

POSITION PAPER

EU INNOVATION ACT

Call for evidence for an impact assessment
(01.10.2025_Final)

The Shipyards & Maritime Equipment Association of Europe (SEA Europe) represents the European maritime manufacturing industry in 17 countries, encompassing **the production, maintenance, repair, retrofit and conversion of all types of ships and floating structures – commercial as well as military – including the full supply chain with the various producers of maritime systems, equipment material, and services.**

This document represents SEA Europe's response to the [Call for Evidence](#) for the impact assessment of the forthcoming **European Innovation Act**. The [Competitiveness Compass for the EU](#) identified the European Innovation Act as one of the key initiatives for closing the innovation gap between the EU and its global competitors – one of the three transformational imperatives to strengthen Europe's competitiveness.

Shipbuilding lacks the scale and volume production found in high-series industries such as automotive, aerospace, and rail. As a result, it's essential to recognize that the **R&D costs inherent to shipbuilding demand incremental investments to scale up clean technologies**—particularly to meet targets like the European GHG net-zero emission objectives. Transitional funding is especially critical between the demonstration phase—when a technology is first installed onboard a vessel, typically by early adopters—and full deployment, when the technology reaches industrial maturity and becomes scalable and commercially viable.

The upcoming EU Innovation Act holds the potential to play a pivotal role by providing innovative companies in the maritime manufacturing sector with access to European research and technology infrastructures, intellectual assets from publicly funded research and innovation, and regulatory sandboxes for testing new ideas. Streamlining regulations will accelerate the **deployment of groundbreaking shipbuilding processes to build innovative ships** and , fostering innovation and enhancing the industry's global competitiveness. The innovative dimension of the maritime manufacturing industry, as well as its high R&D intensity, in a context of global competition for technological leadership.

OVERVIEW OF RECOMMENDATIONS

- A. EU to prioritize maritime innovation through venture capital access, testing environments, and stronger public-private collaboration
- B. EU to support maritime innovation and AI-driven digital transformation to achieve a zero-emission, resilient, and globally competitive shipbuilding sector
- C. EU to ensure strong cybersecurity measures to protect digitalized maritime assets and ensure sector resilience
- D. EU to establish an harmonized EU digital standards to boost maritime innovation, global leadership, and digital sovereignty
- E. EU to ensure a balanced implementation of the Data Act that protects sensitive industrial data while enabling innovation and fair data access
- F. EU to ensure stronger protection of maritime research to safeguard EU innovations and maintain technological leadership

SEA EUROPE RECOMMENDATIONS

The maritime manufacturing sector faces several challenges in driving innovation. These include fragmented regulatory frameworks across EU Member States, which hinder the swift adoption of new technologies. Limited public-private collaboration slows down funding and development of cutting-edge solutions, while concerns over research security risk exposing European advancements to foreign exploitation. Additionally, integrating complex digital technologies—such as AI, Digital Twins, and IoT—across the full lifecycle of ships demands significant investment, standardization, and skilled workforce adaptation. Without coordinated efforts, these barriers could delay the sector’s transition toward a greener, smarter, and more resilient future.

SEA Europe’s contribution aligns with our broader recommendations for the upcoming **Industrial Maritime Strategy**, which seeks to enhance the competitiveness, sustainability, and resilience of Europe’s maritime manufacturing sector. In this regard, **the Industrial Maritime Strategy will enable coherent connection between the ‘maritime’ elements of various legislative instruments, including the Innovation Act.**

- A. EU to prioritize maritime innovation through venture capital access, testing environments, and stronger public-private collaboration

SEA Europe calls for a bold and transformative approach to maritime innovation, urging the European Innovation Act to explicitly prioritize the maritime sector as a strategic pillar of Europe’s sustainability and digitalization goals. Innovation in shipbuilding and maritime equipment is essential to achieving these objectives, particularly through the development of digital and sustainable technologies.

To support this ambition, SEA Europe advocates for improved access to venture capital. Equally important is the establishment of supportive testing environments—known as “sandboxes”—which allow innovators to experiment, validate, and refine technologies under real-world conditions without regulatory constraints. This fosters experimentation, accelerates development, and helps align emerging solutions with safety and compliance standards before full-scale deployment.

In addition, SEA Europe emphasizes the importance of fostering stronger collaborations between public institutions and private enterprises. Such partnerships can accelerate funding for research, speed up the development of innovative technologies, and ensure the rapid deployment of zero-emission and digital solutions across the maritime sector.

To further drive collective progress, SEA Europe proposes the creation of innovation hubs where stakeholders can converge, exchange knowledge, and co-create solutions. These hubs will help maintain Europe's leadership in maritime innovation and ensure the industry remains at the forefront of technological advancement.

B. EU to support maritime innovation and AI-driven digital transformation to achieve a zero-emission, resilient, and globally competitive shipbuilding sector

The European maritime manufacturing sector plays a central role in the EU's ambition to build a zero-emission, sustainable, and digital waterborne transport system and blue economy. By 2030, the industry aims to deliver market-ready zero-emission technologies aligned with the Commission's Sustainable and Smart Mobility Strategy. This initiative is designed to strengthen European sovereignty, reduce strategic dependencies, and enhance the resilience of the maritime value chain in an increasingly digital world.

To achieve these goals, the sector is leveraging its technological innovation capacity to develop zero-emission, digital, and automated systems. Collaboration between naval and commercial segments is proving essential in driving innovation while maintaining cost efficiency.

Research and development in areas such as energy-efficient platform systems (including innovative propulsion, HVAC management, and onboard smart energy management), advanced ship management and navigation systems, and ship electrification (hybrid and electric propulsion, batteries, storage, and energy management) is providing the EU maritime industry with a strategic edge.

A key component of this transformation is the integration of advanced digital technologies. The sector is moving toward a comprehensive lifecycle digital ecosystem, aspiring to industry 5.0 and beyond. This ecosystem will enable seamless collaboration between humans and machines, empowering individuals and making the maritime industry safer, more efficient, and more purposeful. Technologies such as Digital Twins for deterministic systems, Artificial Intelligence, Data Management, Machine Learning, and the Internet of Things (IoT) are set to revolutionize every phase of a ship's lifecycle, including its end-of-life recycling process.

SEA Europe strongly supports the development of a dedicated AI Strategy under the AI Factories Initiative, tailored specifically to the needs of the shipping and maritime manufacturing sectors. Artificial Intelligence and supercomputing have the potential to transform ship design, optimize shipyard operations, and enable the development of autonomous vessels.

These technologies will significantly enhance productivity, safety, and environmental performance across the maritime value chain. By investing in sector-specific AI applications, Europe can reinforce its global competitiveness and ensure its maritime industry remains at the forefront of technological advancement.

Embracing this full-lifecycle perspective is not only visionary but also opens new business opportunities. Collaborative platforms that connect shipowners, operators, and manufacturers will drive performance improvements and foster the creation of innovative services, further strengthening Europe's leadership in maritime technology.

C. EU to ensure strong cybersecurity measures to protect digitalized maritime assets and ensure sector resilience

In an increasingly digitalized maritime environment, cybersecurity is a foundational requirement. SEA Europe highlights the urgent need to implement the European Cyber Resilience Act effectively within the maritime (manufacturing) sectors.

Digitalized ships and shipyards, including systems such as digital twins and smart energy platforms, are vulnerable to cyber threats that could disrupt operations or compromise safety.

Establishing robust cybersecurity frameworks will protect critical infrastructure, ensure operational continuity, and build trust among stakeholders. This is essential for maintaining the resilience of Europe's maritime sector in the face of evolving digital risks.

D. EU to establish an harmonized EU digital standards to boost maritime innovation, global leadership, and digital sovereignty.

SEA Europe advocates for the global promotion of EU digital standards in maritime technologies to position European shipbuilders and equipment manufacturers as leaders in vessel digitalization. By influencing international norms in areas such as AI, cybersecurity, and data governance, Europe can safeguard its digital sovereignty and counterbalance the dominance of US and Asian models in cloud storage, intellectual property rights, standardization protocols, and digital platforms.

To support this, SEA Europe also calls for the harmonization of regulatory frameworks across the EU to streamline innovation processes. Standardized regulations will reduce bureaucratic hurdles, making it easier for companies to innovate and bring new technologies to market.

In this respect, in the maritime manufacturing sector, the 28th Regime could facilitate the rapid adoption of innovations—such as digital and zero-emission technologies—by offering a simplified legal environment for creation, cross-border collaboration, and intellectual property protection, for example through the Harmonised Digital Rules. It would also help reduce administrative burdens and accelerate R&D projects, while strengthening Europe's competitiveness against major global economic blocs.

Furthermore, the development and enforcement of clear standards for emerging technologies—such as AI, Digital Twins, and IoT—will ensure their safe and effective integration into the maritime ecosystem, build trust among stakeholders, and accelerate the adoption of transformative innovations.

E. EU to ensure a balanced implementation of the Data Act that protects sensitive industrial data while enabling innovation and fair data access

While the European Data Act aims to promote fairness and accessibility in the data economy, SEA Europe stresses the importance of balancing these goals with the protection of sensitive industrial information.

In the maritime manufacturing sector, data often contains proprietary insights and strategic know-how that must be safeguarded. SEA Europe calls for a nuanced implementation of the Data Act that supports data sharing and innovation while ensuring confidentiality and security.

This balance is critical to maintaining trust among industry players and protecting Europe's technological edge.

F. EU to ensure stronger protection of maritime research to safeguard EU innovations and maintain technological leadership

Protecting maritime research from foreign exploitation is vital to preserving Europe's leadership in sustainable and defence-related technologies. SEA Europe supports initiatives that enhance research security, ensuring that innovations developed within the EU remain under European control.

This includes safeguarding intellectual property, securing research data, and promoting strategic autonomy in maritime R&D. By securing its research base, Europe can continue to lead in the development of advanced shipbuilding technologies and maintain its competitive advantage in global markets.

By implementing these recommendations, the European maritime manufacturing sector can continue to lead in sustainable innovation, securing a competitive edge in the global arena and paving the way for a greener, smarter future.

ANNEX - Pathway towards maritime manufacturing industry 5.0

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The European Maritime Technology industry is on a transformative journey towards Industry 5.0, driven by the need for zero-emission, sustainable, digital, and autonomous technologies. Whilst Industry 4.0 relies to robots and autonomous machine for repetitive, safety or precision tasks (using Internet of Things, Artificial Intelligence, Machine Learning), Industry 5.0 goes a step further by combining advanced technologies with human skills and competencies.

In this respect, SEA Europe would like to present a potential **sequential pathway illustrating how the industry can evolve toward Industry 5.0.**

Step 1: Initial digitalization and technological integration

- **Digitisation and digitalisation:** The digitalisation journey in the maritime manufacturing industry begins with digitizing all operational data and adopting digital technologies across business models with sovereign data centres and data management, improving efficiency, transparency, and strategic integration. This stage lays the foundation for a data-driven ecosystem with data-centric digital architectures, driving innovation, automation, and enabling real-time collaboration and interconnectivity.

Definition matters: The Digitalisation is the broad transformation of societal and business models through the adoption and strategic integration of digital technologies. Research, development and implementation will focus on programs to improve efficiencies, enhance customer experience, provide new opportunities, enable automation, drives innovation and results in a more agile and competitive organization.

- **Smart ship design:** Advanced modelling tools, digital twins, onboard computing and Model-Based Systems Engineering (MBSE) will revolutionize ship design. This will minimize physical prototypes, reduce costs, and improve safety and ship's resilience by enhancing decision-making and efficiency in design and development, including battle damage control system.

What does step 1 implies?

The initial digitalization and technological integration of the European Maritime manufacturing industry create a strong foundation for improved operational efficiency and data accuracy and sovereignty. This transformation can enhance competitiveness, fostering a culture of innovation. However, the transition may face significant challenges, including high initial investment costs and potential resistance from traditional stakeholders accustomed to legacy systems.

Opportunities abound in leveraging advanced technologies to streamline processes, optimize resource management, and reduce operational costs. Yet, the rapid pace of technological advancements poses a threat of obsolescence, potentially rendering initial investments outdated if they are not continually updated. A sustained pace of R&D supported by specific financial instruments is essential.

Step 2: Scaling and Implementing Advanced Technologies

- **Smart manufacturing and production:** Robotics, Artificial Intelligence, Virtual Reality, Augmented Reality, Digital Twins of shipyards and ships, data management and the Internet of Things (IoT) will become central to shipbuilding. Automated production lines will enhance precision, reduce human error, and speed up manufacturing, while integrated data systems will streamline shipyard operations and ship design.
- **Upskilling the workforce:** To support these technological advancements, the industry will need to upskill the workforce, particularly in robotics, cobotics, data analysis, digital infrastructures and platforms and IT systems, creating a digitally proficient workforce that can manage and operate advanced systems.

What does step 2 implies?

Scaling and implementing advanced technologies within the maritime manufacturing sector can significantly enhance competitiveness by integrating innovations such as artificial intelligence and the Internet of Things (IoT). This shift enables improved productivity and reduced emissions, aligning with sustainability objectives. Nevertheless, the complexity of these systems may result in implementation challenges, leading to potential disruptions during the transition period.

The opportunity to improve overall operational efficiency and the potential for new service offerings in the maritime industry are substantial. However, the threat of failure in scaling these technologies could undermine the digital transformation efforts and limit the industry's ability to capitalize on these advancements. This calls for an accelerated, ambitious R&D support plan.

Step 3: Enabling autonomous operations and connectivity

- **Autonomous and smart ship operations:** Ship automation, leveraging AI-based decision systems, will enhance operational efficiency. Digital Twins, predictive maintenance, and sensor-equipped vessels will ensure real-time¹ monitoring of ship systems, improving safety and reducing downtime. Seamless integration across the supply chain will be achieved through smart contracts and transparency in component traceability.
- **Cybersecurity and digital infrastructure:** Robust cybersecurity measures and reliable digital infrastructure adapted to evolving threats will safeguard data and enable secure communication between ships, unmanned vehicles (UxVs) and ports, facilitating the future of fully autonomous and crewless vessels.

What does step 3 implies?

Enabling autonomous operations and connectivity can markedly improve efficiency and safety within the shipping and maritime manufacturing sectors, allowing for fault tolerant and resilient communication, and reduced human error. This advancement strengthens the industry's competitive position in a rapidly evolving global market. However, increased reliance on technology raises concerns about operational resilience and potential vulnerabilities.

Opportunities for market expansion exist through the introduction of innovative autonomous maritime solutions, which can attract new business ventures. Conversely, heightened cybersecurity

¹ The concept of 'real-time' is not clearly defined, as there will always be a delay in communication, particularly between ship and shore. Therefore, we typically refer to an acceptable delay in communication.

risks associated with increased connectivity pose significant risks, as any disruptions in data security could compromise safety and operational integrity. Considering European data sovereignty (inc. cloud) is key.

Step 4: Lifecycle management and continuous optimization

- **Integrated supply chain management:** Digitalized approaches will optimize ship's management, ensuring transparency, quality control, and sustainability. Lifecycle monitoring of ships, supported by AI algorithms, will enhance operational efficiency, predicting maintenance needs and extending vessel lifespans. The development of Virtual Reality and Augmented Reality tools will also be major contributors.
- **Collaboration on digital platforms:** European Digital Platforms and ecosystems will emerge, enabling stakeholders to collaborate, monitor, and optimize ship performance throughout its lifecycle, enhancing productivity and sustainability.

What does step 4 implies?

Effective lifecycle management and continuous optimization enhance operational performance through data-driven decision-making and predictive maintenance, ultimately extending vessel longevity. By focusing on long-term performance, efficiency and capability, this approach can yield substantial cost savings and improve sustainability. However, ongoing investment in technology, simulation and training is essential to achieve these benefits, which can strain resources.

The opportunity to drive continuous improvement and stay ahead of regulatory demands is significant, providing a pathway to competitive advantage. Nonetheless, changes in regulations can impact established lifecycle strategies and operational protocols, introducing potential risks to Europe's sovereignty, compliance and performance.

Step 5: End-of-life and sustainable recycling

- **Sustainable ship recycling:** The final phase involves integrating digitalization into ship recycling. Digital Twins will store comprehensive information on ship construction, retrofits, and hazardous materials, allowing for safer, environmentally sound recycling practices. This will help drive economic, environmental, and social sustainability.

What does step 5 implies?

Focusing on end-of-life and sustainable recycling practices significantly promotes environmental sustainability within the shipping and maritime manufacturing sectors. By utilizing digital monitoring systems and adhering to stricter regulations, the industry can enhance safety and efficiency in recycling processes. However, managing complex recycling operations and ensuring compliance with environmental regulations can present considerable challenges.

There are substantial growth opportunities in the recycling market due to rising demand for sustainable practices and regulatory pressures. However, economic fluctuations may impact the financial viability of recycling initiatives, posing a threat to investment in green technologies and limiting the sector's ability to develop sustainable solutions effectively.

Enabling factor: Skills transformation and appeal to new talent

- **Attracting new talent:** The shift towards digitalization and automation will create remote operation and nomadism opportunities with better autonomy thanks to advanced onboard communications and connectivity, appealing to talent. By implementing rules/requirements into maritime manufacturing sector, the industry will modernize, ensuring a skilled and vibrant workforce capable of navigating the technological future of maritime operations.

What does this enabling factor imply?

Workforce transformation is crucial for the maritime industry, as it attracts skilled workers through the integration of modern technologies (e.g. Augmented Reality and Virtual Reality), simulations and remote operations. This evolution fosters a more dynamic and innovative work environment, appealing all generation but attracting also the young people interested in technology-driven careers. However, the existing workforce may lack the necessary skills to adapt, necessitating extensive retraining programs that can be resource-intensive.

The industry's evolution also creates new career paths, positioning it as an attractive field for new talent. Nonetheless, competition for skilled labour from other tech-driven sectors poses a threat, potentially hindering recruitment efforts and increasing turnover rates.