SKILLSEA

Co-funded by the Erasmus+ Programme of the European Union

TITLE: INTERNATIONALISED STRATEGIES IN MET

DELIVERABLE: 3.4
DATE: February 26, 2021
VERSION: 7.0

MAIN EDITOR(S)	EUGENIDES FOUNDATION, PROF. DR. ORESTIS SCHINAS, HSBA HAMBURG SCHOOL OF BUSINESS ADMINISTRATION
CONTRIBUTERS	STC GROUP
REVIEWER(S)	SIMAC, DANISH MARITIME AUTHORITY (DMA)
DISSEMINATION LEVEL	PUBLIC

VERSION HISTORY			
VERSION	DATE	EDITOR	SUMMARY OF MODIFICATIONS
Outline	2020-03-10	EF Team	Draft
V1.1	2020-04-16	EF Team	Updated
V1.2	2020-04-29	EF Team	Revised
V2	2020-05-14	EF Team	DMA Feedback
V3	2020-05-25	HSBA EF Team	Redrafted
V4	2020-06-02	HSBA EF Team	Updated
V5	2020-06-18	EF Team	Redrafted
V6	2020-06-24	EF Team	Reviewers: DMA, SIMAC
V7	2020-06-26	EF Team	STC Group
V7	2020-06-29	EF Team	Submission to STC Group (Coordinator)

Acknowledgements

The contributors to this deliverable would like to acknowledge the feedback of the WP3 partners, especially the STC Group, SIMAC and Danish Maritime Authority and would like to also thank all SkillSea project partners, for their valuable inputs. Thanks are expressed also to the Erasmus+ programme and the European Commission for financial support.

Summary SkillSea Report

Deliverable: 3.4, version: 1.0, date: 29 June 2020

Deliverable D3.4 assesses potential forms and related challenges of internationalisation and proposes tools that enable obstacles to be circumvented when opting for a strategic direction in internationalisation and in transferability across and beyond Europe's diverse Maritime Education and Training (MET) environment.

Using a pilot survey as a starting point to derive challenges and bottlenecks, it proceeds to the analysis of different indicative European cases of Internationalised strategies. The analysis of these points to directions and challenges, along with benefits and costs, of an extroverted strategy open to international cooperation among the diverse forms of MET across Europe.

Based on a multiple criteria decision-making approach and on simple key foundations of the EQF framework respectively, the deliverable proposes two innovative tools: the first, the Strategy Direction Location (STRA.D.L.) tool, has been designed to facilitate choice among strategic options open to all MET; the second, the Transcript International Transfer (Trans.I.T.) tool, which uses fundamental ECTS/ECVET elements that are easily adaptable between levels and educational programmes in line with the directions of the SkillSea general strategy framework, as included in the D3.1 Strategy Plan Framework report. Being based on the foundations of the European credit system, the tools are generic and sufficiently open to enable further specification and can be used by MET to promote the adoption of appropriate Internationalised strategies and support these in practice through a versatile transferability mechanism of credits earned.

Among other key findings, the report concludes that the diversity of European MET is both a motive and a resource for providing future-proof skills to maritime professionals focusing on complementarity in a more efficient way and economizing on scarce resources, while cost issues for selecting Internationalised strategies could be supported through a MET-specific ERASMUS+ mechanism.

Future-proof skills for the maritime transport sector

Project SkillSea is co-funded by the Erasmus+ Programme of the European Union

Technology and digitalisation are transforming the shipping industry. 'Smart' ships are coming into service, creating demand for a new generation of competent, highly-skilled maritime professionals. Europe is a traditional global source of maritime expertise and the four-year SKILLSEA project is launched with the aim of ensuring that the region's maritime professionals possess key digital, green and soft management skills for the rapidly-changing maritime labour market. It seeks to not only produce a sustainable skills strategy for European maritime professionals, but also to increase the number of these professionals - enhancing the safety and efficiency of this vital sector.

Contents

LIST OF ANNEXES

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Abbreviation	Definition
AHP	Analytic Hierarchy Process
BIMCO	Baltic and International Maritime Council
CBT	Computer Based Training
CBTA	Computer Assisted Training and Assessment
CEDEFOP	European Centre for the Development of Vocational Training
CoC	Certificate of Competency
Dx.x	Deliverable per Work Package
ECVET	European Credit system for Vocational Education and Training
ECTS	European Credit Transfer and Accumulation System
EEA	European Economic Area
EQF	European Qualifications Framework
ETF	ETF: European Transport Workers' Federation
EU	European Union
GMDSS	Global Maritime Distress and Safety System
GMU	Gdynia Maritime University
HE	Higher Education
IAME	International Association of Maritime Economists
IAMU	International Association of Maritime Universities
ICS	International Chamber of Shipping
IMLA	International Maritime Lecturers Association
IMO	International Maritime Organisation
KPI	Key Performance Indicator
MCDM	Multiple Criteria Decision Making
MET	Maritime Education and Training

MoU	Memorandum of Understanding
PAES	Peer Assistance Self Evaluation
PBL	Problem Based Solving
SMCP	Standard Maritime Communication Phrases
STCW	Standards of Training, Certification and Watchkeeping
STRA.D.L.	Strategy Direction Location
TOPSIS	Technique for Order of Preference by Similarity to Ideal Solution
Trans.I.T.	Transcript International Transfer
UNCTAD	United Nations Conference on Trade and Development
VET	Vocational Education and Training
WP	Work Package

1. INTRODUCTION: INTERNATIONALIZED MET & EUROPE

1.1. Introduction: the terms of an Internationalised MET strategy

The human element in shipping is internationally sourced and managed. The combination of crew nationalities onboard, as well as globally sourced resources ashore, has been the rule throughout post-war shipping. The latter became fully globalized in the last stage of a process of increasing internationalisation – both within and across continents – and becoming the industry standard by the start of the 21st century1.

Currently, it is estimated that about or over 1 million crew members from a substantial mix of countries across all continents are supporting their local economies working on foreign-flagged vessels2. Throughout their careers – which, for the average seafarer, often is an epitome of internationalisation – maritime professionals onboard can, and most often have to, straddle ship registries and employer nationalities on an intercontinental basis. Mariners thus become bridges of knowledge; they have the potential to transfer this knowledge within their companies, as educators across MET institutions in their own MET and MET-related systems, or across the wider maritime cluster moving horizontally within it, and also beyond. At the same time, seagoing maritime professionals serve on ships with qualifications which can be issued by maritime authorities different from their own nationality or their place of ordinary residence. Their qualifications may be endorsed by third countries as the toolbox of the STCW Convention – the international standard for certification and professional training rules – includes guidelines for endorsing these on a worldwide basis.

Yet, across MET provision in Europe, while there are examples of Internationalised perspectives and of specific strategies by a number of institutions, there is no special sectoral framework to assist with educational mobility of prospective maritime professionals across STCW-oriented education, a number of which may not fall under the European ECVET or ECTS building blocks for credit recognition and transfer in educational settings. This absence also hampers cooperation with non-STCW MET or other educational provision.

There are challenges involved in creating tools suitable for the MET system's diversity across Europe, but these are not unsurmountable if properly addressed. Tailor-made tools for the sector could ultimately facilitate professional mobility, increasing the coherence of the broader European labour market and also enabling the combination of more types of shipping-related educational resources beyond those traditionally defined as MET, such as Higher Education (HE) STCW-oriented or Vocational Education and Training (VET) STCW-oriented degree schemes in the provision of future-proof skills to maritime professionals.

Despite the existing general recognition of the potential of internationalisation , there is little analysis, scant direction and few – if any – targeted tools and policy measures to date that seek to promote a related strategy at MET level matching the nature, the careers and the traits of the sector's human resources, to support both educational mobility and the strengthening of essential competences within the MET system.

1 As acknowledged in literature. Cf. for instance, in chronological order, Thanopoulou, H. A. (2000). From internationalism to globalization. Journal for Maritime Research, 2(1), 28-37, Brautaset, C., & Tenold, S. (2008). Globalization and Norwegian shipping policy, 1850–2000. Business History, 50(5), 565-582 Hoffman, J. & Kumar, S. (2010). Globalization - the Maritime Nexus. In The Handbook of Maritime Economics and Business (pp. 35-64). Informa Law from Routledge.35-64 and Roe, M. S. (2010). Shipping policy and globalization: Jurisdictions, governance and failure. Grammenos, C. T. (2013). Revisiting credit risk, analysis and policy in bank shipping finance. In The Handbook of Maritime Economics and Business (pp. 539-556). Informa Law from Routledge.

2 This is a conservative estimate on the basis of about 1.6 million seafarers globally provided through BIMCO (2015) data and a rate of flagged-out tonnage of over 70% for 2019 in UNCTAD (2019). Review of Maritime Transport 2019, Geneva.

This absence is noted at both global and European level. This is an area of possible improvement by the actions of appropriate European agencies and it is towards this direction that the SkillSea D3.4 deliverable aims to contribute within the context of strategy.

This deliverable has a clear focus on how Internationalised strategies in MET across Europe can be used further to support the presence of the continent's residents in the total global maritime workforce. This is especially urgent as European Union/EEA countries still constitute one of the leading groups of world fleet ownership – and the one to which the current top national fleet belongs – despite having lost overall world tonnage leadership to Asia, which currently controls almost half of the world's fleet (cf. ANNEX 2).

Following this introductory chapter on the state of play in terms of European MET diversity and on MET internationalisation potential, the report presents an analysis of survey material from MET in a significant number of European countries designed to gauge internationalisation aspects and the extent of appreciation among MET staff of the value of adopting a direction towards Internationalised MET provision. Different strategies of MET are analysed by main goals distinguishing Internationalised provision and intake as main strategic dimensions, following an analysis of the role that modern technology-based teaching methods can play. The third chapter maps the main challenges for European MET and for successfully drawing up and implementing an Internationalised strategy, providing a tool for selecting internationalisation strategy directions on the basis of internal and external resources. The fourth chapter introduces a prototype of a tool to enable transferability, which suits both the diversity of MET structures across EU and EEA countries and the need to increase cooperation. The latter can enable advantage to be taken of the richness of forms and levels of MET and related educational programmes, of existing infrastructure increasing the potential for addressing subject areas during times of rapid technological advances and newly forming needs for future-proof skills. The final chapter summarises conclusions on the potential of Internationalised strategies in the context of MET and of the use of strategy and transferability tools, along with policy options.

1.2. The diversity of European MET provision

Maritime Education and Training across Europe is a diverse field which can be distinguished according to:

A. whether or not it leads to STCW certification and

B. whether it is classified as Higher Education (HE) or Vocational Training (cf. also INSET 1.A).

Under this umbrella definition, it is evident that a rapid upgrade of the provision is required –analogous to the pace of current change (cf. SkillSea deliverables D1.1.2 and D1.1.3[3], WP1 on current and future skills). This is possible, through the pool of educational resources available to a system with reference to knowledge, skills and competences.

INSET 1.A

'Maritime education and training - in the wider sense - includes knowledge, skills and eventually professional STCW-based certification as well. In the case of the latter, i.e. STCW-MET, Higher Education and Vocational Education and Training co-exist across MET in Europe – as well as beyond[1] - while there are varying mechanisms of progression and transferability within national systems of MET. Non-STCW MET includes education and training related to the industry - with elements which can combine or enrich STCW-MET programmes of various levels - but not leading to STCW certification.'

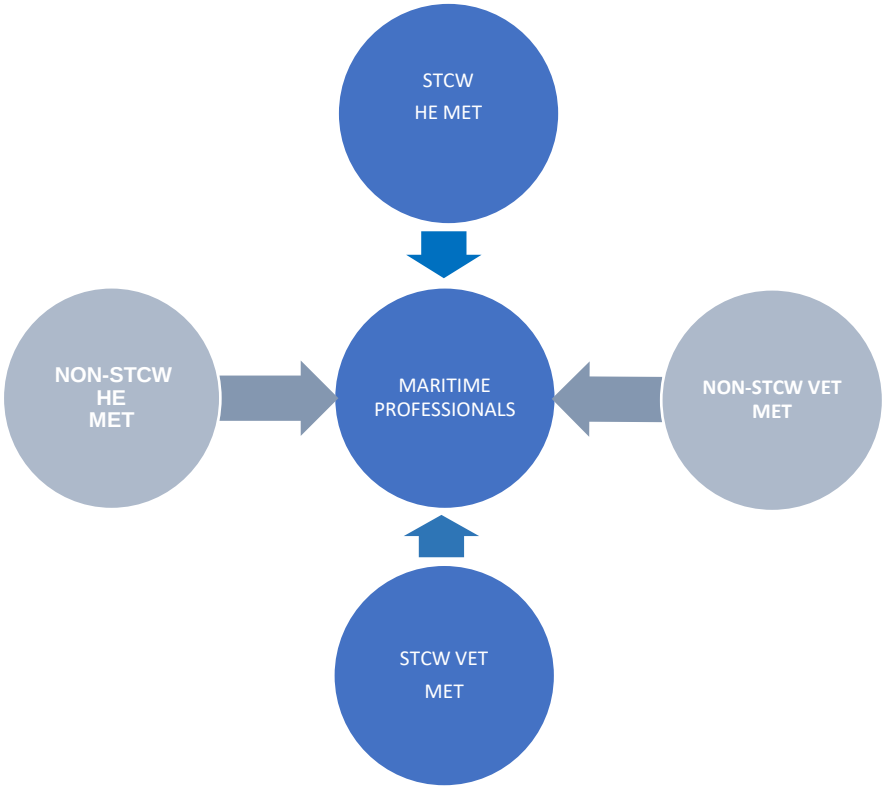
SkillSea (2020). *D3.1* Strategy *Plan Framework* Report.

Internationalised strategies can in this respect create pools of resources and one of the reasons for creating a large partnership for the SkillSea project involving STCW MET and non-STCW HE institutions across Europe has been the diversity of the provision itself, reflecting the different patterns and directions of national maritime clusters. This diverse character of European MET may be considered as a challenge. Yet in this diversity may also lie a hidden resource, with the variety of institutions – both outside and within national boundaries – being a motive for cooperation, as well as a hidden potential. Figure 1.1, below, shows the broad range of possible educational origins of maritime professionals.

3 Cf. SkillSea (2020). D1.1.2 Current skills needs (Reality & Mapping) Report and SkillSea (2020). D1.1.3 Future Skills and competence needs (Possible future development) Report.

FIGURE 1.1

PROVISION OF EDUCATION AND TRAINING FOR MARITIME PROFESSIONALS



By assessing any current gaps (WP1 deliverables and D3.3 in WP3) in their provision, MET establishments could eventually[4] address these and benefit by turning to Internationalised strategies for a quicker incorporation of new educational content, taking advantage of synergies which may exist among the principal categories of MET (cf. Figure 1.2). However, in terms of the horizons of MET provision, national boundaries are still clearly discernible from the diverse structures through which MET is provided today to active shipping professionals participating in the wider European maritime cluster[5]. European Union and European Economic Area countries include examples of Internationalised strategies and, practically, at the level of non-STCW HE MET these largely follow – or can follow more easily – general EU HE standards and procedures of internationalisation and benefit from related tools.

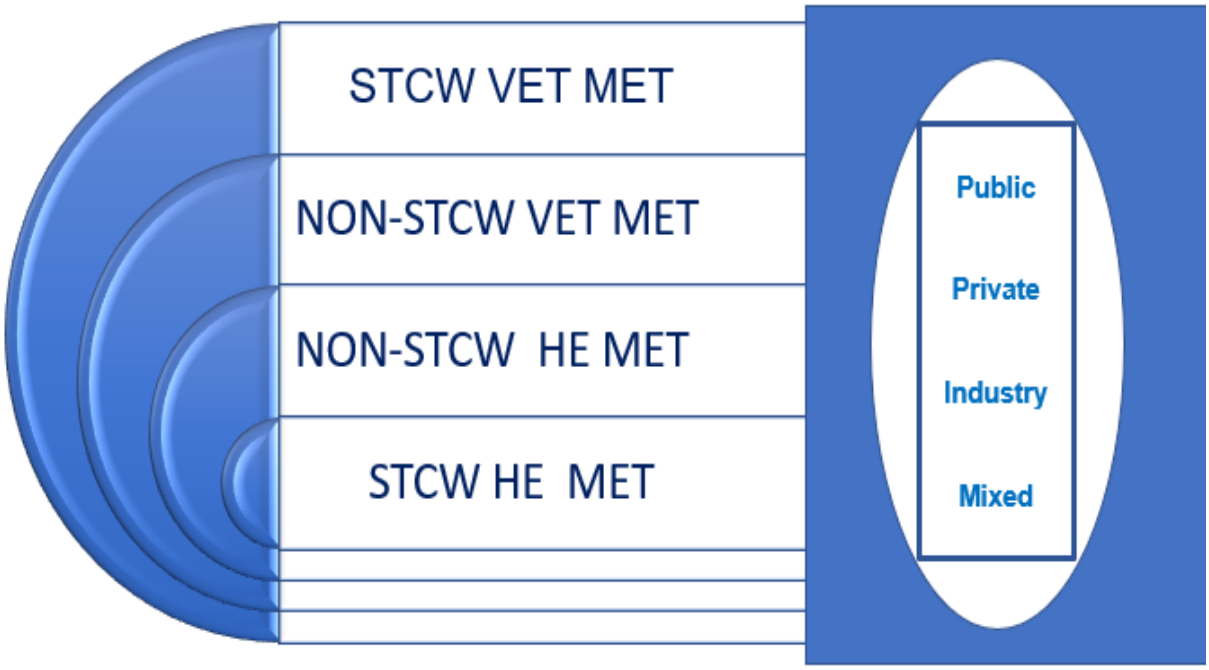
What is lacking is a common strategy direction or a shared vision by design across all types of MET with an emphasis on the STCW MET diversity, especially MET outside HE.

[4] As will be mentioned in the next two chapters, this was the direction taken for this project. These gaps were formulated in the case of this SkillSea deliverable mainly from focus groups and expert consultations conducted among the northern German and Greek maritime clusters, as well by a survey within a number of EU-EEA countries plus a small number outside these.

[5] Cf. also Figure 1.8 in the SkillSea (2020). *D3.1 Strategy Plan Framework* Report.

FIGURE 1.2

PRINCIPAL CATEGORIZATIONS OF STCW - MET PROVISION



Source: SkillSea (2020). *D3.1 Strategy Plan Framework* Report, Figure 1.2, p.16.

1.3. Can Internationalised MET strategies help?

Efficient crewing is critical for shipowners, ship managers and operators, because crew members are responsible for the safe and efficient handling of people, ships, and cargo. Ocean-going ships constitute the vast majority of the world's carrying capacity and the field of operation for their crews is by definition international; as is the composition of the crews and of associated ship operations, including vessel construction. Across the current relevant global regulatory framework (the combined application of STCW, ISM and of other instruments of the IMO and ILO) the role of maritime professionals onboard – and beyond – is stipulated and emphasized.

However, successful crewing in an international industry entails the full consideration of the appropriate background of crews, not only in terms of technical competences but also of overall suitability to serve in a highly Internationalised industry – both onboard and eventually in a mobility context ashore, especially in view of the ascertained officer shortfall. In practice, the skills shortage may be more problematic than the overall limited shortfall estimated in 2016 by BIMCO/ICS report data. This is especially valid when factoring in obstacles preventing surpluses of some nationalities being used to compensate for shortages elsewhere. Common barriers to international mobility among maritime professionals may involve a varied list of missing

elements, or of elements present that are not conducive to it. These can be summarised as follows:

1. There is no required fluency in the use of the lingua franca of shipping. Working knowledge of a language at the level of the Maritime English IMO model course –which focuses on the working knowledge by role onboard – is different from fluency which is facilitated through use in Internationalised educational environments. It must be noted that, apart from the case of the Maritime English Model Course, the IMO is not assuming that exams related to CoC will be conducted in English6.

2. Lack of international experience through exposure to foreign environments longer than for short calls to ports and terminals. The massive improvement of terminal operations across all shipping sectors has reduced seafarers' possibilities for familiarization with international environments during service, minimizing time of stay ashore. This has resulted in a lack of knowledge of other national cultures which was traditionally acquired throughout seagoing career paths. Internationalisation in education can counterbalance this.

3. There is no framework or tools to encourage Internationalised strategies in education that could counter the effects of the limited exposure and familiarization of today's maritime professionals to international environments.

The promotion of mechanisms and tools supporting Internationalised strategies in education and training can contribute towards this by increasing mobility and thus allowing maritime professionals – Europeans, and also non-Europeans serving on European-flagged or European-owned ships – to follow careers paths more seamlessly. Such career paths can be considered to be either seagoing on a continuous basis, or those involving horizontal mobility from ships to onshore work posts. In the case of the former, Internationalised strategies in MET improve mobility between maritime administrations through easier recognition of elements of education and training obtained across institutions which may be of different type and geographical location.

As underlined in key EU documents on the internationalisation of education[7] – in this instance Higher Education, which covers only part of the European and global MET provision (cf. Figure 1.2 *supra*) – a comprehensive internationalisation strategy needs to be integrated for the main aspects of staff and student mobility, provision and governance, together with infrastructure (cf. INSET 1.B).

6 The IMO's international toolkit in the direction of certification includes under the general provisions of the International Convention on Standards of Training Certification and Watchkeeping (STCW), 1978, as amended, the Standard Marine Communication Phrases (SMCP 2011) and the Model Course 3.17 on Maritime English (Visan and Georgescu, 2019). IMO model courses assist maritime training institutes to organize and introduce or update and supplement courses and has a directional role being subject to modifications.

7 Cf. European Commission (2013). European higher education in the world. COM/2013/0499 final. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52013DC0499&from=EN, last accessed June 24, 2020.

INSET 1.B

‘A comprehensive internationalisation strategy should cover key areas grouped into the following three categories: international student and staff mobility; the internationalisation and improvement of curricula and digital learning; and strategic cooperation, partnerships and capacity building. These categories should not be seen as isolated but as integrated elements of a comprehensive strategy.’

European Commission (2013), European higher education in the world, COM/2013/0499 final

Aspects and cases of European MET Internationalised strategies and their related potential are discussed in the following chapters, leading to proposals for relevant strategy and transferability tools, along with policy suggestions.

REFERENCES

- CEDEFOP (2011). Using Learning Outcomes. European Qualifications Framework Series: Note 4, Luxembourg

- De Wit, H., & Hunter, F. (2015). Understanding internationalisation of higher education in the European context. *Internationalisation of higher education*, 41-58.

- EMSA (2017). Seafarer Statistics in the EU 2017. Available at http://www.emsa.europa.eu/infographics/item/3322-seafarer-statistics-in-the-eu-2017.html, last accessed June 11, 2020.

- European Commission (2013). European higher education in the world. COM/2013/0499 final. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52013DC0499&from=EN, last accessed June 24, 2020.

- Erdogan, O., & Demirel, E. (2017). New Technologies in Maritime Education and Training, Turkish Experiment. *Universal Journal of Educational Research*, *5*(6), 947-952.

- IMO (2020a). http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-on-Standards-of-Training,-Certification-and-Watchkeeping-for-Seafarers-(STCW).aspx, last accessed June 8, 2020.

- IMO (2020b). http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx, last accessed June 7, 2020.

- SkillSea (2020). *D1.1.2 Current skills needs (Reality & Mapping)* Report.

- SkillSea (2020). *D1.1.3 Future Skills and competence needs (Possible future developments)* Report.

- SkillSea (2020). *D3.1 Strategy Plan Framework* Report.

- Teichler, U. (2017). Internationalisation trends in higher education and the changing role of international student mobility. *Journal of international Mobility*, (1), 177-216.

- UNCTAD (2019*). Review of Maritime Transport 2019*. UN: Geneva.

2. MET INTERNATIONALIZATION: TRENDS & ASPECTS

2.1. Global trends in Internationalised MET provision

2.1.1. Internationalisation trends in education and MET

The internationalisation of post-secondary education is a broad issue which has increasingly attracted research and policy interest as it can improve both the range and the quality of the provision (cf. also section 2.3.3 infra). At the level of the sector itself, all facets of activities related to the wider cluster of shipping are fully Internationalised – as befits an industry serving mostly, although not exclusively, international trade – as is the regulatory framework of codes and conventions referring to technical and operational specifications, along with elements of safety and quality covered by the training related to STCW standards. The international aspect is evident not only as the main source of shipping demand for the transport of world trade but also in every aspect of the maritime scene, including regulation. It is also evident across all shipping-related conventions pertaining to maritime operations and extending to those forming the wider spectrum of maritime law, starting with UNCLOS 8 and further extending to those with a focus on the human element such as the Maritime Labour Convention. Internationalised strategies resulting in transnational cooperation are deemed to support the mobility that the internationalisation and global coverage of the STCW Convention promotes (cf. INSET 2.A).

INSET 2.A

> 'The Convention shall apply to all seafarers serving onboard sea-going ships entitled to fly the flag of a Party.'
>
> STCW (1978), Article III

Note: some exceptions to the STCW application include warships, fishing vessels, etc.

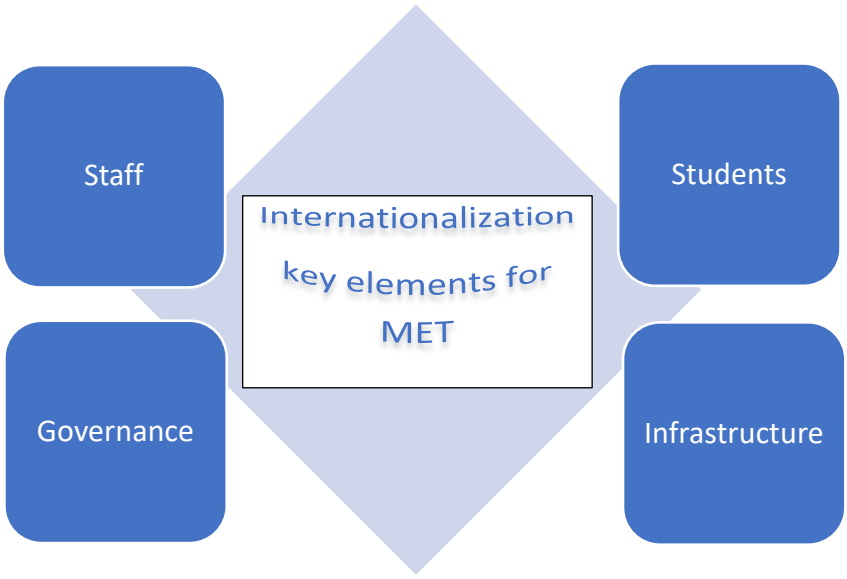
8 See indicatively, UNCLOS Article 27 on the criminal jurisdiction onboard a foreign ship, Article 94 on the exercise of jurisdiction onboard, Article 97 on penal jurisdiction in matters of collision or any other incident of navigation, Article 98 on the duty to render assistance and Article 211 on pollution from vessels.

2.1.2. Aspects and combinations of MET internationalisation

Either in a VET or a HE context, the potential flows and ways to create an Internationalised provision are specific in nature but versatile in their possible combinations (cf. Figure 2.1 below); this is valid for MET, as for any other general or sectoral educational context.

FIGURE 2.1

4 MAIN INTERNATIONALISATION RESOURCES

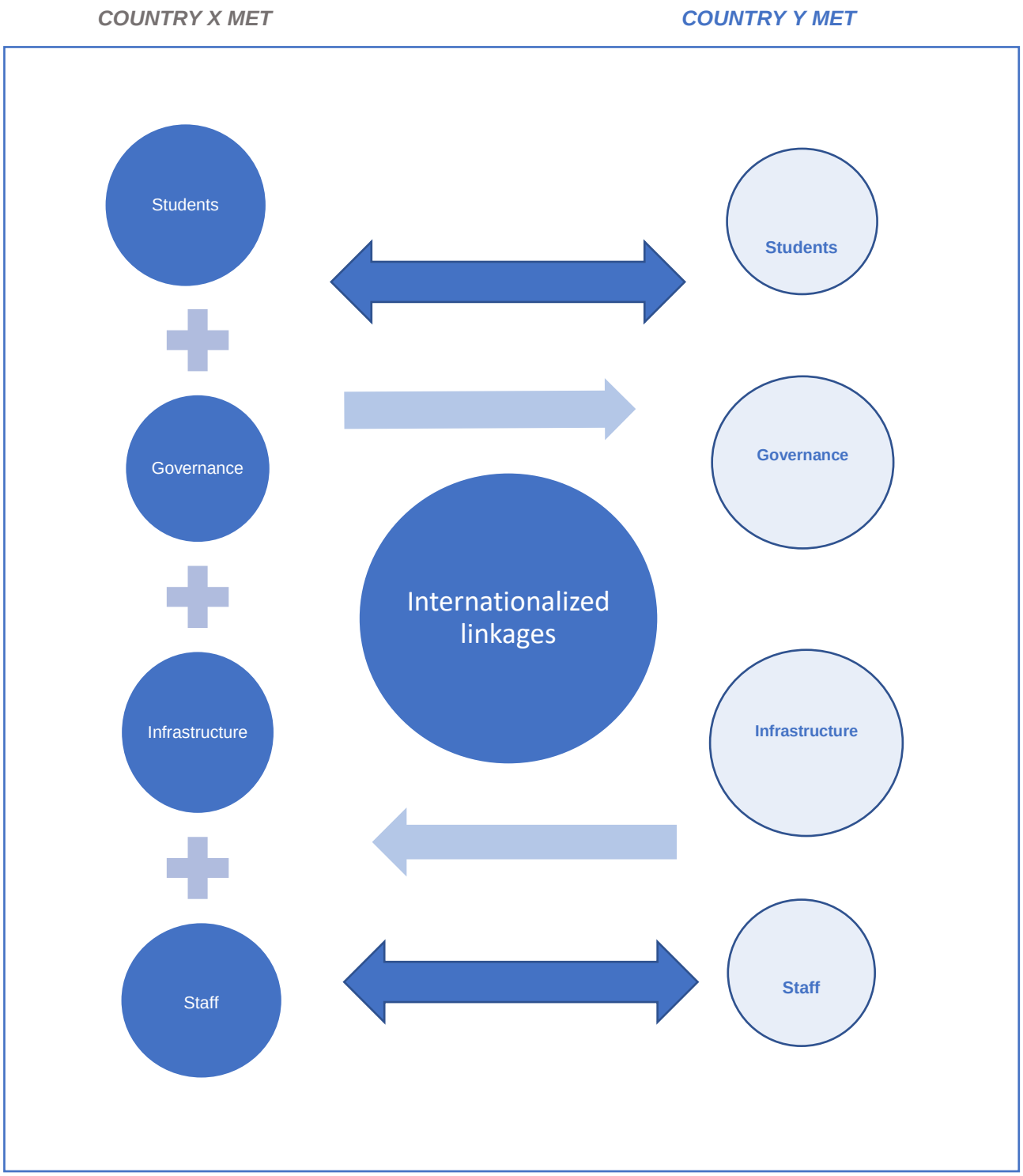


In a simple matrix, there are three key directional flows (incoming, outgoing, and/or double-flowing) and four categories of main resources which can be combined in an Internationalised strategy context (cf. Figure 2.2 below). Technology can today minimize the effect of three major practical hindrances for educational institutions opting for Internationalised strategies, namely distance, time and cost – with the last two evidently a function of the first – allowing combinations of resources in any bilateral or indeed multilateral form of internationalisation .

As shown in Figure 2.2, cooperation and common elements can be created in either a one or a two-directional way with elements being eventually lent to partner institutions (part of infrastructure, for instance) or jointly created and/or mutually exchanged (as in the case of students and staff provided as illustrative examples in this Figure 2.2).

FIGURE 2.2

DIRECTIONS AND PATHWAYS OF MAIN INTERNATIONALISATION LINKAGES



Note: Different sphere size indicates varying degrees of size of activity/resource

2.1.3. Degrees of integration of MET internationalisation

Degrees of internationalisation in MET – the levels of integration of international elements – can vary and depend on:

1. The number of main elements, as per Figure 2.2, for which an actual inflow or outflow or a bidirectional flow has been established
2. The percentage of shared elements (staff, students, etc.) in the overall provision
3. The number of countries of other MET institutions contributing to:
    a. *Intake of students*
    b. *Staff involved in the provision*
    c. *Infrastructure (facilities and equipment, such as simulators etc.)*
    d. *Governance bodies*

In a KPI perspective, a ratio such as this of international/local resources may constitute an appropriate measure for evaluating the level of integration of Internationalised strategies of specific MET establishments. While the number of memoranda of understanding (MoUs) or other agreements may be a measure/criterion of the Internationalised outlook of a MET institution, it could be used as an additional KPI but mainly in terms of strategy direction and not as a measure/KPI of success. MoUs – created through formal exchange mechanisms and liaisons to International offices concerned – may often fall quickly into the inactive category.

2.1.4. Technology as enabler of MET internationalisation

The continuous transformation of the shipping industry from labour-intensive to capital-intensive has been reflected in the restructuring of maritime education, which has shifted over time from a purely apprentice-style learning approach to a more diverse educational landscape including, nowadays, educational provision up to the level of higher education (Pallis & Ng, 2011) and a multitude of teaching methods beyond classic ones.

Traditionally, MET establishments have emphasized the provision of technical education, ensuring that graduates are equipped with the necessary competences to carry out seafaring tasks effectively. Yet, in an increasingly complex environment, the direction of learning has been revised towards the development of soft skills as well. This emerging new orientation is bringing the goals of maritime education into alignment with other educational schemes outside STCW MET, whether of a VET or HE level. The content of such schemes, which may be of various levels, may be related more closely with the technical aspects of MET. Such schemes may be related on the technical side and include various engineering degrees, or may be related to MET proper through sets of skills such as digital, management, and leadership and innovation, including entrepreneurship.

At the same time, Internationalised strategies for the education of maritime professionals can prepare for

the multicultural nature of the shipping industry for which skills can and must be nurtured, whether through conventional or virtual classes as Kitada (2015) advocates. Such an orientation provides MET institutions with the opportunity to design and promote a strategy with a strong international element through an increased pool of potential partners, outside strict geographical proximity, through modern ICT.

2.1.5. MET internationalisation opportunities: the key role of modern teaching methods

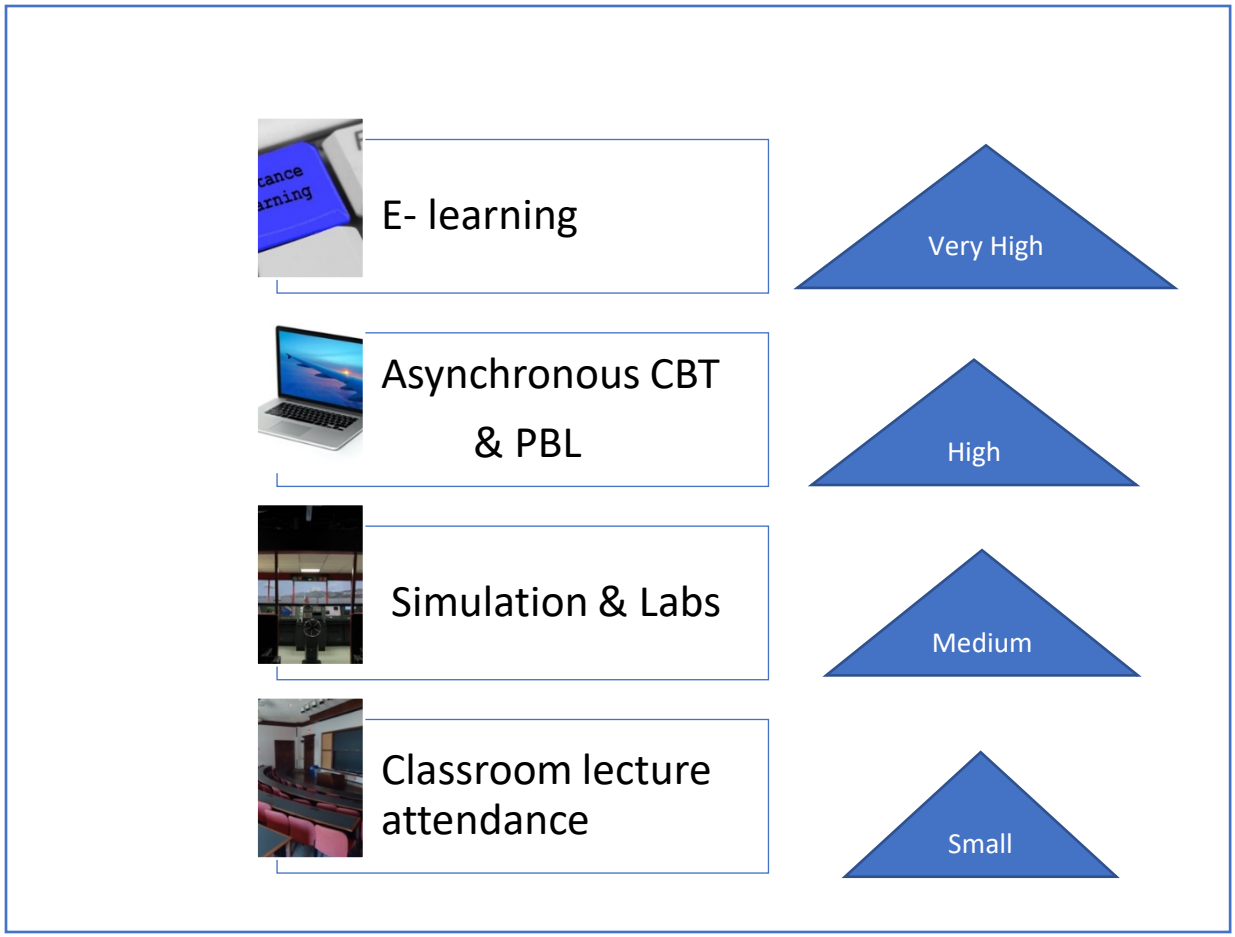
Technology has played a transformative role in maritime education delivery. In practice, today most MET teaching involves a combination of classical lecturing, laboratory and equipment practice with new teaching approaches.

Arguably, the evolution of educational practices is ongoing; yet innovation in teaching remains an important element for distinguishing quality establishments at whatever level or field/sector. Erdogan and Demirel (2017) have recently proceeded to a categorization of new technologies and approaches in MET. These include the use of simulators, sea training of long duration within or after academic studies, the offering of education and training programmes designed to meet vocational and academic requirements, and e-learning tools to support continuous and uninterrupted education of seafarers during their seatime. There has also been a trend towards cooperation with the maritime industry with the aim of improving curricula. It has been argued that in the context of MET, classical lecturing is about to be replaced by new methods which may include – apart from class participation, demonstration, recitation, memorization, or combinations of these – any combination of classroom teaching with computers, simulators, and distance learning. The latter can play a significant role in Internationalised provision in more than one form and degree of facilitation (cf. Figure 2.3 below), especially in view of seagoing service being included within STCW-oriented degrees. Seagoing service may be incorporated into degree schemes over different semesters/study years for different establishments across Europe, but it invariably constitutes a substantial part of the overall study period[9].

9 In Greece, for instance, seagoing service is currently included between the first and second year for early familiarisation with life at sea.

FIGURE 2.3

DELIVERY MODES AND INTERNATIONALISATION POTENTIAL



*All pictures unauthored under BY- SA CC license.

Note: CBT=Computer-Based Training, PBL=Problem-Based Learning.

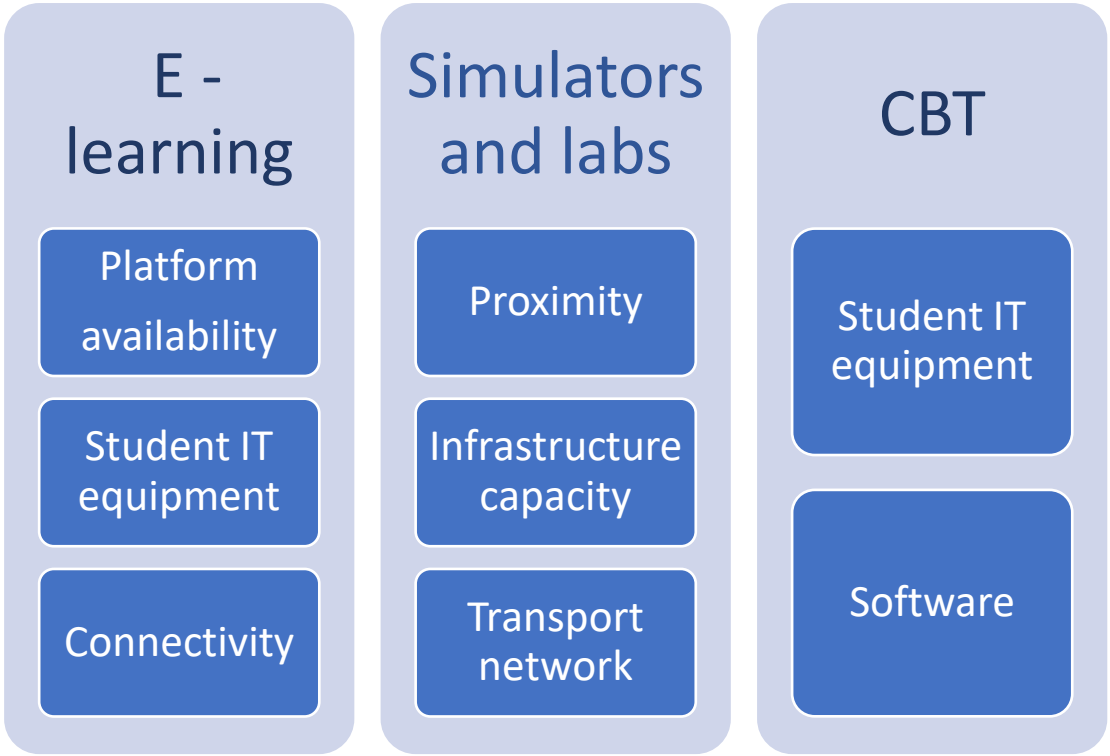
E-learning with an emphasis on synchronous

An alternative teaching approach has been the student-centred Problem-Based Learning (PBL) which uses problems as a starting point in the learning process and stimulates an active learning experience. PBL has been applied in various disciplines, including shipping[10]. The method could be deemed as neutral in terms of internationalisation but since it can be used in an asynchronous mode of delivery, especially aided by Computer-Based Training (CBT), in a distance learning context it is considered in Figure 2.3. to have a significant potential to support any extensive internationalisation . Figure 2.4 assesses the most critical requirements for incorporating such methods in a MET internationalisation perspective.

10 One such example, according to Cerit, Zobra, Deveci, and Tuna (2004), is this of the Dokuz Eylul University School of Maritime Business and Management (SMBM) which completely restructured its curriculum, embracing the PBL approach in order to meet the training needs of both shore-based shipping managers and deck officers.

FIGURE 2.4

TEACHING REQUIREMENTS IN AN INTERNATIONALISED MET – STRATEGIC CONSIDERATION OF MODERN METHODS



Source: Based on Muirhead (2004), Barsan et al. (2017), Demirel and Ziarati (2012) and authors

Quality of existing resources, of staff and infrastructure, and the costs involved to meet the requirements of each modern teaching method are general aspects to be considered. Virtual space/reality applications as means of future communication are also contemplated as future directions which befit internationalisation . In the standard national setting, a complete phasing-out of traditional lecturing is not anticipated, but smart technologies are deemed necessary to increase the accessibility and flexibility of maritime education, as suggested by Barsan et al (2017) – especially for students who may wish to attend courses while working onboard ships. Smart technologies can facilitate similarly Internationalised educational provision.

Cwilewicz et al (2003) recommend that Computer-Based Training (CBT) programs be applied for educational purposes to maritime engineering to shorten the learning curve and make training more interactive. They also note that their experience with CBT programs at Gdynia Maritime University (GMU) has shown that those instruments can substantially enhance the quality of both training and progress assessment. Demirel and Ziarati (2012) report that there is consensus among most MET experts on the necessity of CBT for improving course delivery, as well as for linking theoretical information and practices to real-life situations at sea. In addition, MET experts agree that Computer Assisted Training and Assessment (CBTA) is very suitable for quality assurance of training and graduates' qualifications, allowing students to review lectures in their own time and to also get in touch with their instructors online (Erdogan & Demirel, 2017).

In the SkillSea perspective it is worth noting that Lifelong Learning is expected to be an essential component of future maritime education, enabling seafarers (and/or former seafarers) to continuously enrich their knowledge and keep pace with new developments. E-learning platforms, already embraced by many METs, offer the opportunity for effective delivery (Erdogan & Demirel, 2017) while being also a very cost-effective method for applying Internationalised strategies in all settings. A critical factor for successfully applying such strategies in conjunction with new technologies is the substantial investment of time – albeit different in terms of application – required by teaching staff. The need for MET faculty to possess adequate knowledge and expertise to develop their own teaching material, placing emphasis on designing learning activities, methodology, content development, assessment strategies, and quality control – which is described in general terms in literature[11] – depends on the receptiveness of lecturers to new teaching instruments, such as interactive media (simulators, modelling programs etc.). This is highlighted in research as a critical resource (Laurillard, 2002) for successfully integrating new technologies on which integrated internationalisation strategies – beyond sporadic collaboration – depend. In this respect, it becomes important to investigate the perceptions of staff across MET in Europe to explore current views about the aims and potential benefits and obstacles related to strategies of internationalisation .

2.2. A MET pilot survey: guiding indications

2.2.1. MET survey background

In order to explore the issues involved and support the creation of appropriate tools supporting the selection of strategy as well as transferability, a pilot survey was undertaken to test the validity of assumptions made in the process of this deliverable and for formulating the criteria which created the basis for the proposed tools. An existing literature review showed that there is no significant academic literature relevant to MET internationalisation in order to support the specific gap in the MET sector.

The initial pilot survey was conducted in November 2019 and was related to:

- Academic staffs' perceptions of internationalisation
- Future skills and key skills developed through MET internationalisation

A Likert-scale web-structured and based questionnaire was developed and distributed online to the academic staff of selected MET institutions/maritime academies through a Survey Monkey Platform e-mailed link. A total of 27 replies were received from six MET institutions in EU-EEA countries (Greece, Croatia, Bulgaria, Belgium, and Estonia), from one MET in Georgia and one MET facility outside Europe (Egypt). While the number of questionnaires was small, there was wide regional representation in the initial mail lists used and, although not possible to confirm via the anonymity of the survey, the pattern of standard deviation across questions allowed an informative use of the sample as guiding indications of perceptions related to internationalisation to further consider in a strategy perspective.

11 Cf. Demirel, C. E., & Ziarati, R. (2012). Combining Vocational and Academic Requirements in the Maritime Education and Training. In Proceedings of the 20th Conference of International Maritime Lecturers' Association. Terschelling. Netherlands.

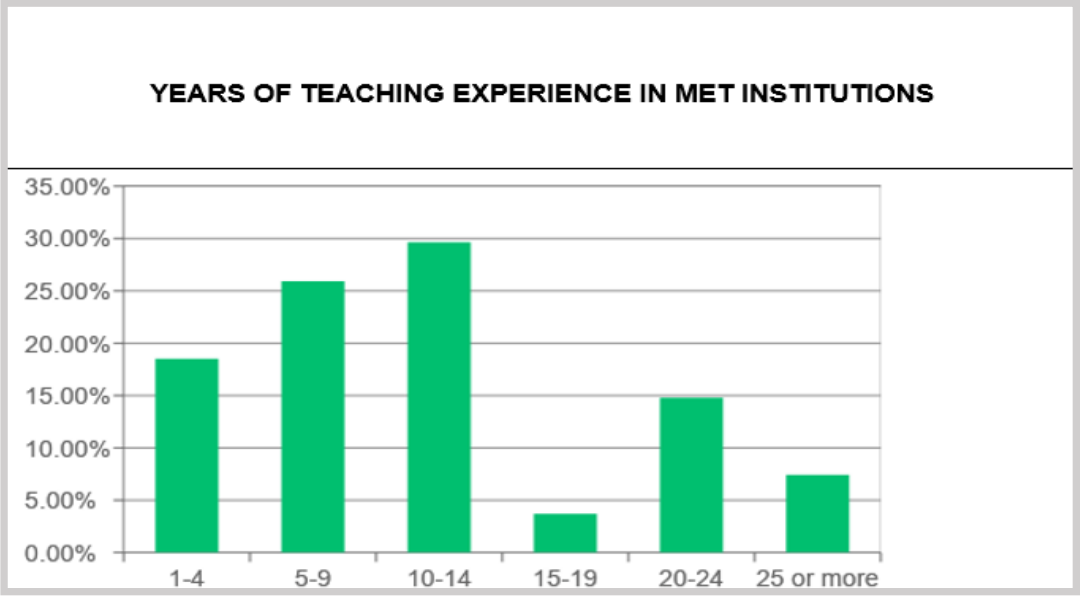
The basic principles of the questionnaire reflected main aspects of the Internationalised policies and strategies:

- Internationalisation activities in respondent MET institution
- The internationalisation of the curriculum
- Barriers to internationalisation
- The use of new technologies and of digital learning for internationalisation
- Student mobility
- The international characteristics of the academic staff

2.2.2. Survey sample demographics

Survey generic demographics are summarised through in Annex 4. In terms of professional experience of the respondents, Figure 2.5 suggests significant accumulated experience, with a median service duration of 10.75 years and mean of 11.7 years.

FIGURE 2.5



As shown in Figure 2.6, the major teaching direction among the respondents was nautical sciences, with 44.4% of them specializing in this discipline. A further 25.9% of the survey participants are experts in marine engineering and 11.1% in marine electromechanics. A total of 51.9% also teach other subjects.

FIGURE 2.6

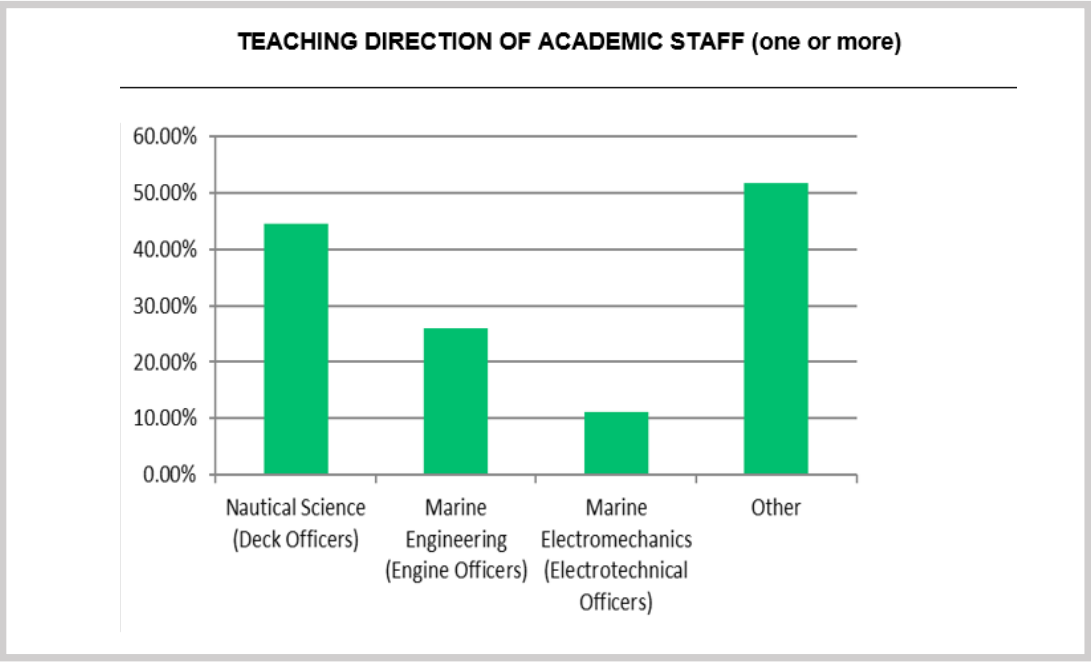
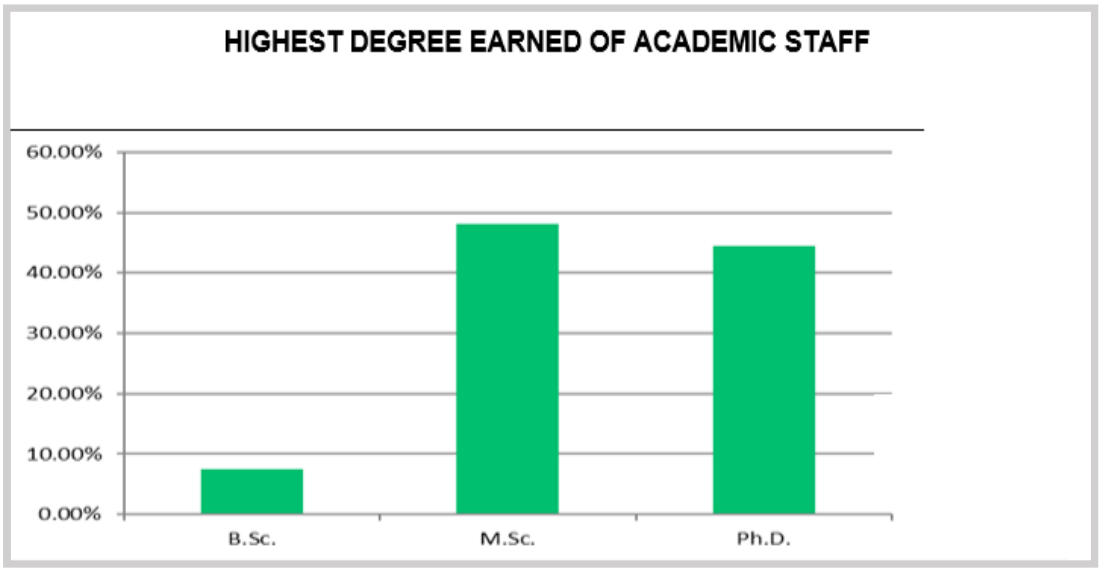


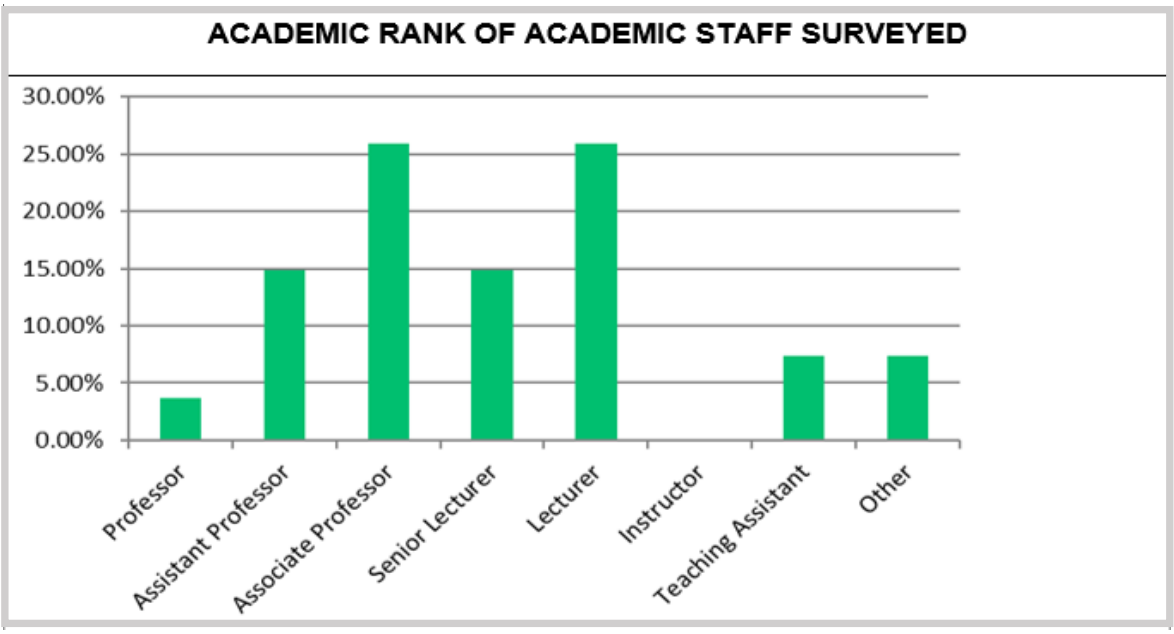
Figure 2.7 shows that 48.2% of survey respondents held an MSc degree, 44.4% held a PhD as their highest degree, and 7.4% were qualified to BSc level.

FIGURE 2.7



As shown by Figure 2.8, approximately four out of 10 respondents are tenure-track faculty, with the majority of these (25.9%) being associate professors. A significant number of participants held lower rank positions, such as teaching assistants, instructors, lecturers, etc.

FIGURE 2.8

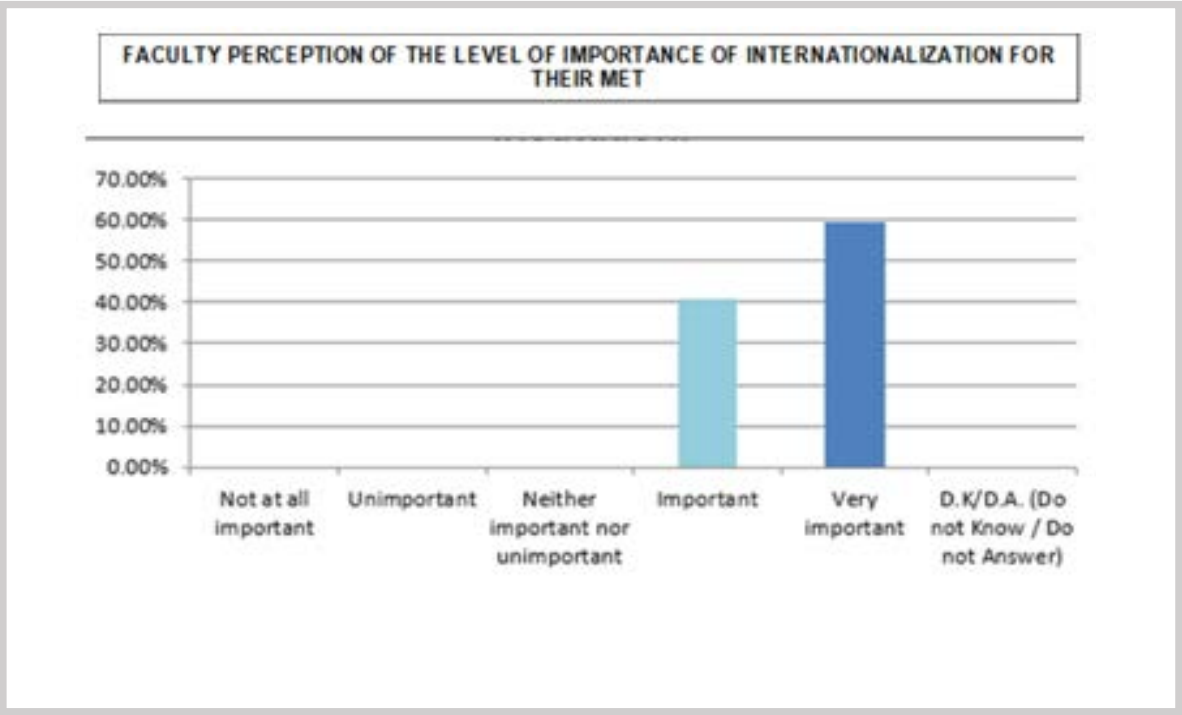


The analysis of sample characteristics showed that the pilot survey results – discussed in the next section – came from a small but well informed and sufficiently varied group of respondents within the limitations of the sample size.

2.3.3. Pilot survey results on MET internationalisation aspects

Figure 2.9 below provides evidence that all faculty members value internationalisation clearly and without exception, with the majority considering it very essential for their MET institution and with no response in the range 1-3 of the Likert scale. Therefore, according to the pilot survey results, there is strong faculty support for the development of a comprehensive internationalisation strategy.

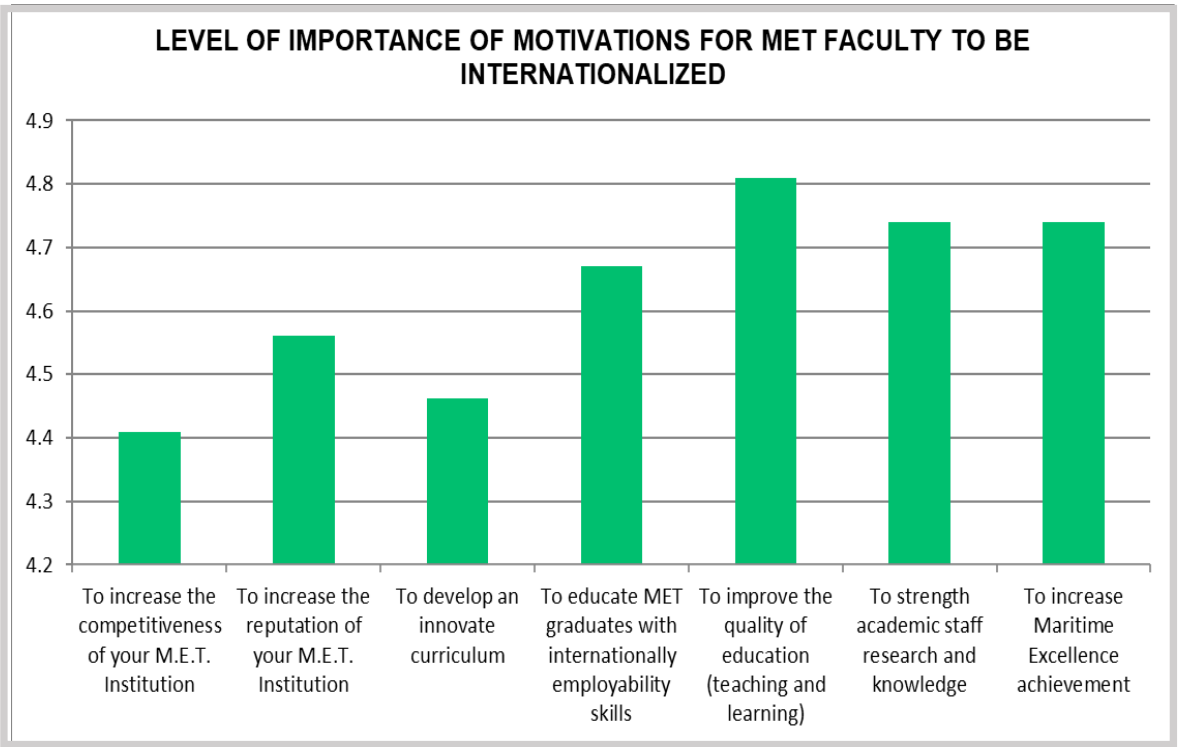
FIGURE 2.9



The next figure sheds light on the respondents' perceptions of the drivers of internationalisation . Data in Figure 2.8 suggests that not all held managing positions at the time of the survey, so the perceptions are more of faculty members than of management. According to Figure 2.10, the main motivations are: the potential to improve the quality of education; to achieve maritime excellence; to strengthen faculty research and knowledge; and to equip graduates with international employability skills. All these motivations were evaluated as very important by more than 70% of respondents. Other motivations (in order of importance) included: the development of an innovative curriculum; the improvement of MET reputation; and the enhancement of MET competitiveness.

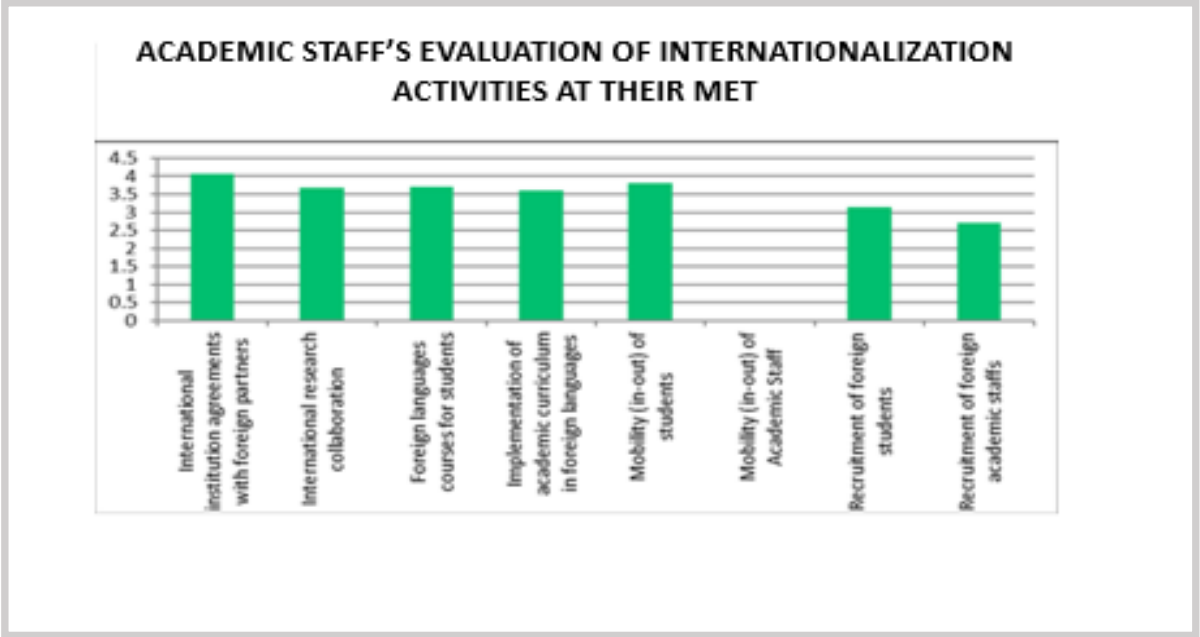
There were no negative opinions on any of the above-mentioned motivations. Only a small percentage of neutral views was recorded, not exceeding 3.7% (with the exception of competitiveness enhancement, for which the respective percentage was 11.1%).

FIGURE 2.10



Overall, the findings show that academic staff support the need to adopt internationalisation strategies with the aim of upgrading the quality of education and the skills of graduates. They also believe that internationalisation could impact positively on their own professional development and their MET institution's reputation and competitiveness.

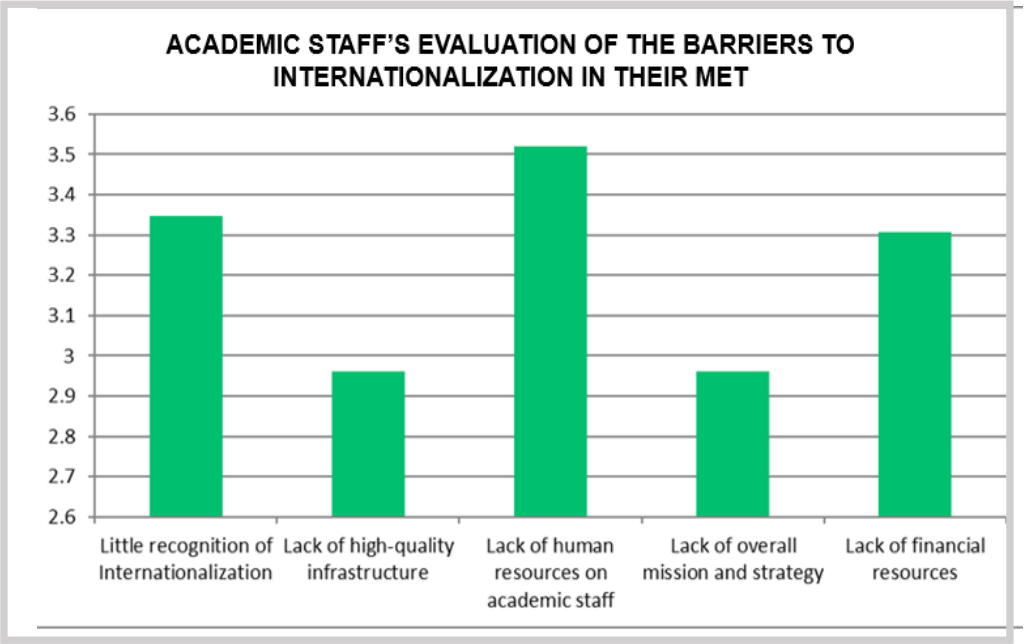
FIGURE 2.11



The survey participants assessed specific aspects of MET internationalisation related to activities in their institution. The survey showed that the top-rated were agreements with foreign institutional partners and student mobility. The second most popular set of activities included foreign language classes for students, international research collaboration, teaching the syllabi in foreign languages, and recruitment of foreign students.

Opinions did not appear to be equally strong on foreign faculty recruitment: only 25.9% of respondents positively evaluated such a direction and the response to this question recorded the lowest weighted average (2.7). In addition, a noticeable percentage of faculty (more than 14%) reported very little or no recruitment of foreign students12, courses in foreign languages, foreign language classes, or student mobility – although these are fundamental elements in establishing a forum of cross-border cooperation among MET institutions to facilitate exchanges of knowledge, best practices, resources, and students.

FIGURE 2.12



The survey results indicate that the major barriers to the implementation of internationalisation are: under-staffed MET institutions; low recognition of internationalisation ; and limited financial resources, with average scores of 3.52, 3.35, and 3.31 respectively. Other, more minor, obstacles (with an average rating of marginally below 3) include the lack of high-quality infrastructure and the absence of a mission and strategy.

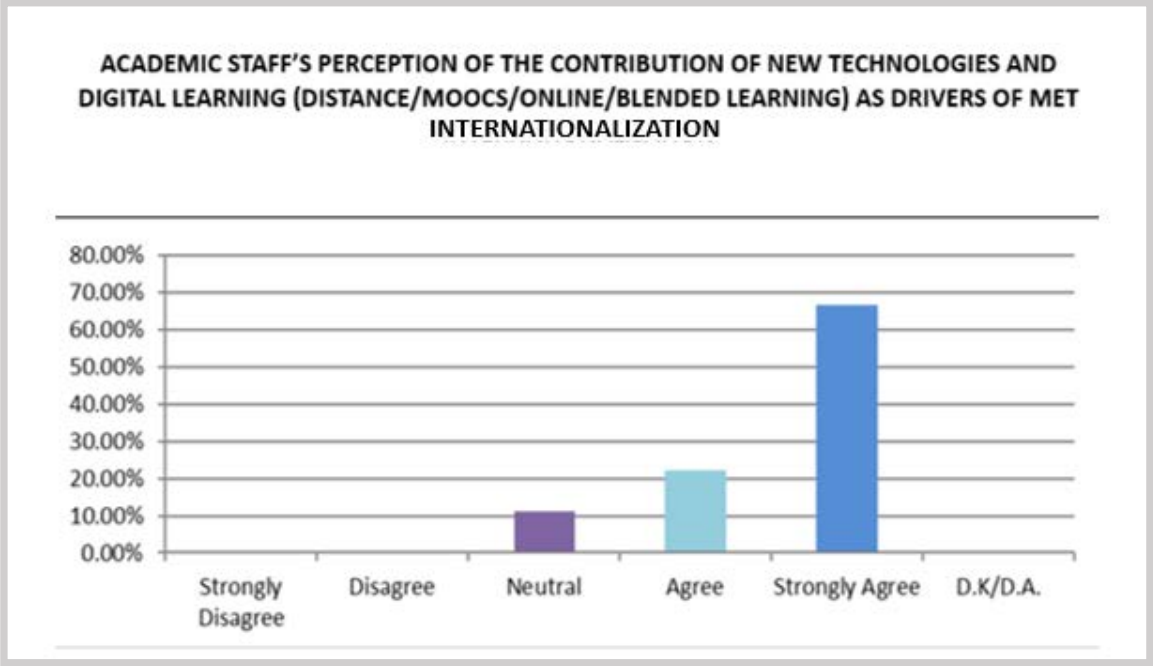
Therefore, from the standpoint of faculty, the effective implementation of internationalisation hinges on overcoming human and financial resource limitations and on raising the awareness of the importance of internationalisation . While the absence of a pertinent strategy is not included in the most critical issue, this is to be reasonably expected. The design of an appropriate strategy is typically proposed as a solution to overcome challenges – but the absence of a strategy is rarely identified as the main cause of challenges, although it may well be.

12 In some instances, national law stipulates that MET education has to be in the language of the country.

However, a very significant number of respondents pointed to the existence of joint degrees with international partners.

The next question sought to identify the level of international orientation of the courses offered in different departments of each MET. The question was answered by deck officers, engineer officers, and electrotechnical officers to reflect the different educational paths of MET institutions. A high degree of internationalisation seems primarily related to courses offered to deck and electrotechnical officers and somewhat less to the courses offered to engineer officers.

FIGURE 2.13



According to Figure 2.13, 66.7% of faculty members strongly agree and 22.2% agree that new digital learning tools could be major drivers of MET internationalisation . The significant role of new technologies in education has been highlighted in WP1 of SkillSea, as well as in the D3.1 strategic plan framework, and in the analysis based on the literature review referred to in sub-section 2.1.4. The above finding adds a new perspective to the role of digitalization in education, showing that it could be viewed as a facilitator of increased international integration among MET institutions.

In summary, the pilot survey results enable the following conclusions to be drawn:

Survey respondents upheld the importance of internationalisation and the majority viewed it as very important to their MET.

Academic staff endorsed the development of internationalisation strategies and anticipate a positive effect on the quality of education, the skills of graduates, their own professional development, and their own MET institution's reputation and competitiveness.

From the standpoint of faculty, the most influential internationalisation activities comprise (in order of

importance): agreements with foreign institutional partners; student mobility; foreign language classes for students; international research collaboration; teaching the syllabi in foreign languages; and recruitment of foreign students.

Overall, internationalisation is mainly related to courses offered to deck and electrotechnical officers and to a somewhat lesser extent to engineer officers.

The vast majority of faculty members believe that digital learning tools could be major drivers of MET internationalisation . From the faculty's perspective, the major barriers to the effective implementation of internationalisation are: under-staffed MET institutions; a low recognition of internationalisation ; and limited financial resources. Other obstacles which have a lower impact include the lack of high-quality infrastructure and the absence of a mission and strategy.

The absence of a pertinent strategy, while identified, does not rank among the most critical issues, but this does not understate its importance. Internationalisation strategy can assist MET institutions to bypass internal contradictions or the limitations of existing national frameworks and therefore to enjoy greater growth through cooperation.

REFERENCES

- Barsan, E., Varsami, C., Duse, A., Hanzu-Pazara, R., & Jenaru, A. (2017, August). Impact of "smart" technologies in teaching maritime subjects. In *IOP Conference Series: Materials Science and Engineering* (Vol. 227, No. 1, p. 012014). IOP Publishing.
- BIMCO/ICS (2016), Manpower Report. Executive Summary. Available at http://www.ics-shipping.org/docs/default-source/resources/safety-security-and-operations/manpower-report-2015-executive-summary.pdf?sfvrsn=16, last accessed January 10, 2020.
- CEDEFOP (2008). The shift to learning outcomes Conceptual, political and practical developments in Europe.
- Cerit, A. G., Zobra, Y., Deveci, D. A., & Tuna, O. (2004). Problem-based learning in maritime education: How to design curriculums. *Dokuz Eylul University, Izmir, Turkey*.
- Cwilewicz, R., Tomczak, L., & Pudłowski, Z. (2003). The development and application of computer-based training programs in maritime engineering education. *Global J. of Engng. Educ*, *7*(2), 209-218.
- Demirel, C. E., & Ziarati, R. (2012). Combining Vocational and Academic Requirements in the Maritime Education and Training. In *Proceedings of the 20th Conference of International Maritime Lecturers' Association. Terschelling. Netherlands*.
- De Wit, H., & Hunter, F. (2015). Understanding internationalisation of higher education in the European context. *Internationalisation of higher education*, 41-58.
- Erdogan, O., & Demirel, E. (2017). New Technologies in Maritime Education and Training, Turkish Experiment. *Universal Journal of Educational Research*, *5*(6), 947-952.
- IMO (2020a) http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-on-Standards-of-Training,-Certification-and-Watchkeeping-for-Seafarers-(STCW).aspx, last accessed June 8, 2020.
- IMO (2020b) http://www.imo.org/en/About/Conventions/ListOfConventions/Pages/International-Convention-for-the-Safety-of-Life-at-Sea-(SOLAS),-1974.aspx, last accessed June 7, 2020.
- Kalnina, R., & Priednieks, V. (2017). Proficiency improvement method in maritime education. *WMU Journal of Maritime Affairs*, *16*(1), 139-159.
- Kitada, M. (2015, June). Promoting cultural awareness through welfare in Maritime Education and Training. In *European Conference on Shipping, Intermodalism & Ports (ECONSHIP 2015)* (pp. 1-12).
- Knight, J. (2008). Higher education in turmoil. *The changing world of internationalisation*, *8*, Rotterdam: Sense publishers.
- Guico, T. M., & Dolor, G. (2013). Level of awareness and possible concerns of the marine faculty members on outcomes-based education. *Journal of international academic research for multidisciplinary*, *1*(7), 159-167.

- Laurillard, D. (2013). *Rethinking university teaching: A conversational framework for the effective use of learning technologies*. Routledge.
- Muirhead, P. M. (2004). New technology and maritime training in the 21st century: Implications and solutions for MET institutions. WMU Journal of Maritime Affairs, *3*(2), 139-158.
- Pallis, A. A., & Ng, A. K. (2011). Pursuing maritime education: an empirical study of students' profiles, motivations and expectations. *Maritime Policy & Management*, *38*(4), 369-393.
- Teichler, U. (2017). Internationalisation trends in higher education and the changing role of international student mobility. *Journal of international Mobility*, (1), 177-216.
- Visan, I. (2019). Types of Englishes and The Case of Maritime English: Some Insights. *Constanta Maritime University Annals*, *27*(223).

3. INTERNATIONALIZED STRATEGIES IN MET PROVISION

3.1. Motives and challenges for Internationalised MET

3.1.1. Motives and advantages: what drives towards an Internationalised MET strategy?

The internationalisation of provision – with STCW MET institutions cooperating with other STCW MET beyond borders or with institutions from the wider area of non-STCW MET, and even with more remotely related degrees in the engineering or business area – can represent a valid strategy for MET in general for the following reasons (cf. also Figure 3.1):

- It can facilitate the standardisation of a 'portfolio of competences' for maritime professionals recognised at international level.
- Such a strategy can be implemented within a reasonably short period; even in the short to medium term.
- This strategic direction can represent a competitive model – both for shipping companies in terms of the competitiveness of their crew and for seafarers, who can acquire a 'portfolio of competences' recognised at international level.
- It can add complementarity with other types of educational and training provision, as it can more easily circumvent any non-cooperative mentalities which may exist within national educational systems through lack of supportive structures for cooperation within levels or types of educational provision.

3.1.2. From simple compatibility to interoperability: what hinders internationalisation ?

The following steps of the analysis aim at formulating a strategy framework relevant for the internationalisation of MET in the context of the diverse MET environment which exists across EU-EEA countries. The steps can be summarised as follows:

a. Ascertaining the importance of aspects related to Internationalised strategies among MET institutions

b. Assessing the options open to MET institutions in the process

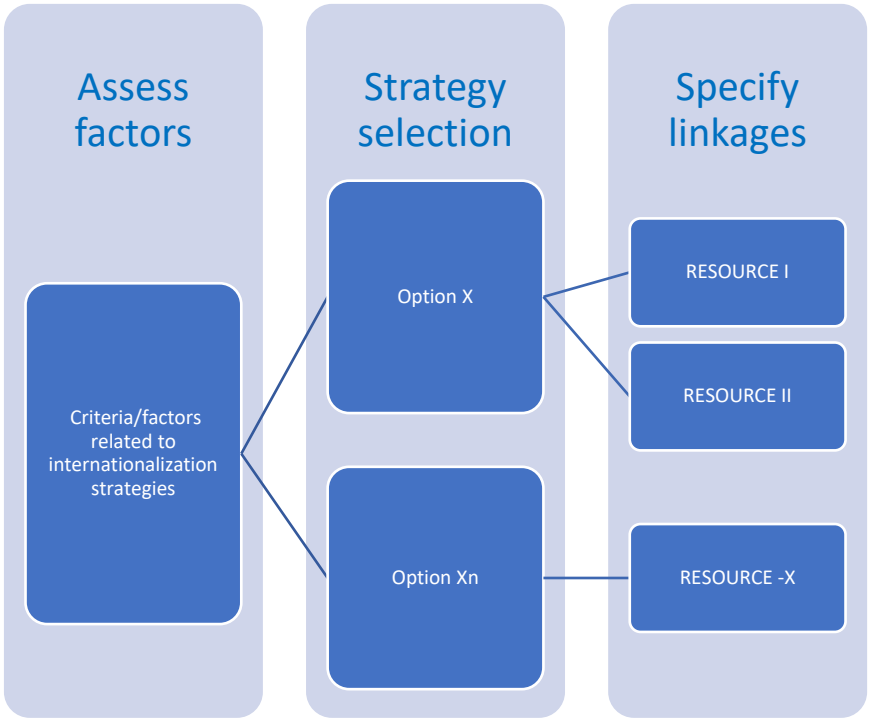
c. Analysing related challenges as these emerge through the pilot survey, the focus group and the contribution of national and specific internationalisation cases provided through the SkillSea partnership (especially WP3 partners) and

d. Providing suitable tools to promote Internationalised MET strategies and to remove hindrances.

These also reflect the steps that need to be taken by MET establishments wishing to follow the path of an internationalisation strategy, as presented in Figure 3.1 below.

FIGURE 3.1

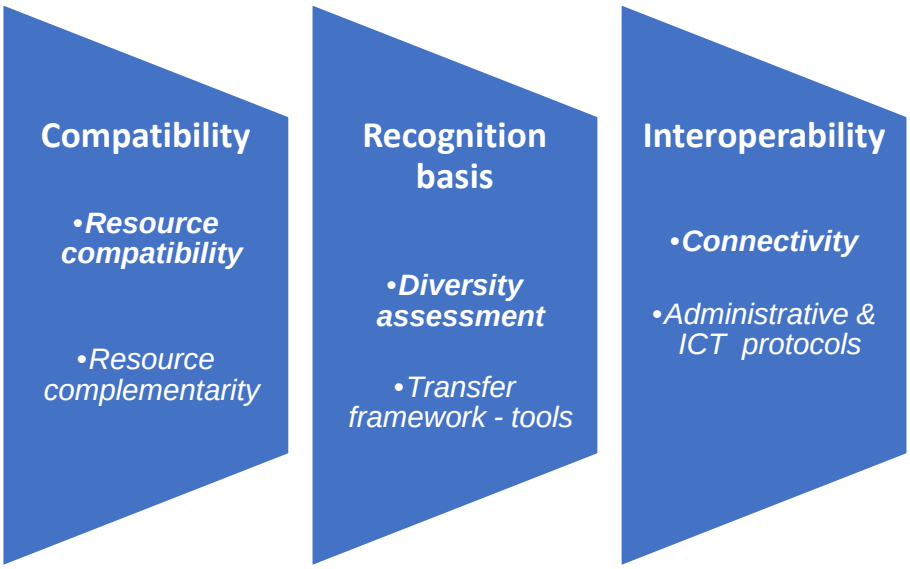
STEPS FOR SELECTING AN INTERNATIONALISATION STRATEGY



The main prerequisites for adopting a strategy for internationalisation can be classified under three main categories, starting from compatibility. From the reverse side, the same prerequisites are also the sources of the main challenges that MET institutions may face when opting for an internationalisation strategy (cf. Figure 3.2). Any such challenges need to be addressed through suitable tools supporting compatibility, recognition and interoperability.

FIGURE 3.2

CHALLENGES TO DIRECTIONS OF INTERNATIONALISED MET STRATEGIES



Studies in the field of VET and HE in general, including MET, indicate that several factors hinder internationalisation . In literature these have been recognised as to be mainly the issues of recognition of learning outcomes, of financing mobility and – as would be expected – language barriers (Christensen13, 2004).

More analytically, internationalisation of STCW-MET may be hindered by the following issues:

- First and foremost, it should be considered that even if the STCW Convention sets the mandatory minimum requirements for seafarers' certification, each party to the convention shall give effect to it by adopting national provisions. Differences arising between the national legislations giving effect to the convention therefore need to be considered.
- National METs are structured in compliance with national provisions; these function within specific settings and frameworks and may involve national bureaucratic procedures and differences in terms of domestic legal and technical provisions, etc.
- A widescale move towards MET internationalisation may be slowed by differences at national level, hindering agreements on standard 'Internationalised' procedures.
- The adoption of a standard approach at international level is a process that requires time to be fully implemented by interested institutions and should be conducted via a step-wise approach extending from the medium to the long term.
- The main challenge to the internationalisation of MET institutions is the long process which MET institutions would face in terms of adaptation to 'a new framework of requirements.

[13] Christensen, S. (2004). *Learning by Leaving*. CEDEFOP.

3.1.3. Location and language challenges: directions and solutions

Location:

Findings of previous research by Schinas (2010)[14] suggest that in the majority of cases shore employment depends on local cluster dynamics, in the case of Hamburg, London, Piraeus and Rotterdam. Locations become hubs for employment of maritime professional due to their inherent 'specialization' – for example, as global hubs of specific shipping-related activities. This is the case for Rotterdam as a key port and logistics element within the maritime supply chain and for London, with its clustering of inputs such as shipping finance, insurance, shipbroking and technical and classification. It is also the case in other locations of concentrated activity, such as Hamburg in the container business and ship finance, as well as Piraeus in ship management. Internationalisation possibilities for maritime education establishments do not depend, however, on location alone – especially in this globalized industry. A cluster gains in size and employment-education reputation based on port/harbour proximity, business-related regulation, ship finance presence and availability, and concentration and marketing of services. For educational facilities, some factors supporting maritime clusters are of particular interest, such as the existence of a high-level logistics network, a multicultural open society, and size. The internationalisation of a location is also critical for attracting both maritime business and educational facilities. The current unequal distribution of simulators across Europe is one area where resources across borders can be targeted to take full advantage and achieve complete use of expensive educational equipment items.

Language:

The existence of a model Maritime English IMO model course calibrated towards STCW certification is a positive element but does not set a sufficient condition for delivery in English, which is currently the most popular option, being both a standard international language and the lingua franca of shipping. It is therefore easier to enter into cooperation agreements with areas and establishments with a good working knowledge of English, but without this being in any way an excluding factor as language skills may vary independently of the specific level of knowledge. Besides the formal requirements of STCW and other IMO rules, sufficient and efficient command of English is requested by employers for both onshore and onboard employment. However, due to the international character of the industry and the use of English as a means of assessment and endorsement[15] for the main certification of competences recognised by the STCW Convention, language barriers are related more to the level of functionality of certification as an assessment mechanism than a major hindrance.

Location and hub-specialization are important, but tradition and strategic cooperation can make up the balance in the absence or weak provision of the three attraction variables which can turn a nationally-acknowledged local centre into a one with a strong international network and recognition.

14 Schinas, O. (2010) Report to the Chamber of Commerce on the Attractiveness of Hamburg as Maritime Cluster, HSBA Papers.

15 Endorsement means an endorsement to a certificate of competency made by the maritime administration of a Party to the STCW Convention.

3.2. Enabler mechanisms for Internationalised MET provision

There is a large list of guides, projects and related deliverables on Internationalised strategies among European-related initiatives practically connected to EU funding. Yet the complexity and diversity of the European MET system can only partly benefit from their findings and guidance, as diverse national systems do not always adopt either ECVET or ECTS credits and while levels of education also differ.

Recent European projects of most relevance to the SkillSea mission include:

- DECOMAR, created to facilitate exchanges, is one of the closest to the orientation of the support tool solutions proposed by SkillSea. Participating partners have assumed the task of developing common curricula modules for merchant marine officers for two bachelor-level study programmes for one semester[16] (navigation and electromechanics).

- UniMET[17] aims 'to embed the UniMET programme within the partner countries through cross-referencing international and local/national requirements. This will ensure that all seafarers are compliant with the international requirements and will therefore increase their employability within the international labour market'.

There are also some related projects which involve internationalisation aspects, such as:

- The MARINE Project aimed at the establishment of a Maritime Network of Education for Development of the maritime culture

Applications of e-learning have been promoted by projects such as the E-GMDSS e-learning platform

At the international level there are a number of enablers through relevant organizations such as the International Maritime Lecturers Association (IMLA), the International Association of Maritime Universities (IAMU), METNET and GlobalMET18, while the International Association of Maritime Economists (IAME) also sources a number of its members from STCW-MET (often more from HE MET, whether STCW-oriented or not).

Among such organizations and groups, IAMU has with great success applied the Peer-Assisted Self-Evaluation (PAES) Scheme with experts acting as external peers. Encompassing goals, standards and measures common to leading MET institutions, this scheme aims to assess the state of excellence of a MET institution and to clearly indicate possible improvements – at management level, organizational aspects, quality of academic curriculum and the learning experience – while maintaining the target learning outcomes. The proposed scheme follows a two-step process. The first step is a guided, task-oriented and quality-driven self-assessment while the second includes peer-assisted iterative self-analyses.

16 Information about the DECOMAR project which run between 2014-2016 is visible through their Facebook page and in secondary sources as https://www.anmb.ro/enasc/materials/Memorandum%20after%20ENASC%202018.pdf.

17 http://www.unimet.pro/Partners.aspx, last accessed June 12, 2020 and http://www.unimet.pro, last accessed June 16,2020.

18 GlobalMET is an association of maritime education and training providers (http://globalmet.org).

3.3. Case studies of Internationalised strategies in European MET

3.3.1. From absence of international exchanges to joint degrees

The diversity of MET across Europe at the level of EU-EEA countries is reflected in the variety of the state of play of Internationalised strategies at MET level. These vary from complete absence in the case of non-EQF included VET-type educational provision, including STCW VET, to strategies of very integrated internationalisation including joint degrees.

3.3.2. The Danish case of MET internationalisation strategy

The examples in this subsection 3.3.2 include those of institutions across the spectrum of MET in Denmark – STCW Higher Education MET degrees, STCW MET of VET type and non-STCW HE provisions which may be related to maritime subjects, and which have Internationalised strategies in terms of cooperation, recruitment or are very active in Erasmus exchanges in a strategic way or have Erasmus Master degrees.

Most Danish MET institutions have internationalisation strategies. This is dominant in Higher Education MET (HE-MET) where several are Erasmus+ charter holders, while all HE-MET have strategies for recruitment and cooperation with foreign maritime universities. A single MET/VET department is part of an institution engaged in a key action 1 mobility project. Analysis in the field of VET institutions indicates that many find Erasmus+ administratively heavy and implement international strategies outside Erasmus+. Non-STCW institutions, with maritime subjects in the field of HE, have comprehensive internationalisation strategies, extensive cooperation with foreign universities, recruitment of staff and students and mobility through Erasmus+ participation as charter holders.

In a nutshell, Denmark has a rich tradition of international cooperation at all levels, from exchanges of students and staff, structural cooperation, education with new angles and strong networks, to structured assessments of whole MET systems. There are also several examples of cross-fertilization of teaching traditions through contact with different ones thanks to internationalisation.

Furthermore, in Denmark:

- Several institutions have reciprocal review of educational provision – as, for example, Fredericia School of Marine and Technical Engineering with Chalmers University of Technology
- SIMAC has an internationally-drawn advisory board of experts providing insight and input for analysis, opportunities, and benchmarking globally
- Lecturers fulfil part of their master education or other further education at universities in other countries

The European Maritime Simulator Network is a physical connection of simulators for research and development activities, amongst others, and now with a global perspective as a South East Asia branch will join

The IAMU approach has proved valuable for participating MET institutions. For example, along the step process of IAMU, a member of one working group from SIMAC has been supporting MET efforts in the Philippines, while other tangible successes were the conference 'Towards globally competitive officers' in 2018 and a three-day workshop in February 2020 providing not only updates on quality improvement to academic standards and learning outcomes but also promoting harmonized implementation of STCW-related subjects and exchange of information and activities with relevant stakeholders.

3.3.3. The case of Greek MET provision

There is significant Internationalised focus among all the non-STCW HE institutions in Greece. This includes a history even of joint MSc degrees with EU partner institutions, and a large number of exchanges of staff and students at all levels, memoranda of understanding of long-term cooperation across borders and continents, with the English language being adopted lately as the medium for a substantial percentage of degrees offered by established public universities, mainly post-graduate courses.

A number of other post-graduate courses are offered by private institutions, often in association with foreign providers, and especially in the area of ship management. Together with a variety of short courses, these are often offered in English as well.

A number of private institutions provide STCW courses endorsed by maritime authorities outside Greece, including European authorities. STCW education recognised by the relevant Greek maritime authority is provided by public maritime academies which were not classed within the EQF framework19 until recently and a current review may eventually lead to its inclusion, which will enable advantage to be taken of the mobility system supported by ECVET/ECTS.

3.3.4. The Netherlands case of a MET internationalisation strategy: STC Group

In the Netherlands, most HE institutions have internationalisation strategies. At bachelor level, the institutions have a high degree of freedom to develop their curriculum, but they are obliged to take their regional and international function into consideration. For MET institutions there is, of course, also the need to have a global outlook to reflect the nature of the maritime profession.

Vocational MET institutions are in the process of developing or extending their internationalisation strategies. On a vocational level, there is also an emphasis on regional impact. Concerning vocational MET institutions, there is, naturally, an international-looking strategy due to the worldwide working field of mariners. For example, in the field of inland navigation, there is excellent cooperation at both national and

[19] Cf. SkillSea (2020). *D3.1 Strategy Plan Framework*, *op. cit*., Annex 4, and Annex 8.

international level between vocational MET institutions.

Still, the execution of international strategies is complicated as the BSc and vocational studies are not educating deck officers and marine engineers but integrated officers (maritime officers) who are dual educated. The system in the Netherlands has only recently been changed to two and a half years of integrated studies (including the first half-year of apprenticeship) and it is after their apprenticeship that students choose between deck officer or marine engineer, and so from there on they are mono-disciplinary educated. The old system made the programme very full, and due to its integrated character, the exchange with other institutions was limited.

The change towards a more monodisciplinary system has opened the way for more collaboration. Also, the system of minor subjects within Bachelor-level studies provides opportunities to extend the internationalisation agenda.

At the vocational education level, a similar system has been introduced, called Keuzedelen (choice parts), which also opens the door to more internationalisation possibilities.

The STC Group is a vertically integrated school with secondary, vocational, bachelor and master level possibilities. As a result of the complicated situation in the past in relation to full programmes and integrated studies, the STC Group decided to establish a project department as part of its European internationalisation strategy. This department is also supervising the Erasmus+ participation. Besides this, the school has an international department which runs projects outside Europe in which lecturers from HE or vocational level can participate.

3.4. Strategy selection through diversity: the case of Germany

The review of the diversity of European MET internationalisation through case studies is completed in the following sections through three examples within the same national setting –German MET – which involve different target groups of students and orientation of studies/and or career paths, yet all have strong internationalisation strategies. The study of the background facts related to these three examples, all within the same national system, provided a national framework-neutral basis to derive some generic criteria which were used in the strategy tool presented in Chapter 4.

3.4.1. Germany: the case of Jade University (Hochschule Elsfleth)

The Jade University (Jade Hochschule) offers maritime programmes at the Elsfleth campus. After the German ‘Abitur’ (general qualification for university entrance) or the ‘Fachhochschulreife’ (qualification for entrance to a university of applied sciences), or equivalent, there are various routes to the acquisition of a certificate of competency for international shipping:

1. Eight-semester study course at Jade University with two integrated practical semesters
2. Vocational training as ship’s mechanic or assistant nautical officer, followed by six semesters at Jade University

Nautical science studies at Jade cover a wide range of subjects, with particular emphasis on technical aspects. In the first three semesters of the core curriculum the basics of maths, physics, law, English, economics and chemistry are covered, in addition to introductory classes in applied subjects, such as classical navigation, ship safety, computer science and employment law. Building on these basics, the main studies cover the specific subjects necessary for future employment as deck officer. Among these are the STCW subjects related to the command of a ship (technical navigation, manoeuvring, meteorology, navigational rules, introductory exercises on a ship simulator) and loading cargo (ship stability and strength, loading technology, dangerous goods, shipping law) and non-STCW subjects, such as management and shipping economics which are aimed at ship operation management. Electives are offered in either nautical science/technology or economics/law and it is possible for the students to concentrate on specific areas. In the final semester, extensive simulator exercises and the bachelor thesis complete the degree course. Training voyages onboard the sail training ship *Grossherzogin Elisabeth* are an integral part of the course and take place in the fourth or seventh semesters, offering the opportunity to consolidate theory in practice. Almost all courses are offered in English.

Apart from the above undergraduate programme (BSc in nautical science and maritime transport) that mainly addresses the needs of future deck officers, Jade offers the BSc in maritime economics and port management, the BSc in international logistics management and the BSc in ship and port operations 'Schiffs und Gafenbetrieb' (dual), along with MSc degrees in international maritime management and maritime management. These programmes are not related to the STCW Convention and have a clear business and managerial focus.

The maritime courses are supported by the Centre of Maritime Research (CMR). CMR facilitates the pooling of skills and resources in the maritime sector, with the goal of transferring technology and knowledge, as well as to generate synergies among market actors and researchers. A range of players in the maritime, industry and science sectors cooperate to strengthen research, development and innovation in the maritime field. In addition to the primary research tasks, the maritime department offers further training courses for advanced professional training in the fields of ship operation and maritime economics and port management. The need for appropriate courses for ships' officers and masters has grown in recent years, due to the international standards for the training of seafarers. In addition to the master's certificate of competency, specific ship types require additional qualifications, as per STCW, which can be acquired at the institute. The appropriate preparatory training courses cover both technical aspects (for deployment on tankers, for example, or for the proper handling of modern communication systems) and management-oriented issues, such as how to deal with emergencies on passenger ships. The department also offers training courses in the use of innovative technology, such as simulator courses, loading computers and software products from the field of logistics. In total, Jade retains relations of various types and levels with 171 partner universities in 35 different countries.

3.4.2. Germany: the case of MTC (private) – background information and key data

MTC Marine Training Centre Hamburg GmbH is one of the most modern maritime training centres in Europe, using sophisticated simulators and training facilities. MTC provides training for captains, pilots, navigators, engineers, deck and engine crew and shore-based staff as per the needs of STCW and of the industry. Shareholders of this marine training centre include the shipping companies Rickmers Reederei,

Orion Bulkers and Marlow Navigation as crew manager. Further shareholders are MAN Diesel as supplier of engines, the class society DNV GL, the pilots' associations from the River Elbe, Port of Hamburg and Kiel Canal, ma-co maritimes competenzcentrum e.V. and private investors. In practice, the shareholders of MTC are both users and stakeholders of the facility. Private and public interests are represented and have direct access to the decision-making.

MTC operates state of the art simulators and training facilities:

- Ship handling simulator
- Radar/ECDIS simulator
- VTS simulator
- Liquid cargo simulator
- Engine simulator
- MAN main engine simulator

The interesting character of MTC is reflected in the courses it offers. For example, in the field of 'human element' MTC offers the following courses:

1. H001: Human Element, Leadership and Management, management level, including Bridge Resource Management. This course meets the latest requirements of STCW Table A-II/1, A-II/2 (Master, Chief Officer) with respect to:
    a) Leadership style, leadership and management
    b) Intercultural communication, habits and attitudes of different nationalities
    c) Assessment of personnel
    d) Teamworking, delegation, target setting and review
    e) Communication and motivation
    f) Conflict management, conflict solving and handling strategy
2. H002: Human Element, Leadership and Management, Management Level, including Engine Resource Management and Engine Team Management. This course meets the latest requirements of STCW Table A-III/1, A-III/2, A-III/6(Chief Engineer, Second Engineer, Electrotechnical Officer) with respect to:
    a) Leadership style, leadership and management
    b) Intercultural communication, habits and attitudes of different nationalities
    c) Assessment of personnel
    d) Teamworking, delegation, target setting and review

e) Communication and motivation

f) Conflict management, conflict solving and handling strategy

3. H004: Maritime Resource Management (MRM) for pilots

a) This is a non-STCW-course on human factor training in accordance with IMO Reg. A.960 for pilots and mooring masters. This maritime resource management training has been developed by HPS GmbH, a subsidiary of the Hamburg Harbour Pilots, in cooperation with the Swedish Club particularly for the requirements of pilots.

b) MRM is training to improve coordination of skills, knowledge, experience and available resources to achieve the highest standards of safety and efficiency for pilots.

As clearly shown, MTC aims to cover the requirements of STCW, as in the case of H001 and H002 courses, while at the same time to address needs identified by industry actors, such as a P&I Club, for skills and competences not covered in the STCW Convention. Although it is advertized as a tailor-made course, it is apparently a successful example of offering a platform for the development of content (educational material) that addresses an identified need, while supporting it with proper infrastructure, freelance external experts as lecturers, and the necessary soft infrastructure, such as marketing and digital footprint to attract mariners from all international markets. Considering that most mariners in the German cluster are non-Europeans (see Annex 2, Figure 2.1), it is clear that this facility follows a strategy that is not limited geographically.

3.4.3. The case of HSBA: background information and key data

HSBA belongs to a modern generation of HE non-STCW MET institutions, having been created on the initiative of the Chamber of Commerce of Hamburg to provide education and training for the next generations of shipping executives. It was established in 2008, four years after non-public universities were licensed to operate in Germany, breaking a long tradition of maritime studies – covering maritime economics, seaborne trade and shipping finance – being offered in northern Germany exclusively at the level of vocational training of 'schifffahrtskaufmann' (roughly translated in English as shipbroker and agent) and meaning that VET graduates had been dominating the market at all decision levels.

The maritime offering of the HSBA20 had to address the needs of the maritime cluster in northern Germany. The first identified need was to attract young candidates for shore employment, who normally would opt for another industry. In this regard, the HSBA's maritime offering had the clear mission to strengthen the attractiveness of the branch in the competition for young candidates. Therefore, high employability is part of the HSBA philosophy and a top priority, being a determinant criterion before launching a new programme. Following the tradition of northern Germany, the BA/BSc programs are 'dual' – meaning that students

20 The first undergraduate programme, BA in Shipping and Ship Finance (dual course) was offered in 2008. Then this programme evolved to BSc Maritime Management, as there was a clear need to strengthen the curriculum with more scientific subjects. At graduate level, the MBA Shipping programme was launched in 2011, with a clearly international orientation and targeting middle to upper-level shore personnel.

should be employed while studying. Every academic semester has a minimum of 11 weeks; during this time, students are fully dedicated to their studies. During the remaining weeks of the year, students are normally employed. The course is demanding, yet the employability rates after graduation are extremely high – close to 95%. It should be noted that in line with German law, employees are not obliged to continue working for the employer that supported them during their studies, although the retention rate is also high.

In addition to the need to attract young employees, digitalization, environmental and corporate governance concerns, as well as increasingly complex finance instruments and financial decision-making and reporting – the provision for which was and could be more developed within a university setting – there was a significant opportunity for HE institutions to make inroads in MET; especially as such knowledge seems to have resulted in increased resilience of clusters and of internationally-oriented shipping businesses with highly specialized decision-makers.

The design of HSBA's maritime courses (BSc and MBA) considered the following strategic principles; among these the international aspect (in bold) is evident:

1. Holistic – interdisciplinary approach
2. International - multicultural experiences
3. Business-oriented learning
4. Matching of theory and practice
5. Preparation for future positions and challenges

These strategic directions address the needs of companies as summarised below:

1. A coherent programme, with modules in business, finance, technology, and law
2. Working/studying with 'foreigners' + soft skills
3. Focus on business development and growth – international markets (not regional or European only as in the past)
4. Study + Work (combination of work experience and academic capacity upon graduation)
5. Working close to the decision-maker

Moreover, employers had identified the need to address key future characteristics that the HSBA curriculum also had to consider:

- Complexity in operations and decision-making
- Sharing platforms of knowledge and information
- Clear split among the functions of:
    - Ownership = financial
    - Management = technical
    - Services = multi-disciplined

International – multicultural (cosmopolitan) environment

It should also be noted that both employers and employees do not solely/exclusively adopt a ship owning/management perspective but adopt one of the wider maritime cluster (banks, agents, etc), which is an inherent characteristic of Hamburg.

- HSBA incorporated the following elements of an Internationalised strategy in the development of its degrees:
- The language for both undergraduate and post-graduate degrees related to MET is English
- The student intake is international; MBA-S had cohorts with more than 50% international students, many of them from the Americas
- A number of key professors have been recruited from across Europe
- 'Focus on internationality' is one of its highest-ranking evaluation criteria, along with 'focus in practice'
- Cooperation with global players from within the international maritime cluster of Hamburg

Despite the international character of the programmes, it was difficult for undergraduate students to get engaged in exchange programmes, due to the dual character of their studies. However, it is common that undergraduate students work abroad during their studies. Within the graduate programme of MBA Shipping, the need for exchange was also limited, as students spent almost one-quarter of their studies abroad (companies and cluster visits).

REFERENCES

- Deloitte (2011). *Challenge to the industry - Securing skilled crews in today's marketplace.* Deloitte Global Services Limited.

- Demydenko, N. (2012). Teaching maritime English: A linguistic approach. *Journal of shipping and Ocean Engineering*, *2*(4), 249.

- IMCA (2016). *Guidelines for The Training and Experience of Key DP Personnel, IMCA M 117 Rev. 2.* Guidelines, IMCA.

- IMD (2019). *World Digital Competitiveness Ranking.* IMD World Competitiveness Center.

- IMO (1978). "1978 STCW Convention Articles." *1978 STCW Convention Articles.* Available at https://vp.imo.org/Customer/Subscriptions/IMOVEGA/MemberPages/IMODocument.aspx?resultIndex=0&docId=ST78AA01ABA&docDate=2019-11-20,last accessed June 8, 2020.

- IMO (2020). *International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978,* http://www.imo.org/en/OurWork/HumanElement/TrainingCertification/Pages/STCW-Convention.aspx, last accessed June 8, 2020.

- IMO (1997). RESOLUTION A.850(20) - HUMAN ELEMENT VISION, PRINCIPLES AND GOALS FOR THE ORGANIZATION, last Accessed June 7, 2020.

- IMO (2017). *STRATEGIC PLAN FOR THE ORGANISATION FOR THE SIX-YEAR PERIOD 2018 to 2023.* London: IMO.

- IMO (2010). "The 2010 Manila Amendments to the Seafarers' Training, Certification and Watchkeeping (STCW) Code." *The 2010 Manila Amendments to the Seafarers' Training, Certification and Watchkeeping (STCW) Code.* 3 August, available at lhttps://vp.imo.org/Customer/Subscriptions/IMOVEGA/MemberPages/IMODocument.aspx?docId=SC10B050FAB, last accessed June 1, 2020.

- Kowaleski, M. (2007). "Alien" Encounters in the Maritime World of Medieval England. Medieval Encounters, 13(1), 96-121.

- Schinas, O. (2010) Report to the Chamber of Commerce on the Attractiveness of Hamburg as Maritime Cluster, HSBA Papers.

4. INNOVATIVE TOOLS FOR STRATEGY AND TRANSFERABILITY

4.1. Innovative tools for strategy and transferability: STRAD.L and Trans.I.T.

As per the requirements of SkillSea, the D3.4 partner team has to address the following two challenges:

1. Mapping/positioning of MTCs with a view to selecting an Internationalised strategy
2. Transferability of modules/content

In this regard, the team developed Tool 1, Strategy Direction Location (STRA.D.L.) for the positioning of any type of MET, abbreviated here for functional purposes as MTC (Maritime Training Centre) and Tool 2, Transcript International Transfer (Trans.I.T.), for the transferability of modules. In both cases, the team strived for similarities and disregarded any comparison, ranking or benchmarking endeavours.

4.2. Positioning of MET as a multi-criteria problem: STRAD.L

The mapping/positioning problem is often treated in the literature as a problem of multi-criteria decision-making (MCDM). Furthermore, it is of discrete nature, as alternatives are distinct, in this case for a Marine Training Centre (MTC) – Tool 1 – or a STCW course/module – Tool2.

In all modern policy-making and management some form of positioning is essential for strategy. Furthermore, in this case of discrete alternatives mapping, it is necessary to consider relative comparisons among independent criteria and absolute input per alternatives. It should be noted that relative comparisons are dependent on the set of the criteria – if any of the criteria changes then the weights of all criteria are altered. Accordingly, this is not the case when considering alternatives, as any change in the input of an alternative does not impact the input of others. The result of the mapping, as in any MCDM case, is data-driven and relevant issues are extensively discussed in the literature (see, for example, Saaty, 2001, Appendix 2, pp 361-372).

Discrete problems are commonly analysed in the following tabular format, where m is the number of alternatives and n is the number of criteria. It is interesting to note that in the MCDM terminology, an attribute may also be considered as a criterion. If Ai is an alternative, then:

TABLE 4.1

THE TABULAR FORMAT OF THE GENERAL MCDM PROBLEM

		Criteria (Attributes)						
		C_1	C_2	C_3	…	C_j	…	C_n
	weights	w_1	w_2	w_3		w_i		w_n
Alternatives	A_1	a_{11}	a_{12}	a_{13}	…	a_{1j}	…	a_{1n}
	A_2	a_{21}	a_{22}	a_{23}	…	a_{2j}	…	a_{2n}
	A_3	a_{31}	a_{32}	a_{33}	…	a_{3j}	…	a_{3n}
	⋮					⋮		
	A_i	a_{i1}	a_{i2}	a_{i3}	…	a_{ij}	…	a_{in}
	⋮					⋮		
	A_m	a_{m1}	a_{m2}	a_{m3}	…	a_{mj}	…	a_{mn}

This tabular format implies a single hierarchy and is known as *decision matrix.* In this formulation:

let C_1, C_2, C_3, …, C_n be the decision criteria (attributes)

let A_1, A_2, A_3, …, A_m be the decision alternatives

let w_i (for i = 1, 2, 3, …, n) be the weight of criterion C_i

let a_{ij} be the performance of alternative A_i when it is examined in terms of criterion C_j

It should be noted that the criteria are considered as independent, which means there is no causal link among them, as per the cancellation principles of normative decision-making. Should the criteria be dependent, then different numerical treatment is necessary, besides any consideration of their physical meaning and impact. Generally, the examination of other alternatives or the analysis under other criteria is not the case in a given MCDM formulation and the decision-maker has to determine both alternatives and criteria before proceeding to further steps. Nevertheless, the suggested tools can easily accommodate as many alternatives as the decision-maker deems appropriate. The same applies for the selected criteria, yet with a rather careful numerical handling.

4.2.1. Using AHP for the strategic positioning criteria

Although there are many methods available for the solution of a multiple-criteria decision-making (MCDM) problem, a combination of Analytic Hierarchy Process (AHP) for the criteria and of Technique for Order of Preference by Similarity to Ideal Solution, (TOPSIS) for the alternatives for an MTC is selected for the first tool. A combination of AHP for the criteria and Weighted Product Model (WPM) is selected for the alternatives (STCW/other MET modules) for the second tool. The reasons for selecting a combination of methods are analysed below, while the grounds for selecting AHP for the criteria weighting are:

1. AHP as a method is based on relative and not absolute comparisons. The relative importance among criteria is easy and user-friendly scales are deployed which are translated to a specific scale of measurement widely applied in the literature and compatible with modern understanding of decision-making by humans.

2. AHP is a flexible technique incorporating judgements and personal values in a logical way – an invaluable attribute when dealing with problems of inherently high subjectivity.

3. AHP provides a framework for group participation in decision-making, and therefore the criteria and their weights can be extracted through consensus and appropriate weighting of the opinion of the decision-makers.

4. AHP has been applied successfully to many problems of policy-making and assessment of impacts.

The above features of AHP fit to the needs identified for this specific problem. The decision model has to be simple to construct, as well as being intuitive and in line with general thinking. Furthermore, it has to encourage compromises and consensus, and it should not require specialized expertise from the personnel involved.

AHP has been thoroughly analysed in academic journals. More on the method can be found in the books of Saaty (Saaty 1977, Saaty 1994, Saaty 2001) and other sources and papers are available. In brief, AHP is a MCDM method based on hierarchies and relative or absolute comparisons of the attributes of the alternatives. The structure of hierarchies permits the decomposition of decision-goals to criteria. This decomposition is a powerful way to help the human mind to cope with complexity and diversity. The decision factors are organized in steps and levels of importance. Further to the advantages of breaking down a decision problem into criteria and sub-criteria, hierarchies may take qualitative properties and factors into consideration. Once the hierarchy of a problem is set, then the decision-maker is concerned with weighting alternatives and criteria.

The weighting of criteria and alternatives is a vigorous academic and multi-disciplinary issue. Humans have the ability to make two kinds of comparisons: absolute and relative. With relative measurements, items are measured and compared to each other while in absolute measurements items are compared to a standard. Saaty has presented the fundamental scale (see Table 4.2 below). Other researchers have presented different scales, but Saaty's is widely used in AHP applications. The fundamental scale permits pair-wise comparisons. One must first establish priorities for the main criteria, judging them for their relative importance, and proceed with the alternatives. The comparison matrices have specific mathematical characteristics, such as being reciprocal, and the diagonal elements are equal to unity.

TABLE 4.2

THE FUNDAMENTAL SAATY AHP SCALE

Verbal Value	Numerical Values
Equally important, likely or preferred	1
Moderately more important, likely or preferred	3
Strongly more important, likely or preferred	5
Very strongly more important, likely or preferred	7
Extremely more important, likely or preferred	9
Intermediate values to reflect compromise	2,4,6,8

Source: Saaty (1994).

As an example, how the scale and pair-wise comparisons work, when comparing criterion A with criterion B and the decision-maker finds that B is strongly more important, then the respective element in the comparison matrix gets the scale value 5 and the reciprocal element 1/5, as logically A is analogously not as important as B.

Since this is not a formal presentation of an MCDM formulation and of the AHP method, the analysis will be limited. Two points of concern are firstly the validity of the method, the judgements and the structure and secondly the sensitivity of the outcome. As it is very difficult, if not impossible, to calibrate a mechanism with so many qualitative and subjective elements and there are no given conditions for many MCDM problems, the method is self-controlled by the measurement of the consistency of the reciprocal decision matrices. The consistency ratios (CR) are calculated for every matrix, and as long as the CR of matrix is less than 10% the judgements are considered as valid. The notion of consistency is expanded to the hierarchies and the systems (Saaty, 1994, p. 126 and pp 246-7). If the CR of the hierarchy – overall consistency – is less than 10% the hierarchy is sound enough to support the decision. Furthermore, this means that the selected criteria describe the problem adequately and decisions can be made on this basis.

The sensitivity of the outcome is also critical. There are two basic questions involved in the sensitivity issue: (1) which is the most critical criterion; and (2) which is the most critical aij performance measure. Intuitively, one may think that the most critical criterion is the one which corresponds to the highest weight wj. It has been proven that this is misleading. There are various ways to extract the criticality of a criterion. The same applies for the criticality of the performance measurement. For the needs of this decision mechanism, the formulation and algorithms provided in the decision-science literature are used and specifically those of Triantaphyllou and Sánchez (Triantaphyllou and Sánchez, 1997). The methodology is better understood in the next section where the hierarchy is presented.

4.2.2. The hierarchy of the problem and the criteria

The hierarchy constructed for the specific problem is presented in Figure 1 below. This hierarchy aims at positioning MET/MTCs as per their similarity either as a unidimensional index or as per two-dimensional geometrical mapping. Therefore, the numerical outcome of the mechanism will be a number, a similarity index per alternative – per MTC participating in the sample. The top index – the similarity index of every MTC – is typically called Level 1. In the lower levels, criteria (attributes), sub-criteria and the alternatives are provided.

In the Level 2, two criteria – sets of sub-criteria – are identified:

1. Internal
2. External

Internal are understood to be all criteria (attributes) related to the internal environment of the MTC – factors that do not relate to any effort to internationalize the services of the MTC. In contrast, external are understood to be all criteria (attributes) related to the effort of internationalizing an MTC, and the MTC management can practically dictate or influence these in line with their own priorities and policies. Both internal and external criteria are broken down further to the Level 3 criteria – attributes that determine the positioning of the MTC. In this regard, the input of the MTC is provided at this level.

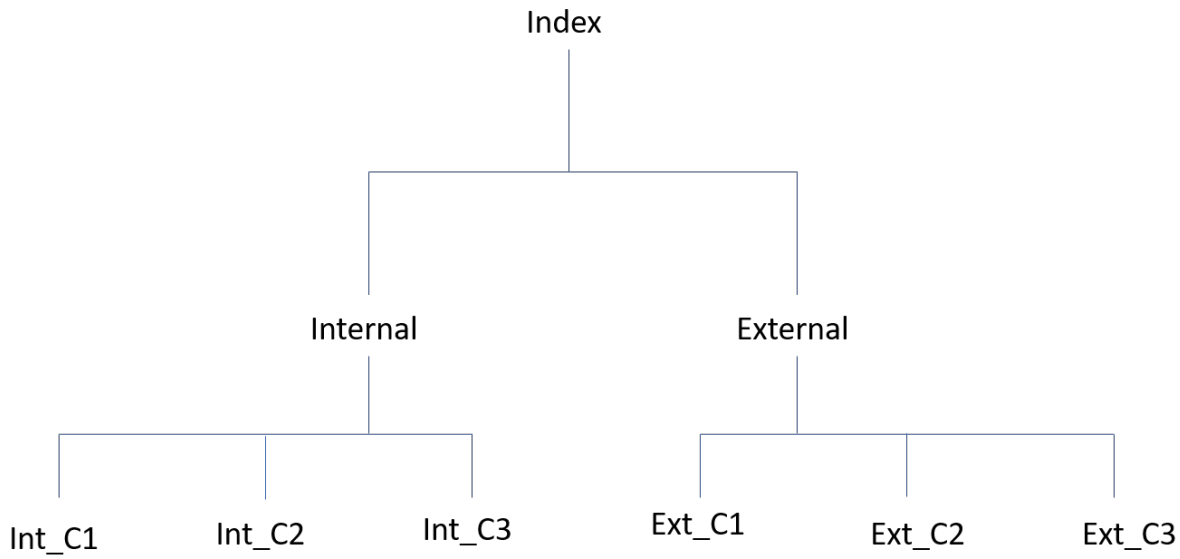


Figure 1: Tool 1- The Hierarchy of the Problem

The criteria in Level 3 are explained below:

Int_c1: percentage of STCW courses over the total courses offered

The number of STCW courses within the total courses offered reveals the orientation and the capacity of the MTC. A facility that offers predominately STCW courses has a clear focus and orientation to the professional market of mariners, while a facility that provides STCW courses along with academic modules follows a mixed strategy. In contrast, a higher education facility may not offer STCW courses yet might aim to bridge the gap between academia and the industry by assisting former mariners to get employment ashore. The requested input by the MTC is in the form of percentages – for example, assume that a facility offers 10 STCW courses out of a portfolio of 15 courses, then the input is 66.67% (=10/15).

Int_c2: number of endorsements a facility currently possesses

The number of endorsements that a facility currently possesses demonstrates the interest of the management to serve diverse markets and administrations. It is a process that demands substantial organizational effort as well as putting quality control and assurance procedures in place, such as international recognised auditing standards which are widely applied for the certification of MTCs and is requested by several administrations. In this regard, assuming that a facility possesses the endorsement to issue certificates on behalf of three administrations (flag states), then the number 3 is expected as input.

Int_c3: orientation – character

This criterion aims at reflecting the orientation of the facility in terms of interest or policies regarding internationalisation . A scale ranging from -100 for absolute local interest/orientation, 0 for indifference, to +100 for absolute international interest/orientation, will be used for the input. As an example, assuming that the interest of a facility is to mainly serve the local market and occasionally to serve international interests (for instance, with less than 10% of the students being non-locals) and this reflects the interest or satisfaction with this achievement, then an input in the range of -30 to +20 is expected.

Ext_c1: non-academic support to foreign students

The support that a facility provides to non-local students – such as accommodation, visa and certificates clearance – is of significant importance when seeking to attract foreign students at most EQF levels covered by internationalisation . It is also an essential attribute and service of the MTC when foreign students are targeted. By using a similar approach to the previous criterion, a scale from 0 to 100 is used. As an example, assuming that a facility provides a full package of support, input close to 100 is expected, while if no support is provided an input in the range 0 to 10 is expected.

Ext_c2: adequacy of means (towards internationalisation)

Adequacy of means – such as time, staff, and budget – allocated for internationalisation in relation to the policies and goals set by management for the subject matter is also a critical factor. No internationalisation strategy can be considered unless a sufficient mix of resources is available. As in the previous criteria, the use of a scale from 0 to 100 is considered. As a numerical example, assuming that policies and interests of a facility promote internationalisation , but the means are only partially sufficient, a mark in the range 40 to 70 might be fair and reasonable.

Ext_c3: established cooperations with foreign partners

The established cooperations with foreign (non-local) users, content providers and other MTCs, reflect the degree of internationalisation of a facility. As previously, a scale ranging from -100 to +100 will be deployed. Assuming that no international ties or links are in place an input in the range of -100 to -50 is expected in this example.

The tool assumes the following feedback and assumptions:

1. The criteria in all levels are independent.
2. Experts, such as national representatives along with representatives of European bodies and social partners, provide their input for the criteria based on the given scale (cf. Table 4.2) as follows below.
3. Internal vs. External
    a. Int_C1 vs Int_C2
    b. Int_C1 vs Int_C3
    c. Ext_C1 vs Ext_C2
    d. Ext_C1 vs Ext_C3

1. The input of experts can be weighted or non-weighted. Usually non-weighted input – all inputs having the same weight – is considered when there is no dominant expert in the group. In contrast, assuming that some experts, such as representatives of social partners, are prioritized by policy-makers and their input is twice as important as that of other experts, this requirement can be easily handled numerically and considered in the whole process.

2. AHP is applied for estimating the weights of criteria.

3. The input of the facilities is independent from the above procedure and is handled numerically in a different way in order to avoid the limitations of AHP.

4.2.3. Using TOPSIS for the Input

At first, the Technique for Order Preference by Similarity to Ideal Solution (TOPSIS) method is applied to mapping/positioning the MTC facilities based on the criteria analyzed in the previous section. The stepwise procedure followed in this case is based on the TOPSIS method developed by Hwang and Yoon in 1981 (Hwang and Yoon, 1981), which was modified by Yoon in 1987 (Yoon, 1987) as well as Hwang, Lai, and Liu in 1993 (Hwang et al., 1993). The basic underlying concept is to find solutions from a finite set of alternatives, while the chosen alternatives should have the shortest distance from the positive ideal solution (PIS) and the farthest distance from the negative ideal solution (NIS). TOPSIS is a useful method for multi-attribute or multi-criteria decision-making problems and has been widely examined and applied in the literature. The model steps are as follows:

First step: the decision matrix D of input is established with *m* rows and *n* columns, representing the different alternatives and evaluation criteria, respectively.

$$D = \begin{bmatrix} x_{11} & x_{12} & \dots & x_{1n} \\ x_{21} & x_{22} & \dots & x_{2n} \\ \vdots & \vdots & \ddots & \vdots \\ x_{m1} & x_{m2} & \dots & x_{mn} \end{bmatrix}$$

Each variable x_{ij} in matrix D refers to the input given by facility i for the criterion j, and in the literature is understood as the performance of alternative O_i $(i = 1,2,\dots,m)$ with respect to the criterion C_j $(j = 1,2,\dots,n)$. Matrix D is provided as input, and x_{ij} can be scaled or non-scaled as per the theory.

Second step: the normalized decision matrix is calculated in order to transform the data into a dimensionless matrix. This allows for comparison of the criteria from different sources by creating a unified unit. For each variable x_{ij} a normalized value r_{ij} is calculated as follows:

$$r_{ij} = x_{ij} / \sqrt{\sum_{i=1}^{m} x_{ij}^2}, j = 1,2,\ldots,n$$

Third step: the weighted normalized decision matrix is calculated by applying specific weights to the matrix generated in step 2.

$$v_{ij} = w_j * r_{ij}, i = 1,2,\ldots,m, j = 1,2,\ldots,n$$

Where, w_j is the weight of the j^{th} criterion; the vector w_j is provided as input and reveals the preferences of the decision-maker. In this application, the weights of the criteria are the outcome of the AHP procedure described in the previous section, therefore the criteria reflect the biases and priorities of the experts.

Fourth step: PIS (A^+) and NIS (A^-) are identified as follows:

$$A^+ = (v_1^+, v_2^+, \ldots, v_n^+ = \left\{ (\max_i \{v_{ij}\} \mid j \in J_1), \min_i \{v_{ij}\} \mid j \in J_2 \right\};$$

$$A^- = (v_1^-, v_2^-, \ldots, v_n^- = \left\{ (\min_i \{v_{ij}\} \mid j \in J_1), \max_i \{v_{ij}\} \mid j \in J_2 \right\}$$

Where, J_1represent the criteria having a positive impact and J_2 represent the criteria having a negative impact. By positive impact, one should understand a benefit (a relation of the nature 'the more the better') while by negative a cost (a relation of the nature 'the less the better').

Fifth step: separation measures are performed based on the Euclidean Distance from the PIS (d_j^+) and the NIS (d_j^-) of each alternative O_i as follows:

$$d_i^+ = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^+\right)^2}, i = 1,2,\dots,m;$$

$$d_i^- = \sqrt{\sum_{j=1}^{n} \left(v_{ij} - v_j^-\right)^2}, i = 1,2,\dots,m;$$

This inherent attribute of TOPSIS also serve as the key reason for selecting this technique for the positioning of the MTC, as it is based on the geometry of the input. It is therefore objectively data-driven, and does not consider subjective or scaled internal norms.

Sixth step: the relative closeness S_j for each alternative with respect to PIS is determined.

$$S_j = \frac{d_j^-}{d_j^+ + d_j^-}, j = 1,2,\dots,m$$

where $0 \leq S_j \leq 1$.

Seventh step: alternatives (MTCs) receive a final index which positions them either on a scale from 0 to 1 (unidimensional approach) or split into two dimensions – the internal and external, as per the breakdown of criteria above – and the MTCs are positioned in the first quadrant of a planar set of coordinates. The results of the procedure reveal MTCs with global similarities – similar indices, for example – or positioned in the same 'neighbourhood' of similarity. The unidimensional similarity transforms information – input – from all criteria levels and input to a single figure. There, for example, a facility with index 0.75 is globally very similar to facilities with an index ranging from 0.70 to 0.80. Nevertheless, this indexing comes at the cost of losing (filtering) information from the components, therefore the two-dimensional approach reveals the positioning of the MTC given their input on 'internal' and 'external' attributes.

4.2.4. Further clustering options

Assuming a fairly large number of MTCs, following the TOPSIS method, a clustering analysis could be carried out to group a set into sub-sets – the so-called clusters – according to similar characteristics or properties. Different clustering methods exist and could be distinguished by the different metrics to define similarities among objects. The theoretical concepts are well described in the literature, while a key advantage of clustering is that no a priori information regarding the number of clusters is required (Rokach and Maimon, 2005; Kim et al., 2001; Fraley and Raftery, 1998; Hartigan, 1975; Rand, 1971; Tyron and Bailey, 1970). Should the number of MTCs be higher than 30, the application of a hierarchical agglomerative clustering (HAC) by iteratively clustering the index per MTC, obtained by using TOPSIS on the basis of the smallest distance measure across all pairwise distances between the individual data points of pairs of MTCs, using Euclidean distance and the single-linkage distance metric (Sibson, 1973), could be a reasonable step. In this case, and as a first step, each MTC starts as a single cluster having level L (0) =0 and sequence number m=o. In step 2, the least distance pair of clusters, vessels (a), (b), is found according to $d[(a),(b)] = min\, d[(i),(j)]$. In step 3, the pair (a) and (b) is merged into a new cluster (m), while level of this cluster defined as $L(m) = d[(a),(b)]$. The distance between the new cluster (a, b) and another existing cluster (z) is described by $d[(z),(a,b)] = min\, d[(z),(a)], d[(z),(b)]$. The sequence is continued by incrementally merging all clusters until only one big cluster of MTCs is left. The results of the HAC process are typically summarised in a dendrogram that provides a graphical tool for choosing a meaningful actual number of clusters.

4.2.5. Numerical example

Given the input from partner MTCs, the capacity and the rationale of the tool is demonstrated. The following input was received by the partners, regarding the weighting of the criteria:

	Q1	Q2	Q3	Q4	Q5
X1	3	3	5	1/9	1/9
X2	7	7	7	1/5	1/5
X3	1/7	5	9	7	9
X4	5	1	1	9	7
X5	5	1	1/7	1/9	1/7
Geometric mean	2 3/8	2 1/2	2 1/7	2/3	5/7

The above input is inserted in the AHP comparison tables:

	INTERNAL	EXTERNAL
INTERNAL	1	2 3/8
EXTERNAL	3/7	1

INTERNAL	INT_C1	INT_C2	INT_C3
INT_C1	1	2 1/2	2 1/7
INT_C2	2/5	1	6/7
INT_C3	½	1 1/6	1

EXTERNAL	EXT_C1	EXT_C2	EXT_C3
EXT_C1	1	2/3	5/7
EXT_C2	1 1/2	1	1
EXT_C3	1 2/5	1	1

In all above tables the consistency ratio (cr) is close to 0, therefore the results are within the accepted limits of error as per the theory.

The resulting weights of the criteria are the following:

INT_C1	INT_C2	INT_C3	EXT_C1	EXT_C2	EXT_C3
37,70%	15,08%	17,59%	7,60%	11,40%	10,64%

Moreover, the partner MTCs provided their feedback per criterion (questionnaire)

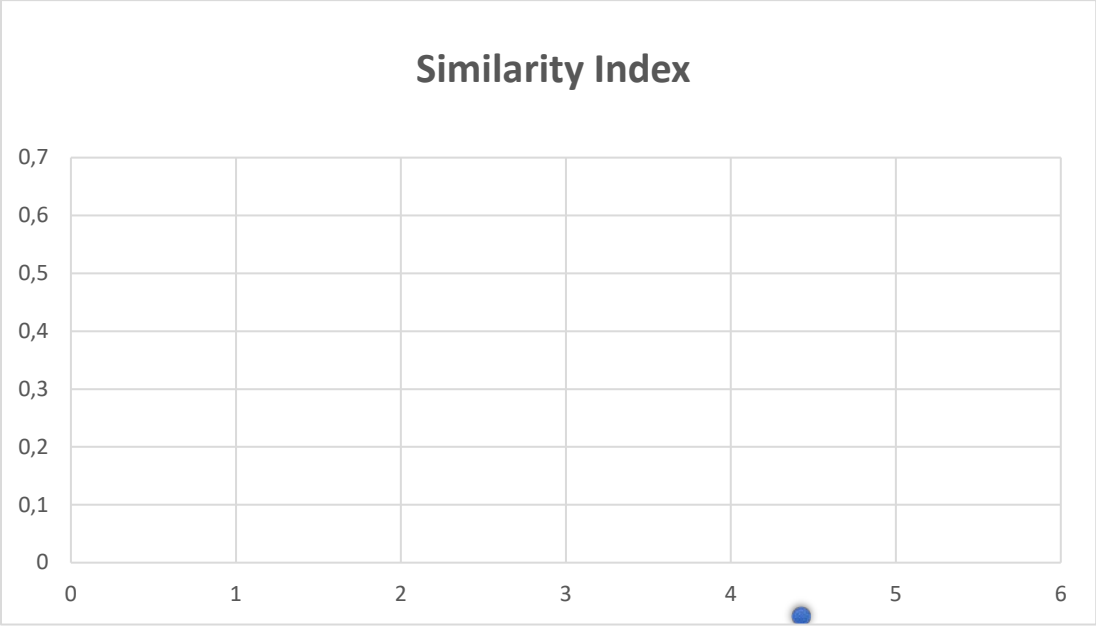
	Q6	Q7	Q8	Q9	Q10	Q11
X1	0	0	75	80	40	80
X2	75%	2	100	50	50	25
X3	20%	6	60	70	80	60
X4	90%	4	0	100	40	10
X5	65%	1	10	75	80	25

This input feeds the first step of TOPSIS:

	INT_C1	INT_C2	INT_C3	EXT_C1	EXT_C2	EXT_C3
Weights	37,70%	15,08%	17,59%	7,60%	11,40%	10,64%
X1	0%	0	75	80	40	80
X2	75%	2	100	50	50	25
X3	20%	6	60	70	80	60
X4	90%	4	0	100	40	10
X5	65%	1	10	75	80	25

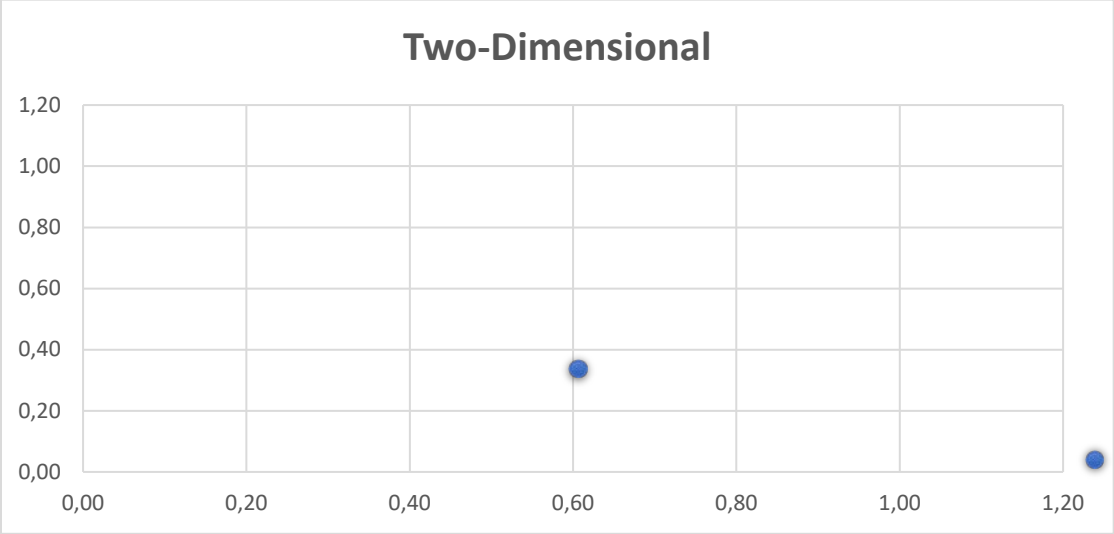
By concluding all the steps of TOPSIS described above, the following results are extracted:

X1	0,21
X2	0,44
X3	0,39
X4	0,61
X5	0,47



The above unidimensional approach does not help the analysis; however, by analyzing the results, the positioning of the MTCs given their internal and external attributes enables a positioning in the first quadrant as follows:

	INT	EXT
X1	0,25	0,94
X2	1,00	0,56
X3	0,67	1,00
X4	0,88	0,56
X5	0,57	0,79



Apparently, X2 (1.00, 0.56) and X4 (0.88, 0.56) seem to be more similar to each other, while there is a clear dissimilarity of these MTCs with X1. This mapping enables MTCs to identify either similar or dissimilar partners in order to pursue their strategies further. Assume a MTC aiming at vertical partnership, then a dissimilar partner might offer complementarity of services and resources; on the other hand, a horizontal partnership is meaningful among facilities positioned relatively close to each other, as there is a compatibility of potentially soft infrastructure.

4.3. The Module Similarity Tool: Trans.I.T.

The second tool aims to enhance the transferability of modules among facilities. Recognition of competencies is an issue to be dealt with at institutional level. In the field of VET, the European Credit System for Vocational Education and Training (ECVET) was intended to promote transnational student mobility through transfer, recognition, and accumulation of learning. However, despite its elaborate form and the several editions of supporting material, ECVET has never gained a stronghold in VET where institutions and companies have difficulties defining and describing learning objectives and outcomes (Christensen, 201921). It has also not been widely adopted as a credit system by any significant number of VET-type post-secondary MET.

In the field of HE, the main obstacle to the recognition process seems to be caused by discrepancies between the content of courses. Some issues with recognition exist in relation to the core curriculum where the requirements are usually less flexible compared to other parts of the curriculum. Another issue hindering recognition is that individual departments or faculties, and even individual teachers/lecturers, may have different opinions on how flexible or strict the curriculum abroad needs to be for students. Some expect curriculum home and abroad to be 100% equivalent (Melin et. al., 2019)22.

As mentioned in Chapter 3, additional but critical issues which hinder internationalisation can be solved by a tool that can use key elements of provision and syllabi for modules to be recognised across STCW Higher Education MET (STCW VET type of MET). Transferability is full of challenges, which may be partly objective but also subjective, and wider issues of fully 'translatable' types and levels have not yet been fully solved across European countries. Therefore, the methodology adopted and the proposal for a prototype tool are based on typical common foundations of the EQF/ECTS/ECVET frameworks at the simplest possible level to create a widely acceptable common denominator in an effort to remove obstacles to cooperation across especially complementary types of MET institutions not falling under the same framework.

[21] Christensen, S. (2019). *Læringsmålsbeskrivelse i mobilitetsprojekter*. Ministry of Higher Education and Science.

[22] Melin, G., Jávorka Z., Krčál, A., Reda, N., Markowski, M., Mikheeva, O., Nielsen, K., Ryd, J., Stafström V., Vingre, A. (2019). *Analysis of academic recognition for higher education students studying abroad with the Erasmus+ programme,* Technopolis Group.

FIGURE 4.1

POTENTIAL TRANSFER FLOWS ACROSS MET AND MET-RELATED PROVISION

The orientation of a number of METs is well established through their similar foundation on STCW-related outcomes. In the context of maritime education, learning outcomes may reflect the requirements shaped by occupational standards and STCW in the curriculum and determine the performance of each student upon completion of each topic. Indeed, the learning content on the basis of learning outcomes is a widely used and appropriate teaching approach for METs (Kalnina and Priednieks, 2016) and a popular method in both higher and vocational education (CEDEFOP, 2008; CEDEFOP, 2011; Guico & Dolor, 2013).

4.3.1. The transferability criteria

Transferability and recognition can be supported by the use of three simple criteria compatible with the European credit systems (ECVET, ECTS) and with EQF learning outcomes, namely:

1. C1: Content similarity
2. C2: Workload
3. C3: Academic level

The weights of these three criteria are determined by experts, as in the previous tool, and AHP is employed. Experts should compare C1 against C2 and C1 against C3. Group decision-making is possible, either weighted or non-weighted, as discussed in the previous sections.

MTC representatives should provide input for every module. Namely, for C1 a scaled input from 0 to 100 for the content similarity. Ideally, this scaled input can be replaced from keywords similarities, a clustering

procedure among learning outcome (or objectives, if not following the EQF terms) keywords offered by major editors of academic content. Nevertheless, there is currently no consensus on the use and classification of keywords besides specific scientific fields, such as mathematics and science. The requested input for C2 is the number of hours of workload considered by the lecturer or the academic programme. Finally, the requested input for C3 is scaled from -100 to 100, where -100 is for fully professionally-oriented VET with no purely academic content, and 100 is for fully academic and no VET content.

The input per module is then normalized geometrically and feeds the weighted product model in order to assess the similarity of the modules.

4.3.2. Weighted product model (WPM)

To avoid complication with the units considered, the weighted product model (WPM) could be considered. Assume two alternatives – AL and AK – the following product (Equation 1) has to be calculated for both of them (Triantaphyllou, 2000, p.8):

$$R(A_k) = \prod_{j=1}^{n} (a_{K_j})^{w_j}$$

Equation 1:

where:

- n is the number of criteria,
- a_{ij} is the actual value of the i-th alternative in terms of the j-th criterion, and
- W_j is the weight of importance of the j-th criterion

Then the ratio of $\frac{R(A_K)}{R(A_L)}$ is estimated; should the ratio be close to one, both alternatives are very similar. Similarly, Equation 2, yields the same numerical result regarding similarity.

$$R\left(\frac{A_k}{A_L}\right) = \prod_{j=1}^{n} \left(\frac{a_{K_j}}{a_{L_j}}\right)^{w_j}$$

Equation 2:

4.3.3. Numerical example

The following numerical example illustrates the rationale and the numerical handling. Assuming the following assessment between criteria C1 and C2, C1 and C3, C2 and C3:

- C1 is slightly less important than C2, therefore 1/3 is the input as per the scale of Saaty.
- C1 is of equal importance with C3, therefore 1 is the input as per the scale of Saaty.
- C2 is more important than C3, therefore 5 is the input as per the scale of Saaty.

As this input is known, the following matrix is formulated:

	C1	C2	C3
C1	1	1/3	1
C2	3	1	5
C3	1	1/5	1

The highlighted values are the input; all other elements of the matrix depend on the given input. Following the numerical approximation of eigenvalues as suggested in the literature, the following weights are calculated:

C1	19%
C2	66%
C3	16%

Note that the sum of the weights equals to 100%, as expected. The physical meaning of this result is, apparently, that C2 is the most important criterion, while C1 and C3 enjoy more or less equal weights. The above judgement yields a consistency ratio of 2.79%. As per the theory, the limit is 10%, so any judgement with a consistency ratio less than 10% is accepted. Once the weights of the criteria are estimated, the decision matrix is formulated.

Assuming that we have to compare three modules offered in three different facilities, A1, A2, A3, an expert as above provides input (see highlighted values) in the decision matrix:

	C1	C2	C3
weights	0.19	0.66	0.16
module A1	32	0.250	0.80
module A2	40	0.800	0.65
module A3	32	0.650	0.40

Then by normalizing geometrically the input and by applying WPM, the following matrix is produced:

	C1	C2	C3	product
module A1	0.889	0.386	0.951	0.326
module A2	0.927	0.830	0.920	0.708
module A3	0.889	0.724	0.853	0.549

The resulting vector of the products enables the estimation of the similarity between modules, as follows, where the ratio of the products is estimated:

A1/A2	0.461
A1/A3	0.594
A2/A3	1.289

The closer the ratio to 1 the higher the similarity between two modules. Apparently A2 is more similar to A3, as their dissimilarity is circa 28.9% (1.289-1.000), while the dissimilarity of A1 to A2 is circa 54% (1.000-0.461).

This tool can be effortlessly incorporated into any online and web application and can offer assistance to lecturers at various institutions when considering requests for transferring credits. Ideally, the criteria could be assessed and weighted by an independent body of experts – such as national representatives and related social partners – or be incorporated in the Erasmus+ toolbox, as a sectorial 'helper', so all requests can be assessed on the basis of the same criteria. Moreover, the scales of criteria C2 and C3 can be further elaborated to offer higher transparency and objectivity in the decision process.

On a practical level, the use of Trans.I.T. can be facilitated through the following:

1. Familiarity of at least one of the institutions involved with the EQF/ECVET/ECTS framework and credit system. While not prohibitive, the absence from both sides of some familiarization with learning outcomes and basic elements of credit systems will make the application of Trans.I.T. more time and effort consuming. However, European tools appended in the annexes of this deliverable provide an initial guide for studying the EQF/ECVET/ECTS framework and systems with a view to increased mobility.

2. Consulting the relevant bibliography provided in the last two chapters of this report.

Both the STRA.D.L. and the Trans.I.T. tools will be developed electronically at a later stage and will be available through the SkillSea portal for further experimentation and familiarization.

REFERENCES

- Almeida, J., Barbosa, L., Pais, A., Formosinho, S., 2007. Improving hierarchical cluster analysis: A new method with outlier detection and automatic clustering. Chemometrics and Intelligent Laboratory Systems, 87 (2), pp.208-217.

- Barnett, V., Lewis, T., 1994. Outliers in statistical data, volume 3. Wiley New York.

- EU (2020). Descriptors defining levels of the European Qualifications Framework. Available at https://ec.europa.eu/ploteus/en/content/descriptors-page#:~:text=Descriptors%20defining%20levels%20in%20the%20European%20Qualifications%20Framework%20(EQF),in%20any%20system%20of%20qualifications.&text=In%20the%20context%20of%20EQF,as%20theoretical%20and%2For%20factual., last accessed June 1, 2020.

- European Union (2012). Using ECVET for Geographical Mobility. PART II of the ECVET user's' guide. Available at https://ec.europa.eu/assets/eac/education/ects/users-guide/docs/ects-users-guide_en.pdf, last accessed June 1, 2020.

- European Union (2015). ECTS Users' Guide. Available at https://ec.europa.eu/assets/eac/education/ects/users-guide/docs/ects-users-guide_en.pdf, last accessed May 1, 2020.

- Fraley C. and Raftery A.E., 1998. How Many Clusters? Which Clustering Method? Answers Via Model-Based Cluster Analysis. Technical Report No. 329. Department of Statistics University of Washington.

- Hartigan, J. A., 1975. Clustering algorithms. John Wiley and Sons.

- Hwang, C.L., Lai, Y.J., Liu, T.Y., 1993. A new approach for multiple objective decision making. Computers and Operational Research, 20. Pp.889-899.

- Hwang, C.L., Yoon, K., 1981. Multiple Attribute Decision Making: Methods and Applications. New York.

- Jayakumar, G.D.S., Thomas, B.J., 2013. A new procedure of clustering based on multivariate

outlier detection. Journal of Data Science, 11(1), pp.69-84.

- Kim, D.J., Park, Y.W. and Park, 2001. A novel validity index for determination of the optimal number of clusters. IEICE Trans. Inf., Vol. E84-D, no.2, 2001, pp.281–285.
- Loureiro, A., Torgo, L., Soares, C., 2004. Outlier detection using clustering methods: a data cleaning application. Proceedings of KDNet Symposium on Knowledge-based systems for the Public Sector.
- Rand, W. M., 1975. Objective criteria for the evaluation of clustering methods. Journal of the American Statistical Association, 66, pp. 846–850.
- Rokach, L., Maimon, O., 2005. Data Mining and Knowledge Discovery Handbook.
- Saaty, T.L, (2001) The Analytic Network Process.
- Saaty, T.L., (1994) Fundamentals of Decision Making and Priority Theory with the Analytic Hierarchy Process. First Edition, RWS Publications.
- Saaty, T.L., Forman, E.H. (2003). The Hierarchon: A Dictionary of Hierarchies. Volume V of the AHP Series, 3rd Edition, RWS Publications.
- Sibson, R., 1973. SLINK: an optimally efficient algorithm for the single-link cluster method. The Computer Journal. British Computer Society, 16(1), pp.30-34.
- Triantaphyllou, E., Sánchez, A. (1997). A Sensitivity Analysis Approach for Some Deterministic Multi-Criteria Decision-Making Methods. Decision Sciences, Vol. 28, No 1, pp. 151-194.
- Tyron R. C. and Bailey D.E., 1970. Cluster Analysis. McGraw-Hill.
- Van Cutsem, B., Gath, I., 1993. Detection of outliers and robust estimation using fuzzy clustering. Computational statistics & data analysis, 15(1), pp.47-61.
- Yoon, K., 1987. A reconciliation among discrete compromise situations. Journal of Operational Research Society, 38. Pp. 277-286.
- Yoon, K.-A., Kwon, O.-S., Bae, D.-H., 2007. An approach to outlier detection of software measurement data using the k-means clustering method. Empirical Software Engineering and Measurement. ESEM 2007. First International Symposium on Empirical Software Engineering and Measurement.

5. CONTRIBUTION AND CONCLUSIONS

5.1. General remarks

Internationalised strategies can be the answer to national or international traditional perceptions of current weaknesses relating to human resources in shipping, and to related limitations of the current MET system such as:

- **Lack of** soft skills, including cross-cultural competences
- **Delivery and infrastructure gaps**: infrastructure across borders and staff filling vacancies in innovative technology can be shared through the selection of appropriate internationalisation
- **Limited innovation:** cooperation can improve the identification of gaps and foster innovation in terms of educational material and methods.
- **Fragmented or incomplete national regulatory framework** for local operations and educational standards

5.2. Contribution to MET internationalisation strategies

The practical contribution that can be supported by the findings of this report include:

- The analysis of the report on critical issues for Internationalised strategies. MET can benefit from an Internationalised orientation and strategy selection.
- Promotion through the SkillSea portal of the strategy selection tool STRA.D.L. to aid in the decision-making of existing MET and the strategic planning of any new educational programmes in terms of internationalisation .
- Promotion through the SkillSea portal of the strategy selection tool Trans.I.T. to assist decision-making of existing MET and in the strategic planning of any new educational programmes in terms of internationalisation.

5.3. Summary of conclusions

- There is a will and notable initiative among several MET across Europe – including STCW-oriented or non-STCW MET establishments – towards Internationalised strategies for their growth and/or geographical expansion.
- Implementation of Internationalised strategies remains, however, the result of fragmented initiatives. Strategy selection can widely be improved through user-friendly multi-criteria decision-making tools providing decision support.
- Internationalised strategies have significant potential to strengthen European MET, enabling training institutions to take advantage of the availability of resources across countries, levels and types of MET, and beyond through more loosely related degrees and educational provision.
- The unequal distribution of simulators across Europe is one area where resources across neighbouring countries' borders can be incorporated or even constitute the basis for opting for an Internationalised strategy to enable access to expensive educational equipment. By eventual contributions to operational and maintenance costs, mutual benefits for all participating parties and the motivation for cooperation would be ensured.
- The diversity of European MET may be both a motive and a resource for providing future-proof skills to maritime professionals, focusing on complementarity in a more efficient way and economising on scarce resources.
- Cost issues for selecting Internationalised strategies may require support through a MET-specific ERASMUS+ mechanism through which non-ECVET or ECTS-based degrees may be supported for international cooperation. Internationalised strategies can assist, through the exchange of best practices, with improvements and the adoption of more standard approaches by the diverse MET establishments which do not currently benefit from European mobility tools.

ANNEXES

ANNEX 1: DIVERSITY OF MET IN EUROPE

TABLE ANNEX 1.1

INDICATIVE DIVERSITY OF MET IN EUROPE THROUGH SkillSea

Diversity of MET Institutions	Total		Post Grad. Studies Available		Members of IAMU	
	No.	%	No.	%	No.	%
Universities providing only Maritime Education	**8**	13	**7**	**87**	**6**	75
University Faculties offering Maritime Education	**14**	23	**13**	93	**8**	57
University Departments offering Maritime Education	**8**	13	**7**	87	**3**	37
University Schools offering Maritime Education	**9**	15	**6**	67	**2**	22
Maritime Academies or Institutes, parts of Universities which offer B.Sc. Diploma	**13**	21	**6**	46	**4**	0.31
Maritime Academies which offer B.Sc. Diploma and they are not part of a University	**8**	13	**7**	87	**6**	75
Maritime Academies, colleges or institutes which do not offer B.Sc. Diploma	**1**	1.6	**0**	**0**	**0**	0
Total	**61**		**46**	75	**29**	48

Source: Based on the D4.4 stakeholder database from WP4, EF created a table to display the database data. This table is updated regularly throughout the SkillSea project.

ANNEX 2: OWNERSHIP DISTRIBUTION OF WORLD TONNAGE AND INDICATIVE DATA ABOUT WORKFORCE SPREAD

TABLE ANNEX 2.1

OWNERSHIP DISTRIBUTION OF WORLD TONNAGE PER CONTINENT

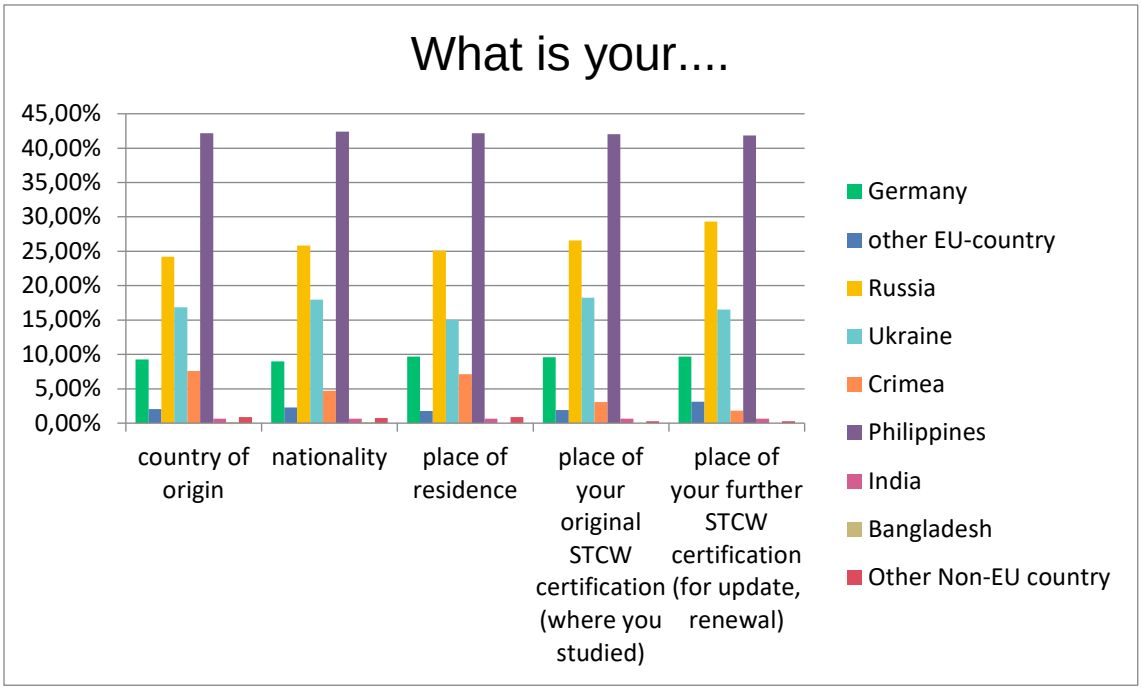
European countries	%		Asian countries
Greece	17.79	11.47	Japan
Germany	4.92	10.51	China
Norway	3.11	6.19	Singapore
UK	2.48	5	HK
Denmark	2.19	3.91	Korea
Monaco	2.15	2.6	Taiwan
Belgium	1.54	1.27	India
Turkey	1.41	1.14	Indonesia
Switzerland	1.26	0.92	UAE
Russian Fed.	1.16	0.92	Saudi Arabia
Netherlands	0.92	0.91	Iran
Italy	0.91	0.49	Vietnam
France	0.67	0.44	Malaysia
Cyprus	0.56	0.4	Oman
Sweden	0.34	0.36	Qatar
		0.35	Thailand
Europe	***41.41***	***46.53***	***Asia***

Note: Europe includes all EU-EEA fleets in the 35 largest fleets by ownership, plus Russian Federation and Turkey; these 35 fleets accounted in 2019 for 95.41% of world total tonnage, (UNCTAD, 2019).

Source: **Share in world ownership data in UNCTAD (2019). Review of Maritime Transport. Geneva, Table 2.6, p.37.**

FIGURE ANNEX 2.1

A SURVEY OF COUNTRY OF ORIGIN OF SEAFARERS WITH A NORTHERN GERMANY FOCUS



Source: Bykova, T., Schinas, O. (2020) Online Survey of Trends in Mariners' Markets in Northern Germany, HSBA Working Papers.

ANNEX 3 : MET INTERNATIONALISATION QUESTIONNAIRE

(SURVEY MONKEY)

EUGENIDES FOUNDATION

QUESTIONNAIRE: "Teachers' Perceptions of Internationalization"

* 1. Please indicate **the level of importance Internationalization has** for your M.E.T. Institution:

- ◯ Not at all important
- ◯ Unimportant
- ◯ Neither important nor unimportant
- ◯ Important
- ◯ Very important
- ◯ D.K/D.A. (Do not Know / Do not Answer)

* 2. Please indicate **the level of importance of the following motivations** for your M.E.T. Institution to be Internationalized:

	Not at all important	Unimportant	Neither important nor unimportant	Important	Very important	D.K/D.A.
To increase the competitiveness of your M.E.T. Institution	○	○	○	○	○	○
To increase the reputation of your M.E.T. Institution	○	○	○	○	○	○
To develop an innovate curriculum	○	○	○	○	○	○
To educate MET graduates with internationally employability skills	○	○	○	○	○	○
To improve the quality of education (teaching and learning)	○	○	○	○	○	○
To strength academic staff research and knowledge	○	○	○	○	○	○
To increase Maritime Excellence achievement	○	○	○	○	○	○

2

* 3. How you evaluate the following **Internationalization activities at your M.E.T. Institution?**

	Not at all	Very little	Neutral	Quite a lot	A very great deal	D.K/D.A.
International institution agreements with foreign partners	○	○	○	○	○	○
International research collaboration	○	○	○	○	○	○
Foreign languages courses for students	○	○	○	○	○	○
Implementation of academic curriculum in foreign languages	○	○	○	○	○	○
Mobility (in-out) of students	○	○	○	○	○	○
Recruitment of foreign students	○	○	○	○	○	○
Recruitment of foreign academic staffs	○	○	○	○	○	○

3

* 4. How you evaluate the following **barriers to Internationalization implementations** that your M.E.T. Institution has?

	Very low	Low	Neutral	High	Very high	D.K/D.A.
Little recognition of Internationalization	○	○	○	○	○	○
Lack of high-quality infrastructure	○	○	○	○	○	○
Lack of human resources on academic staff	○	○	○	○	○	○
Lack of overall mission and strategy	○	○	○	○	○	○
Lack of financial resources	○	○	○	○	○	○

* 5.

*" A **joint degree** should be understood as referring to a higher education qualification issued jointly by at least two or more higher education institutions or jointly by one or more higher education institutions and other awarding bodies, on the basis of a study programme developed and/or provided jointly by the higher education institutions, possibly also in cooperation with other institutions."*

*"**Dual degree** programs include separate, but affiliated degree programs that are linked through shared curricular offerings and collaborative administrative processes. Dual degrees may be awarded concurrently or one degree may be awarded prior to the second. A dual degree program should be differentiated from a joint degree."*

Does your M.E.T. Institution offer ....

	No	Yes	Don't know
Joint degree programs with international partners?	○	○	○
Dual degree programs with international partners?	○	○	○

* 6. At your M.E.T. Institution what percentage of offered courses by the following departments had an international focus?

	None	Low	Medium	High	D.K. / D.A.
Deck Officers	○	○	○	○	○
Engine Officers	○	○	○	○	○
Electrotechnical Officers	○	○	○	○	○

* 7.

Did your M.E.T. Institution **adopt an institutional strategic plan** in relationship to sustainable development?

○ No ○ Yes ○ Currently being developed

5

* 8.
In your opinion, **new Technologies and digital learning** (Distance/ MOOCs / online/blended learning) are important drivers for MET Internationalization?

- ◯ Strongly Disagree
- ◯ Neutral
- ◯ Strongly Agree
- ◯ Disagree
- ◯ Agree
- ◯ D.K/D.A.

* 9. What is your **gender?**

- ◯ Female
- ◯ Male

* 10. What is your **age?**

◯ 25-35 ◯ 36-45 ◯ 46-55 ◯ 56+

* 11. How many **years** have you been working (i.e. teaching experience) in **M.E.T. Institutions?**

- ◯ 1-4
- ◯ 10-14
- ◯ 20-24
- ◯ 5-9
- ◯ 15-19
- ◯ 25 or more

* 12. What is your **teaching direction?** (mark as many as appropriate).

- ☐ Nautical Science (Deck Officers)
- ☐ Marine Engineering (Engine Officers)
- ☐ Marine Electromechanics (Electrotechnical Officers)
- ☐ Other

* 13. What is your **highest degree earned?**

◯ B.Sc. ◯ M.Sc. ◯ Ph.D.

* 14. What is your **Academic Ranking?**

- ◯ Professor
- ◯ Assistant Professor
- ◯ Associate Professor
- ◯ Senior Lecturer
- ◯ Lecturer
- ◯ Instructor
- ◯ Teaching Assistant
- ◯ Other

Co-funded by the
Erasmus+ Programme
of the European Union

7

ANNEX 4: SAMPLE DEMOGRAPHICS OF THE PILOT SURVEY ACROSS MET

FIGURE ANNEX 4.1

GENDER OF ACADEMIC STAFF

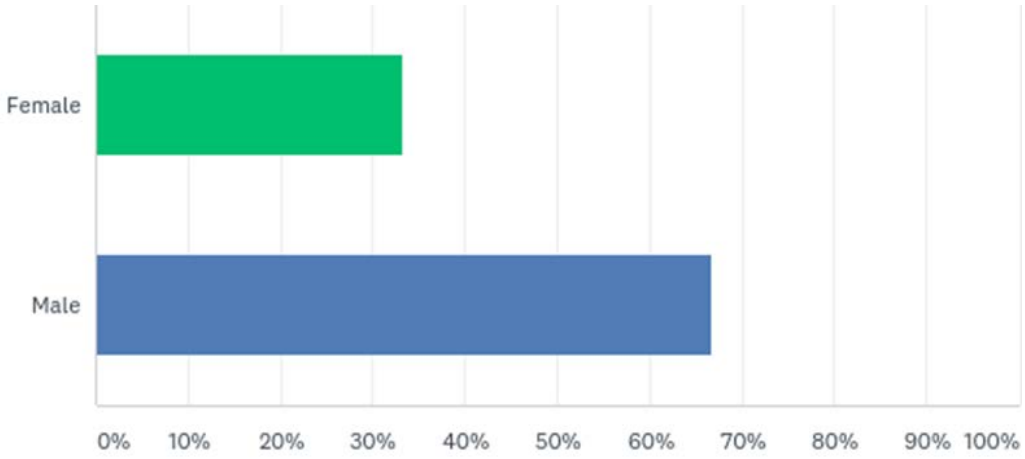
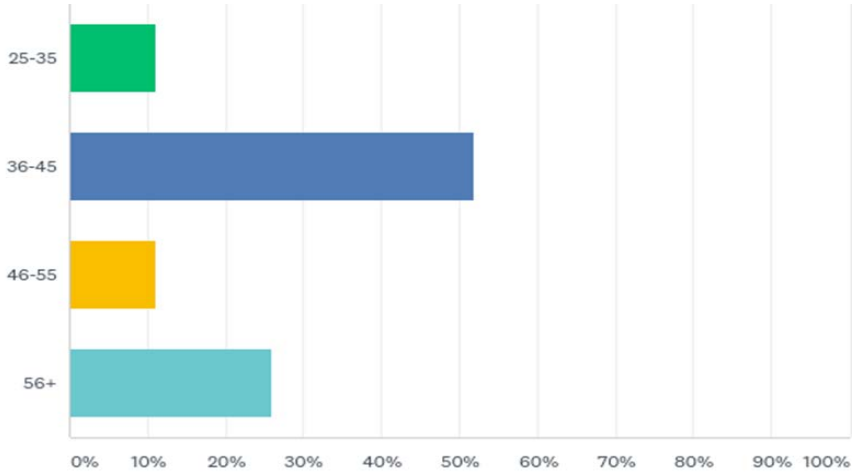


FIGURE ANNEX 4.2

AGE OF ACADEMIC STAFF SURVEYED



ANNEX 5: USING ECVET FOR GEOGRAPHICAL MOBILITY

TABLE ANNEX 5.1

USING ECVET FOR GEOGRAPHICAL MOBILITY (2012)

PART II OF THE ECVET USERS' GUIDE – SELECTED KEY POINTS

KEY POINTS	Page
ECVET may also help VET providers to respond to certain labour market needs by sending learners abroad for units they cannot deliver themselves (for example, because of the investment necessary to purchase the technology). For the same reasons, VET providers may be able to attract new learners from abroad.	p. 10
The quality assurance procedures underpinning the use of ECVET for geographical mobility are based on the EQAVET quality circle: planning – implementation – evaluation – review	p. 11
The agreement about the content of a specific mobility is done between the home and the host institution. In this step the two institutions agree what the learner(s) will learn abroad and how these learning outcomes will be integrated into learners' qualifications. In other words, they agree upon the learning outcomes and the corresponding unit(s) that the learner(s) will achieve during mobility and how learners' credit for these units will be recognised in the home institution.	p. 17
To recognise a learner's credit when s/he returns to the home institution, the home and the host institutions need to discuss assessment and make sure that they trust the assessment approach used in the host institution. Namely they need to discuss: • Who will assess the learner, how will learning outcomes be assessed and in what context (including where)? It is not necessary that the profile of the assessor, the assessment method or the assessment context be the same from one system to another. However, it is important that these points are discussed and that the partners agree that the approach to assessment of the host institution satisfies the requirements (for example in terms of quality assurance) of the system of the home institution. • When will the assessment take place? This is a practical detail, but it is important to inform the learner, the institution who receives him/her and also the home institution about the time and place for assessment. Learners should also know how they will be assessed – especially if this is different from the way they are used to being assessed in their home institution. • What procedures will ensure the quality of assessment? The quality assurance of assessment ensures that the learner is treated fairly and that the result of the assessment is valid and reliable. The lack of quality assurance may undermine the trust in assessment that took place abroad and in turn jeopardises the possibilities of validation and recognition. • How will the results of the assessment be recorded in a learner's transcript of record? Evidence about a learner's achievement of learning outcomes is the basis for validation and recognition. It should be made clear before the mobility, how this will be documented.	p. 19
For credit to be recognised in view of a qualification the learning outcomes have to be relevant for the given qualification.	p. 22
When learners return to their home institution, learners' credit is validated and eventually recognised. There are different ways in which learners' credit can be validated and recognised, depending on the qualifications system of the home institution, these are outlined below.	p. 22

Comparability between learning outcomes from different systems is often difficult to identify. Therefore, in some qualifications systems, it is accepted that the learning outcomes achieved in the foreign qualifications systems are not the same, but equivalent/ comparable.	p. 23

Source : http://www.ecvet-projects.eu/Documents/ECVET_Mobility_Web.pdf

TABLE ANNEX 5.2

GO INTERNATIONAL! A PRACTICAL GUIDE ON STRATEGIC INTERNATIONALISATION IN VOCATIONAL EDUCATION AND TRAINING

KEY POINTS	Page
"In general, strategies today are made for a period of 3 to 5 years, as developments in the environments of education, business and society are changing rapidly… it is also important to consider the need for regular checks so that the strategy stays flexible and dynamic enough".	p. 11
"strategy (…) known as widely as possible within an organisation and made an everyday part of the activities. It is also recommended that all stakeholders are involved in the strategic planning, preferably including all staff, students, social partners, and decision-makers".	p. 12
TAKE INTO ACCOUNT THE FOLLOWING POINTS ON STRATEGIC PLANNING: Key topics for an internationalising VET institution are networking, cooperation with workplaces and industry, core staff skills, project planning and execution, and an ability to operate strategically, both internally and externally. Different sectors need different internationalisation approaches at different stages: strategic partnerships, staff mobility, student mobility or other cooperation & development projects. Professional skills, both for students and staff, should also include the ability to operate in multicultural environments. English is often the internal working language of multinational companies, but the need-to-know other languages is also increasing. Skills such as curiosity, productivity and resilience, which are also linked to international skills, are increasingly needed in working life. It is necessary to be able to provide services to customers or clients from different cultures in more and more jobs. Also, the target groups in the public sector are becoming more and more multicultural. To work in global business requires not only language skills, but also an ability to operate in different working cultures.	p. 14
If the mission, values, vision and goals of your internationalisation strategy are not clearly linked to the basic activities of your organisation, they easily fall out of focus when central decisions are taken on, for example, organisation, resources, pedagogical programmes, partnerships and networks, curricula or quality assurance. Linking and embedding strategic goals concerning internationalisation with other strategic decisions taken in other areas is key to overcoming this problem.	p. 21
However, the qualification standards or requirements vary greatly from country to country in Europe and there are no common standards for how globalisation or international cooperation are covered in the curricula or qualifications. In many cases these topics are only dealt with indirectly.	p. 26
An international and multicultural dimension can be incorporated into teaching regardless of the subject of study or vocational field. It is also a good idea to take advantage of the cultural knowledge and language skills of students and teachers from different cultural backgrounds. This is sometimes referred to as 'internationalisation at home'.	p. 26
In order to be able to follow-up on the activities, it is important to set quantitative and/or qualitative indicators, e.g., mobility statistics, amounts of funding, number of projects, number of foreign	p. 29

partners, the qualitative reports of projects and mobility periods or feedback from participants and partners, how the students or staff feel about the values, etc.	
Participation in projects will also improve the international competences of staff and allow organisations to learn from the good practices of others.	p. 30
Internationalisation in the home country refers to, for example, the provision of training in a foreign language, virtual mobility or cooperation across borders using social media, the integration of students with an immigrant background and their culture into the teaching programmes, cooperating with mainly global or internationally focused companies in the home country, and/or introducing internationally sourced or focused materials into the teaching in the home country.	p. 31

Source: Available at https://www.erasmusplus.org.uk/file/6089/download

ANNEX 6: USING ECTS FOR GEOGRAPHICAL MOBILITY - SELECTED KEYPOINTS

TABLE ANNEX 6.1

ECTS USER's GUIDE ON FOREIGN QUALIFICATIONS' MOBILITY

KEY POINTS	Page
"Qualifications of approximately equal level may show differences in terms of content, profile, workload, quality and learning outcomes. In the assessment of foreign qualifications, these differences should be considered in a flexible way, and only substantial differences in view of the purpose for which recognition is sought (e.g. academic or de facto professional recognition) should lead to partial recognition or non-recognition of the foreign qualifications."	Lisbon Recognition Convention, Art. 36, p. 31 of ECTS User's Guide
"Recognition of foreign qualifications should be granted unless a substantial difference can be demonstrated between the qualification for which recognition is requested and the relevant qualification of the State in which recognition is sought."	Lisbon Recognition Convention, Art. 37, p. 31 of ECTS User's Guide
"By focusing on the five key elements that together make up a qualification (level, workload, quality, profile and learning outcomes) and by taking substantial differences into account, competent recognition authorities have transformed their approach from expecting foreign qualifications to be almost exactly the same as those offered in their own countries, to focusing on 'recognition' by accepting non-substantial differences.	The European Area of Recognition Manual (EAR Manual, 2012), p. 32 of ECTS User's Guide
Substantial differences are differences between the foreign qualification and the national qualification that are so significant, that they would most likely prevent the applicant from succeeding in the desired activity such as further study, research activities or employment.	The European Area of Recognition Manual (EAR Manual, 2012), p. 32 of ECTS User's Guide

The burden of proof of a substantial difference lies with the competent recognition authority of the host country and the accompanying guidelines are as follows: o not every difference should be considered to be 'substantial'; o the existence of a substantial difference entails no obligation to deny recognition to the foreign qualification; o the difference should be substantial in relation to the function of the qualification and the purpose for which recognition is sought."	The European Area of Recognition Manual (EAR Manual, 2012), p. 32 of ECTS User's Guide

Source : https://ec.europa.eu/assets/eac/education/ects/users-guide/docs/ects-users-guide_en.pdf

ANNEX 7: FOCUS GROUP ON HUMAN RESOURCE ISSUES & MET INTERNATIONALISATION

Venue: Briese HQ Hafenstr. 12, Leer, Germany

Date/Time: 04.06.2020 14:30 - 16:00

Participants: nautical fleet manager
technical fleet manager
ISM manager and DPA
Operational manager - Crew Management
ex Captain on tanker vessels, nautical inspector

Moderation: **Prof. O. Schinas**

Recorded: Yes

1. **Describe the skills and competences you look for / expect from a former mariner (Master and/or Chief Eng) to possess for a career ashore.**
   - Very good English knowledge, incl. professional English. Social skills, communication with colleagues and third parties in professional manner. The ex-mariners having huge knowledge shall have willingness to pass on their knowledge to younger colleagues, trainees.
   - Organizational skills (also self-organization), skills to keep proper documentation, decision-making ability, communication skills.
   - To have an overall view, also in regard to the regulations and possible consequences.
   - Commercial thinking, understanding.
   - Masters and chief engineers are predestined for ashore positions as nautical and technical inspectors. They are the main source for these jobs. Ex-mariners could also work in the chartering department.
   - It makes sense to mix the work in the office with the time on board.
   - We have very good experience with the seafarers who are working in the office during their vacation.

2. **Do you see topics that STCW is not covering that you consider either a market needs for or an opportunity?**
   - Soft skills, leadership skills are missing in STCW. The mariners should be additionally trained in these topics too: personnel and conflict management. Special courses can be designed for the officers and should be held by professionals (NLP, psychology). Shall not be a part of the study (university) program.
   - The basics of the personnel management shall be given at the university. The graduates are supposed to be officers and require these skills from the beginning. Additional advanced courses are needed. We face lack of leadership skills and knowledge by the officers on board the vessels.

3. **Mobility is the key to employment! Nevertheless, thriving European maritime segments, such as yachting, sea-river, cruises and floating services, do not 'exchange' workforce i.e. mariners-EU nationals with valid STCW certificates with the other maritime segments and therefore there is an intra-sectoral recycling of workforce that does not promote the interest of either employees or employers. What can be done? How can these segments be better served? Could STCW include modules that could support mobility among segments?**

   - The basics are set up in STCW. Additional training to be done to be specialized in the different segments (like DP certificate in offshore segment). Mobility between the segments is difficult also due to different salary levels and working standards in the sectors.

   - Some ranks are not affected by segment - specialization (Chief engineers, Cooks). There is specialization, but mobility is possible.

   - There could be different certification for the seafarers sailing in different areas. That could secure the seafarers with unlimited certificates. In Philippines the seafarers prefer to sail on WW traded vessels instead of national. In EU the situation is different, the seafarers are mostly leaving WW traded vessels and are sailing as pilots etc. where the salaries are higher. There is non-STCW training / education for pilots.

   - In Netherlands and Belgium there is a training programs for the Pilots for the specific areas. These seafarers are not allowed and are not certified to work on another type of vessel and can be only employed as pilots for a specific region.

4. **Do you experience credible differences in the training, skills and competences of mariners that relate to either the MET programme and/or the specific MTC granting the certificates? Please do not mention institutions or countries – use generic terms, such as 'public EU facility', 'private EU facility', 'public non-EU facility', 'private non-EU facility'**

   - There are definitely differences. STCW is only giving the basic requirements. There are schools much exceeding the minimum standards, many of the schools working on the minimum. In some countries additional exams are required to get the next license (CoC) on top of STCW requirements.

   - There are differences at national or international levels depending on individual universities, facility, teachers / professors.

   - There are differences between the studies at a University (Fachhochschule) and Technical school (Fachschule). The graduates from a Technical school have more practical experience at sea before they get an officer position. University graduates have stronger background in theory, while the graduates of technical school have more practical experience. This difference in visible in the junior officer ranks.

   - There is a clear difference in the education in the EU-MTC vs. non-EU-MTC. There are EU universities (in Germany) with very low number of graduates. A proper education is not possible anymore, professors are losing motivation. In other countries, universities and MTC get an academic approach, undertaking research and attracting new professors.

5. **Given the experience gained during COVID-19 lockup do you consider a synchronous exclusive distance-learning a feasible option for future training? Would you pay a higher fee for a blended STCW course preferring a part of it to involve physical presence as well?**

   - I do not prefer the exclusive distance-learning studies. Personal communication, group dynamics, group works are missing or are difficult. Praxis training is often required. Mixed classes are okay. If no other choice - distance learning is good. But I would pay higher fees for physical presence.

   - Social competence is missing in STCW. Young people can appropriate these skills during the studies, group works and discussions. It could be a problem when the students are joining a vessel with international crew on board.

   - For the advanced courses the distance learning is good. We use online training tools internally for our seafarers since a few years. For the basic studies it is not appropriative.

   - Technically it is possible to organize the group works and classes online (like webinars). Many universities use already such tools. Some modules of the studies could be done online for example as webinars. It will be more and more in the future.

   - The discussions are easier and open during physical classes, then online when sitting home. (Andreas)

6. **Would you consider an Internationalised VET or HE MET program superior to a just nationally sourced and addressed one?**

   - The international programs are more solution oriented. We face that the maritime schools in traditional seafaring countries: in EU countries, England Canada, USA are dying out. There is lack of the young professionals. Giving opportunity to foreign students to study here, will increase the number of students who are getting training of the same quality. Internationalizing contents and systems could be a solution.

   - Shipping is a global industry. The language is the same. The training contents can be unified.

7. **What worries you more in terms of EU MET programs abroad? Transferability of credits or lack of knowledge on content?**

   - There are worries about the contents of the training and education, their compliance with STCW standards. In some countries, where the training facilities are not financed well, the students cannot be trained on modern equipment.

   - Number of students in EU decreases. There is lack of younger professionals. Measures from the EU are needed to increase attractiveness of the seafaring job, contents of the education, to attract good professors and teachers.

ANNEX 8: AHP SURVEY QUESTIONNAIRE FOR INTERNATIONALISATION STRATEGY SELECTION

Please use the scale: 0 = equal importance -100 external are absolutely more important, 100 internal are absolutely more important, all other values reflect scaled bias, e.g. 50 means internal more important than external (Questions 1-5)

Q1. Are Internal or External factors more important for drafting an Internationalization strategy for your MET establishment?

-100	-75	-50	-25	0	25	50	75	100

Q2. Is non-academic support to foreign students, such as accommodation, etc. more important than the adequacy of means, e.g. staff, budget, etc.? Please use the above scale, e.g. a value of 25 means that non-academic support is slightly more important than adequacy of the means?

-100	-75	-50	-25	0	25	50	75	100

Q3. Is non-academic support to foreign students, such as accommodation, etc. more important than the established relations with users and partners abroad? Please use the above scale, e.g. a value of 75 means that non-academic support is definitely more important than established relations with partners abroad?

-100	-75	-50	-25	0	25	50	75	100

Q4. Is the percentage of STCW courses over the total number of course offered more important than the number of endorsements your MTC facility currently possesses? Please use the above scale, e.g. a value of -25 means that the number of endorsements is slightly more important than the percentage of STCW courses over the total?

-100	-75	-50	-25	0	25	50	75	100

Q5. Is the percentage of STCW courses over the total number of course offered more important than the character and orientation of your MTC facility? Please use the above scale, e.g. a value of -75 means that the character and orientation is definitely more important than the percentage of STCW courses over the total?

-100	-75	-50	-25	0	25	50	75	100

Q6. Please provide the percentage of STCW courses over the total number of courses offered; (a percentage is expected, say 75% implies that 3 out of 4 modules offered, are STCW ones).

.....%

Q7. Please provide the total number of endorsements your facility currently possesses. (a number is expected, e.g. your facility possesses an endorsement from 4 Administrations, then 4 is expected as a reply).

.....

Q8. Provide your estimation that reflects the orientation of your facility in terms of interest or policies regarding internationalization; please use the scale -100 for absolute local interest/orientation, 0 for indifference, +100 for absolute international interest/orientation (e.g. assume that your interest is to mainly serve the local market and occasionally you serve international interests, say less than 10% of the students are non-locals and this reflects your interest or satisfaction with this achievement, then a mark in the range of -30 to +20 is expected).

.....

Q9. Provide your estimation regarding the support your facility provides to non-local students, say accommodation, visa- and certificates-clearance, etc., by using as above the scale from 0 to 100 (say that your facility provides a full package, then a mark close to 100 is expected, while if no-support is provided then a mark in the range 0 to 10 is expected).

.....

Q10. Provide your estimation reflecting the adequacy of means (time, staff, budget, etc.) allocated for 'internationalization' vis-à-vis the policies and goals set for the subject-matter by the management by using the scale from 0 to 100 (say that your policies and interests promote 'internationalization' but the means are only partially sufficient, then a mark in the range 40 to 70 might be fair and reasonable).

.....

Q11. Provide your estimation on your established co-operations with foreign (non-local) partners, such as users, contend providers and other MTC, given the -100 to 100 scale as above (say no international ties or links then a mark in the range of -100 to -50 is expected).

.....

ANNEX 9: RECENT BIBLIOGRAPHY ON INTERNATIONALISED STRATEGY IN EDUCATION

(WITH RELEVANCE TO D3.4 CONTENT AND METHODOLOGY)

TABLE ANNEX 9.1

RECENT BIBLIOGRAPHY ON INTERNATIONALISED STRATEGY IN EDUCATION

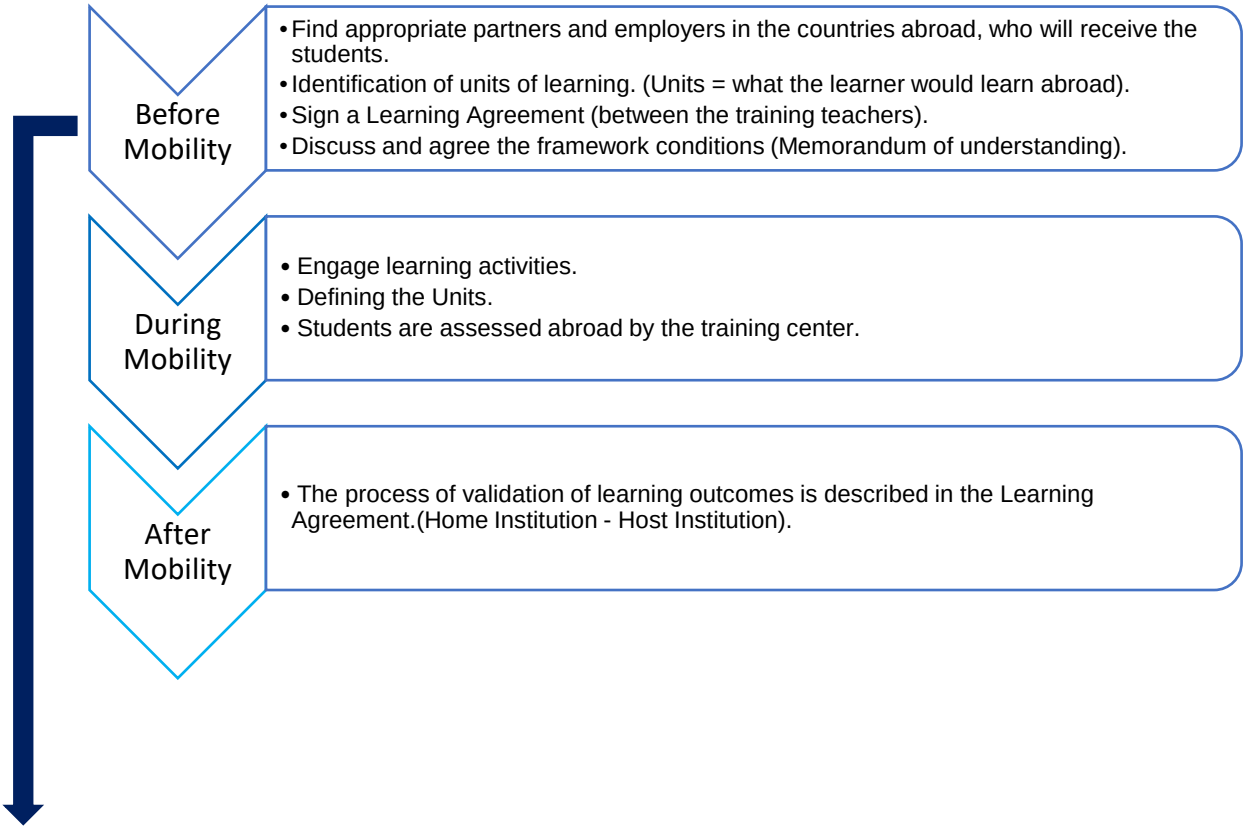
By year and author(s): 2015-2020	AHP	DIGITAL LEARNING	DELPHI
Bedenlier, S., & Zawacki-Richter, O. (2015). Internationalisation of higher education and the impacts on academic faculty members. Research in Comparative and International Education, 10(2), 185-201.			√
Deniko, R. V., Shchitova, O. G., Shchitova, D. A., & Lan, N. T. (2015). Learning terminology in the age of higher education internationalisation: Problems and solutions. Procedia-Social and Behavioral Sciences, 215, 107-111.		√	
De Wit, H., & Hunter, F. (2015). The future of internationalisation of higher education in Europe. International higher education, (83), 2-3.			√
Ho, H. F., Lin, M. H., & Yang, C. C. (2015). Goals, Strategies, and Achievements in the Internationalisation of Higher Education in Japan and Taiwan. International Education Studies, 8(3), 55-65.	√		
Xi, G., Weichao, H., & Xin, Y. (2015). Research on the Construction of an Evaluation Index System for University Innovation and Entrepreneurship Education: Based on International Innovative Talent Evaluation Theory. The Science Education Article Collects, (12), 6.	√		
Yuanyuan, N. (2015). Evaluation of university scientific research competitiveness based on AHP and DEA: Taking "One Province and One School" engineering school as an example [J]. Journal of Higher Education Finance, 18(3), 2012.	√		
Bruhn, E. (2016). Towards a framework for virtual internationalisation. Forging new pathways of research and innovation in open and distance learning.		√	
Kireçci, M. A., Bacanlı, H., Erişen, Y., Karadağ, E., Çeliköz, N., Dombaycı, M., ... & Şahin, M. (2016). The internationalisation of higher education in Turkey: Creating an index. Education and Science, 41(187), 1-28.	√		
Machado, M. S. P., Sepúlveda, G. C. T., & Montoya, M. S. R. (2016). Educational innovation and digital competencies: the case of OER in a private Venezuelan university. International Journal of Educational Technology in Higher Education, 13(1), 10.		√	
Moreira, D. (2016). From on-campus to online: A trajectory of innovation, internationalisation and inclusion. International Review of Research in Open and Distributed Learning: IRRODL, 17(5), 186-199.		√	
Mimović, P., & Krstić, A. (2016). The integrated application of the AHP and the DEA methods in evaluating the performances of higher education institutions in the Republic of Serbia. Ekonomski horizonti, 18(1), 71-85.	√		
Woodin, S. (2016). Calls for accountability: Measuring internationalisation at community colleges. In International Education at Community Colleges (pp. 143-162). Palgrave Macmillan, New York.			√

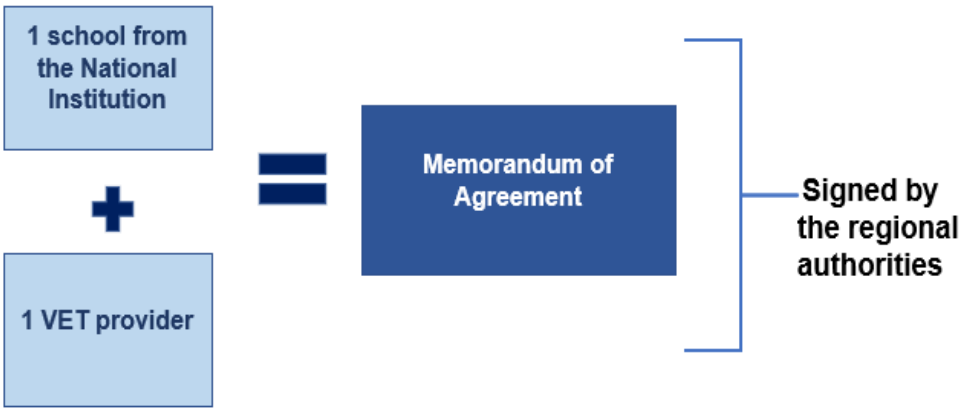
Xue, Y. (2016, January). The Application of AHP Model in College Students Education Quality Assessment. In 2016 2nd International Conference on Education Technology, Management and Humanities Science. Atlantis Press.	√		
Fleacă, E. (2017). Entrepreneurial Curriculum through Digital-Age Learning in Higher Education–A Process-based Model. TEM Journal, 6(3), 591-598.		√	
Salajegheh, A., Farajollahi, M., Moosapur, N., & Sarmadi, M. (2017). Explain and Validate the Components and Indicators of Internationalisation of Virtual Colleges. Education Strategies in Medical Sciences, 10(6), 526-541.			√
Sandkuhl, K., & Lehmann, H. (2017). Digital transformation in higher education–The role of enterprise architectures and portals. Digital Enterprise Computing (DEC 2017).		√	
Starcic, A. I., Huang, P. S., Valeeva, R. A., Latypova, L. A., & Huang, Y. M. (2017, September). Digital storytelling and mobile learning: potentials for internationalisation of higher education curriculum. In International Symposium on Emerging Technologies for Education (pp. 400-406). Springer, Cham.		√	
Almazova, N., Andreeva, S., & Khalyapina, L. (2018, May). The integration of online and offline education in the system of students' preparation for global academic mobility. In International Conference on Digital Transformation and Global Society (pp. 162-174). Springer, Cham.		√	
Amado-Salvatierra, H. R., Rizzardini, R. H., & Chan, M. M. (2018, September). Unbundling Higher Education with Internationalisation. Experiences from Two Hybrid Postgraduate Degrees Using MOOCs. In 2018 Learning with MOOCS (LWMOOCS) (pp. 9-12). IEEE.		√	
Castaldi, L., Iscaro, V., Maresca, P., & Mazzoni, C. (2018). Digital transformation and internationalisation : a complexity approach. Researchgate. net.		√	
Chen, L., & Chen, T. L. (2018). International Students' Conceptions of the Sustainable Internationalisation of Business Education in Taiwan. Sustainability, 10(11), 4292.	√		
Coelho, M., & Ribeiro, M. D. C. A. (2018). Internationalisation strategies in Portuguese Higher Education Institutions–time to move on and to move beyond. EPiC Series in Language and Linguistics, 3, 33-39.		√	
Hadzhikoleva, S., Hadzhikolev, E., Cheresharov, S., & Yovkov, L. (2018). Towards building cloud education networks. *Tem Journal*, *7*(1), 219.		√	
Hui, X., Yang, B., Huang, C., & Qin, Z. (2018, August). Research Project: Research on the Barriers and Countermeasures of the Internationalisation of Young Teachers in Universities and Colleges Planning Project of Education and Science Tianjin Province 13th Five-Year Education Science Planning Issues, No. HE4032-Evaluation Indicators for the Internationalisation of Junior Faculty at Universities. In Proceedings of the 2nd International Conference on E-Society, E-Education and E-Technology (pp. 135-139).	√		
Knight, J., & De Wit, H. (2018). Internationalisation of higher education: Past and future. International Higher Education, (95), 2-4.		√	

Latief, R., & Lefen, L. (2018). Analysis of Chinese Government Scholarship for International Students Using Analytical Hierarchy Process (AHP). Sustainability, 10(7), 2112.	√		
Pouratashi, M. (2018). Internationalisation mechanisms in world selected universities and Iran. Quarterly Journal of Research and Planning in Higher Education, 24(2), 85-108.	√		
Reda, V., & Kerr, R. (2018, September). The MOOC BA, a New Frontier for Internationalisation. In 2018 Learning with MOOCS (LWMOOCS) (pp. 94-97). IEEE.			
Yimeng, L., Le, Z., & Liangying, Z. (2018). Study on Evaluation Index System of Journal Articles in Humanities and Social Science in the Context of Internationalisation. Library Work and Study, (6), 13.	√		
Yong, J., Kong, F., & Sui, X. (2018, July). A Study on Influencing Factors of International Applied Talent Cultivation in Higher Vocational Education. In International Conference on Frontier Computing (pp. 1689-1694). Springer, Singapore.	√		
Zashchitina, E. K., Pavlov, P. V., & Bondarev, M. G. (2018, September). Increasing Export of Higher Education Services through Internationalisation, based on Development of Online Learning. In 2018 IEEE International Conference" Quality Management, Transport and Information Security, Information Technologies"(IT&QM&IS) (pp. 755-759). IEEE.		√	
Ayouni, S., Menzli, L. J., Hajjej, F., & Maddeh, M. (2019, November). A Hybrid Fuzzy DEMATEL-AHP/VIKOR Method for LMS Selection. In ECEL 2019 18th European Conference on e-Learning (p. 47). Academic Conferences and publishing limited.	√		
Cotton, D. R., Morrison, D., Magne, P., Payne, S., & Heffernan, T. (2019). Global Citizenship and Cross-Cultural Competency: Student and Expert Understandings of Internationalisation Terminology. Journal of Studies in International Education, 23(3), 346-364.			√
Pesterva, N., Yuhua, S., Belyakova, M., & Jgin, F. (2019). The Formation of the Eurasian Research-and-Education Ecosystem and the Internationalisation of Educational Platforms: The Case of Russia and China. European Journal of Contemporary Education, 8(4), 841-854.		√	
Wu, X., & Wang, C. H. (2019, May). Data Thinking for Quality Evaluation of University Internationalisation Development in China. In 2nd Symposium on Health and Education 2019 (SOHE 2019). Atlantis Press.	√		
Zakharova, U. S. (2019, May). Online Course Production and University Internationalisation: Correlation Analysis. In European MOOCs Stakeholders Summit (pp. 102-107). Springer, Cham.		√	
De Wit, H. (2020). Internationalisation of higher education. Journal of International Students, 10(1), i-iv.			√
Naveed, Q. N., Qureshi, M. R. N., Tairan, N., Mohammad, A., Shaikh, A., Alsayed, A. O., ... & Alotaibi, F. M. (2020). Evaluating critical success factors in implementing E-learning system using multi-criteria decision-making. Plos one, 15(5), e0231465.	√		
Muhammad, A., Shaikh, A., Naveed, Q. N., & Qureshi, M. R. N. (2020). Factors Affecting Academic Integrity in E-Learning of Saudi Arabian Universities. An Investigation Using Delphi and AHP. IEEE Access, 8, 16259-16268.	√		√

Valtins, K., Tipans, I., & Muracova, N. (2020). Technology Enhanced Internationalisation in Higher Education, Non-Traditional Indicators. Journal of Information Technology Management, 14-25.		√	
Yong, J., & Sui, X. (2020). The Impact Factors of International Navigation Talents Based on AHP. In Data Processing Techniques and Applications for Cyber-Physical Systems (DPTA 2019) (pp. 1023-1030). Springer, Singapore.	√		

ANNEX 10: DECODING THE ECVET MOBILITY 11 PROJECT SOLUTIONS



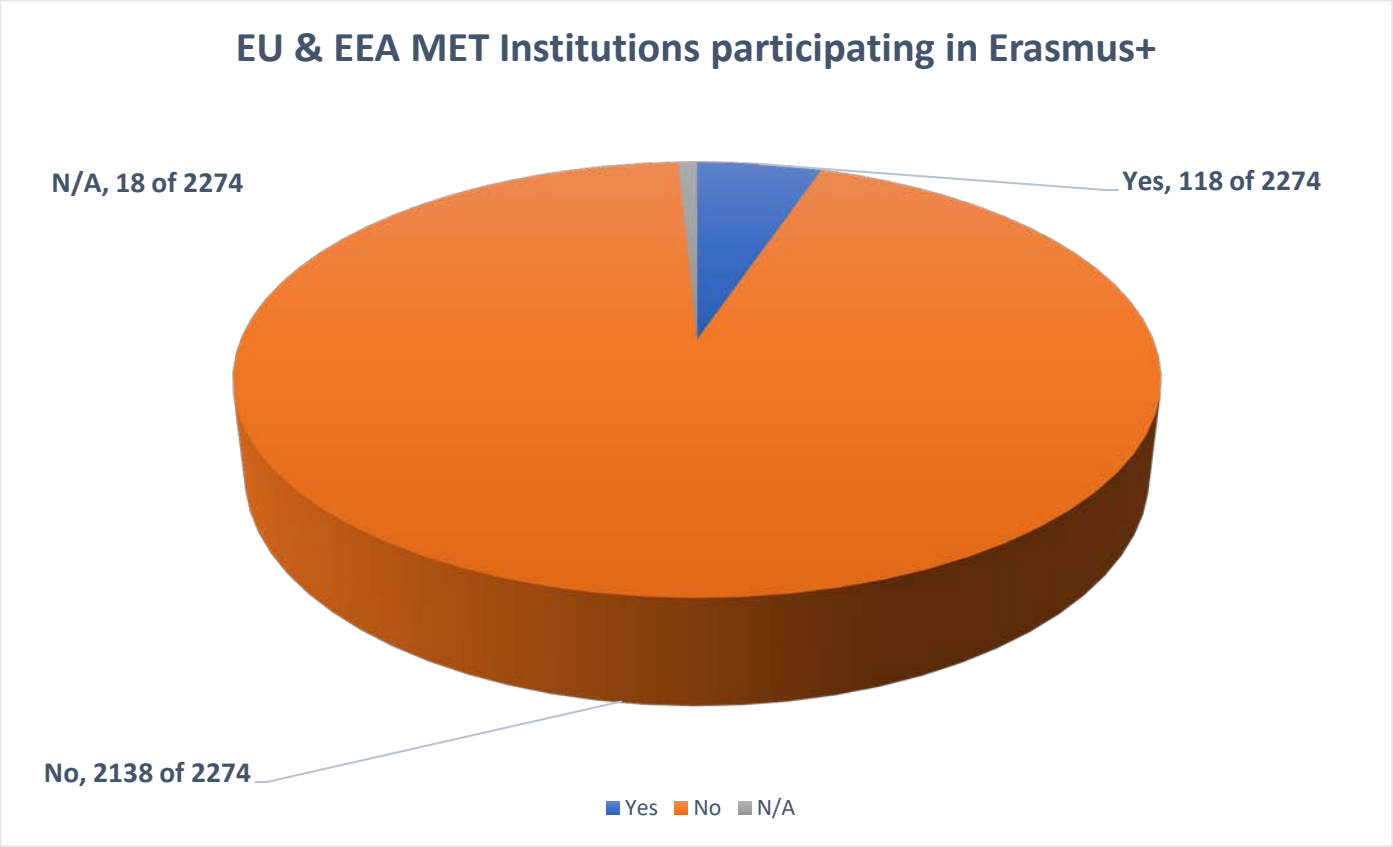


SOURCE: Using ECVET to support learner's mobility solutions developed by the 11 pilot projects 2008-2012. VIDEO available at https://www.youtube.com/watch?v=Etjk64IQI0M&feature=youtu.be

ANNEX 11: APPROXIMATION OF EUROPEAN MET MOBILITY

FIGURE ANNEX 11.1

AN APPROXIMATION SURVEY OF MET PARTICIPATION IN ERASMUS+



Source: Annex 10 of SkillSea (2020.) *D3.1. Strategy Plan Framework*, *op.cit*. Based on the database of stakeholders D4.4, from WP4, EF conducted a survey on the EU & EEA MET institutions participating in Erasmus + and the results shown above are until 30/4/2020. This research will be updated regularly throughout the SkillSea project.

SKILLSEA

skillsea.eu

Co-funded by the Erasmus+ Programme of the European Union