ADT4Blue

ADT4Blue OC3

Innovation Challenges

Interreg Atlantic Area

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Acknowledgements

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Executive Summary

This document compiles all innovation challenges that integrate ADT4Blue OC3 running from October 29th to December 30th, 2025, at 5 pm Brussels Time.

1. Aquaculture and Fisheries

1.1. Equitable access to information for coastal communities (#OC3-AF-C01)

Equitable access to information for coastal communities **Code: #OC3-AF-C01**
Challenge description
Small artisanal fishing communities, especially in developing countries and isolated coastal areas, often lack access to crucial information needed to operate effectively, sustainably, and competitively. They face challenges such as the absence of real-time marine weather data – which compromises safety – limited knowledge of market prices, making them vulnerable to exploitative intermediaries, and insufficient data on sustainable fishing zones, leading to overfishing and conflicts. Additionally, these communities have restricted access to financial services, insurance, and government aid due to limited digital tools and intermediaries. Poor coordination among fishers further hinders resource sharing and the development of strong cooperatives. These gaps exacerbate social and economic inequalities, weaken community resilience to climate change, and slow their progress toward a sustainable blue economy. We are looking for ideas, products or services that can be addressed by advanced digital technologies that: ● provide small artisanal fishing communities with access to crucial, real-time digital information to operate effectively, sustainably, and competitively, ● enhance safety and sustainability by delivering real-time marine weather data and data on sustainable fishing zones to prevent overfishing and reduce conflicts, ● increase economic resilience by supplying real-time market price data to reduce the vulnerability of fishers to exploitative intermediaries, ● improve access to essential services – such as financial, insurance, government aid – by developing appropriate and accessible digital tools and platforms, ● enable better coordination and resource sharing among fishers to support the development of strong cooperatives, ● Strengthen community resilience and foster a sustainable blue economy.

1.2 Optimising offshore aquaculture in aggressive environments (#OC3-AF-C02)

Optimising offshore aquaculture in aggressive environments **Code: #OC3-AF-C02**
Challenge description
Offshore aquaculture of low trophic species – such as seaweed, mussels, and oysters – is a key opportunity for the Portuguese and European West Coast Blue Economy, yet it is currently held back by the fiercely aggressive conditions of the West Coast. Facing the Atlantic's full force, with waves regularly reaching 25 metres, structures must survive extreme swell and hostile marine environments. The primary obstacles aren't just the high capital and upkeep costs, but also the fundamental need for reliable underwater communication and, critically, for the systems to act entirely autonomously – to "sense and survive". We are looking for ideas, products, services, and apps to help establish a viable and reliable offshore aquaculture infrastructure by creating an autonomous survival system that can be leveraged by advanced digital technologies. This system will monitor conditions and enable the structures to make real-time decisions and implement an automated temporary submergence and emergence mechanism to ensure their integrity and survival during storms or adverse conditions, in a preventive way.

1.3 Optimising the growth cycle of algae cultivation offshore (#OC3-AF-C03)

Optimising the growth cycle of algae cultivation offshore **Code: #OC3-AF-C03**
Challenge description
The lack of real-time biological monitoring prevents algae farmers from the European Atlantic coast from optimising the growth cycle, leading to unpredictable yields and inefficient resource management. We are looking for ideas, products, services, and apps to help develop a digital framework that leverages advanced digital technologies to guarantee optimal yields, able to continuously track crucial biological parameters as well as environmental factors and to create a Predictive Growth Model (PGM), enabling yield forecasting, identifying the optimal environmental combinations, and performing anomaly detection for early contamination warnings.

1.4 Combating Illegal, Unreported and Unregulated (IUU) fishing (#OC3-AF-C04)

Combating Illegal, Unreported and Unregulated (IUU) fishing **Code: #OC3-AF-C04**
Challenge description
The pervasive practice of Illegal, Unreported, and Unregulated (IUU) fishing, particularly in prohibited zones, is often facilitated by vessels deliberately switching off their tracking systems (AIS). The main constraints lie in the difficulty of interpreting the vast volume of satellite imagery and location data, and the crucial need for any monitoring system to provide clear and undeniable criminal proof suitable for judicial authorities, given the political sensitivity of the issue. Moreover, to prevent illegal practices, real-time analysis (namely linked to AIS switching off in the neighbourhood of prohibited zones) and alerts are difficult to obtain. We are looking for ideas, products, services, and apps that increase the surveillance capacity of authorities and create a real-time data analysis tool that automatically transforms complex, dispersed data into preventive alerts to maritime authorities and provide evidence of illegal activity in restricted maritime zones. For instance, develop a sophisticated monitoring and infringement detection system to help identify suspicious behavioural patterns (such as vessel heading toward a restricted area just before its AIS signal disappears).

2. Communication

2.1. Increasing data literacy and access to real-time marine data (#OC3-COM-C05)

Increasing data literacy and access to real-time marine data **Code: #OC3-COM-C05**
Challenge description
The vast underutilisation of complex, open marine data (such as Copernicus Marine Service information) by technicians and Small and Medium-sized Enterprises (SMEs) across sectors like aquaculture, fisheries, and security. This is primarily due to low digital and marine literacy within companies, coupled with the technical difficulty of achieving interoperability and effectively managing the sheer volume and dispersion of the data. Essentially, valuable data exists, but it remains locked away, unusable for commercial application. We are looking for ideas, products, services and apps that can be powered by advanced digital technologies to increase the effective use of this information by transforming the raw, complex data (on temperature, swell, etc.) into specific, commercially applicable intelligence. This should: • help synthesize, validate, and deliver data in real-time, • have an easy-to-use format, • contribute to overcoming the literacy barrier • help enable data-driven decision-making across the Blue Economy sectors.

2.2. Establishing a West Atlantic Marine DataSpace (#OC3-COM-C06)

Establishing a West Atlantic Marine DataSpace **Code: #OC3-COM-C06**
Challenge description
The existence of a fragmented, non-interoperable data environment across the European West Atlantic Area, which severely hampers effective public decision-making. Essential marine data – including local pollution levels, sea temperature anomalies, and key ecosystem indicators – is currently scattered across diverse sources, ranging from European satellite programs (like Copernicus) to private sector sensors and scientific institutions. This lack of a single, unified, and validated data space is compounded by the absence of standardised protocols for data sharing among Member States, making it nearly impossible to access and trust the required volume and variety of real-time information necessary for rapid and informed public policy creation, climate adaptation strategies, and effective maritime management. We are looking for ideas, products, services and apps that contribute to the establishment of a fully interoperable West Atlantic Marine DataSpace that: • allows for the creation of advanced visualisation tools and dashboards that provide public bodies with immediate alerts regarding critical events (e.g., oil spills, harmful algae blooms, rapid temperatures shift), • ensures that data is auditable and trusted, • drastically improves the speed and confidence of public decision-making • enables better and faster policy responses related to marine conservation, public safety, and climate change mitigation.

3. Ocean Literacy

3.1 Enhancing ocean literacy through scalable digital education and engagement platforms (#OC3-OL-C07)

Enhancing ocean literacy through scalable digital education and engagement platforms **Code: #OC3-OL-C07**
Challenge description
Improving public understanding of ocean systems and their critical role in global sustainability is essential for fostering responsible stewardship. However, ocean literacy efforts are often hindered by fragmented educational resources, limited access to real-time scientific data, and insufficient engagement tools that can reach diverse audiences effectively. This gap restricts the capacity of educators, policymakers, and communities to make informed decisions and promote ocean conservation behaviours. We are looking for ideas, products, services and/or apps to develop integrated, scalable digital platforms that leverage interactive technologies, real-time data visualisation, and personalised learning pathways to elevate ocean literacy and empower stakeholders across all levels.

4. Ocean Monitoring, Conservation and Marine Ecosystems Protection

4.1. Developing environmentally responsible cleaning solutions (#OC3-OMP-C08)

Developing environmentally responsible cleaning solutions **Code: #OC3-OMP-C08**
Challenge description
The cleaning products commonly used for the external parts of ships and boats often contain toxic substances, such as harmful particles or high concentrations of acids. These substances are directly discharged into the sea during the cleaning process. Consequently, these procedures are extremely damaging to the environment, particularly the oceans, and pose significant risks to the professionals involved in the cleaning activities. We are looking for products and ideas that leverage advanced digital technologies to optimise/improve maritime cleaning solutions to mitigate marine pollution, to make cleaning activities more sustainable and reduce environmental impact.

4.2. Reducing maritime plastic pollution (#OC3-OMP-C09)

Reducing maritime plastic pollution **Code: #OC3-OMP-C09**
Challenge description
Maritime plastic pollution has become a significant environmental threat, adversely affecting oceans, marine ecosystems, biodiversity, and human health. Plastic waste enters the sea from various sources, including land-based activities, maritime industries, and illegal dumping. Moreover, several major obstacles hamper the development of efficient and sustainable solutions, including insufficient and inconsistent data on plastic waste distribution, difficulty in detecting microplastics, integrating various technologies like IoT, AI, and Blockchain into existing systems, and the high cost and resource requirements for deploying these technologies. We are looking for ideas that harness advanced digital technologies to reduce maritime plastic pollution, to significantly enhance ocean quality and improve its capacity to absorb CO2, support marine biodiversity, promote healthier and more sustainable blue food, and benefit coastal tourism.

4.3. Scalling ocean data review for ecosystem protection (#OC3-OMP-C10)

Scaling ocean data review for ecosystem protection **Code: #OC3-OMP-C10**
Challenge description
Marine video datasets deliver critical insights into oceanic environments, yet the current reliance on manual review processes significantly constrains the throughput and scalability of data analysis. This limitation hampers the timely integration of oceanographic information into decision-making frameworks for conservation, maritime security, and ecosystem management. We are looking for ideas, products or services that can automate the analysis or large-scale marine video datasets and deliver high-throughput data analysis and ensure vital information reaches decision-makers quickly and efficiently.

4.4. Real-time multisource data integration for maritime risk detection (#OC3-OMP-C11)

Real-time multisource data integration for maritime risk detection **Code: #OC3-OMP-C11**
Challenge description
Robust maritime domain awareness is fundamental to ensuring maritime security and the sustainable governance of oceanic resources. Nevertheless, the heterogeneity and fragmentation of multisource maritime data, combined with the lack of sophisticated real-time analytical and decision-support systems, severely limit the capacity of governmental agencies and maritime stakeholders to detect, assess, and mitigate risks promptly. These constraints adversely impact the effectiveness of marine ecosystem protection, threat interdiction—including illegal fishing and trafficking—and rapid incident response operations. Advancing interoperable data integration frameworks and implementing automated, AI-driven monitoring and analytics platforms are imperative to enhance operational situational awareness, predictive risk modelling, and informed maritime governance. We are looking for ideas, products or services that provide an analytical and decision-support system to overcome the challenges posed by the heterogeneity and fragmentation of multisource maritime data and that align with the following objectives: • Enhance operational situational awareness, • Enable predictive risk modelling, • Improve informed maritime governance, • Strengthen marine ecosystem protection, • Contribute to interdict threat, • And allow for faster incidents response operations.

4.5. Enhancing security and resilience of the Blue Economy against cyber risk and maritime piracy (#OC3-OMP-C12)

Enhancing security and resilience of the Blue Economy against cyber risk and maritime piracy **Code: #OC3-OMP-C12**
Challenge description
Advanced cyber threats and maritime piracy incidents are driving a significant increase in marine insurance premiums, directly impacting transportation costs and the competitiveness of global supply chains. This environment presents a critical challenge for the blue economy: developing innovative solutions to strengthen legal and operational security, as well as the resilience of maritime infrastructure. This challenge aims to foster the development of sustainable and tailored solutions capable of effectively addressing the complex issues related to data protection, maritime security, and operational cost control. We seek innovative ideas, products or services that integrate technologies and strategies – ranging from cybersecurity and advanced surveillance systems to predictive models and risk management frameworks – to help: • restore stability in maritime trade, • mitigate incident risks, • ensure the sustainability of economic activities dependent on maritime spaces.

5. Ocean Renewable Energies

5.1. Ensuring energy and communication for offshore sensors (#OC3-ORE-C13)

Ensuring energy and communication for offshore sensors **Code: #OC3-ORE-C13**
Challenge description
Isolated offshore structures, such as wind farms, aquaculture and monitoring systems, rely on sensors and micro-computers to collect real-time data and make critical decisions, yet the aggressive marine environment (including high waves, salinity, and biofouling) imposes significant constraints. The major hurdles are the high energy consumption required for continuous data transmission and *on-site* processing, coupled with the need to ensure continuous operation despite isolation. We seek innovative ideas and/or products powered by advanced digital technologies to help achieving permanent energy autonomy and reliable data communication for isolated offshore structures, such as wind farms, aquaculture, and monitoring systems.

5.2. Increasing the resilience and durability of offshore structures (#OC3-ORE-C14)

Increasing the resilience and durability of offshore structures **Code: #OC3-ORE-C14**
Challenge description
The constant and rapid degradation of offshore marine structures – such as those used for wind energy and aquaculture – due to the particularly harsh and aggressive environment of the Portuguese coast and the European Western coast in general. Processes like corrosion, biofouling, and physical abrasion by wave forces significantly reduce asset lifespan. This leads to substantial maintenance costs and complexity, as *in-situ* repairs are difficult and risky. We are looking for innovative ideas and/or products powered by advanced digital technologies that: • mitigate the constant and rapid degradation of offshore marine structures, • effectively combat key degradation processes, such as corrosion, biofouling, and physical abrasion caused by wave forces, thereby extending asset lifespan, • reduce substantial maintenance costs and complexity by innovating solutions that make *in-situ* repairs less difficult and risky or by developing materials/designs that dramatically reduce the need for such interventions.

5.3. Addressing the training gap in offshore energy (#OC3-ORE-C15)

Addressing the training gap in offshore energy **Code: #OC3-ORE-C15**
Challenge description
The widening gap between the rapidly increasing technical complexity of floating offshore energy platforms and the availability of specialised Human Resources capable of implementing and maintaining them. As structures like floating wind farms scale up, the demand for personnel skilled in robotics, subsea autonomous systems, data analytics, and predictive maintenance far outstrips supply. We are looking for innovative ideas and/or products or services powered by advanced digital technologies that: • address the widening gap between the rapidly increasing technical complexity of floating offshore energy platforms and the availability of specialised human resources needed to implement and maintain them, • develop technology-based solutions that reduce the dependency on scarce specialised personnel, • scale up the capabilities of existing human resources through innovative training, augmented reality, or remote assistance platforms to effectively manage and maintain large, complex structures like floating wind farms.

5.4. Enhancing security in offshore energy maintenance (#OC3-ORE-C16)

Enhancing security in offshore energy maintenance **Code: #OC3-ORE-C16**
Challenge description
The high safety and operational risks associated with executing complex, specialised tasks – such as inspection, repair, and maintenance – in the harsh offshore environment pose a persistent threat to human personnel that conduct on-site labour and drive-up insurance costs and downtime. We seek innovative ideas and/or products powered by advanced digital technologies to: • mitigate the high safety and operational risks associated with executing complex, specialised tasks (as described above) in the harsh offshore environment, • remove or significantly reduce the persistent threat to human personnel who conduct on-site labour, • drive down costs and minimise downtime by developing solutions that decrease the need for manual, high-risk human intervention, thereby lowering insurance costs and improving operational continuity.

6. Shipping and Repair

6.1. Addressing Biofouling: towards cleaner and more efficient marine vessels (#OC3-SP-C17)

Addressing Biofouling: towards cleaner and more efficient marine vessels **Code: #OC3-SP-C17**
Challenge description
Biofouling, the accumulation of microorganisms, algae, and marine invertebrates on submerged ship surfaces, significantly increases hydrodynamic drag. This results in elevated fuel consumption, higher operational costs, and increased greenhouse gas emissions. Moreover, biofouling serves as a vector for the translocation of non-indigenous marine species, posing a serious threat to marine biodiversity. Conventional hull maintenance practices are typically reactive, abrasive, and infrequent, often leading to structural degradation of the vessel and adverse impacts on marine ecosystems due to the release of contaminants. We are looking for ideas, products or services that: • develop and implement innovative, proactive, and non-abrasive hull maintenance practices to effectively prevent or control biofouling, • significantly reduce hydrodynamic drag on submerged surfaces, thereby leading to lower fuel consumption, reduced operational costs, and a decrease in greenhouse gas emissions, • mitigate the serious threat to marine biodiversity by preventing biofouling from acting as a vector for the translocation of non-indigenous marine species, • avoid structural degradation of vessels and adverse impacts on marine ecosystems by eliminating the need for conventional, abrasive, and infrequent cleaning methods that often release contaminants.

Port Activities

7.1. Optimising of port pilot routes and trips (#OC3-PA-C18)

Optimising of port pilot routes and trips **Code: #OC3-PA-C18**
Challenge description
Efficient scheduling and high-level coordination of port pilot trips are crucial for the smooth operation of ports and the activities of all involved parties. However, the trips from the base to the vessels and back are not optimised, leading to unnecessary travel, wasted time, and increased fuel consumption. This inefficiency is partly due to ad-hoc decision-making by individual pilots and the absence of a coordinated system to streamline their activities. We are looking for ideas, products, tools, and services that can be addressed by advanced digital technologies to increase efficiency, sustainability and circularity in port activities, such as routes and trips simulations, among others.