D4.2. MariTech Talent ScaleUp

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1. List of Acronyms

- Acronym not used explicitly but implied: ICT – Information and Communication Technology
- CoVE – Centre of Vocational Excellence
- CPD – Continuing Professional Development
- CEN – European Committee for Standardization
- CENELEC – European Committee for Electrotechnical Standardization
- DCN – Digital Collaboration Node
- D2.3 – Deliverable 2.3
- D3.4 – Deliverable 3.4
- D4.2 – Deliverable 4.2
- DTTI – (EIT) Deep Tech Talent Initiative
- ECTS – European Credit Transfer and Accumulation System
- EIT – European Institute of Innovation & Technology
- EQF – European Qualifications Framework
- ESCO – European Skills, Competences, Qualifications and Occupations
- ESG – European Standards and Guidelines for Quality Assurance in Higher Education
- EU – European Union
- GA – Grant Agreement
- HEI – Higher Education Institution
- ICASF – International Conference on Applied Science and Finance (as referenced)
- KIC – Knowledge Innovation Community
- MoU – Memorandum of Understanding
- NGO – Non-Governmental Organisation
- SME – Small and Medium-Sized Enterprise
- VET – Vocational Education and Training
- WP – Work Package

2. Executive Summary

Deliverable “D4.2 Maritech Talent Scaleup” introduces the conceptual framework and initial roadmap for expanding the MariTech Talent Programme beyond its pilot phase, enabling broader adoption across the European maritime sector. Building on the findings of Deliverable 3.4 and the analytical groundwork established in earlier work packages, this deliverable outlines the foundations for a scalable, transferable, and recognisable training model that supports the maritime industry’s transition towards digitalisation and decarbonisation. The maritime sector faces increasing pressure to meet EU climate objectives, integrate digital technologies, and respond to rapid structural changes driven by the twin transition. The MariTech Talent Programme addresses these needs by offering a modular, hybrid training model focused on green

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and digital skills, supported by a Digital Collaboration Node (DCN) and a regional Task Force for Maritime Twin Skills Transition. Evaluations from the pilot implementation demonstrate high satisfaction rates among participants, confirming the programme's relevance, educational quality, and practical value. Key insights—including preferences for flexible delivery, strong interest in micro-credential certification, and demand for supplementary interactive components—form the evidence base for the scale-up design.

This deliverable proposes a refined programme architecture to support transferability across regions and maritime segments, recognition through standardised micro-credential pathways, and integration into existing VET, higher education, and industry-led upskilling systems. The updated framework strengthens alignment with EU initiatives and explores future collaboration with Centres of Vocational Excellence (CoVEs) to secure institutional anchoring and ensure long-term sustainability. The next steps will involve piloting the refined framework with regional partners, expanding collaborations with maritime academies and industry actors, and validating micro-credential schemes within institutional and EU skills ecosystems. Together, these elements position the MariTech Talent Programme as a replicable and future-proof model for building maritime workforce capacity across Europe's blue economy.

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3. Introduction

3.1. Background

The maritime sector is experiencing a significant transformation influenced by digitalisation, decarbonisation, and the incorporation of twin transition technologies. This transition is creating an increasing need for new competencies that integrate maritime operations, data analytics, automation, and sustainability management. The MariTech Talent Programme was created to meet the evolving demands of the maritime industry by providing focused learning pathways that encourage innovation and facilitate the shift towards a sustainable, digitally enabled blue economy.

Based on the outcomes and feedback from the initial implementation phase (Deliverable 3.4), the programme has shown significant potential to enhance workforce readiness and strengthen regional capacity building. The evaluation results and stakeholder feedback highlight the necessity of expanding its reach and impact by enhancing integration with EU-level frameworks and aligning with established standards for training and certification.

This work builds on the Deliverable 3.4 that offers a comprehensive assessment of the initial implementation of the MariTech Talent Programme, encompassing participant feedback, the efficacy of training components, certification preferences, delivery format expectations, and willingness-to-pay insights. It also emphasises the programme's strengths—such as the relevance of its content, the benefits of hybrid learning, and high levels of engagement—as well as identifying key areas for enhancement, including the necessity for more flexible delivery methods, improved certification options, and more transparent pathways for recognition and ongoing learning.

Deliverable 4.2 directly expands upon these findings by utilising the evaluation results as the foundational evidence for developing a scalable, standardised, and broadly transferable program model. Insights from D3.4 directs the refinement of the programme framework, inform the establishment of a micro-credential-based recognition system, and influence decisions regarding delivery methods, target audiences, and collaborations with Centres of Vocational Excellence (CoVEs). In this manner, D4.2 converts the insights gained from the pilot (D3.4) into tangible mechanisms for scaling, mainstreaming, and embedding the MariTech Talent model throughout regions and maritime sectors.

The next phase will concentrate on expanding the MariTech Talent Programme, in close partnership with the Task Force for Regional Maritime Twin Skills Transition. The objective is to improve transferability among regions, guarantee acknowledgement of learning outcomes, and integrate the programme within recognised industry and educational frameworks. Besides revising and expanding the quality and variety of educational material, Maritech Talent will revise its certification schemes exploring a more standardised micro-credentials framework that will be associated with a Center of Vocational Excellence (CoVE) of one of the participating countries.

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3.2. 2.2. Purpose of the Deliverable

This document outlines the conceptual framework and roadmap for the expansion of the MariTech Talent Programme. The results of desk-based research and analysis are synthesised to identify integration mechanisms, recognition pathways, and standardisation opportunities.

3.3. 2.3 Goals

The primary goals of this deliverable are to:

- Develop **a framework for the expansion** of the MariTech Talent Programme, informed by evaluation insights and in alignment with EU-level initiatives, including the EIT Deep Tech Talent Initiative.
- Determine the **methods for transferability, recognition, and integration** of the program across various regional and sectoral contexts, while ensuring alignment with current training and qualification systems.
- **Investigate standardisation pathways** aiding in the enduring recognition and sustainability of the programme.
- Develop **a comprehensive roadmap** for the MariTech Programme Scaleup, outlining essential steps, strategic partners, and significant milestones that will facilitate its wider adoption and integration into institutional frameworks.

3.4. 2.4. Anticipated Results

This activity will result in the development of a MariTech Programme Scaleup model, which will include recommendations for the adoption of standardisation and quality assurance mechanisms as well as the integration into existing EU and industry frameworks for skills recognition and expanded implementation pathways across European maritime regions.

4. Methodology

The development of the MariTech Talent Scale-Up Model followed a structured, collaborative, and evidence-based methodology. The process was grounded in a co-creation approach that engaged project partners, Task Force members, and key maritime stakeholders throughout the design cycle. Building on the analytical work conducted in earlier work packages—particularly the regional needs assessment, occupational mapping, and skills-gap analysis—the consortium synthesised insights to define the requirements, opportunities, and constraints shaping the scale-up of the programme.

The scale-up framework was co-created through a combination of partner workshops, Task Force consultations, participatory sessions with maritime companies, and continuous feedback collected during programme design activities [1], [2]. Feedback from the regional workshops in Bulgaria, Cyprus, and Greece, input gathered during the Task Force meetings, and responses to the online skills-needs survey

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informed the refinement of transferability, recognition, and integration mechanisms [3], [4]. Programme partners jointly evaluated potential pathways for expansion, mapped alignment with EU-level standards and initiatives, and explored standardisation options in collaboration with EIT DTTI and relevant bodies. This iterative and participatory methodology ensured that the scale-up model is grounded in real industry needs, responsive to regional contexts, and designed to enable sustainable adoption across diverse maritime ecosystems.

5. Overview of Existing MariTech Talent Programme

5.1. Summary of the Maritech Talent Programme outcomes

The MariTech Talent Programme is organised around a maritime collaboration hub for the South-East region, linking stakeholders across three littoral areas bordering the Black and Mediterranean seas. This hybrid hub—established as a Moodle-based Digital Collaboration Node at maritech-node.eu—serves as an online learning platform and a forum for knowledge exchange among ports, shipbuilding and maritime technology companies, shipping enterprises, public authorities, VET and higher education providers, clusters, NGOs, as well as deep-tech startups and SMEs. Guidance is provided by the Task Force for Regional Maritime Twin Skills Transition, established through a memorandum of understanding and comprising members from industry, ports, academia, municipal innovation centres, and partners involved with the Pact for Skills and the EIT Deep Tech Talent Initiative (DTTI). The programme's communication and exploitation work stream is preparing for expansion in partnership with EIT DTTI to facilitate standardisation processes.

In terms of content, MariTech emphasises the dual transition skill sets required for the maritime workforce to effectively implement digital and environmentally sustainable innovations. Priority areas identified through desk research and a multi-country survey encompass adherence to environmental protection laws and standards, environmental protection technologies, environmental monitoring, electronics and automation, database and network management, as well as the design and maintenance of electrical and electronic systems. Foundational digital capabilities—such as computer utilisation and data analysis—are integrated with sector-specific expertise in energy and electricity. The skills mapping focuses on five key sectors—shipping; ports and terminals; shipbuilding and repair; maritime logistics and supply chains; and marine technology and equipment— This, however, was grouped and narrowed down to the following themes:

- ☐ Cybersecurity and threats
- ☐ Fuels and technology
- ☐ Sustainability & innovation (ESG, circular economy)

The delivery model is a hybrid, intrapreneurship-focused program that spans from late February until early October 2025 and integrates online education with face-to-face activities. It proceeds through a five-phase sequence: swift identification of company-specific challenges; detailed specification of these challenges and an open invitation to startups and solution providers; a month of preparatory online

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training for both companies and startups covering regulatory frameworks, digital transformation strategies, and ESG requirements; organised matchmaking through events, mentoring, and site visits; and ultimately, the deployment of solutions in conjunction with targeted workforce training within participating companies. The Digital Collaboration Node facilitates the entire cycle through role-based access, a comprehensive course catalogue, collaborative tools, and multimedia learning resources. The individuals, participating in the training programme, represented a broad cross-section of the maritime ecosystem, including professionals from ship and crew management, port infrastructure, vessel performance, engineering, ESG and sustainability, marine ecology, environmental compliance, cybersecurity, and shipping law. Participants also included entrepreneurs, researchers, and doctoral candidates engaged in maritime innovation, digitalisation, and decarbonisation, as well as professionals specialising in policy, investment, and project management within the wider maritime and blue economy sectors. This diverse mix ensured a rich exchange of expertise and perspectives relevant to the programme's focus on innovation and sustainable transformation in the maritime industry. Periodic and final assessments monitor key performance indicators such as the number of individuals trained, skills developed, operational effects, and feedback for continuous solution improvement.

The programme's attained outcomes to date encompass essential project management and quality assurance tools—namely, the Project Management Plan, Data Management Plan, and Quality Assurance Plan—along with a consistent schedule of consortium coordination. This includes the initial kick-off in Sofia (December 2023), ten monthly meetings in the first year, and a second in-person meeting held during the Posidonia exhibition in Athens (June 2024), which also enhanced stakeholder engagement and facilitated the dissemination of surveys. Under the node work package, the regional requirements analysis (submitted 26 August 2024), the Task Force MoU (5 September 2024), and the Digital Collaboration Node (24 September 2024; publicly accessible since July 2024) have been completed. Stakeholder seminars were conducted in each partner country, including a session in Greece organised by the Ministry of Maritime Affairs and Insular Policy at the Goulandris Natural History Museum (31 May 2024). The evidence basis consists of an ESCO-based mapping of 33 occupations and an online survey disseminated to 150 stakeholders between April and June 2024, with 33 validated responses contributing to a prioritised hierarchy of essential green and digital skills. Scientific dissemination has taken place, including a presentation on maritime workforce skill priorities at ICASF in December 2024.

Programme framework design and the evaluation strategy are progressing effectively, collaboratively developed during the June 2024 partners' meeting in Athens and subsequently refined with the Task Force in November 2024. A multi-phase capacity-building initiative designed to strengthen innovation, sustainability, and digital transformation skills across the maritime sector. It began with a mapping exercise to identify industry challenges and thematic priorities—cybersecurity, fuels & technologies, and sustainability & innovation—followed by the selection of three solution-providing startups. The programme then delivered a structured sequence of activities: an introductory webinar on IMO/EU regulations and maritime digitalisation, hands-on training workshops for startups and SMEs, a three-part "train-the-professionals" webinar series, and a final blended-learning phase combining online courses with on-site workshops, conference participation, and a guided port visit. Developed in alignment with EQF Levels 4–5 and grounded in systems thinking, design thinking, and applied innovation methods, the

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programme equipped participants with practical tools, sector-specific knowledge, and networking opportunities, culminating in an accredited micro-credential recognising their learning achievements. Ongoing questionnaires fed into a final evaluation report to inform the exploitation strategy and scale-up model, including pathways for recognition and standardisation.

5.2. Feedback synthesis

Participant feedback gathered via post-training questionnaires and focus group discussions affirms that the MariTech Talent Programme achieved high levels of satisfaction and fulfilled the majority of learners' requirements (Deliverable 3.4). Overall, 93.8% of respondents indicated that the content met their expectations, while 100% perceived the programme's duration and structure as suitable. The integrated format—comprising online learning, webinars, the Maritime Cyprus Conference, and on-site workshops—was consistently emphasised as a significant strength. Participants characterised the training as highly beneficial, with 43.8% classifying it as extremely valuable and 50% as valuable. The opportunity to engage with peers and professionals was likewise highly appreciated, with all participants indicating that sufficient prospects for networking and knowledge sharing were available. These findings illustrate that the programme not only achieved pertinent learning outcomes but also effectively fostered the intended reciprocal learning interaction between maritime professionals and solution providers.

Simultaneously, the feedback identified several areas where participants believed the programme could be further enhanced. Approximately 18.8% of participants indicated a preference for more interactive sessions, while 6.2% requested a more robust theoretical foundation to complement the practical components. Some respondents proposed enhancements to the scheduling, observing that certain training sessions overlapped with significant moments of the Maritime Cyprus Conference, thereby limiting opportunities for engagement with industry executives. Others suggested expanding the content—such as incorporating modules on intellectual property management or establishing a more explicit connection between theoretical frameworks and practical applications. Although the learning materials were predominantly regarded as useful (93.8%), some participants expressed a desire for additional multimedia resources and detailed step-by-step guides to facilitate independent study. Finally, several respondents expressed their willingness to participate in future scale-up phases—offering to promote the programme, mentor others, or assist with training delivery—demonstrating significant potential for ongoing community development and programme sustainability.

5.3. Identified strengths and areas for improvement (skills gaps, scalability potential)

The preliminary analysis conducted within the MariTech project (Deliverable 2.3.) identifies several key assets in the evolving landscape of maritime skills development, along with essential gaps that must be addressed to facilitate the sector's effective transition. A significant strength resides in the explicitly articulated requirement for twin transition competencies—digital and green—which are progressively acknowledged by industry stakeholders as vital for achieving EU climate and sustainability targets. The

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operational environment of the maritime sector is anticipated to experience substantial transformation, encompassing the integration of renewable energy sources, the advancement of smart-port infrastructures, and the implementation of automated systems for route optimisation and emissions monitoring. This provides a compelling justification and sector-wide preparedness for targeted capacity-building initiatives such as the MariTech Talent Programme.

However, the analysis additionally identifies significant skills deficiencies that threaten the sector's readiness. The skills hierarchy derived from the needs assessment indicates that the most significant gaps are in areas such as environmental protection compliance (48.5%), environmental protection technologies (45.5%), and environmental monitoring (39.4%). This underscores an urgent requirement to enhance workers' competencies to facilitate decarbonisation and ensure regulatory conformity. Parallel deficiencies are identified in fundamental digital competencies, encompassing electronics and automation (33.3%), database and network administration (33.3%), and the design of electrical and electronic systems (33.3%). Foundational skills—including computer proficiency (27.3%), data analysis (27.3%), and knowledge of electricity and energy systems (21.2%)—also necessitate further development. Lower-tier skills, such as managing hazardous materials or analysing technical-scientific data, indicate further deficiencies in specialised domains that will grow increasingly significant as new technologies are integrated into maritime operations.

The MariTech framework directly addresses these deficiencies, representing a fundamental strength of the program's design. It accomplishes this through a structured combination of online introductory training for maritime professionals and SMEs, targeted capacity-building initiatives for startups on effective staff upskilling (supporting the intrapreneurship model), and specialised Train-the-Professional modules in three high-priority areas: Cybersecurity and Threats, Fuel and Green Technologies, and Sustainability and Innovation (including ESG reporting and circular economy principles). This alignment guarantees that training content remains both pertinent and directly aligned with the most pressing reskilling and upskilling requirements identified through the analysis.

In terms of scalability potential, the programme exhibits a solid foundation. The modular architecture, integrated delivery approach, and implementation of the Digital Collaboration Node facilitate adaptable replication across various regions. The intrapreneurship-oriented framework, which pairs challenge proprietors with solution providers, further promotes transferability and integrates innovation capacity directly within maritime enterprises. Simultaneously, scalability will rely on the enhancement of recognition and standardisation mechanisms, guaranteeing uniform quality across regions, and addressing the lower-ranked yet still vital skills gaps that may grow more significant as the sector advances further into digitalisation and sustainability transitions.

6. Collaboration Frameworks and Partners

Cleantech Bulgaria is actively engaged with several EIT KICs, including serving as the EIT Community Officer for Bulgaria, and is a pledged participant in the EIT Deep Tech Talent Initiative (DTTI), organising training sessions in advanced technology fields. Therefore, following the possible extension of the DTTI (currently

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scheduled to operate until 2025), we will leverage the CTBG role and insights to examine opportunities for restructuring certain modules and offering targeted training courses through the DTTI Platform.

We have initially planned that a collaboration with CEN/CENELEC would be explored. However, after finalisation of the training programme and considering the scope of MariTech Talent, which is centred on the development of educational and training interventions for twin transition, it was determined that close collaboration with CEN/CENELEC would not be pursued as it would not support the aim of further scaling up of the training programme. CEN is primarily focused on technical standards related to materials, safety, processes, and services, whereas CENELEC concentrates on standards for electrotechnical and digital infrastructure.

The creation and involvement of the Task Force for Regional Maritime Twin Skills Transition in several stages of the project functioned in co-defining recognition and transferability mechanisms that are presented in the following sections. In the following years, collaboration with other stakeholders who are dominant in the maritime sector, from maritime academies – such as the HELMEPA Academy[1]), clusters, centers of vocational excellence (CoVEs), innovation hubs and academic institutions.

7. Transferability, Recognition, and Integration Mechanisms

7.1. Transferability

The MariTech Talent Programme exhibits significant transferability potential owing to its modular design, hybrid delivery methodology, and intrapreneurship-orientated approach, enabling training components to be tailored to diverse maritime environments and regional priorities. The five-phase framework—comprising challenge identification, startup engagement, preparatory training, matchmaking, and solution deployment—can be implemented across various maritime sectors, including port operations, shipbuilding, logistics, and marine technology. Furthermore, the Digital Collaboration Node (DCN) guarantees that learning resources, collaborative environments, and training instruments are accessible and customisable by institutions in additional coastal regions, facilitating scalability beyond the original three partner countries. This adaptability establishes MariTech as a benchmark capable of supporting wider skills development initiatives within the EU's blue economy and in other sectors experiencing digital and ecological transformations.

Ensuring the recognition and integration of MariTech within established skills ecosystems will enhance its influence and promote long-term sustainability. The structure of the programme is closely aligned with European frameworks such as the EIT Label for non-degree education, which facilitates standardised quality assurance, learning outcomes, and professional relevance. The module design also facilitates the development of micro-credentials, enabling participants to obtain stackable, competency-based certifications aligned with the European Qualifications Framework (EQF). This establishes a well-defined pathway for integrating the programme into existing vocational education and training (VET) frameworks, higher education programs, and industry-driven upskilling initiatives. Through partnerships with VET providers, universities, maritime academies, and industry associations, the MariTech modules can be incorporated as accredited short courses, elective units, or ongoing professional development (CPD)

[1] https://www.helmepa.gr/helmepa-academy

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programs, facilitating widespread adoption and sustainable institutional integration within the maritime sector.

7.2. Recognition

To reinforce the formal validation of learning outcomes and improve international portability, the MariTech Talent Programme will update its certification methodology by implementing a more standardised micro-credential framework. This framework will adhere to the European Guidelines on Micro-Credentials, the EQF learning outcomes framework, and the principles of transparency, stackability, and recognition of prior learning. In the subsequent phase of development, MariTech Talent will also investigate linking its micro-credentials with a recognised Centre of Vocational Excellence (CoVE) in one of the participating nations. Such alignment will facilitate the integration of the programme's certificates into nationally recognised VET pathways, promote cross-border recognition, and guarantee that the acquired competencies are validated within a comprehensive and quality-assured institutional framework. This approach will substantially enhance the programme's visibility and recognition within the European maritime and blue economy training sector.

In addition to the micro-credentials approach, another opportunity for internationally recognized validation of the skills and knowledge gained could be also considered. Starting with scaling up of the MariTech courses to VET courses, future certification of curricula, training materials and persons could be implemented based on the International Standard ISO/IEC 17024:2012 Conformity assessment - General requirements for bodies operating certification of persons.

It sets the main principles for the development and maintenance of a certification scheme for persons. Any certification organization/body operating under the ISO standard and willing to engage with MariTech could develop dedicated certification schemes for the MariTech trainings. The initiative could also come from trainees since every individual aiming to validate their skills and obtain recognized credentials, has the opportunity to request certification by a certification body. The Certification Body must first evaluate and approve the curricula and training material of a course regarding the necessary knowledge and expected learning outcomes for the requested certification.

By adhering to this international standard, certification ensures credibility, impartiality, and recognition across borders and industry contexts.

8. MariTech Programme Scaleup Model

8.1. Conceptual Design

The conceptual design of the MariTech Talent Programme Scale-Up is based on the programme's pilot framework, the insights gained from the regional requirements analysis and the establishment of the Digital Collaboration Node (WP2), and the design and delivery of the training framework (WP3). The programme structure incorporates the skills hierarchy along with essential gaps identified through Deliverable 2.3. To promote relevance and flexibility, the programme is structured into modular, themed learning segments aligned with identified skill deficiencies, such as environmental compliance, digital automation, data management, and ESG-related competencies. These modules can **be integrated,**

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modified, or extended in accordance with stakeholder requirements and regional differences, facilitating a versatile design that allows for application across diverse maritime sectors.

The scale-up model further delineates the programme's target audiences to facilitate a wider reach and a more profound impact. In addition to maritime workers and operational personnel within ports, shipping, shipbuilding, logistics, and marine technology companies, the programme will include customised pathways for entrepreneurs and SMEs, especially those providing digital and sustainable solutions applicable to the sector. As exemplified during the pilot intrapreneurship phase, this dual-target strategy improves both employee skill development and the adoption of innovative practices. Public authorities, maritime academies, and VET providers will be mapped and approached to join as associate partners to support the expansion and higher outreach of the MariTech Talent Academy. In addition, certificates issued by the MariTech Talent Programme will continue to be structured as micro-credentials, ensuring they are modular, stackable, and compatible with EU recognition frameworks, incentivizing further participants to enroll in the programme.

To enhance accessibility and scalability, the delivery modalities will be extended and formalised into a hybrid training model that incorporates:

- **Online learning** via the Moodle-based Digital Collaboration Node (maritech-node.eu), facilitating introductory modules, asynchronous learning, assessments, and cross-country peer exchange.
- **In-person sessions**, encompassing challenge-definition workshops, practical demonstrations, and hands-on training customised to meet the specific requirements of the company and its technological solutions.
- **Industry placements and practical components** that will enable maritime professionals to implement digital and green technologies directly within operational environments, while receiving guidance from solution providers and Task Force specialists.

This integrated approach aligns with established best practices in vocational innovation education and intrapreneurship frameworks, thereby supporting the European Union's focus on adaptable, perpetual learning pathways as outlined in the European Skills Agenda and the Pact for Skills. Through the incorporation of structured digital modules, experiential learning environments, and industry-led challenges, the revised conceptual framework guarantees that the MariTech Talent Programme remains comprehensive from an educational perspective and operationally aligned to the practical demands of the maritime industry as it advances through the dual transition.

8.2. Certification Mechanisms

In the survey conducted with the initial trainees of the MariTech Talent Programme (Deliverable 3.4), several questions were included to understand participants' preferences regarding certification formats, delivery methods, and acceptable cost levels for future training cycles. The results clearly indicate that flexibility in delivery—including hybrid and modular formats—and reasonable, accessible pricing are the two most important factors influencing learners' selection of a training programme. When asked about

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their willingness to pay, the majority of respondents (75.1%) indicated that they would be prepared to pay up to €300 for a high-quality training offer, reflecting a moderate but realistic valuation of professional upskilling within the maritime sector. A smaller proportion (18.8%) were unsure about the amount they would be willing to pay, suggesting either limited experience with fee-based training or the need for clearer communication on programme value and outcomes.

Regarding certification preferences, participants expressed a clear interest in micro-credentials as a recognised, portable, and stackable form of certification. Micro-credentials were viewed as more attractive and relevant than the EIT Label, particularly because they offer immediate applicability, alignment with the European Qualifications Framework (EQF), and the ability to accumulate learning achievements over time. This preference suggests that future iterations of the MariTech Programme should prioritise micro-credential pathways, while maintaining alignment with broader European quality standards, to maximise perceived value and learner uptake.

Thus, continuing the approach adopted during the first year, participants who successfully complete the MariTech Talent training will be eligible to receive an ECTS micro-credential accredited and delivered by Higher Education Institution partner [2]. These micro-credentials will be developed in line with the European framework for micro-credentials and provide a formal, academically validated means of certifying the competencies acquired through the programme. The assessment structure, based on participation and submission of a final project report, will ensure that learning outcomes in sustainability, regulatory compliance, innovation, and digital transformation will be rigorously demonstrated. By integrating an accredited micro-credential into the programme, the MariTech Talent framework supports EU priorities on lifelong learning, strengthens professional mobility, and enhances the recognition of skills critical to the maritime sector's green and digital transitions.

8.3. Scaleup Implementation Plan

The implementation plan of the scaleup will be comprised of 3 phases (see Figure 1). The first phase will aim at the finalization of the programme framework, the pilot of scale-up activities, and the development of mechanisms for recognition and standardisation. First-year actions will include:

1. **Enhancement of the Programme Structure and Modules**. Maritech Talent Partners will revise the consolidated training program incorporating feedback from the Task Force and initial trainees, such as including more interactive sessions, adding step-by-step guides or expanding the content of the Modules covering topics, such as "intellectual property management" or making explicit connections between theory and practice.
2. **Revision of the recognition schemes.** Taking into account the feedback from the first round of trainings, that shows that participants seem to prefer micro-credential certificates, the recognition scheme will be revised. In addition, the partners will explore the development of micro-credential insignia in collaboration with associate partners.
3. **Digital Collaboration Node (DCN) Expansion**. The revised learning resources will be uploaded on the platform as well as the revised framework for micro-credentials. The DCN will be also

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updated and further enhanced to attract new users and keep the existing users engaged, by introducing badges and other competency frameworks, leaderboards for friendly competition and more interactive material to the courses.

4. **Targeted Regional Implementations.** During the first year of the scaleup phase, we will initiate pilot programs with two to three maritime companies across Greece, Cyprus, and Bulgaria, along with the process of connecting businesses and solution providers with industry partners in challenge-based environments.
5. **Network Development**. Collaborate with working groups, such as EIT Label or EQAVET (European Quality Assurance in Vocational Education and Training), to investigate applicable standards (e.g., skills frameworks, digital competences) and identify opportunities for informal coordination or the development of future formal standards.

In the following year (12–24 Months) the objective will be to streamline the operational framework of the program and establish readiness for expansion across multiple countries. Specific milestones will include:

1. **Complete Programme Deployment and Continuous Improvement**. Deliver multiple iterations of the hybrid program (online, in-person, industry placements) and incorporate continuous feedback from participants, trainers, and industry collaborators to refine and adapt the programme content.
2. **Enhancing Collaborations for Expansion**. Expand collaboration to additional maritime companies, ports, shipyards, and VET institutions in neighboring regions and establish formal agreements with maritime academies to incorporate MariTech modules as elective or Continuing Professional Development components.

Finally, after the second year, the Maritech Talent Programme will seek to scale-up its activities in Europe ensuring, so sustainability. Specific actions will include:

1. **Regional and Cross-Sector Expansion**. Replicate the MariTech Talent model in additional coastal regions (Mediterranean, Black Sea, Baltic, Atlantic) and explore transferability to related blue economy sectors: offshore renewables, maritime tourism, aquaculture.
2. **Institutional Integration**. Embed the programme into national VET and lifelong learning systems and facilitate adoption by maritime academies as part of accredited non-degree professional offerings.
3. **Sustainable Governance and Business Model.** Transition to a long-term governance model (hub-and-spoke cluster, consortium-led entity, or public–private partnership) and reconsider revenue streams (fees, memberships, industry sponsorships, EU instruments such as EIT, Erasmus+).
4. **Impact Tracking and Continuous Innovation**. Monitor career progression, company-level innovation uptake, and environmental performance improvements and continuously update modules based on new technologies (AI, automation, green fuels) and upcoming EU regulations.

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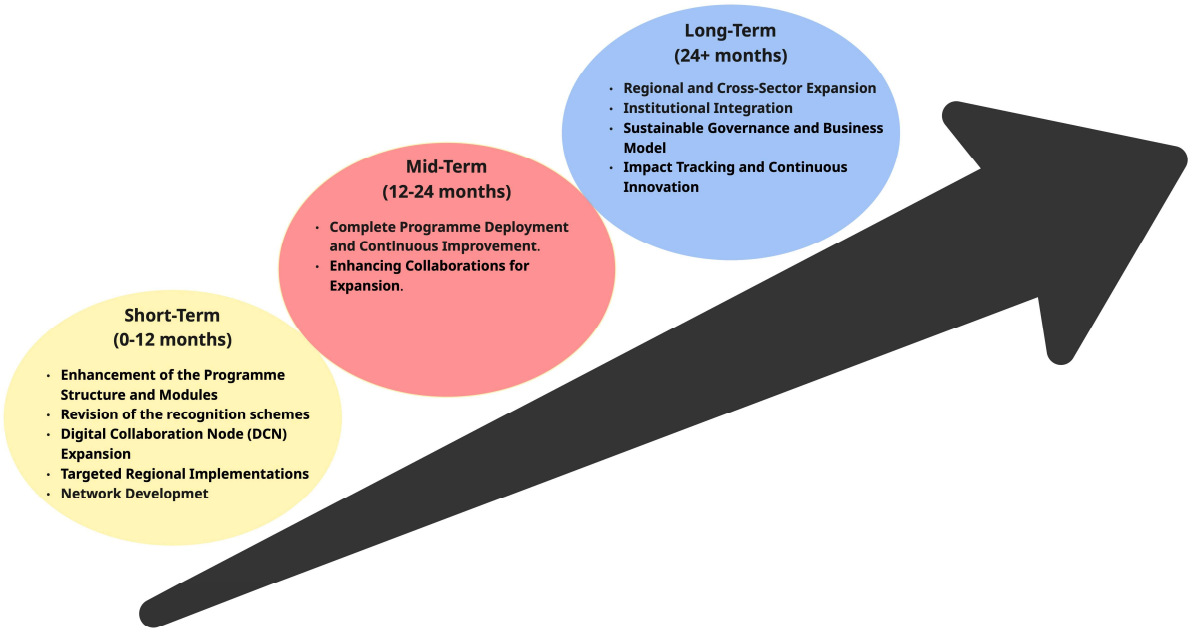

Figure 1 - Maritech Talent Programme Scale-Up Timeline

8.4. Quality assurance and continuous improvement

Quality assurance (QA) represents a fundamental element of the MariTech Talent Programme and is integrated throughout all phases of programme development, implementation, assessment, and evaluation. The programme implements a comprehensive quality assurance framework aligned with European standards for higher education, vocational training, and micro-credentials—specifically the European Standards and Guidelines for Quality Assurance (ESG) and the European Approach to Micro-Credentials. This guarantees that the training modules, learning objectives, assessment methods, and certification pathways uphold consistency, transparency, and reliability throughout all participating regions.

The QA framework incorporates both internal procedures and external validation methods. Internally, partners conduct systematic evaluations of training materials, peer reviews of module content, and ongoing monitoring of learner progress through formative assessments and instructor feedback mechanisms. The participation of the Task Force in evaluating content relevance, industry congruence, and methodological rigour further enhances internal governance. Additionally, the issuance of a 2 ECTS micro-credential by the Cyprus University of Technology offers formal academic recognition, guaranteeing that learning outcomes, workload, and assessments comply with institutional standards and European quality benchmarks.

Ongoing enhancement is propelled by methodical assessment procedures integrated into each training cycle. Participant surveys, focus group discussions, and expert observations are employed to document

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learner experiences, identify deficiencies, and emphasise opportunities for improvement. These insights inform ongoing refinements of the curriculum, instructional materials, delivery approaches, and assessment instruments. Proposed enhancements—such as broadening theoretical elements, enhancing interactivity, and modifying scheduling—are integrated into the scale-up model to guarantee that the program remains attuned to stakeholder requirements and the changing demands of the industry.

Finally, the programme's dedication to continuous enhancement is underpinned by mechanisms for sustained monitoring and benchmarking. Annual evaluations, alignment with emerging European standards and active engagement with maritime industry stakeholders ensure that the training remains pertinent amidst the swiftly evolving landscape of the green and digital transitions. Through this exhaustive quality assurance and ongoing enhancement framework, the MariTech Talent Programme ensures educational rigour while preserving flexibility and scalability for future expansion throughout Europe.

9. Conclusions & Next Steps

The scale-up analysis verifies that the maritime sector encounters substantial and pressing skills shortages concerning the EU twin transition, particularly in the areas of environmental compliance, digital automation, data management, and sustainability expertise. The delineation of 33 ESCO occupations across five key maritime sectors underscores a noticeable disparity between evolving operational demands and the existing skill set of the workforce. The MariTech Talent Programme explicitly targets these gaps by implementing a modular, hybrid intrapreneurship model that combines online foundational education, in-person practical training, and industry-driven challenge-solving. The scale-up framework advocates a systematic expansion of these modules, supported by a versatile Digital Collaboration Node, a dedicated Task Force for expert consultation, and avenues for recognition through micro-credentials, EQF alignment, and prospective eligibility for the EIT Label. Together, these components constitute a coherent and flexible framework for providing high-quality, demand-driven upskilling and reskilling across diverse maritime settings.

The subsequent phase will concentrate on completing and verifying the scale-up model via targeted pilot initiatives. This encompasses conducting challenge-definition seminars with participating companies, initiating the two-phase call for digital solution providers, and delivering the initial iteration of the expanded hybrid training program. Data and feedback will be systematically gathered through pre- and post-assessment instruments, stakeholder surveys, and mentoring reports to evaluate the effectiveness of the revised modules and delivery methods. The prototypes will additionally function to validate micro-credential frameworks, assess the scalability and resilience of the Digital Collaboration Node, and enhance the processes of matchmaking and industry placement. Findings from the validation phase will directly inform the refinement of the scale-up model and the development of recognition pathways with VET institutions, maritime academies, and the EIT Deep Tech Talent Initiative.

Ongoing stakeholder engagement is vital for the long-term viability and expansion of the MariTech Talent Programme. It is advised that the consortium sustains consistent communication via the Digital Collaboration Node, conducts quarterly Task Force meetings, and organises periodic cross-country

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seminars to promote shared ownership and ensure ongoing alignment with industry requirements. Engagement should also be expanded to encompass additional maritime companies, startups, ports, and sectoral organisations, thereby establishing a broader ecosystem of adopters and contributors. For tracking progress, a systematic evaluation framework should be established, integrating quantitative indicators—such as the number of trained personnel, skill development metrics, and solution deployment—with qualitative insights from industry partners, trainers, and participants. Ongoing monitoring should guide annual revisions to the programme content, guaranteeing its continued alignment with emerging technologies, regulatory developments, and industry priorities within the maritime twin transition.

10.References

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