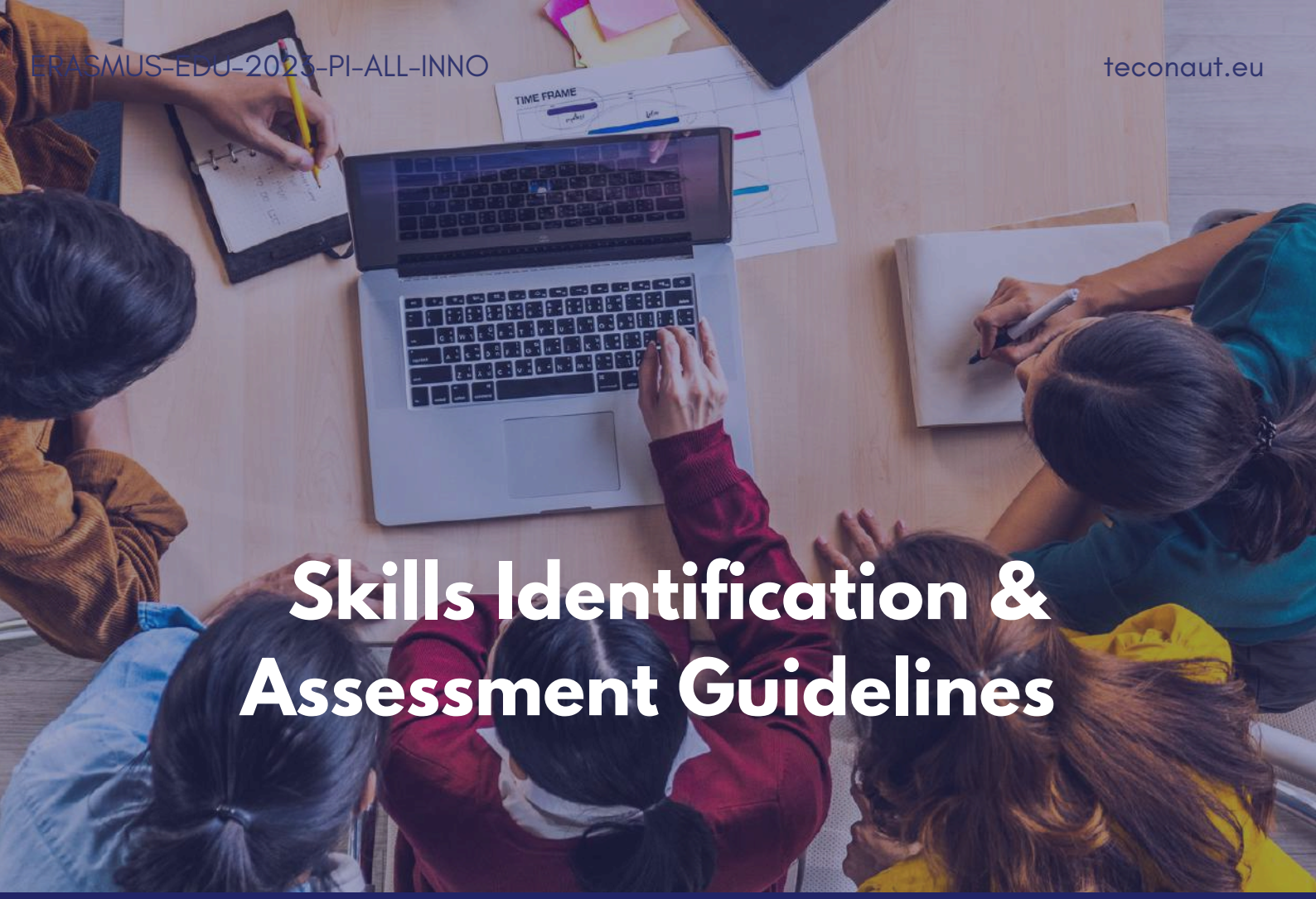

Skills Identification & Assessment Guidelines

TECONAUT

USING DEEP TECH TO FACILITATE THE ECO TRANSITION IN THE NAUTICAL SECTOR

Co-funded by the European Union

Executive Summary

The TEcoNaut project, an Erasmus+ initiative, conducted an extensive study to evaluate EU-funded projects and initiatives on green and/blue skills in the boatbuilding sectors across Europe. The research aimed to identify skill gaps, competencies needed for the transition to sustainable practices and green technologies by researching and analyzing market demands and emerging sustainability trends.

Initially, the project partners from four European countries assessed 23 European projects and initiatives using different methodologies and assessment guidelines.

Key findings revealed significant gaps in the integration of digital tools and software, techniques and functionality of traditional shipbuilding, safety protocols and regulatory compliance and soft and interpersonal skills, among many others.

The study underscores the urgent need to introduce more holistic approaches in the different areas and disciplines, promotion of cross-sector competencies in deep-tech materials, addressing resistance to adopting sustainable practices, and collaborating closely with industry stakeholders, while also enhance curricula, introduce modules on traditional and new materials.

The study also identified several strengths, weaknesses, opportunities and threats of these initiatives and projected guidelines and recommendations for the TECoNaut training courses and materials, so it can become a model for sustainable, industry-aligned training that supports Europe's nautical sector in its green transition.

Disclaimer

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Index

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Introduction

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Introduction

This report presents a comprehensive analysis of European Union-funded projects focused on developing green and blue skills within the shipbuilding sector. The TEcoNaut project, supported by the Erasmus+ program, conducts this evaluation as a crucial step in identifying skills gaps and training needs essential for transitioning towards sustainable practices and adopting green technologies in the maritime field.

Based on a structured methodology that includes a comparative analysis of **23 previous European projects**, this report examines various approaches and practices, ranging from the identification of digital and sustainable skills to the development of technical competencies and methodologies for implementing disruptive technologies. Key areas highlighted include initiatives that integrate **circular economy principles, energy efficiency, and training in digital skills to meet the demands of an increasingly green and technologically advanced economy**.

Additionally, the report includes a **SWOT analysis** (Strengths, Weaknesses, Opportunities, Threats) of these projects to identify effective strategies and areas for improvement that will guide the development of TEcoNaut's training objectives. This analysis serves as a strategic tool to ensure that TEcoNaut's training programs align with the current and future needs of the maritime industry while promoting intersectoral collaboration and sustainable growth throughout Europe.

Ultimately, this report underscores how innovative European projects, including those analyzed within the TEcoNaut framework, are driving transformative changes in the skills required for the nautical industry and related sectors. Through a multifaceted approach that integrates digital, green, and technical skills, these projects contribute to a transition towards a more sustainable and circular economy, in line with the objectives of the **European Green Deal**. By identifying skills gaps and developing training strategies that address the industry's current and future needs, TEcoNaut positions itself as a key facilitator in the ecological transition of the maritime sector. This effort not only provides innovative and relevant vocational training but also reinforces intersectoral collaboration across Europe, laying the foundations for sustainable, resilient growth aligned with global environmental priorities.

Methodology

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Methodology of the report

The methodology of this report is built upon a comprehensive and systematic assessment of prior EU initiatives aimed at transforming Europe's maritime and construction industries. It emphasizes advancing the blue economy and sustainability through innovations in vocational training, digitalization, and environmental strategies.

To achieve this, TEcoNaut members adopted a methodology that facilitated the collection of essential data on project type, target audience, and region. This approach also provided insights into each project's focus and context, the specific competencies emphasized, and ultimately, how each project identified and addressed these competencies.

Figure 1 - Methodology for Evaluating Previous EU Initiatives

1) Selection of previous EU projects by each partner, related to the identification and development of green skills in the maritime sector.

2) **Guideline Selection**. TECoNaut partners convened to establish the key points and guidelines that would form the basis for project evaluation.

3) **Data collection based on a questionnaire**: Based on the guidelines established in the previous section, a questionnaire was developed and distributed to collaborating partners, including Sea Teach, SOIB, Gdansk Tech, NTUA, and Golcuk. The questionnaire gathered detailed information on each project, covering specific areas such as project type, target industries, target groups, geographical region, skills types, and methods for identifying these competencies, among others. This approach enables a structured comparison of the initiatives.

4) **Data Analysis:**

- **Classify and assess fundamental and general information about the project,** including: Industry, Target levels/groups, Regions. Additionally, identify other relevant aspects that could provide valuable insights for TEcoNaut, such as: Virtual/remote capabilities and Dissemination forms.

- **Methodological evaluation**: The report reviews the methodologies used in the evaluated projects. This includes assessing their research methods, such as desk research (official reports, statistics, scientific studies), data collection techniques (quantitative or qualitative), and whether pilot tests or experimentation were included.

- **Analysis of skills: approach, typology and identification method.** The report specifically examines the skills identified in previous projects, with particular attention to the detection of **green skills** and whether these competencies introduced new definitions or aligned with EU guidelines. Finally, the report emphasizes the methods used by these projects to identify relevant skills.

- **SWOT (Strengths, Weaknesses, Opportunities, Threats)** analysis was conducted for each initiative. This analysis helps to identify potential gaps or areas what the projects did not fully succeed and assesses how the TECoNaut project can address these shortcomings.

Key words of the assessment

Green Skills

The list of skills from the "Eco-Boat building Guide and Directory" (to be published) was used and is directly linked to another stage of the project that involves conducting a deep "Skills gaps" identification. The results will be connected to ESCO and the new EU Green Taxonomy. ESCO being the multilingual classification of European Skills, Competences, and Occupations relevant for the EU labour market and education and training, which by the end of this project will be able to include a new set of green skills from the boating building sector.

Blue Economy

An economic sector focused on the sustainable use of ocean, sea, and coastal resources, including industries such as fishing, coastal tourism, renewable marine energy, and marine conservation, promoting marine ecosystem protection and economic growth.

European Green Deal

An EU initiative aimed at transforming Europe into the first climate-neutral continent by 2050. It focuses on reducing greenhouse gas emissions, promoting resource[1] efficiency, fostering a circular economy, and protecting biodiversity, while ensuring economic growth and social fairness in the transition to a sustainable, low-carbon economy.

Industry 4.0

The fourth industrial revolution, marked by the integration of advanced technologies like IoT, automation, and AI into manufacturing and industry, transforming production and operational processes toward greater efficiency and digitalization.

[1] https://www.eitdeeptechtalent.eu/wp-content/uploads/gb/2023/02/deeptech-definitions.pdf

Results

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Results by Industry

Having left this question opened to partners interpretation and in order to analyse and compare the 23 assessment templates that were completed, standardisation of the resulted data related to "industry" was necessary to organize the information and guarantee that a structured report with accurate conclusions could be reached.

The standardization process involved categorizing the data into Standard Industrial activities as outlined in Figure 1.

The classification of the International Standard Industrial Classification of all economic activities (ISIC), as the international reference classification of productive activities and an important tool for comparing statistical data, was taken as the main reference point.

Most of the initiatives assessed included for the question "Q3. What is the industry, maritime transport, nautical, shipping, shipbuilding, deep tech, etc" more than one category.

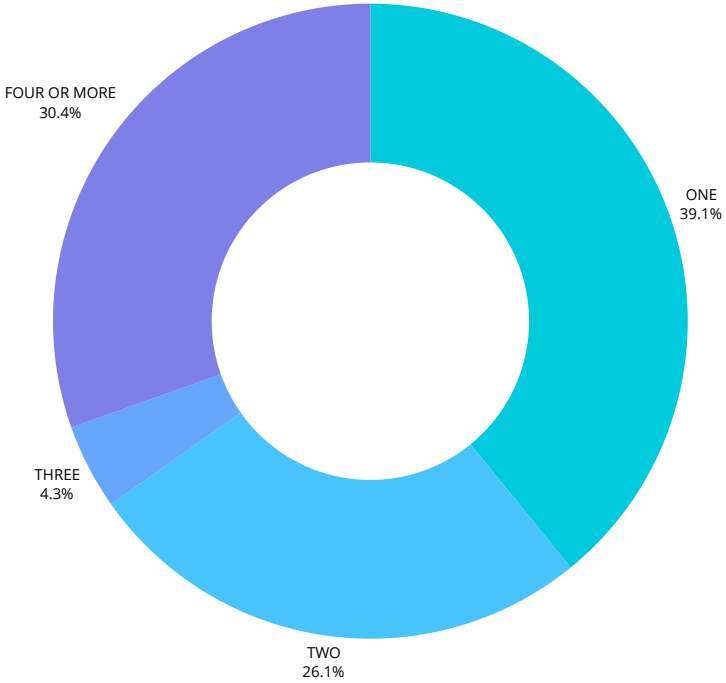


Figure 1: Results by number of industries included in the initiative.

The categorisation was performed by grouping the answers related to Question 3: Industry behind the project into different sections included in the International Standard Industrial Classification of all economic activities, being able to identify and cluster 11 different sections, and 14 specific divisions.

Results by Industry

Table 1: Results by number of industries included in the initiative.

Q3. What is the industry?				
Categories considered in the report adapted to the International Standard Industrial Classification of all economic activities (ISIC)				
Section	Division	Description	Answers	
Section A	Division 03	Fishing and aquaculture	Aquaculture	2
Section C	Division 30	Manufacture of other transport equipment	ShipbuildingShipyardMaritime sector/ship machineryMaritime industryRecreational boating	13
	Division 33	Repair and installation of machinery and equipment	Batteries	1
Section D	Division 35	Electric power generation, transmission and distribution	Offshore structures – wind energy industryRenewable energ	2
Section E	Division 38	Waste collection, treatment and disposal activities; materials recovery	Maritime waste management	1
Section F	Division 41	Construction	Construction	1
Section H	Division 50	Water transport	Maritime transportShipping	14
	Division 52	Warehousing and support activities	Ports	1
Section M	Division 72	Scientific research and development	Deep TechMarine Biotechnology	4
	Division 74	Other professional, scientific and technical activities	Maritime technologyGreen innovation	2
Section O	Division 84	Defence activities	Defence	1
Section P	Division 85	Technical and vocational secondary education, Higher education and other education	VETMaritime Education	2
Section R	Division 93	Sports activities and amusement and recreation activities	Nautical tourismCruise Tourism	3
Section S	Division 94	Activities of environmental, conservation and wildlife organizations	Environmental protectionMarine conservation	2
*Other			Blue economy	1

The results show a **wide variation in the types of industries addressed**. However, two activities stand out as predominant: the manufacture of other transport equipment (which includes shipbuilding) and water transport (which encompasses shipping and maritime transport).

The participant partners were unable to assess only related initiatives and had to expand their initial focus to include other areas, which were considered relevant and useful to TEcoNaut.

If we consider only those closest to the ones related to TEcoNaut, we find “the manufacture of other transport equipment” representing 26% from the total of answers, “Technical and vocational secondary education, Higher education and other education” representing only 4% and “Scientific research and development” representing 12%.

Results by Industry

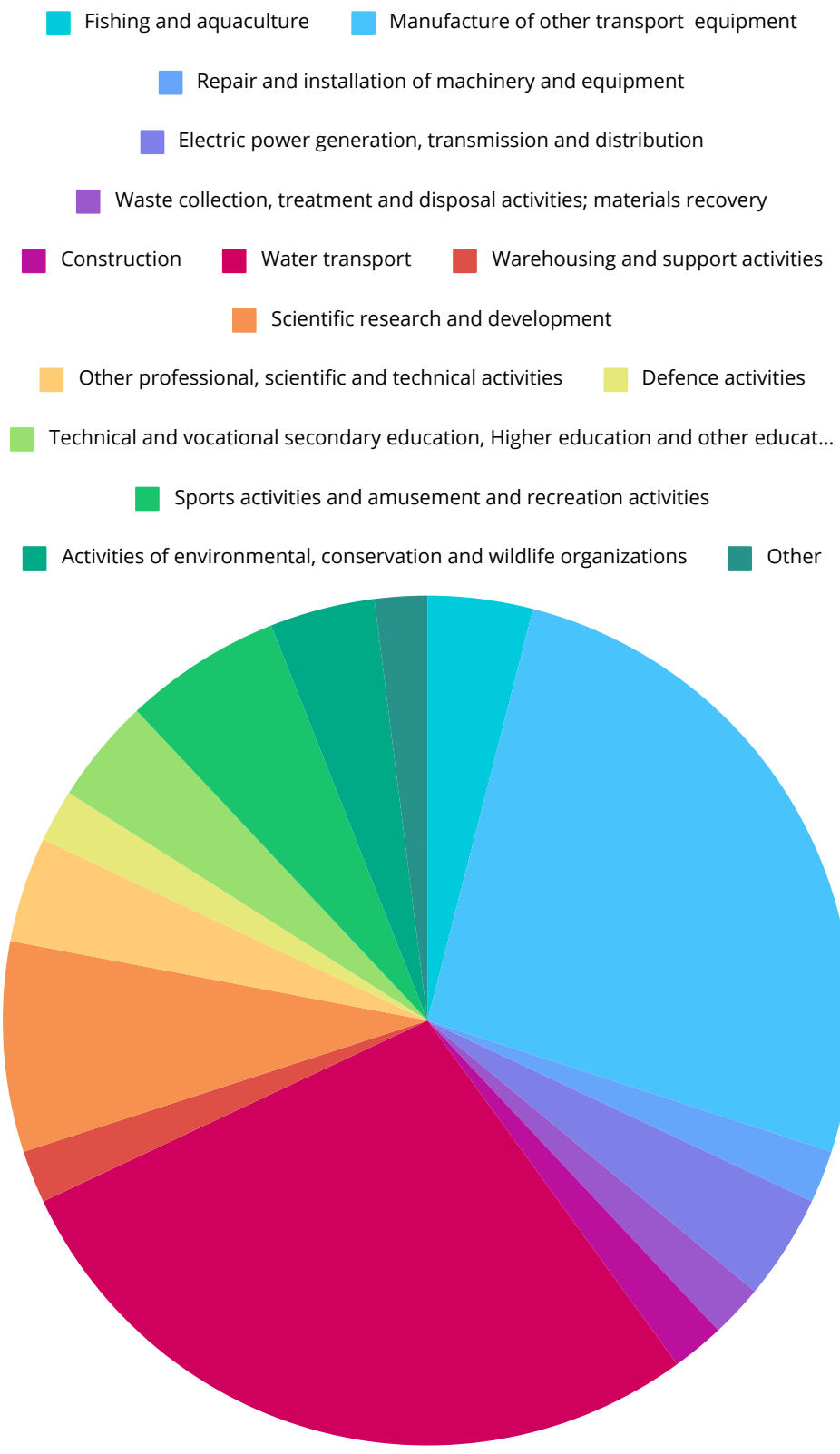


*Figure 2: Types of Industries in Previous EU Projects**

Results by Level/Target groups

Regarding the target group addressed by each assessed EU initiative table X summarizes the main answers to "Q4. Levels/target groups. What is the target group? the industry, VET education, HE..."

CATEGORY	ANSWER	NUMBER OF ANSWER
VET EDUCATION	STUDENTS	10
	PROVIDERS	
	PROFESSORS	
	MARITIME ACADEMIES	
HE		7
STUDENTS (in general)		3
TEACHERS AND TRAINERS		1
INDUSTRY	SHIPPING / TRANSPORT	20
	SHIPBUILDING / SHIPYARD	
	CONSTRUCTION	
	DEEP TECH	
PROFESSIONALS	INDUSTRY PROFESSIONALS	10
	MARITIME TRANSPORT PROFESSIONALS	
	YOUNG PROFESSIONALS, OR WORKERS SEEKING SPECIFIC SKILLS	
	WORKERS AND PROFESSIONALS IN THE SHIPBUILDING INDUSTRY	
	PORT PERSONNEL	
	ADULT PROFESSIONAL EXPERTS IN HUMAN RESOURCES	
POLICY MAKERS / GOVERNMENTS		6
ASSOCIATIONS AND NETWORKS		1
STAKEHOLDERS		4
SCIENCE		1
OTHERS*	Water sports clubs and users	8
	Maritime attorneys	
	Surveyors	
	Inspectors	
	Analysts	
	Heritage researchers	
	Sector and employer Representatives	
	Regional innovation agencies	

Table 2. Distribution of the target groups

The obtained data was classified into 11 categories to facilitate analysis and identify key groups.
From a total of 23 completed questionnaires, more than half (16) target the industry sector and a little less than half include education.

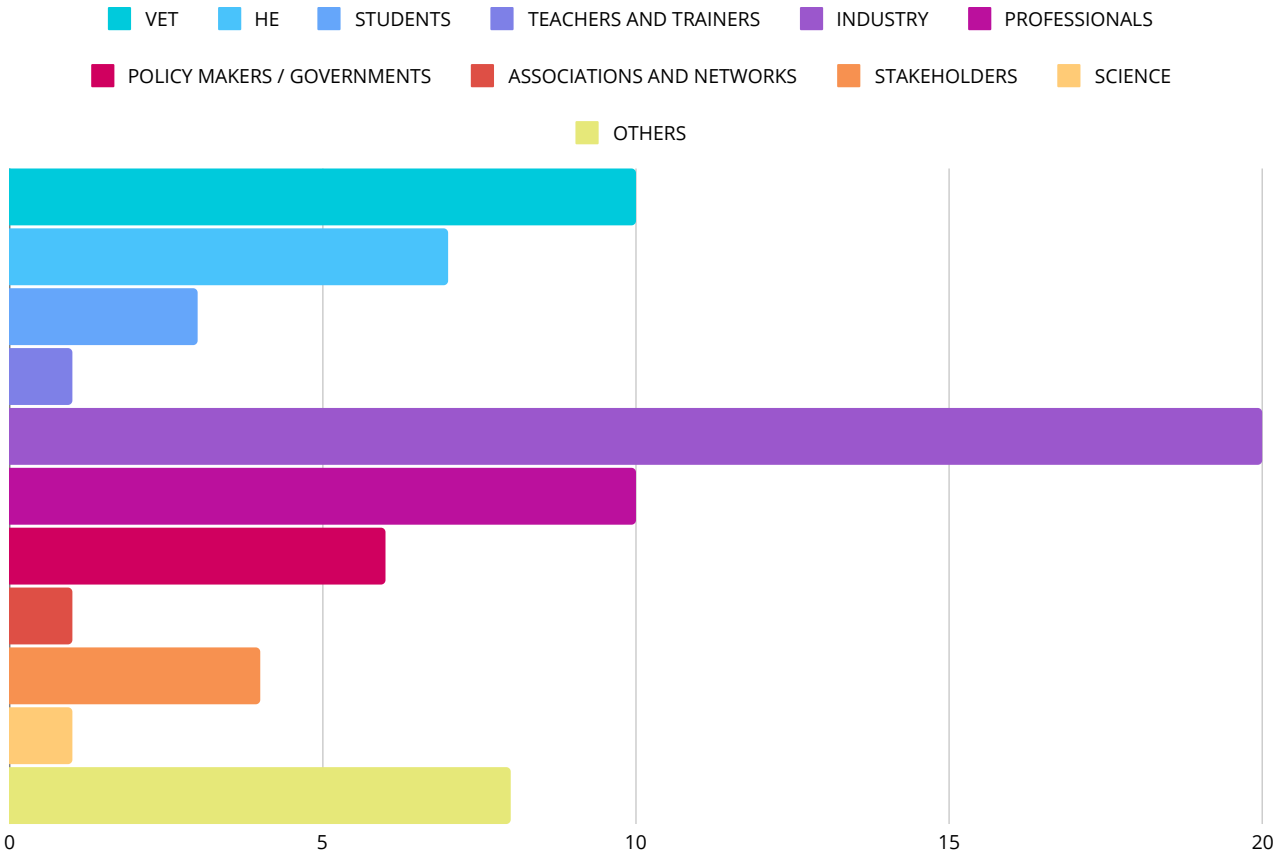


Figure 3: Results target group

As the answers were open to more than one answer, and some of the assessed projects include more than one target group, we find that on the whole, the initiatives mostly addressed simultaneously were industry, Vocational education and training and professionals.

Results by Region

The graphs and figures below provide a detailed analysis and commentary on the regional distributions of the analysed project consortia and activities within Europe and also the integration of virtual reality and remote learning methodologies in various educational curricula included in the 23 initiatives, based on the answers given to the question.

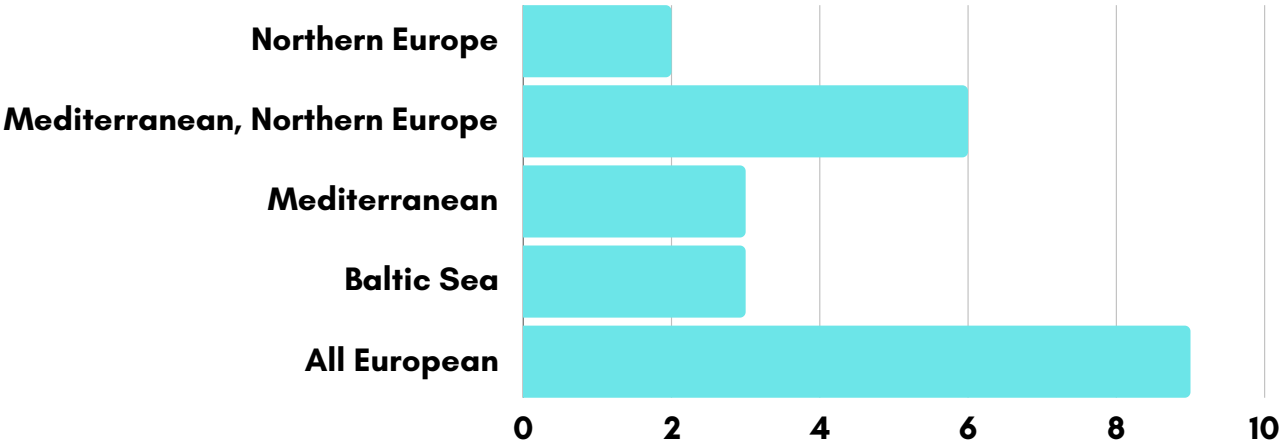


Figure 4: Regional distribution of projects, according to question 5 of the questionnaire.

Within the scope of the designated regions, 23 initiatives have been analyzed. As a result of our analysis and according to the distribution, the regions were classified as follows: All Europe: 9; Mediterranean and Northern Europe: 6; Mediterranean, including the Black Sea: 3; Baltic Sea: 3; Northern Europe: 2.

The initiatives distributed by region are as follows:

- Northern Europe, 2: USWE, Digiwind.
- Mediterranean and Northern Europe, 6: Mates, Skill Sea, LeaderSHIP, GreenoVET, BlueVET, and Environaut.
- Mediterranean, 3: Blue Ports, Green Diving, and Mentor.
- Baltic Sea, 3: Ahod, Ecological Ferry Design for the Waters of Gdansk, and Green Small Craft.
- All Europe, 9: UMTMS, A Pan-European Network, Zero Waste, Next Blue Generation, Construction, Skill Sea, Ahod, EBI LCA Project - Blue Boat Horizon, and Green.

Results by Virtual/ Remote learning

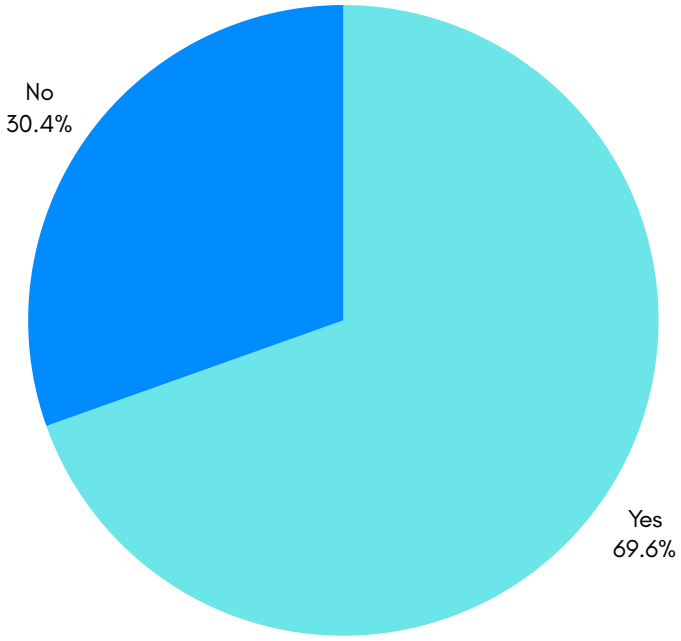


Figure 5: Presence of Virtual/Remote Learning according to the question 13. Do these project include virtual reality/remote learning in curricula?

To the Question "Q13. Do these projects include virtual reality/remote learning in curricula?", Out of 22 initiatives 16 initiatives which is (72.7%) answered YES and they are, Mates, UMTMS, BlueVET, Green Diving, USWE, Digiwind, AHOD, Green Small Craft, A pan Eropean Network Ocean Tribology, LEADERSIP, GREENOVET, Next Blue Generation, CONSTRUCTION BLUE PRINT , Blue Ports, Environaut, Mentor where as 7 of the initiatives which is (27.3%) answered NO and they are Skill Sea, Digi Flodoc, EBI LCA Project - Blue Boat Horizon, Design Of Ecological Water Ferry Fort He Waters Of Gdansk , Zero Waste Ports, GREEN, CIRCLES OF LIFE.

Results by Methodology

In response to rapid technological advances, environmental imperatives, and evolving labor demands, numerous educational and industry-driven projects have emerged to bridge skill gaps, promote sustainability, and foster innovation across key sectors. This report details the methodologies used by **23 diverse projects focused on maritime, construction, renewable energy, and related industries, each designed to address specific demands within its field**.

This section provides a comparative overview of the diverse methodologies applied across these projects, emphasizing how each structured approach contributes to building specialized skills that meet the evolving demands of various industries, from maritime to construction and renewable energy. The analysis captures how targeted skills development, such as the integration of digital, green, and practical competencies, supports not only immediate workforce needs but also broader sustainable growth objectives. This alignment is especially relevant as these sectors adapt to rapid technological advances and environmental priorities.

By showcasing a range of projects that address both regional and industry-specific challenges, this section highlights the strategic importance of cross-disciplinary methods in education and training. For instance, projects focusing on Industry 4.0 technologies and digital twin systems in shipbuilding or circular economy practices in the construction sector illustrate how such approaches can drive sectoral innovation. Moreover, projects that integrate **life cycle analysis (LCA) methods or emphasize green skills within curricula** demonstrate a commitment to fostering resilience and environmental responsibility within the workforce.

Below, various tables are presented detailing the analyzed projects and the specific methodologies used for their implementation.

Results by Methodology

Table 3: Methodology used in the EU projects

Project	Category	Main focus	Key methods
MATES	Skills Development and Training	Addressing skills shortages in the maritime industry with a focus on digital and green skills.	Desktop research, surveys, interviews, pilot studies, curriculum development.
SeaSkills	Skills Development and Training	Mapping workforce challenges and addressing skills gaps in maritime sectors, focusing on digitalization and sustainability.	Desktop research, surveys, interviews, pilot testing of educational modules.
UMTMS	Skills Development and Training	Simulation-based vocational training for maritime machinery systems.	Desktop research, simulation-based training programs.
Green Diving	Skills Development and Training	Green skills training for maritime professionals and VET schools.	Desktop research, interviews, pilot testing of green skills courses.
USWE	Skills Development and Training	Upskilling the shipbuilding workforce with a focus on Industry 4.0 and green technologies.	Surveys, data collection, curriculum development, forecasting of future skills.
DigiWIND	Digitalization and Automation	Addressing skills gaps in the wind energy sector through digitalization and new technologies.	Desktop research, surveys, curriculum development, pilot testing

Results by Methodology

Table 4: Methodology used in the EU projects

Project	Category	Main focus	Key methods
AHOD	Skills Development and Training	Preservation of shipwright techniques and e-learning content for adult learners in woodworking-related industries.	Desktop research, data collection, e-learning development, mentorship programs.
DigiFloDock	Digitalization and Automation	Enhancing the safety and efficiency of floating docks through digital twin systems and numerical simulations	Desktop research, sensor monitoring, expert consultations, scale model testing.
Design of an Ecological Water Ferry	Sustainability and Green Technologies	Developing an eco-friendly water ferry with a focus on photovoltaic and electric motor technologies.	Desktop research, CFD simulations, model testing, interviews.
Green Small Craft	Sustainability and Green Technologies	Adapting digital and automation technologies for small high-speed crafts, focusing on energy efficiency and safety.	Desktop research, stakeholder engagement, qualitative analysis of past projects.
Pan-European Network of Ocean Tribology	Specialized Maritime Systems and Research	Addressing tribological challenges (friction, wear, lubrication) in marine environments, improving sustainable and energy-efficient technologies.	Desktop research, simulations, expert consultations, test environments for real-world conditions.

Results by Methodology

Table 5: Methodology used in the EU projects

Project	Category	Main focus	Key methods
ZeroWastePorts	Sustainability and Green Technologies	Waste management systems for ports, focusing on the development of waste collection vessels (WCVs) and optimizing their energy efficiency and operational performance.	Desktop research, simulations, cost analysis, model testing.
GREEN	Sustainability and Green Technologies	Developing green skills and sustainability within various industries, focusing on integrating green modules into VET curricula.	Desktop research, interviews with stakeholders, pilot testing of green skills modules.
LeaderSHIP	Skills Development and Training	Identifying skill gaps in the maritime and shipbuilding sectors, focusing on digital transformation and environmental sustainability.	Gap analysis, surveys, stakeholder engagement, training program development.
Greenovet	Skills Development and Training	Promoting green innovation in vocational education through skills gap analysis and green innovation training.	Stakeholder workshops, surveys, data collection, development of self-assessment tools.

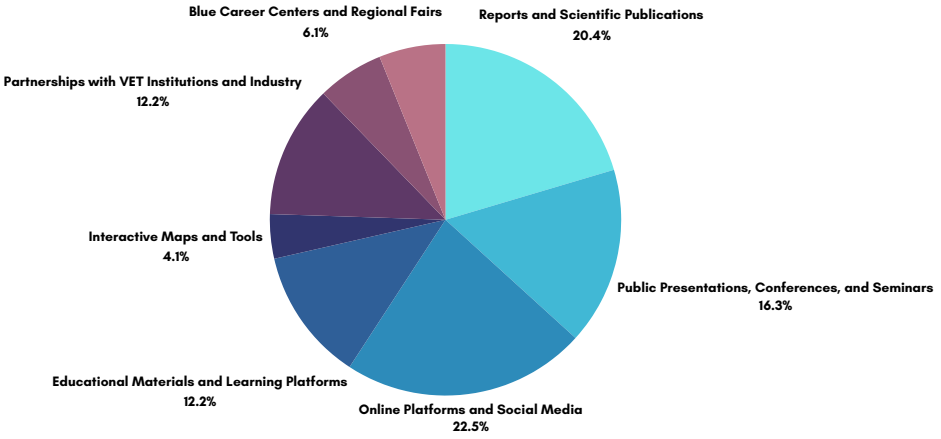
Table 6: Methodology used in the EU projects

Project	Category	Main focus	Key methods
Construction Blueprint	Skills Development and Training	Addressing skills gaps in the construction industry with a focus on energy efficiency, digitalization, and the circular economy.	Status quo analysis, roadmap development, VET curriculum development, use of Big Data to predict skills needs.
BluePorts	Sustainability and Green Technologies	Addressing skills shortages in European ports for the green transition, focusing on digitalized training for climate change and the circular economy.	Baseline analysis, digitalized training material development, certification schemes, pilot testing.
Circles of Life	Specialized Maritime Systems and Research	Promoting sustainability in shipbuilding through the development of environmental reporting tools and circular practices (e.g., Cradle to Cradle Ship Passport).	Environmental performance tools (SEPI), smart software for data collection, collaboration with industry stakeholders.
EnviroNaut	Sustainable Nautical Tourism	Develops a qualification for *Environmental Officers* to improve sustainability in nautical tourism	Offers a modular online course aligned with the EU Green Deal and UN Sustainable Development Goals, including skills in pollution control and ecosystem protection
Mentor	Green Skills Development	Provides tools for green skills training in the circular economy and sustainability sectors.	Uses open educational resources and toolkits in a modular format to prepare professionals for green economy demands in Europe
EBI LCA Project – Blue Boat Horizon	Circular Economy and End-of-Life Boats	Establishes a roadmap for recycling and circular economy practices in boat dismantling	Develops EU-wide recycling processes, partnering with sectors like wind energy, and promotes regulations to eliminate landfill usage

Results by Dissemination

Given that this report reviews previous EU projects, project collaborators have taken the opportunity to identify and analyze the dissemination methods used in these projects, with the aim of gathering valuable information and adapting best practices for the development of TECoNaut. This analysis will enable the optimization of communication and dissemination strategies in TECoNaut, ensuring greater impact and visibility for the project.

Figure 6: Dissemination Strategies in EU Projects: Analysis of Impact and Prioritization Across Key Channels



These percentages highlight the distribution of dissemination efforts across the main categories, emphasizing the areas of focus and effectiveness in terms of reach:

- Predominance of **Online Platforms and Social Media (22.45%)**: The most widely used category for dissemination is online platforms and social media. This reflects the priority given to accessibility and immediate visibility of results, allowing for rapid and effective outreach to a broad audience.
- **Reports and Scientific Publications (20.41%)**: The second most-used category is the publication of reports and scientific papers, indicating a focus on formality and credibility in dissemination, enabling findings to be shared in a detailed and documented manner with professionals and academic institutions.
- **Conferences, Public Presentations, and Seminars (16.33%)**: This category ranks next in importance, highlighting an intent to directly engage with the community and industry stakeholders, facilitating interactive knowledge exchange.
- **Educational Materials and Learning Platforms (12.24%) and Partnerships with VET Institutions and Industry (12.24%)**: These categories underscore a focus on practical training and alignment with industry needs. Training and collaboration with VET institutions are crucial for aligning acquired skills with market demands.
- **Interactive Maps and Tools (4.08%)**: The lower priority given to this area suggests these are supplementary tools. While less common, interactive resources can add value to training and independent learning.
- **Blue Career Centers and Regional Fairs, Fairs and Specialized Exhibitions (6.12% each)**: These categories show an interest in promoting professional development within the blue economy sector and networking opportunities. They allow both students and companies to explore opportunities and trends in the industry.

Overall, this distribution suggests a balanced dissemination strategy that combines online accessibility, formal scientific documentation, and engagement through events and collaborations.

Results by Analysis of Skills

The report provides an in-depth examination of the skills identified in previous projects, with a particular focus on detecting green skills and assessing whether these competencies introduced new definitions or aligned with EU guidelines. Additionally, the report highlights the methods employed by these projects to identify relevant skills. The skills analysis is structured around four main pillars:

This axis focuses on identifying the strategic approaches that EU projects adopt for skills development. It analyzes how projects structure their training and skills-updating programs, including priority areas and teaching methods they employ. This approach may include learning models such as continuous training, progressive certification programs, or specific initiatives for green skills training, all aligned to meet the needs of the European labor market.

This aspect explores whether projects follow the established EU definitions of green skills or develop their own interpretations. It examines whether the project introduces new perspectives or concepts that expand the understanding of "green" (such as including new sustainable practices, emerging skills in green technologies, or circular economy approaches) or adheres to the pre-existing EU guidelines, facilitating direct comparison and consistency across the region.

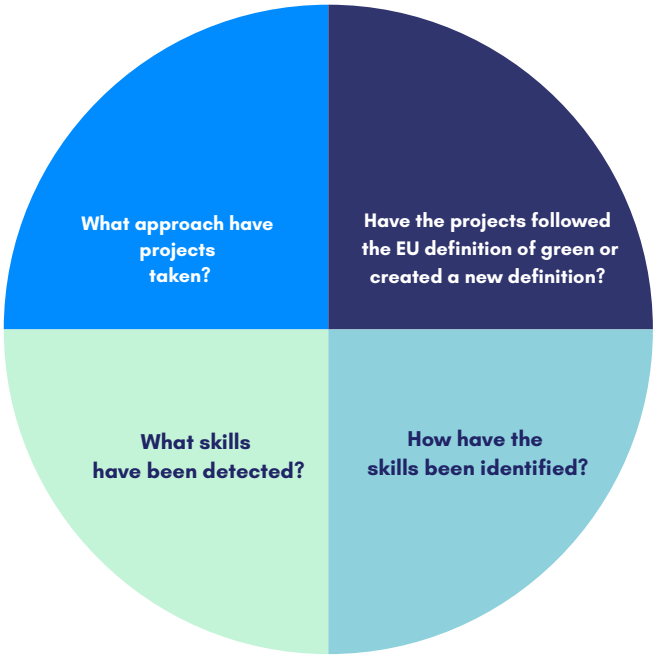


Figure 7: Key points of skills analysis

In this section, the specific skills prioritized by each project are identified and categorized. Both technical and transferable skills are examined, as well as the type of competence (for example, skills in energy efficiency, waste management, circular economy, or environmental awareness). This helps determine the most relevant and in-demand competencies and how these projects prepare professionals in key areas to advance a green and sustainable economy.

This axis examines the methods and criteria used by projects to select and assess relevant skills. It studies how needs analysis, market research, expert consultations, or labor data are utilized to determine which skills are critical. Additionally, data collection approaches such as surveys, interviews, or policy review are considered, and specific criteria (e.g., labor demand, technological innovation, or sustainability alignment) are explored to help define which skills are necessary in the European context.

Together, these insights reveal how previous EU projects contribute to building a workforce prepared for environmental, digital, and social challenges.

Results by Analysis of Skills

What skills have been detected?

This report identifies the key skills emphasized in previous EU projects. This identification is essential for subsequently analyzing the methods each project has used in the selection and development of specific skills. Below, the different skill categories are presented:

Green Skills

The **green skills identified in these projects focus on fostering sustainability, energy efficiency, and circular economy principles across industries, particularly within the blue economy and maritime sectors.** They encompass competencies in natural resource management, waste reduction, and the adoption of eco-friendly materials, alongside an emphasis on energy-efficient technologies and renewable energy integration. Projects also highlight skills in environmental impact assessment and compliance with regulatory frameworks to ensure sustainable practices are maintained. Additionally, green and social entrepreneurship is promoted, emphasizing leadership, ecological innovation, and strategic thinking to drive transitions toward sustainable business models and community engagement.

Health, Safety, and Compliance

The **skills identified in these projects center around ensuring safety, risk management, and cybersecurity in high-risk and offshore environments.** They encompass a thorough understanding of safety protocols and regulatory compliance to prevent workplace accidents, particularly under hazardous conditions. Additionally, expertise in risk management is critical for identifying and mitigating dangers in automated processes, like autonomous docking. Cybersecurity skills are also prioritized to safeguard the integrity of digital systems used in renewable energy operations, protecting against threats and ensuring reliable, secure technological infrastructure.

Digitalization, Technological and Technical

The **skills highlighted in these projects emphasize a blend of technical expertise, digitalization, and control optimization to enhance efficiency and sustainability across various sectors. Technical skills include drafting, 3D modeling, and hands-on abilities like welding and assembly, vital for maritime and energy industries**. Digitalization skills focus on the use of advanced digital tools (BIM, IoT, 3D printing) and software for efficient project management and monitoring, particularly in energy-efficient and offshore operations. Control and optimization skills enable precision in managing small craft operations, with an emphasis on reducing emissions and integrating electric and hybrid propulsion. Finally, expertise in mathematical modeling, data analytics, and energy systems digitalization supports the transition to renewable energy through efficient monitoring and advanced computing solutions

Traditional

The skills identified in these projects emphasize **traditional shipwright craftsmanship, focusing on essential techniques such as machining, wood steaming, curving solid wood, precise assembly, and caulking**. These skills preserve the art and functionality of traditional shipbuilding, ensuring expertise in working with natural materials and mastering hands-on processes that contribute to the durability, aesthetics, and performance of maritime vessels

Soft and Personal Competencies

The skills outlined emphasize a **blend of interpersonal, cognitive, and practical abilities essential for effective work in collaborative and dynamic environments.** Key competencies include problem-solving, critical thinking, and creativity, which drive innovative solutions, alongside adaptability and flexibility to respond to changing situations. Strong communication skills, stakeholder engagement, and science communication are vital for conveying information and fostering partnerships, while teamwork, empathy, and conflict resolution support a cooperative work culture. Additionally, time management, multitasking, and stress management contribute to productivity and resilience, with leadership and decision-making fostering confident guidance. A focus on ocean stewardship and advocacy highlights commitment to environmental responsibility and sustainable practices.

The diverse skills identified across these projects reflect a holistic approach to fostering a sustainable, safe, and technologically advanced workforce, especially in the blue economy and maritime sectors.

Results by Analysis of Skills

The following is a detailed presentation of the Green Skills identified across various projects.

Green Skills:

Sustainability and Cirdular Economy

Sustainability in the Blue Economy:

- Understanding and implementing sustainable practices, including energy efficiency and reducing environmental impact.
- Managing natural and marine resources sustainably.
- Promoting sustainable tourism and logistics practices.

Circular Economy:

- Applying circular economy principles, such as recycling and resource efficiency.
- Innovating circular business models.
- Utilizing eco-friendly materials and promoting sustainable procurement.

Sustainable Manufacturing and Construction:

- Green manufacturing practices, including additive manufacturing.
- Sustainable construction using eco-friendly materials and waste management practices.
- Incorporating eco-friendly design principles and reducing waste in production.

Environmental Regulations and Compliance:

- Knowledge of environmental regulations, energy efficiency, and compliance with green technologies.
- Understanding regulatory frameworks for environmental protection and energy efficiency.

Waste and Resource Management:

- Strategies for waste reduction, recycling, and effective waste management.
- Sustainable management of resources within the marine sector.

Alternative and Sustainable Practices:

- Using alternative fishing gear to minimize environmental harm.
- Promoting sustainable boat construction and assessing the environmental impact of materials.

Environmental Impact and Climate Change Awareness:

- Conducting environmental impact assessments.
- Raising awareness of climate change impacts on maritime ecosystems.

Ocean Literacy:

- Understanding the principles of sustainability in marine environments and promoting eco-friendly practices.

Results by Analysis of Skills

Energy Efficiency and Green Technologies

Energy Efficiency:

- Competencies in energy-efficient building materials and technologies.
- Energy-efficient ship operation and construction techniques.
- Reducing emissions and improving energy efficiency in maritime transport.

Renewable Energy:

- Knowledge and integration of renewable energy systems (e.g., wind turbines, solar panels for marine craft).
- Hands-on experience with renewable energy technologies and sustainable processes.
- Managing the energy transition towards renewable sources.

Green Technology Implementation:

- Implementing and managing green technologies, including eco-friendly materials and renewable energy systems.
- Sustainable transport initiatives focused on emission reduction and energy efficiency.

Environmental Management:

- Skills in managing and mitigating the environmental impacts of maritime activities, particularly for high-speed vessels

Green and Social Entrepreneurship

- Green entrepreneurship and ecological innovation
- Social and green entrepreneurship
- Leadership and Management Skills: Leading teams, managing sustainable projects, and overseeing transitions to sustainable practices
- Strategic thinking and stakeholder engagement

Results by Analysis of Skills

What approach do projects take in relation to skills?

The analyzed projects adopt diverse and collaborative approaches to develop skills in the blue economy and related sectors, integrating both digital knowledge and sustainable competencies. Methods include hands-on learning and digital simulation, partnerships with industry, and online learning platforms that facilitate training in specific competencies. Several projects are organized under sectoral or international collaboration models, such as **Sector Skills Alliances and Centers of Vocational Excellence (CoVEs)**, allowing for the exchange of knowledge and teaching strategies among various stakeholders (VET, industry, governments, and universities). Some projects also employ specific methodologies, such as **gap analysis and experimental validation tools**, along with practical and gamified approaches to make learning interactive and accessible. The use of asynchronous and modular learning models allows students to earn progressive certifications and adapt to the evolving demands of the labor market. The following table identifies the approaches for each project:

Table 7: Approach followed according to project

Project	Approach Used
Blue Economy Digitalization Skills	Hands-on learning and digital simulation; industry partnerships; modular system with certifications
USWE	Sector-specific analysis and alignment with EU strategies
LeaderSHIP	Combination of sectoral analysis and EU policy alignment
UMTMS	Simulation-based learning and digital methodologies (online platforms)
AHOD (All Hands on Deck)	Combination of traditional knowledge and digital tools; digital platforms and e-learning
GREENOVET	Collaboration among VET, industry, and governments, with Centers of Vocational Excellence (CoVEs)
Construction Blueprint	Sectoral approach with 24 partners from 12 countries; gap analyses and creation of training programs
CIRCLES OF LIFE	Collaboration with 15 organizations; development of methodologies like SEPI and C2C Ship Passport
Next Blue Generation	Interactive and gamified approach with tools like the Blue Career Pathway Tool
Blue Ports	Quadruple helix model with synchronous and asynchronous learning
MATES	Sectoral skills alliance with pilot experiences and awareness campaigns
SkillSea	Collaboration between industry and education; needs analysis and development of educational packages
GREEN VET Network	Collaborative approach with practical workshops and online programs
Green Diving	Promotion of eco-friendly practices in the diving industry; green certifications
ZeroWastePorts	Collaborative, cross-sectoral approach with training in circular practices
Green Small Craft	Practical collaboration with maritime industries and VET providers; hands-on workshops
DigiWind	Modular education system with degrees, LLL modules, and interoperable virtual campus
Ecological Ferry (Gdańsk)	Research-driven approach with experimental validation
EnviroNaut	Modular online curriculum for continuous professional development
Mentor	Innovative VET curriculum for mentors with online resources and practical mentoring sessions
EBI LCA Project - Blue Boat Horizon	Scientific methodology for assessing environmental impact across the lifecycle
A Pan-European Network of Ocean Tribology - CA23155	European network of experts and research centers with shared infrastructure for design optimization and condition monitoring for marine environments

The diverse and collaborative approaches of these projects show clear alignment with EU strategies for green and digital skill development, positioning the maritime and blue economy sectors as key drivers of Europe's green transition. The integration of innovative methodologies, from digital simulations to modular education models and expert networks, promotes accessible and continuous training. This approach not only fosters a more resilient and sustainability-focused workforce but also strengthens European competitiveness in key industries, supporting the shift toward a circular, low-carbon economy.

Results by Analysis of Skills

Have the projects followed the EU definition of green or created a new definition?

General Alignment with EU's Green Skills Definition

The projects adhered to the EU's established definition of "green," aligning with sustainability goals and policies such as the Green Deal, without creating new definitions.

The following table identifies the green definition for each project:

Table 8: Green definition approach according to project

Project	Green Definition
Blue Economy Digitalization Skills	Alignment with the EU Green Deal, combining digital and sustainable skills to enhance resource efficiency and reduce emissions
USWE	Alignment with the EU's definition of green skills, adapted to the shipbuilding industry
LeaderSHIP	Alignment with the EU Green Deal, focused on sustainability and digital transition
UMTMS	Focus on efficiency in operations and maintenance, indirectly supporting environmental goals
AHOD (All Hands on Deck)	Alignment with EU sustainability goals, promoting eco-friendly materials (wood) in shipbuilding
GREENOVET	Alignment with the EU definition, supporting sustainable economies through education and training
Construction Blueprint	Adaptation of the EU green definition to the construction industry, focused on energy efficiency and circular economy
CIRCLES OF LIFE	Green definition aligned with circular economy and zero emissions in shipbuilding
Next Blue Generation	Alignment with sustainability in the blue economy, focused on eco-friendly practices in maritime industries
Blue Ports	Alignment with the EU Green Deal, focusing on renewable energy and emissions reduction in port operations
MATES	The project did not create a new definition, it followed the European Unions guidelines on sustainability and the green transition.
SkillSea	Alignment with the EU green transition goals, promoting energy efficiency and environmental awareness
GREEN VET Network	Green skills definition focused on resource efficiency and environmental protection, promoting circular economy
Green Diving	Alignment with marine conservation and reduction of human impact on marine ecosystems
ZeroWastePorts	Alignment with waste reduction and improved efficiency in port operations
Green Small Craft	Focus on emission reduction and circular economy in maritime construction
DigiWind	Alignment with green energy transition, optimizing wind energy operations through digital tools
Ecological Ferry (Gdańsk)	Design focused on energy efficiency and emissions reduction, supporting sustainable public water transport in Gdańsk
EnviroNaut	Alignment with marine protection and sustainability in tourism, promoting responsible practices
Green Mentor	Promotion of sustainable business practices, reducing environmental impact through green entrepreneurship
EBI LCA Project - Blue Boat Horizon	Alignment with circular economy and emission reduction, improving material efficiency in boat manufacturing and disposal
A Pan-European Network of Ocean Tribology - CA23155	Alignment with EU sustainability goals, optimizing durability, resource consumption, and energy efficiency in ocean-based systems

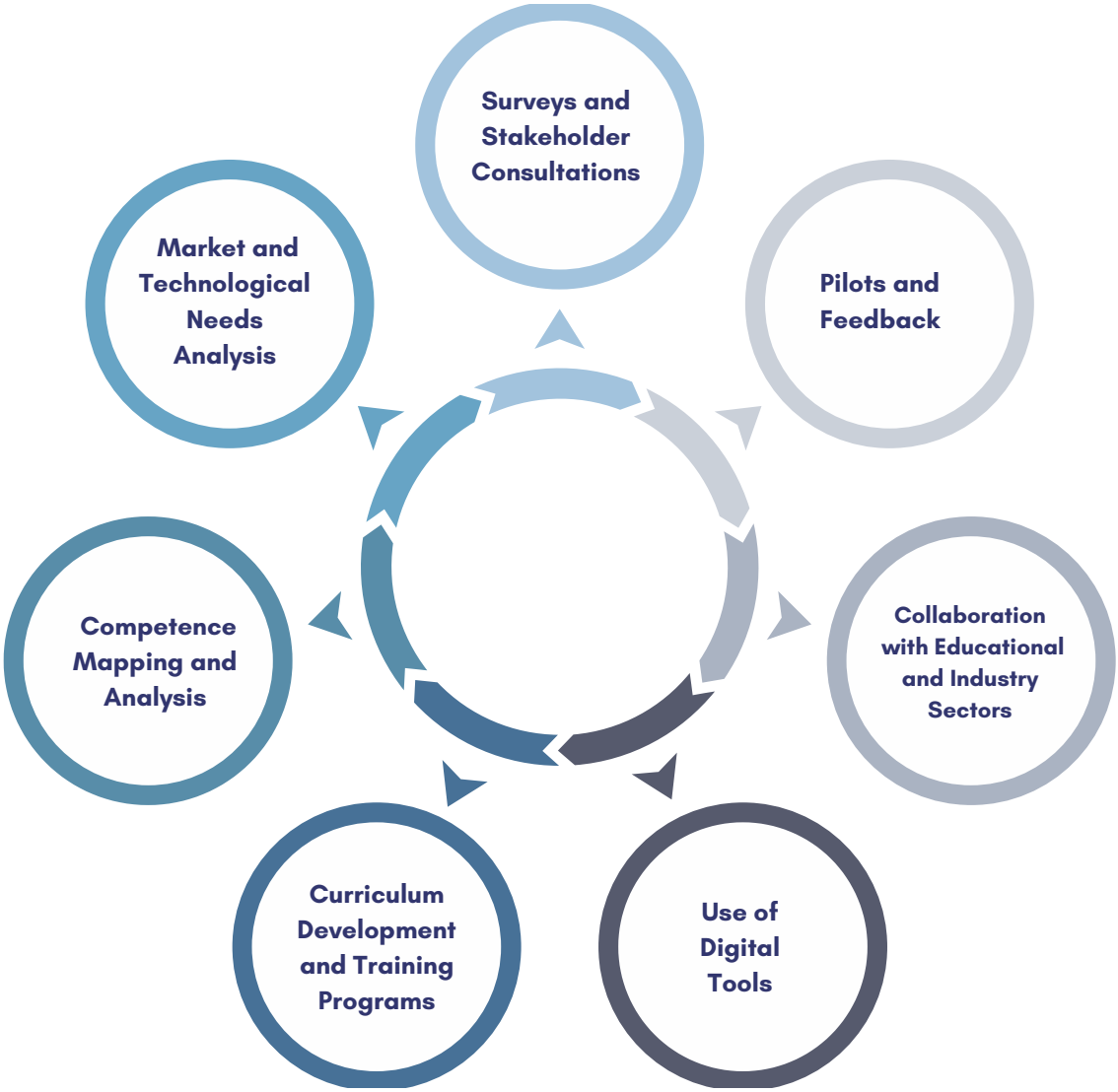
The projects align their approach to green skills with the European Union's established framework on sustainability, avoiding the creation of new definitions. Instead, they adopt existing EU guidelines, notably the **European Green Deal**, **GreenComp** framework, and climate neutrality targets for 2050.

Results by Analysis of Skills

How have the skills been identified?

The analysed projects identify necessary skills through comprehensive approaches that combine market analysis, stakeholder consultations, competence mapping, and the development of training programs. These methods ensure that the skills taught align with current market demands, digital and green transitions, and emerging technologies.

Figure 8: Methods for identifying skills



Results by Analysis of Skills

Categorization of Methods for Identifying Skills

1) **Market and Technological Needs Analysis:** Projects conduct research to understand market demands and emerging technological developments.

Examples:
BlueDivet: Research across Europe to identify digital needs.
DigiWind: Evaluation of the impact of digitalization in the wind energy sector.

2) **Surveys and Stakeholder Consultations:** Surveys and consultations with employers, workers, and educational sectors are used to gather information on current and future skills gaps.

Examples:
USWE: Surveys with shipbuilding workers to identify skills related to digitalization and green technologies.
EnviroNaut: Consultations with maritime operators and academics to identify skills for sustainable operations.

3) **Competence Mapping and Analysis:** Competence frameworks are created to map the skills needed for different roles in emerging sectors.

Examples:
SkillSea: Mapping of digital and green skills in maritime transport.
Green Small Craft: Development of a competency framework focused on green technologies for small craft industries.

4) **Curriculum Development and Training Programs:** Training programs are designed and updated to equip students and workers with skills aligned with industry demands.

Examples:
BlueDivet: Creation of digitalization training modules for the blue economy.
USWE: Integration of new skills into vocational training profiles.

5) Pilots and Feedback: Training programs are tested in pilots and adjusted based on participant feedback.

Examples:
BlueDivet: Testing training modules in various European countries.
UMTMS: Use of simulations to train students in practical ship machinery skills.

Results by Analysis of Skills

Identification of skills

6) **Collaboration with Educational and Industry Sectors:** Collaboration between educational sectors, industries, and authorities ensures that training programs meet real-world needs.

Examples:
LeaderSHIP: Collaboration to align training with emerging technologies such as AI and sustainability.
GREENOVET: Centers of Vocational Excellence to foster innovation and develop green competencies.

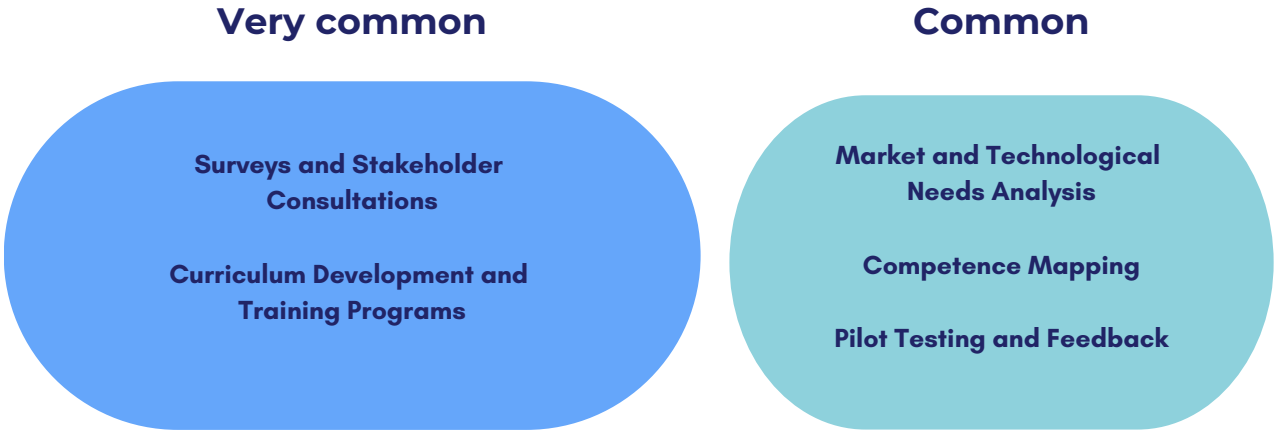
7) **Use of Digital Tools:** Digital platforms and simulations are used to support skills development in practical and theoretical settings.

Examples:
UMTMS: Moodle platform to track student progress.
Next Blue Generation: Use of gamified tools to assess skills.

This structure ensures that the identified skills are relevant, fostering employability and supporting the digital and green transitions necessary for sustainable sector growth.

The most commonly used methods in previous EU projects

The most commonly used methods for identifying skills in the analyzed projects are:



These five methods are most widely used to identify and validate the necessary skills in the projects, ensuring that training programs align with real market and technological needs.

Results by Analysis of Skills

The most commonly used methods in previous EU projects

The methods most frequently applied in relation to Green Skills

The **most commonly used method for identifying green skills** in the analyzed projects is the **Skills Gap and Market Needs Analysis**. This method enables projects to identify the competencies needed for the transition to sustainable practices and green technologies by researching and analyzing market demands and emerging sustainability trends.

Examples of this method:

- **GREENOVET**: Conducts skills gap analyses in the participating regions (Austria, Finland, Portugal, North Macedonia) to identify the competencies required for the green transition.
- **Construction Blueprint**: Carries out an in-depth analysis of skills needs in areas like energy efficiency and the circular economy, based on consultations with experts and surveys of companies.
- **EnviroNaut**: Starts with an environmental impact assessment in the maritime sector to identify the skills needed for green technologies and sustainable practices.

These analyses allow training programs to be tailored to market demands, particularly in sustainability, renewable energy, and the circular economy, ensuring that workers acquire key skills for the green transition in their respective industries.

Results by Analysis of Skills

Conclusion of the skills analysis

In analyzing various European Union projects, a cohesive focus emerges on **digital, green, technical, and soft skills** as fundamental elements for preparing professionals to meet the evolving needs of the blue economy, maritime sectors, and related industries. Each project implements specific methods to identify and foster these skills, often aligning with the EU Green Deal and sustainability goals. Competencies in digitalization and technical areas, such as automation, renewable energy integration, and sustainable manufacturing practices, are central across these initiatives. Projects like USWE, LeaderSHIP, and MATES emphasize the importance of cross-sectoral and Industry 4.0 skills, ensuring a workforce capable of merging traditional craftsmanship with advanced technological applications.

Regarding green skills, most projects adhere to the **EU's sustainability framework**, incorporating sustainability through circular economy principles, **resource efficiency**, and **emission reduction**. However, projects like CIRCLES OF LIFE and GREENOVET adapt this framework to their specific sectors, focusing on circularity in shipbuilding and green innovation in vocational education, respectively. Additionally, soft skills such as problem-solving, adaptability, and stakeholder engagement are recognized as essential for developing resilient, collaborative, and eco-conscious professionals. Together, these projects demonstrate a comprehensive, multidimensional approach to skill development, supporting the **EU's dual digital and green transitions** and preparing a workforce for the future.
The analysis of EU projects highlights a **strategic, multi-layered approach** to developing the essential skills for the blue economy, maritime sectors, and beyond. By prioritizing a blend of digital, green, technical, and soft skills, these initiatives closely align with the EU Green Deal and sustainability objectives.

Through core methods such as market research, competency mapping, stakeholder consultations, and continuous curriculum development, these projects tailor training to meet the practical demands of evolving industries. The integration of pilot testing and industry collaboration further ensures that training remains adaptive and relevant, bridging technological advancements with environmental stewardship.

The comparative approach presented here underscores how well-structured initiatives can not only enhance skills but also empower industries across Europe to proactively adapt to global economic and environmental changes. This analysis of effective methodologies provides a model for scalable solutions in other regions, illustrating how these educational frameworks, aligned with industry, contribute to **sustainable growth at both the local and international levels**.

Results by Analysis of Skills

Conclusion of the skills analysis

Methodology Implemented in TEcoNaut and Recommendations

Following an analysis of the methodologies used in previous EU projects for **skills identification**, it is confirmed that **TEcoNaut** employs a solid, well-structured methodological approach. The project uses a comprehensive model to address the ecological transition in the nautical industry, focusing on skills needs assessments and training programs centered on sustainable materials and digital competencies.

The TEcoNaut project utilizes **several key methodologies focused on the ecological transition in the nautical industry**, some of which are already implemented in other EU projects, while others could complement its current strategies effectively.

Methodologies Already Implemented in TEcoNaut:

1. **Needs Identification and Skills Gap Analysis**: TEcoNaut conducts an in-depth skills gap analysis aligned with the **European ESCO** classification system and the EU Green Taxonomy. This identifies key skills gaps necessary for sustainable materials work in shipbuilding.
2. **Stakeholder Consultations and Cross-Sector Collaboration**: TEcoNaut collaborates closely with academic institutions, vocational education centers (VET), and companies in the nautical sector to develop training programs focused on sustainability.
3. **Curriculum Development and Training Programs**: The project has designed a specialized course on sustainable materials for vocational training, along with a "Train the Trainers" program to equip future trainers and students
4. **Pilot Testing and Internship Programs**: TEcoNaut includes an internship program for higher education students focused on the practical application of skills related to eco-friendly technologies and materials within the sector

Based on this comparative analysis, several recommendations have been formulated to further enhance its methodology:

1. **Integration of Advanced Digital Tools**: Incorporating systems like digital twins into training could optimize practical learning in the use of sustainable materials, improving the simulation of real-world processes.
2. **Ongoing Curriculum Updates**: A regular curriculum update is recommended to keep the content relevant in light of technological advancements, ensuring that students acquire skills aligned with the ever-evolving needs of the industry.

These recommendations aim to complement TEcoNaut's existing practices, adding flexibility and adaptability to ensure a lasting impact on the training of professionals within the sustainable nautical sector.

SWOT

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SWOT Results of EU Initiatives and Training Objectives

Introduction

The identification of skills gaps in training of boat building sector provides essential direct input for curriculum development. Through systematic analysis, WP3 has revealed specific knowledge and competency gaps in the handling, application, and management of deep-tech materials within the nautical sector. These findings directly translate into curriculum topics, ensuring that the training programs address real and current industry needs.

This document presents a comprehensive **SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of various EU-funded projects focused on maritime skills development**. The analysis serves several strategic purposes:

- To evaluate existing approaches to **technological and green skills development** in the maritime sector.
- To identify effective methods for integrating **disruptive technologies in ecological transition training.**
- To **understand barriers and enablers in implementing green technology** education programs.
- To form and shape the training objectives of TECoNaut's training framework that bridges existing gaps in using disruptive Technologies to facilitate the Ecological transition of the Nautical sector.

The analysis followed a structured approach:

- Systematic review of selected EU projects related to maritime skills development.
- Clustering of findings to identify patterns.
- Integration of insights with TECoNaut's dual focus on deep tech materials and ecological transformation.
- Development of actionable recommendations for the course outline.

The rest of the section is organized into the following sections:

1. **SWOT Analysis Results**
2. **Clustering and Category Analysis**
3. **TECoNaut's Training Objectives**
4. **Action Plan and Recommendations**

The findings and recommendations presented here will guide the development of innovative training programs that prepare the nautical sector workforce for both integration of new materials but also for the ecological transformation. This analysis supports TECoNaut's mission to accelerate the ecological transition of the European nautical sector through the effective.

SWOT Analysis Results

This document presents a SWOT action plan of various EU-funded projects related to green skills. The purpose of this analysis is to identify key strengths and weaknesses while highlighting opportunities and threats that can inform the development of the Teconaut project and its training objectives. A SWOT action plan is a strategic tool that translates the findings of the SWOT analysis into actionable steps. It helps leverage strengths, address weaknesses, and capitalize on opportunities while mitigating threats, guiding Teconaut in designing its training programs to meet both current and future industry needs.

While MATES focuses on training in skills related to the Blue Economy and renewable energies, TECoNaut can contribute its knowledge and expertise in the development of innovative technologies and the application of sustainable materials in the construction and repair of vessels. This could complement the strategies of MATES, promoting sustainability and circularity in the maritime sectors, combining both approaches for a more comprehensive transformation of the industry.

Sharing knowledge on disruptive technologies: TecoNaut could help SkillSea integrate knowledge about new technologies and sustainable materials into maritime sector training programs, improving workers' preparedness for the demands of a more ecological and technological environment.

Synergy in ecological transition: Since both projects focus on sustainability, TecoNaut could provide SkillSea with a model of how green technologies can be applied practically in the maritime industry. This would help SkillSea trainers and professionals better understand innovations in sustainable materials and their impact on maritime transport.

Expanding educational reach: TecoNaut's innovations in sustainable materials and advanced technology could be incorporated into the educational programs and training technology could modules developed by SkillSea, broadening the range of skills taught to future maritime professionals.

Clustering

Strengths Categories

1. Sustainability and Green Skills

Many projects emphasize training in sustainability, environmental practices, and green skills, which are essential in the context of climate change and environmental protection. Keywords like "green skills," "sustainability," and "pollution reduction" point to efforts aimed at fostering a workforce equipped to meet the demands of a greener economy.

This category captures the shared focus across projects on promoting eco-friendly practices, reducing environmental impact, and preparing industries for a sustainable future.

2. Collaboration and Networking

Most projects leverage broad networks of stakeholders, including cross-sector and pan-European collaborations, to enhance their impact and foster knowledge exchange. Keywords such as "collaboration network," "Pan-European collaboration," and "stakeholder network" indicate the importance of partnerships between educational institutions, industry, and government bodies.

This category reflects how collaboration enhances each project's reach, providing access to resources, insights, and regional perspectives that strengthen their initiatives.

3. Digitalization and Technology Integration

The integration of digital tools and advanced technologies (like AI, robotics, and digitalization) is a key trend, particularly in updating training programs and meeting industry needs. Keywords such as "digitalization," "technology integration," and "control systems" indicate that projects are preparing workers to engage with modern technology-driven workplaces.

This category represents the common push toward modernizing skills and aligning training with technological advancements, crucial for competitiveness in today's digital state.

4. Skills Development and Certification

Many projects focus on upskilling, reskilling, and professional qualifications to meet sectoral needs and close skills gaps. Keywords such as "VET upskilling," "professional qualifications," and "ISO/IEC certification" demonstrate efforts to prepare workers with future-oriented skills and certifications recognized across industries.

This category captures projects' emphasis on fostering a skilled workforce equipped with certified, industry-relevant competencies, enhancing employability and mobility.

Table 9: Selected EU Projects and their Key Strenghts and Weaknesses.

1	MATES (Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy). 2023.	Sustainability and Green Skills, Skills Development and Certification,Collaboration and Networking,Digitalization and Technology Integration	Resistance to Change and Traditional Practices,Skill Gaps and Curriculum Limitations
2	SkillSea (Futureproof Skills for the Maritime Transport Sector), completed in 2022.	Collaboration and Networking, Sustainability and Green Skills	Resistance to Change and Traditional Practices, Skill Gaps and Curriculum Limitations
3	Green Diving, ongoing project.	Sustainability and Green Skills, Collaboration and Networking, Digitalization and Technology Integration	Resistance to Change and Traditional Practices, Infrastructure and Technological Gaps
4	UPSKILLING SHIPBUILDING WORKFORCE FOR EUROPE (USWE) 30 Nov. 2020	Digitalization and Technology Integration, Collaboration and Networking, Skills Development and Certification	Infrastructure and Technological Gaps, Skill Gaps and Curriculum Limitations
5	AHOD – All Hands on Deck - June 2022	Digitalization and Technology Integration, Skills Development and Certification	Infrastructure and Technological Gaps, Skill Gaps and Curriculum Limitations

Weaknesses Categories

5. Resistance to Change and Traditional Practices

A very common challenge is resistance from established institutions and workers hesitant to adopt new methods and technologies. Keywords like "resistance to change," "traditional stakeholders," and "modernizing traditional sectors" highlight the difficulty in shifting mindsets and breaking away from established practices.

This category underscores the barrier that cultural and institutional resistance poses to project implementation and adoption of new practices, especially in industries with deeply ingrained traditions.

6. Infrastructure and Technological Gaps

Many projects face challenges related to limited digital infrastructure or outdated facilities, which hinder the adoption of new technologies. Keywords such as "limited infrastructure," "technology resources," and "digital infrastructure limitations" reflect the technological inconsistencies that can slow down modernization.

This category captures how inadequate infrastructure, and technological gaps can be significant obstacles to implementing cutting-edge training programs and technologies, especially in under-resourced regions or traditional sectors.

7. Funding and Implementation Challenges

Projects that rely heavily on funding (often from the EU) and require adaptation across different regions face financial and logistical challenges. Keywords like "dependence on EU funding," "external factors," and "implementation challenges across countries" highlight how variations in local contexts and funding limitations can affect project sustainability and scalability.

This category groups the systemic and financial dependencies that impact projects' long-term success and their adaptability to different regional contexts.

8. Skill Gaps and Curriculum Limitations

A recurring theme is the shortage of skilled professionals and curriculum gaps in meeting emerging industry needs, such as AI or green skills. Keywords like "lack of industry links," "absence of AI focus," and "low qualification levels" point to the disconnect between current educational offerings and industry demands.

This category addresses the issues with outdated or insufficient curricula, which can leave students unprepared for the demands of modern and evolving job markets in the marine industry.

Opportunities Categories

9. Reskilling – Upskilling Workforce, Traditional Boatbuilding Practices, Heritage Preservation (wooden boats)

This category presents an opportunity for projects to improve the skills of the workforce while preserving traditional craftsmanship. By investing in training programmes and educational initiatives, projects can create a pipeline of qualified professionals equipped with necessary skills. In addition, focusing on traditional boatbuilding practices allows for the preservation of cultural heritage, which can enrich community identity and pride.

10. Eco Skills, Sustainability and Environmental Impact

Projects in this category can seize the opportunity to promote sustainable practices and green skills within the industry. By aligning with EU policy on environmental transitions, projects can tap into the growing demand for green skills and solutions. Initiatives focused on sustainable practices not only benefit the environment but also position the projects as leaders in the transition to a green economy.

11. New Materials, Innovative Technologies and Digitalisation

The rapid advancement of technology offers significant opportunities for projects to innovate and improve operational efficiency. By using new materials and digital tools, projects can improve their teaching methods and create cutting-edge training programmes. This category encourages the integration of digital content and innovative teaching methods that can engage a wider audience.

12. Industry Growth and Economic Opportunities, Network Expanding

This category highlights the potential for projects to drive industry growth and expand networks. By collaborating with universities, industry leaders, and stakeholders, projects can create robust partnerships that facilitate knowledge sharing and resource allocation. This collaborative approach can lead to new funding opportunities and increased market visibility.

Threats Categories

13. Regulatory/Policy Changes

The landscape of regulatory and policy change is a critical threat. As laws and regulations evolve, projects can face compliance challenges that threaten their implementation timelines and quality standards. Inconsistent or unexpected regulatory changes can lead to projects changes that dilute the intended outcomes, increase costs, and ultimately result in a final product that does not meet the original vision or stakeholder expectations.

14. Low Interest from the Industry/Stakeholders

Low interest and engagement from industry stakeholders is a significant risk for projects in this category. This lack of involvement can lead to a disconnect between the project deliverables and the real needs of the industry, resulting in a final product that is misaligned with market needs and less effective in addressing the challenges it was intended to solve.

15. Lack of Resources (funding, increased cost, time and effort, stuff)

Lack of resources is a major threat to the sustainability of project outcomes. Inadequate funding can severely limit the ability of projects to invest in essential tools, technologies, and skilled personnel needed for long-term success. Furthermore, without adequate resources, ongoing support and maintenance of the end product may be compromised, leading to reduced functionality and relevance over time.

16. Industry Outlook and Potential market changes (disruptive technologies e.g. AI)

The rapid evolution of disruptive technologies and changing market conditions pose a significant threat to the projects in this category. If they fail to anticipate and adapt to these changes, their deliverables may quickly become outdated or irrelevant. The introduction of automation and AI can change industry dynamics and skill requirements, potentially making the end product less useful or effective.

TEcoNaut's Training Objectives

1. Focusing on Cross-Sector Skills in Deep Tech Materials

Objective: Designing training programs that cover cross-sector competencies in deep tech materials, combining knowledge from shipbuilding, transport, and green technologies, with a focus on how advanced materials are used across these sectors.

Actions:

- Collaboration with experts from multiple sectors to design learning paths that emphasize how deep tech materials and green technologies drive innovation across different industries.
- Developing core modules on material science, composites, nano-materials, and advanced manufacturing techniques that are applicable in multiple sectors like maritime, transport, and renewable energy.

2. Addressing Resistance to Change and Traditional Practices in Using Deep Tech Materials

Objective: Building modules that not only teach new skills but also promote the value of change and innovation in traditional industries. Include change management strategies and emphasize the importance of sustainability and digital transformation for long-term competitiveness. Training modules that will promote the adoption of innovative deep tech materials in industries traditionally resistant to change, such as shipbuilding.

Actions:

- Teaching professionals in traditional industries how to integrate advanced materials into existing workflows and the benefits of adopting green skills.
- Providing case studies from companies that successfully transitioned to green practices and advanced materials, demonstrating real-world successes.

3. Enhancing Collaboration with Industry in Deep Tech Materials

Objective: Building strong partnerships with industry leaders in advanced material science, ensuring that the training is aligned with the latest market demands and providing learners with hands-on experience.

Actions:

- Partnering with companies consisting of leaders in both green technology and material science so that training reflects the latest industry needs and advancements.
- Companies can conduct workshops on deep tech materials and green technologies in their facilities or through virtual tours, allowing learners to see material applications in sustainable manufacturing and material innovation.

4. Addressing Skills Gaps and Curriculum Mismatches in Material Science

Objective: Ensuring that the curriculum is designed with input from industry stakeholders, addressing both current market needs and future trends. Regularly updating the curriculum to stay aligned with evolving industry requirements, particularly focusing on green skills and automation. The curriculum will also include information on deep-tech materials with input from industry stakeholders and regularly updated to reflect evolving market needs and trends in advanced materials.

Actions:

- Involving material science and green skills experts and researchers to co-design the curriculum, ensuring that learners acquire the most relevant skills.
- Annual curriculum reviews with industry partners to update the training material based on new advancements in green technologies.

Effective approaches for enhancing industry engagement and overcoming resistance to changes

Objective: To enhance industry engagement with the curriculum and facilitate the adoption of new practices by addressing resistance to change within the sector.

Actions:

- The establishment of collaborative curriculum development forums, involving industry representatives, educators and stakeholders, will ensure alignment with industry needs and foster a sense of ownership and commitment to the changes.
- Offering targeted training sessions for industry professionals with a focus on the benefits and applications of the curriculum elements. In addition, successful case studies and practical examples should be presented to demonstrate the value of adopting those practices.

5. Continuous curriculum assessment and enhancement

Objective: To ensure that the curriculum remains relevant and responsive to regulatory changes, industry demands and technological advancements.

Actions:

- Establishing committees consisting of industry experts, educators and state representatives to provide ongoing input and guidance on curriculum content and updates based on current trends and requirements.
- Implementing a structured review process for regular curriculum evaluations, incorporating feedback from students, employers and educators to facilitate timely updates that address changes in policies, labour market needs and compliance standards.

Conclusions

The report on Skills Identification and Assessment Guidelines has gathered several aspects of previous EU initiatives and projects that are dealing with green and/or blue skills in the boat building sector with the aim to transform Europe's maritime and boat construction industries.

Based on the adopted methodology project partners have selected and evaluated 23 initiatives and projects from the European Union to identify potential gaps or areas in training of boat building sector. The most commonly used method for identifying green skills in the analyzed projects is the Skills Gap and Market Needs Analysis. This method enables projects to identify the competencies needed for the transition to sustainable practices and green technologies by researching and analyzing market demands and emerging sustainability trends.

The report follows a robust structure that includes the mains stages of the assessment, such as showcasing results by industries, levels and target groups, assessing different regions and the presence of virtual or remote learning. Later on the report is followed by analysis of the identified skills and the SWOT analysis that examines the various EU-funded maritime skill development projects to outline strengths, weaknesses, opportunities, and threats. This analysis informs TECoNaut's training objectives and its integration of green technologies in boatbuilding and repair, complementing other projects like MATES and SkillSea.

The report has identified several valuable and innovative outcomes and skills. The main concluding points on the detected skills are the following:

- Holistic approaches ensuring sustainability, energy efficiency, circular economy principles -in natural resources management, waste reduction, adoption of eco-friendly materials,
- Understanding safety protocols and regulatory compliance, risk management, cybersecurity,
- Advancement of digital tools and software, energy-efficient and offshore operations, control and optimization skills, mathematical modelling, data analytics,
- Art and functionality of traditional shipbuilding, working with natural materials,
- Soft skills and interpersonal, cognitive and practical abilities: problem-solving, critical thinking, creativity, communication, stakeholder engagement, fostering partnerships, multitasking, leaderships, decision making.

The SWOT analysis enriched the report with an even deeper assessment and understanding of the 23 EU-funded maritime skill development projects, projecting training objectives for the TECoNaut project and helping the integration of green technologies in boatbuilding and repair. The conclusing marks on the SWOT are the following:

- **Strengths:** Emphasis on sustainability, strong collaboration networks, and integration of digital technologies and skills certification are common strengths across projects, equipping the workforce for a greener economy.
- **Weaknesses:** Industry resistance to change, limited technological infrastructure, and curriculum adaptation challenges hinder progress in incorporating new technologies and sustainable practices. institutions and workers hesitant to adopt new methods and technologies, limited digital infrastructure or outdated facilities, which hinder the adoption of new technologies.
- **Opportunities:** Growth in the blue economy, demand for sustainable practices, and advanced materials offer significant opportunities for curriculum innovation and industry collaboration. to improve the skills of the workforce while preserving traditional craftsmanship. Projects in this category can seize the opportunity to promote sustainable practices and green skills within the industry. By collaborating with universities, industry leaders, and stakeholders, projects can create robust partnerships that facilitate knowledge sharing and resource allocation.
- **Threats:** Rapid technological and regulatory changes, funding challenges, and potential policy shifts present risks to the longevity and relevance of training programs. Low interest and engagement from industry stakeholders is a significant risk. Inadequate funding can severely limit the ability of projects to invest in essential tools, technologies, and skilled personnel needed for long-term success.

After the outcomes of the SWOT analysis, the TECoNaut project has identified main training objectives:

- **Design training programs** that cover cross-sector competencies in deep tech materials, combining different disciplines such as shipbuilding, transport, and green technologies, with a focus on how advanced materials are used across these sectors. For this industrial collaboration is needed.
- **Build modules** that further promote the value of change and innovation in traditional industries. For this, training of professionals in traditional industries are needed with case studies from companies successfully transitioned to green practices.
- **Strong partnerships** with industry leaders in advanced material science is fundamental.

Therefore, companies in green technology and material science should come together in an active manner such as workshops on deep tech materials and green technologies in their facilities or through virtual tours, allowing learners to see material applications in sustainable manufacturing and material innovation.

- **Establishing committees** with industry experts, educators and state representatives, so they provide ongoing input and guidance on curriculum content and updates based on current trends and requirements.

In conclusion, the Skills Identification and Assessment Guidelines report emphasizes the importance of integrating green and blue skills into the boat building sector to support Europe's shift toward sustainable maritime practices.

By analyzing 23 EU projects, the report identifies essential competencies such as sustainability, regulatory compliance, digital skills, and traditional craftsmanship, which are critical for meeting market needs. The SWOT analysis further reveals strengths in collaborative networks and sustainability focus, while noting challenges like industry resistance and funding constraints. The TECoNaut project's primary training objectives aim to bridge skill gaps by fostering cross-sector competencies, advancing partnerships in green technology, and designing adaptable curricula that promote sustainable innovation and resilience in boat building.

Annex

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ANNEXES I.

In the following section you can read further information and details about the Methodology of the analyzed projects.

MATES

1. Desktop Research - the project starts with extensive desktop research, analyzing a wide range of sources like official reports, statistics, and scientific studies to understand current trends in maritime sectors like shipbuilding and offshore renewable energy. This step establishes the baseline knowledge about skill shortages and future needs.

2. Data Collection Instruments & Techniques- Quantitative Methods: this involves gathering numerical data, primarily through surveys and analysis of official statistics.

his provides a broader picture of trends and demands in the workforce. Qualitative Methods: In-depth insights are collected through interviews with industry stakeholders such as employers, vocational educators, maritime experts, and employees. These interviews capture experiential data, feedback, and perceptions that quantitative data may not fully reveal.
3. Piloting & Experimentation - the MATES project sets up 11 pilot case studies to test the strategies developed through research and consultations. These pilots experiment with the application of new digital and green skills, as well as innovations in training programs and ocean literacy initiatives. The objective is to validate the project's theoretical frameworks by applying them to real-world scenarios. These pilots focus on:
·Digital Skills: Training for Industry 4.0 technologies such as automation, robotics, and AI in maritime industries.
·Green Skills: Addressing sustainability through renewable energy applications and environmentally friendly shipbuilding techniques.
·Mobility & Innovation Management: Enhancing workforce adaptability and the implementation of new maritime technologies.
·Curricula Development: Ensuring educational programs align with the evolving needs of the industry.
This methodology is comprehensive, integrating theoretical research, quantitative/qualitative data collection, and practical experimentation to ensure the project delivers actionable, real-world results that address both current and future skills gaps in the maritime industry.

SeaSkills

1. Desktop Research: The project begins by reviewing official reports, scientific studies, and statistics from maritime industry stakeholders. This helps map current and future trends, focusing on workforce challenges, skills shortages, and the impact of digitalization and sustainability in the maritime sector.
2. Data Collection Instruments and Techniques:
·Quantitative methods: Surveys and statistical analysis are employed to gather wide-ranging data from maritime professionals about skill requirements, workforce demands, and current practices.
·Qualitative methods: Semi-structured interviews with experts, focus groups with stakeholders, and industry representatives help gain deeper insights. These methods capture experiential knowledge and attitudes toward future trends, such as digitalization and sustainability. This helps uncover nuanced gaps in skills and training.
3. Piloting & Experimentation: The SkillSea project emphasizes real-world testing through pilot programs. These pilot studies aim to validate new educational packages and training modules designed to address the skills gaps identified. For example, the project pilots educational content focused on digital skills, green technologies, and leadership in the maritime sector, ensuring their practical applicability and scalability across Europe.

UMTMS - Usage of Multipurpose Tasks in Maritime Simulation

The methodology of the project includes:
1.Desktop Research: Reviewing relevant reports and studies to define industry needs.
2.Piloting & Experimentation: Developing and testing simulations with scenarios that replicate real-world maritime machinery challenges, aimed at enhancing vocational education.
So, it primarily focuses on practical, simulation-based training rather than surveys or interviews.

Green Diving

The Green Diving project methodology includes:
1.Desktop Research: Analyzing existing data on green skills, sustainability, and maritime practices.
2.Data Collection: Interviews with VET institutions and maritime sector stakeholders to identify training needs.
3.Pilot Experiences: Testing new educational materials, such as the Digital Toolkit for Green Skills and Green Skills Courses for teachers, in VET schools to ensure effectiveness.
4.Dissemination: Sharing results through reports, educational resources, and conferences, ensuring the materials are integrated into VET maritime curricula and institutions.

USWE - UPSKILLING SHIPBUILDING WORKFORCE FOR EUROPE

The methodology of the USWE project involves several key components:
1.Surveys and Data Collection: The project conducted surveys targeting shipbuilding companies and workers to identify skills gaps, particularly in adopting Industry 4.0 technologies and green technologies.
2.Forecasting and Analysis: Using the data, the project analyzed the future demand for skills and how new technologies like AI, robotics, and 3D printing will affect occupations in shipyards.
3.Curriculum Development: Based on the skills identified, the project updated 25 VET professional profiles and developed training programs that align with future workforce needs.
4.Dissemination and Validation: The findings and recommendations were disseminated through reports, workshops, and online platforms to reach industry stakeholders and policymakers, ensuring the long-term impact of the project.

DigiWIND - Digital Skills in Wind Industry

The DigiWind project likely focuses on addressing skills gaps in the wind energy sector, particularly through digitalization and technological advancement. Like similar projects, it may involve a methodology that includes:

.Desktop Research: Analysis of reports and industry data to identify technological needs in wind energy.
2.Data Collection: Surveys and interviews with industry experts to determine skills gaps.
3.Curriculum Development: Creating training modules focused on digital technologies relevant to the wind energy sector.
4.Piloting and Dissemination: Testing the training programs and sharing results through industry reports and conferences.

AHOD - All Hands on Deck

The AHOD (All Hands on Deck) project employs a comprehensive methodology focused on preservation and training. It uses:
1.Desktop Research: Gathering historical documents, studies, and interviews with professional shipwrights across Europe to build a digital repository.
2.Data Collection: Collecting and curating shipwright techniques, then adapting them into contemporary e-learning content for adult learners.
3.E-learning Platform Development: Creating accessible training materials in multiple languages, tailored to professionals in woodworking-related industries.
4.Mentorship Programs: Facilitating intergenerational knowledge transfer through a "training-for-trainers" approach.

DigiFloDock

The DigiFloDock project methodology incorporates the following elements:
1.Desktop Research: Review of available digital twin systems and numerical simulation solutions used in similar floating dock projects and analysis of existing technologies and best practices to identify improvements in the efficiency and safety of floating dock operations.
2.Data Collection: Sensor Monitoring - Installation of sensors on the floating dock to monitor key operational parameters, including draft, trim, structural stresses, ship-induced loads, real-time data collection to understand the dock's behavior in various operational conditions. Numerical Simulations: the collected data is used in numerical simulations to model the dock's stability and strength, supporting the analysis of potential operational risks.
3.Qualitative Methods. Expert Collaboration: Consultations with marine engineering experts and dock operators to capture practical challenges and insights related to docking operations. This qualitative feedback helps refine the technical solutions, ensuring they address real-world needs effectively.
4.Piloting & Experimentation: Scale model tests are conducted under laboratory conditions to validate the numerical simulations. These tests assess the accuracy of simulations and provide real-time monitoring of operational parameters such as pump and valve system controls, responses that could approach stability and strength limits.

Design of an ecological water ferry

1.Desktop Research: Comprehensive review of literature on eco-friendly watercraft technologies, focusing on photovoltaic advancements, electric motor efficiency, and regulatory changes to support a shift from traditional combustion engines to electric and solar-powered alternatives. Exploration of hull and propulsion system designs to optimize energy efficiency.
2.Data Collection. Quantitative Data: Use of computational fluid dynamics (CFD) simulations to optimize hull design and assess hydrodynamic properties. Analysis included construction costs, operational efficiency, and feasibility through statistical comparison of design scenarios. Qualitative Data: Interviews with industry experts and potential users to gain insights on practical design considerations like user needs, safety, and aesthetics.
3.Piloting & Experimentation: Model testing of the hull design to validate hydrodynamic performance and ensure compliance with environmental and safety standards. Testing the electric propulsion system for energy efficiency before scaling up to full production.

Green Small Craft

1.Desktop Research: Analysis of existing literature and technologies related to onboard systems for small high-speed crafts (HSCs), focusing on automation and digitalization solutions. Identification of potential systems and equipment that could be adapted for HSCs, considering their unique operational needs.
2.Stakeholder Engagement: Compilation of a list of industrial stakeholders and potential partners in Poland to form a consortium for the main project. Identification of research gaps and challenges based on the gathered information.
3.Qualitative Analysis: Review of related current and past projects to find synergies and opportunities for collaboration. Evaluation of potential solutions in terms of safety, reliability, and energy efficiency, ensuring they are adaptable to the specific characteristics of HSCs.

A pan-European network of Ocean Tribology

1.Desktop Research: Comprehensive review of studies, technologies, and best practices related to tribological challenges in marine environments, focusing on friction, wear, and lubrication in harsh oceanic conditions. Analysis of data from offshore platforms, wave and tidal generators, and subsea equipment to identify areas for improvement in sustainable, energy-efficient technologies.
2.Quantitative Methods: Use of simulations and models to assess the tribological behavior of materials, focusing on wear, energy consumption, durability, and ecological impact through experimental data collection.
3.Qualitative Methods: Expert consultations and interviews with engineers and researchers across Europe to gather practical insights on challenges and opportunities in designing reliable, sustainable ocean systems.

.Piloting & Experimentation: Creation of test environments to simulate real-world marine conditions, testing materials and systems for friction, wear resistance, and lubrication effectiveness. Validation of systems to ensure reliability, sustainability, and minimal environmental impact under extreme ocean conditions like high salinity, pressure, and motion.

ZeroWastePorts

1.Desktop Research: Comprehensive review of global solutions, regulations, and technologies related to marine waste management. Analysis of best practices in waste collection vessels (WCVs) and existing systems for waste collection and processing from ships and coastal areas, providing a foundation for developing an environmentally compliant vessel design.
2.Quantitative Methods: Use of advanced simulation tools to optimize the vessel's waste collection capabilities, energy consumption, and operational efficiency. Cost analysis and feasibility studies conducted with statistical models to evaluate the design's financial and operational viability.
3.Piloting & Experimentation: Model testing to verify the hydrodynamic properties of the WCV, ensuring stability, maneuverability, and waste collection efficiency in various environmental conditions. Experiments focused on assessing the vessel’s practicality, energy efficiency, and safety before moving on to full-scale production.

GREEN

The GREEN project methodology incorporates three key elements:
1.Desktop Research: Gathering and analyzing existing data on green skills and sustainability within various industries.
2.Interviews: Engaging with stakeholders, such as educators and industry professionals, to gain insights into the current training needs and gaps related to green skills.
3.Pilot Experiences: Testing and evaluating the integration of green skills modules into VET curricula to assess their effectiveness in real-world educational settings.

LeaderSHIP

The LeaderSHIP project's methodology involves several key components:
1.Gap Analysis: Identifying skill gaps in the maritime and shipbuilding sectors, focusing on digital transformation and environmental sustainability.
2.Stakeholder Engagement: Consulting with industry leaders, educational institutions, and policy makers to define the necessary skills and competencies. They make use of surveys.

1.Training and Development: Designing and implementing training programs for both current and future workers in areas like digitalization, green technologies, and Industry 4.0.
2.Collaboration: Fostering partnerships between companies, educational bodies, and regional clusters to promote knowledge exchange and innovation across Europe.

Greenovet

The methodology for the GREENOVET project involves a comprehensive research approach structured into three main phases: preparation, implementation, and results.
1.Preparation Phase: This phase included the collection of inputs from stakeholders, workshops, and qualitative analyses. Stakeholders' involvement was vital, and they were engaged through regional workshops to understand their perspectives.
2.Implementation Phase: This involved conducting surveys and interviews with key stakeholders, such as VET providers and industry representatives, to identify regional skills gaps, particularly in green innovation. The data was collected and analyzed to assess these gaps.
3.Results Phase: The analysis results were used to create recommendations for educational institutions and develop self-assessment tools for VET providers.

Next BlueGeneration

The Next BlueGeneration project methodology includes the following components:
1. Research and Data Collection: Developing a comprehensive database of career paths within the Blue Economy sectors through collaboration with industry experts. The methodology for creating the Next BlueGeneration database involves collaboration with industry experts to compile over 200 career and training paths in sectors such as Nautical Tourism, Maritime Transport, and Marine Conservation.
2.Interactive Tools: Creation of digital tools like the BlueGeneration Game and Blue Careers Pathway Tool, which engage young people through gamification and self-assessment for career exploration.
3.Teacher Support: A MOOC course for educators is developed to train them in promoting Blue Economy careers and guide students using the tools.
4.Outreach and Promotion: Involving youth through events, workshops, and education to attract them to Blue Economy sectors.

Construction Blueprint

The Construction Blueprint project follows a comprehensive methodology designed to address the skills gaps in the construction industry, especially concerning energy efficiency, digitalization, and the circular economy. Key aspects of their approach include:
1.Status Quo Analysis: Examining the current landscape of the construction sector and identifying key factors influencing skill needs.
2.Roadmap and Action Plan Development: Establishing a clear strategy to enhance skills cooperation.
3.VET Curriculum Development: Creating and adapting training programs to meet national needs.
4.WatchTower Tool: Using Big Data methodologies to anticipate future skills needs.
The project also fosters collaboration through the Sector Skills Alliance and emphasizes outreach to promote construction careers.

BluePorts

The Blue Ports project uses a comprehensive methodology designed to address skills shortages in European ports to support their green transition. This involves several key steps:
1.Baseline Analysis: Mapping existing training and certification initiatives related to the blue economy in ports, focusing on countries like Georgia, Greece, Italy, Spain, and the EU. This phase helps identify relevant gaps and training needs in the sector.
2.Training Development: Creation of tailored, digitalized training material focusing on green technology solutions, with content covering climate change, energy transition, circular economy, and more.
3.Certification Scheme: Designing a new certification scheme compliant with ISO/IEC 17024 standards to ensure mutual recognition across Europe. It aims to validate new skills in green practices.
4.Pilot Testing: Testing and validating the operational certification scheme in select Mediterranean and Black Sea countries.
5.Collaboration and Synergies: Establishing partnerships and synergies with other EU projects and blue economy stakeholders to ensure the uptake and success of training programs.

Circles of Life (not educational project)

The Circles Of Life project methodology involves a multi-step approach focused on reducing emissions, enhancing material circularity, and improving environmental reporting in shipbuilding. The project is developing tools like the Shipyard Environmental Performance Index (SEPI) and the Cradle to Cradle (C2C) Ship Passport to track environmental footprints and promote sustainable practices. By integrating smart software for data collection and life cycle assessments, CirclesOfLife enables shipyards to meet new environmental regulations. Collaboration among shipyards, technology providers, NGOs, and industry experts ensures comprehensive solutions to sustainability challenges.

Summary

The summary of the methodology description is given in the table, which contains the infomation about project's cathegory, main focus and key methods.

ANNEXES II.

In the following section you can read further information and details about the SWOT analysis of the two selected projects: MATES and SkillSea

Table 1 Indicative Projects SWOT Analysis Results

MATES (Maritime Alliance for fostering the European Blue Economy through a Marine Technology Skilling Strategy). Completed 2023.	***Strengths***: Focus on future skills: MATES addresses the skills needed for the growth of the Blue Economy, particularly in shipbuilding and offshore renewable energy. Collaboration between key actors: The project has a strong network of stakeholders in the maritime industry, research centers, and education, which reinforces the relevance and impact of the project. Use of innovative technologies: MATES promotes the use of digital and green technologies in the maritime sector, ensuring that workers are trained in the skills of the future. ***Weaknesses***: Resistance to change: As in many technological transformation projects, there is some resistance in the industry to adopting new technologies and methods. Implementation challenges: Adapting and updating training programs to meet new needs can be a long and complicated process, especially in more traditional sectors like maritime. ***Opportunities***: Growth of the Blue Economy: The blue economy is expanding in Europe, and the MATES project benefits from this growth by providing a platform to develop and enhance the necessary skills for this sector. EU support: European Union policies promoting sustainability and digitalization offer key backing to the project, especially regarding funding and the implementation of new technologies. ***Threats***: Regulatory changes: The evolution of labor and environmental policies may influence the demand for certain skills or delay the adoption of new technologies. Rapid technological advancements: The fast pace of digital technological development could render some programs or skills obsolete sooner than expected, requiring constant updates.

SkillSea (Futureproof Skills for the Maritime Transport Sector), completed 2022.	***Strengths***: Pan-European collaboration: SkillSea brings together a strong network of stakeholders, including educational institutions, maritime companies, and authorities, which enhances its impact on the training of maritime professionals. Focus on sustainability and digitalization: The project aligns with current trends in sustainability and digitalization in the maritime industry, providing crucial training in these areas. Support for labor mobility: By improving workers' skills, it facilitates mobility between maritime and land-based jobs, expanding employment opportunities. ***Weaknesses***: Resistance to adopting new technologies: The transition towards digitalization and green skills may face resistance from more traditional institutions and professionals. Challenges in updating curricula: Adapting existing educational programs to meet new technological and sustainable needs can be a slow and complicated process. ***Opportunities***: Growth of the blue economy: The blue economy in Europe is booming, offering significant opportunities for SkillSea to position itself as a leader in the training of professionals for this industry. EU policies: European Union initiatives to promote sustainability and ecological transition directly support the project's goals. ***Threats***: Changes in labor regulations: Fluctuations in European labor policies could affect the demand for certain skills or workers' mobility. The fast pace at which digital technologies evolve could quickly render some of the programs and skills taught in the project outdated.

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