

## Work package 4

**Deliverable:** D4.6 Report (incl. recommendations) on strategies and instruments to support responsible and sustainable innovation in the Baltic and North Sea region

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### *The main outcomes*

- Identifying strategies, tools and requirements that will best serve the goal of bridging the gaps between research, innovation industry, funders, and societal needs.
- Providing recommendations to optimise innovation funding instruments to develop a sustainable Blue Economy in the Baltic and North Sea region.
- Presenting summaries of interactive workshops where experiences and ideas for innovation funding were discussed among stakeholders from academia, industry (SMEs), government and funding organisations.

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## **Description of task: (i.e. as in the Description of Work)**

‘Blue research’ can effectively underpin and successfully foster blue growth. On the other hand, innovation for blue growth often requires research on different levels and from different disciplines, including natural and engineering sciences as well as social sciences and humanities. In the past, the human aspect of innovation, especially innovation implementation, was often neglected, potentially resulting in unexpected opposition of stakeholders and citizens. The new Baltic Sea and North Sea research and innovation programme will aim at crossing the old divides between scientific research, economic development and societal interests.

The exact areas of innovation to be addressed in this programme shall be clarified in the scoping exercise (Task 1.1) and further developed in the strategic research and innovation agenda (SRIA). This task will address the following innovation-related issues:

- How can the new programme best foster and support responsible innovation?
- Which strategies and instruments will best serve the goal of bridging the gaps between research, innovation and societal needs?
- How can the programme as a whole exert a positive impact on relevant fields of innovation and Blue Growth in the Baltic and North Sea regions? Which structures or activities are needed to achieve this goal?
- How can the programme effectively promote ‘open innovation’?
- Which relevant opportunities can be expected from the new 9th framework programme (FP9)?

These questions will be answered through consultations and discussions with specialists and stakeholders from research, innovation, NGO’s and society at large. Stakeholders from the Baltic Sea and North Sea region, as well as pan-European stakeholders will be consulted for this task. To achieve the goals mentioned above a series of smaller and bigger workshops will be organised on innovation-related issues. The aspect of responsible and sustainable innovation will receive special attention in this task. Work will start as soon as the scope of the new programme is delineated (M6); in M13 outcomes of the preliminary study on the potential measures to integrate innovation aspects (e.g. open innovation) will be discussed at an expert workshop and further delivered to the SOW. The draft recommendations developed by this task are discussed in the BANOS CSA Steering Committee approval (M25) and completed and presented at the final conference (M36).

**THE BALTIC AND NORTH SEA  
COORDINATION AND SUPPORT ACTION  
(BANOS CSA)**

**BANOS CSA D4.6**

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## 1 Executive summary

As Horizon Europe takes further shape, the European Commission recognizes that stimulation of innovation is a critical component of the new European Research & Innovation Agenda. Stimulating innovation requires the participation and interaction of different stakeholders, including (academic) researchers, small-and medium-sized enterprises, government, national research funding organisations as well as private funding parties. The Baltic and North Sea Research and Innovation Programme (BANOS), as planned in BANOS CSA, can play a critical role in the development and funding of research programmes, as well as link the required stakeholders by acting as a one-stop shop for sustainable 'blue' innovation in the Baltic Sea and North Sea region.

Stimulation of innovation development is required to maximize the knowledge potential within the EU towards building a sustainable Blue Economy in the Baltic Sea and North Sea region, as well as in other European regional sea areas. The development and diffusion of 'open innovation' requires an ecosystem of fundamental & applied research that is closely connected to entrepreneurs. In a healthy, open innovation ecosystem, the development of new technologies and knowledge can make an impact on society through synergy of emerging technologies from research to implementation in new innovative products and services, but also on optimization of the sustainability of already existing activities and governance. Instruments supporting innovation development need to tie into the requirements of both industry and academia to optimally stimulate open innovation, as interest from both sides ensures full participation and uptake into actions.

This deliverable presents recommendations to optimise innovation funding instruments, incorporating the outcome of discussions between stakeholders from research institutes & academia, funding organisations, BANOS CSA partners and Small- and Medium Enterprises in the Blue Economy sector. Input for the report was collected through small-scale interactive workshops where experiences and ideas for innovation funding were discussed. The recommendations contained in this report are intended to be implemented in future BANOS funding calls and can be adapted by other initiatives relevant for implementation of BANOS strategic research and innovation agenda (BANOS SRIA) i.e. Horizon Europe Partnership candidate Climate neutral, sustainable, productive blue economy.

## 2 Introduction

### 2.1 Current innovation landscape: need to foster innovation

The EU countries surrounding the Baltic- and North Seas all recognize the potential and urgent need for stimulating the further development of a sustainable Blue Economy. For example, as demands for sustainable, (green) energy sharply increase during the coming decades on the path towards a carbon-neutral economy by 2050<sup>1</sup>, and land use faces increasing conflicting demands between food production and other land use, (multi)use of marine areas is a very urgent topic in the EU. The challenges concerning sustainable production of energy and food, in harmony with nature and human wellbeing, are not limited to specific countries but affect the entire Baltic Sea and North Sea region from Norway to France and from the UK to the Baltic Sea. Recently, the European Commission published the fourth edition of "The EU Blue Economy Report", providing an overview of the performance of the EU-27 economic sectors related to oceans and the coastal environment<sup>2</sup>. This report highlights that emerging activities, such as ocean energy, marine biotechnology and robotics, are developing quickly and will play an important role in the EU's transition towards a carbon-neutral, circular and biodiverse economy. Citing Commissioner for Environment, Oceans and Fisheries **Virginijus Sinkevičius**:

*"This [EU Blue Economy] report shows that the blue economy is an important driver of today's European economy, in coastal communities and beyond. Moreover, with the European Green Deal, its importance*

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<sup>1</sup> [https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2050-long-term-strategy\\_en](https://ec.europa.eu/clima/eu-action/climate-strategies-targets/2050-long-term-strategy_en)

<sup>2</sup> [https://ec.europa.eu/oceans-and-fisheries/news/2021-eu-blue-economy-report-emerging-sectors-prepare-blue-economy-leading-part-eu-green\\_en](https://ec.europa.eu/oceans-and-fisheries/news/2021-eu-blue-economy-report-emerging-sectors-prepare-blue-economy-leading-part-eu-green_en)

*will only grow in the future. The sector will contribute to decarbonisation and other European environmental objectives with innovative solutions and by reducing its own footprint. I call on Member States and private investors to support this transformation and invest in a sustainable blue economy.”*

Furthermore, as highlighted in the 4<sup>th</sup> EU Blue Economy report, a recent investment survey pointed out that the interest in sustainable Blue Economy investment is high as the global Blue Economy is expected to expand at twice the rate of the mainstream economy by 2030. Secondly, it is pointed out that many of the projects in the area of sustainability and Blue Economy are risky or require risk-bearing capacity from investors, as the returns on investments are long for many sectors. The development of a broader range of Blue Economy financial instruments, with appropriate risk sharing mechanisms may contribute to the solution.<sup>3</sup>

A smart, sustainable use of our regional sea regions is required to develop new technology, knowledge, public support, and governance. The required innovation developments needed to achieve a circular Blue Economy are supported by most Baltic Sea and North Sea countries on a national level, for example, through national science funding councils/funding agencies and local enterprise development agencies. The future BANOS program should tie into existing (co-)funding structures, including also synergies with funding mechanisms outside Horizon Europe<sup>4</sup>.

BANOS CSA members recognize there is a need for a sustainable Blue Economy innovation programme that is organized on a supranational level and creates synergy from the exchange of experts and knowhow across EU Baltic Sea and North Sea countries, tying together the required stakeholders from academia, industry, funding partners (public and private) and government that work together in a collective innovation strategy.

Together with the development of new technology and knowledge, the innovation strategy should also result in capacity building for educating the experts for tomorrow that work in the Blue Economy sector<sup>5</sup>.

## 2.2. History of innovation in BONUS

Striving for enhancing the societal impact of research, the predecessor of future BANOS programme, BONUS the joint Baltic Sea research and development programme (2011–2021), set from its very beginning an objective of integrating academic science with innovation in the fields related to protection of marine environment and sustainable use of marine ecosystem services. The Strategic research Agenda of BONUS (ref., first published in 2011<sup>6</sup> and updated in 2014<sup>7</sup>) formulated among total of 19 research and innovation (R&I) themes that unambiguously called for involvement of innovative enterprises to deliver the expected project outcomes. By launching calls on the themes dedicated to innovation, BONUS was pioneering the implementation of the basic idea behind the EU’s strategic framework for R&I funding driven by the necessity to progress with sustainability blue economy, and optimally exploit its potential. In 2012 a specific BONUS Innovation call was published. The call covered three R&I themes and resulted in 13 funded projects ranging in their focus from enhanced retention of nutrients in small-size wastewater treatment plants to improvements in maritime navigational safety. In addition, in 2015 BONUS call Blue Baltic significant involvement of enterprises was required in four of the R&I themes. Six out of total twelve project selected in this call had a clear focus on different aspects

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<sup>3</sup><https://www.credit-suisse.com/media/assets/microsite/docs/responsibleinvesting/spread-blue-economy-report.pdf>

<sup>4</sup>Ulvila M., M. Sirendi, K.A. Koho, D. Lisbjerg (2021). Report on new forms of cooperation and co-funding mechanisms with initiatives financed by ESIF and other sources. BANOS CSA/D2.8.

<sup>5</sup>Lescroart J., A.K. Lescrauwaet, F. ten Hoopen, K.A. Koho, M. Sirola, A. Andrusaitis (2021). Report proposing strategies in support of human capacity building and skills development. BANOS CSA/D4.4.

<sup>6</sup>Andrusaitis A, von Bodungen B., Conley D., et al. (2011), BONUS strategic research agenda 2011–2017. BONUS Publication No. 12.

<sup>7</sup>Andrusaitis, A., K. Kononen, M. Sirola, et al. (2014), BONUS strategic research agenda 2011–2017, update 2014. BONUS Publication No. 14.

technological innovation – from minimizing the environmental footprint of aquaculture to novel methods of environmental surveying and monitoring.

While producing a wealth of practically applicable outcomes, BONUS effort in funding innovation projects left us also with several significant lessons learned. Thus, the dedicated query of the beneficiaries of BONUS innovation projects revealed, that for the small private enterprises (the target group of the call), following and fulfilling the application guidelines was in many ways discouraging. In view of innovation beneficiaries, size of the available grant occurred disproportionate compared to the relatively cumbersome application procedure, let alone to additional burden to be assumed by a consortium leader. In addition, the long duration of the application and subsequent evaluation procedures were seen as a discouragement by many SMEs to apply R&I funding. The questions to be answered in this report originate greatly from the lessons learned already while experimenting with the innovation calls in BONUS.

### 2.3. Aims and objectives of deliverable

‘Blue research’ can effectively underpin and successfully foster sustainable blue growth. On the other hand, innovation for blue growth often requires research on different levels and from different disciplines, including natural and engineering sciences as well as social sciences and humanities. In the past, the human aspect of innovation, especially innovation implementation, were often neglected, potentially resulting in limited uptake by both stakeholders and citizens. The new Baltic Sea and North Sea research and innovation programme will aim at crossing the old divides between scientific research, economic development and societal interests.

The exact areas of innovation to be addressed in this programme were be clarified in the scoping exercise (Task 1.1) and further developed in the BANOS SRIA<sup>8</sup>. This task will address the following innovation-related issues:

- *How can the new programme best foster and support responsible innovation?*
- *Which strategies and instruments will best serve the goal of bridging the gaps between research, innovation and societal needs?*
- *How can the programme as a whole exert a positive impact on relevant fields of innovation and Blue Growth in the Baltic and North Sea regions? Which structures or activities are needed to achieve this goal?*
- *How can the programme effectively promote ‘open innovation’?*
- *Which relevant opportunities can be expected from the new 9<sup>th</sup> framework programme (FP9)?*

These questions were addressed through consultations and discussions with specialists and stakeholders from research, innovation, NGO’s and government. Stakeholders from the Baltic Sea and North Sea region, as well as pan-European stakeholders were consulted for this task. To achieve the goals mentioned above two workshops (physical and online) were organized on innovation-related issues.

## 3 Methodology

The BANOS CSA task 4.5 *Developing strategies and instruments stimulating innovation diffusion and ‘open innovation’* brought together the full range of stakeholders involved in sustainable ‘blue’

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<sup>8</sup> Koho K.A., A. Andrusaitis, M. Sirola, et al. (2021). The Baltic and North Sea Strategic Research and Innovation Agenda, BANOS SRIA 2021. BANOS CSA/D1.5.



innovation during two workshops. The first workshop was held in-person on February 5<sup>th</sup> 2020 in the Hague, the Netherlands, focusing on 'finding suitable financing instruments to stimulate innovations for a sustainable Blue Economy'. Most attendees were from BANOS CSA member countries, Dutch ministries, scientists from research institutes and universities, research funding organizations (incl. hosting organization NWO), but also from EATIP Ocean and the North Sea Region Interreg Program. The full summary of this workshop is attached (**Annex 1**).

Workshop 1 addressed the following questions:

- How can the new programme best foster and support innovation and a sustainable Blue Economy in the Baltic Sea and North Sea?
- Which strategies and instruments will best serve the goal of bridging the gaps between research, innovation and societal needs?
- How can the programme as a whole exert a positive impact on relevant fields of innovation and Blue Economy in the Baltic Sea and North Sea regions? Which structures or activities are needed to achieve this goal?
- How can the programme effectively promote 'open innovation'?

Workshop 2 was organized online (29 April 2021) using Zoom platform, focusing on Small and Medium Enterprises (SMEs) that are active in the Blue Economy sector in the Baltic and North Sea region. The aim of the workshop was to identify the tools and requirements to ensure the participation of SMEs across innovation themes of the BANOS SRIA and capture the interest of relevant stakeholders and funding bodies, including the representatives of the European Commission and Member States.

Prior to the workshop, interviews were conducted with relevant stakeholders from SMEs, funding organisations and BANOS CSA members to outline the specific scope of the workshop and identify major bottlenecks with respect to innovation funding. To assist in the task, an expert on innovation development was hired (**Philippe Vanrie**, EcoSystemiX Innovation Dynamics, former Head of the EUREKA Secretariat) to map out the relevant stakeholders among SMEs and innovation-supporting organizations within BANOS CSA member countries and to engage with these stakeholders to ensure their participation.

Emphasis was placed on the activities that are within the scope of the themes addressed in the BANOS SRIA, stating that innovation development should lead to cleaner technologies and optimised practices, sustainable new business activities and environmental improvements in general. Further, incentives and bottlenecks for relevant SMEs to engage in the development of the future BANOS innovation projects were identified. Input from industry (or sectors working with innovation in general) is essential to ensure that BANOS funding instruments generate interest from stakeholders developing and implementing innovation ideas and technologies that contribute to the goals listed in the SRIA.

The outcomes from the 2nd innovation workshop were synthesized in report with a set of clear recommendations for implementation in the future BANOS programme (**Annex 2**).

## 4 Discussion of main outcomes

### 4.1 How can the new programme best foster and support responsible innovation?

Societal benefits, environmental health and sustainability should be basic principles for BANOS innovation projects. The One Health approach<sup>9</sup> is adopted in the BANOS SRIA, as human, animal and environmental health are all taken into account by the three interlinked strategic objectives: Healthy Seas and Coasts, Sustainable Blue Economy, Human Wellbeing. In addition, potential ethical and societal issues connected to research and innovation need to be identified and considered right from

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<sup>9</sup> <https://www.who.int/news-room/q-a-detail/one-health>



the beginning of the Programme and implemented projects. Where appropriate, research funders participating in the future BANOS Programme should require that proposals take an array of aspects into account (e.g. environmental, legal, ethical and social aspects), to ensure that they are properly taken up and considered during the evaluation and selection procedures of the funding calls. Calls for proposals may specifically include measures addressing the above-mentioned array of potential impacts. Responsible innovation<sup>10</sup> should thus become an integral aspect of the BANOS Programme. This means that a vision on responsible innovation should be developed for individual calls and that the principles of responsible innovation should be considered from the proposal initiation phase on the project-level. Incorporating an impact plan (incorporating societal benefits, environmental health and sustainability) into research proposals can be seen as a means to ensure and support the inclusion of responsible innovation in the BANOS Programme<sup>11</sup>.

#### 4.2 Which strategies and instruments will best serve the goal of bridging the gaps between research, innovation and societal needs?

As outlined in section 4.1 societal issues, societal costs and benefits of innovation, incl. ethical considerations, need to be taken into account in future innovation projects. This may require consortia to be multi-, inter- and trans-disciplinary, or to devise processes and measures that ensure a proper involvement of different disciplines, relevant stakeholders and societal partners. Specific regulatory measures may be developed to combine technological and societal innovation. To foster societal take-up and to ensure the acceptance of innovation it may be useful to develop joint fora where scientists from diverse disciplines, involved companies and societal partners, incl. citizens, can meet and discuss relevant issues. It is imperative to start this dialogue at an early stage and to continue it at regular intervals. Supporting collaborative projects, instead of funding mono-beneficiary projects, favouring agile and rather small consortia rather than large groupings may facilitate the process. Alternatively, field- or living-lab approaches can be considered, as they facilitate and often require close interactions between different stakeholders and scientists. Furthermore, creating a portfolio of different BANOS funding instruments allows targeting innovation projects at different Technological Readiness Levels (TRLs)<sup>12</sup>. To bridge the natural gap between research, innovation and society and to achieve proper inclusion of societal needs, it is advisable not to rely on one-size-fits-all instruments but rather to create flexibility and diversity in the funding instrument portfolio.

#### 4.3 How can the programme as a whole exert a positive impact on relevant fields of innovation and Blue Growth in the Baltic and North Sea regions? Which structures or activities are needed to achieve this goal?

The BANOS Programme should be designed and conducted as a coherent portfolio, not as a list of unrelated funded projects. Managing a portfolio means adopting strategic value-chain thinking, at the level of devising calls, developing selection criteria and also following up projects during the lifetime of the funding cycle. In the description of the Programme as well as of individual calls care should be taken to explicitly specify the role of private and societal partners. Not every call and not every topic may be equally suitable for incorporating companies and societal partners. Therefore, it is necessary to devise a clear vision and strategy concerning their roles and expected contributions. Targeted instrument allowing for proofs-of-principle studies or other activities to explore the economic viability of scientific

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<sup>10</sup> <https://epsrc.ukri.org/index.cfm/research/framework/>

<sup>11</sup> Koho K.A., M. Sirendi, M. Sirola, A. Andrusaitis (2020). Report proposing impact indicators and programme-level impact monitoring mechanisms BANOS CSA/D4.1.

Koho K.A., M. Sirendi, M. Sirola, M. Ulvila, A. Andrusaitis (2021). Guidelines for applicants on integrating practical Impact Indicators in project design. BANOS CSA/D4.2.

<sup>12</sup> [https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014\\_2015/annexes/h2020-wp1415-annex-g-trl\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/wp/2014_2015/annexes/h2020-wp1415-annex-g-trl_en.pdf)

results, as well as measures to stimulate the exchange of people between research and innovation partners (incl. private partners) should be considered when appropriate.

Capacity building is essential for delivering long-term impact on the sustainable Blue Economy sector. The BANOS Programme should aim to connect research to innovation development and to engage with industry on various levels. Opportunities for industrial collaborations and PhD internships could be used as a way to build discipline-specific capacity. Development of transferable skills are also likely to enhance researchers and technicians in their roles in innovation, leadership and influencing across academia, public and private sectors. This approach can contribute to capacity building at the interface between scientific research and industry, as outlined further in BANOS CSA deliverable 4.4<sup>13</sup>. The BANOS Programme may set up one or more permanent stakeholder groups to discuss and to initiate activities fostering Blue Growth and innovation. As such, the BANOS Programme may perform a hub function, providing the nexus between funders, researchers and business, and also link into existing education programmes.

#### 4.4 How can the programme effectively promote ‘open innovation’?

Open innovation is described as “*combining internal and external ideas as well as internal and external paths to market to advance the development of new technologies*”<sup>14</sup>. This means to ideas for innovations do not need to be exclusively developed entirely within a specific company, but that ideas can also be included from external expertise and R&D. In other words, the pathway of development from initiation to marketing can include multiple participating stakeholders that do not necessarily engage in the entire process chain<sup>15</sup>. The open innovation ecosystems allows new markets to emerge, whereas in a ‘closed’ innovation ecosystems, boundaries during innovation development are much more firm (Figure 1).

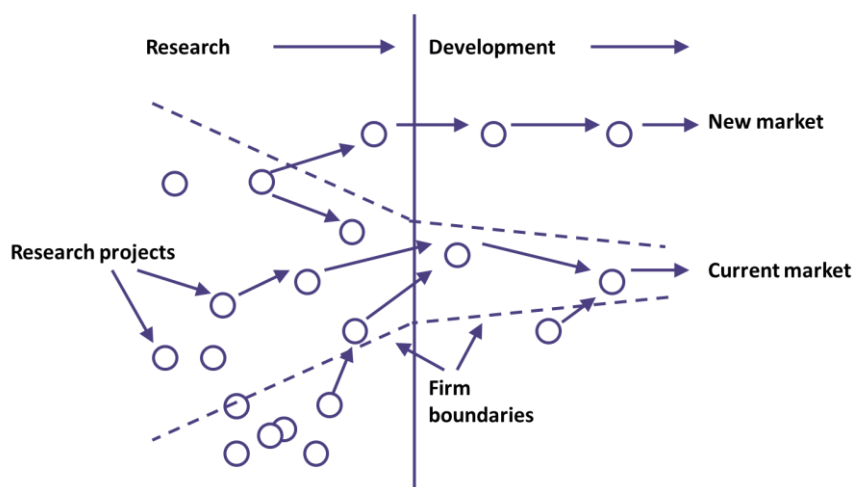


Figure 1. Illustration of an open innovation ecosystem, redrawn from Chesbrough 2003<sup>14</sup>. See main body of text for more details.

Open innovation may be stimulated by allowing (industry) partners to be flexible in their participation in research projects. For example, some companies may only be interested in participating during the start-up of projects, where other companies want to step in further developed projects at a higher Technology Readiness Level (TRL). Flexible and fit-for-purpose calls may best promote a low-level entry for businesses to interact with researchers from academia. The topic of open innovation was addressed during the workshops with stakeholders from the Blue Economy, but was not identified as a critical bottleneck for innovation development, which may indicate that in this sector open innovation is already implemented to a sufficient degree. However, the principle of open innovation should be

<sup>13</sup> Lescroart J., A.K. Lescrauwaet, F. ten Hoopen, K.A. Koho, M. Sirola, A. Andrusaitis (2021). Report proposing strategies in support of human capacity building and skills development. BANOS CSA/D4.4.

<sup>14</sup> Chesbrough, H. (2003), “*Open Innovation: The New Imperative for Creating and Profiting from Technology*”, Harvard Business School Press.

<sup>15</sup> <https://openinnovation.eu/open-innovation/>

included and promoted by BANOS Programme, whenever possible, in the agreed terms of collaboration between scientists and private companies.

#### 4.5 Which relevant opportunities can be expected from the new 9<sup>th</sup> framework programme (FP9)?

The 9th research and innovation framework programme of the European Union for 2021-2027 – Horizon Europe – was launched earlier this summer. The new and updated format of the framework programme is going to have some unexpected impacts on the implementation of future BANOS programme, as planned in BANOS CSA, as these changes were not anticipated during the writing of the BANOS CSA Description of Action. For example, in the Horizon Europe, the ERA-NET Co-fund scheme of Horizon 2020 is being discontinued and the EU's programme level R&I funding is going to be channelled through fewer and larger initiatives/entities than in earlier framework programmes. This means that the implementation mechanism of the BANOS predecessor programme, BONUS Programme (based on Art 185), is no longer feasible. Instead, the new opportunities are linked to European Partnerships with EU member states and associated countries, the private sector, foundations and other stakeholders as their members. Three types of European Partnerships are planned within Horizon Europe:

- Co-programmed European Partnerships: based on memoranda of understanding and/or contractual arrangement between the Commission and private and/or public partners
- Co-funded European Partnerships using a programme co-fund action: based on grant agreement between the Commission and the consortium of partners, resulting from a call for proposals for a programme co-fund action in the work programme of Horizon Europe. Research funders and other public authorities at the core of the consortium, possible also to include foundations and international partner.
- Institutionalized European Partnerships: partnerships where the EU participates in research and innovation funding programmes that are undertaken by EU countries. This includes so-called TFEU Art 185 and Art 187 programmes.

The BANOS CSA consortium and particularly BONUS EEIG as the coordinator have been actively contributing to the development of the Partnership candidate *Sustainable, climate neutral and productive blue economy* (from here on referred to as the SBE Partnership) for which the envisaged implementation mode is a co-funded European Partnership. The implementation of the SBE partnership is proposed to be based on the 'common partnership's strategic research and innovation agenda' (Partnership SRIA). The First high-level SRIA was published already in February 2021<sup>16</sup> and together with the other regionals seas' initiatives and their agendas, BANOS SRIA was considered by BANOS members states an important contribution to this 1<sup>st</sup> strategy but also to the more detailed update, which is currently under preparation.

In addition to the SBE Partnership, BANOS may implement its own complementary activities tailored to address the specific challenges faced in the BANOS region in a most fit-to-purpose way. Here, collaboration across various Partnerships is likely to be of high valuable and used as an additional implementation mechanism of the BANOS SRIA. These Partnership candidates include (in no particular order): Zero Emission Waterborne Transport Partnership, Rescuing Biodiversity Partnership, Water4All Partnership, European Partnership for Chemicals Risk, Clean Energy Transition Partnership, European Partnership Innovative SMEs, Animal Health Partnership, Safe and Sustainable Food System Partnership and European Partnership for a Circular bio-based Europe.

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<sup>16</sup> Horizon Europe candidate partnership. A climate neutral, sustainable and productive blue economy. Draft Strategic Research and Innovation Agenda (2021)

As transnational calls for proposals are seen as the main instrument of implementing the BANOS SRIA, and is strongly supported by additional impact enabling activities<sup>17</sup>, including stimulating innovation diffusion and open Innovation. The thematic content of each call is expected to be detailed in the SBE Partnership, and in case of complementary activities in BANOS workplans. Some calls are likely to be directed more towards research activities, others in innovation or combination of various actors involved. All in all, to achieve the three strategic objectives of BANOS: (i) Healthy coasts and seas, (ii) Sustainable blue economy and (iii) Human wellbeing, input from industry and involvement of SMEs is seen critical to enable the green transition of the sustainable blue economy in the BANOS region.

## 5 Recommendations

The following set of recommendations are formulated for the BANOS Programme, based on informed discussions among stakeholders including representatives of Academia, Small- and Medium Enterprises, (public and private) Funding Organizations, Government and partnering EU-programmes (for detailed list see Annexes):

### A. Open innovation

Integrate a true innovation strategy in the programme, with the purpose to enable and engage more SMEs to and populate the programme. Open innovation may be stimulated by allowing (industry) partners to be flexible in their participation in research projects. For example, some companies may only be interested in participating during the start-up of projects, where other companies want to step in further developed projects at a higher Technology Readiness Level (TRL).

### B. Responsible innovation

Research funders may require proposals to include objectives for implementation of responsible innovation and take this into account during the evaluation and selection of projects. This may also require consortia to be multi-disciplinary, and regulatory measures may need to be developed during projects to combine technological and societal innovation tasks. These regulatory measures, including objectives for responsible innovation may be part of an impact plan that is a compulsory part of research proposals. The BANOS Programme should therefore include specific research questions that are relevant for both industry, research and society.

### C. Sustainability

Include sustainability as a criterion for evaluating proposals to ensure funding for innovation as part of responsible innovation (see also recommendation B). A push for sustainability could be stimulated by clear (long-term) regulations by governments. The push for sustainability should not only come from market demand, but also from government policies. Technological innovation requires a balance with ecosystem services and social requirements. The offshore wind energy sector is a good example of legal requirements that may act as a pull-factor as nature (wellbeing) requirements need to be included in the tender process for offshore wind farms.

### D. Technology Readiness Level (TRL)

Develop mixed Technology Readiness Level (TRLs) projects, by balancing research-intensive, technology-pushed with demand-led/market-driven projects. Push the limits of the usually accepted TRL ceiling. The ideal situation being to select highly innovative projects powered by “mature” business-driven SMEs, for who the funded project is a critical step in their development track. By linking lower to intermediate TRL-levels within projects the greatest societal and economic impact may be achieved.

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<sup>17</sup> For complete list of BANOS impact enabling strategies reader should consult BANOS SRIA Section 6: Impact enablers. In: Koho K.A., A. Andrusaitis, M. Sirola, et al. (2021). The Baltic and North Sea Strategic Research and Innovation Agenda, BANOS SRIA 2021. BANOS CSA/D1.5

Mid-range companies are important with their out-of-the-box ideas, but are often overlooked in funding schemes. A limited number of specific project targets need to be set in order for small and medium-sized enterprises to participate.

Reserve a minimum-required leadership role (Work Package leadership) for one or several SMEs (incl. start-ups & spin-offs) within consortia to ensure active engagement within projects. Stimulate equally the participation of anchor-large firms. Naturally attract best-in-class RTD&I performers (Institutes, Universities, RTOS). Study the possibility to insert intermediary organizations (Clusters, Accelerators, etc.) for a small portion of the projects' budgets. Approaches such as 'living labs' or 'test beds' may be appropriate and attractive ways to promote collaboration between basic and applied science, between research and innovation, between scientists and citizens.

#### **E. Programme portfolio of research & innovation projects**

Design and conduct the programme like a coherent portfolio, not just a list of funded projects. Managing a portfolio means adopting strategic value-chains thinking, both at selection criteria level and during the lifetime of the project's funding cycle.

Create a portfolio of different BANOS funding instruments allows targeting innovation projects at different TRLs and across different sectors within the Blue Economy spectrum (see also recommendation D). Do not focus on one-size-fits-all instruments, but rather create flexibility and diversity in the funding instrument portfolio. Support collaborative projects, instead of funding mono-beneficiary projects, but favour agile & rather small consortia rather than large groupings. Be as bottom-up (and less prescriptive) as possible within the boundaries of the programme's priority areas.

#### **F. Strategic funding**

Segment research funding across two escalating stages (start-up + scale-up). Provide financial/contractual incentives and/or eligibility rights for the efforts made to mobilize private funds & investors (in the scale-up phase). Also allow eligible expenses in demonstration & prototyping infrastructures.

Co-financing requirements are often a bottleneck for start-up companies. For SMEs, it may be important to cross the 'dead valley' to turn initial innovation ideas into a commercially viable product. Funders should provide flexibility in their funding instruments. Co-financing requirements to private parties should focus on in-kind contributions to stimulate private companies take ownership of projects. The capacity of a company to contribute in-kind to a project should therefore be taken into account and requirements to companies to contribute may need to be linked to company size.

Minimize the bureaucratic burden for companies to join research consortia, as especially SMEs may not have to capacity for intensive project administration. Simplify the access to calls. The evaluation process needs to be efficient and short, as projects need to start timely in order to remain relevant in rapidly developing innovation sectors. Take the risk to create a trust-culture where a random control approach could be used in project administration & control.

#### **G. Creating Synergy**

Provide programme support (and eligibility checks & guidance) to search for inter-instrument synergies, with for example other relevant Partnerships, Horizon Europe projects, ESIF funds, ESA/Copernicus support, and any National, Regional and Inter-Regional funding instruments. There is a clear need for knowledge brokering, to know if other companies are developing technologies that could be implemented by others who may already be working on similar innovation ideas.

BANOS needs to find its own unique niche in the landscape of European science and innovation structures. The Programme should not duplicate existing efforts but create synergy and added value by positioning itself at the interface between science, public authorities and industry. In this way, the strategic aims and the societal impact of the Programme could be maximized.

#### **H. Research & innovation project support**

Reserve a programme's budget line to cover accompanying support measures, such as: business & market development, investment readiness and financial modelling, matchmaking (before, during, after project initiation) & search for partners/experts, tech transfer & IP, innovative procurement, connecting to investment & acceleration platforms, etc.

Facilitate access to legal and regulatory advice on of the various supply chains, in relationship with new taxonomies related to sustainability, green procurement, and ESG (Environmental, Social & Governance) reporting related to sustainable finance.

#### **I. Capacity building**

BANOS Programme should aim to connect research to innovation development and to engage with industry on various levels. Opportunities for industrial collaborations and PhD internships could be used as a way to build discipline specific capacity. Development of transferable skills are also likely to enhance researchers and technicians in their roles in innovation, leadership and influencing across academia, public and private sectors. Here, data-management, knowledge transfer, communication, insights in socio-economic, policy, and governance aspects in the ocean and maritime environment are likely to be on top of the 'new skills for a blue agenda'.

## **6 Annexes**

1. Report 'BANOS Innovation Funding workshop', February 5th 2020, the Hague, the Netherlands (22 p.)
2. Report 'Stimulation of innovation & SME engagement in the sustainable blue economy (22 p.)

# INNOVATION FUNDING WORKSHOP

IMPRESSION FEBRUARY 5TH 2020



## **BANOS**

Baltic and North Sea Coordination  
and Support Action





# BANOS CSA Innovation Funding Workshop

On Wednesday, 5 February 2020, about 40 participants attended the Innovation Funding Workshop organized by the Dutch Research Council (NWO) in its capacity as a consortium member of the Baltic and North Sea Coordination and Support Action (BANOS CSA).

Topic: finding suitable financing instruments to stimulate innovations for a sustainable Blue Economy. Andris Andrusaitis, Coordinator of BANOS CSA, said: “We’re talking about research for impact. The future Baltic and North Sea Research and Innovation Programme as we are planning it in the BANOS CSA is like a space shuttle: we must make it fly.”

The workshop is part of the BANOS CSA workplan of 13 Baltic and North Sea countries who are jointly preparing the framework for the future BANOS Programme. Most attendees were from the BANOS CSA consortium. In attendance were also several Dutch ministries, research institutes, NWO, and also representatives from the European Aquaculture Technology and Innovation Platform Ocean (EATIP Ocean) and the Interreg North Sea Region Programme. This report includes a wrap-up of what was discussed during the day, mainly intended for all those who were not able to attend the event but who would nevertheless like to get involved.

## 1. WELCOME & INTRODUCTION

The Chair and Olympic sailing medallist Marcelien Bos-de Koning welcomed the attendees. As the Dutch ‘Mayor of your North Sea’ she represents everyone who is committed to blue waters and a green world. “It is my task to share knowledge with the public and thereby contributing to a widely supported vision of the North Sea.”

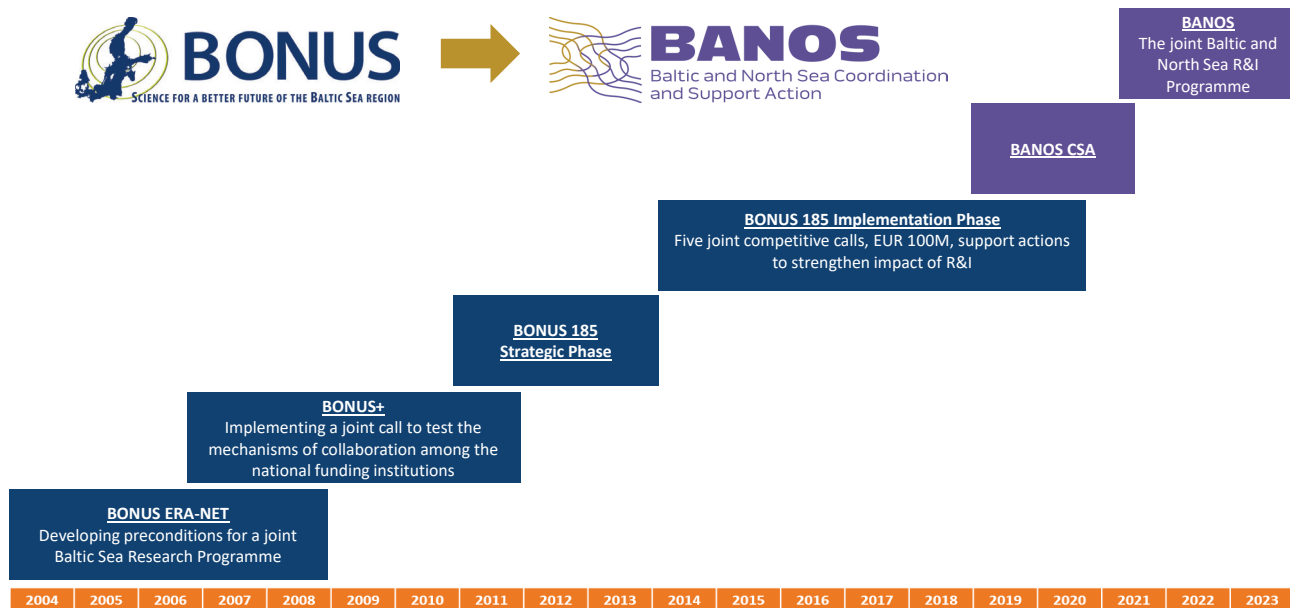


**Marcelien Bos-de Koning:**  
“Together we have an enormous task to fulfil”

Karoliina Koho and Andris Andrusaitis (both of the BANOS CSA coordinating office) introduced the BANOS CSA project and its task of developing the framework for the future BANOS Programme. “Research in the Baltic region has a long history. The predecessor programme of the future BANOS Programme is now nearing the end: BONUS, the joint Baltic Sea research and development programme which has funded a



total of 64 research and innovation projects (if counting since its pilot phase of BONUS+) will end within a year. So now we're building on this wealth of experience the future BANOS Programme, linking R&I efforts of both the Baltic and North Sea regions."



**BONUS (Baltic Sea) is the predecessor programme of the future BANOS Programme (Baltic and North Sea), as is currently being planned in the BANOS CSA project (2018-21).**

"The future BANOS is all about generating new knowledge for better management of the Baltic Sea and North Sea. The programme is to provide implementation-mechanisms and -procedures, communication and dissemination of findings and results, reinforcement of long-term impact of research and innovation, and last but not least: a strategic research and innovation agenda (SRIA). This strategic agenda contains three main-objectives: 'Healthy seas and coasts', 'Sustainable Blue Economy' and 'Human Wellbeing' with 'Open Science: access to knowledge and information' as a cross-cutting objective.

Fourteen funding-organisations from 12 different Baltic and North Sea countries and BONUS EEIG are members in BANOS CSA, with Finland as the 13th country involved and the EU Commission joined in as observers. In addition, there are four strategic partners, namely Helsinki Commission (HELCOM), OSPAR Commission, ICES and JPI Oceans. Russia, involved through bilateral agreements already in the predecessor programme BONUS, is envisaged to be also part of the future BANOS Programme.

Currently, we are working through the five work-packages of the BANOS CSA to ensure a high level of financial, administrative and scientific integration in the future programme and also to achieve great added value and impact on European level. Among other, for example, the development of a strategic innovation agenda facilitated by NWO, the development of a citizen science strategy, 'impact monitoring', and 'open science- open data' are tasks that are currently ongoing, all with a shared ultimate aim to enable high impact in the future BANOS Programme."

## RESEARCH FOR IMPACT

"This particular workshop today is about the key question: how to stimulate open innovation and innovation diffusion? In other words:

- How can the future BANOS Programme best foster and support innovation and a sustainable Blue Economy in the Baltic and North Sea?
- Which strategies and instruments will best serve the goal of bridging the gaps between research, innovation and societal needs?
- How can BANOS, as a whole, exert a positive impact on relevant fields of innovation and Blue Economy in the Baltic and North Sea regions? Which structures or activities are needed to achieve this goal?
- How can BANOS effectively promote 'open innovation'?



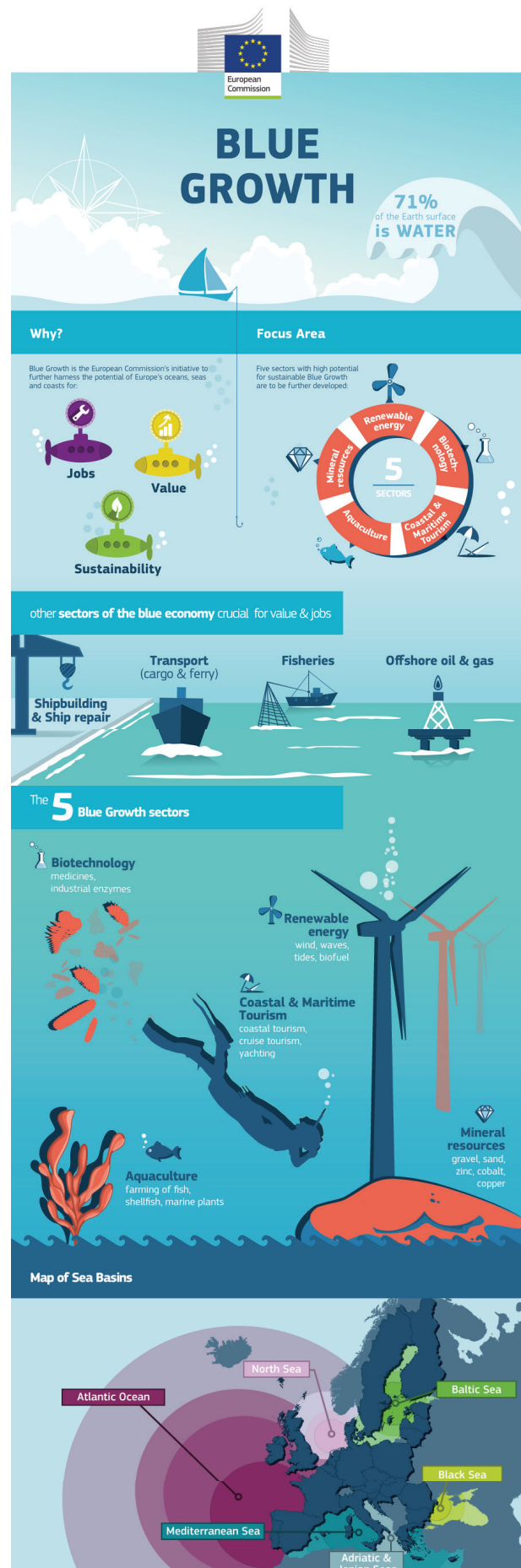
## 2. KEYNOTE PRESENTATION: TOWARDS A BLUE GROWTH STRATEGY IN THE NORTH EUROPEAN SEAS

The keynote presentation was titled ‘Towards a Blue Growth Strategy in the North European Seas’ by Mark van Koningsveld, Professor Ports and Waterways at TU-Delft, who also works at a large marine dredging company (Van Oord). Recently he has been appointed as the ‘academic representative’ of the Dutch Topsector Water & Maritiem. Like Andris Andrusaitis, Van Koningsveld stated that Blue growth at the North Sea is all about creating an impact-agenda. But what does this mean?

“Both the North Sea and the Baltic Sea are already very busy seas. In the coming years the use of these seas will increase even further. In 2050, most of the sustainable energy that is needed on land will be produced at large scale offshore wind farms. If this vision is to be materialized, it is clear that the spatial claims of wind parks will be enormous.”

Van Koningsveld shared some experiences at Van Oord’s. “The company constructs offshore wind parks and is also the initiator of the research programme ‘Building with nature’. We explore if it is possible to use the momentum of the development of wind farms with other sustainable ecological developments at sea.”

Where do we go from here? “To facilitate the idea of multipurpose use of wind farms, the Ministry of Economic Affairs and Climate Policy has included specific boundaries in the lot decree, such as the obligation to stimulate sustainable use that contributes positively to the environment. For that purpose research was set up, and several reports have been published already. Furthermore, new coalitions are formed with both NGOs and constructors. About research funding: the Dutch National Lottery aided a big amount of money to make this research possible. And NWO started a scientific project that will be executed in this context. In other words: if we do not manage to do something positive now, how will we ever?”



About BANOS Van Koningsveld stated: “A complex web of human activities and ecological functionalities will be interacting with each other. We know that if things change within a complex system, everything else will also change. The challenge will be to understand how this changing system is functioning. In addition, how can we keep control? These kinds of questions demand a lot of new knowledge, that is for sure.”

The overall question for BANOS would be: what is the ambition? Van Koningsveld pointed out that in preparing the BANOS Innovation Programme, the following topics should first be addressed:

- Should future calls be completely open, or should they be focussed and framed on certain themes or topics (e.g. sustainable Blue Economy)?
- Should the programme focus on the development of scientific knowledge only, or should it also aim at implementation and maximizing impact of knowledge in the field?
- What kind of organisations are asked to join the consortium: scientists only or companies and NGOs as well?
- Are we aiming at one coherent programme, or will the programme include many separate research lines?
- About the organisation: who will manage the programme as a whole? How to manage data and code? Is it ok if individual projects work in their own system, or do you prefer to coordinate approaches of different projects?

### 3. WORKSHOPS: COLLECTING OPPORTUNITIES AND BOTTLENECKS FOR INNOVATION FUNDING

To prepare the breakout sessions, three project pitches were given to learn from innovation funding instruments across the BANOS CSA member countries. They were meant to inspire the attendees for the discussion breakout-sessions following the presentations.

- BONUS RETURN, by Dag Lorick and Biljana Macura (Stockholm Environmental Institute, SE)
- BONUS CLEANWATER, by Kai Bester, (Aarhus University, DK)
- SEAWEED Farming, Alexander Ebbing (NIOZ, NL)

#### ROUND TABLE DISCUSSIONS

To collect input for the development of a strategic innovation agenda, five different breakout sessions were organised. Discussion topics were: ‘capacity building for delivering impact’, ‘harmonising and optimisation of innovation funding instruments’, ‘responsible and sustainable (open) innovation’, ‘requirements for innovation development’, and ‘exploring the potential for marine multi-use areas’.

In small rotating groups, several statements related on the above five topics were discussed. Every session was facilitated by a chair, who led the discussion and summarized what was being said. Afterwards, participants were asked to give their final opinion about the five statements (Mentimeter-poll). The results of the poll are shown in the graphs below. The full minutes of the breakout-sessions can be found in the appendix.

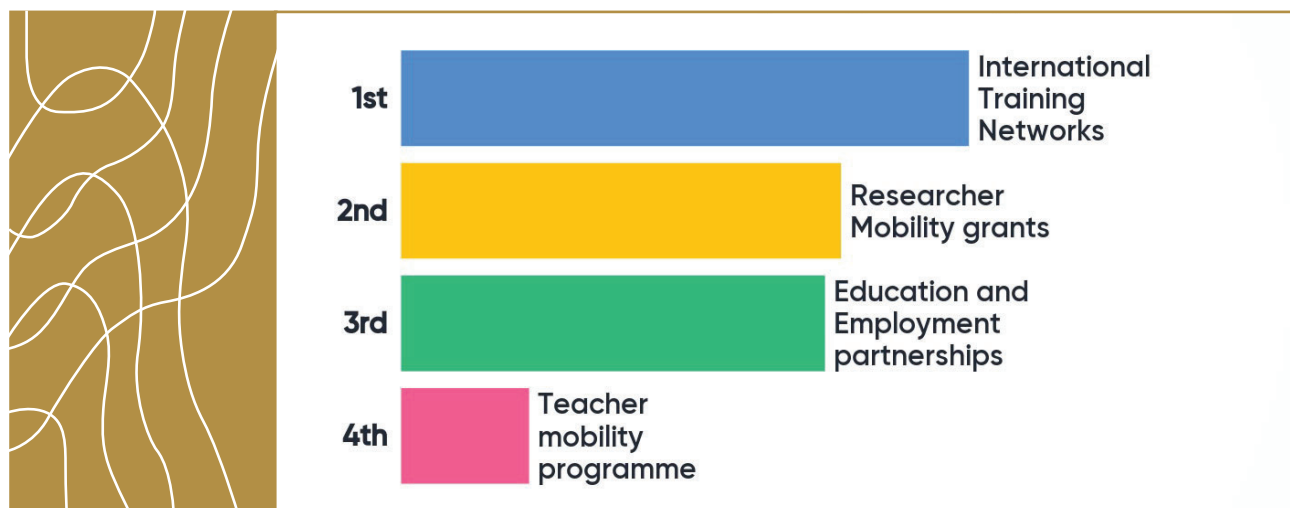
### 3.1 CAPACITY BUILDING FOR DELIVERING IMPACT

#### Statement

'BANOS should include mobility grants and/or international training networks for PhDs' to foster skill exchange across member countries.'

Further input for the discussion were provided by these questions: how could BANOS stimulate innovation development by strengthening skills and increase capacity building for blue career development? How could BANOS stimulate knowledge exchange across its members and beyond? What are the key blue economy opportunities in the Baltic and North Sea regions?

The Chair Roula Dambrink (NWO): "We talked about tools and activities for the younger generation, including high school. But also about the connection between university and the industry, so that PhDs could actually work in the blue economy. And third: there should be a focus on capacity building for industrial partners. Often there is a need for updating skills and knowledge on the work floor. This is also a way in which the industry can help closing the gap between PhDs and the industry. BANOS should not organise this exchange by itself, because in the EU there are already many platforms for exchange."

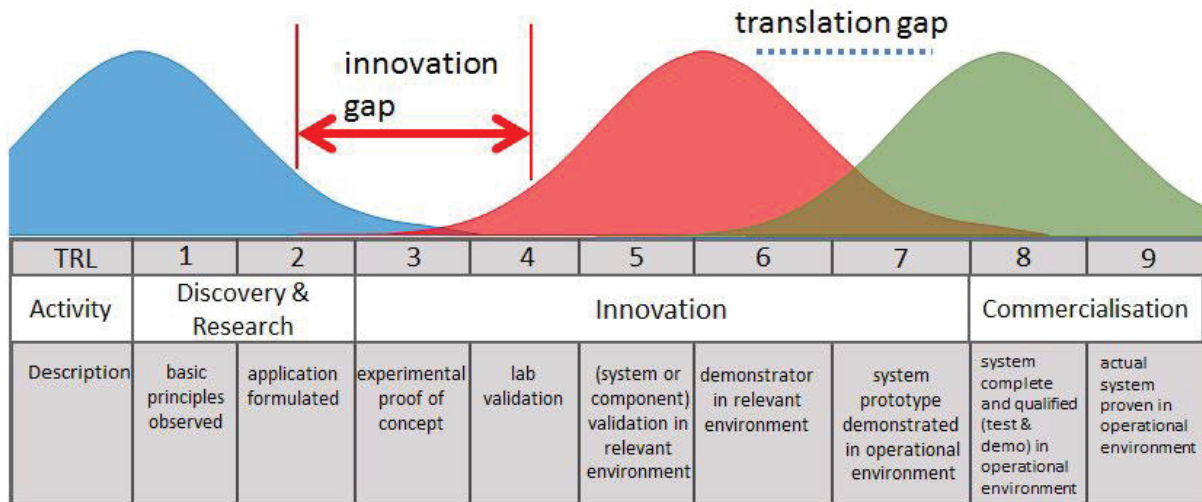


Ideal BANOS (as planned in the BANOS CSA) contribution to capacity building

## 3.2 HARMONISING AND OPTIMISATION OF INNOVATION FUNDING INSTRUMENTS

### Statement

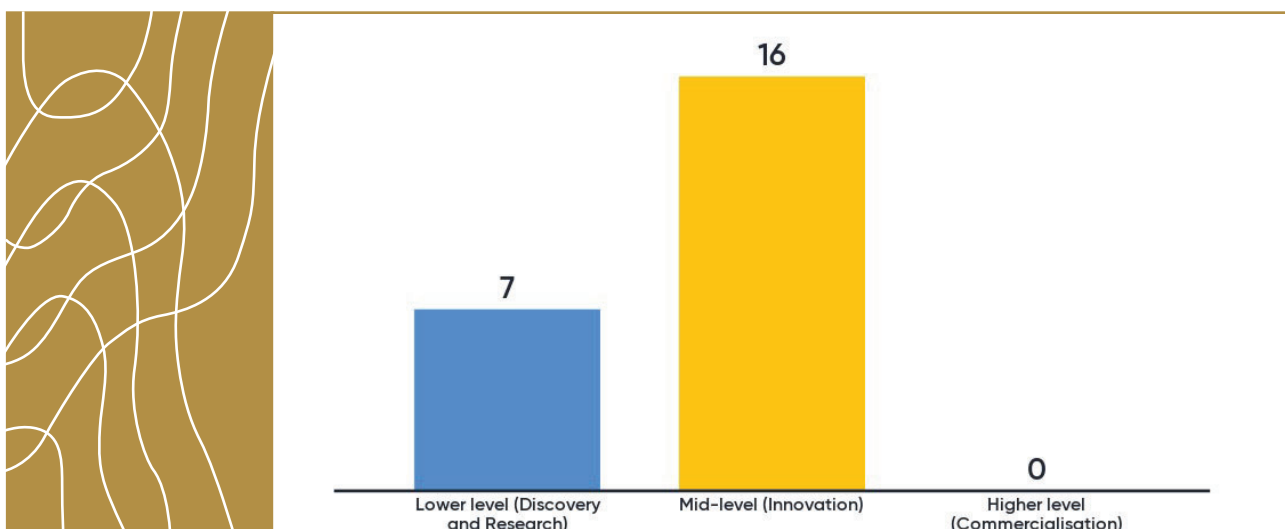
'BANOS should focus at lower TRL's (0-4).'



TRL levels

Input for the discussion was provided by the following questions: which type of funding instruments are key to include in the future BANOS programme to best stimulate innovation development (size and type of projects)? Which range of technology readiness levels should BANOS aim for (graph)? What is the exact role of private partners in prospective BANOS-calls (beneficent, co-funder, knowledge user)?

The Chair Josef Stuefer (NWO): "Discussion was about do's and don'ts. What we should not do is making it too complicated, because otherwise companies will not be able to participate. Furthermore, it is clear that there will not be one solution for all the needs. Key words: flexibility and diversity. BANOS should built a portfolio of instruments to include companies and involve public authorities. Discussions were also about technology readiness levels. There seems to be two gaps: the innovation gap and a translation gap. The BANOS Programme should contribute in closing these gaps. Finally: the future BANOS funding is likely to lie with the Horizon Europe partnerships programme, therefore as we know that the Horizon Europe will concentrate on impact, so should also BANOS focus not only on basic science but also on impact."



Which TRL should BANOS funding target?



### 3.3 RESPONSIBLE AND SUSTAINABLE (OPEN) INNOVATION

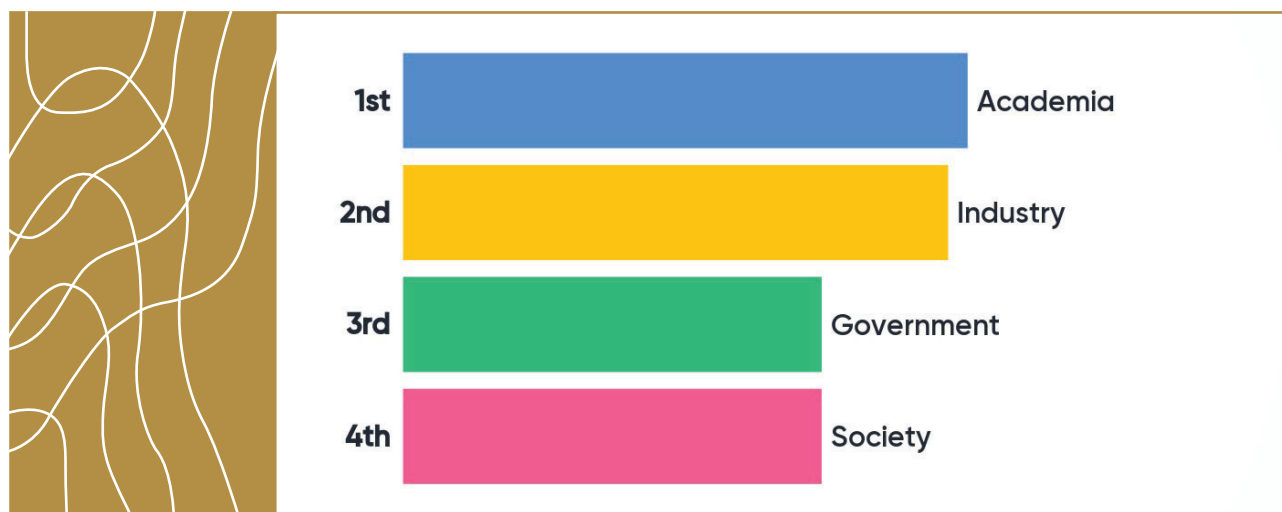
#### Statement

'BANOS should only fund open innovation projects that include aspects of co-creation and responsible innovation.'

Input for the discussion: what could BANOS do to encourage responsible innovation? How could BANOS stimulate the Blue Economy through the basic principles of the open innovation 2.0 model: co-creation (quadruple helix: government industry academia society) and communication and networking. Is a sustainable blue economy possible?

The Chair Daan Blok (NWO): "What exactly is open innovation? It refers to the EU open innovation model, where you have an innovation development in which partners can enter and exit during the innovation process. What could BANOS do to encourage such innovation? It leads to the question whether BANOS should go for clear-defined goals and target specific deliverables, or for open goals in themes in which you could not predict the outcome of a call. Furthermore, technological development requires innovation, but BANOS should also include societal and ecological impacts of these technological innovations.

How could BANOS stimulate blue economy through an open innovation model? It is important that funders that participate in a project show some flexibility in their funding model. That might stimulate companies that would not want to be involved during the whole project period but only during a certain stage of the project. This flexibility is not yet common practice among funders. So it should be looked into what the limits and boundaries are by the different funding parties in different BANOS countries."



Co-creation: key stakeholder involvement



### 3.4 REQUIREMENTS FOR INNOVATION DEVELOPMENT

#### Statement

'BANOS should focus on small to medium-sized companies as novel innovation concepts are first developed there (as R&I investments of large companies have decreased).'

Input for the discussion: how to reach industry most effectively through (regional) communication networks? What are the (research) needs of relevant private partners, how could BANOS best address these needs? Which types of companies should BANOS interest (start-up, mid-, or large-scale)? Which type of innovation should be addressed (technological, eco services, social?) Which structures or activities are required to overcome bottlenecks in innovation development? What is the role of public authorities for fostering innovation in the North and Baltic Sea?

The Chair Peter Spierenburg (NWO): "About creating impact: from research towards innovation towards society. What is needed to involve other partners, such as the industry in a research programme /BANOS? First we need to know what their needs are to be able to clarify objectives and targets. For example, quantitative targets for the desired societal impact, environmental impact, system impact. In other words: what is the legal framework. Lack of clarity seems to be the most important bottleneck for industries to participate in research projects. Summarised, industry needs a clear level playing field. On the other hand, industry needs a business case to join a research or innovation programme. What type of industries could be interested in BANOS? Focus should be on the mid-range companies."



Word-cloud on key requirements for innovation development

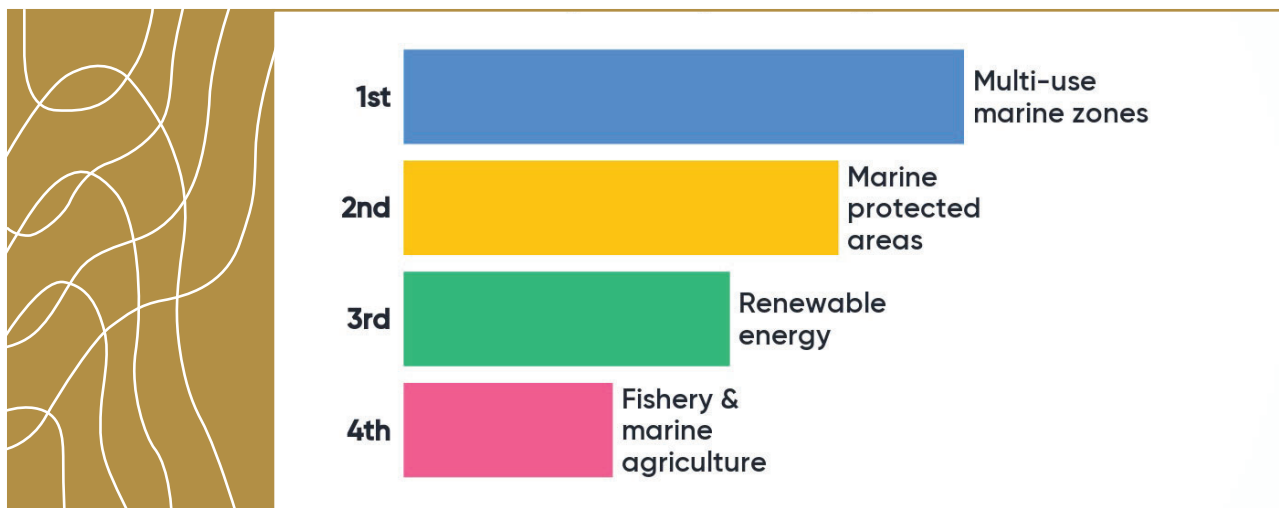
### 3.5 EXPLORING THE POTENTIAL FOR MARINE MULTI-USE AREAS

#### Statement

'BANOS should focus on multi-use marine innovation technologies instead of single-use activities.'

Input for the discussion: an increasing demand in marine space for potentially conflicting economic (renewable energy fishery), social (coastal protection) and ecological (marine protected areas) developments urges exploring marine multi-use areas. Should BANOS focus on multi-use innovation development in the Baltic and North Sea? How would this be best achieved?

The Chair Niels van den Berg (NWO): "Multi-use can have far field effects, cumulative effects and sequential effects. In order to understand such effects we need to understand the system first. Multi-use seems to be the overarching framework of BANOS, but that does not mean that that we only need multidiscipline projects. Single-discipline projects are required as well. Overall: BANOS should not always be focused on multi-use, though the aspect of multi-use should always be considered, also in single-discipline research. Final remark: multi-use is not only about areas but also about multi-use of knowledge. Different countries working on the same challenges creating and sharing new knowledge."



Optimal marine spatial planning

## 4. PRESENTATION ‘NORTH SEA CHALLENGES: ECOLOGY, ENERGY TRANSITION AND FOOD TRANSITION’

As a kick-off of for the plenary discussion, Luca van Duren (Deltares) presented ‘*North Sea challenges: Ecology, energy transition and food transition*’.

Van Duren stated: “The sea is large, and the sea is small. Large when we have to clean up the mess, and small if we want to exploit her sustainably.

The Dutch North Sea policy aims at realising large-scale restoration of North Sea nature, as well as achieve an energy transition, food transition, building at sea, and protect ourselves from sea-level rise. That means many challenges, but also some opportunities; all emerging in the same area. The key to achieving these goals lies in science-based marine spatial planning, involving all the important stakeholders. Science is a prerequisite to achieve the multitude of targets. However, scientists need to accept that the pace of societal changes is often faster than the pace of research. Sometimes we (scientists) need to give advice based on the best available knowledge, even if we know that not all essential knowledge is available. So, the key question is: how could the future BANOS programme foster socially responsible innovation development?”



Transition

## 4.1 PLENARY DISCUSSION ABOUT SOCIAL RESPONSIBLY BLUE ECONOMIC DEVELOPMENT

### REMARKS FROM THE AUDIENCE

- “As soon as you use nature, the focus changes to sustainability. A used territory (for food or energy) is not natural anymore. Therefore one must sustain it for the future. In order to learn from nature as a untouched system, we need marine protective areas to keep nature in a fully natural state, instead of a ‘sustained state’.”
- “Is Blue Growth possible? It needs to be, but it cannot be unlimited. Growth has to be within boundaries. And there will be trade-offs with ecological impacts.”
- “Scientist do not understand the North Sea-ecosystem yet. So how can they think they can do research on the impact of human activities?”
- “Today is about innovation. But BANOS is broader than that. It’s about a knowledge agenda for a much bigger programme. We need to know much more about the North Sea ecosystem. We should do that in an international context. Does the BANOS programme finance basic research?”
- “The answer is yes. BANOS has three strategic objectives in its SRIA: Ecosystem health, Blue economy, Human well-being. You cannot sustain an ecosystem if you do not understand it first. But the key-word here is balance between all these research needs.”



## 5. WRAP UP OF THE DAY

The Chair Marcelien Bos-de Koning: “Today a lot has been said about innovation. For some it is like a big hairy monster, for some it’s like a box of chocolates. But in any case: you don’t know where you are going and sometimes you have to fill in the dots. We set up this workshop to have a fast track in making the right regulation for having a healthy sea and prosperous blue economy.

So what needs to be done? Mostly it is about sharing and working together, and a lot has been said about collaboration to include different expertise and have a broader knowledge base. Presentations today pointed out that the focus should be to include nature in the innovation process. But sometimes it’s hard to get the right people around the table. The diversity within the spatial planning is a huge task which has been discussed in the workshop, and to regulate areas for multi usage should also be thought of in BANOS.

Discussions were going back and forth all the time. You all want a broad perspective, but you also want to narrow it down to specificities, so in the end it is going to be a mixture. Therefore you need different types of instruments.

I also overheard conversations about the fact that BANOS needs a programme management team to make sure that the calls will be sustainable and beneficial. So do not stop after a while but keep going on and make sure that programmes and intentions are happening. It is very important to work with the different countries since large-scale wind parks are built in many countries and cross borders. And so is nature. An oyster or flounder does not stop at a line on the map. Research fields should extent over different owners and nationalities. BANOS helps to make that happen.

And I noticed a big discussion about intellectual property. What to do if it is public money or if it’s co-financed by industries. Should we have open source, do we do open innovation, so where do we go from there? In the end, it’s not about maximization but it’s about optimization. Together we have an enormous task to fulfil.”

### MORE INFORMATION

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# APPENDIX

## MINUTES OF THE BREAKOUT-SESSIONS





### 3.1 CAPACITY BUILDING FOR DELIVERING IMPACT

The discussion at this table focused on capacity building for delivering impact. To get more people engaged in the Blue Economy sector, it is important to interest young people through e.g. doing experiments, meet scientists, setting up challenges through Marie Curie PhD Training Networks. Marine education is a focus topic of the EU, BANOS can potentially benefit from EU policy briefs hereon to develop their impact plan. To help achieve this, the future programme may form connections to international organizations (e.g. European marine Board) and museums/science centres, etc. To stimulate 'Blue Skill'-development, it is important to find out what may trigger schoolchildren to pursue a 'blue career', develop teaching/training programs, clearly define and sell the 'Blue Economy'. In addition, valuable input for BANOS may come from the efforts of previous Blue Economy programmes. BANOS may also consider facilitating the organisation of young researcher summer schools, targeted on Blue Economy themes. For connecting research to innovation development, it is important to engage with industry early on in the programme and organise mapping exercises collectively with industry to mark future needs for Blue Economy development. Finally, capacity building needs to be done internationally, where knowledge exchange can take place from different programmes.

### 3.2 HARMONISING AND OPTIMIZATION OF INNOVATION FUNDING INSTRUMENTS

The discussion at this table focused on appropriate research funding instruments for stimulating the Blue Economy. For a broad international program such as BANOS, general instruments need to be developed which fulfil the strategic aims of the program and which can be applied by its members. The institutional research and innovation funding landscape can differ quite strongly between different countries, requiring a careful approach when designing common instruments. There was consensus at the table that we will most likely not find one single instrument which can serve all purposes. Flexibility and diversity was mentioned as important elements of the instrument portfolio. The illusion of one-size-fits-all instruments should be avoided.

After discussing different modalities applied in different countries the discussion moved on to more general issues. According to several participants, BANOS needs to find its own unique niche in the rather 'populated' landscape of European science and innovation structures. The program should not duplicate existing efforts but try and create synergy and added value by positioning itself at the interface between science, public authorities and industry. In this way, the strategic aims and the societal impact of the program could be maximized.

The members of this table called for an early, basic discussion on what BANOS wants to achieve in terms of stimulating the Blue Economy and fostering innovation by doing international research. A multitude of answers can be given to this question and BANOS, also in discussion with the EC as important co-funder, should strive to get a realistic and as concrete answer as possible. Only then we can design appropriate measures and instruments for achieving the strategic goal of supporting the Blue Economy.

The strategic aims of the program should be aligned with the mission-oriented approach taken in Horizon Europe. BANOS can fulfil an important role in addressing parts of the goals of the missions and translating them into scientific questions relevant for regional seas. "Clean and healthy seas" was mentioned as a general example for such a thematic approach. Specific, concrete goals could be developed within such a framework. Researchers, private partners, authorities and civil society representatives should then jointly find their role in achieving the goals. In this example public entities may work on regulatory issues (e.g., barriers), scientists may contribute to a better understanding of the relevant (natural and social) systems,



private partners may develop real world solutions based on insights and needs, civil society organizations and citizens can make important contributions to awareness-building, outreach and education.

Supporting the Blue Economy does not always mean funding enterprises! There are also indirect ways of achieving this goal, especially in the longer run, by involving industry and public authorities which often assume the role of launching customers in various aspects related to sea and coasts. When asked about the appropriate TRL-levels for BANOS, there was a preference for intermediate, somewhat lower levels. For achieving societal and economic impact it is necessary to link lower to intermediate TRL-levels within projects. Approaches such as 'living labs' or 'test beds' were mentioned as appropriate and attractive ways to promote collaboration between basic and applied science, between research and innovation, between scientists and citizens.

Everybody agreed that a minimal bureaucratic burden is an important prerequisite for companies, especially SME's, to actively join a program such as BANOS.

### 3.3 RESPONSIBLE AND SUSTAINABLE (OPEN) INNOVATION

The discussion at this table focused on responsible and sustainable (open) innovation

There may be trade-offs in social, ecological and economic targets. It may be difficult to find parties who can address all these aspects. Therefore, it may be required to limit the number of expected outcomes to ensure that project goals can be delivered. A Blue Economy must be sustainable by definition, to be able to remain profitable on the long-term.

Furthermore, societal benefits need to be taken into account in innovation projects. The One Health approach may be adopted by BANOS, taking human, animal and environmental health equally into account. BANOS should also align with existing national and EU policy, where societal benefits are an important consideration. Research funders may require that proposals take an array of aspects into account (e.g. environmental, legal and social aspects), to ensure that this is taken into account in new projects. This may require consortia to be multi-disciplinary, and regulatory measures may need to be developed to combine technological and societal innovation tasks. The BANOS programme should therefore include specific research questions that are relevant for industry, research and society.

The discussion also highlighted that funder should provide flexibility in funding instruments, especially as unexpected results play a big part in innovation development. Co-financing requirements to private parties should focus on in-kind contributions to stimulate private companies take ownership of projects. The capacity of a company to contribute in-kind to a project should therefore be taken into account and requirements to companies to contribute may need to be linked to company size. Providing freedom to project consortia' composition allows parties to join or leave consortia during their development. Private partners may be stimulated to join consortia by creating more freedom and by reducing loopholes of national science funders. In addition, funders should be willing to take certain risks when funding innovation projects. A portfolio of different BANOS funding instruments allows targeting innovation projects at different Technological Readiness Levels (TRLs). Intellectual property issues need to be taken into account carefully when research is publicly funded, especially as national regulations may differ among BANOS member countries. Finally, the legacy of funded projects should be considered, to make sure results disseminate to education and further research (open access).



### 3.4 REQUIREMENTS FOR INNOVATION DEVELOPMENT

The discussion at this table focused on requirements for innovation development.

Different types (start-up, mid, large-scale) of companies were discussed and how BANOS can best address their needs. For start-up companies, it is important to have a perspective after a BANOS project ends. Further, co-financing requirements are often a bottleneck for start-up companies. For small and medium-sized enterprises, it may be important to cross the 'dead valley' to turn initial innovation ideas into a commercially viable product. Mid-range companies are important with their out-of-the-box ideas, but are often overlooked. A limited number of specific project targets need to be set in order for small and medium-sized enterprises to participate. In addition, it was stated that projects require a viable business case to interest and involve industry. Many companies are mostly focused on higher technological readiness levels (TRLs), and less on lower TRLs. To be effective, there is a need for knowledge brokering, to know if others are already working on similar innovation ideas.

Regarding sustainability, this may be stimulated by clear (long-term) regulations by governments. The push for sustainability should not only come from market demand, but also from government policies. Technological innovation requires a balance with ecosystem services and social requirements. The offshore wind energy sector is a good example of legal requirements that may act as a pull-factor. Nature (well-being) requirements need to be included in the tender process.

### 3.5 EXPLORING THE POTENTIAL FOR MARINE MULTI-USE AREAS

The discussion at this table centred on the topic of increasing demand in marine space for potentially conflicting economic (renewable energy, fishery), social (coastal protection, well-being) and ecological (marine protected areas) developments urges exploring marine multi-use areas.

Table discussion participants argued that BANOS should focus on multi-use innovation development in the Baltic and North Sea where possible and should always refer to a system-approach with marine multi-use areas as an important aspect of the overall context. This may be achieved by making multi-use marine planning part of the problem definition of calls for proposals, by stimulating the development of innovative ideas and formation of consortia through for example match making events; requirements for multi-disciplinary approach/consortium in proposals, reward multi-disciplinary and multi-use innovation with assessment criteria. BANOS should focus on multi-use marine innovation technologies where possible and on single-use activities when needed. Further, stimulation of multi-use programmes may be achieved through legislation (i.e. tender criteria) and subsidies. For example, renewable energy (wind/solar/tide) and circular aquaculture (i.e. seaweed) projects may be combined. An important question remains on how to cross the 'dead valley' from knowledge and concepts to upscaling. The pull-factor by government measures may be important (by setting targets, goals, requirements and legislation).

Multi-use of marine areas was considered by table discussion members to be an important and relevant topic for all BANOS member countries, especially in the context of sustainable blue growth and increase in demand for use. Cross-border aspects should be taken into account, to align ambitions across countries. In some cases the topic of multi-use should be an explicit focus and/or condition for the research. In other cases it could be important to focus research on advances in the area of one use-type. An integrated system approach should however always be considered when formulating and performing research projects. Life cycle analyses can facilitate a deeper understanding of the cost and benefits of single- vs. multi-use.

Sustainability is a very big challenge within the blue growth ambitions. The public good and environmental economics should receive due attention in innovation processes. This concerns not only innovation for

commercial/technical use but also for innovation for policy and legislation. Therefore, interests and needs of all stakeholders need to be taken into account. This system function knowledge is necessary before one can consider multi-use and its impact, especially also looking at cumulative impacts. It is not straightforward to combine the interests and perspectives of different stakeholders and achieve transitions. Inclusion of Social Sciences may important in innovation processes.



## COLOFON

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# STIMULATION OF INNOVATION & SME ENGAGEMENT IN THE SUSTAINABLE BLUE ECONOMY



## ***FINAL REPORT & RECOMMENDATIONS***

REPORT OF PHILIPPE VANRIE TO  
BANOS COORDINATION & SUPPORT ACTION (CSA)

### **1. INNOVATION SCOPE AND PRIORITIES - SUMMARY**

#### **A. General context**

##### ***A. Programme***

- Research & Innovation

##### ***B. Geographical scope***

- Baltic Sea & North Sea
- 13 Member States: *BE, DK, EE, FR, DE, LV, LT, NL, NO, PL, SE, UK + FIN as observer*

##### ***C. Thematic SRIA context***

- Healthy Seas & Coasts
- Sustainable Blue Economy
- Human Wellbeing

##### ***D. Selected thematic scope***

- R&I-driven sustainable blue growth/blue economy activities

##### ***E. Thematic shifts***

- Innovation & open innovation-driven
- Engaging with Start-ups, SMEs, and innovative entrepreneurs
- Interacting/complementing with other relevant initiatives.

B. Specific development priorities

*HIGH priority*

- A. Sustainable fisheries and seafood sector, including aquaculture and seaweed farming
- B. Sustainable multi-use of space and offshore infrastructure, including material improvement
- C. Coastal development and restoration, including nature-based solutions

*HIGH to MEDIUM priority*

- D. Marine data and digital technology, including sensors
- E. Valuing ecosystems goods and services
- F. Monitoring, reductions and preventing micro- and macro-plastics to enter marine environment
- G. Renewable energy including offshore wind, tidal, wave, and thermal energy

C. BANOS Vision Statement

***“BANOS supports innovation on approaches and technologies that primarily address mitigation of any-human-induced pressures on marine and coastal environment and contributes to restoration of environment and development of regenerative blue economy”***

## 2. IDENTIFICATION OF RELEVANT STAKEHOLDERS

A. General approach

Complementarily to the BANOS CSA partners, the approach was to Look outside/aside of the Research circles and to focusing on innovation funding bodies and territorial players, including clusters which are traditionally in closer contacts with SMEs and innovators

The exploration of investment platforms, incubators & accelerators has provided very useful insights confirming the exponential generation of business support & investment intermediaries & Funds

Analyzing other EU or International initiatives also brought confirmation of a series of trends in policy priorities and financial/non-financial support instruments

This stakeholders mapping is not exhaustive but provides a preliminary view of its nature and diversity

B. BANOS CSA partnering R&I Agencies

*B1 Consortium members*

- A. BE Flanders Marine Institute (VLIZ)
- B. DK Innovation Fund Denmark (IFD)
- C. EE Estonian Research Council (ETAg)

- D. FR Agence Nationale de la Recherche (ANR)  
Institut Français de Recherche pour l'exploitation de la Mer (IFREMER)
- E. DE Forschungszentrum Jülich GmbH (JULICH)
- F. LV State Education Development Agency (SEDA)
- G. LT Research Council of Lithuania (RCL)
- H. NL Netherlands Organization for Scientific Research (NWO)
- I. NO Research Council Norway (RCN)
- J. PL National Centre for Research & Development (NCBR)
- K. SE Swedish Research Centre for Environment, Agricultural Sciences & Spatial Planning (FORMAS)  
Swedish Agency for Marine & Water management (SWAM)
- L. UK Centre for Environment, Fisheries & Aquaculture Science (CEFAS)

#### *B2 Strategic partners*

- A. HELCOM – The Baltic Marine Environment Protection Commission
- B. ICES – The International Council for the Exploration of the Sea
- C. JPI Oceans – The Joint Programming Initiative Healthy & Productive Seas & Oceans
- D. OSPAR – The Convention for the Protection of the Marine Environment of the North-East Atlantic

#### *B3 Observers*

- A. BE Politique Scientifique Fédérale (BELSPO)
- B. FIN Academy of Finland
- C. EU European Commission

#### C. Innovation Funding/Enterprise Development Agencies (National)

- A. BELSPO (B)
- B. Enterprise Estonia - EAS (EE)
- C. Environmental Investment Centre-KIK (EE)
- D. BPI-France (FR)
- E. DLR (DE)
- F. RVO (NL)
- G. Vinnova (SE)
- H. Innovate UK (UK)
- I. Business Finland (FIN)
- J. Nordic Innovation (NO)

#### D. Research & Technology Centres

- A. Scoot–Swedish Centre for Ocean Observing Technology - SW
- B. Royal Institute of Technology - KTH, Stockholm (SW)

- C. *East Regional Aquaculture Centre*
- D. *Centre for Autonomous Marine Operations & Systems, NTNU Trondheim (NO)*
- E. *Offshore Renewable Energy Catapult – ORE (UK)*
- F. *Wave Energy Scotland (UK)*
- G. *Scottish Association for Marine Science - SAMS (UK)*
- H. *Kiel Centre for Marine Natural Projects – KiWiZ (DE)*
- I. *Offshore Wind Infrastructure Application Lab – OWI Lab (B)*
- J. *Offshore Centre Denmark (DK)*
- K. *Helmoltz Centre for Ocean Research – GEOMAR (DE)*
- L. *Leibniz Institute for Baltic Sea Research (DE)*
- M. *Nausicaa – Centre National de la Mer, Boulogne-sur-Mer (F)*

#### E. Territorial Clusters

- A. *Flanders Blue Cluster, Ostend (B)*
- B. *Pôle Mer Bretagne, Brest (F)*
- C. *Energy Cluster Denmark, Esbjerg (DK)*
- D. *Odense Robotics (DK)*
- E. *Aquimer, Boulogne-sur-mer (F)*
- F. *EuraEnergie, Duinkirk (F)*
- G. *Jurinis Klasteris Maritime Cluster, Klaipeda (LITH)*
- H. *NCE Aquatech Cluster, Trondheim (NO)*
- I. *Bioeconomy at marine Sites (BaMS), Kiel (D)*
- J. *Marum, Bremen (D)*
- K. *North Sea Farmers, The Hague (NL)*
- L. *Stichting Water Alliance, Leeuwarden (NL)*
- M. *Campus de la Mer, Boulogne-sur-mer (F)*
- N. *GCE Blue Maritime, Alesund (NO)*
- O. *Offshore Väst, Börs (SW)*

#### F. Science & Tech Parks, Incubators, Accelerators

- A. *European Centre for Marine Biotechnology - ECMB (UK)*
- B. *Atlanpole Blue Cluster, Nantes (F)*
- C. *Crisalide Eco-activités Creativ', Rennes (F)*
- D. *Turku Science and Technology Park (FIN)*
- E. *Tartu Science & Technology Park (EST)*
- F. *Rocket57 – The StartupLaunchpad- Incubator & accelerator (DK)*
- G. *Norway Katapult Ocean*
- H. *Blue Tech Accelerator*
- I. *Blue Science Park, Karlskrona*

G. Investment Platforms and Venture Capital Funds

- A. *Blue Invest*
- B. *Blue Invest Funds (EC/EIF)*
  - i. *Blue Horizon ventures I*
  - ii. *Astanor Ventures*
- C. *Euroquity (by BPI-France)*
- D. *Blue Ocean Partners*
- E. *Innoport smart capital*
- F. *Althelia*
- G. *Vulcan capital*
- H. *Happy Capital, Crowdfunding platform, Bordeaux (F)*
- I. *Blue Pelican Capital*
- J. *Blue Economy Equity Technology Fund, BNP Paribas*
- K. *Crédit Suisse*
- L. *Systemiq*
- M. *Future Positive Capital*
- N. *Green Square Venture*
- O. *Mirova*

H. EU programmes, initiatives, and projects

- A. *Blue Invest*
- B. *Eurostars-2 - Eureka*
- C. *EIT – KICs*
  - i. *EIT InnoEnergy*
  - ii. *Climate KIC*
- D. *EIC Accelerator - DG RTD*
- E. *Connecting Nature project (Nature-based Solutions)- Trinity College Dublin*
- F. *Horizon Europe Partnerships*
  - i. *Climate neutral sustainable blue economy*
  - ii. *Biodiversity*
  - iii. *Clean energy transition*
  - iv. *Waterborne transport*
  - v. *Circular Bio-based Europe*
- G. *Joint Programming Initiatives (JPIs)*
  - i. *Oceans*
  - ii. *Water*
  - iii. *Climate*
- H. *Eranet co-funds & P2Ps*
  - i. *Marterra*



- ii. Cobiotech
- iii. Blue Economy
- iv. BiodivERsA
- v. Blue Bio
- I. *Horizon 2020 projects*
  - i. Maribe
  - ii. Mermaid (FP7)
- J. *Interreg projects*
  - i. Submariner
  - ii. Retrout
  - iii. Many others

### 3. IDENTIFICATION OF SMES – BREAKDOWN BY COUNTRIES

The following list of 66 pre-selected SMEs & start-ups has been established by analyzing:

- the portfolios of several investment platforms;
- the cohorts of several accelerators, incubators and clusters;
- the portfolios of several relevant European programmes (Bonus, Eurostars-2, EIT InnoEnergy, Blue Invest, Blue Bioeconomy, Nature-Based Solutions/connected by Nature) and of National Innovation Funding Bodies (Vinnova, Business Finland, BPI-France, Enterprise Estonia, etc);
- the reality of their business existence sustainability, trading status and TRL position; company's web-sites have been duly checked;
- the correspondence with the BANOS-selected innovation areas, including the attention given to emerging innovations presenting both a BANOS vision relevance and an economic sustainable development potential.

#### A. Belgium

- A. *DotOcean* ([www.dotocean.eu](http://www.dotocean.eu))  
*Automomous Ocean Clean-up vehicle*
- B. *AtSeaNova* ([www.atseanova.com](http://www.atseanova.com))  
*Turnkey solutions for industrial seaweed farming*
- C. *Calidris Bio* ([www.calidrisbio.com](http://www.calidrisbio.com))  
*Sustainable bacterial protein for aquaculture*

#### B. Denmark

- A. *Billund Aquakultur Services, DK* ([www.billundaquaculture.com](http://www.billundaquaculture.com))  
Water recirculation systems (RAS) & technology for aquaculture  
BONUS *Cleanaq* project
- B. *Aquaporin, DK* ([www.aquaporin.com](http://www.aquaporin.com))

Aquaporin-based membranes for water purification & reverse osmosis filtration

BONUS Cleanwater project

C. Anemo Analytics ([www.anemo-analytics.com](http://www.anemo-analytics.com))

Wind turbine engineering

D. IHP Systems ([www.ihp.dk](http://www.ihp.dk))

Sorting plastics by visual identification and AI solutions

E. Blue ocean robotics ([www.blue-ocean-robotics.com](http://www.blue-ocean-robotics.com))

Marine robotics

F. Blue Atlas Robotics ([www.blueatlasrobotics.com](http://www.blueatlasrobotics.com))

High-quality underwater imaging

#### C. Estonia

A. Est-Agar ([www.estagar.ee](http://www.estagar.ee))

Red seaweed extracted gelling and texturant agent (Furcellaran)

B. LDI Innovation ([www.ldi-innovation.com](http://www.ldi-innovation.com))

Photonics solutions for offshore pollution (oil-spills) detection

C. Vetik ([www.vetik.eu](http://www.vetik.eu))

Colourant from red seaweed biomass for cosmetics

#### D. France

A. Eranova ([www.eranovabioplastics.com](http://www.eranovabioplastics.com))

Bio-plastics created from green macro-algae

B. Neocean ([www.neocean.com](http://www.neocean.com))

Ecological electric hydro-foil boat for marine farms and harbours surveillance

C. Algama ([www.algamafoods.com](http://www.algamafoods.com))

Micro-algae healthy nutrients & food

D. Next protein ([www.nextprotein.co](http://www.nextprotein.co))

Insect-based protein for animal feed stocks

E. Sinay Hub ([www.sinay.ai](http://www.sinay.ai))

Maritime Big data AI platform

F. Ocean's Arise ([www.oceansarise.fr](http://www.oceansarise.fr))

Low frequency hydro-acoustics repellants for shellfish farming

G. Glowee ([www.glowee.com](http://www.glowee.com))

Marine micro-organisms-based bioluminescence

H. Airmarine ([www.air-marine.fr](http://www.air-marine.fr))

Drones for maritime and terrestrial inspection & operation

I. Hydro Air Concept Energy ([www.hacewave.com](http://www.hacewave.com))

Wave energy system

J. BIOceanOr ([www.bioceanor.com](http://www.bioceanor.com))

Underwater weather station for real-time predictive water quality monitoring

K. *Seaproven* ([www.seaproven.com](http://www.seaproven.com))

Autonomous laboratory vessel for multiple data collection & real-time remote monitoring

E. Germany

A. *Innomar Technologies, D* ([www.innomar.com](http://www.innomar.com))

Sediment echo sounder & seafloor sediment imaging (dredging, sea acoustics)

BONUS *Ecomap* project

B. *Algoliner* ([www.algoliner.de](http://www.algoliner.de))

Closed system algae biomass photobioreactor

C. *Biofabrik* ([www.biofabrik.com](http://www.biofabrik.com))

Plastics catalytic depolymerization

D. *Ocean Basis Kiel* ([www.oceanbasis.de](http://www.oceanbasis.de))

Cosmetics & nutraceuticals from Algae

F. The Netherlands

A. *Desolenator* ([www.desolenator.com](http://www.desolenator.com))

Solar-powered sustainable desalination

B. *Flexbase* ([www.flexbase.nl](http://www.flexbase.nl))

Floating base for fish farms powered by solar panel

C. *OPT/Net* ([www.opt-net.eu](http://www.opt-net.eu))

AI aimed for detection & prevention of illegal fishing

D. *Danvos* ([www.danvos.nl](http://www.danvos.nl))

Seaweed biorefinery for protein extraction and bioplastics production

E. *Kelp Blue* ([www.kelp.blue](http://www.kelp.blue))

Underwater Giant Kelp harvesting for bio-stimulants, bio-fertilizers & soil improvers

F. *Hortimare* ([www.hortimare.com](http://www.hortimare.com))

Breeding of sustainable seaweed

G. Norway

A. *C-Feed* ([www.cfeed.no](http://www.cfeed.no))

Copepods & zooplankton-based food for aquaculture

B. *Alginor* ([www.alginaor.no](http://www.alginaor.no))

Seaweed farming and biorefinery

C. *Blueye Robotics* ([www.blueyerobotics.com](http://www.blueyerobotics.com))

Underwater robotics and drones

D. *Marimetrics* ([www.marimetrics.com](http://www.marimetrics.com))

Data monitoring of aquatic animal health

E. *Biomarine* ([www.akerbiomarine.com](http://www.akerbiomarine.com))

*Krill-based food*

- F. *Planktonic* ([www.planktonic.no](http://www.planktonic.no))

*Cryoplankton Large for live feeding of seabass and kingfish*

- G. *Aquaai* ([www.aquaai.com](http://www.aquaai.com))

*Biomimicry, animatronics, underwater drones & robots*

#### H. Poland

- A. *Noa Marine, PL* ([www.noa-marine.com](http://www.noa-marine.com))

*Underwater autonomous vehicle for marine data collection services*

*BONUS Seamount project*

#### I. Sweden

- A. *Primozone Production, SW* ([www.primozone.com](http://www.primozone.com))

*Ozone generator for water treatment in aquaculture*

*BONUS Cleanwater project*

- B. *Marine Taste* ([www.marinetaste.com](http://www.marinetaste.com))

*Sea squirt umami production*

- C. *Aquammodate* ([www.aquammodate.com](http://www.aquammodate.com))

*Natural water purification & desalination*

- D. *Deepoid* (no website found)

*Underwater sensors*

- E. *WA3RM* ([www.wa3rm.com](http://www.wa3rm.com))

*Circular regeneration of industrial & natural waste resources (fish farms, algae farms, ...) and renewable energy generation*

- F. *C-Green* ([www.c-green.se](http://www.c-green.se))

*Hydrothermal Carbonization of biomass sludges and energy generation*

- G. *Surfcleaner* ([www.surfcleaner.com](http://www.surfcleaner.com))

*Surface skimmer separator for oil spill and plastics cleanup & water treatment*

- H. *Cor-Power Ocean*([www.corpowerocean.com](http://www.corpowerocean.com))

*Wave energy technology developer*

- I. *Ecoloop* ([www.ecoloop.se](http://www.ecoloop.se))

*Consultancy*

- J. *Sea Twirl* ([www.seatwirl.com](http://www.seatwirl.com))

*Floating offshore grid-connected wind energy*

- K. *Swedish Algae factory* ([www.swedishalgaefactory.com](http://www.swedishalgaefactory.com))

*Silica extraction micro-algae*

- L. *Musselfeed* ([www.musselfeed.com](http://www.musselfeed.com))

*Extraction of proteins-riched & omega-3 nutrients from blue mussels*

J. UK

- A. *Fixed Phage, Scotland UK* ([www.fixed-phage.com](http://www.fixed-phage.com))  
Antibacterial solutions using phages, replacing antibiotics & chemicals  
BONUS *Flavophage* project
- B. *ARC Marine* ([www.arcmarine.co.uk](http://www.arcmarine.co.uk))  
*Accelerating Reef Creation, habitats & nurseries*
- C. *Cervest* ([www.cervest.earth](http://www.cervest.earth))  
*AI & machine-learning climate intelligence platform & statistical analysis*
- D. *Ellipsis Environmental* ([www.ellipsis.earth](http://www.ellipsis.earth))  
*Drones for river & coastlines pollution tracking*
- E. *Dendra Systems* ([www.dendra.io](http://www.dendra.io))  
*Drone-based and AI-powered intelligent system for restoration of natural ecosystems*

K. Finland

- A. *Image Soft, FIN* ([www.imagesoft.fi](http://www.imagesoft.fi))  
Underwater surveillance systems and radars/sonars simulators  
BONUS *Hardcore* project
- B. *Origin by ocean* ([www.originbyocean.com](http://www.originbyocean.com))  
*Blue-green algae, seaweed and bladderwrack farming, refinery & purification for natural food, cosmetics, pharma & detergents*
- C. *Clewer* ([www.clewer.com](http://www.clewer.com))  
*Ecological waste water treatment, and innovative equipment for aquaculture (bioreactors, recirculating aquaculture systems)*
- D. *Awake.AI* ([www.awake.ai](http://www.awake.ai))  
*Maritime logistics and smart data & AI platforms for monitoring, securing and simulating sea & port vessels movement*
- E. *Groke Technologies* ([www.groke-tech.com](http://www.groke-tech.com))  
*Autonomous vessel navigation solutions and multi-sensors systems*
- F. *Gaia* ([www.gaia.fi](http://www.gaia.fi))  
*Consultancy specialized in offshore wind energy*  
*Animator of the Baltic Offshore Wind ecosystem (companies: Terramare, Savcor, Destia, ...)*
- G. *Wello* ([www.wello.eu](http://www.wello.eu))  
*Offshore wave energy converter (penguin)*
- H. *Lamor* ([www.lamor.com](http://www.lamor.com))  
*Waste – including port waste) management services, recovery & recycling*

#### 4. BLUE ECONOMY SMES – BREAKDOWN BY INNOVATION & APPLICATION SCOPES

The purpose is to have a precise understanding of the distribution of the 66 identified and pre-selected SMEs per innovation areas and application's scopes

##### A. Sustainable fisheries & seafood

###### A. *Aquaculture*

Clewer, Primozone Productions, WA3RM, Next protein, Fixed Phage, Ocean's Arise, Flexbase, C-Feed, Planktronic, Billund aquakultur services, Calidris Bio

###### B. *Seaweed farming*

Origin by Ocean, Kelp Blue, Danvos, Hortimare, Alginor, AtSeanova, Algoliner

###### C. *Fisheries*

OPT/Net

###### D. *Seafood production*

Marine Taste, Biomarine

###### E. *Nutrients, biorefinery & functional material*

Swedish Algae factory, Musselfeed, Algama, Glowee, Danvos, Alginor, Ocean Basis, Vetik, Est-Agar

##### B. Sustainable multi-use of offshore infrastructure

###### A. *Energy & aquaculture*

Flexbase

###### B. *Energy & water treatment*

Desolenator, Aquaporin

##### C. Nature-based solutions for coastal restoration

###### A. *Natural habitats & biodiversity*

ARC marine, Dendra Systems

###### B. *Anti-erosion*

###### C. *Seafloor imaging*

Innomar Technologies

###### D. *Water & waste cleaning*

Lamor, C-Green, Aquammodate, DotOcean

##### D. Marine data, sensors and digital applications

###### A. *Sensors, sonars, radars*

Groke Technologies, ImageSoft, Deepoid

###### B. *Robots & drones*

Ellipsis Environmental, Aquaai, Blueeye Robotics, Blue Ocean Robotics, Blue Atlas Robotics

###### C. *Data & AI*

Awake AI, Sinay Hub, Seaproven, Cervest, Marimetrics, Noa Marine



- E. Ecosystems goods & services
  - A. *Marine biomass valorization*
  - B. *Services, surveillance, analytics & consultancy*  
Ecoloop, Neocean, Airmarine, BIOcenOR, LDI Innovation
- F. Monitoring & restricting of plastics penetration into marine environment
  - A. *Plastics separation*  
Surfcleaner, IHP Systems
  - B. *Bioplastics*  
Eranova, Danvos, Biofabrik
- G. Renewable energy
  - A. *Wind*  
Gaia, Sea Twirl, Anemo Analytics
  - B. *Wave & tidal*  
Wello, Cor Power Ocean, Hydro Air Concept energy

## 5. SMES MAPPING & INTERVIEWS, AND OBSERVED TRENDS

### A. SMEs mapping & engagement

Following a quick characterization exercise, these 66 identified and pre-selected SMEs were distributed per innovation areas and application's scopes:

- i. Sustainable fisheries & seafood
  - A. *Aquaculture*
  - B. *Seaweed farming*
  - C. *Fisheries' control*
  - D. *Seafood production*
  - E. *Nutrients, biorefinery & functional material*
- ii. Sustainable multi-use of offshore infrastructure
  - A. *Energy & aquaculture*
  - B. *Energy & water treatment*
- iii. Nature-based solutions for coastal restoration
  - A. *Natural habitats & biodiversity*
  - B. *Anti-erosion*
  - C. *Seafloor imaging*
  - D. *Water & waste cleaning*
- iv. Marine data, sensors and digital applications
  - A. *Sensors, sonars, radars*
  - B. *Robots & drones*
  - C. *Data & AI*
- v. Ecosystems goods & services
  - A. *Marine biomass valorization*

- B. Services, surveillance, analytics & consultancy*
- vi. Monitoring & restricting of plastics penetration into marine environment
  - A. Plastics separation*
  - B. Bioplastics*
- vii. Renewable energy
  - A. Wind*
  - B. Wave & tidal*

## B. General trends

The first conclusion of the exploration of the above-mentioned portfolios and of the SMEs sample (66 cases) is that a few dominant segments can be isolated within the Sustainable Blue Economy area, which are:

- i. Aquaculture (including Aquaculture dual-use infrastructure)
- ii. Seaweed farming and blue biotech (micro- & macro-algae)
- iii. Bio-based functional ingredients and nutrients, bio-based polymers & plastics
- iv. Offshore wind energy (including floating infrastructure)
- v. Tidal & wave energy
- vi. Sensors, Robotics & Autonomous Underwater Vehicles (AUVs)
- vii. Data, AI, satellite telecommunications and earth/sea observation, and other digital applications & services
- viii. Coastal & Environment protection (including water desalination and purification, filtration technologies, remote monitoring & surveillance, dredging, artificial & natural habitats, and analytical services)
- ix. Others : coastal electric mobility, hydro-acoustics, etc

It is worth noticing that very few SMES were identified in the following segments:

- (a) Multi-use offshore infrastructure;
- (b) Ecosystems goods & services;
- (c) Nature-based solutions for coastal restoration.

## C. Selected interviews with SMEs & stakeholders

Following this large desk-research analysis, which lead to SMES & stakeholders' mapping, a series of intensive bilateral interviews took place with the two target-groups:

*SMES:*

ARC Marine, Origin by Ocean, Cor Power Ocean, OPT/Net, Aquammodate, Noa Marine, Eranova Bioplastics, Aquaai, Est-Agar, Hydro-Air Concept, Neocean, Ocean's Arise.

*Stakeholders:*

Blue Invest, EC (EIC), Vinnova, Business Finland, Enterprise Estonia, BPI-F, Belspo, EIT InnoEnergy, EIT, ESA, EUREKA, EBN, Nordic Innovation, Katapult Ocean, Beta-i, Trinity College, JPI Water, University of Vaasa.

These interviews were also used to enable the selection of SMEs for the "SMEs meet Funders" Workshop (see below).

## **6. "SMES MEET FUNDERS" WORKSHOP (T3)**

### **A. Objectives**

The workshop aims to identify the tools and requirements for a successful future BANOS programme, with a focus on:

- A. Ensuring the participation of SMEs, across all selected innovation themes;
- B. Capturing the interest of other relevant stakeholders and funding bodies, including the EC and MS

### **B. Participants**

- A. The primary users (attendees) of the workshop are the selected & invited SMEs, who will constitute a representative sample of sustainable blue economy promising innovative firms.
- B. They will be joined by stakeholders who have helped these SMEs in their start-up & scale-up journey through the provision of financial and/or non-financial support (Clusters, Accelerators, Technology Parks, Tech Transfer Offices, Innovation Funding Agencies, etc)
- C. The BANOS CSA partners will provide the "fil rouge" of the future BANOS programme, and will invite the invited contributors to feed them with inputs on how to best design future funding mechanisms to support SMEs-driven innovation projects & R&I investments in the sustainable blue economy.
- D. The contributors of the workshop are :
  - i. *Selected SMEs leaders*, providing their requirements and expectations on how to be supported in their sustainable growth trajectory and innovation development by public sector funding schemes;
  - ii. *Innovation funding bodies*, at national & EU levels;

- iii. *Other relevant stakeholders, such as specialized Universities, R&D Centre, Large Corporations, Clusters, Investors, etc);*
- iv. *The BANOS R&I community members.*

### C. The Workshop

10:00: Welcome message & tour de table

*Philippe Vanrie, Innovation Expert*

10:10: The vision & upcoming offering of BANOS programme to SMEs

*Andris Andrusaitis, BANOS CSA coordinator (BONUS EEIG)*

10:20: Trends & perspectives in the Blue Economy entrepreneurial ecosystem

*Renata Almeida Peloso, Blue-Invest (PWC Luxembourg)*

10:40: Scene setting: summarizing the key-challenges for innovators & entrepreneurs

*Philippe Vanrie, innovation expert*

10:50-12:45: needs and expectations of SMEs in terms of future financial & non-financial public support and blue economy funding programmes

*Moderated by Philippe Vanrie*

Each SME leaders is invited to bring 3 elements:

- What about you ? A short description of your company and your innovations
- Looking back ! What has been your experience (positive/negative) so far with public funding support (EU, National, Regional) ?
- Looking forward ! What are the key-issues and the recommendations you would like to address to public funding schemes for the upcoming development of your company & innovation projects ?

1. Origin by Ocean (Espoo, FIN)

*Mikael Westerlund, Founder & CEO*

2. Cor Power Ocean (Stockholm, SE)

*Patrick Möller, Founder & CEO*

3. Aquaai (NO)

*Liane Thompson, Founder & CEO*

4. Noa Marine (Krakow, PL)

*Michal Latacz, co-founder & CEO*

5. Eranova Bioplastics (Port Saint Louis-du-Rhône, FR)

*Philippe Michon, co-founder & CEO*

6. OPT/Net (Noordwijk, NL)

*Taras Matselyukh, CEO*

7. Aquammodate (Gothenburg, SE)

*Simon Isaksson, co-founder & CEO*

13:30-14:15: needs and expectations of SMEs in terms of future financial & non-financial public support and blue economy funding programmes

*Moderated by Philippe Vanrie*

Each Stakeholder is invited to bring 3 elements:

- What about you ? A short description of your organization, and its specific interest for Sustainable Blue Economy
- What's on ? What programmes are you deploying and what support measures (financial & non-financial) are available for sustainable blue economy innovation & innovative SMEs ? What is your approach ?
- Reacting to SMEs' statements & requirements ! Could you comment on the expectations and requirements expressed by the SMEs ? What are your recommendations to improve public funding schemes for innovation projects & innovative SMEs, especially in the fields of sustainable blue economy ?

*Lisa Almesjö* (Head of Brussels office, Vinnova);

*Heikki Uusi-Honko* (Head of Int'l progr, Business Finland);

*Minna Martikainen* (Vice-Rector for Research University of Vaasa, Finland)

*Diana Rucinski* (EIC Fund Advisor, EISMEA)

14:15- 15:00 Discussions and Q&A

14:45-15:00 Conclusions

*Daan Blok* (NWO)

*Karoliina Koho* (BONUS EEIG)

## 7. LEARNINGS & FINDINGS FROM THE DISCUSSION

### A. General considerations guiding the discussion

The following statements were prepared following the numerous intensive exchanges with SMEs' owners and stakeholders, with the aim to prepare and stimulate the interactions during the workshop; the key-words highlighted **in bold** (below) have been the mostly-followed statements:

#### **i. Simplification**

Easy application & administration

#### **ii. Competition**

Degree of calls' competitive pressure

#### **iii. Widening & positive discrimination**

For less R&I performing players & places

#### **iv. Innovation**

Disruptive, deeptech, or less-tech

Deeptech or not deeptech

Collaborative, organizational, business model, social

#### **v. Collaboration**

- Multi-partners projects or mono-beneficiaries, or both
- vi. *Duplication*
  - Overlapping with national programmes
  - Confusion between instruments
  - European added value
- vii. ***SMEs***
  - Entrepreneurs inside ! Policy criteria or politically-correct
- viii. *Attractiveness*
  - Co-financing rates and other incentives
- ix. *TRLs*
  - Upstream or downstream vision, towards commercialization
- x. ***Industrialization***
  - Scaling-up, farming, multi-sites/multi-countries
- xi. *Research & Technology*
  - Cross-techs, cross-KETs, multi-disciplinary
- xii. *Universities & RTOs*
  - A key role, but maybe not so central !?
  - Tech Transfer policies & TTOs
- xiii. *Size of projects*
  - Size counts, especially for capital-intensive innovations
  - While keeping it agile
- xiv. ***Deeptech or not deeptech***
  - Fast-track vs new frontiers
- xv. Number of partners
  - Any views on this key-aspect
- xvi. *Duration of projects*
  - Any views on this
  - Calls with multiple, successive entries & cut-off dates
- xvii. *Top-down or bottom-up*
  - Fully transversal & open, or thematic, or hybrid
- xviii. ***Hardware & demonstration equipment***
  - Demonstrators are essential, and expensive
  - Many capital-intensive innovations
- xix. *Soft-innovation/skills & business development*
  - Design thinking & business modelling
- xx. *Financing mix*
  - Grant, equity, loan, guarantee, what else
- xxi. *Financing instruments*
  - EU: EIC, KICs, Partnerships, ESIF,...
  - Other int'l agencies: ESA, ...



- National, Regional, Local
- xxii. *Leverage effect*  
Business Angels, Crowdfunding, Accelerators, Seed-funds, VCs, Corporate financing, Foundations, ...
- xxiii. ***Non-financial support/accompanying measures***  
Coaching, training & mentoring  
Business modelling & planning  
Incubation & acceleration  
Access to market and to finance (investment readiness)  
Digital strategy
- xxiv. ***Role of intermediaries & support structures***  
Clusters, Incubators, Accelerators, Technology Parks, Development agencies, Innovation Agencies, etc
- xxv. ***Collaboration with large corporates***  
Open innovation, partnership schemes, co-development, ...
- xxvi. *Typology, taxonomy, categorization*  
Fish farming vs seaweed farming  
Polluting activities vs regenerating/cleaning technologies  
Blue, blue-bio, circular blue, circular bio, circular blue bio, ...
- xxvii. ***Regulations***  
Catalyzing or interfering with blue growth
- xxviii. *(Innovative) Public Procurement*  
Critical and quasi-absent !
- xxix. *Benchmarking*  
Looking outside Europe for best practice (US & Canada, Chile, South-Korea, ...)  
What's up with Worldbank & UN system

## B. Learnings & findings

- Blue entrepreneurship is significantly booming, and this provides an interesting emerging start-up, spin-off and scale-up dynamics, with experienced tech-entrepreneurs joining the blue economy R&I communities. A specific ecosystem is in the making.
- Despite the still important share of aquaculture, other growing trends are observed and confirmed: seaweed, blue-bio, water purification, robotics, energy, data, remote sensing & monitoring, etc.
- Most initiative are driven by the search for sustainability systemic solutions, very often with a nature-based approach and a climate-change goal.

- Sustainable blue economy seems to be very well aligned with high-level EU Agendas & National Policies: Bio-Economy, circular economy, Green Deal, and digital transformation.
- Large players are around and enter the scene: Large Corporates (Veolia, Total, Wartsila, EDP, Iberdrola, Eurofins, Valio, Schulte Group, etc), Investors (SEB, BNP Paribas, Credit Suisse, Innoport, Vulcan Capital, etc), RTOS and Technical Universities (KTH, TU Delft, CEA-tech, Chalmers, NTNU, INSA, etc), and International Institutions and Foundations.
- A lot of blue economy SMEs are highly capital-intensive, with strong financial needs for large scale demonstration and production facilities.
- There are significant funding gaps. SMEs are forced to search for highly fragmented financing mix.
- Acceleration funding schemes (public or private) are either too selective, sometime with a much too much over-subscription (EIC), or with too low investment capacity.
- Feedback mechanisms are not good enough, which therefore doesn't bring the "learning by failing" project's improvement effect.
- There is a scale-up problems for most of the selected innovation areas (Energy, UAVs & robotics, Seaweed farms, ...) for which SMEs' business model cannot fly below a minimal critical scale.
- Regulations are not adapted to the rapidly-evolving innovations, in particular in the blue-bio-economy (Seaweed farming, Biorefinery, Nutrients and bio-based ingredients). A new and fine-tuned taxonomy is required.
- SMEs are interested by the future BANOS programme offering, especially by the singular & complementary solutions it would offer, complementary to large-scale/partnership projects, highly-competitive accelerator grants, or national early-stage support programmes.

## 8. RECOMMENDATIONS FOR FUTURE BANOS PROGRAMME

### A. *Innovation*

Integrate a true innovation strategy in the programme, by contrast with the rather R&D-oriented BONUS culture, with the purpose to enable more (already-trading) SMEs, and entrepreneurial project-holders (even with early-stage projects) to engage and populate the programme.

### B. *Market-oriented (Projects/SMEs)*

Develop mixed TRLs projects, by balancing research-intensive, technology-pushed with demand-led/market-driven projects. Push the limits of the usually-accepted TRL ceiling and rock the state aid rules. The ideal situation being to

select highly-innovative projects powered by “mature” business-driven SMEs, for who the funded project is one (amongst others) development track.

*C. Portfolio*

Design and conduct the programme like a coherent portfolio, not just a list of funded projects. Managing a portfolio means adopting strategic value-chains thinking, both at selection criteria level and during the lifetime of the project’s funding cycle. This also means promoting mixity of sectors, technologies, supply chains for projects “at the crossroads”.

*D. Projects*

Support collaborative projects, instead of funding mono-beneficiary projects, but favor agile & rather small consortia rather than large groupings. Be as bottom-up (and less prescriptive) as possible within the boundaries of the programme’s priority areas.

*E. Partnerships*

Reserve a minimum-required leadership (Work Package leadership/Budget breakdown) for one or several SMES within the applicants’ consortia. SMES meaning also start-ups & spin-offs. Stimulate equally the participation of anchor-large firms. Naturally attract best-in-class RTD&I performers (Institutes, Universities, RTOS). Study the possibility to insert intermediary organizations (Clusters, Accelerators, etc) for a small portion of the projects’ budgets.

*F. Funding*

Provide grants of course, significant grants please. Study the possibility to segment the funding across two escalating stages (start-up + scale-up). Provide financial/contractual incentives and/or eligibility rights for the efforts made to mobilize private funds & investors (in the scale-up phase). Allow eligible expenses in demonstration & prototyping infrastructures.

*G. Synergies*

Provide programme support (and eligibility checks & guidance) to search for inter-instruments synergies, with for example other relevant Partnerships, Horizon Europe projects, ESIF funds, ESA/Copernicus support, and any National, Regional and Inter-Regional (I3) funding instruments.

*H. Accompanying measures*

Reserve a programme’s budget line to cover accompanying support measures, such as in particular: business & market development, investment readiness and financial modelling, matchmaking (before, during, after) & search for partners/experts, tech transfer & IP, innovative procurement, connecting to investment & acceleration platforms, etc.

*I. Programme policy support*

Develop a BANOS Policy Lab facility, offering and promoting advancement on legal and regulatory aspects of the various supply chains, in relationship with

new taxonomies related to sustainability, green procurement, and ESG (Environmental, Social & Governance) reporting related to sustainable finance.

*J. Programme regional hubs*

Create and animate a Sustainable Blue Economy Network of BANOS Regional Hubs, involving selected quadruple helix players to experience a community-based ecosystem.

*K. Programme administration*

Simplify the access to calls. Be fast in the evaluation process. Take the risk to create a trust-culture. Develop a random control approach. Provide “feedback-as-a-service”.

**END OF DOCUMENT**

*Philippe Vanrie – EcoSystemiX*

*, 15 May 2021*



