Interreg North Sea Region PERISCOPE European Regional Development Fund

EUROPEAN UNION

PERISCOPE reaping the potential of the oceans

PERISCOPE FORUM 2019

POLICY RECOMMENDATIONS FROM THE PERISCOPE NETWORK

Table of Contents

Executive Summary

The North Sea Region (NSR) is a crucial area for Europe's Blue Economy with its vast amount of marine resources, technologically advanced industries, major port areas and increased offshore activities including renewable offshore energy. Due to global drivers, the wider maritime, marine and offshore economies are exposed to profound challenges. On the regulatory side, this sector is pressured to improve its environmental, safety and security performance. On the societal side, digitalisation, automation, cybersecurity or the Internet of Things are potentially disruptive technologies which may fundamentally change the future. At the same time, these challenges create interesting opportunities for the European Blue Economy. To remain competitive and innovative, the European Maritime sector needs to strengthen the strategic use and implementation of new (digital) technologies and to have the rightly skilled and trained workforce.

The North Sea will be busier, with new technology opening it up for greater exploration and exploitation. Its resources will be more in demand. Its environment is expected to be transformed by climate change, with major implications for the industries and communities. Industry, academia, governments and the public all have a stake in the future of the sea, and there are complex inter-dependencies between their interests. To be successful, it is clear that industry, science and policy will need to work together across sectors and in close interaction with stakeholders.

Global Leadership in the Blue Economy

The Periscope Network, a project within the Interreg North Sea Programme, supports the combined maritime and marine innovation ecosystem in the North Sea region to grow transnational innovation partnerships for sustainable business development in emerging blue markets. Periscope crowdsources and shares market intelligence, allowing the identification of emerging market opportunities in the blue economy. Periscope accelerates ideas by using foresight to develop ideas with the Periscope community. And finally, Periscope helps to grow new businesses by connecting with companies and knowledge institutions across the North Sea region.

After two years of operation, and having analysed the innovation climate in NSR, the Periscope Network hosted the Periscope Forum bringing together strategists, policymakers and politicians to discuss the main issues that need to be addressed through EU programming in the next programming period, with a special focus on the North Sea Region Strategy 2030.

Constant support for change and innovation is key to enable European industries to face new challenges, and to keep or acquire leadership at global level.

- In this perspective, European industries need to tackle important challenges in terms of sustainability. Reduction of carbon emissions, of waste, as well as greater use of circular economy models, are among these challenges.
- Emerging industries require a long-term commitment in order to be successful. They are often slow to develop, partly as a result of increased costs associated with innovating in the marine environment. They can also require significant infrastructure investment.

- European industries will also need to adapt to digitalisation, which will affect and redefine the maritime industry sector and will cause major implications for European shipping companies, maritime technology companies and system providers, as well as information technology companies.
- Finally, the blue growth issues are global. The EU shares the marine environment, trade, security challenges and opportunities with its global partners. The long-term success of the EU's marine and maritime interests will, to a large extent, therefore depend upon global action, collaboration and a level playing field.

To tackle all these challenges the EU strategy for the North Sea must be instrumental in facilitating synergies between investments co-financed by the regions and European centrally managed programmes. For the EU, this means ensuring that policy siloes are avoided, clear and long-term strategies are developed and where beneficial, DG's make strategic decisions together. European maritime regions are implementing ambitious actions to support the development of these industries. As reflected in Smart Specialisation Strategies, these actions involve both support to economic sectors, as well as support to economic interactions between these sectors, via support to key enabling technologies, shared infrastructures or the adaptation of workers' skills.

To enable the Blue Economy to fully realise its potential and deliver sustainable economic growth, significant investment in innovation is required. Key enabling technologies and technology transfer are important to open up new opportunities, as they promise breakthrough innovations as well as improvements in efficiency, productivity and cost structures in many ocean activities. More sustainable ocean resources need to be harnessed to contribute to our clean energy transition and to grow more food to relieve pressure on land. The pace of innovation in the blue economy is lower than anticipated, in particular regarding commercialisation and upscaling of successful innovations. The key reason for this is a lack of finance. It was debated how, through Smart Specialization of regions, European companies could be helped to capitalise on emerging global opportunities and stay competitive. The focus was on business support, the development of cross-border innovation ecosystems supported by open innovation platforms and infrastructures, skills development and access to funding. Against this background, policy recommendations were extracted from the community.

Overview of Key Recommendations

The high-level stakeholders gathered at the Round Table at the Periscope Forum suggested the following flagship actions in order to improve the innovation climate in the North Sea Region. Future programming should aim at strengthening the North Sea region's position as a frontrunner in the blue economy with emphasis on its ability to innovate.

1. In order to enable flexible, coherent and aligned finance and funding schemes from multiple programmes for the financing of cross-border innovation with potential for global leadership in the blue economy, providing availability of and synergies between investments and funds on transregional levels:
   - Enable shared access to innovation testing infrastructure, innovation ecosystems and communities across borders; such internationalisation serves individual user groups whilst

also enriching the research and innovation infrastructure by facilitating the inflow of both knowledge and financial resources. Allowing certain funding instruments to be used for activities outside regional or national borders is one example of policy measures supporting improved accessibility and reducing regional disparities.

- Establish a NSR Innovation Fund to stimulate trans-national co-operation. This could be implemented through vouchers, with each region/country getting back what it put in. Such a Fund would thus also surpass any EU restrictions, as projects could be bilateral, etc. There is a pressing need for smaller funding amounts (up to 50K) to stimulate the sector.
- Establish a blue investment platform for the sustainable blue economy linked to the investment bank, or even establish a 'blue' investment bank directed at the NSR. Accompanying could be a Maritime Blue Accelerator to assist small and medium-sized businesses and start-ups with mentorship and other support services including access to funders.

2. In order to maintain a sustainable ecosystem for the Blue NSR – including business support and the role of clusters, digital innovation hubs and research & innovation infrastructures:

- Establish a "Blue Knowledge and Innovation Community (KIC)"; the KIC should be able to spur activities from large lighthouse projects to stimulating collaborative SME-driven innovations by awarding innovation vouchers reducing barriers for cross-border collaboration and international business development in new markets. Regional developments would be based on smart specialisation. To fuel the KIC, a smart digital open innovation platform should serve at its core to engage the community across the North Sea Region and ensure collaboration, knowledge sharing and idea generation across sectors, professions and borders and in an active, continuous, brokerage way they should bring together: clusters, businesses, knowledge institutes, innovation ecosystems and communities.

3. To manage the shaping of the workforce transformation in the NSR, a coherent Skills Agenda which gives access to education and labour markets across borders for skilled workers meeting new skills demands.

- There is a need for a platform that marries education with skills required in the Blue Economy. Create and curate an NSR inventory of available online training courses and MOOCs – offered not just via educational institutions, but also industry, etc. Such a platform could have complementary features to support an ecosystem, such as exchange of knowledge, increase in ocean awareness, etc., and would be aimed on future blue economy workers.

4. Capitalise on emerging global opportunities and improve the global competitiveness of the NSR by implementing a permanent open innovation platform stimulating cross border innovation partnerships based on Smart Specialization of regions, and promotion of intra-regional trade (with a focus on SMEs):

- Establish an Open Innovation Platform (OIP) using advanced digital technologies that will deliver value to users, broader stakeholders and the NSR at large. The OIP would enable physical, virtual and social co-creation, prototyping and demonstration. The external

ecosystem would be leveraged to increase innovation relevancy. Innovation would be accelerated through a clearly defined and structured process from ideation to commercialisation. There would also be space for disruptive technology (true innovation) with enablers in place. Citizen participation would be encouraged as citizens are equally creative and innovative.

If you have any questions, please contact:

Stig Marthinsen
Managing Director
tel (+47) 400 74 750
e-mail sm@south-norway.no

Challenge: Financing cross-border innovation with potential for global leadership in the blue economy.

The year is 2030.

- *The NSR has become a Blue innovation leader globally. Cross-border financial instruments to support innovation and business development have played a key role.*
- *The NSR has kick-started sustainable Blue Growth through cross-border SME funding schemes with limited red tape.*
- *The NSR has improved access to finance for SMEs through focusing access to external finance and pooling regional and national business support resources.*

The vision, its framework and context

To continue to be globally competitive, regions around the North Sea need to consider the dual innovation phenomena of increasing international linkages and the persisting importance of geographic proximity. For all regions around the North Sea, collaborating with an international neighbour makes sense for innovation-driven growth. Cross-border instruments that contribute to an overall strategy are more likely to have economic impact than if they are simply a collection of different projects. In October 2017, the European Commission highlighted that less developed regions face major obstacles linked to fragmentation and sustainability of research and innovation infrastructures, whilst regions undergoing industrial transition may lack sufficient open frameworks for R&D&I and firms that could form the basis for broad industrial modernisation. Research and innovation frameworks will help SMEs and start-ups manage their digital transformation and help regions confronted with industrial transition challenges. An important function of research and innovation infrastructure is to drive knowledge and technology transfer in the innovation eco-system, facilitating the uptake of innovative ideas flowing from research institutes and academia, by SMEs and larger companies. Together, scientific and industrial partners can develop solutions to shared problems.

Projects in the Blue Economy face many hurdles when accessing capital. Regulation, market and demand framework conditions are perceived as the most important drivers and incentives, but also present the biggest risks and challenges for both project promoters, as well as financial market participants. However, investments in the Blue Economy help reduce Europe's dependence on non-renewable natural resources, transform the production of food and manufacturing of bio-materials, and promote sustainable and resource-efficient production and the use of renewable resources from land, fisheries and aquaculture, while at the same time creating new jobs and developing new industries. The transition from a conventional, extraction-focused ocean economy to a sustainable, climate-secure Blue Economy is a tremendous economic and investment opportunity for all investors. The EU has begun to gather experience how to actually make this work, e.g. through the BlueInvest

platform and other networking events. The EU sees the financial sector as a key partner to bring about transition to sustainable consumption and production. However, knowledge about investment behaviour, experience with working with these investors, and ways to engage investors in the Blue Growth sectors is lacking. Risk is also a key issue; many segments of the Blue Economy are characterised by high market volatility and inherent risks, which adversely affect its competitiveness, leading to sub-optimal levels of private investment. Risk mitigation should be seen as a shared responsibility of entrepreneurs, investors and governments.

Tools need to be developed for mobilising capital to support a sustainable, climate-secure Blue Economy. There are also potential new business models deriving from the decarbonisation of the NSR: different approaches to modelling the investment implications of the phase-out of fossil fuels, for example.

Policy action alternatives

Whether funded and operating on regional, national or EU level, research and innovation infrastructure has a key role in advancing, exploiting and disseminating knowledge and technology. These facilities, resources and services include major scientific research equipment, resources such as collections, archives or scientific data, e-infrastructures such as data and computing systems, communication networks, as well as pilot and demonstration sites, living labs, and more. There are important distinctions in terms of organisation; the infrastructure can be single-sited (a single resource at a single location), distributed (a network of distributed resources), or virtual (the service is provided electronically). Used by the scientific community, industry, and entrepreneurs alike, research and innovation infrastructure is equally important in helping to find solutions for global challenges as it is to driving innovation in SMEs through technology transfer, thus contributing to both societal development and economic growth. To maximise the output and impact of the infrastructure, coordination and cooperation among different facilities is crucial. Coordination to avoid duplication of efforts or sub-optimisation, and cooperation to efficiently pool efforts and resources when addressing scientific challenges that require a cross-sectoral or large-scale approach. Test infrastructure, such as living labs, floating wind test sites, etc. provide critical testing for innovations and prototypes to get through iterations of technology. All users can benefit from sharing more of their test data, but companies are often reluctant to share (even data on failure rates on offshore equipment). One way to encourage sharing is to create a 'dial' system with conditions, e.g. Do you want more finding? Then you have to give more of your data away and make it shareable. Identities of companies can stay confidential. The Norwegian government did this – perhaps it could be scaled to the NSR.

On-shore charging (cold ironing) should be standardised – this could be developed on ferry routes and then scaled up to the International Maritime Organisation. Subsidies could be offered to support the development of new fuels. Different market approaches, such as 'consumer pull', could be leveraged for transport efficiency, for example through labelling.

Government procurement strategies are powerful tools to manipulate the market: the government could use an independent institute to validate the claims of 'efficiency gains' by companies/technology providers; a government procurement strategy to purchase equipment and technology so that it could be tested and monitored and improved, e.g. taking inspiration from Singapore and their 'flag state'. Perhaps a 'European flag' technology subsidy for first-movers?; or could governments underwrite, for example 25% of the costs of installing a pioneering technology? This guarantee would stimulate the piloting of new technology – if the technology does as it claims, then the government gets their money back. In order to reduce nitrogen oxide (NOx) emissions, Norway imposed a NOx tax in 2008. Businesses had the option of not paying the tax if they committed to reduce NOx emissions by a certain amount. It allows money to be recycled into emissions reduction technologies within the industry by providing a pot of money to be used to purchase green technologies that would not have otherwise been bought. It could be an interesting model for the International Maritime Organisation, as it illustrates how a small price on emissions can stay within the sector and drive emissions reductions that would otherwise not happen. Companies should be monitored for their performance, and either be rewarded or punished for their contribution to the blue economy.

Blue Economy activities have a strong interdependency with other economic activities resulting in a high capacity to create additional jobs and value added along the value chain in the local and regional economies. A demonstration project is a means of promoting innovations and capturing and disseminating best practice through the development and analysis of a live project. This can help build an evidence base to test and support industry improvements. Blue Economy demonstration projects are clearly needed in the NSR. Feed-in tariffs can support this for ocean energy; energy prices and guarantees for access to markets are important for energy developers. 'Quick wins' do not cost anything. Possibly, create a club of leading ports (green ports) that can have their voice heard; decarbonising ports could be rewarded by giving them a higher profile or more business.

(i) An NSR Innovation Fund

Regional authorities have pooled resources to offer financing to regions around the North Sea, without unnecessary red tape. Existing funding schemes are being complemented with a transparent NSR innovation fund. The funding is not connected to type of organisation, but to the content. All funded projects are also evaluated for and judged on their environmental impact.

Citizens have been engaged in harvesting entrepreneurial ideas. Although citizens want an ever-low price of energy per KWH, is it sustainable? The awareness of citizens has to be raised regarding climate change, and the resultant price of energy, etc. Ocean literacy is advanced through stakeholder engagement.

Governments around the NSR no longer fund non-sustainable energy. If an R&D project is funded 100% by public funds, then IP is free to all and made available. Politicians have applied 'polluter pays' principles – and the revenues are re-invested in 'clean' solutions. Taxes are paid into a fund

(monetising carbon emissions targets to reinvest) – from which innovations can be funded (like the Norwegian NOx Fund). There are actions to de-incentivise investment without looking at the % ROI, but rather supporting the Blue Sector by defining/elaborating business case(s) for sustainable blue growth.

(ii) A Blue Investment platform

Government support must go further than financial support for research and development or technological demonstration projects. Proven technologies get stuck in the Valley of Death as investors alone are not willing to take the risk associated with upscaling of promising technologies. Tied in a reciprocal relationship, governments need to attract private investors – their capital, knowledge, and networks – to enable the Blue Growth sectors to grow further while investors need stable, predictable and effective government support schemes to mitigate their financial risks. Blue Growth investors are not dealing with mature technologies or low risk markets. The Blue Growth sectors face uncertainty and risk in the commercialisation of the products coupled with regulatory problems, and technologies are still under development. It is not so much the access to money, but the inherent investment risks. To obviate this, perhaps a guarantee fund for SMEs, and/or a risk reduction tool for project failures for up to seven years. National tax schemes could be adapted so that they are more favourable for supporting SME investments: the obligation to repay is only triggered once profits are being made. Experience from Sweden also shows that many investors have too little knowledge about the Blue Economy, so awareness raising and communication efforts need to accompany any such fund.

There is also a perceived lack of direct access for SMEs to investment banks, e.g. the EIB, so facilitate the bundling of relevant projects to qualify for EIB schemes. An alternative is to establish a blue investment platform for the sustainable blue economy linked to the investment bank, or even establish a 'blue' investment bank directed at the NSR. This investment platform would group maritime funds in order to help SMEs at the demonstration phase to scale up their technologies. Accompanying this would be an assistance mechanism to provide tailor-made assistance to SMEs concerned to help them getting access to finance – an investment support facility.

Policy action recommendation

(i) Access to testing infrastructure

An important function of research and innovation infrastructure is to drive knowledge and technology transfer in the innovation eco-system, facilitating the uptake of innovative ideas flowing from research institutes and academia, by SMEs and larger companies. Industry uses research infrastructure for both basic and applied research, as well as for testing innovative technologies and products. On a larger scale, this kind of infrastructure is an important resource to catalyse industrial transition in sectors or among companies where the individual organisations lack sufficient skills, knowledge or

information. The issue of accessibility, not least from the perspective of SMEs who may have the most to gain from close interaction with these eco-system institutions, is also of importance for policy makers. For reasons of resources and efficiency there are incentives for sharing access to certain infrastructures across borders; such internationalisation serves individual user groups whilst also enriching the research and innovation infrastructure by facilitating the inflow of both knowledge and financial resources. Allowing certain funding instruments to be used for activities outside regional or national borders is one example of policy measures supporting improved accessibility and reducing regional disparities. Demonstration projects are effective mechanisms for forging partnerships between public, private and (especially) community sectors, developing new ways of working together, learning by doing, and generating visible results on the ground.

(ii) A NSR Innovation Fund

To stimulate trans-national co-operation, an NSR Innovation Fund needs to be established. This could be implemented through vouchers, with each region/country getting back what it put in. Such a Fund would thus also surpass any EU restrictions, as projects could be bilateral, etc. This is particularly important as all major players around the NSR need to be involved, and any restrictions imposed by Brexit could be surmounted. There needs to be particular focus on synergies between EU, national and regional initiatives to stimulate private investment. There is a pressing need for smaller funding amounts (up to 50K) to stimulate the sector. Action needs to be taken at the sea basin level to help industry enter new markets and at the same time cushion investors against risk in new projects that support environmental policies and that would otherwise not get off the ground. Trans-regional initiatives are more effective in regions where ease of cooperation is already established, e.g. due to similar maritime traditions or close historical ties. To involve as many SMEs and start-ups as possible, restrictions on participating should be limited and flexible. Through a common agenda, industry would decide and evaluate what should be supported by being involved in reviewing the applications. In order to allow risks to be taken safely, rather than a 1-3 year horizon, projects could have a 10-12 year horizon.

Such a Fund would require the following structure:

- Forum of policymakers and industry from regions to decide on strategic priorities for investment;
- Pooling of budgets to tackle a small number of priority areas in a substantial manner;
- Each country needs to get back what they put in.

Interregional cooperation is a key component of regional competitiveness measures in support of SMEs and start-ups utilising research and innovation resources to progress along the Technology Readiness Levels (TRL) and value chains and explore cross-sectoral collaboration with the support of enabling technologies. Closer interregional cooperation can lead towards co-investment thus further strengthening collaboration between regional ecosystems. Cooperation between tiers of government, market parties, knowledge institutions and interest groups (the golden quadrangle) around the North Sea is helpful in achieving this objective.

(iii) A Blue Investment platform

Constant support for innovation is key to enable European industries to face new challenges, and to keep or acquire leadership at global level. This is especially true for the Blue Economy. To foster the Blue Economy, the integration of science into policy and practice to support evidence-informed decision making is essential. However, new technologies or innovative methodologies developed by researchers are not always widely and quickly transferred or fully exploited by all stakeholders. Therefore, clusters or collaborative platforms to bring investors, funders, industry, public sector and other stakeholders together represent opportunities to bridge science to policy and practice frameworks through the exchange of knowledge and data and the tackling of sea and land-based challenges jointly. The key recommendation is to establish a blue investment platform for the sustainable blue economy linked to the investment bank, or even establish a 'blue' investment bank directed at the NSR. This investment platform would group maritime funds in order to help SMEs at the demonstration phase to scale up their technologies. Accompanying this would be an assistance mechanism to provide tailor-made assistance to SMEs concerned to help them getting access to finance – an investment support facility. This could take the form of a Maritime Blue Accelerator to assist small and medium-sized businesses and start-ups with mentorship and other support services including access to funders.

Expected impact of the policy

Market take-up of innovation is frequently the main challenge in the maritime industries sector, to ensure sustainable growth and jobs. The sectors, such as marine renewable energies, are at different development stages, and there remain gaps in the value chains and thus there is technological potential to be realised in the maritime economy. When innovation is taken to scale beyond the pilot phase, important increases in efficiency occur. Innovation is accessible not only to large organisations, but also to SMEs, which can achieve a transformative impact by focusing on pragmatic solutions that don't require large investments. Closer interregional cooperation regarding existing research and innovation infrastructures can lead towards co-investment thus further strengthening collaboration between regional ecosystems. The current and potential future value of the sustainable Blue Economy is immense, but its vast size and interconnected nature means that only a collective commitment to sustainable development will allow us to approach the challenge at the scale needed.

An Innovation Fund based on the NSR would stimulate trans-national collaboration greatly, breaking down silos and enabling innovation for the benefit of the entire region. The business outcomes for the blue sector in the NSR can be summarised as co-creation, new revenue streams, new products & services, accelerated time to market, increased market differential, competitive advantage, minimised innovation risk, cost-effective R&D&I, and engaged customers and partners. It is recommended to identify and work with key actors and stakeholders to create an Innovation Fund for the North Sea businesses to capitalise on growing blue opportunities of global significance.

There is little trans-national cooperation in the NSR, apart from that regarding energy, which is a contrast to other European sea basins. In other sea basins, there are co-operation platforms and frameworks, and match-making events. In the NSR, silos persist. At the national level, there is no sense of urgency to take action, so an alternative would be to look outside the framework of the EU: look at the 43 regions around the NSR and not the seven countries, as there is more co-operation and easier access at the regional level. Public involvement is justifiable because of the economic, social and environmental benefits that can be realised by developing the Blue Growth sectors, but government support must go further than financial support for research and development or technological demonstration projects. Proven technologies get stuck in the Valley of Death as investors alone are not willing to take the risk associated with the upscaling of promising technologies. Tied in a reciprocal relationship, government needs to attract private investors – their capital, knowledge and networks – to further develop Blue Growth sectors while investors need stable, predictable and effective government support schemes to mitigate their financial risks.

Next steps: Topics for follow-up with stakeholders

There was clear interest in developing this idea further and the participants declared that there was value in initiating a pilot solution in the NSR or Baltic Sea basin. In order to help industry enter new markets and at the same time cushion investors against risk in new projects that support environmental policies and that would otherwise not get off the ground, a workshop is needed on three topics:

1. Explore interest among NS States to establish a transnational internationalisation-support mechanism in the NSR – based on relevant national schemes, for instance under Innovation Norway.

2. Establish contact with regions to determine priority topics, skipping the national level. Contact the North Sea Commission and the INTERREG North Sea Programme to establish if such an activity could be encompassed under their umbrella. Businesses would need to be involved to ensure focus and scalability.

3. Look to examples of best practice from Interreg Europe, e.g. the Co-investment scheme from East Scotland: SMEs access to finance and the CLIPPER project in France. Build on the results for the NSR and the Blue Economy.

FChallenge: The year is 2030. The NSR is a lighthouse for Blue Growth founded on an open and sustainable innovation ecosystem.

The vision, its background and context

The European Union (EU) is encouraging and supporting research and innovations to advance a sustainable Blue Economy in Europe, one that acknowledges that seas and oceans are essential drivers for the European economy and have potential for further – sustainable – innovation and growth. At the global level, the EU is an active player in protecting oceans and shaping ocean governance. It has made progress by taking measures in a series of areas: maritime security, marine pollution, sustainable blue economy, climate change, marine protection, and sustainable fisheries; by working towards the UN 2030 Agenda SDG on oceans; and by taking part in negotiations on a new international legally binding instrument on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction. In encouraging the Blue Economy, the EU also recognises the environmental responsibilities that go along with it. Healthy, clean oceans guarantee the long-term capacity to sustain such economic activities, while a natural decline threatens the ecosystem of the planet as a whole and ultimately, the well-being of our societies.

In the 'business-as-usual' blue economy model, large-scale industrial nations have seen the development of their ocean economies through the exploitation of maritime and marine resources – for example through shipping, commercial fishing, and the oil, gas, minerals and mining industries – often without a view to the effects their activities have on the future health or productivity of those same resources. For the Blue Economy to be truly sustainable, it must have a framework and processes in place that recognise and accommodate for nature's different values. The concept of ecosystem services is often explored as a means to bridge this divide and allow the application of conventional economic thinking to emphasise the various values of nature. If the Blue Economy fails to develop in a sustainable manner it may undermine the foreseen growth potential of Europe's marine sectors as many of them directly or indirectly depend on the long-term quality and resilience of the oceans.

The Smart Specialisation approach has become a policy driver oriented to discover innovation potential to unlock sustainable growth and employment, especially in the emerging sectors of the Blue Economy. A sustainable Blue Economy, where the growth potential of ocean-driven sectors for the economy and jobs is realised, is dependent on an effective implementation of innovation activities, whilst simultaneously ensuring resilient and sustainable management of maritime space and marine resources.

Policy action alternatives

Europe holds 7% of the world population, and undertakes 20% of the global R&D. It publishes 1/3 of all high-quality scientific publications. Despite its scientific excellence it lags in business R&D investment, where it represents only 1.3% of the global investment. These facts tell us that resources

must be allocated, and support mechanisms built, to leverage Europe's scientific strengths into leadership in (breakthrough and disruptive) innovation and entrepreneurship for global marketplaces. Aligning with, and complementing, the upcoming Horizon Europe programme and its pillar III "Innovative Europe" becomes essential for the North Sea Region. Placing a transnational innovation ecosystem – a super cluster – at the heart of the Blue Economy in the North Sea Region to foster open innovation, co-creation, entrepreneurship and networking between players and capital, should unlock global lighthouse projects and innovations with solid growth potential. This is supported by the Horizon Europe programme's ecosystem action within pillar III and the view of ERRIN, the European Regions Research and Innovation Network, which both claim that effective research and innovation capabilities are increasingly dependent on strong interconnected research and innovation ecosystems embedded in the regions. Connected ecosystems would allow for increasing innovation excellence, as well as for the strengthening and widening of the European research and innovation community.

Drawing on regional smart specialisation strategies as a framework for coordinating shared North Sea Region missions, priorities and investments through relevant instruments such as the Interreg North Sea programme, the connected Blue Growth innovation ecosystem can deliver lighthouse projects aiming to turn original scientific ideas into marketable products and services as quickly as possible. Those products and services represent novel solutions to global sustainability challenges.

Supporting NSR ecosystem mechanisms, activities and lighthouse projects should aim for synergies and demonstrate how co-funding mechanisms can work in practice to unlock skills development, growth and employment (such as matching private funds, regional and national funds, Interreg component 5, Interreg North Sea programme, Horizon Europe, Digital Europe Programme, etc.). Thus, regions around the North Sea should develop and deploy policies to create an ecosystem which can nurture the potential in the ocean economy while helping manage the risks. The creation of an ecosystem would not be a policy goal in itself, but rather a supporting tool for developing the maritime economy in the NSR. Ecosystems can be brought together through public intervention via grant-funded projects where trans-national collaboration is forced, with the potential to avoid duplication of efforts and make more efficient use of public funds. Strong environmental rules can ensure that industry moves in a sustainable direction. Big lighthouse projects start with subsidies – and then they become self-sustaining and the ecosystems reveal themselves.

Policy action recommendation

In each region across the North Sea one or more Blue industry cluster, maritime/marine network, digital innovation hub or R&D infrastructure holds seat. Most are knowledge and innovation hubs in regional ecosystems, and play a key role in the regional smart specialisation strategies. By pooling their knowledge, expertise and resources, the North Sea Region can become a frontrunner in contributing to the UN Sustainable Development Goals and the EU's Horizon Europe mission "healthy oceans, seas, coastal and inland waters". Jointly, new partnerships for innovation and business development and formation of European and global lighthouse projects can be achieved if such an

ecosystem facilitates a shared and open innovation culture thriving on trusted relationships and co-creation across borders.

Within the Blue Economy three technological megatrends – connectivity, intelligence and flexible automation – are among the principal innovation-drivers towards more efficient and sustainable production and operations. The ecosystem embraces these and other megatrends, such as clean energy, thus realising significant financial and operational benefits in addition to the societal benefits.

The ecosystem could take the form of a "Blue Knowledge and Innovation Community (KIC)", adding to the European Institute of Innovation and Technology (EIT) existing network of KICs. The EIT aims for KICs to increase Europe's competitiveness, its sustainable economic growth and job creation by promoting and strengthening cooperation among leading business, education and research organisations, and power innovation and entrepreneurship in Europe by creating environments for creative and innovative thoughts to thrive. The KIC should be able to spur activities from large lighthouse projects to stimulating collaborative SME-driven innovations by awarding innovation vouchers reducing barriers for cross-border collaboration and international business development in new markets. To fuel the KIC, a smart digital open innovation platform should serve at its core to engage the community across the North Sea Region and ensure collaboration, knowledge sharing and idea generation across sectors, professions and borders.

Expected impact of the policy

The thriving KIC with its portfolio of lighthouse projects and SME-driven innovations in the NSR would serve as beacons for the rest of the world, exemplifying the type of approach that can drive the next engine of global economic growth. It would demonstrate how forward-thinking communities' sharing, co-creation and engagement of technology can create a better, cleaner world through new levels of innovativeness. The impact in the NSR would be faster development of solutions, getting technological solutions to market faster, shared business objectives and goals, reducing silos, connected regions working collaboratively, and maximising the impact of the funding.

Next steps: Topics for follow-up with stakeholders

There was clear interest in developing this idea further, as the challenge is both highly relevant and important. Priority areas need to be created, and agenda, and an overview of existing research projects. The participants declared that a workshop was required on the specific challenge.

Challenge: *The year is 2030. The NSR has deployed a robust framework for skills development transnationally.*

The vision, its framework and context

Industry is highly dependent on the knowledge, skills, competencies and creativity of its workforce to be competitive. There is persistent competition from outside Europe, and the continent is losing craftsmanship, which has always been a driver of innovation. Potential shortages and gaps in skills development, combined with mismatches between labour supply and demand, directly harm job creation. Our coasts and seas have the potential to deliver growth and jobs in the coming years. In order to achieve blue growth, highly qualified and skilled professionals are needed. The energy, digital and green transitions all require new skills.

Yet many Blue Economy sectors are experiencing difficulties in finding the right employees – and most sectors expect these difficulties to continue in the near future. This is due to:

1. a skills gap between education offer and labour market needs, especially with regards to technological developments and innovation;
2. a lack of communication and cooperation between education and industry;
3. a lack of attractiveness and awareness of career opportunities in the Blue Economy;
4. lack of ocean literacy culture.

The combined effects of rapid technological change, digitalisation, climate change, circular economy, and new forms of work, call for innovative ideas to ensure that training methods and offers not only adapt to change, but are also at the forefront of mastering and driving this change. These developments not only disrupt every aspect of work and life, but also create opportunities for innovation and employment creation across all sectors. The capacity to innovate is increasingly becoming the key factor driving economic and social development.

Policy action alternatives

Businesses across all sectors, and even individuals, are going through a transition – green, digital and energy. Among other things, this requires the transformation of business processes, business models, business ecosystems, and ecosystem and partnership models. The importance of digital transformation is highlighted under the 'Digitisation of EU industry' strategy, whereby to support industry in this adoption, Digital Innovation Hubs have been established under the Digitising European Industry initiative.

To respond to and be ready for this transition, businesses need to evolve, to establish new strategies and to encompass new expertise. Young people need to be inspired to consider roles in the Blue Economy; the talent pool needs to be expanded; the right skills and training need to be in place; and those already in the Blue Sector need to be supported at all levels.

Technical skills relevant to smart industrial specialisation and digital transformation cover the following technology domains:

- Skills relevant to researching and developing production technologies;
- Skills relevant to researching and developing digital technologies;
- Skills relevant to researching and developing cyber-technologies;
- Basic digital technology skills; and
- Advanced digital technology skills.

Skills shortages are expected in all these domains, and to address them, new educational curricula and teaching methods will be needed across all educational levels – from university programmes to vocational education down to primary education. Apprenticeships need to be established, and mentoring/coaching included. The competence level is important for the right skills. To achieve this, bring the marine business/offshore more inland: work for the ocean, but not necessarily become a sailor. Use branding to attract the next generation to work in the Blue Economy – more than just marine/maritime companies.

Developments in the educational curricula and teaching methods have often been of a gradual and incremental nature, and in many cases driven top-down. Business-as-usual is not a viable option for the future. The speed and scale of change calls for innovative approaches where those offering training are empowered to understand, engage and be an active partner in co-creating solutions for local social and economic development. A bottom-up approach to excellence, and the capacity to adapt skills provision rapidly to evolving local needs, is essential.

The NSC could help mobilise for NSR-related projects under the ERASMUS programme, seeking synergies. Exploit the skills agenda in the national and regional ERDF programmes in the NSR. Education could be set as a pillar in a new NSR programme. Co-ordinate with projects that have outputs to assist in the path, e.g. the ongoing INTERREG RIGHT project (with Hordaland County Council as Co-ordinator) – consider how to follow-up the findings from this project in terms of mapping the needs for future skills.

Harmonise educational systems & curricula in each NSR country, as a basis or first step for the establishment of a version of an NSR Maritime University [see previous Interreg NSR project "Northern Maritime University"]. E-platforms show a high potential for scalability and transferability.

Policy action recommendation

A skilled and flexible workforce is increasingly at the centre of an economy's capacity to attract investment, participate in global value chains and sustain economic growth. Consequently, investing in education systems that deliver the right skills for the 21st century job market is high on the agenda of policy makers aiming to boost economic and social well-being. Skills development therefore needs to be built and integrated into new policy instruments. There is a need for a platform that marries

education with skills required in the Blue Economy. As E-platforms show a high potential for scalability and transferability, develop a type of online educational platform focussing on the skills required to maintain global leadership in the Blue Economy. Create and curate an NSR inventory of available online training courses and MOOCs – offered not just via educational institutions, but also industry, etc. Such a platform could have complementary features to support an ecosystem, such as exchange of knowledge, increase in ocean awareness, etc., and would be aimed on future blue economy workers.

To manage the shaping of the workforce transformation in the NSR, a common vision of high-tech skills and future professionals and designing actions to foster them need to be identified and validated. The skills requested by industry are not merely technical. Over the last decade, the notion of 'T-shaped' skills has emerged, referring to an individual worker having a combination of both general skills across multiple domains and specialist skills within one domain. Future professionals are likely to be creative, innovative and entrepreneurial, and capable of building relationships, advancing research and strengthening their organisations. The breadth of the future professional reflects the individual's willingness and ability to collaborate across industries, sectors and disciplines. The depth of the future professional refers to the depth of the industry-related and sectoral skills and knowledge that the individual possesses. For the NSR to proposer and to tackle the transitions in 'digital', 'green' and energy, raising ocean literacy, it needs to invest in capability building and lifelong learning; all in the quadruple helix need to prepare the NSR workforce for the Fourth Industrial Revolution transition, including re-tooling the education system and investing in training as well as lifelong learning to create a mobile workforce which can benefit from the opportunities. To this end, the NSR needs to learn from existing initiatives in other parts of Europe and develop and deploy the best, for example, learn from the BSR Submariner network as a model for how to organise/build up a framework in the NSR, study the EUSBSR Policy Area for Education: http://groupspaces.com/eusbsr-education/, collaborate with the DG MARE Expert Group on Skills and Career Development, look at the Baltic University Programme: https://www.balticuniv.uu.se/, and find synergies with the DG MARE Blue Career scheme and with Blue Skills projects. What exists needs first to be mapped, and then leveraged.

Expected impact of the policy

Skills development is a lifelong process. The skills, competences, and qualifications that people need change over time and must be developed in line with the evolving needs of the labour market. People need to be equipped with a variety of basic skills (including literacy, numeracy, foreign languages and digital skills) and equally higher and more relevant skills as the needs of the labour market evolve. Transversal skills, such as the ability to learn and take initiative, to work with others and solve problems, will help people deal with today's varied and unpredictable career paths. The development of entrepreneurial skills, knowledge and attitudes will help contribute to employability, support new business creation and benefit individuals and society on the whole. Digital technology is transforming almost every aspect of our public, private or work life. For every individual – employee, learner or citizen – this technological innovation creates a demand for new and evolving digital skills.

Addressing these requirements at the North Sea level, supra-nation, would ensure that the NSR maintains its current global leadership in aspects of the Blue Economy.

Next steps: Topics for follow-up with stakeholders

To explore the concept further, including outlining the possible framework of how such an NSR Maritime University could operate, investigating how to secure stable funding, etc., a workshop needs to be held. Stakeholders need to be consulted to explore the level of interest, and if it desired, then how it can be integrated as a synergetic action with Member States and the EU. A mapping of what currently exists, in terms of both skills and competences, would need to be an early step.

Challenge: *The year is 2030. The NSR has scaled up a sustainable open innovation platform, which is widely and actively used by all players in the Blue sectors.*

The vision, its background and context

In a world of accelerated technological mutation, companies have to co-innovate with innovative and agile external parties, such as SMEs and start-ups, in order to survive and to succeed. In the same way, start-ups and SMEs need to rely on established and larger companies to accelerate their development across borders. Innovation cannot be made up: it comes alive through collaborations, exchanges, idea sharing and relationships. The EU has identified innovation ecosystems as highly relevant, and they are a priority in the upcoming framework programme, Horizon Europe. Due to the need both to succeed and stand out in an increasingly global and competitive marketplace, impact becomes key. Bringing research into the equation strengthens the ecosystem and increases the likelihood of success.

The objective of open innovation is to connect companies to their environment to access new ideas, external competencies and potential sources of growth. Open Innovation calls for innovation development based on the meetings of talents from different industries and with different backgrounds. Such a bottom-up approach fosters the construction of an environment and conditions that will create common value. Open innovation fits into an innovation strategy that balances internal R&D&I and external input, coming from start-ups, university, clients, providers or even competitors. It is thus a priority of the EC, which actively supports open innovation approaches.

Policy action alternatives

Bottlenecks:

- involvement of all innovation actors
- links with S3 priorities (creation of critical mass of actors at EU)
- synergies between programmes – regulations (EU/national)
- sustainable projects (e.g. avoid short-term projects with no continuation)
- national vs regional innovation + EU challenge
- sharing of best practice
- trust between actors

Open Innovation matches problem owners with problem solvers. Technology, market or industry may be the spur for innovation. It is time consuming and difficult for SMEs and start-ups to keep track of multiple large company challenge sites. A sophisticated digital solution could match expertise and identify (required) complementary expertise. The platform must allow very easy and intuitive access for those that decide to partake as to encourage retention and discourage frustration. Having a cloud-based solution would limit the national focus, and trans-nationality would become intrinsic.

Thus, an Open Innovation Platform (OIP) using advanced digital technologies should be developed that will deliver value to users, broader stakeholders and the NSR at large. The OIP would enable physical, virtual and social co-creation, prototyping and demonstration. Such an OIP may be developed by different bodies: (i) one where companies only participate up to a certain level, then stop when it becomes competitive, and develop the rest themselves; or (ii) that run by clusters, where the benefit from open innovation is shared equitably. As trust and confidence are key issues, correct incentives would have been established to enable value creation; in clusters, members already share with each other and trust each other. Clusters add value to the open innovation challenge, or (iii) an independent solution, not driven by large companies or clusters, but by an independent organisation without bias.

Policy action recommendation

The key policy action recommendation to emerge from the Round Table was to develop an independent solution. Capitalising on shared resources, different viewpoints and experiences can be an extremely powerful innovation tool. The OIP would enable physical, virtual and social co-creation, prototyping and demonstration. Services could be bundled and offered to strengthen sustainability aspects: responsive space-as-a-service operator, or acceleration ecosystem operator, for example. The OIP could be positioned as an orchestration space, and/or a community hub.

Successful innovation is always problem-focussed. Inviting different solution providers to look at the problem statement – the challenge – from different angles enables different technological solutions to be offered, including those that the problem owner may not even have considered. The problem-solving potential of collaboration increases with the diversity of knowledge of the partners, underlining the potential gains from North Sea cooperation. The community would be important space to bring together players to work on societal challenges and missions. Utilising advanced technologies, the expertise of the potential solution provider would be matched with the challenge, including the identification of any required complementary expertise, which could also result in further bankable solutions.

The external ecosystem would be leveraged to increase innovation relevancy. Innovation would be accelerated through a clearly defined and structured process from ideation to commercialisation. There would also be space for disruptive technology (true innovation) with enablers in place. Citizen participation would be encouraged as citizens are equally creative and innovative. Active trans-national collaboration would be facilitated on multiple levels, for example (virtual/physical) events, etc. Additional elements could be developed over time, for example mentorship in prototype development, living labs, etc. The value to the Blue Economy in the NSR would be immeasurable: communities in regions abutting the NSR would be active in multi-disciplinary co-learning, co-design and co-effectuation configurations. Silos would be broken down, and using advanced digital technologies, such as the cloud, would ensure than cross-border collaboration was intrinsic and automatic. The OIP would be the ideal tool initially to address non-competitive aspects, e.g. safety.

Interregional cooperation is a key component of regional competitiveness measures in support of SMEs and start-ups utilising research and innovation resources to progress along the Technology Readiness Levels (TRL) and value chains and explore cross-sectoral collaboration with the support of enabling technologies. Closer interregional cooperation can lead towards co-investment thus further strengthening collaboration between regional ecosystems. Cooperation between tiers of government, market parties, knowledge institutions and interest groups (the golden quadrangle) around the North Sea helpful in achieving this objective.

Expected impact of the policy

An OIP would encourage trans-national collaboration and aid in breaking down silos. It would be a tool to advance sustainable and strong industrial development and for further strengthening the industrial base in Europe. An advanced technological OIP would be easier to access for SMEs and start-ups – saving them time, and accessible to all interested stakeholders. It would enable matchmaking, mentoring and collaboration, again across borders. As the OIP would be in the cloud, data should be easy to organise and analyse. Data analytics could then be employed to develop new business models (e.g. to forecast business models based on the types of challenges submitted).

The business outcomes for the blue sector in the NSR can be summarised as co-creation, new revenue streams, new products & services, accelerated time to market, increased market differential, competitive advantage, minimised innovation risk, cost-effective R&D&I, and engaged customers and partners.

On the negative side, a cloud-based solution may be too open, and solutions could be 'stolen' by others, especially outside Europe. However, only problems / challenges would be published and not the solutions. Additionally, who controls the cloud?

In conclusion, it is recommended to identify and work with key actors and stakeholders to create an OIP for North Sea businesses to capitalise on growing global opportunities. These include maritime business services, high-value manufacturing, autonomy and robotics, satellite communication, marine science, and hydrographic surveying and mapping.

Next steps: Topics for follow-up with stakeholders

There was clear interest in developing this idea further. The participants declared that there was value in initiating a pilot solution in the NSR or Baltic Sea basin.

Sustainability

Such solutions would fit seamlessly into global priorities:

Contributing to the following **Sustainable Development Goals of the UN**:

- **Goal 4:** Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- **Goal 8:** Decent work and economic growth: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.
- **Goal 9:** Industry, Innovation, and Infrastructure: Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

- **Goal 12:** Responsible consumption and production: Ensure sustainable consumption and production patterns.
- **Goal 13:** Climate action: Take urgent action to combat climate change and its impacts by regulating emissions and promoting developments in renewable energy.
- **Goal 14:** Conserve and sustainably use the oceans, seas and marine resources
- **Goal 17:** Partnerships for the goals: Strengthen the means of implementation and revitalize the global partnership for sustainable development. *Increasing international cooperation is seen as vital to achieving each of the 16 previous goals. Goal 17 is included to assure that countries and organizations cooperate instead of compete. Developing multi-stakeholder partnerships to share knowledge, expertise, technology, and financial support is seen as critical to overall success of the SDGs. The goal encompasses improving North-South and South-South cooperation, and public-private partnerships which involve civil societies are specifically mentioned.*

Dovetailing with the following **EU priorities and strategies**:

- Horizon Europe – Pillar 2 – Global Challenges and Industrial Competitiveness

- Horizon Europe – Pillar 3 – Open Innovation
- Digital Europe - Access: better access for consumers and businesses to digital goods and services across Europe
- Digital Europe - Environment: creating the right conditions and a level playing field for digital networks and innovative services to flourish
- Digital Europe - Economy & Society: maximising the growth potential of the digital economy.

In accord with the North Sea 2030 Strategy:

- tapping into 'blue' resources
- promoting local businesses and partnerships in order to help create vibrant local communities

as well as contributing to the priority areas:

- A productive and sustainable North Sea
- A climate-neutral North Sea Region

- A connected North Sea Region
- A smart North Sea Region