response.[40]

OPITO Competence programs.

1. Application of Insulation Systems Competence Assessment Level 2
2. Application of Insulation Systems Training
3. Authorised Gas Tester Training
4. Authorised Gas Tester Training Digital Delivery
5. Banksman and Slinger Training - Stage 1
6. Banksman and Slinger Training - Stage 3
7. Banksman and Slinger Training - Stage 4
8. Basic H2S Training
9. Further Offshore Emergency Response Team Leader
10. Basic Offshore Safety Induction & Emergency Training with (CAEBS) STCW 95/2010 Conversion
11. Basic Offshore Safety Induction and Emergency Training (BOSIET) for Renewable Energy (Wind) - Full Access
12. Basic Offshore Safety Induction and Emergency Training (BOSIET) for Renewable Energy (Wind) - Full Access Upgrade
13. Basic Offshore Safety Induction and Emergency Training (BOSIET) for Renewable Energy (Wind) - Limited Access
14. Basic Offshore Safety Induction and Emergency Training (with CA-EBS)
15. Basic Offshore Safety Induction and Emergency Training (with CA-EBS) Digital Delivery

39 The stakeholders also involve unions and ECSA, e.g., ref. ITF in IMO committees, ITF STCW guidance, ITF presentation at IAMU conference, ITF Accredited Representative to the IMO. Also involvement of ETF at EU-level consultations regarding the topic.

40 https://downloads.opito.com/downloads/Standards/basic-emergency-response/Standards-Review-Calendar-May-2019.pdf?mtime=20190521161947&focal=none

16. Basic Offshore Safety Induction and Emergency Training (with EBS)
17. Basic Offshore Safety Induction and Emergency Training (with EBS) Digital Delivery
18. Basic Onshore Emergency Response
19. Blaster Sprayer Competence
20. Blaster/Sprayer Training
21. BOSIET Bridging Elements
22. BOSIET for Renewable Energy (Transition) - Full Access
23. BOSIET for Renewable Energy (Transition) - Limited Access
24. Command and Control for ERRV Masters and Mates
25. Competence Assessor
26. Compressed Air Emergency Breathing System (CA-EBS) Initial Deployment Training
27. Compressed Air Emergency Breathing System CA-EBS (Delivered in conjunction with TBOSIET)
28. Compressed Air Emergency Breathing System CA-EBS (Delivered in conjunction with TFOET)
29. Compressed Air Emergency Breathing System CA-EBS (Delivered in conjunction with THUET)
30. Control of Work Refresher Training for Performing Authorities
31. Control of Work Training for Performing Authorities
32. Control Room Operator
33. Dangerous Goods By Sea
34. Drilling Rigger Competence Assessment/Reassessment Standard
35. Elected Safety Representatives Development Training Module 1
36. Elected Safety Representatives Development Training Module 2
37. Elected Safety Representatives Development Training Module 3
38. Elected Safety Representatives Development Training Module 4
39. Emergency Breathing System
40. Emergency Coordinator for Renewable Energy (Wind)
41. ERRV Crew Advanced Medical Aid
42. ERRV Crew Daughter Craft Coxswain
43. ERRV Crew Fast Rescue Craft Boatman
44. ERRV Crew Fast Rescue Craft Coxswain
45. ERRV Crew Initial Training Shipboard Operations
46. ERRV Further Crew Advanced Medical Aid
47. Escape Chute Training
48. Fire Proofing Training
49. Fire Warden Competence Standard
50. Further Offshore Emergency Response Team Member
51. Further Offshore Emergency Response Team Member
52. Further Offshore Emergency Train
53. Further Offshore Emergency Training (FOET) for Renewable Energy (Wind) - Full Access
54. I Further Offshore Emergency Training (FOET) for Renewable Energy (Wind) - Limited Access
55. Further Offshore Emergency Training (with CA-ESS)
56. Further Onshore Emergency Response
57. Gas Monitor Training
58. Gas Monitoring Training Digital Delivery
59. Helicopter Landing Officer (HLO) for Normally Unattended Installation (NUI) Operations Further Training
60. Helicopter Landing Officer (HLO) for Normally Unattended Installation (NUI) Operations Initial Training
61. Helicopter Landing Officer (HLO) Workplace Competence Assessment
62. Helicopter Underwater Escape Training
63. Helicopter Underwater Escape Training (with CA-ESS)
64. Helideck Assistant (HDA) Workplace Competence Assessment
65. Helideck Emergency Response Team Leader (HERTL) Further Training - HERTLF
66. Helideck Emergency Response Team Leader (HERTL) Training
67. Helideck Emergency Response Team Leader (HERTL) Workplace Competence Assessment
68. Helideck Emergency Response Team Member (HERTM) Further Training - HERTMF
69. Helideck Emergency Response Team Member (HERTM) Training
70. Helideck Emergency Response Team Member (HERTM) Workplace Competence Assessment
71. Helideck Operations Initial Training
72. Internal Verifier
73. International Minimum Industry Safety Training
74. Lead Fire Warden Competence Standard

75. LOLER Competent Person (Competence Re-Assessment)
76. LOLER Competent Person Assessment
77. Major Emergency Management Initial Response (MEMIR) for Renewable Energy (Wind)
78. Major Emergency Management Initial Response Training
79. Minimum Industry Safety Training
80. Minimum Industry Safety Training (MIST) Further Training Standard
81. Minimum Industry Safety Training (MIST) Further Training Standard
82. Minimum Industry Safety Training for Experienced Workers
83. Offshore Crane Operator - Stage 1 Introductory Training
84. Offshore Drilling Industry Greenhand
85. Offshore Emergency Response Team Leader
86. Offshore Emergency Response Team Member
87. Offshore Helideck Assistant (HOA) Initial Training
88. Offshore Lifeboat Coxswain
89. Offshore Lifeboat Coxswain Further Training (Free Fall)
90. Offshore Lifeboat Coxswain Further Training (Single Fall)
91. Offshore Lifeboat Coxswain Further Training (Twin Fall)
92. Offshore Lifeboat Coxswain Supplementary Fall Training (Single Fall)
93. Offshore Lifeboat Coxswain Supplementary Fall Training (Twin Fall)
94. Offshore Lifeboat Coxswain Training (Free Fall)
95. Offshore Lifeboat Coxswain Training (Single Fall)
96. Offshore Lifeboat Coxswain Training (Twin Fall)
97. Offshore Radio Operator
98. Offshore Safety Representative
99. Offshore Safety Representatives Refresher Training
100. OIM Controlling Emergencies
101. Ongoing Onboard Development & Training Programme for ERRV Master and Crew
102. Onshore Control Room Operator Emergency Response Assessment
103. OPITO Global Engineering Foundation Training Certificate: Introduction to Mechanical and Electrical Engineering
104. OPITO Global Renewable Energy Foundation Training Certificate: Renewable Energy Foundation
105. Plant Manager/ Incident Commander
106. Preparation of Dangerous Goods for Transport by Sea (Refresher Training)
107. Rigger Competence - Stage 3
108. Rigger Competence - Stage 4
109. Rigger Training - Stage 1
110. Safe Driving at Work
111. Shallow Water CA-EBS Initial Deployment Training
112. Swimming Assessment
113. Travel Safely by Boat
114. Travel Safely by Boat - Further Training
115. Travel Safely by Boat - Supplementary Training
116. Tropical Basic Offshore Safety Induction and Emergency Training
117. Tropical Basic Offshore Safety Induction and Emergency Training Digital Delivery
118. Tropical Further Offshore Emergency Training
119. Tropical Helicopter Underwater Escape Training

Guidelines for Offshore Marine Operations - GOMO

GOMO make international guidance on offshore marine operations. Regional guidelines for the UK and the Norwegian offshore sector are also issued. The intention of the chapter on training and competence is to ensure that offshore marine operations are performed to an acceptable standard and in a controlled manner. The competence regimes in the industry are based on both international and national regulating bodies and best practices and guidelines[41].

Senior Watchkeepers in Charge of Anchor Handling (AH) Operations

Senior watchkeepers in charge of AH operations require relevant expertise. Watchkeepers allocated to charge of operations with no previous AH experience should perform at least 5 MOU moving operations accompanied by an AH experienced Master, or a suitable combination of rig moves and simulator training

41 http://g-omo.info/wp-content/uploads/2020/11/Chapter-5-rev-1.pdf

in accordance with training matrix and experience log, before they may command an AH assignment. AH, experience gained in a chief officer role is acceptable.

Officers

Officers involved in AH operations also require relevant expertise. In particular, officers must have a complete understanding of all safety aspects of anchor handling, especially concerning safe use and limitations of the equipment.

If supervising AH work on deck, the officer must have AH experience and be competent in AH procedures and guidelines, AH equipment set-up and function, and be familiar with associated hazards and risks.

Officers working on the bridge during AH and who may have tasks affecting the safety of those working on deck shall be familiar with AH deck work operations and the associated hazards and risks.

Vessel Winch Operators

The Vessel winch operators should be competent in the winch, safety systems, functions and limitations.

The Ship Owner should be able to document that appropriate on the job training, or a course has been given. A training certificate should be issued by Shipowner or a course centre.

Deck Crew

During AH operations, personnel assigned independent work on deck should be familiar with guidelines and procedures for this and AH safety. They should also be familiar with the use of UHF/VHF radio.

Able seamen with no previous AH experience must be trained in guidelines, procedures and safe equipment use before assignment to independent AH work on deck. All training is to be documented.

Tow Master

It is the organisation's responsibility to provide or employ a person to undertake the function of Tow Master to ensure that the individual has the competency and experience to fulfil this function.

It is recommended that persons supporting this function should have participated in the moving of mobile offshore units in the following capacities:

- 1. In relation to semi-submersible units, acted as a stand-alone Barge Supervisor on such units for a minimum of three (3) rig moves or as assistant Tow Master for a minimum of five rig moves. An experienced Tow Master should supervise both roles.
- 2. In relation to self-elevating units, acted as a stand-alone Barge Supervisor on such units for a minimum of three (3) rig moves or as an assistant Tow Master for a minimum of five rig moves. An experienced Tow Master should supervise both roles.

Recent experience gained as a Master or senior watchkeeper on vessels that have been engaged in anchor handling operations of a similar nature should also be considered when assessing the competency of a Tow Master. In this context, “recent experience” should be taken as being within the previous three years, though the earlier experience may also be considered if particularly relevant.

In addition, persons acting as Tow Master should have:

1. Relevant marine knowledge experience.
2. Where necessary, appropriate qualifications which may include STCW certification.
3. Full understanding of the proposed operation, including any particular risks which might be involved.
4. Appropriate knowledge of Geotechnical/Soil Conditions.
5. Knowledge of Offshore Meteorology and Forecasting.
6. Knowledge of DP Operations if relevant.
7. Knowledge of relevant international and local rules and regulations.

8. Ability to communicate effectively in English and/or local working language.

Marine Representative

It is the responsibility of the organisation providing or employing a person to undertake the function of Marine Representative to ensure that:

9. 1. The individual has the competency and experience to fulfil the function related to the particular operation.
10. 2. The terms of reference for the role are fully understood.
11. 3. The individual has been adequately briefed and provided all relevant information.

Dual Responsibilities & Reporting Functions

Dual Responsibilities & Reporting lines must be clarified, and a single line of communication to be established. The Master has overall responsibility for the safety of all operations conducted on the vessel, including simultaneous operations.

MOU Winch Operator

MOU winch operators should be competent in the winch operation, safety systems, functions and limitations. MOU Owner shall be able to document that appropriate on the job training, or a course has been given.

Crane Operators (including Subsea Functions)

Crane operators must be certified and competent in the crane, safety systems, functions and limitations.

Operational experience with cranes installed on the vessel or MOU must be logged, including operation of any heave compensation or other particular features provided.

The vessel or MOU Owner shall be able to document that appropriate training has been given. For examples of training requirements, refer to OMHEC standard or local equivalent.

Dangerous and Noxious Liquid Cargoes

The carriage and handling of dangerous and noxious liquid cargoes by ship is governed by IMO and implemented by the different Flag States and Coastal States.

There are no specified competence standards covering the freight of dangerous and noxious liquid cargoes on Offshore Supply Vessels.

Recommended competency levels for handling these cargoes are as follows:

Vessel Personnel

Masters, Chief Engineers and certain other Officers should have received suitable training relating to SOLAS and MARPOL requirements which includes the relevant parts of the IBC Code as referred to in A.673 (16) (Guidelines for the transport and handling of limited amounts of hazardous and noxious liquid substances on offshore support vessels) appropriate to the vessels to which they are assigned, the IMDG Code and the OSV Code where relevant.

On Shore Personnel

Personnel working at the onshore base or on the offshore facility responsible for declaration and shipment of dangerous or noxious liquid cargoes should have received similar training so that they have a full knowledge and understanding of the requirements that vessels must comply with carrying such cargoes.

Table 9 GOMO Shore Competence Requirements

Role	Adequate English	IMDG Code	Lifting Equipment	Slinger Course	Cargo Handling	Bulk Material Handling	Materials Management	Industrial Personnel - Shore	Industrial Personnel	Notes and Additional Requirements
Operation managers Shipping managers Sailing managers Vessel coordinators Logistics coordinators		X	X		X					1. Shall preferably have a maritime background (nautical studies, mate, Master) 2. The defined operation manager, shipping manager, sailing manager, vessel coordinator or logistics coordinator is responsible for coordination and follow-up of all loading or offloading operations involving offshore service vessels at a base, quay or tank installation.
Quay Foremen	X	X	X			X	X			
Personnel packing goods in containers		X*	X		X					* IMDG required if handling goods classified as dangerous goods
Crane Operators			X	X						
Personnel involved in cargo handling		X		X						
Personnel involved in bulk cargo handling					X					1. Familiar with identfication of hazardous chemicals and requirements for testing 2. Safe handling of bulk cargo and hazardous chemicals. 3. Handling and containment of spills, and familiar with related external notification procedures.
Installation Maritime Co-ordinator					X					Training shall include vessel types, functioning of manoeuvring and/or positioning systems, vessels' characteristics and limitations (including weather restrictions and vessel load capacity) and maritime terminology.
Installation cargo handling		X								
Personnel involved in tank cleaning								X	X	1. Familiar with identfication of hazardous chemicals and requirements for testing 2. Safe operation in tanks and confined areas 3. Handling and containment of spills, and familiar with related external notification procedures.
Other Industrial Personnel									X	As identifed by co-ordinators of their operation and their required for the service they perform

The Norwegian shelf's competitive position - NORSOK

The Norwegian petroleum industry develops the NORSOK standards to ensure adequate safety, value-adding and cost-effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are as far as possible intended to replace oil company specifications and serve as references in the authorities regulations.

This set of standards applies to a single country's sea basin, The North Sea. Energy companies that come

from many parts of the world need to learn to understand and comply with these national regulations on training and best practice. This is obviously not optimal, although made to safeguard the national environment and HSEQ.

The standard specifies the number of training programmes that seafarers must comply with, such as specific G5-Offshore Crane training and re-training. A group of private companies administrates the content of the training programmes and approval but ultimately answers to rule no. 6.5 of the ISM Code.

5.2 Overview of common MET institutions and programmes

(This chapter is copied from D1.1.2 and is included for reference).

The training of seafarers was traditionally based on empirical knowledge acquired during shipboard work. During the 19th century, new challenges - the most important being the introduction of steam engines - necessarily led to the development of a different approach to the education of seafarers. Being historically related to the navy, many maritime schools at the time maintained a military style and did not follow the development paths of higher education institutions. During the first half of the 20th century, many maritime schools established close relations with shipping companies and mainly focused on providing specialist maritime education and training for these companies.

A significant development took place in the 1970s and 80s when numerous maritime schools, mainly those offering post-secondary education, became members of the local universities or agreed to some form of formal relations with universities. Some of these higher education MET institutions continue to provide MET as VET institutions and some as university institutions - the significant difference being, in most cases, institutional participation in research programmes. In the 1980s, though highly diversified in their status and formal goals, these MET establishments instigated international cooperation, firstly through the International Maritime Lecturers' Association (IMLA[42]) and later through the International Association of Maritime Universities (IAMU[43]). While IMLA continues to be an association of individuals (i.e. lecturers at higher education MET institutions), IAMU represents an association of institutions and requires that each institution provides one or more study programmes leading to Certificates of Competence at the management level and at least one study programme at Master of Science degree level[44].

Higher education MET institutions

Programmes offered by MET HEI institutions deliver coherent STCW-related study programmes, mainly those leading to Certificates of Competency at management level and non-STCW study programmes. The non-STCW programmes commonly focus on maritime trade and business, international shipping and logistics, maritime law, and similar.

Duration of these programmes is as, a rule, two to three years and may include onboard training. Sometimes onboard training, as a prerequisite for the respective Certificate of Competency, is left to be arranged by the students themselves. In several countries, programmes are offered as "sandwich" education, i.e. periods of academic activities interchanged with periods of onboard training.

The programmes required for the management level and offered by higher MET institutions may be grouped into two broad categories:

- programmes offering STCW subjects only, with no or with only minor additional subjects

[42] http://www.imla.co/
[43] https://iamu-edu.org/
[44] As of April 2019, IAMU has 66 members from 35 countries,

- programmes offering STCW subjects but extended in scope and depth

VET institutions usually provide the first group of programmes. The education process is most often adjusted to the needs of serving seafarers. The duration of the programme depends on whether onboard training is a part of the process or not.

According to the European Qualifications Framework, the second group of programmes are commonly offered by university-level institutions and are usually identified as Level 6 programmes. In addition to core STCW skills, these programmes commonly assume more in-depth knowledge in core professional skills (mathematics, mechanics, stability, etc.). They are extended with the maritime economy, technology, and/or maritime law subjects.[45] Most institutions at this level are members of their respective universities (usually, universities of applied sciences[46] or polytechnics[47]). Some are fully-fledged technical universities offering a range of programmes for the maritime industry.[48]

In many cases, particularly in EU member states, institutions offer top-up programmes for those who are willing to continue their careers onshore after serving as officers at management-level positions aboard.

It should be emphasised that the courses offered by EU VET and university-level institutions are characterised by high diversity in terms of their duration and modes of delivery, even in the case of subjects outlined in the STCW Convention. The most important reason for such diversity is development based on the predominant education model in a respective country, different national interests, and traditions. Consequently, the wide diversity of programmes and modes of delivery means that identifying skill gaps based on the analysis of these programmes does not guarantee sufficiently reliable results.

Maritime training centres

With the adoption of the amendments to the STCW Convention in 1995, seafarers at all levels and positions were required to attend one or several short, usually very practical, courses. These courses initially dealt mainly with safety subjects, while subsequently the range of required courses included security issues and pollution prevention.

Although in many cases being a part of regular education, the short courses instigated the development of maritime training centres – institutions offering these short courses primarily to shipping companies or to seafarers who did not acquire such competencies during regular education. Most maritime training centres are privately owned and profit-oriented. Some are owned, entirely or partially, by one or several shipping companies, and they provide training primarily to seafarers employed by these companies.[49] On the other side, many MET institutions run their maritime training centres as separate profit-oriented units, offering short courses to their students as part of the study programme and shipping companies and seafarers.

The number of maritime training centres varies, and there are probably hundreds of such centres at the

[45] For example, the Solent University - Warsash Maritime Academy offers eight undergraduate programs of which only two comprises STCW skills leading to the management level CoC. In addition to these, the University offers another four postgraduate programs, all offering maritime subjects. https://www.solent.ac.uk/courses/

[46] Bremen University of Applied Sciences, https://www.hs-bremen.de/internet/en/studium/stg/nautik/

[47] Universitat Politècnica de Catalunya Barcelona, Facultat de Nàutica de Barcelona, https://www.upc.edu/en/the-upc/schools/fnb

[48] Gdynia Maritime University, https://www.umg.edu.pl/en/

[49] See for example Helen Sampson & Lijun Tang (2016) Strange things happen at sea: training and new technology in a multi-billion global industry, Journal of Education and Work, 29:8, 980-994,

global level.[50]

[50] For example, in Croatia there are 26 authorized maritime training centres, while in the Philippines 63 approved maritime training centres operate only in the Metro Manila area (https://www.seamanmemories.com/list-of-marina-accredited-maritime-training-centers-in-manila-2018/)

In the early 2000s, the most significant number of maritime training centres mostly offered STCW-required training. More recently, many developed training programmes dealing with the subjects proposed by the industry, going way beyond the requirements of the STCW Convention.

The most prominent non-STCW subject areas are:

- offshore industry, including exploration of oil[51] and gas and wind farms,
- operation of large yachts/superyachts
- handling (manoeuvring) ships with unusual characteristics,
- handling sophisticated shipboard equipment,
- ship and cargo surveying,
- hotel management,
- operation of fishing vessels, etc.

In the early 2000s, many companies started inviting their crews, mostly those at the management level, to shore-based seminars to keep them up-to-date on numerous subjects. In the beginning, the primary goal was to increase the safety culture onboard ships. Still, soon the range of subjects was increased to include commercial subjects and new technological advances. An indicative, though not exhaustive, list of topics is provided below:[52]

- changes in legislation applicable to ships and industry
- management reviews
- safety, quality, environment, health, energy, operational matters
- accident/incident/near-misses and their root causes/lessons learnt
- customers' complaints
- security, cyber security
- company philosophy, etc.

Therefore, seafarers onboard sophisticated ships may be required to attend numerous courses (besides those required by the STCW Convention) during their seagoing career. Very relevant evidence is provided in the analysis of the list of various certificates acquired by masters on LNG carriers[53] , and large passenger ships carried out in 2015 and refreshed for this report.[54]

[51] Offshore Petroleum Industry Training Organization – OPITO (UK) has designed numerous courses for offshore industry, which became *de facto* industry standards. The courses are provided by numerous training providers all over the world.

[52] E. Bal Besikci, J.U. Schröder-Hinrichs, A. Sıhmantepe, D. Dalaklis, J. Larsson, Evaluating maritime education and training needs for tanker shipping companies, 13th International Technology, Education and Development Conference, Valencia-Spain, 2019

[53] The courses presented here are required for masters on LNG ships operated by companies operating 188 LNG ships at the time. See Gundić, Ana; Ivanišević, Dalibor; Zec, Damir, ADDITIONAL MET PROGRAMS FOR THE MASTERS ON BOARD LNG CARRIERS // Proceedings of the 7th International Conference on Maritime Transport, Barcelona: Oficina de Publicacions Academiques Digitals de la UPC, 2016

[54] Courses for which data on duration and content were available are listed in Annex 1 and 2.

From the data analysed above, the following may be concluded:

- Several courses are focused on dedicated equipment common for certain ship types. The main goal seems to be to ensure in-depth knowledge and hands-on experience for key personnel (for example, Ship Handling & Manoeuvring - Azipod).
- A large group of courses is dedicated to ensuring safe and uniform implementation of complex procedures, mainly those involving teamwork (for example, Maritime Resource Management - Attitude and Management Styles).
- Several courses clearly aim to improve human interactions (such as Bridge Resource Management and similar).

A significant overlapping in subjects and goals can be noted from the lists presented. In addition, most courses are designed to last between three and five days.

A significant number of courses are simulator-based, with a great deal of hands-on training. Moreover, in several advanced maritime training centres, handling of large, sophisticated ships is carried out using manned models to increase the reality of the training.

Another important observation is a certain difference in requirements across different companies. There is a strong belief that additional competencies are needed, but there is no consensus on which competencies are essentially needed.

As pointed out by Manuel[55], "traditional seafarer training has always focused on the acquisition and use of practical skills. This approach recognises that a degree of cognitive skills is needed, but it focuses on and emphasises the acquisition of hands-on practical skills. On the other hand, academic education has been much more focused on developing in-depth analytical and critical thinking skills; cognitive skills that are less reliant on hands-on task-oriented training, but stress critical reading and discussion."

These two opposing views are even more polarised in the case of highly sophisticated ships. On the one hand, all activities onboard are considered "vocational", i.e., jobs requiring only job-specific technical training and not requiring higher knowledge skills. On the other hand, it is pretty clear that the complexity of the environment and systems to be controlled and managed demands abilities and skills way beyond traditional vocational training.

Specialised MET establishments

Specialised MET establishments may be defined as institutions or establishments providing specialised and/or high-level education, mainly for people already working in the maritime or shipping industry ashore or for seafarers looking for a job ashore. They may be understood as educational units offering more in-depth knowledge and competencies than maritime training centres but less consistent and overarching than education programmes offered by universities or similar institutions.

The courses offered may be of different duration, from a few days to 18 months. Stand-alone courses may be a part of one or more longer courses, thus providing flexibility for participants in terms of content, duration and awarded a degree. Specialised MET establishments, as a rule, offer programmes tailored to full-time and part-time students, executives (abridged coursework typically occurring on nights or weekends) and distance and online learning students, many with specialised topics.

55 Manuel M.E, Vocational and academic approaches to maritime education and training (MET): Trends, challenges and opportunities WMU Journal of Maritime Affairs, September 2017, Volume 16, Issue 3

Course subjects mainly include maritime law and finance; contracts and insurance; management; offshore (oil and gas mostly); port operations; logistics; safety; ship manning and operations; and shipbuilding.

After graduation, the participant may be awarded a certificate, diploma or degree, depending on the national accreditation system requirements. Programmes leading to an MBA or MSc degree are as a rule carried out in cooperation with one or more established educational institutions, usually universities.

These institutions may use traditional modes of teaching (i.e. front-end lecturing), although more modern modes of delivering are predominant, such as distance or blended learning.

Examples of recognised MET establishments include the Lloyd's Maritime Academy (UK)[56] and STC Maritime & Logistics University of applied sciences (Netherlands).[57]

Different entities with accumulated knowledge in a specific maritime field view this as an opportunity to enter the education market and offer courses in their fields of expertise. This approach can be recognised among classification societies[58] and it can also be noted among equipment producers (for example, Kongsberg[59]), associations (for example, IALA[60]), and maritime training providers (for example, Videotel, Seagull, Marlins etc.[61]). However, the programmes offered by those ventures usually remain close to their field of expertise and rarely offer courses from other fields.

MET establishments' courses mainly target shipping companies' employees and supporting industries. The course subjects are flexible in terms of duration, scope and delivery. The most attractive courses cover maritime law, maritime economy and ships' technologies.

It may be therefore concluded that:

18) There is very high variation in institutional forms offering maritime training and education, ranging from privately owned institutions offering only short courses to seafarers and shipping companies to independent maritime universities.

19) In almost all EU member states, the university-level study programmes delivering courses in the field of international shipping and logistics, maritime law and business, port management (i.e. programmes for the shore-based maritime industry) are identified.

20) Maritime education and training institutions offering education leading to management-level Certificates of Competency are in most cases supervised by the ministries responsible for education and by the ministries responsible for maritime affairs.

56 http://www.lloydsmaritimeacademy.com/

57 https://stc-mlu.com/en/

58 See DNV-GL (https://www.maritime-executive-diploma.com/) and ABS (https://ww2.eagle.org/en/Products-and-Services/maritime-training.html)

59 https://training.km.kongsberg.com/course-category

60 The objective of the IALA Academy is not to conduct training itself, but to develop and promote the use of its model training courses. The Academy will facilitate such courses as required. https://academy.iala-aism.org/wwa/training/

61 https://videotel.com/maritime-training-solutions

21) The cooperation among EU MET institutions is irregular and of questionable usefulness. The cooperation among MET institutions in different countries occurs mainly as a part of EU-funded projects. And even in this case, the institutions cooperating are mainly those with specific research capabilities while others participate only sporadically.

22) There are no recognised EU-wide initiatives aiming to harmonise maritime education programmes offered by different institutions or in different countries. This is not even the case regarding the subjects defined in the STCW Convention.[62] The only formal contact identified among MET institutions regarding study programmes is a partial comparison of courses delivered by two institutions at the university level within the ERASMUS student exchange programmes.

23) Thanks to ever-accelerating technological development and the increasing number of high-tech companies who accumulate expertise, the number of education and training providers for dedicated applications is expected to increase significantly, thus changing the institutional position of the traditional MET providers.

24) New modes of delivery (blended learning, distance learning and similar) are expected to increase their share.

25) The number of specialised courses aiming to upgrade or re-skill adult workers associated with the maritime industry and who have already earned degrees is expected to increase, both in numbers and scope.

The most referenced STCW codes and CoCs
To show the most referenced STCW codes which are required by CoCs, we visualise them in Table 6.
We do not see mismatches on the refereed STCW codes for obtaining CoCs.

62 The sentence that could be misinterpreted: This is not the case even regarding the subjects defined in the STCW Convention is altered to: This is not even the case regarding the subjects defined in the STCW Convention.

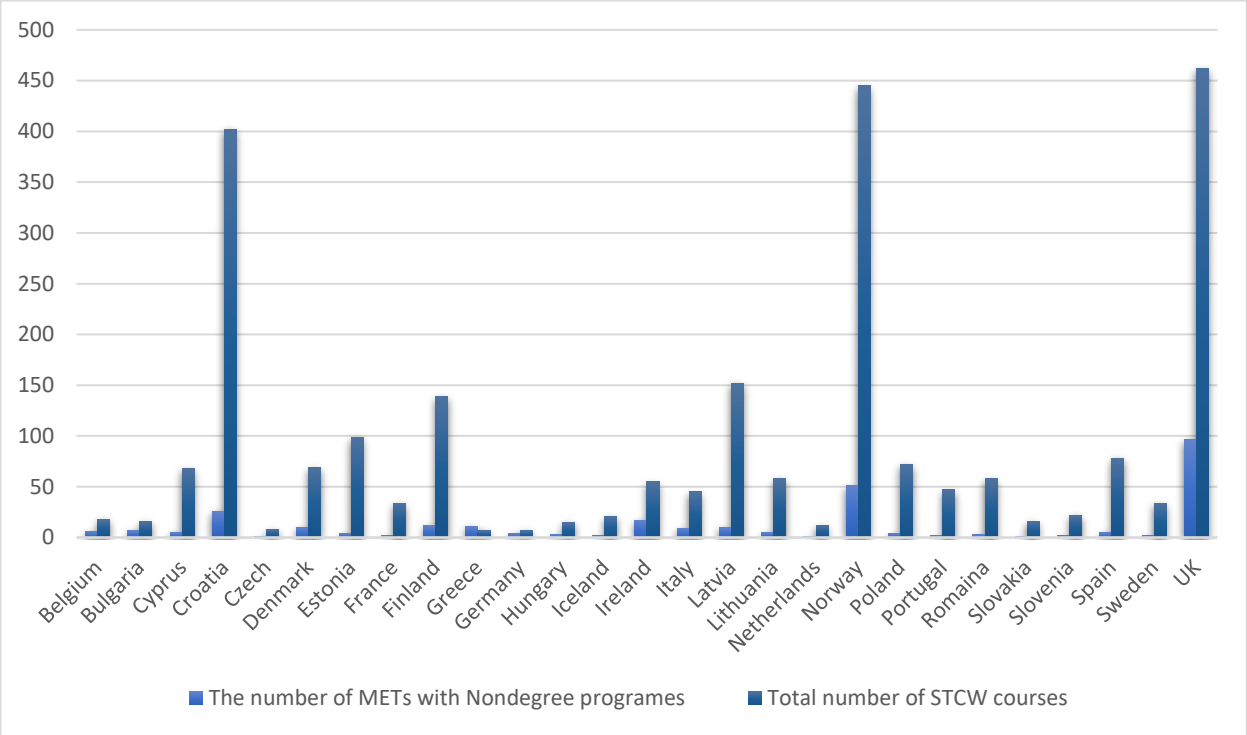


Figure 5: The number of nondegree programmes of METS vs the number of STCW courses (EMSA, StudyinGreece, and UK Gov[63]).

Table 10: The most referenced STCW codes and CoCs

Positions	STCW codes
Officer in charge of a navigational watch on ships (500GT and more)	II/1
Chief officer contracting material ships of 3000 GT and more operating within 200 nautical miles offshore	II/2; para1-2 CM
Chief mate on ships of 3000 GT or more	II/2; para1-2 CM
Master on ships of 3000 GT or more	II/2; para1-2 CM
Master on contracting material ships of 3000 GT and more operating within 200 nautical miles offshore	II/2; para1-2 CM
Chief mate on ships between 500 and 3000 GT	II/2; para3-4 CM
Master on ships of between 500 and 3000 GT	II/2; para3-4 CM
Officer in charge of a navigational watch on ships of less than 500 GT engaged in NCV	II/3; para3-4 CM, para 5-6
Master on ships of less than 500 GT engaged in NCV	II/3; para5-6
Officer in charge of an engineering watch on ships powered by main propulsion machinery of 750kW or more	III/1
Electro-technical officer	III/6

63 Data was extracted from EMSA, StudyinGreece and UK Gov, see attachment: All European METS data

GMDSS general/restricted operator	IV/2
Chief engineer officer on a ship powered by the main propulsion machinery of 3000 kW propulsion power and more	III/2 CE
Second engineer officer on a ship powered by the main propulsion machinery of 3000 kW propulsion power or more	III/2 SE
Chief engineer officer on a ship powered by the main propulsion machinery UP TO 3000 kW propulsion power	III/3 CE
Second engineer officer on a ship powered by the main propulsion machinery less than 3000 kW	III/3 SE

Although the most referenced STCW codes are similar or the same, the lengths of training programmes are different. We noticed that the SCTW Convention (Table B) offers guidance on certificates and endorsements but does not suggest courses' content and lengths. The STCW Convention (Table B) mainly advises on how to train, assess, and control the quality of training courses. National maritime authorities themselves need to approve the module courses, which are typically designed by METs, and control the quality of the training programmes. Onboard training applies to all STCW certificate programs, and its length is stated in the code as a minimum of 12 months for deck and 180 days for the engine room.

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