

SKILLSEA WP1 – METHODOLOGY REPORT

1 INTRODUCTION

1.1 WP1 WORK GROUP

The organisations participating in WP1 are as follows:

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|--|------------|--------|---|--|
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2 PREREQUISITES

2.1 SUMMARY OF WP1 GUIDELINES, OBJECTIVE AND OUTPUT FROM THE APPLICATION

2.1.1 From the work plan we have the following on 1.1.1:

| | | |
|--|----------------------------|--|
| Expected Result (output or outcome) | Number | 1.1.1 |
| | Title | Methodology |
| | Type | Publication (Technical Report) |
| | Description | <p>Representative samples of qualitative data from 8 countries will be documented. A larger selection of sources will be used for sampling quantitative data from open sources on line and available to the public.</p> <p>The first four steps in The Foresight Method will be included in the output document:</p> <ul style="list-style-type: none"> - Reality - Mapping the current state - Understanding the state - Possible future development - What should be done? <p>What and how do we do that?</p> |
| | Due date | M3 |
| | Language(s) | English |
| | Media(s) | Publication |
| | Dissemination level | <input checked="" type="checkbox"/> Public <input type="checkbox"/> Restricted to other E+ Programme participants <i>(including EACEA, Commission services and project reviewers)</i> <input type="checkbox"/> Confidential , only for members of the consortium <i>(including EACEA, Commission services and project reviewers)</i> |

From the general section of the application we have described common categories from which shipping industry is normally segmented.

2.2 THE MARITIME SHIPPING SECTOR INCLUDES THE FOLLOWING KEY AREAS:

At the kick off meeting in Rotterdam 6-7 February 2019 it was a strong wish from the WP1 partners to include also needs from the maritime industries not explicitly mentioned in the application, but which require competence gained from working at sea and having an IMO certificate.

2.2.1 The seafarers are, in accordance with the STCW grouped into the following main categories with sub-categories:

Management level means the level of responsibility associated with serving as master, chief mate, chief engineer officer or second engineer officer on board a seagoing ship. It specifically refers to:

- Master and chief mate on ships of 3,000 gross tonnage or more
- Master and chief mate on ships of between 500 and 3,000 gross tonnage
- Master serving on a seagoing ship of less than 500 gross tonnage engaged on near-coastal voyages
- Chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more
- Chief engineer officers and second engineer officers on ships powered by main propulsion machinery of between 750 kW and 3,000 kW propulsion power

Operational level means the level of responsibility associated with serving as officer in charge of a navigational or engineering watch or as designated duty engineer for periodically unmanned machinery spaces or as radio operator on board a seagoing ship. It specifically refers to:

- Officers in charge of a navigational watch on ships of 500 gross tonnage or more
- Officer in charge of a navigational watch on a seagoing ship of less than 500 gross tonnage engaged on near-coastal voyages
- Officer in charge of an engineering watch in a manned engine-room or designated duty engineer officer in a periodically unmanned engine-room on a seagoing ship powered by main propulsion machinery of 750 kW propulsion power or more
- Electro-technical officers
- GMDSS radio operators

Support level means the level of responsibility associated with performing assigned tasks, duties or responsibilities on board a seagoing ship under the direction of an individual serving in the operational or management level

- ratings forming part of a navigational watch
- able seafarer deck
- ratings forming part of a watch in a manned engine-room or designated to perform duties in a periodically unmanned engine-room
- able seafarer engine in a manned engine-room or designated to perform duties in a periodically unmanned engine-room
- electro-technical ratings

2.3 SECONDARY DATA

A considerable amount of research has been undertaken in the past decade to assess supply and demand for maritime skills, at the national, regional and global levels. This brief paper summarises and links to some of the most relevant for the SkillSea project.

- The starting point for holistic consideration of current and projected worldwide trends is the ISF/BIMCO Manpower Report, which is updated every five years. The most recent edition identified an existing shortfall of about 16,500 officers (2.1%), and estimated a need for an additional 147,500 officers by 2025: <https://www.bimco.org/products/publications/other-manuals/manpower-report-2015>

- The EU-funded ‘Enhancing Recruitment and Training in the European Shipping Industry’ project, which concluded in 2010, produced proposals on ways to attract young people to a seafaring career and to develop a more stimulating career path and mobility within the maritime cluster. The final report is available at: <http://www.etf-europe.org/TrainingAndRecruitment.cfm>
- The joint ETF/ECSA project ‘The Mapping of Career Path in the Maritime Industries’ provided evidence on the potential and actual career paths of seafarers across a range of member states, with additional work to examine the demand for seafarers at sea and in relevant shore-based maritime sectors, and barriers to the mobility of qualified seafarers between the sectors. The final report can be downloaded on: <http://www.ecsa.eu/sites/default/files/publications/054.pdf>
- The “Career Mapping Update 2013” was a follow-up to the first project and aimed at addressing challenges in training sufficient numbers of young people to adequately supply the current and future needs of the European maritime transport industry. The final report can be downloaded here: <https://nautilusint.org/media/169249/ETF-ECA-Maritime-Career-mapping-2013.pdf>
- The UK-based Project Ulysses was conducted in response to one of the recommendations of the 2015 Maritime Growth Study and sought to identify current and future needs for skilled and experienced seafarers throughout the maritime sector. The final report is available at: https://www.maritimelondon.com/wp-content/uploads/2016/09/Project_Ulysses_Covering_Summary_2016.pdf
- The Institute of Marine Engineering, Science and Technology (Imarest) report on ‘Mitigating the skills gap in the maritime and offshore oil + gas market’ (2013) is mostly focussed on engineering and recruitment, but contains relevant recommendations on skills, experience and CPD. Notably, it found, ‘71% of employers state that graduates are not leaving university with all required skills’. Full report is at: <https://www.imarest.org/reports/683-mitigating-the-skills-gap-in-the-maritime-and-offshore-oil-a-gas-market-1/file>

The International Labour Organisation recently produced an analysis on some of the challenges and opportunities linked to the recruitment and retention of seafarers and the promotion of opportunities for women seafarers – this can be found at: https://www.ilo.org/wcmsp5/groups/public/---ed_dialogue/---sector/documents/meetingdocument/wcms_664163.pdf

2.3.1 Industry’s recruitment challenges

- <https://www2.deloitte.com/content/dam/Deloitte/global/Documents/dttl-er-challengeindustry-08072013.pdf>
- https://www.researchgate.net/profile/Jiangang_Fei/publication/292424132_Human_resource_practices_in_seafaring_Opportunities_for_improving_retention/links/59471e920f7e9b6910f72ddf/Human-resource-practices-in-seafaring-Opportunities-for-improving-retention.pdf
- A good paper on the recruitment and retention of seafarers: what keeps individuals in a career at sea? <http://iamu-edu.org/wp-content/uploads/2014/07/Recruitment-and-retention-of-seafarers-what-calls-to-and-keeps-individuals-in-a-career-at-sea.pdf>
- Exploring the range of retention issues for seafarers in global shipping: opportunities for further research - WMU Journal of Maritime Affairs April 2015, Volume 14, Issue 1, pp 141–157
- Another interesting analysis of retention issues can be found in a report on the Diversification of Seafarers’ Employability Paths at: <https://www.futureacademy.org.uk/files/images/upload/WLC2016FA003F.pdf>
- Interesting analysis on the potential impact of automation and technology on work at sea, the role of seafarers and the shipping industry: <http://www.ics-shipping.org/docs/default-source/resources/ics-study-on-seafarers-and-digital-disruption.pdf?sfvrsn=3>

2.3.2 Potential skills needs for seafarers

- International Transport Workers’ Federation/World Maritime University report ‘Transport 2040: Automation Technology Employment - the Future of Work’ has a strong focus on shipping and seafarers: https://commons.wmu.se/lib_reports/58
- Nautilus Federation: Future proofed? Research into seafarers’ views on the impact of autonomous shipping, 2018 - <https://www.nautilusint.org/en/news-insight/resources/nautilus-reports/autonomous-shipping-research>
- <http://www.sirc.cf.ac.uk/Uploads/Publications/New%20Shipboard%20Technology%20&%20Training%20Provision%20for%20Seafarers.pdf>

- <https://www.osm.no/PageFiles/4497/The%20Future%20of%20Crewing%20-%20Shipping's%20Challenges%20and%20Opportunities.pdf>
- MSA – Maritime Skills Need Assessment – 2009 – Attached. Has recommendations on management skills, career progression, strengthening qualifications and training etc.
- ‘Creating a European Skills Council for the Maritime Technology Sector’ – attached. Some results on skills gaps in maritime sector p23.
- ‘Training the 21st Century Marine Professional’ – attached. Not much of use but some on transferable/generic skills p38
- Officers’ shortage: viewpoints from stakeholders. *Int J Mar Navig Saf Sea Transp* 3(4):471–474
- Gekara, V. (2008) 'Globalisation, state strategies and labour in the shipping industry: the UK response to declining shipping skills' – SIRC, Cardiff University
- Leong, Priscilla 2012. Understanding the seafarer global labour market in the context of a seafarer 'shortage'. PhD Thesis, Cardiff University.
- Hill J (1972) The seafaring career: a study of the forces affecting joining, serving and leaving the merchant navy. Centre for Applied Social Research, Tavistock Institute of Human Relations, London
- Mitroussi K (2008) Employment of seafarers in the EU context: challenges and opportunities. *Mar Policy* 32(6):1043–1049
- Pekcan C, Barnett M, Gatfield D (2003) A national survey of cadets. Warsash Maritime Centre, Warsash
- Pyne, R. (2012) Internationalising Maritime Education and Training – Developing Content and English Language Integrated Curricula. PhD Thesis, Plymouth: Plymouth University.
- Sampson, H. (2015) ‘Maritime Futures: Jobs & Training for UK Ratings’, Report to RMT
- Sampson, H., Tang, L. (2016) ‘Strange things happen at sea: training and new technology in a multi-billion global industry’, *Journal of Education and Work*, 29(8): 980-994. DOI: 10.1080/13639080.2015.1102213
- Silos J, Piniella F, Monedero J, Walliser J (2012) Trends in the global market for crews: a case study. *Mar Policy* 36(4):845–858
- Zaar S, Hammarstedt K (2012) Promotion campaigns in the maritime sector and the attitude of young people towards a career at sea. *masters Masters*, Chalmers University of Technology
- Thai VV, Balasubramanyam L, Yeoh KKL, Norsofiana S (2013) Revisiting the seafarer shortage problem: the case of Singapore. *Marit Policy Manag* 40(1):80–94

2.3.3 Maritime SuperSkills - UK

Maritime SuperSkills (MSS) is managed by a regional consortium of Liverpool John Moores University (LJMU), Mersey Maritime, Hugh Baird College (Port Academy Liverpool), Northern Logistics Academy, The Engineering College and Wirral Metropolitan College, and is part-funded by the European Social Fund. It is overseen by a Steering Group with a national remit, chaired by the Maritime Skills Alliance. The key remit of the project is to engage with Maritime employers in order to design new apprenticeship standards. Groups of employers, known as ‘trailblazers’, pool their knowledge and experience of the sector to develop new occupational standards that will address sectoral skills needs and routes for progression. Specifically, it explores the current roles at sea and the progression to on shore roles. The body in England charged with approval of Apprenticeship Standards is the Institute for Apprenticeships (IFA).

The methodology of needs analysis employed in the MSS is to establish the necessary knowledge, skills and behaviours identified through trailblazer groups of industry employers. This approach to needs analysis aligns with the European Union’s Reference Framework for Key Competencies, in which the term ‘behaviours’ is replaced with the term ‘attitudes’.

Key progression pathways identified and developed into higher-level apprenticeship standards through the MSS since it started in 2016, include:

- Marine Technical Superintendent – Level 7 (standard approved by IFA, assessment plan in development)
- Marine Surveyor – Level 6 (proposal approved by IFA)
- Ship Operations Manager – Level 7 (proposed, but not yet approved)

Other specific progression pathways have been developed and approved by the IFA, independently of LJMU, by other industry trailblazer employer groups with stakeholder presence in England. Each standard has been

developed using the same needs analysis methodology of establishing knowledge, skills and behaviours (attitudes). These represent both ‘at sea’, ‘marine engineering’ and ‘onshore asset management’ roles, see Figure 1.

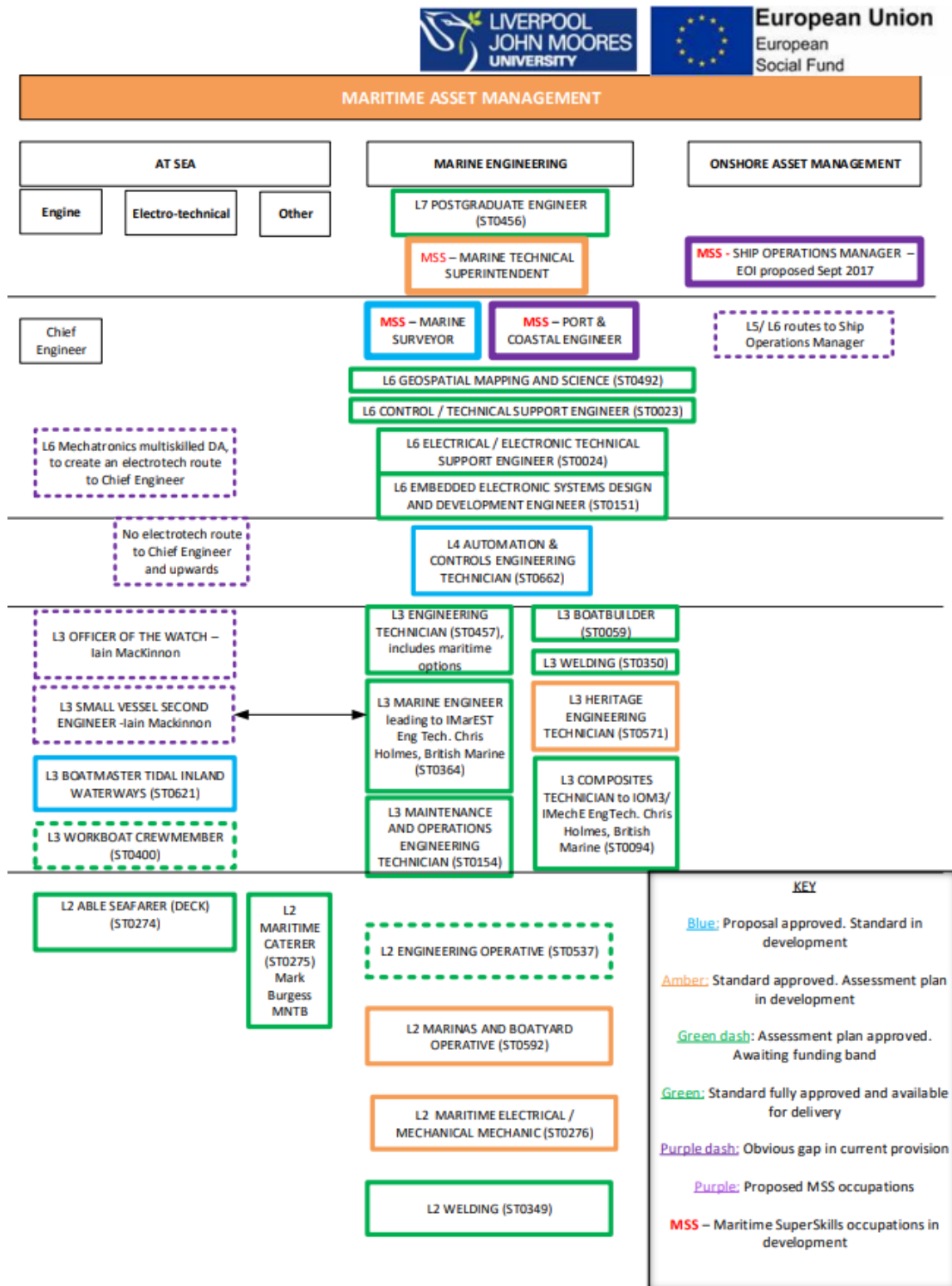


Figure 1 - Higher/Degree Apprenticeship Standards-based Skills Progression Pathways for the Liverpool City Region Maritime Sector V10 Source: Liverpool John Moores University (2018:n.p.)

3 GUIDELINES ON METHODOLOGY

3.1 CURRENT SKILLS NEEDS (CSG) WP 1.1.2 (M10) – QUANTITATIVE RESEARCH

Current Skill Needs will be carried out as a multi-activity process. The main activities will include:

- Literature analyses
- Questionnaire
- Semi-structured interviews

3.1.1 Literature analyses

The activity will start with a systematic, thorough search of relevant literature (e.g. books, peer reviewed articles, proceedings, web, etc.).

In particular, the literature search and subsequent analyses will focus on:

1. articles, proceedings and books referring to the STCW Convention, in particular those containing proposed amendments and clarifications, or suggestion for improvements
2. articles, proceedings and books referring to the crew-management issues
3. documents recently submitted (at least those submitted since 2014) to IMO HTW Subcommittee
4. articles published at different web sites dedicated to maritime subjects, in particular those publishing interviews with top-level managers and recognized experts, and dealing with maritime education and training or human capital

The subjects to be investigated include:

1. recent changes in maritime education and training, in particular in relation with high-tech ships
2. impacts of human capital on safety, security, pollution prevention and work efficiency
3. maritime labour market dynamics, in particular involving European maritime labour market
4. trends regarding educated workforce in shipping
5. impacts of expected new technologies on on-board organization, trends and issues

After evaluating the results of the literature search the outcomes will be drafted. The outcomes are expected to include present status and recent changes in respect of:

1. European maritime education and training
2. European maritime labour market
3. New on-board technologies and changes

3.1.2 Questionnaire

Based on the outcomes of the literature analyses the questionnaire will be developed as a research instrument for the purpose of gathering information from main stakeholders.

The goal of the questionnaire is to collect information on beliefs, preferences, attitudes and expectations in respect of maritime skill needs.

The expected structure of the questionnaire contains the following topics:

1. Introductory information
2. Company profile
3. Personal profile
4. On board competencies and skills (STCW skills)
 - 4.1. Expectations and actions
 - 4.1.1. On manpower and skills
 - 4.1.2. On new business environment
 - 4.1.3. On "green" constraints
5. On-shore competencies and skills (Non-STCW skills)
 - 5.1. Expectations and actions
 - 5.1.1. On generic competencies required
 - 5.1.2. On sectoral competencies required
 - 5.1.3. On cross/sectoral competencies required

5.1.4. On others competencies

6. Recommendations

The short description of each part of the questionnaire follows.

- Part 1 **Introductory information.** The part will contain the abridged description of the project, goals, partners, etc. Also, it will contain the reference to GDPR Regulation (or national legislative, as appropriate).
- Part 2 **Company profile.** The part will contain a number of questions regarding the company profile (short history, size, area of activity, primary line of business, number of employees, number of seafarers, number of employees at head office, etc)
- Part 3 **Personal profile.** The part will contain a number of questions on respondent's background, including age, education, experience in the company, position, area of expertise.
- Part 4 **On board competencies and skills.** The part will deal with competencies prescribed in STCW Convention (maritime competencies), The part will refer to each function, as defined in the STCW Convention in Chapters II, III, IV and V. In addition, a number of questions will deal with professional competencies beyond and above STCW competencies (for example, additional competencies required for personnel on DP vessels or LNG carriers).
The part will also examine preferences, attitudes and expectations regarding shipboard personnel in respect of new business requirements (participation in shore activities, understanding of company policies and their implementation, recent trends in shipping, etc) as well as competencies needed as a consequence of pollution prevention measures (air quality monitoring, BWM, etc).
- Part 5 **On shore competencies and skills.** The part will examine competencies that are required for on-shore jobs requiring on-board experience (technical supervisors, crew manager, pilots, etc). The part will in particular examine generic competencies needs and gaps, as perceived by main stakeholders. As a basis for this part, the European Key Competencies Framework (EKCF) will be used. In a lesser degree, the part will investigate the importance of sectoral and cross-sectoral competencies.
The areas of particular interest include communications, teamwork, leadership, adaptability, problem-solving skills and creativity, interpersonal skills and time management, work ethics, motivation, organizational skills, planning and handling feedback, conflict-resolution and stress handling, decision-making and analytical skills.
- Part 6 **Recommendations.** The part will offer an opportunity to respondents to insert their opinion on the related topics, subject to personal preferences.

The questionnaire is planned to be personalized i.e. each respondent will be clearly identified and (preferably) contacted in personal before filling the questionnaire. The topics under survey are deemed as highly demanding in respect of expertise and experience; it is anticipated that random selection of respondents could not provide sufficient level of reliability of answers.

It is estimated that each group of main stakeholders having information of present and future skill needs should be contacted. The main stakeholder and the assumed number of questionnaires follows:

- Ship owners (40)
- Ship managers/operators (30)
- Classification societies (5)
- Unions (8)
- Crew managers (20)
- Training centres (20)
- Agents (20)
- Pilots (10)
- Insurance, P&I (10)
- Logistic companies (5)
- Equipment and store providers (5)
- Cargo survey (10)

- Maritime administration (3)
- Shipyards (4)
- Offshore industry (5)

The most important criteria for selecting respondents are the following (order does not represent importance):

- use or participation in development of new on-board technologies
- use or participation in new business models in shipping
- participation in development of new legislation or similar requirements
- regular employment of senior masters, chief engineers, and other maritime experts
- regular and significant on-the-job training
- management/deployment of noteworthy manpower
- education and training (advanced subjects)

The questionnaire will be developed and communicated using dedicated software (Google Docs, SurveyMonkey or similar). The analyses of the responses will be carried out taking into account the background, prime line of business and expertise in the subject.

3.1.3 Semi-structured interviews

Based on the experience gained during preparation of the questionnaire and its circulation the semi-structured interview format will be developed.

A semi-structured interview is a knowledge-capturing session in which the interviewer does not strictly follow a formalized list of questions. It is based on the open-ended questions, allowing for a discussion with the interviewee rather than following a straightforward question and answer format.

In this case, a list of questions (topics) will be prepared and presented to the interviewee. The main topics will include:

- relevance of STCW KUPs for successful operations
- relevance of generic skills for on-board and on-shore jobs
- transition from ship to shore employment – issues and solutions
- importance of shipboard experience for shore jobs
- applicability of on-the-job training in shipping industry
- lack of horizontal skills and methods to fill the gap
- relations with education providers
- use of internet as a tool for knowledge and skills upgrade – experience and expectations

It is assumed that:

- at least two interviewers will participate at each interview (one to be responsible for note taking)
- more than one interviewee may participate at the same time but not more than two
- interviews will take place only with selected stakeholders (not more than 10% of assumed number of stakeholders)

The target stakeholders will be selected after the questionnaire is successfully launched.

3.2 FUTURE SKILLS NEEDS (CSG) WP 1.1.2 (M10) – QUALITATIVE RESEARCH

3.2.1 Methodological considerations for education policy research

According to Rizvi and Lingard (2010:51), much of recent education policy research has been “qualitative and illuminative”. There is also the place for quantitative research as empirical quantitative methods can also be appropriate for exploring many education policy contexts. Achieving value-neutrality in education policy research is a challenge highlighted by the authors, as the analysis of policy is inherently a political activity. They recognise, also, that we now live and work in a globalised “space”. Simultaneous influences of local, national, regional and global education policy are part of the everyday environment for education providers.

The major influences of education policy in the context of Maritime Shipping sit currently at the international level (International Maritime Organisation), with member States being required to comply with the International Standards of Training, Certification and Watchkeeping (STCW) requirements for seagoing job roles. At a regional level (EU) there is the need to create a greater level of harmonisation among member countries, and others in the Schengen Area, to collaborate on the development of standards for associated shore based roles, and to facilitate the transition from seagoing roles to shore based roles (and potentially vice versa).

In order to study future skills and competence needs, this part of study will use a ‘folk explanation’ approach^{1,2}. The approach allows researchers to study and talk about people’s everyday lives, their work and their work practices with new technologies. No assumptions or measuring of properties will be made while conducting this study. Furthermore, no oppositions, conflicts or contradictions will be investigated in the in-depth analysis³. Methods in this section could involve interviews, taking of notes and photos, and observations. These methods could help to create a more complete picture of the future work skills of maritime professionals. It is also acknowledged that what people say and what they do are not always the same⁴. Thus, bear in mind that you need to have good reasons to triangulate your methods, sources, analysis, and theory and perspective.

The methodology we will use is focus group. We will utilize secondary data and semi-structured interview. Thus, we list a few but mandatory questions when you interview someone. However, remember that, this is not a survey! The guide acts as a prompt, reminding you of necessary topics to cover, questions to ask and areas to probe. Last, researchers need to decide themselves who will be the right person to interview but remember you should scope a density, as there are many job categories in the maritime sectors.

In order to achieve this aim of creating greater collaboration within the region, it is proposed that the EU Key Competencies framework forms the basis of the needs analysis.

3.2.1.1 SECONDARY DATA

Categorisation of the KSA details into the EU Key Competency framework will be completed as part of WP1 - Future Skills (secondary data analysis). Secondary data to inform this study can be obtained from the needs identification studies completed to date, as well as the analysis of various reliable sources of industry discourse. The purpose of the secondary qualitative data analysis proposed will to outline and categorise the detailed Knowledge, Skills and Attitudes perceived as necessary for the relevant occupational roles; comparing ‘critical now’ with ‘. While the majority of these data sources are in the form of published written materials, this activity differs from a literature review in that the sources are coded in order to identify and capture significant information from the data, with the outcome of putting them into ‘containers’. A software programme (supported by a licence at Liverpool John Moores University and Norwegian University of Science and Technology) called NVivo will be used for this coding process. In NVivo the ‘containers’ are called ‘nodes’. The ‘parent nodes’ will reflect the European Union framework for Key Competences, and the lower level nodes will be grouped based on their content similarities and unique relationships. Qualitative data from primary research will also be incorporated in this analysis process. A necessary stage in the development of the primary data collection instruments will be the rigorous analysis of secondary data sources. See Appendix 1, and the SkillSea country industry profiles that are also attached at the end of the document.

¹ O’Reilly. 2012. Interpretivism. In: Key Concepts in Ethnography. SAGE Publications, London. 119-124.

² The candidate methodologies are listed below – Case study, action research, ethnography, and grounded theory and so on. Note, when you pick up one methodology for qualitative research, please consider research paradigm because the paradigm will strongly influence how you conduct research and analyze your data. Research paradigm: Critical, Interpretive and Positivist

³ Myers M, Klein HK. 2011. A Set of Principles for Conducting Critical Research in Information Systems. MIS Quarterly 35(1): 17-36.

⁴ Blomberg J, Giacomi J, Mosher A, Swenton-Wall P. 1993. Ethnographic field methods and their relation to design. In: Participatory design: Principles and practices. Lawrence Erlbaum Associates, London, 123-155.

3.2.1.2 PRIMARY DATA

Focus groups

The use of focus groups is recognised as a form of group interview promoting interaction within the group. The focus of discussion is on a topic supplied by the facilitator of the focus group (Cohen Manion and Morrison, 2011). The successful use of focus groups (trailblazer groups) in identifying the needs of the maritime shipping industry has been employed in the UK as part of the Maritime SuperSkills project, and as an established means for carrying out needs analysis to inform curriculum design across other industry sectors.

In a focus group, the participants interact with each other, rather than with the researcher/facilitator. This results in the views of the participants emerging from the interaction, rather than being directed by the agenda of the organisation or individual behind the focus group.

It is proposed that the participants for the focus group phase of the study will be selected from the following stakeholder groups, representative of the maritime shipping sector:

- Classification societies
- Consultancies
- Recruiting department
- Financial
- Legal
- Protection and indemnity and defence associations
- Research bodies
- Training and recruitment
- Ship-owners and operators
- shipyards

The role of moderator/facilitator will be filled by representatives from WP1 partner. Focus groups will be held in a minimum of six countries (to represent approximately half of the countries participating in the SkillSea project). All countries will be included at the questionnaire stage of the data collection. An appropriate work package partner will assume responsibility for running focus groups in each of these countries. The timeframe for focus groups will be in May to June of 2019.

It is proposed that in the initial round of focus groups that all of the EU Key Competencies are presented in discussions with the four maritime shipping focus groups. The framework for the focus groups discussions will be informed by the analysis of the secondary data sources identified in section 3.2.1.1

- Literacy competence;
- Languages competence;
- Science, technological, engineering and mathematical STEM competence;
- Digital competence;
- Personal, social and learning competence;
- Civic competence;
- Entrepreneurship competence;
- Cultural awareness and expression competence.

Table 1 - Focus group facilitation prompts

| Competence | Definition | Knowledge | Skills | Attitudes |
|---|------------|-----------|--------|-----------|
| Literacy competence | - | - | - | - |
| Languages competence; | - | - | - | - |
| Science, technological, engineering and mathematical STEM competence; | - | - | - | - |
| Digital competence; | - | - | - | - |

| | | | | |
|---|---|---|---|---|
| Personal, social and learning competence; | - | - | - | - |
| Civic competence | - | - | - | - |
| Entrepreneurship competence; | - | - | - | - |
| Cultural awareness and expression competence. | - | - | - | - |

Source: Adapted from EU Commission (2018)

3.2.1.3 ETHICAL CONSIDERATIONS

Primary data collection brings a number of ethical considerations. Interviews, of any kind, involve an ethical dimension. By nature they are an interpersonal interaction. Both questionnaires and interviews require that the EU General Data Protection Regulation (GDPR) principles are adhered to at all times. Specific considerations to be addressed see Table :

Table 2 - Ethical considerations of primary data collection

| Issue | How this will be addressed |
|---|---|
| 1. Has informed consent of the interviewees been gained? | Written informed consent will be required from all participants – can be given in advance or at the outset of the focus group. This will be provided by 12 th of April. |
| 2. How much information should be given in advance of the study? How can adequate information be provided if the study is exploratory? | All parties to receive the KSA descriptions and focus group prompts in advance – with a reasonable amount of time to familiarise themselves with these ahead of the event. |
| 3. Have the possible consequences of the research been made clear to the participants? | All participants to be informed in writing at the point of confirmation of participation of the other parties. Some employers may wish to withdraw from the study if they feel the information they may reveal in such settings may be commercially sensitive. |
| 3. Have the benefits of participating in the research been outlined? | The scope and justification for the focus groups and follow up questionnaires will be outlined at the invitation stage. |
| 4. Have confidentiality, anonymity, non-identifiability, and non-traceability been guaranteed? | All participants to be informed in writing at the point of invitation that the outcomes of the research will be made publicly available as a requirement of the Erasmus+ programme requirements (outlined in the Erasmus Plus Programme Guide). Certain parts of the research to be withheld will be outlined. Steps will be taken to guard that outputs will not be identifiable/traceable to individuals. |
| 5. How does data protection law affect the research? | The EU General Data Protection Regulation (GDPR) principles will be adhered to at all times when gathering |

| | |
|--|---|
| | respondent contact information and data archiving. |
| 6. How will the data transcription be verified, and by whom? | WP Partners with facilitation responsibilities will ensure the transcription and verification process is timely and includes all participants. |
| 7. Who will see the results? Will some parts be withheld? Who owns the data? | All participants to be informed in writing at the point of invitation that the outcomes of the research will be made publicly available as a requirement of the Erasmus+ programme requirements (outlined in the Erasmus Plus Programme Guide). Certain parts of the research to be withheld will be outlined. Steps will be taken to guard that outputs will not be identifiable/traceable to individuals. |

Source: Adapted from Cohen Manion and Morrison (2011)

3.2.1.3.1 PERSONAL DATA

Definition and scope: Research into the social, cultural, political, economic, ethical, technical and aesthetic aspects of future skills involves interactions with, and/or collections of personal data from and about individual persons from both online and offline sources, or from other sources, for data processing purposes. Note that same legal/ethical framework (different from country to country) framework as any ‘other’ research involving processing of personal data.

Some example shall be noticed. Discourses analysis of online archives, e.g., blogs, online newspapers (including comment fields), online ‘social’ media. Ethnographic research into virtual ‘communities’ and using robots to scrape and analyse online data from individuals posting online.

Because the project may use various methods which may involve use of personal data, there may be legal and ethical guideline that regulates data processing:

- EU privacy directive and Norwegian privacy law (POL)
- European Convention on Human Rights
- UN Declaration of Human Rights
- The Nuremberg Code
- The Belmont Report
- The Declaration of Helsinki

3.2.1.3.2 EU LEGAL FRAMEWORK

All EU partners will have a ‘white statement’ regarding data protection and informed consent by 12th of April.

3.2.1.3.3 NORWEGIAN LEGAL FRAMEWORK

Norway has special requirements for data privacy. Since the first draft of questionnaire for the current skills will be ready on date 6th of May. Thus, we will report this phase to Norwegian Centre for Research Data when Croatia has a full list of questions in the questionnaire. However, we will report how we conduct interviews for the future skills before 12th of April.

There are three actors in Norwegian legal framework

- Controller: the person who determines the purpose of the processing of personal data and which means are to be used (POL §2.4)
- Processor: the person who processes personal data on behalf of the controller (POL §2.5)
- Data subject: the person to whom personal data may be linked (POL §2.6)

Personal data that may directly and indirectly connected to a physical person includes name, PIN, IP-address, job title and company name, location. Thus, if data is recorded includes sensitive personal data (POL §33), for example data that reveals information relating to racial or ethnic origin, political opinions, philosophical, or religious beliefs, the fact that a person has been suspected of, charged with, indicted for, or convicted of, trade-union membership and so on, we will follow the guidance of Norwegian privacy law.

In addition, we will report the research project to the Norwegian Centre for Research Data [Norsk senter for forskningsdata] (NSD). The official reporting form (Personvernombud meldeskjema 2019 [English version]) will be used. If changes have to be made, we will notify NSD too. The change request form will apply⁵.

3.3 TIMEFRAME – FUTURE SKILLS

3.3.1 Timeframe for focus groups

The following events are chosen. However, it depends on the availability of the interviewees and interviewers. The timeframe for this phases of research is from May to June. Specific dates will be discussed with interviewees. The public events may be scheduled tight, the interviewers might have less time to dig into a specific topic during the interview. Thus, if possible, the interview will be conducted in the end of April and May, avoiding the public events such as Norshipping and UK chamber of shipping.

- Norshipping 4th -7th June
- UK Chamber of Shipping 12th June Edinburgh

3.3.2 Timeframe for semi-structured interviews

There may be more than one round of interviews. Researchers need to reach a saturation through the data collection processes. This means that researchers also need to ongoingly analyse data after interview. Then, they need to decide whether to conduct second round interview or not until they find out what they are looking for. Timeframe is set up in between July and September.

- 1st July – 31st of September

3.4 INTERVIEW

3.4.1 Purpose of the interview

With advance of information technology, maritime education has to prepare professionals ready for the rapid changes of work skills. The maritime sectors are to affect, to a major extend, the jobs and competence requirements of workforce in the future. Thus, the purpose of interview is twofold.

⁵ https://nsd.no/personvernombud/en/notify/notifying_changes.html

- To identify the future needs of stakeholders, including deep sea and short sea shipping industries, and shore/land side shipping industries.
- To identify existing and new schemes that seems to be the most promising for future skills in the maritime sector.

3.4.1.1 TEMPLATES FOR QUALITATIVE RESEARCH – INTERVIEW EXAMPLE

A. General

Introduce myself:

Name, researcher/professor/officer at *institution/organisation* in Norway/the UK/xxx/. I have worked for many years the maritime sector. Became interested in how digitalisation will influence on future skills in the maritime sector.

Introduce my research

Explain purpose of my research. Request consent to participate in interview and ask permission to use the information gained in the interview in my research

Always ask:

1. Name
2. Function
3. Contact information
4. Can you describe your work and your daily responsibilities in your own words.
5. Particular interests
6. Anonymity (if yes; ask name or organisation; purpose alias)
7. On the record/off the record (partly anonymous)

B. Guiding questions deep and short sea shipping: Ask if they can give a demonstration of their work

Ask if applicable, about options, categories, knowledge organisation, languages, and if they know, since the maritime jobs have their own terminologies.

1. What is your work, in your own words.
2. How can ICT support your work.
3. How they got involved with your work.
4. What is specific to the ICT supported work in your current position.
5. Is the ICT solution a good solution for supporting your work.
6. How has your work changed since the introduction of ICT.
7. Do you see the differences between ICT support work and tradition work? What are the differences?
8. In your understanding of ICT supported work, what is then maritime knowledge/skills and how is it different from current job position.

B. Guiding questions shore side shipping industries: Ask if they can give a demonstration of their work

1. How long have you been doing this work. Has your knowledge changed since you involved in the shipping industries. How your work affected by maritime skills? How does it benefit by digitalisation.
2. What is skills for development careers in the shipping industries.
3. What maritime skill is needed in your work? In your own words. What is so important about it.
4. How can ICT support skills sharing
5. How long have they been involved in skills sharing, what are the most visible or important changes?
6. Understanding, and differences between current and future skills. Examples!
7. What is good future skill. Examples!

8. In your understanding of future skill, what is then knowledge and how is it different from information.

3.4.1.2 SELECTION OF INTERVIEW PARTICIPANTS

The study desires to get access to as many stakeholders as it can since they all have potentials to shape the future of skills in the maritime sector. However, a list of seven key stakeholder groups has been identified in the application proposal for the grant agreement:

- Ship owner associations
- Educational leaders at university or training centres
- Research leaders at university or research institutions
- Worker unions / specialist in digital design
- Ship design industries – Research and Development Division
- Onshore bank/insurance - should have a requirement for what could be considered as a shipping bank/insurance company
- Shipping company / Strategy, Research and Development Division

This has been given more detail/clarification and a set of stakeholders was agreed as part of the early work of WP1, and takes into account the key contributors in the current maritime sectors whom the project wishes to interview. See attached Industry Profiles for each partner country:

It does not matter how many contributors in abovementioned fields. However, to bear in mind that in-depth knowledge of future maritime skills in their own world is important. Thus, even though you might choose only one leading actor in abovementioned contributors from each field, it will be also a good case study or multiple case study⁶ if an in-depth study can be conducted (Stake 1995). The most important thing is how to find out in-depth knowledge of future maritime skills in their world. Thus, the interview process should be finished until you will not get any new information from your interviewees. The selection criteria was agreed at the WP1 meeting in Aalesund March 26th and 27th. WP1 key partner LJMU will be responsible for collating this information and agreeing with partners countries which stakeholders to target to avoid duplication.

3.5 SKILLS AND COMPETENCE GAP BETWEEN CURRENT AND FUTURE NEED (M12, M36)

We will use secondary data to report the skills and competence gap between current and future need. However, this gap will be identified in more details after the analysis of WP 1.1.2 and WP 1.1.3. The categorisation of ‘critical now’ and ‘future ongoing’ will be adopted from the previous work of the UK Automobile Council (Bettsworth and Davies, 2016).

3.6 IDENTIFICATION OF MISMATCHES ON A STRUCTURAL BASIS - WP 1.2.2 (M15)

We will use secondary data to report the skills and competence gap between current and future need. The mismatches on a structural basis will be identified in more details after the analysis of WP 1.1.2 and WP 1.1.3. Importantly, any identified mismatches will use to suggest each country’s educational, research, and industrial restructuring. We do not aim to change the structure neither for each country nor for other partner countries.

3.7 RECOMMENDATIONS FOR EDUCATION AND TRAINING - WP 1.3 (M18)

⁶ Note: We are interpretivism researchers and here we are talking instrumental case study. However, you are free to choose any methodologies/methods that fit you well.

This methodological report do not stand to recommend education and training at the current phase since it is too early to make suggestions. However, we do use our data collection and analysis methods for both primary and secondary data to inform potential education and training.

4 DISCUSSION: KEY COMPETENCIES – EU DEFINITIONS OF KNOWLEDGE, SKILLS AND ATTITUDES

Knowledge – facts and figures, concepts, ideas and theories which are already established und support the understanding of a certain area or subject;

Skills – ability and capacity to carry out processes and use the existing knowledge to achieve results;

Attitudes - disposition and mind-sets to act/ react to ideas, persons or situations; in the European Framework of Key Competences also including values, thoughts and beliefs;

An example of a previous study to adopt these in a similar context is the ESF Funded Maritime SuperSkills project, see section 2.3.3. Examples of adoption in other EU countries is evaluated as part of the 2018 review - see section: 4.2.

4.1 2006 RECOMMENDATIONS ADOPTED BY EU COMMISSION

- Communication in the mother tongue;
- Communication in foreign languages;
- Mathematical competence and basic competences in science and technology;
- Digital competence;
- Learning to learn;
- Social and civic competences;
- Sense of initiative and entrepreneurship; and
- Cultural awareness and expression.

EU Commission (2018)

4.2 2018 REVISED TERMINOLOGY ADOPTED BY EU COMMISSION

- Literacy competence;
- Languages competence;
- Science, technological, engineering and mathematical STEM competence;
- Digital competence;
- Personal, social and learning competence;
- Civic competence;
- Entrepreneurship competence;
- Cultural awareness and expression competence.

EU Commission (2018)

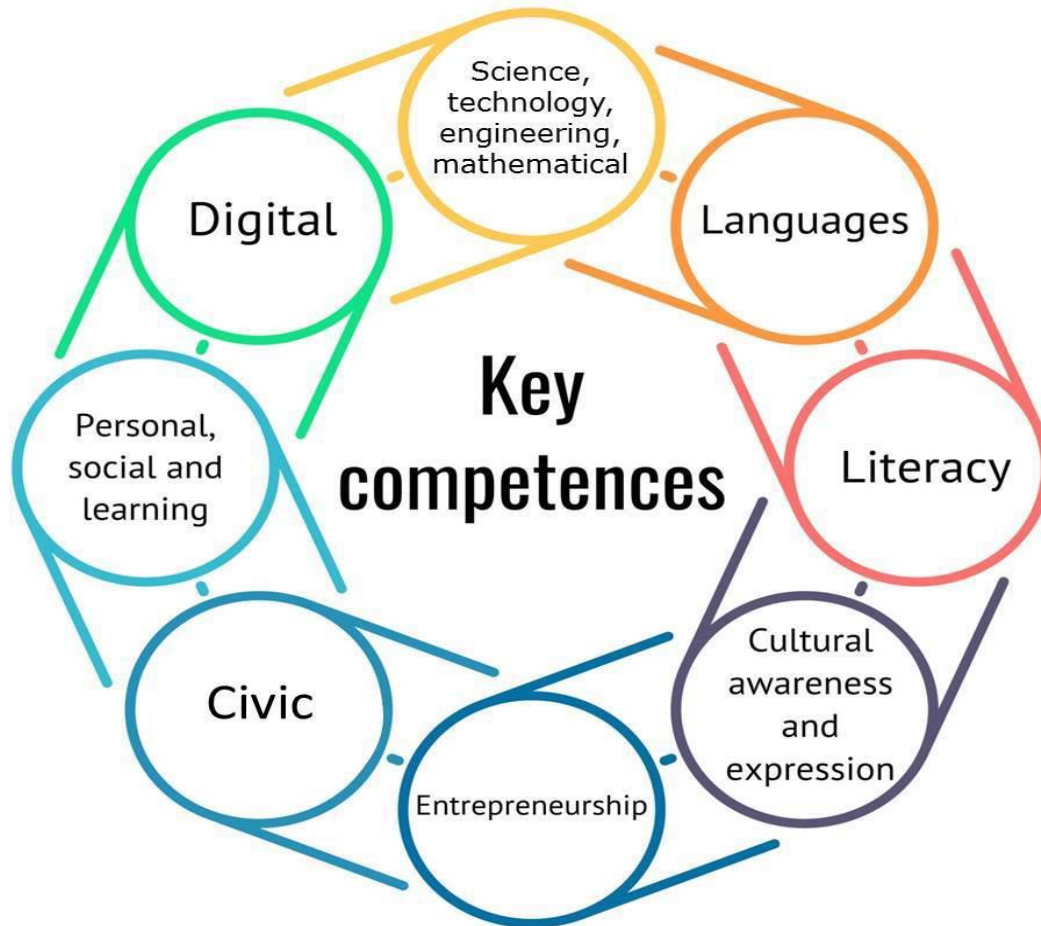


Figure x - Key Competencies – Incorporating 2018 recommendations

Source: EU Commission (2018:40)

4.3 DETAILED DESCRIPTION

4.3.1 Literacy

“Defining literacy as a key competence has to take note of the fact that literacy can be developed in the mother tongue, in the language of schooling and/or the official language in a country or region and that these languages can be different. The key element here is that a good level of literacy needs to be ensured in at least one of these languages to allow for further competences development.” (EU Commission, 2018:45).

4.3.2 Language competence

“The 2006 Reference Framework referred to 'Communication in a foreign language', however the concept of 'foreign language' can cause ambiguity when trying to define what is foreign and to whom⁸². It also excludes sign languages which could hardly be described as foreign. Therefore, it is proposed to refer to 'Languages competence' in a revised Reference Framework, stressing the importance of learning languages as a tool for communication within multilingual societies and work environments.” (EU Commission, 2018:48).

4.3.3 Science, technological, engineering and mathematical competence

“The Reference Framework already provided a good and comprehensive definition of these competences. This is also confirmed by the results of the consultation process dedicated to the review of the Recommendation on Key Competences. They indicate that the descriptions of these two competences correspond to the commonly accepted understanding among education experts and the Member States' authorities. Looking at it more than a decade later might lead only to minor changes, adapting the title of this competence to current terminology, strengthening the understanding of science as a process and way of thinking, and including a reference to the increasing need of financial literacy.

However, about 20% of Europe's 15-year olds do not reach a minimum level of skills in mathematics and science. Furthermore, a number of countries experience shortages of highly qualified graduates in the so-called STEM disciplines (science, technology, engineering and mathematics); the share of STEM graduates compared to the total number of graduates in the European Union is further decreasing. Therefore, in the context of the review of the Recommendation on Key Competences for Lifelong Learning it is important to address the challenge of helping learners to develop competences in mathematics, science and technology.

Mathematics is an instrument; mathematical reasoning is essential for a wide range of daily activities, tasks and professions. It is also key to academic areas of study such as sociology, psychology, history, geography, economics or politics. Together with literacy, a basic level of mathematical reasoning is a basic skill that is a pre-requisite for the development of other key competences” (EU Commission, 2018:48).

4.3.4 Digital competence

“The terminology used in the competence definition also needs to be updated to reflect language used by the sector. Instead of 'IST' (Information Society Technology) and 'ICT' (Information Communication Technology) that were used in the 2006 definition, 'digital technologies' is considered the most appropriate term to refer to the full range of devices, software or infrastructure. With the increased, varied and embedded use of mobile devices and applications, references to 'computers' and the 'Internet' are removed, but are still classed under the broad term of 'digital technologies'.” “The 2006 Reference Framework referred to 'Communication in a foreign language', however the concept of 'foreign language' can cause ambiguity when trying to define what is foreign and to whom⁸². It also excludes sign languages which could hardly be described as foreign. Therefore, it is proposed to refer to 'Languages competence' in a revised Reference Framework, stressing the importance of learning languages as a tool for communication within multilingual societies and work environments.” (EU Commission, 2018:50).

4.3.5 Personal, Social and Learning Competence

“The 2006 definition of the competence 'learning to learn' focused on personal development through learning strategies and management of learning and career, while omitting broader personal development and social interrelations. Having in mind the new challenges described above, a new 'personal, social and learning competence' is able to encompass a comprehensive approach to personal development, learning strategies and social competences. The competence includes three specific aspects:
Personal, including self-awareness, physical and mental well-being;
Social, covering interpersonal interactions and working with others; and
Learning, with focus on lifelong learning strategies and career management skills.

Personal, social and learning competence addresses also a number of transversal skills from the 2006 Framework as well as some new ones such as resilience, ability to deal with uncertainty and complexity.” (EU Commission, 2018:51).

4.3.6 Civic competence

“The 2006 Reference Framework included social and civic competences as a dual competence, including both a personal and a societal perspective. Some aspects of the social competence were more interlinked with personal

elements, as specified in the learning to learn competence. Other aspects of the social competence were interlinked with civic, in the sense of knowledge of societies and respect of diversity.

Civic (citizenship) competence as a concept has recently been developed further through several international frameworks and surveys. This calls for giving "civic competence" a separate place in the framework. In addition, the requirement to create sustainable societies and economies needs stronger reflection within a Reference Framework of Key Competences for lifelong learning" (EU Commission, 2018:55).

4.3.7 Entrepreneurship competence

"Already the 2006 Reference Framework listed 'Sense of initiative and entrepreneurship' among the eight key competences for lifelong learning. But since then, the understanding of entrepreneurship competence has developed further and consequently also the public consultation called for better alignment between the Reference Framework and the recently developed Entrepreneurship Competence Framework." (EU Commission, 2018:57).

"The Entrepreneurship Competence Framework has been created as a reference tool to help improve the entrepreneurial capacity of European people and organisations. The framework aims to build consensus around a common understanding of entrepreneurship competence by defining 3 competence areas and a list of 15 competences, learning outcomes and proficiency levels." (EU Commission, 2018:58).

"Emphasis in the definition of entrepreneurship competence remains on the broad understanding of turning ideas into action and creating value, both as something that happens over time and that involves people and things (resources). Social, commercial and cultural processes and outcomes refer to activity that makes a positive contribution to individuals' lives and to the sustainable development of society as a whole. This contribution is also reflected in the skill of 'negotiating with others with empathy' and the attitude of 'taking care of people and the world'. Whereas 'creativity' and 'innovation' are sometimes thought of as discrete skills (alongside risk-taking) within entrepreneurship competence, they are more accurately understood as processes that entrepreneurship skills play a part in." (EU Commission, 2018:58-59).

4.3.8 Cultural awareness and expression

"Like 'entrepreneurship competence', the benefits of the competence of cultural awareness and expression can be of socio-economic value. The Council Conclusions on a Work Plan for Culture (2015-2018)¹⁶³ recall the substantial contribution of the cultural and creative sectors to economic, social and regional development, and the importance of these sectors to the Europe 2020 strategy for smart, sustainable and inclusive growth.

'Cultural awareness and expression competence' means both actually having a voice and a way (tools/processes) to view and shape the world. This also relies on an awareness of how culture, as a collective social construct, shapes the views of the individual in return. It is important to highlight the crucial process of developing a sense of one's own place or role in society – which may be understood as one's 'socio-cultural identity' - as well as a sense of the identity of others with positive open-minded attitudes towards diverse cultural differences. This understanding of culture, based on the individual existing within particular contexts and communities implies interaction, inclusion and mobility as key issues and opportunities in society. Whilst this has strong links to the competences of personal, social and learning, and of civic, the distinction is made through the tools and processes; in other words the forms of cultural expression." "Emphasis in the definition of entrepreneurship competence remains on the broad understanding of turning ideas into action and creating value, both as something that happens over time and that involves people and things (resources). Social, commercial and cultural processes and outcomes refer to activity that makes a positive contribution to individuals' lives and to the sustainable development of society as a whole. This contribution is also reflected in the skill of 'negotiating with others with empathy' and the attitude of 'taking care of people and the world'. Whereas 'creativity' and 'innovation' are sometimes thought of as discrete skills (alongside risk-taking) within entrepreneurship competence, they are more accurately understood as processes that entrepreneurship skills play a part in." (EU Commission, 2018:59).

4.3.9 Making the Key Competences approach more operational for the future

For supporting the future use of the Reference Framework, contributors highlighted the following themes for future development (EU Commission, 2018:38-39):

- “Developing detailed reference frameworks – namely for competences that needed more explanation, such as personal and social, civic, and cultural awareness and expression;
- Developing guidelines to support competence based teaching and learning in educational practice. This in particular refers to support for teachers in delivering competence based teaching and ways of organizing learning;
- Assessment – developing practices to assess key competences that may not necessarily correspond to established individual subjects such as those currently covered by the PISA measurements; and
- Mutual learning and collaboration between policy makers and practitioners on the use of the key competence approaches in education, training and learning.

Transversal elements (more recently and needs strengthening): Critical thinking, decision making, problem solving, and sustainability. Lacking career management, financial literacy, and physical literacy.

- The frameworks tend not to distinguish between communication in the mother tongue and in foreign languages, but focus on “communication” in general. Only the Italian framework makes an explicit distinction between the mother tongue and foreign languages. The Dutch framework specifies that the languages which the students should master are Dutch and English.
- The approach to mathematical competence and basic competences in science and technology is surprisingly varied. Whereas some frameworks tend to take a similar approach than the Reference Framework and define a competence in the area of mathematics and science, other look at the languages of mathematics and science.
- With respect to digital competence, several frameworks define a specific 'digital competence' with some variation in the terminology used (digital competence, ICT competence, digital literacy, citizenship and digital creativity). But digital competence is in others also treated as part of the language/communication area. For instance, France includes digital tools under 'Methods and tools for learning', and also takes a language approach, including informatics language under 'Languages for thinking and communicating'.
- Learning to learn, or methods and tools for learning, is explicitly included in about half the frameworks. In Finland, learning skills are combined with critical thinking into multiliteracy, “the competence to interpret, produce and make a value judgement across a variety of different texts which will help the pupils to understand diverse modes of cultural communication and to build their personal identity”.
- Social and civic competences are largely included in all frameworks, but the terminology used varies a lot. Some countries take a straight-forward approach similar to the EU framework: social and citizen competence (Estonia), personal and citizen development (France), whereas this area in most of the other frameworks is spread over several competences/skills. Generally, the competence covers three main aspects:
 - “civic” in the sense of “citizenship”, with concepts such as “participation, involvement and building a sustainable future” (Finland), political-legal society/socio-economic society/socio-cultural society (Flanders), active citizenship (Italy)
 - social relationships, including respect for diversity (Italy); empathy, respect, working together, responsibility, considerateness (Flanders), working with others (Ireland), interpersonal relationships (Portugal)
 - physical and mental well-being, including “taking care of oneself” (Finland), “managing myself” and “staying well” (Ireland)
- Sense of initiative and entrepreneurship as a separate competence is only present in a few of the frameworks – Estonia, Italy, Finland (in the latter combined with “working life competence”). Initiative is a personal skill covered by the “common trunk” in Flanders, whereas the Irish framework refers to “being personally effective”.

- Cultural awareness and expression is comprehensively covered in all frameworks, except the Irish framework. Again, the terminology and the degree to which this is considered as one competence or several, varies. The Estonian and Finnish frameworks refer to it as “cultural and value competence” and “cultural competence, interaction and self-expression”, respectively. In several frameworks, this is linked to language in the broader sense (languages of the arts, language and culture), and also to representations of the world and human activity (France), and aesthetic and artistic sensibility (Portugal).
- Finally, a specific competence which should be mentioned is financial literacy, which is not part of the Reference Framework. This is covered under the Finnish framework as consumer skills and personal finance skills, while the Italian framework specifically mentions financial literacy.”

5 TASKS AND DELIVERABLES BY PARTNER

| # | TASK | DUE | PARTNER | | | | | | | | | | |
|-------|--|----------|---------|-------|-----|------|------|------|------|-----|-----|-------|---|
| | | | NTNU | SIMAC | UoR | LJMU | HSBA | ENSM | SeaE | ESA | NaL | Stena | |
| 1.1.1 | Methodology | M3 | x | | | | | | | | | | |
| 1.1.2 | Current skills needs | M10 | | | x | | | | | x | x | x | |
| 1.1.3 | Future Skills and competence needs | M12 | x | | | x | x | x | | | | | x |
| 1.2.1 | Skills and Competence GAP btw current and ft needs | M12, M36 | x | | | x | | | | | | | |
| 1.2.2 | Identification of mismatches on a structural basis | M15 | x | | | | | | | | | | |
| 1.2.3 | Impact on occupational profiles | M15 | x | | | | | | | | | | |
| 1.3 | Recommendations for Education and Training | M18 | x | | | | | | | | | | |

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5.1 APPENDIX 1.

Existing vocational standards in countries represented in SkillSea

Table 1 - Existing vocational standards in countries represented in SkillSea*

| | |
|---------|---|
| UK | - Attached |
| Germany | - N/A due to no responses from the partner. |
| Norway | - Attached |
| Denmark | - Attached |
| Ireland | - Attached |
| France | - N/A due to no responses from the partner. |
| Italy | - Attached |
| Greece | - Attached |
| Spain | - Not collected yet |
| Belgium | - Not collected yet |
| Poland | - Not Contacted yet |
| Croatia | - Attached |

Source: Institute for Apprenticeships (2019)

*There is a separate excel field attached with this methodological report.