PLATINA3
IWT policy platform

D3.2 Report on required content to create and options to establish training and refresher classes for greener vessel operation

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Executive summary

The Horizon 2020 project PLATINA3 provides a platform for the implementation of the NAIADES III action programme. PLATINA3 is structured around four fields (Market, Fleet, Jobs & Skills, Infrastructure) of which Work Package 3 (WP 3) deals with various aspects of the IWT training and careers topics, in particular:

- Providing input for competence standards related to the use of zero or low emission propulsion systems (see Deliverable 3.1)
- Identifying knowledge and skills needed for greener vessel operation in refresher classes (the present Deliverable 3.2)
- Preparing input for competence standards related to onboard systems allowing automation of IWT vessels
- Supporting the use of modern techniques such as simulators, virtual reality (VR) and augmented reality (AR) in training schemes for greener and highly automated vessel operation
- Provide input to a roadmap on standards for examination of new competences in the EU regulatory framework

This report presents the conclusions from PLATINA3's Task 3.2 which identify content for refresher classes for greener vessel operation to enable personnel of inland navigation vessels to update competence with a view to new technologies applied by ageing workforce not yet familiar with life-long learning. This deliverable builds upon existing studies and analyses, interviews as well as the outcomes of the 5th PLATINA3 Stage Event (19 and 20 October 2022) where experts made presentations on this topic and first findings were showcased.

Scope of the report and definitions

The scope of the report is limited to analysing and identifying content for refresher classes for greener vessel operation. It highlights the fact that the use of alternative fuels and energy carriers is likely to lead to a need for diversification on upskilling and refresher classes that is different from the current situation in which almost all vessels are using diesel as fuel. The report has been inspired by the findings of Deliverable 3.1 on alternative fuels or energy carriers that will most likely be used most in future IWT. It applies the methodology suggested by CESNI experts in the discussion of the draft competence tables submitted in the framework of Deliverable 3.1, i.e. the system of a boatmaster sailing a vessel using alternative fuels or energy carrier and the persons being involved in the bunkering of fuels or exchange/maintenance of accumulators as addressing of specific competence that may have to be refreshed periodically.

More concretely, this report 3.2 follows the submission of Deliverable 3.1, which objective is to "*Identify competences, detailed in knowledge and skills, to deal with alternative fuels, propulsion technology and exhaust gas aftertreatment systems that can be proposed to update European Standard for Qualifications in Inland Navigation (ES-QIN)*".[1] Based on findings of other projects and initiatives on zero or low emission propulsion systems and experience gained in drafting competences for lower emission fuels, the deliverable proposed new standards for competence.

Regarding the alternative fuels that are under consideration, or that may play a role in the energy mix of the future, **Battery Electric, Fuel Cells and Hydrogen, Ammonia and Methanol as combustion fuel** have been considered - Ammonia is currently not used in IWT. E-Fuels (Hydrogen based synthetic Diesel-like fuel) is still in an experimental stage. Experts agreed to strive to go beyond pilot projects currently covered in the permanently updated CCNR overview of pilot projects for zero and low emission fuels, e.g. by including liquid hydrogen as an example of cryogenic gaseous fuel.

[1] PLATINA3 Grant Agreement, p. 30.

As forseen in the PLATINA3 Grant Agreement, this new draft competence standards for new and innovative technologies have been discussed in CESNI meetings. CCNR Secretariat prepared a first set of draft standards for an environmental-friendly navigation that has been presented for the first time in CESNI/QP on 4 February 2021 and been further examined in CESNI/QP on 20 May, 16 September and 2 December 2021, and 19 September 2022. Now available in all four CESNI languages, the draft competence standards have been examined in more detail by expert during the CESNI/QP/QM meeting on 15 November 2022.

In parallel, CESNI experts have been involved in the preparation of the session on task 3.2 and, also, partly, participated in the exchanges on the task 3.2 at the PLATINA3 5th stage event in October 2022. This recent exchange reaffirmed the approach of renewing any future specific authorisation for alternative fuels by a two step approach, including an examination and the proof of navigation time on board vessels using the alternative fuel for propulsion. CESNI experts from different permanent working groups of CESNI, including the working group on technical requirements, underlined the need to update content of refesher classes preparing for an examination on the specific competence, with a view to rapid developments, both in the field of technological progress and regulatory updates of elements concerned by proposed competence standards. This view is comparable to the requests for updating the competence standards for LNG experts in the 2010s which led to the adoption of an estabilised chapter on LNG competence and examination that entered into force as chapter 4a of RPN on 1 July 2016[2].

Results of the analysis and recommendations

The most important points which have been raised in this report are the following:

- refresher classes for environmentally friendly vessel operation are **needed** in view of rapid technological enhancement of engine drivelines, life-long learning principles and, most important, maintaining a high level of safety in the IWT sector
- to best provide an adequate proof of this knowledge and skills, a **combination of an exam and a proof of navigation time** in a relevant environment is considered to be most adequate. However, it has been argued that sailing time with a new system on board does not guarantee familiarity with that system. Therefore, it is key to find appropriate ways to identify appropriate documentation of required experience and to establish, next to an exam, also simulator time that should be subscribed in the framework of an approved training programme or alternatively a practical exam.
- such refresher classes, at least the (practical) examination and the proof of sailing time should be **mandatory**
- the recommended interval for refresher classes in need of regular updates is set at **5 years**
- a first step should be to prepare curricula on the basis of approved competence standards related to the use of zero or low emission propulsion systems, which can be followed by preparing curricula for regular education and training programmes and refresher courses
- Innovations, like VR/AR, could facilitate a more interactive approach in offering short courses to the IWT sector in combination for guidelines for practical “on-the-job” experience, while also VR/AR could facilitate tailored options upon request.

[2] See CCNR resolution 2015-I-7 referring to experience gained with pilots of LNG vessels addressed in CCNR recommendations like TMS Argonon or TMS Scirocco and results from the EU funded project LNG Masterplan

List of abbreviations

AC	Alternating Current
AR	Augmented reality
CCNR	Central Commission for the Navigation of the Rhine
CESNI	European Committee for drawing up standards in the field of inland navigation
CESNI/QP	CESNI permanent working group for professional qualifications
DC	Direct Current
EC	European Commission
EU	European Union
ES-QIN	European Standard for Qualifications in Inland Navigation
GTL	Gas to liquids
HVO	Hydrotreated Vegetable Oil
ILO	International Labour Organization
IOE	International Organization of Employers
ITUC	International Trade Union Confederation
IWT	Inland Waterway Transport
LNG	Liquefied natural gas
OME	Oxymethylene ethers
PLATINA	Platform for the Implementation of NAIADES
SSMS	Sustainable and Smart Mobility Strategy
VNF	Voies Navigables de France
VR	Virtual reality
UNEP	United Nations Environmental Programme

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1. Introduction

1.1 Background: why refresher classes are needed

1.1.1 Stakeholder impulse

For more than 15 years, several International Organisations have stressed the role of skills development in facilitating the transition to a greener economy and seizing employment opportunities that energy transition entails. The United Nations and its suborganisations have submitted e.g. The Green Jobs Report (2008)[3]: Part of the Green Jobs Initiative, a joint effort launched by the International Labour Organization (ILO), the United Nations Environmental Programme (UNEP), the International Organization of Employers (IOE), and the International Trade Union Confederation (ITUC). ILO and the European Centre for the Development of Vocational Training (Cedefop) conducted a report in 2011 "Skills for Green Jobs"[4]: it shows that skills development is critical to unlocking the employment potential of green growth, while skills shortages are becoming an obstacle in realizing this potential.

In 2015, ILO published a guide to provide guidance on how to embark on the identification of current and anticipation of future skill needs for the green economy and green jobs.[5] According to this study, transition to the green economy and sustainable development bring about economic restructuring and shifts in employment. New jobs and new job tasks require different skills. The key to inclusive and just transition is to help enterprises to adjust, change, and equip current and potential workforce with relevant skills in order to ensure that job losses are mitigated and those affected receive retraining. Anticipating skill needs therefore becomes critical.

At EU level, for the IWT sector, the action programme NAIADES III (2021) highlights that new standards for competence and examination for digital and eco-efficient skills are needed, to keep skilled crew members fit for the future. According to the action programme, "*the current and future workforce needs to be equipped with the right skills to deal with the green and digital transitions, cyber-security, synchromodality and the automation of vessels and infrastructure. Policies for lifelong learning need to be developed so that new technology can be introduced in a smooth and safe manner*." [6]
The same concept has already been raised also in 2018 by the Mannheim Declaration. The CCNR has been tasked by its Transport Ministers in the Mannheim declaration to provide for up-to-date manning requirements that provide for more flexibility and to enhance the attractiveness of the sector also with a view to the demographic development.

The Sectoral Social Dialogue Committee in IWT is recognizing the importance of refresher classes, stressing their importance also in the CESNI committee.

[3] ILO, Green Jobs: Towards Decent Work in a Sustainable, Low-Carbon World, 2008, https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---emp_ent/documents/publication/wcms_158727.pdf
[4] ILO, Cedefop, Skills for Green Jobs: A Global View, 2008, https://www.ilo.org/wcmsp5/groups/public/---dgreports/---dcomm/---publ/documents/publication/wcms_159585.pdf
[5] ILO, "Anticipating skill needs for green jobs - A practical guide", 2015, https://www.ilo.org/wcmsp5/groups/public/---ed_emp/---ifp_skills/documents/publication/wcms_564692.pdf
[6] Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions, "*NAIADES III: Boosting future-proof European inland waterway transport*", COM (2021) 324 final

However, the newly introduced competence-based approach for obtaining IWT qualifications[7] does not provide for refresher classes apart from LNG experts – LNG being the first alternative fuel introduced in IWT regulations in 2016 - and the apart from passenger navigation experts.

1.1.2. Demographic challenges

Eurostat Structural Business Statistics show that the total number of persons employed in the transport of goods and passengers on inland waterways in Europe amounted to approximately 48,000 in 2020. The age of the employees is an important characteristic of the IWT workforce. An aging work force seems to be a great challenge for the labour market of today and tomorrow. In Germany, around 25% is over 55 years old and in France, in 2016, around 24 % is over 50 years old.

The CCNR thematic report on the European inland navigation sector labour market (2021) detailed long run data for Belgium show that ageing is particularly a problem within the group of self-employed barge owner-operators, but also within the group of employees.

In 2018, there were about 26.000 people employed in passenger transport and about 23.000 in freight transport across Europe. In passenger transport, the vast majority of employed people are working in non-nautical jobs. About 20% are employed as crew members with nautical tasks. Roughly 28.000 people are employed in nautical jobs/navigation in combined freight and passenger transport.

The number of people working in freight transport during the period 2008-2018 slightly decreased before more or less stabilizing in the last few years. The number of people working in passenger transport was growing rapidly during the period 2013-2018. Unfortunately, the COVID-19 pandemic has had a disastrous outcome on this part of the IWT-industry.

In expert interviews, EBU and ESO are expecting a more or less stable labour market in nautical employment. According to their secretary generals, the number of people working in navigation will probably show a small decrease in the upcoming years and will steadily rise again when river cruises recover from the pandemic.

EBU and ESO also feel that equipment and technology used on inland navigation vessels are getting more and more complex. Therefore, inland navigation companies are looking to hire more specialized and qualified crew members. An example relates for instance in the additional provisions concerning the expertise of crew members of inland vessels fueled by liquefied natural gas (LNG), for whom a specific certificate of qualification is required. In order to attract such more specialized and highly qualified profiles, more and more companies are defining specific human resources policies. The shortage of such profile results from the fact that, across all inland navigation sectors, employers are recruiting from the same pool of employees.

Trade union representatives from ETF highlight that it is not only because of the attractiveness of the sector, but also due to the ageing workforce that refresher classes are key to enable the IWT personnel to keep up with the demands of today.

[7] For a full overview of the new system applicable as of 18 February 2022, see Deliverable 3.4, pages 7 and 8 of Platina3 Deliverable 3.4 as submitted on 9 November 2022

2. Refresher classes in Inland Navigation: The example of the LNG expert at CESNI level

As presented in Deliverable 3.1, CESNI experts advocate the approach of the LNG expert[8] as a role model for refresher classes for alternative fuels or energy carriers. Directive (EU) 2017/2397 on the recognition of professional qualifications in inland navigation and identical requirements in the new RPN[9] (Rhine regulations): Certificates of qualification for specific operations shall be valid for up to a maximum of five years.

Annex I, section 4.2 of Directive (EU) 2017/2397 sets out the **minimum requirements** for certification as a LNG expert, being a minimum **age of 18 years** (as with boatmasters, but also applicable for persons involved in the bunkering, who do not necessarily have to be a crew member) and **meeting the essential competence requirements** for LNG experts laid down in Annex II of Directive (EU) 2017/2397.

Also according to Annex I, point 4.2, every **applicant for the renewal** of a certificate of qualification as a LNG expert shall:

(a) have accumulated the following navigation time aboard a craft using LNG as fuel:
— at least 180 days during the previous five years; or
— at least 90 days during the previous year;

or

(b) meet the standards of competence for LNG experts set out in Annex II.

So, renewal is granted by proof of navigation time or by new practical exam, at the end of the period of validity of the certificate of qualification as LNG experts after 5 years (see Art. 12(5) of Directive (EU) 2017/2397. CESNI detailed the essential competence requirements for LNG experts[10] and laid down standards for practical examination of LNG experts, including 18 examination elements that have to be met in the mandatory practical examination to meet the required competence. The specific examination elements for the LNG experts are divided in two categories: Category I elements that has to be passed with at least 7 out of 10 points and category II elements, for which a performance of less than 7 out of 10 points can be replaced by a good overall performance. Category I elements, i.e. key content for LNG experts, consist of the abilities to

- read pressure and temperature,
- operate LNG systems including valves,
- perform daily maintenance and addressing malfunctions conceived during such maintenance work, start, monitor and carry out bunkering,
- perform inerting and stripping operations, and other common procedures as well as
- performing action in emergency situations.

[8] Definition of LNG expert as in Art. 3 (12) of Directive (EU) 2017/2397: 'liquefied natural gas expert' means a person who is qualified to be involved in the bunkering procedure of a craft using liquefied natural gas as fuel or to be the boatmaster sailing such a craft

[9] Regulations on Personnel Navigating on the Rhine, adopted on 8 November 2022, CCNR resolution 2022-II-1, see chapter 16

[10] European Standard for Qualifications in Inland Navigation (ES-QIN), Part I, Chapter 6 for competence standards, and Part II, Chapter 3 for standards for practical examination. ES-QIN and also non-mandatory CESNI standards are available in 4 languages at https://www.cesni.eu

Under the current system applicable to LNG, experience is required for the renewal of a certificate of qualification as LNG expert. Experience is measured in navigation time. This is why, in terms of navigation time, the Directive and the new RPN require navigation time spent on board a vessel using LNG as a fuel. For alternative fuels, familiarization via navigation time might follow a similar pattern, if the use of the alternative fuel can be compared to LNG. This seems to be the case for bunkering procedures and engine operation with methanol. In this case, CESNI standards for service record book and for service record books combined with certificates of qualification could be adopted in order to allow registration of navigation time on board a vessel using methanol for propulsion.
Navigation time may however not be a suitable parameter for the familiarization with fuels that require specific expertise only when bunkering (i.e. replacing accumulators) or during specialized maintenance work. For such fuels and energy carriers, such as electric energy at high voltage, the CESNI standards for service record books and for service record books combined with certificates of qualification may have to require the registration of bunkering/accumulator replacement operation and carrying out of maintenance work that requires the presence of a specific expert (i.e. on high voltage) on board the vessel.

With a view to the specificities of alternative fuels other than diesel or LNG, CESNI experts may wish to examine a draft standard for practical examination which is held necessary by the sector itself and which may be submitted by PLATINA3 Deliverable 3.5 in March 2023. This will allow to treat the specific experts separately that are currently looked at in CESNI/QP on the basis of the overall competence standards submitted in Deliverable 3.1. On 17 November, CESNI/QP decided to analyse the listed competences in a way that the presence of a certain expert for high voltage, methanol, hydrogen and any other future expert that may be identified by CESNI experts, can be explained and justified by the specific tasks that need to be carried out by an expert holding a specific authorisation to carry out the required task.

The specificities for each fuel may also require continuous monitoring and processing of technological developments and regulatory framework conditions. This finding of discussions at the 5th Platina3 stage event can be confirmed by the fact that the suggested competence standards for lithium-ion batteries (LIB) have been developed in an early drafting the stage of Deliverable 3.1 for an old generation of batteries (Ni-Ca for example) and have not been appropriate to address fire risks of more modern LIBs[11]. The inclusion of new content in ES-TRIN 2023/1 on storage of methanol is an example for regulatory updates that need to be taken into account in refresher classes.

CESNI experts currently examine the tasks that have to be carried out by experts on alternative fuels. They may find that with a view to the specific dangers associated with specific fuels, tasks requiring specific competence may be necessary only for maintenance and bunkering / accumulator exchange tasks. The necessity of the option to intervene with such specific competence may then be identified during the debate on new European manning regulations.

In Deliverable 3.1, high voltage electric energy, methanol and hydrogen have been considered as most promising energy carriers for inland vessels. In discussions on 3.1 results, use of ammonia has been seen critical by many experts from national ministries of transport. They all agreed, however, that refresher classes should cover this specific competence for high voltage, methanol and hydrogen.

[11] Deliverable 3.1 based itself on work carried out with a view to Article 10.11 (17) of ES-TRIN in its final version, as well as on several accidents in the maritime sector.

For high voltage, it has been stated that according to accident prevention regulation applicable in inland navigation[12], only experts should be dealing with voltage of 1.000 V AC or 1.500 V DC or above. CESNI/QP felt that experts for high voltage should be trained and prepared to make all crew members and persons working on board (e.g. for regular vessel maintenance) sensible for the specific dangers of high voltage. For the maritime sector, however, even lower limits of voltage, being 1.000 V for AC or DC, will be introduced as a definition for the terminology "high voltage"on 1 January 2023. [13]

For methanol, a clear colourless liquid, the refresher classes should vary if used as energy carrier for hydrogen fuel cells or when used in adapted fuel cells. In any way, refresher classes should deal with the characteristics of methanol being harmful to the environment and health[14]. It should by all means be avoided that due to similar properties, methanol is viewed as being as easy to handle as diesel.

For hydrogen, experts wish to make a distinction too between gaseous hydrogen (at 0 degrees and 1 pressure of 1 bar) and compressed or liquid hydrogen. For the use in fuel cells, the purity of hydrogen has been underlined as a prerequisite for safe operation of craft.

How could this relate to the development of specific refresher classes? Again, the LNG example may be used as a blueprint.

In the EU-financed ReaLNG project [15], STC Group has conducted a risk assessment for LNG as alternative fuel and conditions have been described under which an equivalent risk can be guaranteed compared to navigating with traditional fuel (diesel). The project partners could state that for other energy carriers a similar approach could be followed.

In the EU-financed LNG Masterplan Rhine-Main-Danube project, STC Group has developed a methodology, which focused on the human factor of LNG safety. The purpose of this training is knowledge and skills (competence in the sense of ES-QIN) and attitude (safety culture). The training distinguishes and contains several target groups and categories. The target groups are:

- Crew (LNG as fuel);
- Crew (LNG as cargo);
- Terminal personnel;
- Bunkering personnel;
- Company personnel and staff;
- Inspectors of competent authorities;
- Students focusing on logistics.

The training includes an assessment for each target group, lesson materials, ship handling simulator training as a tool to train and assess emergency situations and practical training using the tanker vessel training facility. The learning outcomes are knowledge and understanding of characteristics of LNG as a low flashpoint fuel and validated experience on the basis of standardized modules.

The rationale of competence and safety culture lies also behind the combined basic and advanced training.

[12] Deutsche gesetzliche Unfallversicherung (DGUV) Vorschrift Nummer 3, Elektrische Anlagen und Betriebsmittel
[13] STCW, MSC.486(103)
[14] DST study „Assessment of technologies in view of zero-emission IWT", Report No. 2293, Duisburg, page 26.
[15] For project overview, see https://ec.europa.eu/inea/sites/default/files/2014-eu-tm-0095-w.pdf.

for service on board. The learning objective of this training is safe navigation using low flashpoint fuels. More concretely, this can be summarized under the following essential competence requirements that should be addressed in refresher classes:

- Familiarise crew members with the specific points (physical and chemical properties) of fuels used;
- Operate propulsion machinery fuel controls and machinery systems and services and safety devices;
- Perform bunkering / energy carrier swapping operations in a safe and controlled manner;
- Monitor safe storage of the fuel;
- Take precautions to prevent risks and spills;
- Ensure compliance with regulations;
- Prepare system for maintainance;
- Implement occupational health and safety measures and
- Handle emergency situations related to the fuel.

3. Refresher classes in Inland Navigation: Application of AR/VR technology

As AR/VR technology, Augmented and Virtual Reality[16], is advancing in a tremendous pace as an interactive monitoring, control and training tool. As an example, in order to prepare students before going on board of the training vessel, STC Group, together with technology partner WarpVR, is recording images of the Ab Initio for a digital VR tour. The tour enables students to walk around the vessel in a 3D environment and explore the equipment on board. The VR models can also simulate safety and emergency protocols, in relation to the engine driveline (diesel hybrid electric system and hydrogen-fuel cell-electric system).

Such application opens new opportunities for refresher classes and familiarization to new technology prior to going on board for existing professionals (refreshment or exchange crew) and new entrants to the sector. VR technology can be linked to inland shipping simulators, offering the possibility to train dedicated situations and incidents with "own" crew. For example, navigating on the waterway a with hydrogen as cargo or black-out situation on board without redundancy, focusing on emergency response. These situations can be dealt with in general, but also targeted (refresher) training within a barge operating company.

Reference here is made to "the LNG Experience" which is an interactive Virtual Reality learning platform designed under the EU-financed ReaLNG project, by Beyond Reality and STC-Group that teaches the user how to handle different scenarios and how to perform certain repairs or maintenance on an LNG powered vessel.

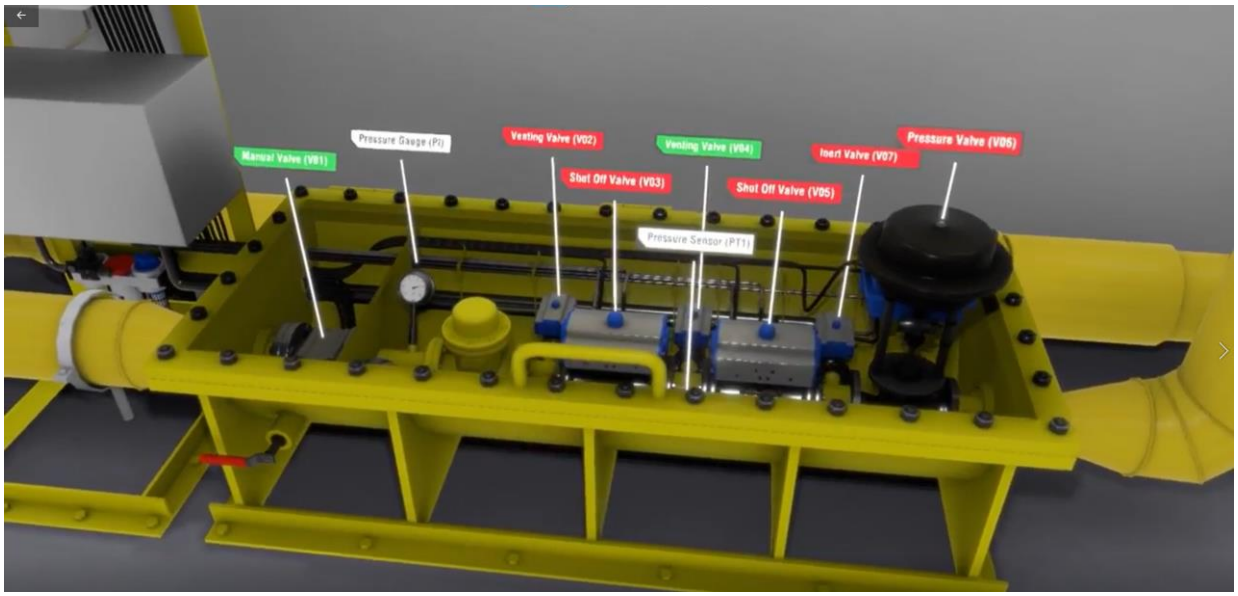

Figure 1: Beyond Reality and STC-Group, "the LNG Experience"

[16] https://tbtech.co/news/how-augmented-reality-can-improve-efficiency-in-transportation/

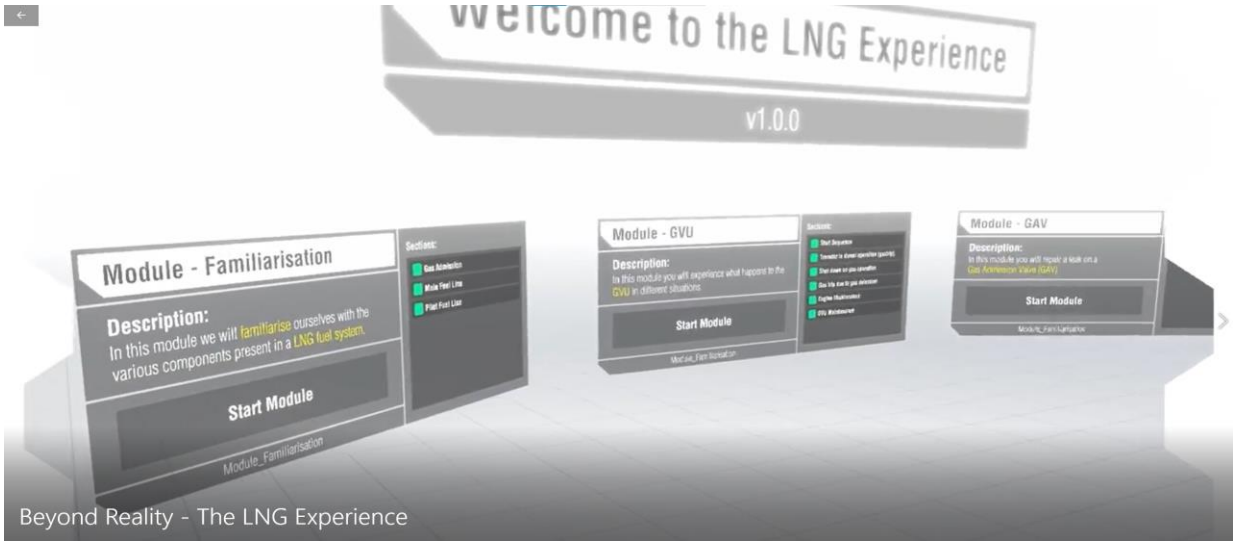

Figure 2: The LNG experience 2

Reference can also me made to another EU-financed project called RELAR (REmote Learning system based on AR in maritime VET education). In this running project, STC Group, together with six other VET/HE institutions, is experimenting with augmented reality technology in work-based learning. As a result of a feasibility study the HMT-1 device from RealWare was found to be most appropriate for use in maritime settings (bridge, engine room) where situational awareness is a key factor. The head mounted tablet (see figure 3 below) enables the user to stay into contact with his/her surroundings (facilitating the use of human sensors) and be able to connect with a remote expert (anywhere around the world; see figure 4).

By means of digital workflows, containing learning loops, using the HMT-1 students can develop their knowledge and skills in a relatively independent way; only in case of specific questions they have to ask for the teacher's (remote) attention. In this way a teacher can work more efficiently, and the students can have personalized learning experiences.


Figure 3: head mounted tablet

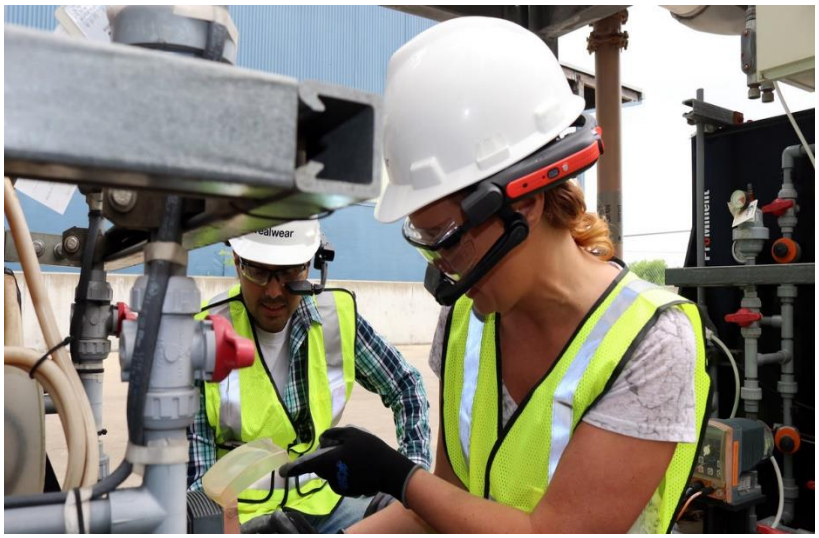

Figure 4: head mounted tablet in use for purpose of remote maintenance

The RELAR project has a lot of potential and might be inspirational for other sectors (like IWT) and of added value to a possible methodology, built up in the projects as described above.

Referring to the feasibility study mentioned above, stakeholders were interviewed. Major stakeholders in the maritime industry like Caterpillar, Mitsui and others who know that installations on board are becoming more and more complex, indicated that they would expect educational institutions like STC Group to provide basic knowledge, skills and attitude. The manufacturers realize that producer specific knowledge should be made available if need be (depending on the type of vessel and powertrain) the boatmaster or alternative fuel expert is responsible for at that moment. Figure 5 below shows this distinction.

The representatives highlighted that lifelong learning courses are seen as key to enable personnel to keep up with the demands of tomorrow.

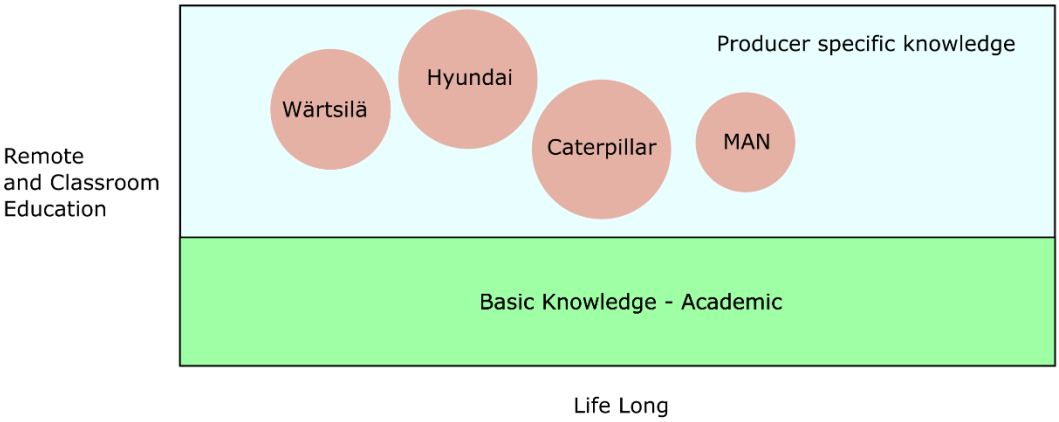

Figure 5: schematic presentation of basic knowledge versus producer specific knowledge

4. CESNI standards eco-efficient navigation

Apart from standards for alternative fuels or energy carriers, experts of the CESNI permanent working group for professional qualifications (CESNI/QP) prepared draft standards for an environmental-friendly navigation that take up experiences from GRENDEL project and experiences from Green Award schemes that recognize certain training programmes. The reason for this is the wish to provide a non-mandatory standard, being good practice recognised by all participants of CESNI/QP to the large majority of personnel sailing on craft that do not use alternative fuels or energy carriers.

During the CESNI committee meeting on 13 October 2022, Member States gave green light for adoptions of these standards at the next CESNI meeting in April 2023. As with other non-mandatory CESNI standards related to professional qualifications (e.g. basic safety training for deckhands or standard communication phrases), experts invited the network of training institutes in inland navigation EDINNA to use the draft standards as a model for refresher classes in their pan-European network.

5. CCNR roadmap for reducing inland navigation emissions

The CCNR roadmap for reducing inland navigation emissions[17] "*underlined the need for new financial instruments to achieve these environmental objectives and entrusted the CCNR to lead this development*".

In the Mannheim Declaration (2018)[18], Ministers in charge of transport of the CCNR Member States: "*tasked the CCNR to develop a roadmap in order to largely eliminate greenhouse gases and other pollutants by 2050*". To carry out this work, a study on the financial and technological aspects was published in 2021: Study on financing the energy transition towards a zero-emission European IWT.

Despite current uncertainties it is necessary to make an immediate start on designing an approach towards zero emission in 2050. The roadmap understood as an instrument to mitigate climate change and foster the energy transition and to contribute to European IWT policy. Two transition pathways are proposed, to describe the expected evolution of the fleet (new and existing vessels) and the technologies and fuels used to achieve the 2035 and 2050 goals, and to ease the dimensioning of policy measures (financing, regulatory, logistics, infrastructure…). The study provides for several scenarios, all showing the need for diversified refresher classes, addressing several fuels or energy carriers. The outcomes of the study give an idea on the repartition of possible needs of future refresher classes in the IWT sector.

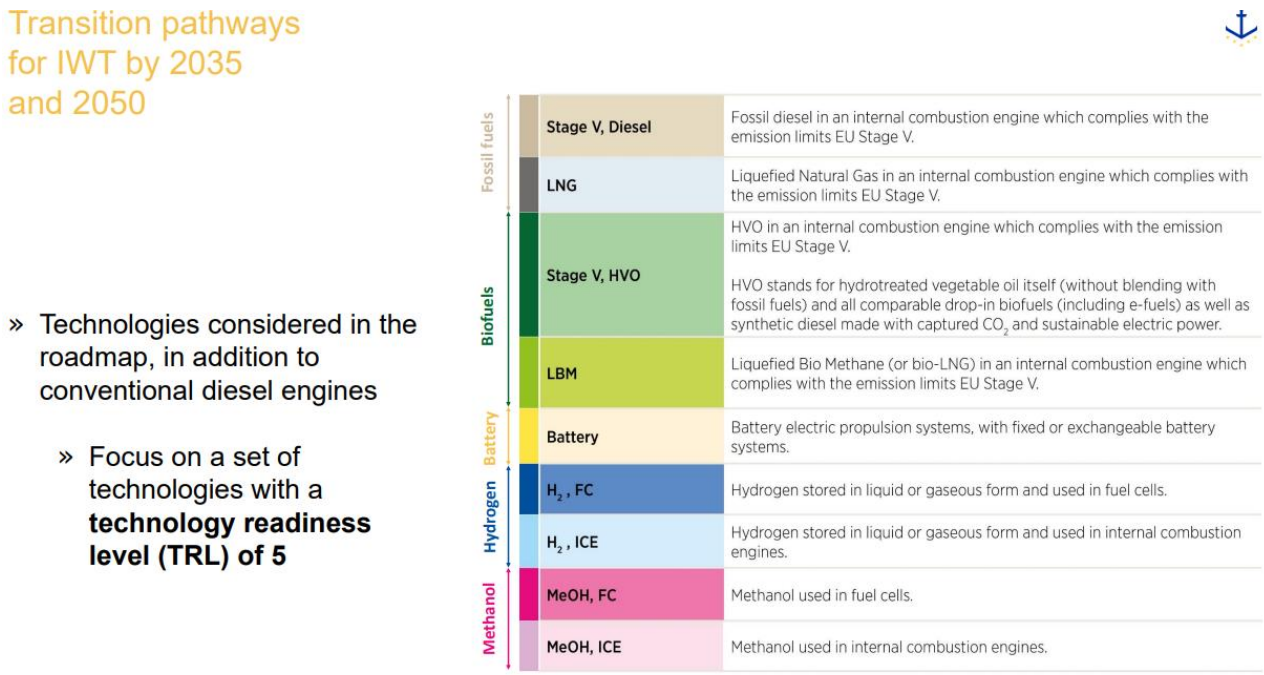

Figure 6: CCNR roadmap for reducing inland navigation emissions, Transition pathways for IWT by 2035 and 2050

[17] CCNR, https://www.ccr-zkr.org/files/documents/Roadmap/Roadmap_en.pdf

[18] CCNR, Mannheim Declaration "150 years of the Mannheim Act – the driving force behind dynamic Rhine and inland navigation", 17 October 2018, https://www.ccr-zkr.org/files/documents/dmannheim/Mannheimer_Erklaerung_en.pdf

Transition pathways for IWT by 2035 and 2050

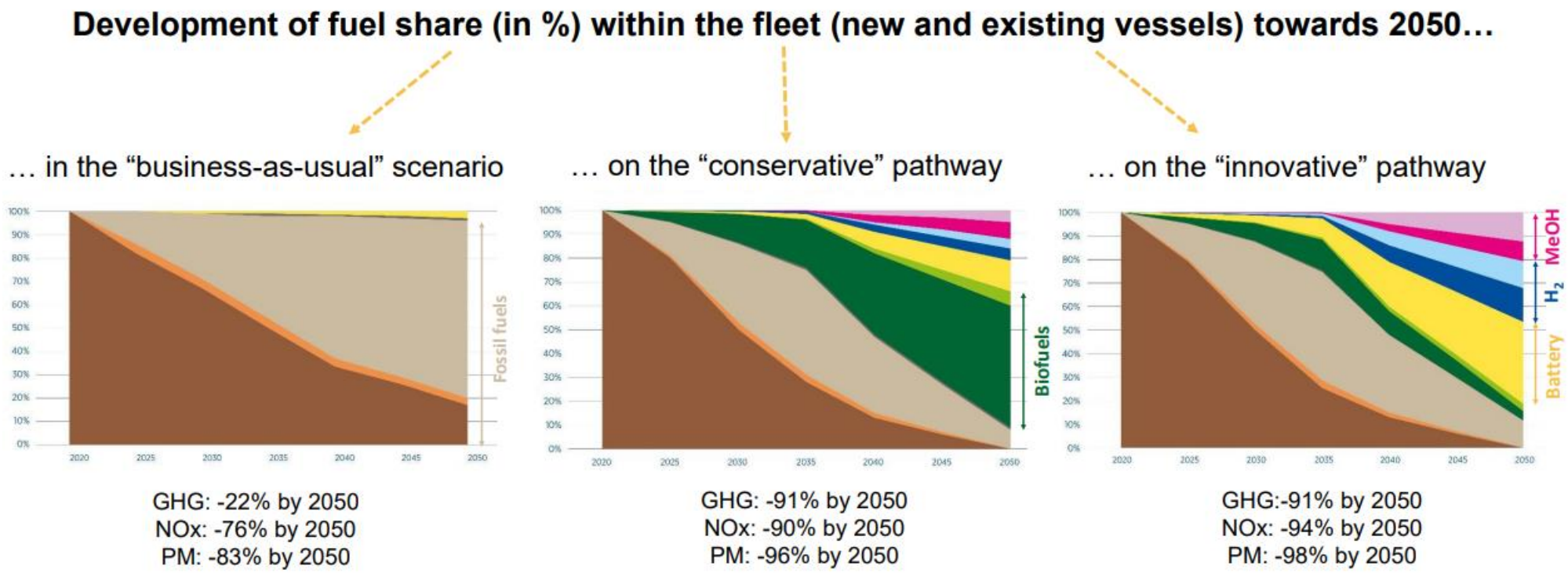

Figure 7: Transition pathways

6. Conclusions and next steps

6.1 Mandatory refresher classes for experts for alternative fuels or energy carriers

Whereas electricity seems to be perfectly addressed in ES-QIN, the use of high voltage requires extra competence, according to the finding of PLATINA3 Deliverable 3.1. Along with the most important alternative fuels and hydrogen as energy carrier used in fuel cells with methanol etc. as fuel, experts for each alternative fuel should allow periodic refreshment classes or at least take exams.

As technological development in the field of greening is continuous, in view of lifelong learning principles, the content of refresher training and examination will need periodic updates. A close cooperation within the sector between technology providers, barge operators, industry representatives, legislators, and inland shipping training & education institutes, is needed in order to keep curricula up-to-date for both regular and refresher programmes.

Along with training and education, also the practical “on-the-job” experience should be recorded. Requirements on sailing time should be defined clearly and in discussion with administrations and IWT sector representatives proper recording tools should be introduced along with monitoring and inspection regimes.

Documenting sailing time with alternative fuels will require an update of ES-QIN standards for service record books that currently only provide for the option to document sailing time with vessels propelled by LNG as a specific fuel.

Based on the competence framework developed under PLATINA3 D3.1, a next step would be to develop curricula for integration into regular education and training courses. On the basis of these materials, with reference to potential future incidents, refresher courses can be introduced to the IWT sector.

6.2 Make use of digital tools in education and training

The introduction of VR/AR technology into education and training offers opportunities for both distance support and more lively training of specific competences. Barge operators will have the possibility to train specific situations tailored for their crew, for instance in relation to the cargo or the engine driveline. But, also, more general programmes can be introduced by means of e-learning platforms and simulator training.

6.3 Good practice as incentives to reduce cost and receive “Green awards”

It is recommended to include eco-efficient navigation in the refresher classes programme, based on findings from GRENDEL and Green Award.

6.4 On shore electricity reassessment

Finally, for the subject shore electricity a re-assessment may be needed. This became clear from the discussions at the 5th PLATINA 3 stage event. A remarkable number of some 35 per cent of the participants felt that shore electricity has not been properly addressed in training so far, with an even larger percentage of participants who did not know whether shore electricity was properly addressed in IWT (see Annex, second wooclap question- figure 2 of the annex).

These figures do not come as a surprise with a view to the demographic situation in IWT as shore electricity has not been part of IWT training before 2015, and, moreover, the coverage of shore electricity facilities along the European inland waterway network, as well as the obligation of their use CESNI experts constantly monitor the application of the new legal framework from ES-QIN notably on the required competences and results of examination. At the 3rd meeting of CESNI exam commissions and approved training programme providers in 2023, these experts may wish to re-assess if the first exams under the new legal framework taken in 2022 and early 2023 have confirmed the feeling expressed by stage event participants.

Annex: Results from the Wooclap Session – 5th Stage Event

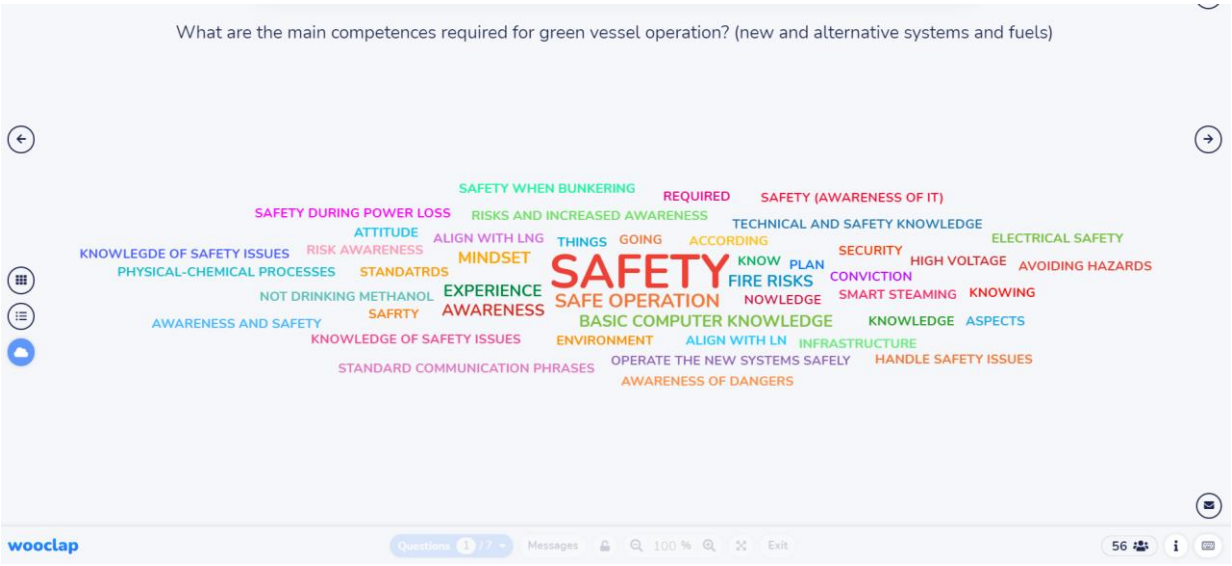

Figure 8: What are the main competences required for green vessel operation (new and alternative systems and fuels)?

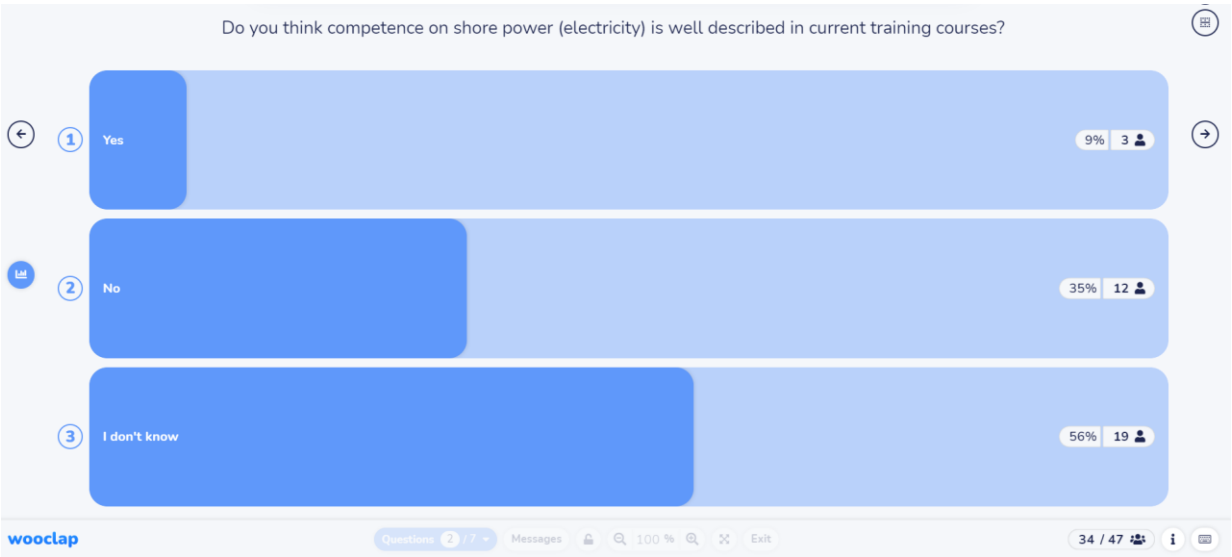

Figure 9: Do you think competence on shore power (electricity) is well described in current training courses?

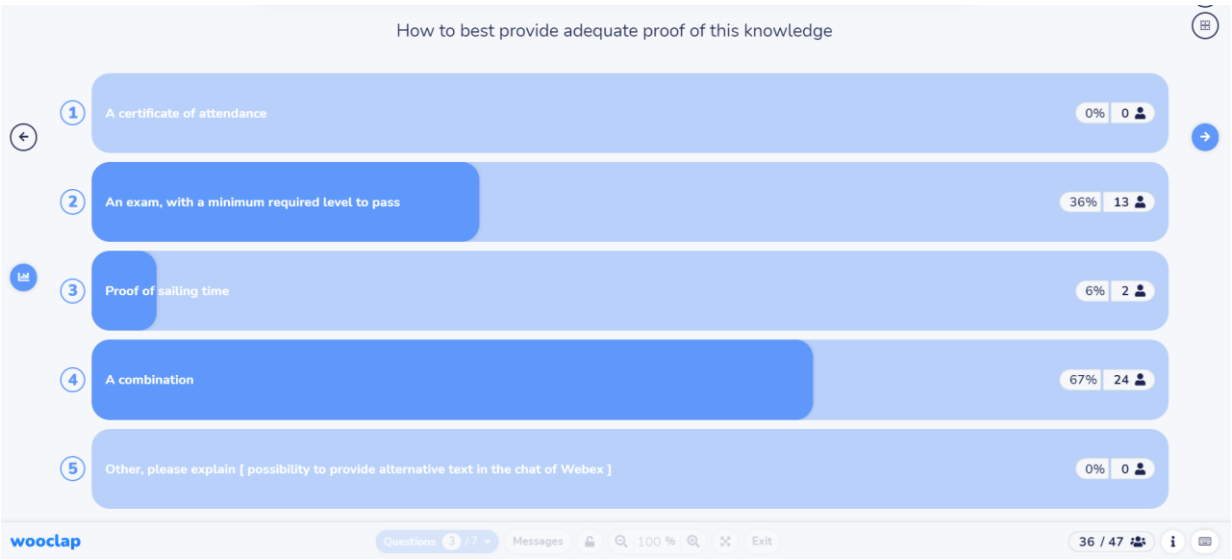

Figure 10: How to best provide adequate proof of this knowledge.

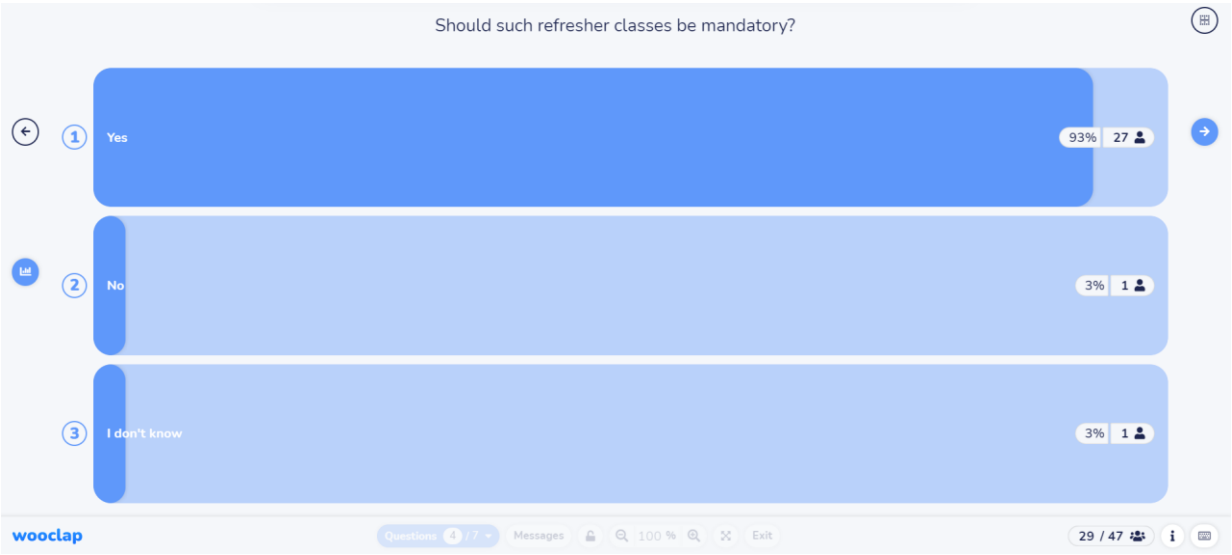

Figure 11: Should such refresher classes be mandatory?

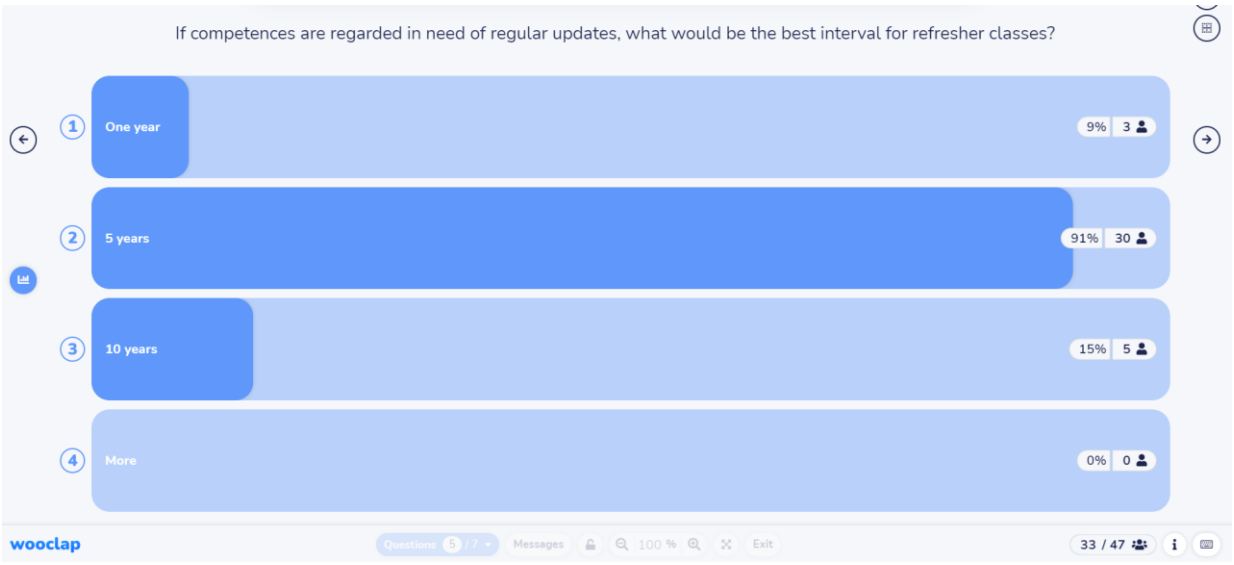

Figure 12: If competences are regarded in need of regular updates, what would be the best interval for refresher classes?

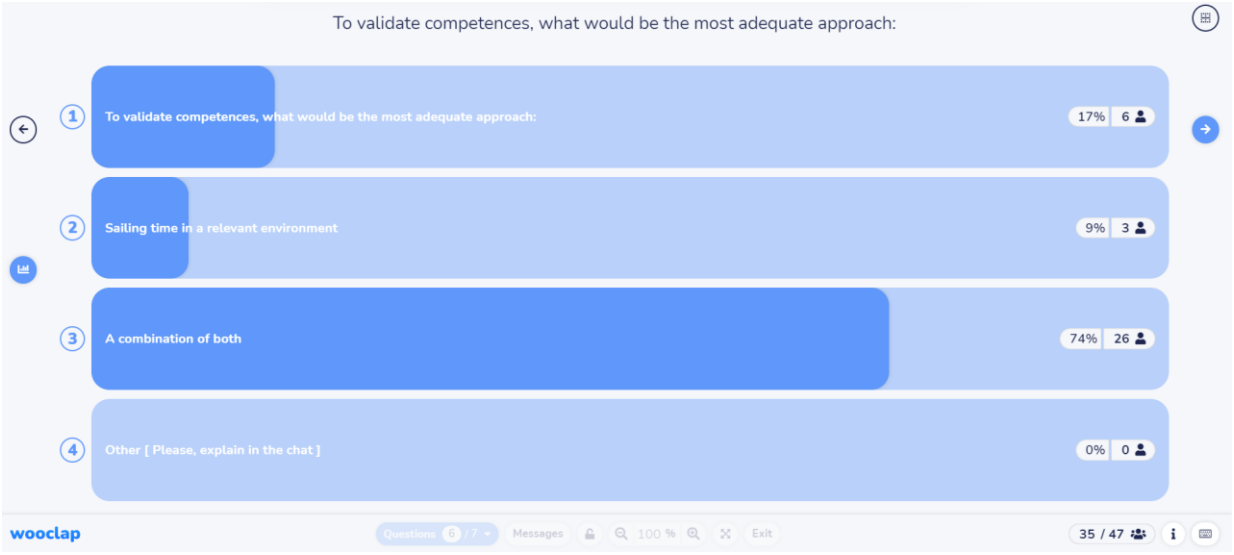

Figure 13: To validate competences, what would be the most adequate approach?[19]

[19] NB: The slide has been corrected during the meeting to underline that option 1 refers to an exam.

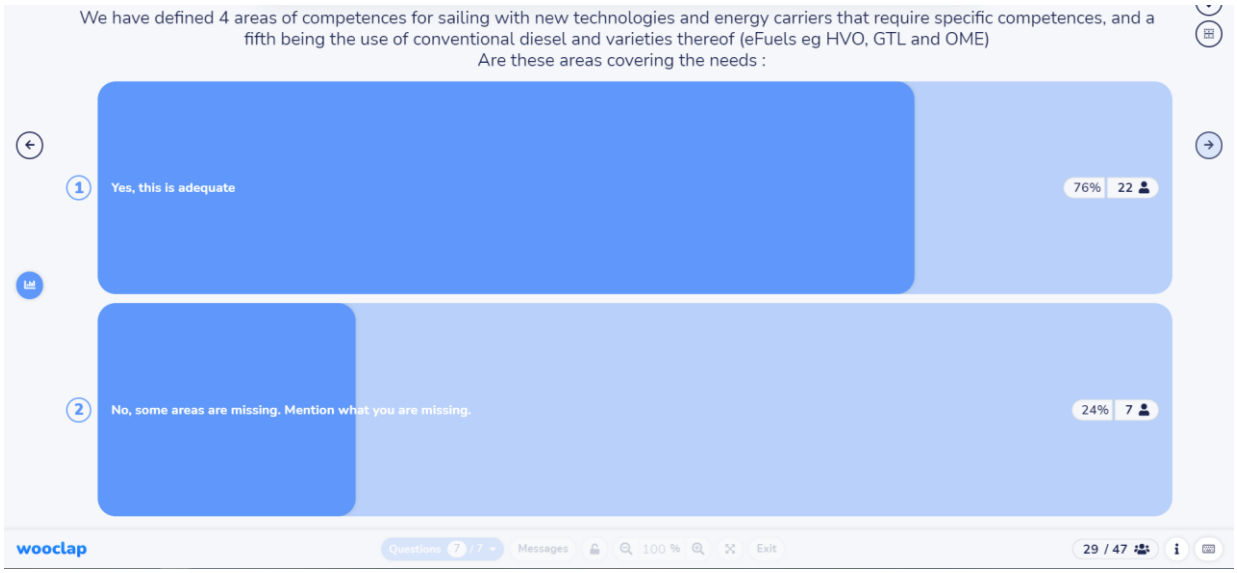

Figure 14: We have defined 4 areas of competences for sailing with new technologies and energy carriers that require specific competences, and a fifth being the use of conventional diesel and varieties thereof (eFuels e.g. HVO, GTL and OME). Are these areas covering the needs?

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