Baltic Sea Region wide study identifying Blue Growth cooperation opportunities

DR. BARBARA WEIG

SmartBlue REGIONS

Baltic Sea Region wide study
identifying Blue Growth
cooperation opportunities

Interreg Baltic Sea Region

EUROPEAN UNION
EUROPEAN REGIONAL DEVELOPMENT FUND

SmartBlue REGIONS

WP 4:
Identifying macro-regional synergies and initiating transnational cooperation

GoA 4.1:
Elaboration of a BSR-wide study identifying Blue Growth cooperation opportunities

Smart Blue Regions
Main Output Report

PP01 DR. BARBARA WEIG

SH
Schleswig-Holstein
Ministry of Economic Affairs, Transport, Employment, Technology and Tourism

November 2017

CONTRIBUTING AUTHORS:

Edgars Rantiņš, Inga Brieze (Riga Planning Region)

Joanna Przedrzymirska, Joanna Licznerska-Bereśniewicz, Agnieszka Piaszczyńska, Magdalena Batko, Iwona Rakowska (The Maritime Institute in Gdansk)

Helinä Yli-Knuutila, Otto Lappalainen, Petteri Partanen, Sonja Palhus, Aleksis Klap (Regional Council of Southwest Finland)

Magda Leszczyna-Rzucidło (Association "Pomorskie in the European Union")

Steffen Lüsse (Ministry of Economic Affairs, Transport, Employment, Technology and Tourism Schleswig-Holstein)

Anda Ikauniece (Latvian Institute of Aquatic Ecology)

Peter Askman (Region Skåne), Helene Norberg (HN Analys & Strategi AB), Karina Linnér (Linnér Consulting AB)

Kerda Eiert, Hardi Murula (Ida-Viru County Government), Garri Raagmaa, Uku Varblane (University of Tartu)

Contents

LIST OF ABBREVIATIONS

AWI	Alfred Wegener Institute
BSO	Business Support Organisation
BSR	Baltic Sea Region
BWMC	Ballast Water Management Convention
ERDF	European Regional Development Fund
EU	European Union
EUSBSR	EU Strategy for the Baltic Sea Region
GDP	Gross Domestic Product
GoA	Group of Activity
ICT	Information and Communication Technology
IMARE	Institute for Marine Resources (Bremerhaven)
KTH	Kungliga Tekniska Högskolan
LNG	Liquefied Natural Gas
OP ERDF	Operational Program of the European Regional Development Fund
RAS	Recirculating Aquaculture Systems
R&D	Research and Development
PRDS	Pomorskie Regional Development Strategy 2020
RIS3	Research and Innovation Strategy
SECA	Sulphur Emission Control Area
SME	Small and Medium sized enterprises

LIST OF FIGURES

1 Introduction

In major sectors such as automotive or food, actors are mostly well aware of the (international) players in their fields. However this does not yet apply to most of the comparably young blue growth sectors. Information on enterprises, research institutes, universities and suitable business support organisations (BSO) is rare. Some enterprises are very young others have just added a new "blue" field to their portfolio. The community is not yet fully established. Besides the young blue growth sectors, there are also important traditional blue sectors like shipping and the shipbuilding industry in the Baltic Sea Region (BSR). Their business has changed dramatically during the last decades, from being a very labour-intensive industry to a highly specialised activity for improving the vessels environmental and economic performance. This industry, even though being very mature has undergone a metamorphosis and is about to enter into the new world of digitalisation, robotisation, new manufacturing processes, new materials and is thus in need of new services. The need to broaden their networks of cooperation partners in the field of ICT, system integration, greentech solution providers and material experts is obvious.

No matter if traditional or young, all blue sectors are affected by the relatively new process of the Research and Innovation Strategy (RIS3). The RIS3 is a requirement by the European Commission as an ex ante conditionality to use ERDF for innovation policy. The strategy is based on the concept of smart specialisation. Smart specialisation does not only aim at focusing innovation funding on defined specialisation fields, but also at fostering cooperation and the building of macro-regional value chains, based on regional specialisation. For the blue growth actors this new approach requires to familiarize with the new strategy process, to learn how to use new opportunities for their goals and to connect with other blue actors within and outside their regions.

The project team of Smart Blue Regions has therefore conducted a Baltic Sea Region wide study to identify blue growth cooperation opportunities in the blue fields of "Machinery and Technology", "Energy" and "Life Science and Blue Medicine". The study aims at closing the gap of information by mapping blue growth focus areas and actors. The review is based on regional/national Research and Innovation Strategies. Following the EU concept of smart specialisation, the study focuses on supporting innovation in selected fields of specialisation only.

The BSR-wide study is based on a selection of regions. The regions are restricted to the countries involved in the Smart Blue Regions project. That means that all countries around the Baltic Sea are involved except for Denmark, Lithuania, Norway and Russia. Besides the six partner regions, other blue regions in the respective countries were identified. Each project partner was responsible to do a selection for his/her own country, based on an analysis of the national/regional RIS3 documents.

The selection shows, that most regions with a focus on blue growth sectors are located directly at the coast. However there are also inland regions, far away from the sea, contributing significantly to blue growth. Mostly those regions are traditional steel producing regions, benefiting from new applications for high quality steel products, in the offshore (wind) industry or in shipbuilding. Other inland regions host important research and education centres for biotechnology, medical sciences or tourism. They supply the blue growth sector with skilled workers and innovative research results. For a detailed description of the selected regions please see appendix 1.

In a second step the Smart Blue Regions project team conducted a series of interviews. The interviews with RIS3 and blue growth experts in the respective countries pursued two different goals: first, the maps have been evaluated by experts; second, experts were asked about future topics in their field of expertise und possible themes for transnational cooperation.

The report is structured in the following way: In chapter 2, maps of blue growth focus areas according to the respective RIS3 documents are presented. Chapter 3 deals with different groups of blue growth actors (BSOs,

Photo 1: A large tanker ship is being renovated in shipyard Gdansk, Poland (by Nightman1965)

universities, and research institutes) in the Baltic Sea region. Maps in the various categories are presented. In chapter 4 the results of the interviews are summarised. The report concludes with a list of recommended topics for future cooperation in chapter 5.

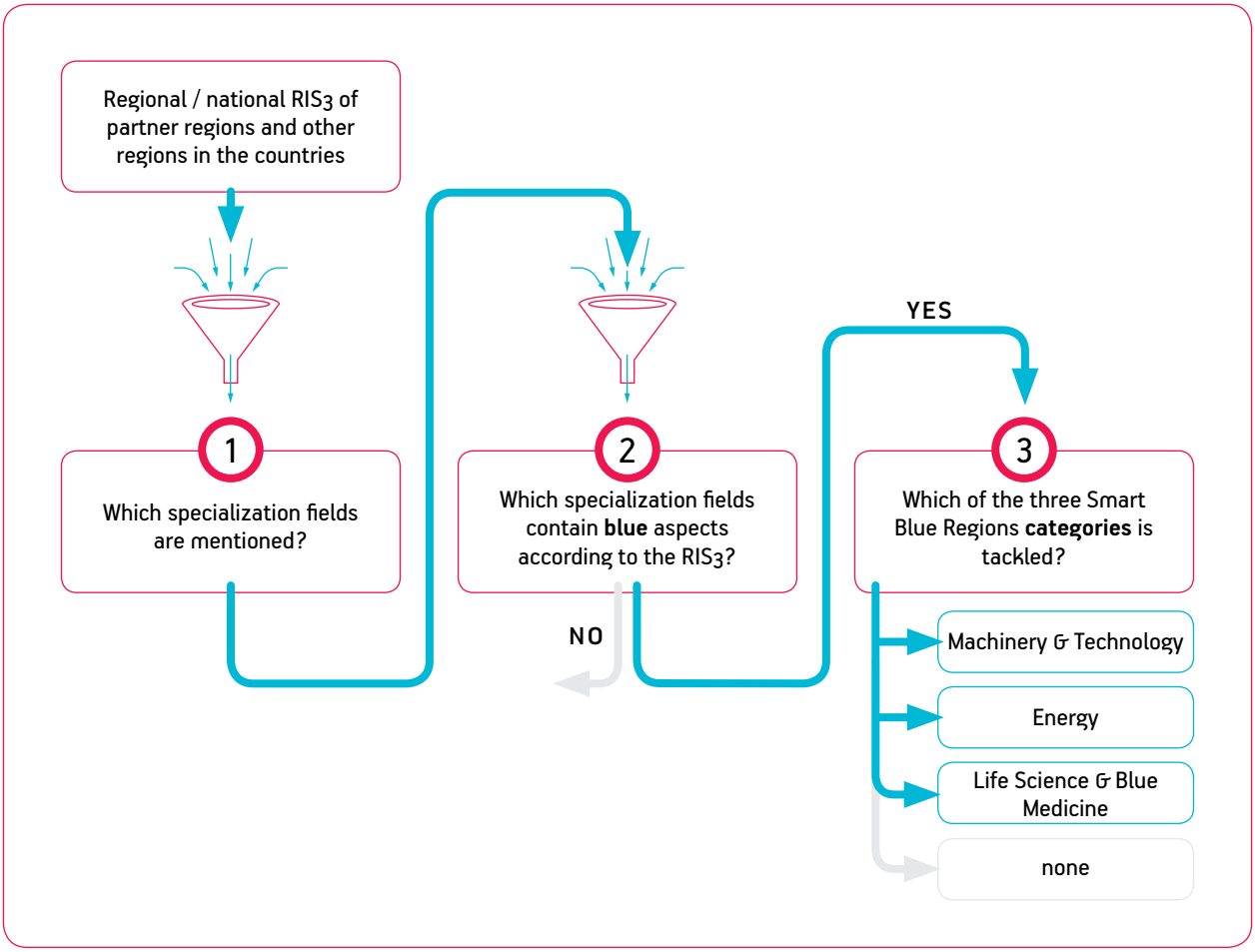
In further works of the Smart Blue Regions project (groups of activity (GoA) 4.2 and 4.3) these recommendations will be further elaborated inter alia during organised workshops together with blue growth actors from the partner regions.

The maps included in this report also exist in an interactive version for online usage. The interactive maps include web links and short information boxes opening when the cursor touches the respective symbol. Those maps will be made accessible for everyone, who is interested to learn more about blue growth actors in the Baltic Sea region. Additionally, lists of actors (BSOs, universities and research institutes) are attached to this report (see appendix 2–4).

2 Blue Growth Focus Areas in RIS3

This chapter aims at summarising the results from identification of blue growth focus areas in the six partner regions and other blue regions in the respective countries. In a first step, various Research and Innovation Strategies (RIS3) in the participating countries of the Baltic Sea Region were selected. This exercise revealed some first differences: while smaller countries like Latvia and Estonia have a national innovation strategy only, other countries have regional strategies on the NUTS 1 level (Germany), NUTS 2 level (Poland) or NUTS 3 level (Sweden, Finland). The geographic level of the strategies varies, resulting in different consequences for implementation. In a second step, the selected RIS3 documents were analysed: smart specialisation topics and specialisation fields of all partner regions and other regions in the respective countries were extracted. In the next step, the specialisation fields had undergone a multi-step sorting process. Blue topics were sorted out and selected according to the three predefined categories "Machinery & Technology", "Energy" and "Life Science & Blue Medicine" (see fig. 1). Only regions with specialisation fields in the respective blue fields were included in the following study.

Figure 1: Sorting process



Smart specialisation topics define fields of action that are primarily to be funded by the European Research and Development Fund (ERDF). The topics range from education and basic research infrastructure via knowledge and technology transfer to energy transition and internationalisation (see fig. 2). The Smart specialisation topics seem to differ slightly between the partner regions. The core topics however appear in most regions, no matter which country.

Figure 2: Smart Specialisation Topics

Riga Planning Region	Schleswig-Holstein	Skåne	Southwest Finland	Pomorskie
• Flexible and outstanding education: Connection of innovative entrepreneurship, outstanding research and higher education in the areas of smart development • Globally competitive areas: Support for knowledge and technology export to companies and industries with outstanding, innovative and international "niche" products and services • High-quality transport and logistics: Development of common inner and international infrastructure networks;... Development of integrated inner and seashore waterway network • Smart development: Elaboration and implementation of smart specialization policy in smart development territories and areas. Detailed self assessment of smart specialization	• Targeted expansion of the regional knowledge infrastructure and linking the scientific potential to strengthen R&D capacities • Structural innovations and intensification of communication within knowledge and technology transfer to accelerate the exchange process • Expanded support of start-ups to raise knowledge and technology intensive start-ups and to unfold a culture of entrepreneurship • Expansion of business-related innovation support to enhance innovation activities and to expand gradually the innovation basis • Strengthening the regional profile through a targeted development and enhancement of clusters and networks with a profile defining and internationally emitting quality • Expansion of R&D infrastructure supporting economic activities by means of competence centres to develop a number of core innovation focus areas	• Increasing the efficiency in the innovation support system by applying a so called "systemic leadership approach: including all relevant stakeholders into a holistic approach • Broaden the sense of what innovation is – should encourage support of not only high-tech innovation but also "broad tech", which may very well lead to growth faster than high-tech • Streamlining the support structure for innovation for a more efficient and more flexible support. Acknowledging that individual solutions can lead to higher efficiency • Developing new innovative areas and creative environments. Efforts to attract and strengthen creative capital. These efforts to be coordinated with other efforts so that they reinforce each other • Developing, encouraging and supporting international cooperation in all areas (public, academia and industry). Focus on knowledge exchange, stimulate Open Innovation Arenas to form international strategic alliances	• Leading actor in Baltic Sea cooperation: visions and responsibility as a motor and host for cooperation activities in the Baltic Sea region, centre for congress and seminars, Turku – process: communication forum between EU and Russia • Enhance strategic partnership between business and research institutes, active networking between public and private sectors • In addition to the traditional marine- and bio clusters in the region new openings can be expected e.g. from censor-, perception- and understanding technologies. • Enhance versatile resource efficiency: resource efficient way of using natural resources, buildings, spaces, immaterial values and knowhow... • Natural resources wise region: both virgin and naturally renewable as well as recycled raw materials are considered as natural resources. Recognition of different raw material flows to enhance their sustainable, smart and economically wise use	• Innovation and transfer of knowledge to the economy – the aim is to strengthen innovation in companies by increasing investment in new technologies, knowledge transfer from R&D + I and professional business consultancy. This priority allows (through innovation) the development and expansion of activities • External economic links – the aim is to increase the competitiveness of Polish enterprises in the international arena, by increasing their activity abroad and by attracting outside investors. This priority increases their opportunities for development and has an impact on the Blue Growth area activities • Modern information and communication technologies for the economy – the aim is to develop all areas of the economy and improve the quality of life through investments in the development of ICT. The priority increases their opportunities for development and has an impact on Blue Growth area activities

Riga Planning Region	Schleswig-Holstein	Skåne	Southwest Finland	Pomorskie
	• Development of skilled workers as intellectual basis of the innovation system in Schleswig-Holstein • Realisation of the energy transition and reduction of CO_2 emission in economy by expanding R&D efforts in renewable energies, energy efficiency and bio economy • Strengthening of the innovation capacities in Schleswig-Holstein by combining cross-border potentials in a smart way	• Strengthening innovation capacity in existing industry and public sector activities. We have identified a need to improve skills in sales and marketing, particularly for SME. An initiative to enhance these capabilities to be implemented	• Full-scale utilization of different side streams provides innovative ways to act for individuals, business opportunities for companies and research possibilities for research institutes • Energy efficiency will be enhanced by structural and technical solutions. Structural solutions include enhancement of everyday choices diminishing energy use e.g. related to mobility and traffic. Future decentralized energy production will need new logistics and methods to garner and redistribute energy • To accomplish energy efficiency and natural resources wise South-West Finland partnerships between citizens, companies, research institutes authorities and cities need to be strengthened. New cooperation will be targeted especially to gain a large common overview and to find even the smallest side streams for (re) utilization	• Transregional and international activity of universities – the aim is to attract students from outside the region and effectively encourage those in the region to benefit from the offer of regional schools. This priority gives the possibility for staff training (based on the regional demand) • Education for the needs of the economy – the aim is to adapt their educational offer of universities to meet the current market demand and effectively fill the formed gaps in this area, inter alia, through constant and intensive cooperation with groups of employers. This priority gives the opportunity to create fields of education in the area of Blue Growth

The **specialisation fields** define sectors or cross-sectoral topics which are chosen to be exclusively funded by ERDF innovation funding. The comparison of the specialisation fields listed in the RIS3 documents revealed some interesting differences: First, the number of nominated fields differs quite a lot, even within the same country. While Schleswig-Holstein has five specialisation fields, Hesse, North Rhine-Westphalia, Hamburg and others nominate eight or more specialisation fields within their RIS3. Second, the choice of wording for the specialisation fields offers ways to include more topics than specialisation fields. While some RIS3 combine ICT with media and/ or creative industry within one specialisation field, others nominate each topic separately. Third, while German regional RIS3 as well as the Estonian national RIS3 rather focus on economic sectors as specialisation fields (e.g. food industry, energy industry, automotive

Figure 3: Specialisation Fields

Ida-Viru	Pomorskie	Riga Planning Region	Schleswig-Holstein	Skåne	Southwest Finland
Tourism, spa and health services	Off-shore, port and logistic technologies	Research and development services	Maritime economy	Smart materials	Food industry
Wind energy	Interactive technologies in an information-saturated environment	Creative industries	Life sciences	Smart sustainable cities	Agriculture
Fish farming	Eco-effective technologies in the generation, transmission, distribution and consumption of energy and fuels, and in construction	High added-value production and services	Food industry	Personalized health	Technology industry
Boat building and repair	Medical technologies in the area of civilization and aging-associated diseases	Nonstandard products and "just on time" exports	Renewable energies		Environmental technology
		Air and maritime transportation	Information and communication technology, media		Marine environment
		Tourism			Shipyard industry
		Green economy and sustainable living			Information and cultural services
					Bio sector
					Tourism
					Health and social services
					Other service sectors such as commerce, education, administration and logistics

industry), Swedish, Latvian and Finish regions take into account future cross-sectoral topics such as "smart sustainable cities" (Skåne), "green economy and sustainable living" (Riga Planning Region) or "waste treatment" (Satakunta) (see fig. 3). The Polish RIS3 in turn puts different technologies in the focus. Specialisation fields in Pomorskie are for instance "eco-efficient technologies" or "interactive technologies".

After this first analysis, the specialisation fields listed in the RIS3 documents were analysed concerning their content of blue topics. Afterwards, the extracted blue topics were sorted according to the predefined fields of Machinery & Technology, Energy and Life Science & Blue Medicine. This exercise showed that blue topics are not always obvious. A lot of sectors have something to do with blue growth, without being primarily blue. To figure out the blue growth focus areas of each region was quite a challenge. Defining subfields within the three predefined categories helped to develop a common approach among the project partners (see fig. 4). The final decision what to include or exclude was in the responsibility of each partner for his/her country.

The subfield "Maritime Technology" comprises shipbuilding companies and their suppliers, with a focus on innovative technological products. "Monitoring and other Marine Technologies" includes all kinds of technologies used for marine purposes that are not covered by shipbuilding and offshore energy. The subfield of "Shipping" focuses on technologies used by shipping companies to make transportation more efficient in terms of energy, time, safety, costs etc. The subfield "Ports" deals with technologies used in ports to smoothen processes of handling. The category

Figure 4: Categories and Subfields (blue growth)

Machinery & Technology	Maritime Technology
	Monitoring and other Marine Technologies
	Shipping
	Ports
Energy	Building of Plants & Systems
	Operation & Maintenance
Life Science & Blue Medicine	Blue Biotechnology
	Marine Aquaculture
	Health Treatment

of "Energy" was divided into two subfields, oriented towards the value chain. The subfield "building of plants and systems" deals more with the technical aspects of production while the second subfield "operation & maintenance" has a stronger focus on services. Within the category of "Life Science and Blue Medicine", three subfields were identified to be important for the participating regions. "Blue Biotechnology" includes research in and production of pharmaceutics, cosmetics and food using marine resources such as algae. "Marine Aquaculture" comprises the breeding of fish, mussels, shrimps and other seafood. The subfield of "health treatment" consists of two different sectors: Medical treatments using marine resources for the recovery process and spa tourism, fostering wellbeing.

Based on those subfields, each project partner identified blue growth focus areas in several regions of the respective country. Only regions with a focus on blue growth in the regional innovation strategy were included in the study. It might be that regions do have a focus on one of the blue fields, but if this focus is not mentioned in one of its specialisation fields in the respective RIS3, it is consequently not indicated in the maps. Maps were developed for each country separately (see fig. 5–10).

The six national maps show that blue growth fields are mentioned in several regional innovation strategies in the respective countries. All three categories of blue growth and the defined subcategories do play a major role in the Baltic Sea region and also within the RIS3 process. Each region and country shows its unique character but in general all subfields are well spread over the regions.

In most countries, blue growth focus areas are gathered along the coasts. However there are regions far away from the coast, contributing as well to blue growth. Such examples are Dalarna (Sweden), Saarland (Germany) as well as the Polish regions of Śląskie, Dolnośląskie and Wielkopolskie. The majority of those regions are traditional steel production areas, hosting supply firms for the energy sector as well as for machinery and technology. Moreover, the Polish regions of Dolnośląskie and Wielkopolskie are hotspots for modern medical technologies and education and research in medical and touristic fields.

In a next step, maps of the whole Baltic Sea Region were developed to get a better overview and to find matches between the regions. The Baltic Sea Region maps are thematically focused on one category each. One map shows all regions with a focus on blue Machinery & Technology (see fig. 11). Another map gives an overview of the topic blue Energy (see fig. 12) and the third map shows all regions with a focus on Life Science and Blue Medicine (see fig. 13).

Photo 2: Cages for fish farming (by Popova Valeriya)

Figure 5: Blue Growth Focus Areas in Estonia – based on an analysis of regional / national RIS3

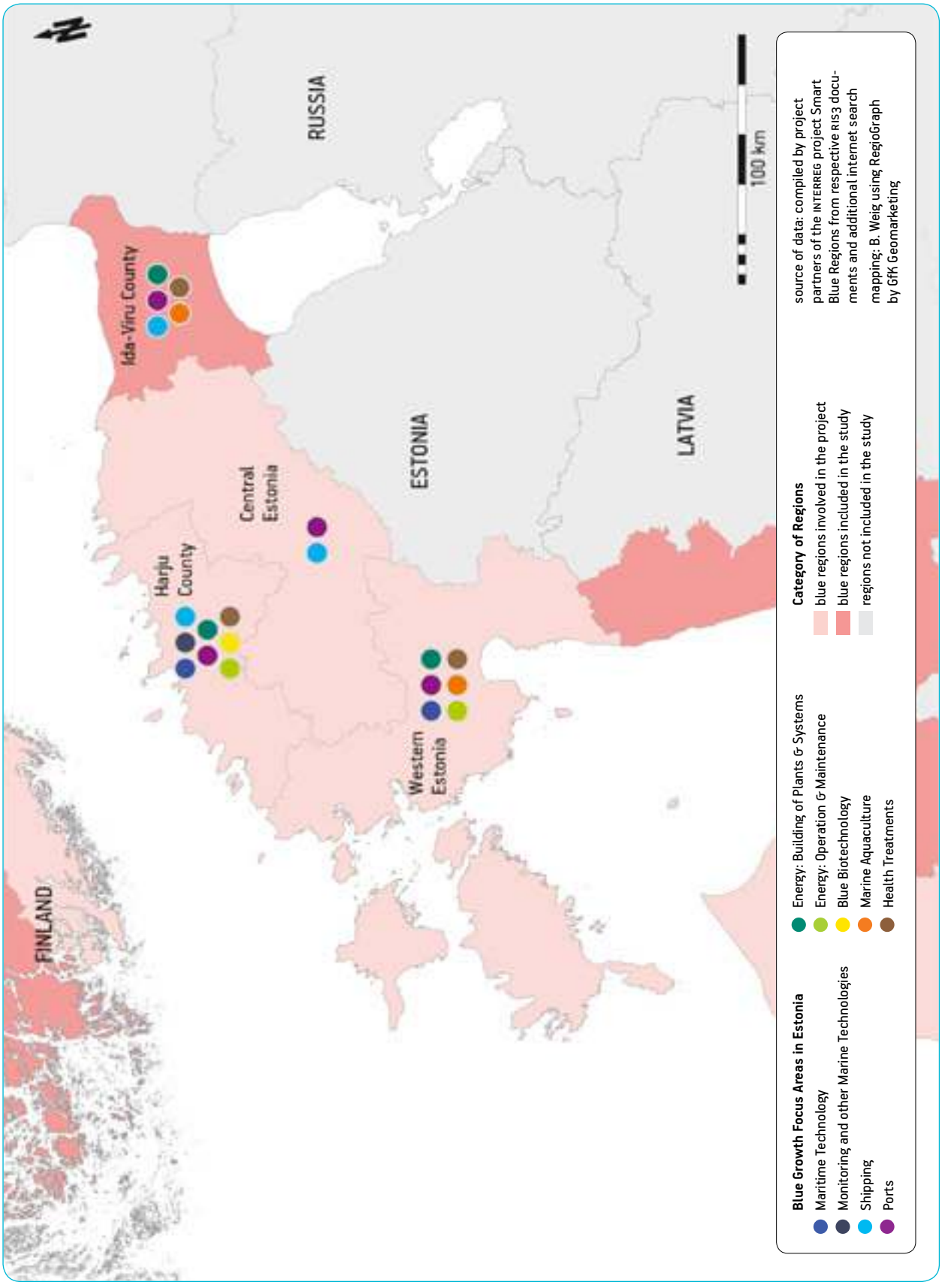


Figure 6: Blue Growth Focus Areas in Finland – based on an analysis of regional / national RIS3

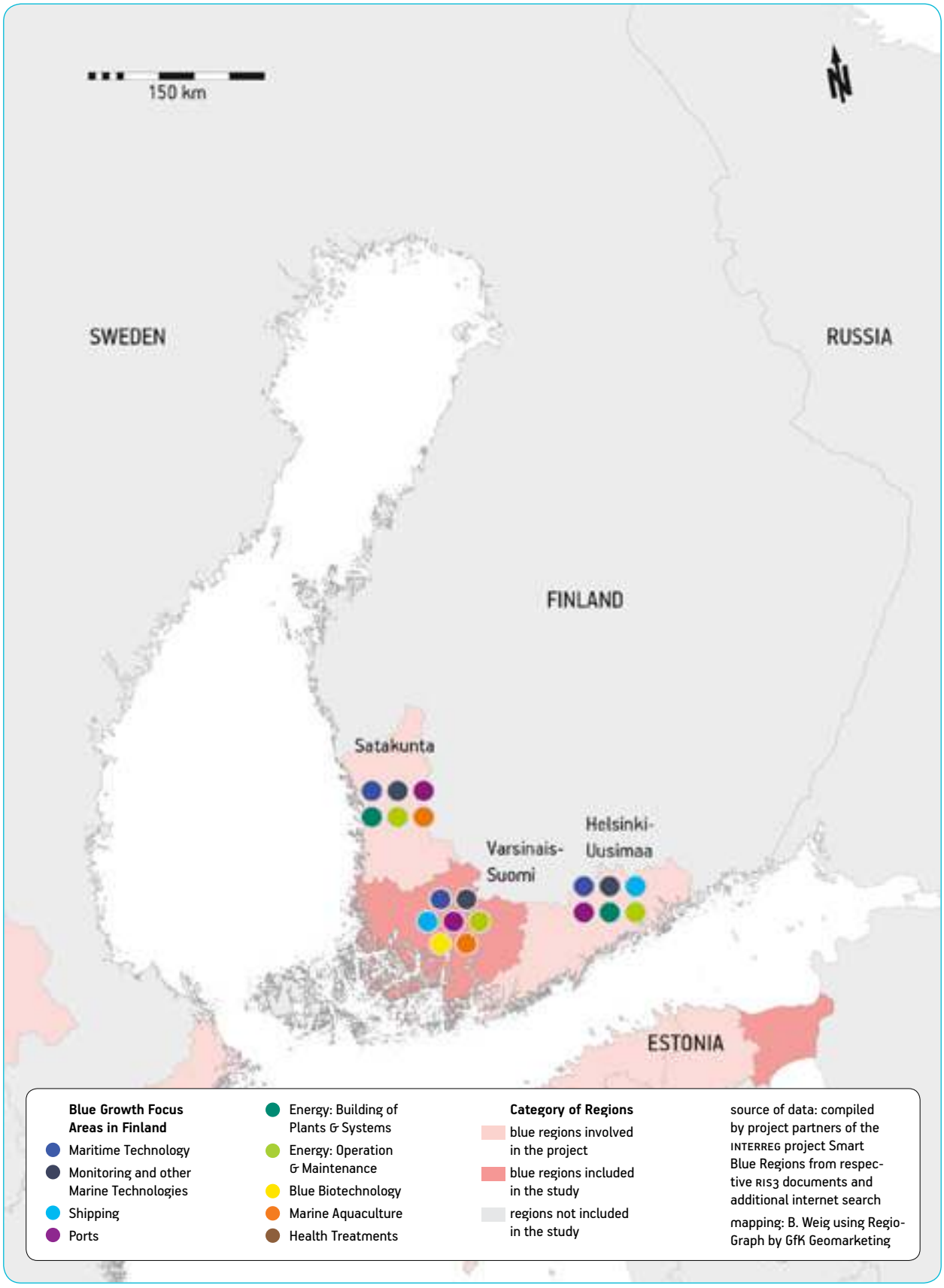


Figure 7: Blue Growth Focus Areas in Germany – based on an analysis of regional / national RIS3

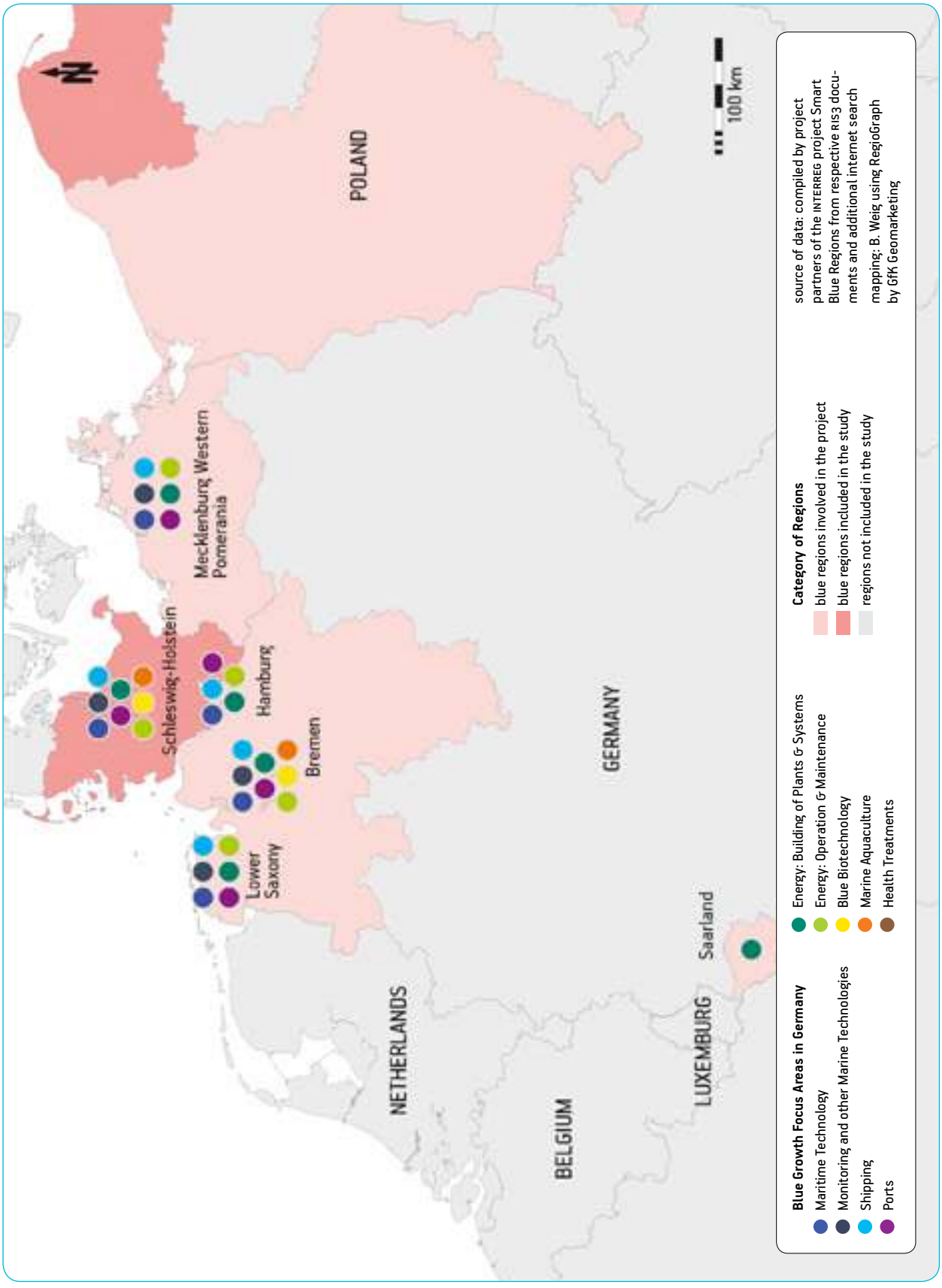


Figure 8: Blue Growth Focus Areas in Latvia – based on an analysis of regional / national RIS3

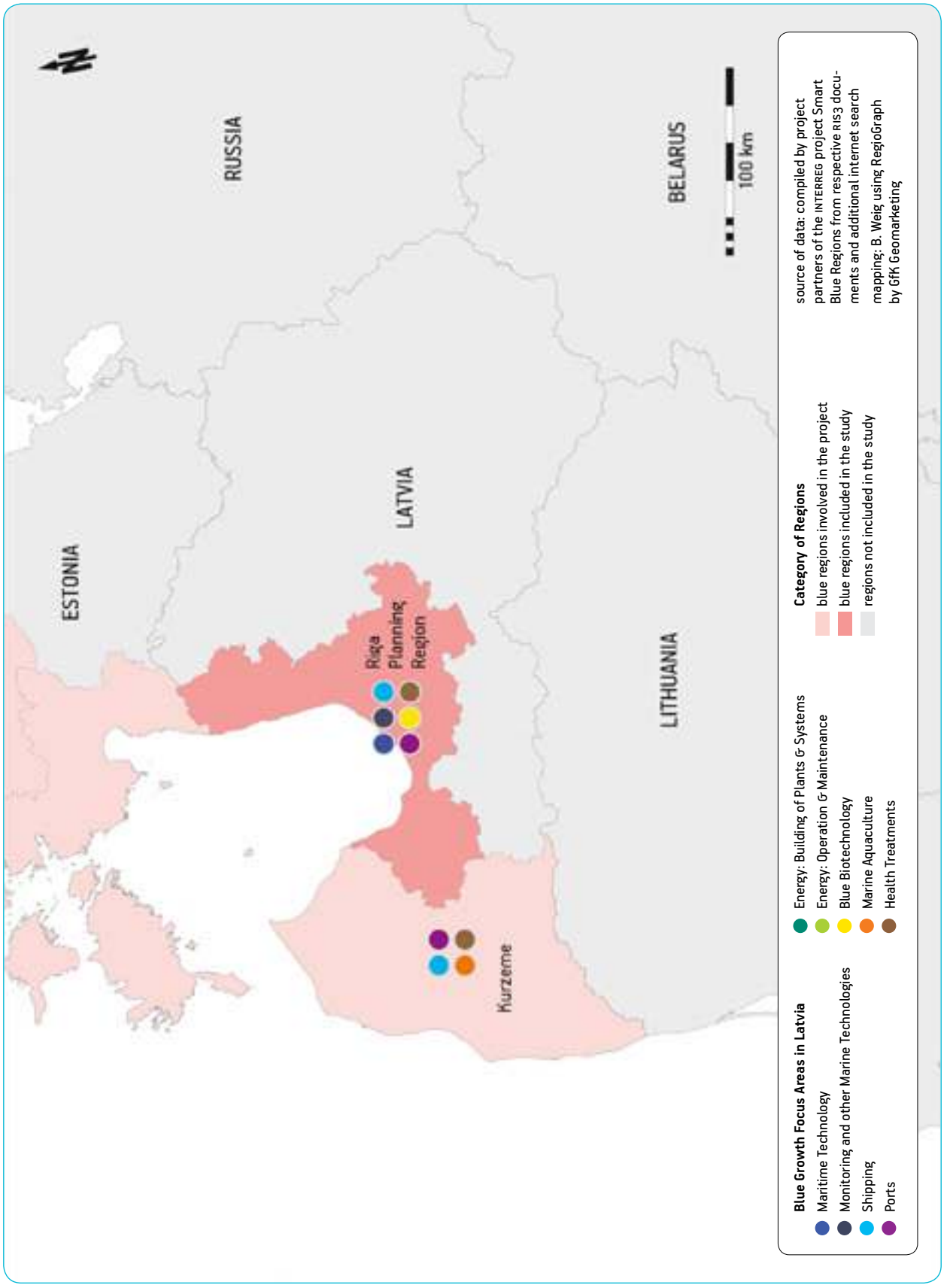


Figure 9: Blue Growth Focus Areas in Poland – based on an analysis of regional / national RIS3

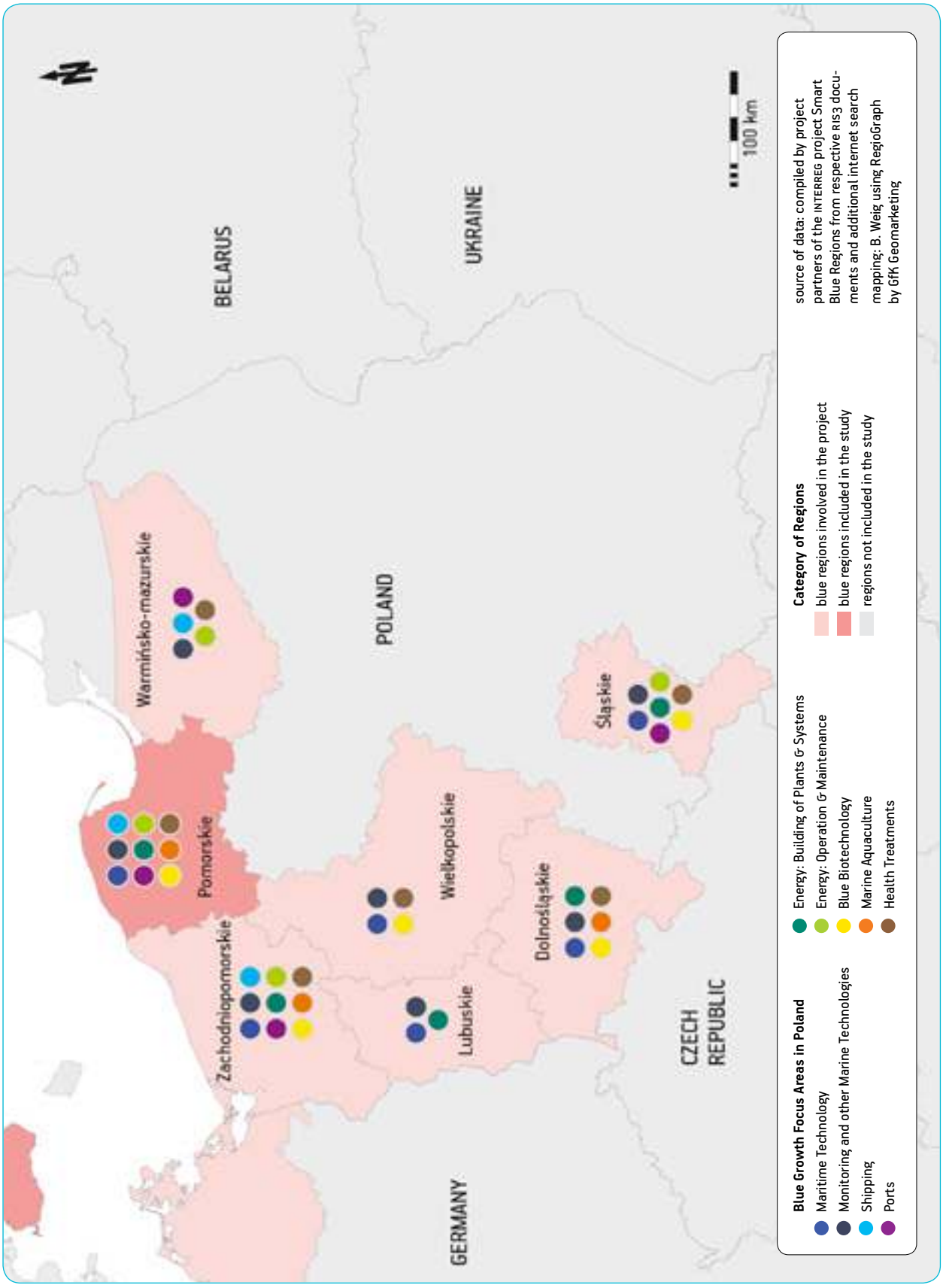


Figure 10: Blue Growth Focus Areas in Sweden – based on an analysis of regional / national RIS3

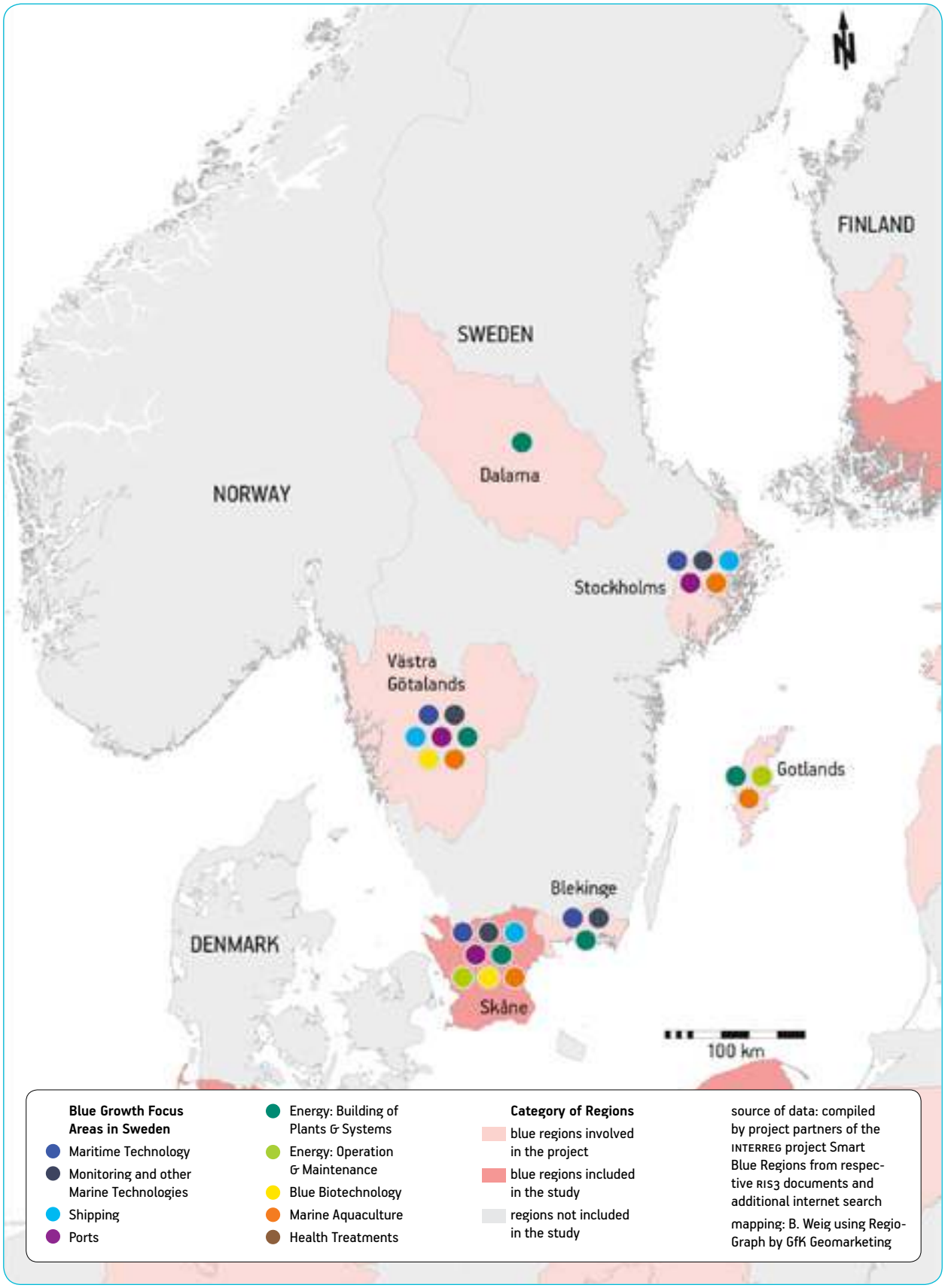


Figure 11: The Baltic Sea Region: Blue Growth Focus Areas in the Field of Machinery & Technology – based on an analysis of regional / national RIS3

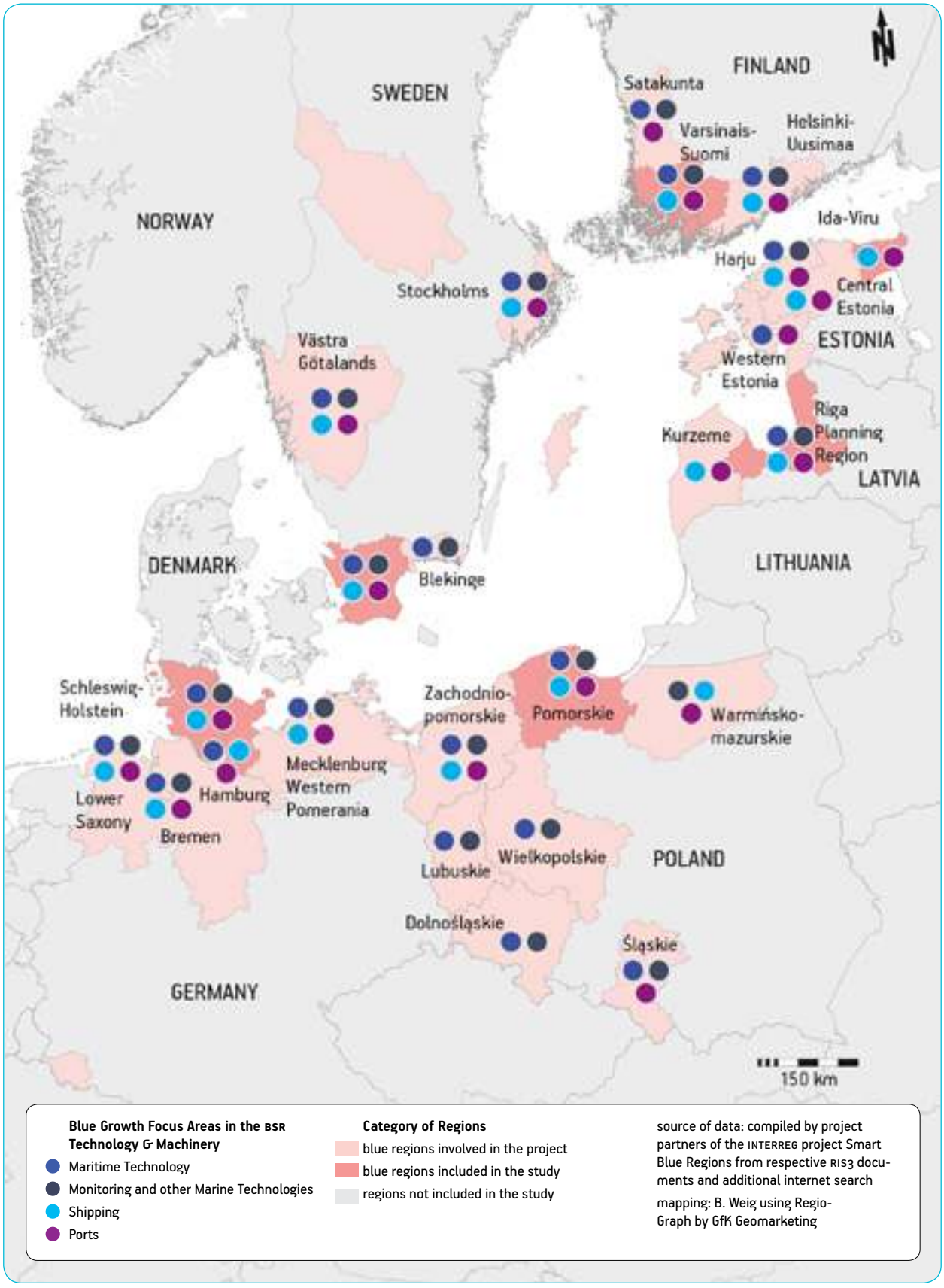


Figure 12: The Baltic Sea Region: Blue Growth Focus Areas in the Field of Blue Energy – based on an analysis of regional/ national RIS3

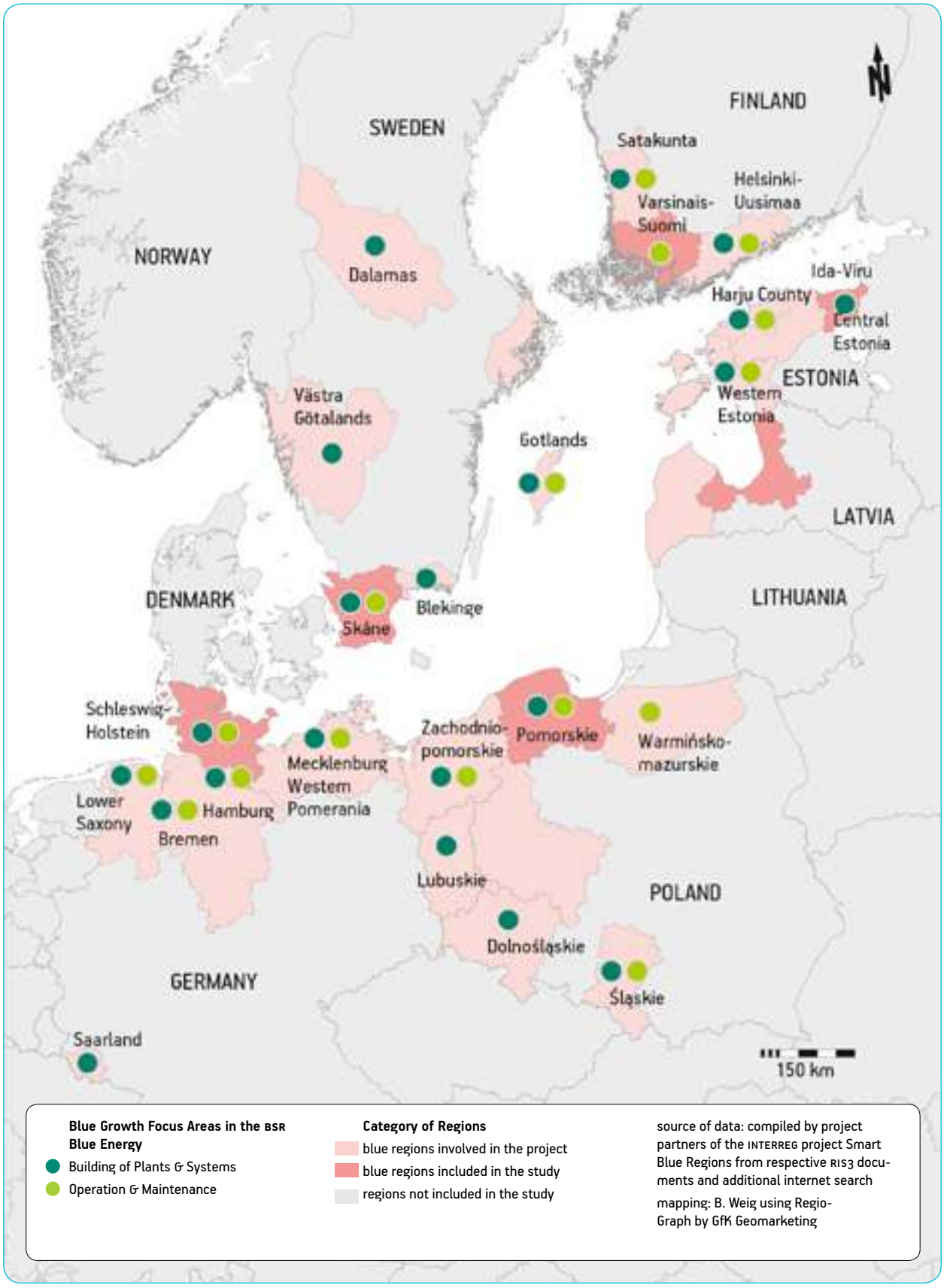
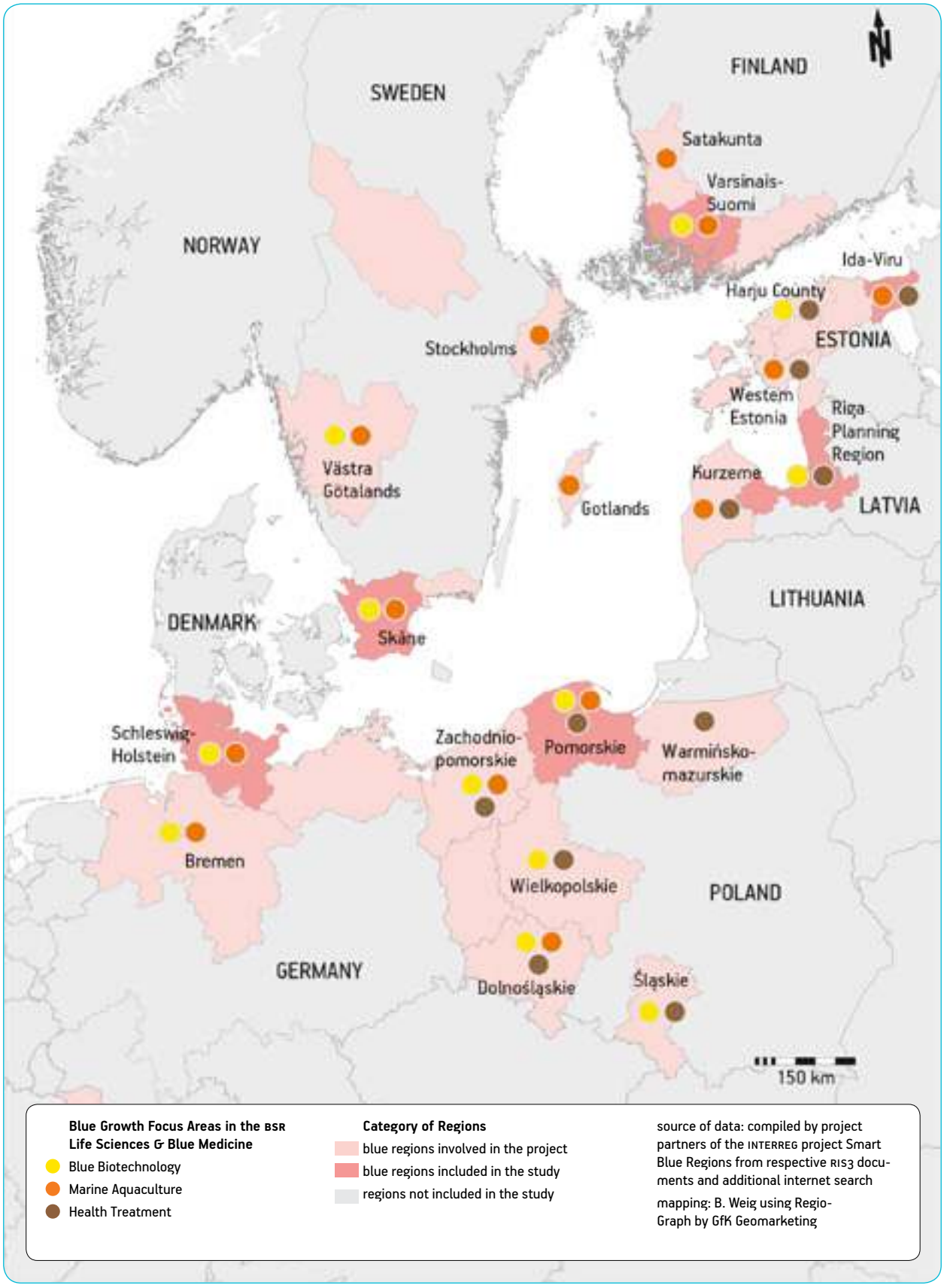


Figure 13: The Baltic Sea Region: Blue Growth Focus Areas in the Field of Life Sciences & Blue Medicine – based on an analysis of regional / national RIS3



"Machinery & Technology" is the most widely spread category. Except for the two traditional steel producing regions (Dalarna and Saarland), all analysed regions have identified at least one of the four respective subfields in their RIS3. Most regions even cover all four subcategories "Maritime Technology", "Monitoring and other Marine Technologies", "Shipping" and "Ports".

"Energy" is an important specialisation field in most regions, except for Latvian regions. Our analysis showed that offshore wind energy is the most important blue energy sector in the Baltic Sea region. Most regions are involved in building of plants & systems as well as in operation & maintenance. Most Swedish regions are only involved in the construction part, while operation and maintenance only plays a role on the island of Gotlands and in Skåne, being on the threshold in this field with advanced discussions on new investment going on. The same applies to the German region of Saarland, to the Polish regions of Dolnośląskie and Lubuskie and the Estonian region Ida-Viru. The Finish region of Southwest Finland (Varsinais-Suomi), however, is only involved in operation and maintenance and not in building of plants and systems.

"Life Science and Blue Medicine" includes several quite distinctive subfields. In general, those topics are not as widely spread as the other fields of blue growth. Several blue regions do not include any topics of this category in their RIS3. The subfield of health treatment is relevant for Estonia, Latvia and Poland.

The maps so far only indicate, in which of the selected regions the defined subfields of blue growth are mentioned in the respective RIS3. The maps do not yet indicate any actors or activities. In the next chapter, more detailed information on actors and activities are given.

3 Blue Growth Actors in the Blue Focus Areas

For the study on actors in blue growth, we decided to look at business support organisations, institutions of higher education and research institutes. This exercise provides an overview of contact persons for the next step: identifying cooperation opportunities. However, the RIS3 documents as source of information were not enough for this task. Other sources like the internet or more specific strategic documents had to be consulted.

The map on **business support organisations** differentiates between business parks, clusters or networks, competence centres and incubators (see fig. 14). Other forms of business support are summarised in the category "others". Moreover the map indicates by using different colours, which of the three blue categories is covered by the respective organisation. Regional and local organisations are presented within the region they are active in. The location on the map however, is not exactly correspondent to the location of the office or headquarter. National organisations are indicated by larger symbols placed in the national capital. This might not be the real location of the organisation, but enables a common approach and helps to distinguish between regional and national organisations. The online version of this map allows for information on the name of the organisation, the region(s) of activity and a contact point. This information is gathered in form of a database and attached in appendix 1.

The map on actors in **higher education** (see fig. 15) shows universities, technical universities and universities of applied sciences with a focus on blue topics in the Baltic Sea region. Other forms of institutions are summarised in the category "others". Different colours indicate which of the three blue categories (machinery & technology, energy, life sciences and blue medicine) are covered by the respective institution. The indicated location on the map corresponds with the real location of the university. The interactive online version of the map gives information on the name of the institution, the location, blue fields of expertise and contact points. For this report, this information is summarised in appendix 2.

The map on **non-university research institutes** (see fig. 16) shows institutes indicated by the categories of blue growth they cover. The indicated location on the map corresponds with the real location of the research institute. The interactive online version of the map includes information on the name, the location, blue fields of expertise and contact points. For this report, this information is summarised in appendix 3.

To sum up, the three maps on blue growth actors reveal that the density is quite different in the BSR countries. In the field of Business Support Organisations, Finland, Germany and Poland show a quite dense network of mostly regional organisations. In Sweden there are less BSOs but regional ones predominate as well. In Latvia and Estonia however, national BSOs dominate. Universities and other institutes of higher education with a focus on blue topics are quite evenly spread over the analysed region. Almost every region included in the study shows at least one institute. Non-university research institutes are much more clustered in some important locations. According to our study, hotspots of research in blue topics are: Helsinki and Turku in Finland, Riga in Latvia, Gdańsk/ Gdynia and Warszawa in Poland, Gothenburg and Lund in Sweden as well as Kiel, Lübeck, Hamburg, Bremen, Oldenburg and Rostock in Germany.

Figure 14: The Baltic Sea Region: Blue Growth Actors – Business Support Organisations

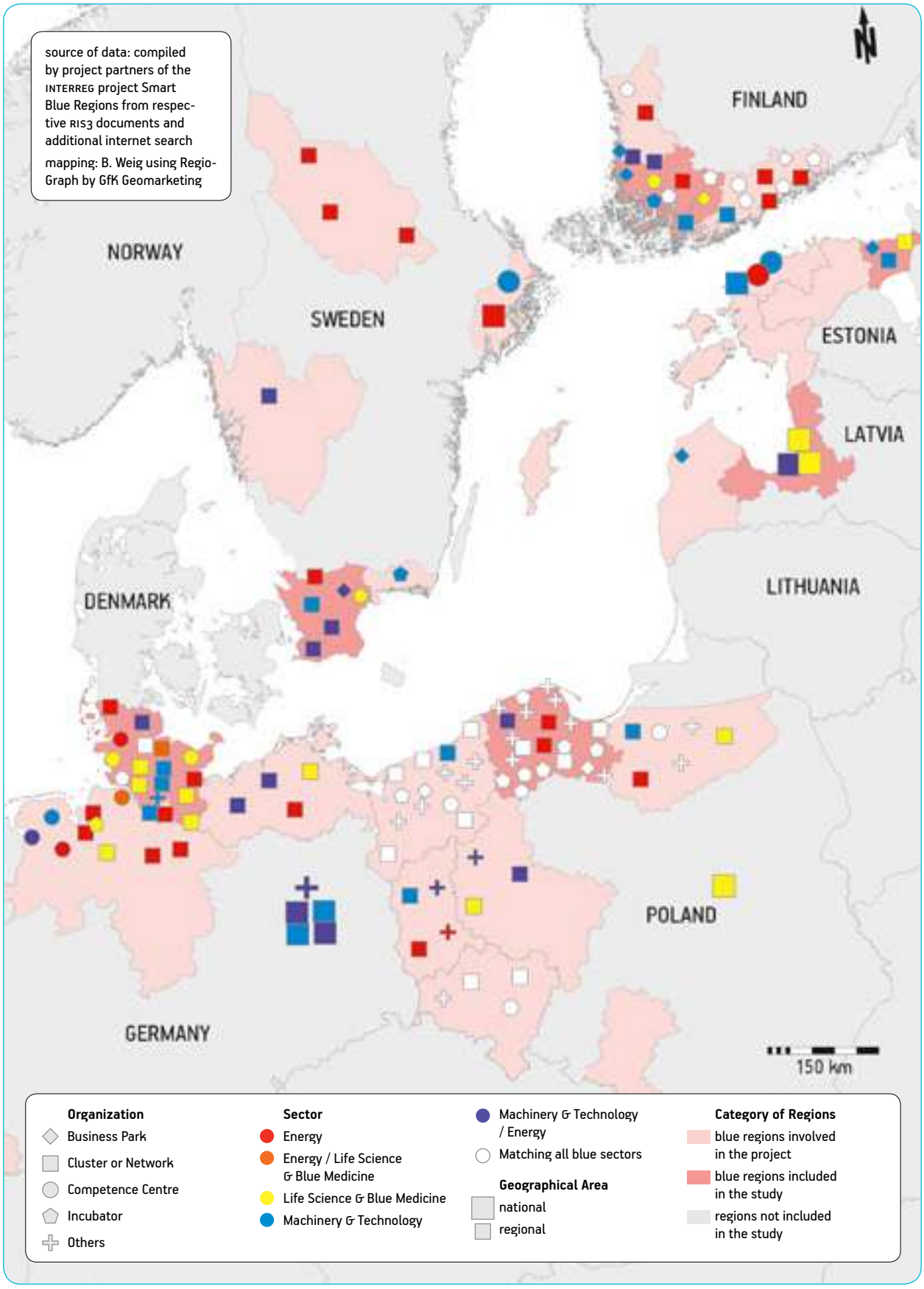


Figure 15: The Baltic Sea Region: Blue Actors in Higher Education

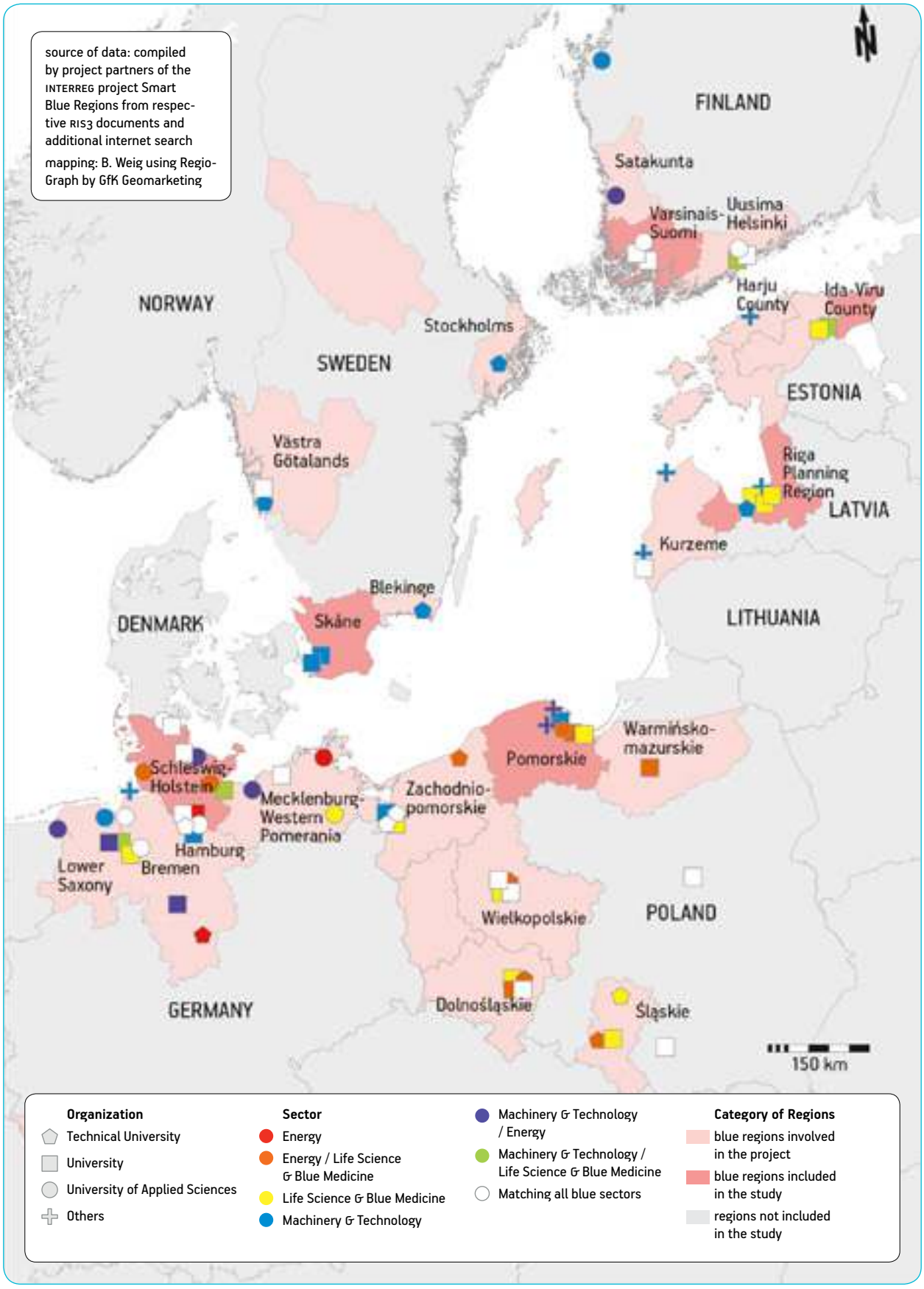
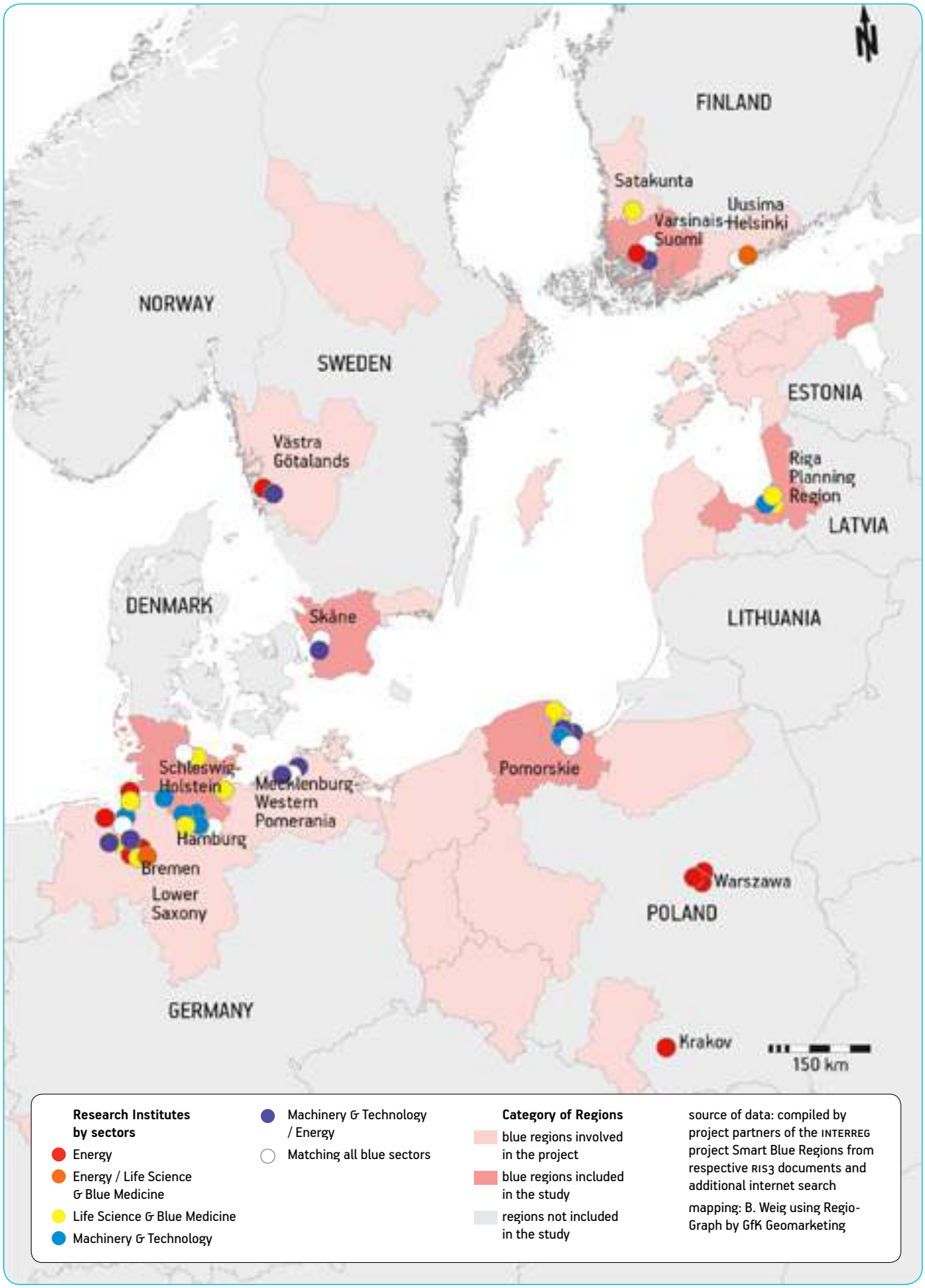


Figure 16: The Baltic Sea Region: Blue Actors in Non-university Research Institutes



4 Cooperation Opportunities

The above described and summarised blue growth study was conducted to provide a profound basis of possible future cooperation projects and initiatives related to the blue growth sectors in the Baltic Sea Region. In the next step several interviews were conducted by each project partner for the following purposes: 1. getting feedback on the maps; 2. determining possible topics and groups of actors in blue growth with potential for future cooperation projects. Results from the feedback were included in the mapping exercise. Outcomes of the interviews concerning cooperation opportunities are summarised in the following section (see also Appendix 5). The suggested topics for cooperation were organised according to the nine subcategories developed in chapter 3.

Monitoring and other marine technologies (interview results)

The regions of Schleswig-Holstein, Southwest Finland, Pomorskie and Riga Planning Region expressed interest within this subfield. Pomorskie is interest in **seabed mining**. Another suggested cooperation topic from Pomorskie is **safety systems on the sea**. Riga Planning Region is interested in the development of various constructions as an **artificial substrate** in the sea in different depth zones and monitoring. Schleswig-Holstein hosts a variety of actors in the fields of **marine technology/monitoring** and **marine mining** and would be interested to join transnational projects/ initiatives in these fields. In Southwest Finland the focus is on **smart water management and monitoring**. A motor laboratory to conduct emission monitoring is envisaged. The water cluster "Loura" already exists and provides wide knowledge in water treatment and measurement. From those answers two proposed topics arise:

- Monitoring (Riga Planning Region, Schleswig-Holstein, Southwest Finland)
- Mining (Pomorskie & Schleswig-Holstein)

Maritime Technology (Shipbuilding) (interview results)

All partner regions are interested in the field of Maritime Technology. Ida Viru provides a regional **metal industry** that would be interested in new cooperation and learning for product development. Pomorskie is also interested in a variety of maritime technology fields, those are: **electric marine propellers, energy storing devices, autonomous vessels, new specialised vessel types for seabed mining and offshore constructions, new kind of electric vessel.** Riga Planning Region is interested in **Clustering** in the shipbuilding sector and in IT solutions for the digitalization of shipping. Skåne is most interested in **low carbon shipping** (alternative drive technologies), **unmanned shipping** (autonomous shipping) and developing, designing and manufacturing processes for creating competitive European value chains in order to support the Reindustrialize Europe ambition… The list of interesting topics for future cooperation in the BSR is long in maritime technology. Schleswig-Holstein is especially interested in the following four themes: **alternative drive technologies** (LNG, exhaust gas treatment, scrubbing), **optimizing energy efficiency in shipping** (e.g. by improving hull shape, streamlining of the fuselage, propeller shapes), **individualisation of ships** (optimizing ships by adapting shape and function to the usage of the ship), **digitalisation/ autonomous shipping**. Southwest Finland lists several fields of interest within this subcategory: **dismantling of used ships**, **floating constructions**, **new materials and methods to reduce costs** (laser welding), **boosting start-ups and subcontractors** in the shipbuilding industry, **alternative drive technologies** (biogas, LNG) and **autonomous shipping.** The most promising topics are:

- Building/ developing/ testing of autonomous ships (Pomorskie, Riga Planning Region, Skåne, Schleswig-Holstein, Southwest Finland)
- Alternative drive technologies (Pomorskie, Skåne, Schleswig-Holstein, Southwest Finland)
- New materials/ technical methods "to reduce costs" (Ida Viru, Skåne, Schleswig-Holstein, Southwest Finland)

Shipping (interview results)

For the subfield of shipping, Riga Planning Region, Skåne, Schleswig-Holstein and Southwest Finland mentioned interest in future cooperation projects. The topics are mainly related to the vision of **autonomous shipping** (this is mentioned by all four regions). So in addition to aspects of how to build such ships, another topic is how the shipping sector can prepare for future developments towards autonomous ships. Southwest Finland is furthermore interested in **harmonization of on board medical treatment, occupational safety and emergency skills in Baltic Sea shipping, industrial modernisation/ logistics, new model/ IT-solutions to reduce emission and waiting times in logistic chains, green shipping, making the maritime transport more efficient, digital solutions and cargo flows**. From the above listed topics the most promising is:

- Autonomous shipping (Riga Planning Region, Skåne, Schleswig-Holstein, Southwest Finland)

Ports (interview results)

For the subfield of ports, all partner regions except for the interview partners from Schleswig-Holstein listed topics of interest. Ida Viru is interested in reviving the **ferry line** from Sillamäe to Kotka (Finland). Furthermore Ida Viru wants to develop its **infrastructure and services in marinas** to expand its capacities for yacht shipping. Pomorskie is interested in future projects dealing with **transshipping large weights and sizes**, **new loading/handling machinery as well as new logistic and transportation systems.** Riga Planning Region is interested in cooperation of **small ports for yachting** services. Skåne's interest in the subfield of ports is focused on **cost reduction as well as decreased turn-around time in port operations**. Southwest Finland is especially interested in **low carbon port activities, industrial modernisation/ logistics, new model/ IT-solutions to reduce emission and waiting times in logistic chains, green shipping and making the ports more efficient.** From all the listed regional interest topics, the following ones are interesting for several regions:

Photo 3: Containers loading by crane in the morning, Trade Port, Shipping (by Tonton)

Photo 4 (redpixel.pl)

- Efficiency of port operations (Pomorskie, Skåne, Southwest Finland)
- Modernisation of logistics and handling (Pomorskie, Southwest Finland)
- Small ports for yachting (Ida Viru, Riga Planning Region)

Blue energy (building of plants & systems / operation & management) (interview results)

These two subfields are of interest for the regions of Pomorskie, Skåne, Schleswig-Holstein and Southwest Finland. However, Southwest Finland is interested in **ship bioenergy** (biogas, LNG) and **oil spill control**, while three other regions are interested in the offshore wind sector. Pomorskie is concerned about **new designs** and **new engines** for offshore wind mills as well as **installation, operation and monitoring as well as decommissioning** in the offshore wind sector. Skåne draws attention on the issue of **cost reduction** along the whole value chain of offshore wind, as well is Schleswig-Holstein. The focus is set here on the production side (big parks, type of plant, multi-use of offshore wind farms) and installation (faster methods for drilling to save time and thus costs for installation ships). Another aspect is related to **security and rescue issues**, including monitoring devices for surveillance (e.g. to detect and monitor cracks in the monopoles). Based on these interview results it is difficult to make out common topics of interest so far. In general offshore wind seems to be the most interesting form of blue energy for the partner regions. However, the development of the sector differs quite a lot between the different regions.

- Offshore wind energy (Pomorskie, Skåne, Schleswig-Holstein)

Blue biotechnology (interview results)

The sector of blue biotechnology is interesting for the regions of Pomorskie, Riga Planning Region, Schleswig-Holstein and Southwest Finland. Pomorskie is attracted by investigations for **marine compounds with potential for medicine drugs and therapy treatment**. Riga Planning Region does not specify its interest in blue biotechnology. Schleswig-Holstein is interested in **blue biotechnology for food** (food security, legal aspects) and **health** (pharmaceutics). Southwest Finland is interested in cooperation opportunities with a focus on "**smart" chemistry, life sciences and the use of algae for medicine**. To sum up, the following topics seems most interesting within the partner regions:

- Blue Biotechnology for health/pharmaceutics (Pomorskie, Riga Planning Region, Schleswig-Holstein Southwest Finland)

Aquaculture (interview results)

The field of aquaculture has been identified by all partner regions but Skåne, for providing options for further collaboration. Ida Viru has indicated interest but without specification. Pomorskie is interested in **designing aquaculture facilities** and in the **combined use of aquaculture and offshore wind farms**. Riga Planning Region is interested in the **cultivation of algae and mussels without additional feeding at the sea**. In addition their interest is in an exchange of best practice on **cleaning the sea** and **developing business options for the coastal community**. Schleswig-Holstein focuses on the **efficient use of material flows (circular economy), better knowledge and cooperation between the sectors of aquaculture and blue biotechnology, comparative studies of legal frameworks for aquaculture** (european, national, regional), **mussel and algae farming**. Southwest Finland is interested in **cultivating algae, in circular economy and new applications**. From this listing several topics of interest can be derived:

- Circular economy in aquaculture (Schleswig-Holstein, Southwest-Finland)
- Mussel and algae farming – legal issues and technologies (Riga Planning Region, Schleswig-Holstein)
- Combined use of offshore wind farms and aquaculture (Pomorskie, Schleswig-Holstein)

Health treatment (Spa tourism) (interview results)

The regions of Ida Viru, Riga Planning Region and Southwest Finland have indicated interest within the field of health treatment and spa tourism. Ida Viru suggests a common marketing for the BSR as a region for (spa) tourism. Riga Planning Region is interested in marketing as well, but also in clustering, benchmarking and exchange of good practice within the field of health tourism. Southwest Finland is also interested in the tourism sector. So far no specific topics of mutual interest have emerged. However, the topic of tourism could be a starting point for further cooperation between the three regions, with a focus on marketing.

- Tourism – especially marketing (Ida Viru, Riga Planning Region, Southwest Finland)

In addition to those specific sectoral topics of interest, the interviews revealed some cross-sectoral issues of major importance. Those might also be a starting point to develop further cooperation opportunities in the BSR and especially among the partner regions of Smart Blue Regions. The mentioned topics are:

- Lack of skilled workers (Ida Viru, Skåne, Southwest Finland)
- Support for SMEs (Schleswig-Holstein, Southwest Finland)
- Safety issues offshore (Pomorskie, Schleswig-Holstein)
- Spatial planning (Riga Planning Region, Southwest Finland)

A detailed scope and anticipated goals of these identified topics will be further developed within different stakeholder workshops (GoA 4.2) and within the project team (GoA 4.3) to build up future cooperation between blue actors in the BSR.

Photo 5 (by Pressmaster)

5 Conclusions

The presented blue growth study aimed in closing an information gap in the blue growth sector. This task was fulfilled by collecting information on blue growth focus areas, actors and resources in the Baltic Sea Region.

From the study it can be concluded that many regions in the BSR are involved in blue growth activities. Most regions with a blue growth focus are located directly at the sea, but exceptions of inland regions with "blue" activities exist as well. The BSR has a multitude of locational advantages for different blue growth fields, such as proximity to the sea, maritime infrastructure or human capital. Blue growth has direct relations to a number of issues like infrastructure, digitalisation, environmentally friendly transportation and energy, health topics and the potential of marine substances to be used for food, pharmaceuticals and cosmetics. This diversity of blue applications enables each region to develop a place-based blue growth development path, based on regional characteristics and advantages.

The analysis of RIS3 documents reveals that most regions do cover several blue growth sectors within their specialisation fields. However, it was not always easy to find out what stands behind the listed titles. The maps developed within the study show that Machinery and Technology is the blue category most important in the BSR. All regions included in the study show at least one activity in this field. In the category of energy, offshore wind is the most important sector. Offshore wind is an interesting field of innovation in all participating countries except for Latvia. Blue fields of Life Science and Blue Medicine are less widely spread. Tourism for instance is only named in Poland, Latvia and Estonia, while aquaculture and blue biotechnology is a focus area in all participating countries.

In addition different actors, such as business support organisations, research institutes and universities were mapped. The density of supporting organisations varies among the countries. While smaller countries mostly have national BSOs, bigger countries have more regional organisations. In some regions, specific BSOs for blue growth are rather rare. However, general organisations are open for blue actors and thus close the gap in such regions. Universities with a blue focus seem to be spread quite evenly. Most analysed regions host at least one entity of higher education with a blue focus. Research institutes however are clustered in a limited number of cities, representing the centres of blue research.

Reflections

It was aimed to analyse RIS3 documents for the blue growth study. However, the content of the RIS3 documents varies substantially. While some strategies are suitable to get an overview of the current situation, others are rather superficial. Additional sources of information had to be taken into account. In addition it is not so easy to extract blue sectors from specialisation fields nominated in the RIS3 documents. It is not always clear, what is meant by the titles of the specialisation fields. Moreover difficulties arise because the strategies are based on different regional levels (NUTS 0, 1, 2, 3) depending on the country. Furthermore, the concept of blue growth is not strictly defined and therefore the understanding of what belongs to blue growth differs slightly between countries and regions. In this study, the project partners have been responsible for the choice of regions, the gathering of information and the selection of what is blue growth for them, having in mind their countries and regions specificity. Thus, there are slightly different approaches for each country.

Recommendations for Blue Growth cooperation

Based on the blue growth study in the BSR, first thematic ideas for cooperation opportunities were elaborated. Interviews with intermediates resulted in a long list of topics for each region. A matchmaking between the regional interests leads to the following topics with three or more regions interested in:

- Building/ developing/ testing of autonomous ships (5 interested regions)
- Alternative drive technologies in shipping (4)
- Autonomous shipping (4)

- Blue Biotechnology for health/ pharmaceutics (4)
- Health tourism – especially marketing (3)
- Lack of skilled workers (3)
- Monitoring (3)
- New materials for shipbuilding (3)
- Offshore wind energy (3)
- Efficiency of port operations (3)

These topics are suggested as a basis for further analysis, discussions and workshops on possible blue growth cooperation projects in the BSR. In addition to these outcomes, other activities within the Smart Blue Regions project revealed that a cluster support system seems important to implement (blue) RIS3. To gain maximum efficiency from such a costly measure, it is crucial that role, duties and responsibilities for those organisations are very well designed and long term support must be secured. The planned workshops in spring 2018 (GoA 4.2) and the elaboration of future cooperation (GoA 4.3) will therefore focus on the topics of clusters, as well as on building of autonomous ships, on offshore wind energy and on health tourism/ spa.

It can be concluded that the BSR has excellent pre-conditions for blue growth. The variety of actors in different blue fields is immense and future challenges to be tackled by blue growth sectors are manifold. Blue growth actors in the BSR just have to take them up and work on solutions. For this cooperation is crucial. No actor can solve the identified future challenges alone. The results of the blue growth study provide an overview of regional fields of specialisation and actors and therefore close the information gap identified in the field of blue growth.

Photo 6: Offshore wind farm at dusk, renewable energy background (by chuyuss)

Appendix 1 Blue regions in the BSR: Locational advantages and future development paths

A description of the selected regions for the blue growth study is compiled in this appendix. The information on locational advantages and future development paths in blue growth has been collected by the project partners analysing RIS3 and other strategy documents.

1. Estonia

The "Smart Blue Regions" partner region **Ida-Viru County** is located in the Northeast of **Estonia**. The region is characterized by the sea, lakes and rivers, which make the region well suitable for blue economy. The main blue sectors in Ida-Viru County are spa tourism, aquaculture, port industry, energy and metal industry (shipbuilding, ports and shipping). Other blue regions in Estonia are Harju County and Western Estonia, including the island of Saaremaa. Central Estonia is of lesser importance for blue growth, as it has only a small share of coast.

The development of blue growth in Estonia is supported by a variety of political strategies and action plans. Above all stands the Estonian Marine Strategy 2016–20201. In addition there is the National Tourism Development Plan 2014–20202, the Estonian Fisheries Strategy 2014–20203 and the National Renewable Energy Action Plan. Future development paths described in the above mentioned strategies and plans are among others:

- Compiling regional aquaculture plans to manage possible environmental pressures
- Ratification and implementation of the International Convention For The Control And Management Of Ships' Ballast Water And Sediments (BWMC), and participating in the regional information system
- Application of electronic reporting system for fishing efforts (gears) to better control fishing and avoid abandoning of fishing gear
- Creating the readiness to use liquefied natural gas (LNG) as ship fuel
- Developing an action plan for managing marine litter in harbours, including the litter related to fishing
- Increase the awareness of Estonia as a travel destination.
- Diversify the choice of tourism products and services and improve their quality.
- Develop regional tourism products (e.g. spa tourism)

2. Finland

The "Smart Blue Regions" partner region **Southwest Finland** (Varsinais Suomi) is the leading region of the Finnish maritime industry and hosts over 30 % of all Finnish maritime technology industry companies. Shipbuilding and maritime industry and the whole maritime cluster are regionally very important. Meyer Turku Shipyard focuses mainly on cruisers, passenger vessels and special vessels. Meyer is investing in modernisation of the shipyard in coming years. There are also two smaller workboat shipyards in Southwest Finland. There is a unique competence network in shipyards, and the cooperation between Turku's shipyards and its subcontractors had resulted in the biggest and the most environmentally friendly cruisers in the world. Marine and metal industries form the base in the region's economy. Main technologies are shipbuilding technologies, production development technologies, environmental technologies, energy/ drive technologies (e.g. LNG). The most active offshore technologies can be divided in manufacturing and operating of smart multiuse vessels, in planning and designing and in ICT solutions. Multiuse vessels can be used in building sea cable infrastructure, erecting offshore wind turbines or in normal logistics. Planning and designing are concentrated in floating structures such as artificial islands, housing units or oil production equipment. ICT

1 http://www.envir.ee/sites/default/files/summary_of_the_estonian_pom.pdf

2 https://www.mkm.ee/en/objectives-activities/construction-and-housing-sector/tourism

3 https://www.agri.ee/en/objectives-activities/european-maritime-and-fisheries-fund-emff-2014–2020/estonian-fisheries

solutions are developed and in use to secure sea traffics' safety in vulnerable sea areas.

Fish farming in Southwest Finland produces over one third of farmed fish in Finland. New feed solutions to reduce nutrient flows from fish farming into the Baltic Sea are developed. So called "Baltic feed" is produced from fish bones which lowers environmental impact. Potential of algae and seashells to aqua cultivation is in research level. Knowhow, research and industry in biotechnology is very strong in Southwest Finland. Production and research in medicine industry and biotechnology equipment are closely related to life sciences. Companies in equipment technology are specified in measurement and monitoring techniques. In universities research of cyanobacteria and microalgae potential for bioenergy production is active. Also marine biofuel production from waste streams and from fish industry are in progress. In future high growth potential is seen in biomedicine, bio diagnostics, bio energy and in chemistry.

Future topics are e.g. digitalization and automatization, robotic, internet of things, use of different energy sources, big data, free trade/ protectionism, arctic knowhow, wave energy solutions and equipment, planning of floating structures, "smart ships", remote controlling (need for vessel service etc.) and sea safety by IT-solutions, development of repair and service vessels for offshore wind energy use, nutrient circulation in fish farming, closed loop fish farming on land, algae use for energy production, renewable fuel from marine side streams, medicine research (fish side streams, algae, etc.), use of alternative food sources, for example algae, use of secondary fish species as food.

Satakunta is located north of Southwest Finland at the west coast of Finland. Satakunta is active in the blue subfields of maritime technology, monitoring and other marine technologies, ports, offshore wind energy and marine aquaculture. Future topics in the region are e.g. added value and sustainability in the agro-food, aquaculture and fish industries, exploitation of opportunities resulting from green and blue economy. Another field of priority is restructuring the industry. The aim is to have one of Finland's most diverse economic structures and to increase the region's share of national exports. Offshore oil and gas exploration and production as well as offshore wind power construction and production. Research on bio products and bio refineries is currently preparing the bio based economy. The Spearhead project aims in improving the ports of Pori and Rauma.

Helsinki-Uusimaa, the capital region is located on the south coast of Finland. The region is focused on the blue subfields of maritime technology, monitoring and other marine technologies, ports, shipping and offshore wind energy. Future strategic priorities are defined in the fields of cleantech (energy and resource efficiency, renewable energy, recycling, waste processing, water treatment and sustainable traffic, LNG terminal currently under planning, creating prerequisites for business in the bio economy and water sectors) and ICT (in cooperation with the cleantech industry). Additionally sustainable ecology is a future development path for the region Helsinki-Uusimaa, including an increase in use of renewable energy sources and bioenergy.

3. Germany

The "Smart Blue Regions" partner region **Schleswig-Holstein** is located in the North of Germany between the North and the Baltic Sea. This is of great advantage regarding blue growth. With more than 1,700 enterprises, about 47,000 employees and an annual turnover of about 8.5 billion Euros, maritime economy is an important engine of the regional economy. German maritime technology and ships have internationally a good reputation. That applies also to products from Schleswig-Holstein. Several technologies developed in Schleswig Holstein are closely related to a variety of blue sectors. Fruitful exchange is happening. The maritime sector is dominated by SMEs. Those enterprises are flexible enough to react on changes quickly. They work on special solutions and cover a huge variety of niche markets. Schools and universities in Schleswig-Holstein supply the labour market with highly qualified employees for the maritime sector.

The locational preconditions for wind energy are good: a lot of wind, two coasts, vast areas of relatively flat land for onshore wind energy. Advantages for onshore wind energy led to the development of the sector, now following the trend to offshore wind farms.

Regional research institutes and enterprises have high competences in the field of marine aquaculture. In addition, academic expertise in various fields of marine biotechnology is available in Schleswig-Holstein. The geographical location between two seas with different ecosystems leads to an outstanding availability of a

variety of marine resources and comprehensive collections of marine compounds. A considerable number of cooperation between SMEs and research institutes is successful. Strong regional, national and international connections are established. Besides SME, important research divisions of international enterprises (technological competences) are located in Schleswig-Holstein. This is an advantageous combination. Distances within Schleswig-Holstein are not too far. Actors know each other and meet on a regular basis, resulting in a good cooperation atmosphere between actors of marine biotechnology in Schleswig-Holstein.

Future development paths in blue growth are predicted in the fields of alternative drive technologies in shipping, e-navigation, using cross-sectional function of ICT for maritime technology and shipbuilding (industry 4.0), deep-sea exploration, ocean mining and gas hydrates, robotics, combining marine aquaculture and energy transition, research on algae against cancer, substitution of bone components by using marine collagen and the use of marine biotechnology in the food sector.

Lower-Saxony, located in the Northwest of Germany, has access to the North Sea only. The region has strong locational advantages in the fields of maritime technology, monitoring and other marine technologies, offshore wind industry, ports and shipping. Actors from maritime economy in Lower Saxony cover the full range of the value chain. Maritime enterprises have a long tradition in Lower Saxony and strong regional roots. Some enterprises are global leaders within their field of specialisation. More than 60 scientific institutes dealing with marine and maritime topics are located in Lower Saxony. Lower Saxony is an important location for the expansion of offshore wind energy in Germany. The region is hosting internationally leading wind turbine producers. Moreover, Lower Saxony is one of the European leaders in supply of higher education in navigation. Several specialised ports are located within the region; inter alia the only deep water port in Germany (Jade-Weser-Port Wilhelmshaven). Main future topics will be green and digital shipping, as shipyards will have to develop environmental friendly ships that are economically efficient. Automatization technologies will be another future topic, preliminary for suppliers in the shipping industry.

The energy transition will bring forward the development of offshore wind energy. Further expansion of offshore wind energy in the North Sea is expected. Future challenges are anticipated in the context of innovative energy storage technologies, energy efficiency, intelligent energy systems and smart grids. Ports will have to adapt to the needs of the offshore wind sector and according to the development of the world trade. Shipping companies in Lower Saxony have concentrated their business on feeder container transportation, a sector in crises for some years now. A structural change is expected to be necessary in the next years, if market conditions do not change significantly.

Mecklenburg-Western Pomerania is located in the Northeast of Germany and only holds access to the Baltic Sea. The region is focused like Lower Saxony on the blue fields of maritime technology, monitoring and other marine technologies, offshore wind industry, ports and shipping. Enterprises in the regional shipbuilding sector are specialised in the production of unique products. They are highly flexible and have an extensive know-how, an excellent quality management system, modern production halls and high technological competences. They are specialised in future focus areas with long-term demand. Regional enterprises in the field of marine technologies show high flexibility regarding order size, depth of production, variety and logistics. Highly qualified employees, high flexibility of labour and a huge variety of technological competences (materials, processing, installation, and logistics) are regional characteristics in this field. On one hand Mecklenburg Western Pomerania is a coastal country, on the other hand, it's a large territorial state. This combination enables the joint development of onshore and offshore wind energy with mutual benefit.

Future developments in maritime technology are mainly seen in the development of the IT industry, having substantial influence on other sectors like shipbuilding. Especially in the field of renewable offshore energies, new technologies will be needed. Developments in ICT will also influence the future of marine/offshore technologies. Production, installation and maintenance of offshore wind farms will become more important. The extension of grids, the storage of energy and energy efficiency will be important topics in the near future.

Hamburg is about 100km away from the coast, connected by the river Elbe. The port of Hamburg is the biggest sea port in Germany and the third largest port in Europe. Moreover Hamburg is the most important

location for shipping in Germany, with 117 shipping companies, 1,733 registered ships and 60.7 Mio. tonnage. Additionally Hamburg is an important place for ship financing. International shipping companies, especially from Asia, are located in the Free and Hanseatic City of Hamburg, to manage world trade flows.

The sector of renewable energies comprises 1,500 enterprises in Hamburg. 77% of those firms are SME. Almost 25,000 employees can be counted within in the Metropolitan Area Hamburg, which also includes parts of Schleswig-Holstein. Almost all important energy suppliers and service enterprises, but also project developers, banks and insurances with a focus on renewable energies are located in Hamburg, run a subsidiary or a competence centre in the city.

Hamburg is also an important location for health sciences, including highly specialised hospitals, pharmaceutical industry and renowned research institutes. In this context, the relatively young sector of blue biotechnology has a good environment to evolve. Moreover a strong connection to the Life Science sector in Schleswig-Holstein (common cluster Life Science Nord) is an advantage for Hamburg.

For future development Hamburg aims to strengthen and improve its position as logistical hotspot. Better cooperation between enterprises, science and research institutes will be crucial in the future, to improve the transfer of knowledge between the actors and to foster innovation. Renewable energies like offshore wind are future technologies. To manage energy transition, it will be necessary to increase activities in this sector. Besides producing and managing the development of offshore wind energy in Germany, export markets will be a topic for the near future. Life Science is an important future field for the northern German states Hamburg and Schleswig-Holstein. So far, enterprises, institutions and infrastructure in the two states are complementary. Further cooperation is planned for more innovation and common solutions for all kinds of challenges in this field.

The Free and Hanseatic City of **Bremen** consists of the city of Bremen (about 60km away from the North Sea) and Bremerhaven (coastal city at the Weser estuary). The innovation program 2020 substitutes a missing RIS3 in Bremen. Locational advantages of Bremen are first of all the belonging to the Hanse. Bremen has a long tradition in shipping and sea trade. The advantage of Bremen is having an outpost at the coast – Bremerhaven, with its big port at the coast and lots of possibilities to expand.

Bremerhaven as location of the famous Alfred-Wegener-Institute (AWI) is a traditional hotspot of polar and ocean research. Suffering the decline of shipbuilding, Bremerhaven has gone through a structural change towards science and tourism, combining the two sectors in form of scientific museums. Marine biotechnology benefits from this structural change and from the proximity to leading food enterprises in Bremen.

Bremerhaven is also a hotspot of the German offshore wind energy sector. Bremerhaven has an offshore terminal and an excellent infrastructure. Cluster structures were developed in a targeted way. New activities in the interface of maritime technology and offshore wind industry are part of the future development path, such as transportation of wind energy plants offshore. Different tasks in service and maintenance as well as safety management for offshore wind farms are challenging the shipping industry in Bremen. An intelligent transformation of the energy supply is necessary for the future. More cooperation between ICT experts and the offshore wind energy sector is important to meet this challenge. Standardised production processes and serial production will become necessary to reduce production costs and to enhance performance and reliability to make regional enterprises competitive in the long-run.

Research and development in sustainable aquaculture is seen as another future development path. Therefore close cooperation of AWI, IMARE (institute for marine resources) and the local economy is foreseen. For the future of this relatively new subfield, better networking of the members is crucial. The foundation of a new association comprising all stakeholders in marine biotechnology should be helpful[4].

The **Saarland** is more than 500km away from the coast. Nevertheless, the analysis of the RIS3 for the Saarland has revealed, that steal produced in Saarland is used for wind energy plants and offshore industry. Extraction and processing of steal and non-ferrous metals is still an important sector in the Saarland and the use of those resources for new applications is seen as a successful future development path.

4 The association „Nordverbund" marine biotechnology has been founded in Kiel, in autumn 2016.

4. Latvia

The "Smart Blue Regions" partner **Riga Planning Region** is centrally situated in Latvia. Due to historical and economic reasons the region holds about 50% of the country's population. 80% of Latvia's students obtain their degree in Riga. About 70% of the GDP is produced here. Riga as the capital city is also a main hub for transportation – air, marine, railway and motorways. Riga is the main spot for all blue activities (maritime technology, monitoring and other marine technologies, shipping, ports and blue biotechnology), except for health tourism, which is located in Jurmala. Tourism, port services and small-scale fish processing are the main "blue" economic activities in the coastal municipalities on both sides of the Gulf of Riga. Additionally to the national Latvian RIS3, four regional strategies specify the regional development goals: 1. Sustainable development strategy 2030 (inclusive development program 2020), 2. Research on the Potential for Smart Specialization of Riga Planning Region; 3. Economic Profile of Riga Planning Region; 4. Spatial Development Plan 2025. For future plans and planning in Riga Planning Region European (Europe 2020, EUSBSR), national and regional strategies are considered.

Kurzeme is the second coastal region in Latvia with blue activities. The longest coastline in Latvia is the central advantage for Kurzeme Planning Region with regard to blue growth. The sea provides optimal opportunities for the development of marine transportation hubs, fish processing and tourism. However the potential of the region has not been fully exploited due to historical (closed military areas without any development during USSR times) and natural reasons (forest covers 53% of region's territory). Consequently the region's population density is the lowest in Latvia. The highest concentration of human resources and infrastructure can be found in the largest coastal cities of the region – Ventspils and Liepāja. In addition small coastal communities have also identified their niche – like Pāvilosta as marina for yachts, Roja, Jūrkalne and the nature park "Pape" for landscape/ nature tourism and recreation. Similar to Riga Planning Region, European (Europe 2020) and national strategies are considered for future plans. The development programme "Kurzeme 2020" contains an operational plan with a list of potential funding sources. The majority is representing European territorial cooperation programmes (BSR programme, bilateral programmes Estonia-Latvia and Latvia-Lithuania, INTERREG Europe etc.) and for some administrative activities also national budget's funding. "Kurzeme 2030" is a strategy for sustainable development in the region, including a desired vision of the region's future as well as strategic goals and perspectives for spatial development.

5. Poland

The "Smart Blue Regions" partner region **Pomorskie** is directly located at the coast and thus has direct access to ports. This location provides a number of opportunities related to the economic exploitation of the sea and its resources (including innovative shipbuilding industry, maritime trade, maritime tourism), as well as international cooperation in the Baltic Sea Region. Pomorskie has locational advantages in the fields of offshore, port and logistics technologies, interactive technologies in an information-saturated environment, eco-effective technologies in the generation, transmission, distribution and consumption of energy and fuels and in construction as well as in medical technologies in the area of civilization and ageing-associated diseases.

The key objective of the Pomorskie Regional Development Strategy 2020 (PRDS) is improving the competitiveness of the whole region. The policy will result in strengthening the development potential of all areas in the region, creating conditions ensuring cohesion and participation in the development processes of the entire region as well as shaping the centres and zones that will become the main links to the region's development. Within the PRDS three strategic objectives and ten operational objectives were defined: The first strategic objective is "modern economy" including first high efficiency of enterprises; second competitive education (universities); third unique tourist and cultural offer. The second strategic objective is "active inhabitants" including first high level of employment; second high level of social capital; third effective education system; fourth better access to health services. The third objective is "attractive space including first efficient transport system; second safety and energetic efficiency; third good environmental condition. Financial resources to implement these objectives come from three main sources: 1. national public funds (government, regional, and local); 2. foreign public

funds and 3; private funds involved in projects with high public impact.

Zachodniopomorskie, the coastal region located in the northwest of Poland is like Pomorskie active in all blue subfields. The region has comparative advantages specific to blue sectors like favourable natural conditions for the development of renewable energy, especially wind, a high human and infrastructural potential in the shipbuilding sector, an expanded maritime transport and fish processing sector, high competitiveness and innovation in the chemical industry and high activity and innovation of the ICT sector as well as rich tourist resources.

Strategic goals of the region are firstly increasing the level of competitiveness and innovation of enterprises; secondly the development of science for an innovative economy and thirdly the building up of human capital for the development of innovation.

Warmińsko-Mazurskie is the third polish region with direct connection to the sea, located in the Northeast of the country. The locational advantages of the region are a unique natural environment providing perfect conditions for the development of ecological industry sectors as well as tourism and agro-tourism, the biggest surface of water resources in Poland and a strong position in research facilities in the field of food production. In total approx. 9% of all people employed in the *voivodeship* (administrative region) are working in companies operating within the water economy (employing more than 9 people). In the group of companies functioning within the specialization, there are companies which are recognizable on the market, which have high export and investment potential.

Wielkopolskie is not directly located at the coast, but having a strong economy, the region is important for blue growth in Poland. This refers especially to the fields of maritime technology, monitoring and other marine technologies, blue biotechnology and health treatment. Advantages of the region are among others a high level of gross domestic product (GDP), a high efficiency of innovation, measured by revenues from the sale of innovative products, a large number of students, a high public sector contribution to R&D funding and a high employment in research and development.

Wielkopolskie listed „modern medical technologies" as specialisation field. Solutions developed in the Wielkopolska region can be used in the blue health sector. Wielkopolska has a strong position in the training of specialists like physiotherapists, who will find employment in Spa, wellness and rehabilitation centres at the coast.

Lubuskie, located in the west of Poland, contributes to the fields of maritime technology, monitoring and other marine technologies as well as building energy plants and systems. Regional advantages are the transport accessibility and the developed road infrastructure, a well-functioning special Economic Zone, a good level of entrepreneurship and an export surplus over imports. The SME's export activity in this region is higher than the national average. Moreover, Lubuskie is known for its modern traditional industry as well as for being a good place to live.

Dolnośląskie is located in the southwest of Poland, contributing to a variety of blue growth fields such as maritime technology, monitoring and other marine technologies, building energy plants and systems, blue biotechnology, aquaculture and health treatment. Industry has a dominant role in the Dolnośląskie region with a predominance of traditional fields. The region is one of the richest in mineral resources in Poland. Traditions of mining industry date back to the beginning of the 12th century (energy, metallic, chemical and rock minerals). Moreover Dolnośląskie hosts several universities offering programs in health treatment and tourism.

Śląskie, located in the south of Poland, is a traditional industrial centre. However Śląskie is also a region with great innovative potential. A large number of scientific institutions and an extensive industrial base create good conditions for the emergence and diffusion of innovations. The industry in Śląskie contributes in an indirect way to most blue fields. There is a strong connection to the sea via the "coal" main line between Śląskie and Gdynia. Moreover the region has a strong focus on innovative energy issues, providing testing and full-scale implementation centres for innovative solutions. And the region is an area for creating, testing and applying smart media distribution networks, from which experiences can be transferred to solutions for other so-called intelligent markets such as the maritime. Finally, Śląskie is known for its high quality in technologically advanced products of medical engineering, biotechnology, materials engineering, computer science and electronics. Biotechnology and technology solutions can be useful in the area of blue health and blue biotechnology.

6. Sweden

The "Smart Blue Regions" partner region **Skåne** is located in the very south of Sweden. Being enclosed by the sea on three sides, Skåne is predestined for blue growth. The regional advantages however are only used indirectly. Many companies, involved in the blue sector, contribute to different value chains and cover a huge variety of niche markets. Some of them would hardly identify themselves as (mainly) belonging to the "blue" sector. These are companies, mainly SMEs, with links to the food industry such as process systems, packaging, but also clean tech, heat and power and machinery. A key group are mechanic enterprises with advanced manufacturing as well as those with high competence in systemic solutions. Some deliver specific equipment and components for vessels or offshore constructions. Many of them have their roots in Tetrapak manufacturing industry, a global player, today though with hardly any production left in Skåne. The diversity of companies acting as subcontractors and suppliers for maritime technology is a great advantage. It provides flexibility to react on changes and reduces vulnerability, since the companies have different niches to lean on. Swedish/Skåne maritime technology and services have internationally a good reputation.

The location of Skåne – 650 km coast – has good potential for offshore wind, especially along the south coast where the wind conditions are favourable. The Baltic Sea in general has a considerable potential for production of offshore wind energy at significant lower costs compared to North Sea conditions. The Baltic Sea offers lower waves, less salt and other climate advantages as well as the possibility to build wind plants nearer shore. However, for the time being, low energy prizes and the lack of long term rules (taxes, subsidies etc.) delay the development of wind energy in Sweden. Lund University offers a programme related to smart grids and intelligent power systems. Skåne also hosts excellent entrepreneurs related to RAS (land based, Recirculating Aquaculture Systems).

Future development paths in maritime technology are foreseen in the fields of supply of components for special shipbuilding, ballast water treatment systems, adaption of vessel machines to new SECA rules, non-fossil fuels for shipping, nano-technological approaches for shipbuilding, using cross-sectional function of ICT for maritime technology and shipbuilding (industry 4.0) and innovative high environmental performance port infrastructure. In the field of offshore wind future topics are related to high performance components and services to offshore constructions, non-corrosion technology, smart grids as well as intelligent systems for power and equipment and services for increasing sustainability in shipping (navigational, communication, monitoring, and control systems). Port development in a broader context (transport systems, synergies etc.) also plays a role in future strategies. Land based energy and cost efficient recirculating aquaculture systems (used by farmers as a complementary business) is an upcoming issue for a secure food supply in the future. Research and test plants are the next steps and have been initiated.

Västra Götaland is located at the west coast of Sweden. The geographic position of this region between the sea and one of the largest lakes of Europe (Vänern) has led to a comprehensive maritime sector. The port of Gothenburg has made it to a Nordic shipping centre. The Swedish Agency for Marine and Water Management is located in Gothenburg.

The maritime business sector shows a high level of specialisation in Västra Götaland. The number of companies as well as the share of employees in the sectors sea transport, fisheries and aquaculture is large compared to other Swedish regions. Actors from maritime economy in Västra Götaland cover a great part of the value chain. Maritime enterprises have a long tradition in Västra Götaland and strong regional roots. Relevant blue research institutes and centres are located in the region. Besides shipbuilding and offshore wind suppliers, port industry and shipping plays a major role in Västra Götaland. The port of Gothenburg provides the centre of the biggest node for transport and logistics in Scandinavia. It has an outspoken environmental profile, including focus on railway. The port is a node both for long distance shipping and for short sea shipping, including new concepts for vessels and logistics. Several ship owners are located in the region, as well as important Swedish institutions of higher education in navigation.

Green and digital shipping are focal topics in Västra Götaland. Shipyards will have to develop environmental friendly ships that are economically efficient and live up to upcoming environmental regulations (reduction of emissions etc.). Automatization technologies will be another future topic, preliminary for suppliers in the

shipping industry, with a focus on maritime informatics and systems. Energy transition will bring forward the development of offshore wind energy; the sector will gain importance in the next years. Further expansion of offshore wind energy in the Baltic Sea is expected. The Swedish Windpower Technology Center and Power Väst will be important players, focusing on all types of marine based energy. Cargo to sea and short sea shipping will also be of future relevance. The sector of blue biotechnology is under development and regarded as promising. The Sven Lovén Centre plays an important role in this context.

Blekinge is located east of Skåne at the south coast of Sweden. A strength of Blekinge is the local ecosystem build up by shipyards for submarines, research and education at Blekinge University of Technology, the Blue Science Park, the Naval base as well as the headquarter of the Coast Guard. The Swedish Navy has ordered a new generation submarines. This means a bright future for the region's blue economy.

Dalarna is located in central Sweden. However, the advanced steel industry of the region is an important supplier for offshore constructions/applications (i.e. wind energy). The regional companies are among others famous for wellheads, manifolds, seabed, processing, bearings, rotating elements, special steel in the shape of bars and tubes for hydraulic pitch drives and components for wind turbines, chrome plated bars, used in pistons as well as fastening/anchoring elements. The cluster comprises a number of companies in Dalarna and in neighbouring regions, being known for their high quality steel components.

The national capital **Stockholm** is involved in many different economic sectors. Within the blue fields, Stockholm has advantages in the subfields of maritime technology, monitoring and other marine technologies, shipping, ports and marine aquaculture. Naval architecture and naval engineering is a focus at KTH (Kungliga Tekniska Högskolan, Royal University of Technology). Another regional focus in maritime technologies is the development of autonomous vessels.

There are many aqua culture projects in the Archipelago of Stockholm, where both academy and community level are involved. KTH is involved in specific projects – also with Gotlands – concerning combined uses of the sea for wind energy and aquaculture (i.e. mussels).

The island of **Gotlands** is located west of the Swedish mainland. Offshore wind is considered important and growing, in particular in the southern part of Gotlands. Especially notably is the way the local population has been involved. They got the possibility to invest in the windmills benefiting from the return of these investments. The regional administration is involved in this development. Interesting is also the combined use of sea areas for wind energy and sea farming. In this field actors from Gotlands collaborate with the KTH (Stockholm).

Appendix 2 Data base blue actors: business support organisations

Germany

Name of Business Support Organisation	Form of Organisation	Region	Sector
3N Competence Centre	Competence Centre	Lower Saxony	Energy / Life Science & Blue Medicine
Agrarmarketing M-V e.V. (food marketing association)	Cluster or Network	Mecklenburg-Western Pomerania	Life Sciences & Blue Medicine
BioNord Centre Bremerhaven (Centre for Blue Biotechnology)	Incubator	Bremen	Life Sciences & Blue Medicine
BSH – Federal maritime and hydrographic agency	Others	Hamburg,Mecklenburg-Western Pomerania	Machinery & Technology / Energy
CEMBO – Cluster food industry in the metropolitan area Bremen-Oldenburg	Cluster or Network	Bremen, Lower Saxony	Life Sciences & Blue Medicine
Cluster Agency: Renewable Energies	Cluster or Network	Hamburg	Energy
Cluster Life Science North (SH)	Cluster or Network	Schleswig-Holstein, Hamburg	Life Sciences & Blue Medicine
Competence Centre for Renewable Energies and Climate Change Schleswig-Holstein	Competence Centre	Schleswig-Holstein	Energy
Competence Centre Green Shipping Lower Saxony	Competence Centre	Lower Saxony	Machinery & Technology
Competence Centre ICT for smart grids	Competence Centre	Lower Saxony	Energy
Competence Network Aquaculture Schleswig-Holstein (KNAQ)	Cluster or Network	Schleswig-Holstein	Life Sciences & Blue Medicine
DiWiSH (Digital Economy Schleswig-Holstein)	Cluster or Network	Schleswig-Holstein	Machinery & Technology / Energy
Energieforschungszentrum Niedersachsen (Energy Research Centre Lower Saxony)	Cluster or Network	Lower Saxony	Energy
Excellence Cluster "Future Ocean"	Cluster or Network	Kiel (Schleswig-Holstein)	matching all blue sectors
Food Regio	Cluster or Network	Schleswig-Holstein	Energy
GeoEnergy	Cluster or Network	Lower Saxony	Energy
Gesamtverband Schleswig-Holsteinischer Häfen e.V. (Association of all ports in Schleswig-Holstein)	Cluster or Network	Schleswig-Holstein	Machinery & Technology

Website	Email	Telephone
http://3-n.info/	info@3-n.info	+49 595198930
http://www.mv-ernaehrung.de/home.html	info@mv-ernaehrung.de	+49 3812523871
http://www.bio-nord.de	mail@bis-bremerhaven.de	+49 47194646610
http://www.bsh.de/en/index.jsp	posteingang@bsh.de	+49 4031900
http://www.food-nordwest.de	info@food-nordwest.de	+49 44418538910
http://www.erneuerbare-energien-hamburg.de/en/home.html	info@eehh.de	+49 4069457310
http://www.lifesciencenord.de/en/start/	info@lifesciencenord.de	+49 43190896858
http://www.eek-sh.de/en/frontpage.html	info@eek-sh.de	+49 4312184433
http://greenshipping-niedersachsen.de/Netzwerk/Hintergrund?lang=en-US	info@MARIKO-leer.de	+49 4919261117
https://www.offis.de/en/competence-center/ict-for-smart-grids.html	institut@offis.de	+49 44197220
http://www.knaq-sh.de/en.html	info@knaq-sh.de	+49 43319453433
https://www.diwish.de/	mail@diwish.de	+49 43166666851
https://www.efzn.de/	geschaeftsstelle@efzn.de	+49 532138168000
http://www.futureocean.org/en/index.php	office@futureocean.org	+49 4318803030
https://foodregio.de/en/Home	info@foodregio.de	+49 451706550
http://en.preview.geoenergy-celle.de/	info@geoenergy-celle.de	+49 514120881
http://www.haefen-sh.de/		+49 45028070

Name of Business Support Organisation	Form of Organisation	Region	Sector
Gesellschaft für Maritime Technik e.V. (German Association for Maritime Technologies)	Cluster or Network	Germany	Machinery & Technology / Energy
HPA – Hamburg Port Authority	Others	Hamburg	Machinery & Technology
Industrielle Biotechnologie Nord e.V. (Industrial Biotechnology North)	Cluster or Network	Schleswig-Holstein, Hamburg, Bremen, Lower Saxony, Mecklenburg-Western Pomerania	Life Sciences & Blue Medicine
Kieler Algenstammtisch (Group of regulars: algae) organized by Competence Centre for Renewable Energies	Cluster or Network	Kiel (Schleswig-Holstein)	Energy / Life Science & Blue Medicine
Kooperationsverbund MAZA M-V e.V.	Cluster or Network	Mecklenburg-Western Pomerania	Machinery & Technology
Logistics Initiative Hamburg	Cluster or Network	Hamburg	Machinery & Technology
MariCube Start-up and Commercial Centre	Incubator	Meldorf (Schleswig-Holstein)	matching all blue sectors
Maritime Alliance Baltic Sea Region Association	Cluster or Network	Mecklenburg-Western Pomerania	Machinery & Technology / Energy
Maritime Cluster Northern Germany	Cluster or Network	Schleswig-Holstein, Lower Saxony, Hamburg, Bremen, Mecklenburg-Western Pomerania	Machinery & Technology
Maritimes Kompetenzzentrum (Maritime Competence Centre (MARIKO))	Competence Centre	Leer (Lower Saxony)	Machinery & Technology / Energy
National Competence Centre Aquaculture (GMA Society for Marine Aquaculture)	Competence Centre	Schleswig-Holstein	Life Sciences & Blue Medicine
Netzwerkagentur Erneuerbare Energien (Renewable Energies SH)	Cluster or Network	Schleswig-Holstein	Energy
Nordverbund Marine Biotechnologie (Northern Network for Marine Biotechnology)	Cluster or Network	Schleswig-Holstein, Hamburg, Mecklenburg-Western Pomerania	Life Sciences & Blue Medicine
Oldenburger Energiecluster (Energy Cluster Oldenburg)	Cluster or Network	Parts of Lower Saxony	Energy
Verband Deutscher Maschinen- und Anlagenbau (German Association of Machine and Plant Manufactureres'	Cluster or Network	Germany	Machinery & Technology / Energy
Verband für Schiffbau und Meerestechnik e.V. (German Shipbuilding and Ocean Industries Association)	Cluster or Network	Germany	Machinery & Technology
Wab – Wind energy association Bremerhaven/Bremen	Cluster or Network	Bremen	Energy

Website	Email	Telephone
http://www.maritime-technik.de/en-index.php	gmt@maritime-technik.de	+49 4023935769
https://www.hamburg-port-authority.de/en/		+49 40428470
http://www.ibnord.de/	ibnord@tutech.de	+49 40766296321
http://www.eek-sh.de/de/	info@eek-sh.de	+49 4312184433
http://www.maza-mv.de/	info@maza-mv.de	+49 3814031832
http://www.hamburg-logistik.net/	info@hamburg-logistik.net	+49 4022701983
http://www.maricube.de/	info@cat-meldorf.de	+49 4832996100
http://www.mao-ev.de/	info@mao-ev.de	+49 38112874887
https://www.maritimes-cluster.de/en/	info@maritimes-cluster.de	+49 43166666868
https://www.mariko-leer.de/	info@mariko-leer.de	+49 4919261117
http://www.gma-buesum.de/projekte/aktuelle-projekte/nationales-kompetenzzentrum-marine-aquakultur-phase-iii.html	info@gma-buesum.de	+49 483496539911
http://www.ee-sh.de/	info@ee-sh.de	+49 484166850
https://nvmb.de/en/sample-page/	info@nvmb.de	+49 4316004430
http://www.energiecluster.de/14-0-Netzwerk.html	info@energiecluster.de	+49 44136116565
http://www.vdma.org/der-vdma	info@vdma.org	+49 4050720716
https://www.vsm.de/en	info@vsm.de	+49 402801520
https://www.wab.net	info@wab.net	+49 471391770

Name of Business Support Organisation	Form of Organisation	Region	Sector
Wind-Energy Network	Cluster or Network	Mecklenburg-Western Pomerania	Energy
Zentralverband der deutschen Seehafenbetriebe e.v. (German Association of Ports)	Cluster or Network	Germany	Machinery & Technology
Zentrum industrielle Biotechnologie (Centre Industrial Biotechnology)	Competence Centre	Schleswig-Holstein	Life Sciences & Blue Medicine

Estonia

Name of Business Support Organisation	Form of Organisation	Region	Sector
Federation of Estonian Engineering Industry	Cluster or Network	Estonia	Machinery & Technology
Ida-Virumaa Industrial Areas	Business Park	Ida Viru	Machinery & Technology
IVEK (Regional Tourism Cluster)	Cluster or Network	Ida Viru	Life Sciences & Blue Medicine
Life Science Cluster of Latvia	Cluster or Network	Estonia	Life Sciences & Blue Medicine
Oil Shale Competence centre	Competence Centre	Estonia	Energy
Small Craft Competence Centre	Competence Centre	Estonia	Machinery & Technology
Virumaa Small Harbours Association	Cluster or Network	Ida Viru	Machinery & Technology

Finland

Name of Business Support Organisation	Form of Organisation	Region	Sector
Aalto Start Up Center	Incubator	Uusima	matching all blue sectors
Bastu – acceleration concept	Incubator	Southwest Finland	matching all blue sectors
Bioenergy Association of Finland	Cluster or Network	Uusima	Energy
Blue Industry Park	Business Park	Southwest Finland	Machinery & Technology
Clic Innovation Ltd	Cluster or Network	Uusima	Energy

Website	Email	Telephone
http://www.wind-energy-network.de/en/index.html	info@wind-energy-network.de	+49 38137719254
http://www.zds-seehaefen.de/	info@zds.seehaefen.de	+49 40366203
http://www.cib-fhl.de/	kontakt@fh-luebeck.de	+49 4513006

Website	Email	Telephone
https://www.emliit.ee	triin@emliit.ee	+372 6515578
	info@ivia.ee	+372 5114685
http://ivek.ee	info@ivek.ee	+372 5174236
http://www.lifescience.lv	lifescience@lifescience.lv	+371 67298683
http://www.pkk.ee	info@pkk.ee	+ 372 332 5479
http://www.scc.ee	info@scc.ee	+372 5145968
		+372 3358101

Website	Email	Telephone
http://www.start-upcenter.fi/en/	startupcenter@aalto.fi	
https://bastuturku.wordpress.com/in-english/		
http://www.bioenergia.fi/English		
https://turkubusinessregion.com/en/services/growth-and-development/maritime-and-manufacturing-industries/		
http://clicinnovation.fi/		

Name of Business Support Organisation	Form of Organisation	Region	Sector
Espoo Innovation Garden	Competence Centre	Uusima	matching all blue sectors
Finnish Water Forum	Cluster or Network	Uusima	Machinery & Technology
Forum Virium	Cluster or Network	Uusima	Energy
Health Turku	Incubator	Southwest Finland	Life Sciences & Blue Medicine
Helsinki Business Hub	Incubator	Uusima	matching all blue sectors
Kilpilahti Clean Tech Innovation environment	Business Park	Uusima	matching all blue sectors
Loura-network	Cluster or Network	Southwest Finland, Satakunta	Machinery & Technology / Energy
Luonnonvarafoorumi	Cluster or Network	Southwest Finland	Energy
Maritime Cluster	Cluster or Network	Southwest Finland, Satakunta	Machinery & Technology / Energy
Maritime Training Forum	Cluster or Network	Southwest Finland	Machinery & Technology
Prizztech	Incubator	Satakunta	matching all blue sectors
Seaside Industry Park Rauma	Business Park	Satakunta	Machinery & Technology
Smart Chemistry Park®	Business Park	Southwest Finland	Life Sciences & Blue Medicine
Start Up Sauna	Incubator	Uusima	matching all blue sectors
Turku Future Technologies (TFT)	Incubator	Southwest Finland	Machinery & Technology
Turku Science Park	Incubator	Southwest Finland	matching all blue sectors

Latvia

Name of Business Support Organisation	Form of Organisation	Region	Sector
"Foundation ""Ventspils High Technology Park"" (VHTP)"	Business Park	Kurzeme Planning Region	Machinery & Technology
Clean Tech Cluster	Cluster or Network	Riga Planning Region	Machinery & Technology / Energy
Health Tourism Cluster	Cluster or Network	Riga Planning Region	Life Sciences & Blue Medicine
Life Science Cluster of Latvia	Cluster or Network	Riga Planning Region	Life Sciences & Blue Medicine

Website	Email	Telephone
https://www.espooinnovationgarden.fi/en		
http://www.finnishwaterforum.fi/en/	info@fwf.fi	
https://forumvirium.fi/en/	info@forumvirium.fi	+358 40 668 5599
http://www.turkusciencepark.com/en/about-science-park/bioturku/		
http://www.helsinkibusinesshub.fi/	info@helsinkibusinesshub.fi	+358 45 214 7494
http://www.loura.fi		
http://www.varsinais-suomi.fi/fi/tehtaevaet-ja-toiminta/suunnittelu-ja-kaavoitus/luonnonvarafoorumi		
https://turkubusinessregion.com/en/services/growth-and-development/maritime-and-manufacturing-industries/		
http://www.prizz.fi/en	yrityksen.apuna@prizz.fi	+358 2 62 62 62
http://www.seasideindustry.com/en		
http://smartchemistrypark.com/en/		
http://startupsauna.com/		
http://www.turkufuturetechnologies.fi/		
https://turkubusinessregion.com/en/		

Website	Email	Telephone
http://www.vatp.lv	info@vatp.lv	+371 63664934
http://cleantechlatvia.com	info@cleantechlatvia.com	+371 22333322
http://www.healthtravellatvia.lv/en/cluster-0	carelatvia@gmail.com	+371 67147906
http://www.lifescience.lv	lifescience@lifescience.lv	+371 67298683

Poland

Name of Business Support Organisation	Form of Organisation	Region	Sector
Agencja Rozwoju Pomorza (Development Agency of Pomerania)	Others	Pomorskie, international	matching all blue sectors
Akademickie Inkubatory Przedsiębiorczości (Academic Enterprise Incubators)	Incubator	Pomorskie	matching all blue sectors
Baltic Eco-Energy Cluster	Cluster or Network	Pomorskie, Warmińsk-Mazurskie, Zachodniopomorskie	Energy
Bałtyckie Centrum Transferu Technologii (Baltic Technology Transfer Center)	Cluster or Network	Pomorskie, international	matching all blue sectors
BIOREGION Wielkopolska	Cluster or Network	Wielkopolska	Life Sciences & Blue Medicine
Black Pearls	Others	Pomorskie, international	matching all blue sectors
Business Angel Seedfund	Others	Pomorskie	matching all blue sectors
Centre of Innovation and Technology Transfer of Warmia and Mazury University	Competence Centre	Warmińsko-Mazurskie	matching all blue sectors
Centrum Transferu Wiedzy i Technologii Politechniki Gdańskiej (Transfer Center for Knowledge and Technology of	Incubator	Pomorskie, international	matching all blue sectors
Dolnośląska Agencja Rozwoju Regionalnego S.A. (Lower Silesian Agency for Regional Development)	Others	Dolnośląskie	matching all blue sectors
Dom Przedsiębiorcy (Business House)	Incubator	Tczew	matching all blue sectors
Elbląg Tourism Cluster	Cluster or Network	Warmińsk-Mazurskie	Life Sciences & Blue Medicine
Gdańska Agencja Rozwoju Gospodarczego (Gdański Agency Development Economy)	Business Park	Pomorskie, international	matching all blue sectors
Gdański Inkubator Przedsiębiorczości Starter (Gdański Inkubator of Enterprises Starter)	Incubator	Pomorskie	matching all blue sectors
Gdański Park Naukowo-Technologiczny (Gdańsk Scientific-Technological Park)	Others	Pomorskie	matching all blue sectors
Gdański Park Naukowo-Technologiczny (Gdański Scientific-Technological Park)	Incubator	Pomorskie, international	matching all blue sectors

Website	Email	Telephone
http://www.arp.gda.pl	sekretariat@arp.gda.pl	+48 583233100
http://www.aipgdansk.pl	aipgdansk@inkubatory.pl	+48 515229847
https://www.imp.gda.pl/en/beec/	bkee@imp.gda.pl	+48 583416825
http://www.bctt.pl	info@bctt.eu	+48 587612960
http://www.bioregionwielkopolska.pl	biuro@bioregionwielkopolska.pl	+48 61 6585499
http://www.blackpearls.pl	office@blackpearls.vc	+48 533643209
http://www.seedfund.pl	biuro@seedfund.pl	+48 587396100
http://www.uwm.edu.pl/ciitt	ciitt@uwm.edu.pl	+48 895233900
http://ctwt.pg.edu.pl	ctwt@pg.gda.pl	+48 583486640
http://www.darr.pl	darr@darr.pl	+48 746480400
http://www.dp.tczew.pl	info@dp.tczew.pl	+48 587775341
http://www.klaster-elblaskaturystyka.pl	kontakt@elblaskaturystyka.pl	+48 502769942
http://www.investgda.pl	office@investgda.pl	+48 587220300
http://www.inkubatorstarter.pl	biuro@inkubatorstarter.pl	+48 587316556
www.gpnt.pl	office@gpnt.pl	+48 587396117
http://www.gpnt.pl	office@gpnt.pl	+48 587396117

Name of Business Support Organisation	Form of Organisation	Region	Sector
Goleniowski Park Przemysłowy (Goleniów Industrial Park)	Business Park	Zachodniopomorskie	matching all blue sectors
Klaster ICT Pomorze Zachodnie (ICT cluster Western Pomerania)	Cluster or Network	Zachodniopomorskie	Machinery & Technology
Klaster Logistyczno Transportowy Północ-Południe (North-Southern Logistic Transport Cluster)	Cluster or Network	Pomorskie, Łódzkie, Zachodniopomorskie, Warmińsko-Mazurskie, Mazowieckie, Lubuskie	matching all blue sectors
Klaster Morski Pomorza Zachodniego (Maritime Cluster of Western Pomerania)	Cluster or Network	Zachodniopomorskie	matching all blue sectors
Koszalińska Agencja Rozwoju Regionalnego (Koszalin Regional Development Agency)	Others	Zachodniopomorskie	matching all blue sectors
Koszalińska Izba Przemysłowo-Handlowa (Koszalin Chamber of Commerce and Industry)	Cluster or Network	Zachodniopomorskie	matching all blue sectors
Lubuski Metal Cluster	Cluster or Network	Lubuskie	Machinery & Technology
Lubusz Renewable Energy and Energetic Efficiency Cluster****	Cluster or Network	Lubuskie	Energy
Metal Processing Cluster***	Cluster or Network	Warmińsk-Mazurskie	Machinery & Technology
Polish Chamber of Maritime Commerce**	Cluster or Network	Pomorskie, Zachodniopomorskie	matching all blue sectors
Polska Fundacja Przedsiębiorczości w Szczecinie (Polish Entrepreneurship Foundation in Szczecin)	Others	Zachodniopomorskie	matching all blue sectors
Polskie Towarzystwo Morskiej Energetyki Wiatrowej (Polish Maritime Wind Energy Association)	Cluster or Network	Pomorskie	Energy
Pomorska Agencja Rozwoju Regionalnego (Pomerania Regional Development Agency)	Incubator	Pomorskie	matching all blue sectors
Pomorska Dolina Medyczna (Pomorska Medical Valley)	Cluster or Network	Poland	Life Sciences & Blue Medicine
Pomorski Fundusz Pożyczkowy (Pomeranian Loan Fund)	Others	Pomorskie	matching all blue sectors
Pomorska Izba Rzemieślnicza Małych i Średnich Przedsiębiorstw	Others	Pomorskie, international	matching all blue sectors
Pomorski Park Naukowo-Technologiczny (Pomeranian Scientific-Technology Park)	Incubator	Pomorskie, international	matching all blue sectors
Pomorski Regionalny Fundusz Poręczeń Kredytowych (Pomeranian Regional Credit Guarantee Fund)	Others	Pomorskie	matching all blue sectors

Website	Email	Telephone
http://goleniow.biz/	ugim@goleniow.pl	+48 914698200
http://www.klaster.it	biuro@klaster.it	+48 91 8522920
http://www.klasterlogtrans.pl/	klasterlogtrans@gmail.com	+48 510116739
http://www.klastermorski.com/	biuro@klastermorski.com	+48 914624941
http://karrsa.eu/	karrsa@karrsa.pl	+48 943416330
http://www.kiph.com.pl	kiph@kiph.com.pl	+48 943488645
http://www.lubuskiklaster.pl	biuro@lubuskiklaster.pl	+48 95 7227530
http://metalklaster.pl/	biuro@metalklaster.pl	+48 85 651 4146
http://www.kigm.pl/index.php?option=com_content&task=view&id=158&Itemid=129&lang=en	kigm@kigm.pl	+48 587820191
http://www.pfp.com.pl	pfp@pfp.com.pl	+48 913129216
http://www.ptmew.pl/pl/strona-glowna.php	ptmew@ptmew.pl	+48 585008406
http://www.parr.slupsk.pl	office@parr.slupsk.pl	+48 598468100
http://www.pamt.org/index.php?l=l2	office@pamt.org	+48 508386144
http://www.pfp.gda.pl	biuro@pfp.gda.pl	+48 583022005
http://www.pomorskaizba.pl	biuro@pomorskaizba.com.pl	+48 583011127
http://www.ppnt.pl	ppnt@ppnt.gdynia.pl	+48 586982140
http://www.prfpk.pl	prfpk@prfpk.pl	+48 583203405

Name of Business Support Organisation	Form of Organisation	Region	Sector
Regional Develoment Agency of Warmia and Mazury	Others	Warmińsko-Mazurskie	matching all blue sectors
Regionalna Izba Gospodarcza Pomorza (Regional Chamber of Commerce of Pomerania)	Others	Pomorskie	matching all blue sectors
Regionalne Centrum Innowacji i Transferu Technologii (Regional Center for Innovation and Technology Transfer)	Competence Centre	Zachodniopomorskie	matching all blue sectors
Renewable Energy Center	Others	Lubuskie	Energy
Skandynawsko-Polska Izba Gospodarcza (Scandinavian-Polish Chamber of Commerce)	Cluster or Network	Zachodniopomorskie	matching all blue sectors
Stowarzyszenie Polskich Gmin Euroregionu „Pomerania" (Association of Polish Municipalities of Euroregion "Pomerania")	Cluster or Network	Zachodniopomorskie	matching all blue sectors
Stowarzyszenie Rozwoju Przedsiębiorczości (Association of Entrepreneurship Development)	Cluster or Network	Dolnośląskie	matching all blue sectors
Szczeciński Park Naukowo-Technologiczny Sp. z o.o. (Szczecin Science and Technology Park)	Incubator	Zachodniopomorskie	matching all blue sectors
Szczecińskie Centrum Przedsiębiorczości (Szczecin Center of Entrepreneurship)	Others	Zachodniopomorskie	matching all blue sectors
The Employers Association Ship Forum	Cluster or Network	Pomorskie	Machinery & Technology / Energy
The Energy Agency of Warminsko-Mazurskie Voivodeship Ltd	Cluster or Network	Warmińsk-Mazurskie	Energy
The Lubuski Industrial and Technological Park	Others	Lubuskie	Machinery & Technology / Energy
The Warmia-Mazury Special Economic Zone	Others	Warmińsko-Mazurskie	matching all blue sectors
Wielkopolska Agency of Entrepreneurship Development	Others	Wielkopolska	Machinery & Technology / Energy
Wielkopolskie Centre of Clustering	Cluster or Network	Wielkopolska	Machinery & Technology / Energy
Wrocławskie Centrum Transferu Technologii (Wroclaw Center for Technology Transfer)	Competence Centre	Dolnośląskie	matching all blue sectors
Zachodniopomorska Agencja Rozwoju Regionalnego S.A. (West Pomeranian Regional Development Agency S.A.)	Others	Zachodniopomorskie	matching all blue sectors

Website	Email	Telephone
http://www.wmarr.olsztyn.pl	wmarr@wmarr.olsztyn.pl	+48 895211250
http://www.rigp.pl	biuro@rigp.pl	+48 583052325
http://www.innowacje.zut.edu.pl	innowacje@zut.edu.pl	+48 914494354
http://www.centrumenergetyki.com.pl	info@centrumenergetyki.com.pl	+48 683520101
http://www.spcc.pl	spcc@spcc.pl	+48 228497414
http://www.pomerania.org.pl	biuro@pomerania.org.pl	+48 914860738
http://www.srp.wroclaw.pl	biuro@srp.wroclaw.pl	+48 601777426
http://www.spnt.pl	biuro@spnt.pl	+48 918522911
http://www.zsrg.szczecin.pl	office@zsrg.szczecin.pl	+48 914892271
http://www.forumokretowe.org.pl/	forum@forumokretowe.org.pl	+48 5852070 91
http://www.wmae.pl/	sekretariat@wmae.pl	+48 89 5215970
http://lppt.pl	info@lppt.pl	+48 601554897
http://www.wmsse.com.pl/?lang=en	WMSSE@WMSSE.COM.PL	+48 895350241
http://www.warp.org.pl	info@warp.org.pl	+48 616563500
http://www.wielkopolskiklastering.pl/	stowarzyszenie@wielkopolskiklastering.pl	+48 618526376
http://www.wctt.pl	wctt@wctt.pl	+48 713203318
http://www.zarr.com.pl	zarzad@zarr.com.pl	+48 914329321

Name of Business Support Organisation	Form of Organisation	Region	Sector
Zachodniopomorski Klaster Morski (West Pomeranian Sea Cluster)	Cluster or Network	Zachodniopomorskie	matching all blue sectors
Zachodniopomorski Regionalny Fundusz Poręczeń Kredytowych (West Pomeranian Regional Loan Guarantee Fund)	Others	Zachodniopomorskie	matching all blue sectors
Związek Pracodawców Dolnego Śląska (Association of Employers of Lower Silesia)	Cluster or Network	Dolnośląskie	matching all blue sectors

Sweden

Name of Business Support Organisation	Form of Organisation	Region	Sector
Blue Science Park	Incubator	Blekinge	Machinery & Technology
Havsvindforum	Cluster or Network	Skåne, Västra Götaland, Blekinge	Energy
High Voltage Valley	Cluster or Network	Dalarna	Energy
Industrial Cluster IUC Syd	Cluster or Network	Skåne	Machinery & Technology
Krinova Incubator Science Park	Incubator	Kristianstad (Skåne)	Life Sciences & Blue Medicine
Lighthouse	Competence Centre	Sweden	Machinery & Technology
Materials Business Center	Business Park	Skåne	Machinery & Technology / Energy
OffshoreVäst	Cluster or Network	Sweden	Energy
Sustainable Business Hub	Cluster or Network	Skåne	Machinery & Technology / Energy
Swedish Maritime Technological Forum (SMTF) (Skåne)	Cluster or Network	Skåne, Västra Götaland, West Coast Municipalities	Machinery & Technology / Energy
Swedish Maritime Technological Forum (SMTF) (Västra Götaland)	Cluster or Network	Skåne, Västra Götaland, West Coast Municipalities	Machinery & Technology / Energy
Teknikdalen/Dalarna Science Park	Cluster or Network	Dalarna	Energy
Triple Steelix	Cluster or Network	Dalarna, Västmanland, Gävleborg	Energy

Website	Email	Telephone
http://klastermorski.org/	biuro@klastermorski.org	+48 721808608
http://www.zrfpk.pl	biuro@zrfpk.pl	+48 918130110
http://zpds.com.pl/	biuro@zig.pl	+48 717950656

Website	Email	Telephone
http://www.bluesciencepark.se	info@bluesciencepark.se	+46 708 705100
http://www.havsvind.org/		+46 705 372835
http://www.highvoltagevalley.se	info@highvoltagevalley	+46 240 565510
http://www.iucsyd.se/	info@iucsyd.se	+46 181 593
http://www.krinova.se/	info@krinova.se	+46 708 291434
http://www.lighthouse.nu	info@lighthouse.nu	+46 317 722674
http://materialsbusinesscenter.se/	info@innovationskane.com	+46 739 311052
http://www.offshorevast.se		+46 105 166586
http://www.sbhub.se		+46 766 347563
http://smtf.se/	info@smtf.se	+46 706 419932
http://smtf.se/	info@smtf.se	+46 706 419932
http://www.dalarnasciencepark.se/	kontakt@dalarnasciencepark.se	+46 243 246400
http://www.jernkontoret.se/sv/stalindustrin/samarbeten-och-natverk/triple-steelix/	info@triplesteelix.se	+46 768 007733

Appendix 3 Data base blue actors: higher education

Germany

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
University of Bremen	DE Bremen	Machinery & Technology / Life Science & Blue Medicine	Material sciences and their technologies, Logistics	
Jacobs University	DE Bremen	Life Science & Blue Medicine		
University of Applied Sciences Bremen	DE Bremen	matching all blue sectors	International program shipbuilding and marine technology, International program Ship Management, International program Shipping and Chartering, Shipbuilding and marine technology	Future energy systems
University of Applied Sciences Bremerhaven	DE Bremerhaven	matching all blue sectors	Maritime technologies, Marine engineering, Transportation and logistics, Logistics engineering and management	Sustainable environmental and energy technologies, Wind energy technology, Process engineering and energy technology
Technical University Clausthal	DE Clausthal	Energy		Energy and material physics, Energy and resources, Energy systems technologies, Energy technologies
National nautical college	DE Cuxhaven	Machinery & Technology	Navigation, Ship technology, Navigation for deep sea fishing	
University of Applied Sciences Emden/ Leer	DE Emden, Leer	Machinery & Technology / Energy	International maritime technology and management, Navigation, Shipping management	Energy efficiency
University of Applied Sciences Flensburg	DE Flensburg	matching all blue sectors	Ship technology, Shipping, Nautical sciences and logistics	Energy Sciences, Wind engineering
Europe-University of Flensburg	DE Flensburg	matching all blue sectors	Ship technology, Shipping, Nautical sciences and logistics	Energy Sciences, Wind engineering
Helmuth Schmidt University of the federal armed forces	DE Hamburg	Energy		Renewable energies and intelligent grids, Energy and environmental technologies
Hamburg University of Applied Sciences	DE Hamburg	matching all blue sectors	Logistics	Renewable energy systems and energy management, Renewable Energies

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Marine biology, Marine microbiology	http://www.uni-bremen.de/	transfer@uni-bremen.de	+49 4212180
Health (focus on bio-active substances)	http://www.jacobs-university.de/	info@jacobs-university.de	+49 4212004820
International program technological and applied biology	http://www.hs-bremen.de/internet/en/index.html	info@hs-bremen.de	+49 42159050
Cruise tourism management, Food technology, Biotechnology	https://www.hs-bremerhaven.de/en/	info@hs-bremerhaven.de	+49 47148230
	http://www.tu-clausthal.de/Welcome.php.en	info@tu-clausthal.de	+49 5323720
	http://www.seefahrtschule-cuxhaven.de/	info@seefahrtschule.niedersachsen.de	+49 47215087790
	https://www.hs-emden-leer.de/en/	info@hs-emden-leer.de	+49 49218070
Biotechnology and Process Engineering	https://hs-flensburg.de/en	info@hs-flensburg.de	+49 46180501
Biotechnology and Process Engineering	https://www.uni-flensburg.de/en/	praesidium@uni-flensburg.de	+49 46180502
	https://www.hsu-hh.de/	pressestelle@hsu-hh.de	+49 4065411
Biotechnology, Pharmaceutical biotechnology	https://www.haw-hamburg.de/english.html	info@haw-hamburg.de	+49 40428750

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
University of Hamburg	DE Hamburg	matching all blue sectors	ogistics and digital services	Integrated climate system sciences
Technical Unversity Hamburg-Harburg	DE Hamburg	matching all blue sectors	Shipbuilding and marine technologies, Logistics and mobility, Water and environmental engineering	Energy and environmental technologies, Energy technologies, Renewable energies
Kühne Logistics University	DE Hamburg	Machinery & Technology	Logistics and supply chain management, International maritime law and logistics	
Leibniz University Hannover	DE Hannover	Machinery & Technology / Energy	Navigation and environmental robotic	Energy technologies, Windenergy-Engineering
University of Applied Sciences at the West Coast	DE Heide	Energy / Life Science & Blue Medicine		Green energy
University of Applied Sciences Kiel	DE Kiel	Machinery & Technology / Energy	Shipbuilding and maritime technology	Offshore plant technology
Christian-Albrechts-University	DE Kiel	matching all blue sectors	Nano, Surface & Interface Sciences	Electrical Engineering
University of Lübeck	DE Lübeck	Machinery & Technology / Life Science & Blue Medicine	Robotics and autonomous systems	
University of Applied Sciences Lübeck	DE Lübeck	Energy / Life Science & Blue Medicine		Electrical engineering – energy systems and automation
University of Applied Sciences Neubrandenburg	DE Neu-brandenburg	Life Science & Blue Medicine	Marine sensoric	
Carl-von Ossietzky University Oldenburg	DE Oldenburg	Machinery & Technology / Energy	Marine sensoric	European Master in Renewable Energy, Postgraduate Programme Renewable Energy, Water and Coastal Management
University of Rostock	DE Rostock	matching all blue sectors	Ship and marine technologies	Combustion engine and energy technology, Energy efficiency

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Marine ecosystems and fisheries, Molecular LifeSciences, Polar and Marine Sciences	https://www.uni-hamburg.de/en.html	praesident@uni-hamburg.de	+49 40428380
Medical engineering, Life Science technologies	https://www.tuhh.de/alt/tuhh/startpage.html	president@tuhh.de	+49 40428783201
	https://www.the-klu.org/	info@the-klu.org	+49 403287070
	https://www.uni-hannover.de/en/?no_cache=1	praesident@uni-hannover.de	+49 5117620
Tourism	http://en.fh-westkueste.de/home/	praesidium@fh-westkueste.de	+49 48185550
	http://www.fh-kiel.de/	info@fh-kiel.de	+49 4312100
Biological Oceanography, Biochemistry & Molecular Biology, Pharmaceutical Research, AgriGenomics, Agricultural sciences, Food and diet sciences, Medical Life Sciences	http://www.uni-kiel.de/index-e.shtml	mail@uni-kiel.de	+49 43188000
Medical Information technology, Mathematics in Medicine and LifeSciences, Medical food sciences, Medical engineering, Molecular Life Sciences, Biomedical engineering	https://www.uni-luebeck.de/en/university/universit	info@uni-luebeck.de	+49 45131010
Biomedical engineering, Food processing technologies	https://www.fh-luebeck.de/	kontakt@fh-luebeck.de	+49 4513006
Food technology, Food and bio food production	https://www.hs-nb.de/en/	rektor@hs-nb.de	+49 39556930
	https://www.uni-oldenburg.de/en/	internet@uni-oldenburg.de	+49 4417980
Aquaculture	https://www.uni-rostock.de/en/	rektor@uni-rostock.de	+49 3814980

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
University of Applied Sciences Stralsund	DE Stralsund	Energy		Renewable energies
Jade University	DE Wilhelms-haven, Olden-burg, Elsfleth	Machinery & Technology	Maritime management, Navigation,Shipping and port industry, International logistic management	
University of Applied Sciences Wismar	DE Wismar	Machinery & Technol-ogy / Energy	Marine engineering, Nav-igation/ traffic operation, Ship operation facilities and supply engineering, Digital logistics and man-agement, Operation and management of maritime systems	Marine electrical engi-neering, Energy and resource efficient tech-nologies and processing

Estonia

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Estonian Maritime Academy of TTÜ X	EE Tallinn	Machinery & Technology	navigation, ship engi-neering, operation of marine powerplant, ship refrigeration engineer, electrotechnical officer, port and shipping management, waterway safety management, fisheries tehcnolo-gies management and administration, marine engineering,	
Estonian Marine Institute	EE Tartu	Machinery & Technol-ogy / Life Science & Blue Medicine	Remote Sensing and Marine Optics	
The Institute of Veterinary Medicine and Animal Sciences of the Estonian University of Life Sciences	EE Tartu	Life Science & Blue Medicine		

Programs in Life Science and Blue Medicine	Website	Email	Telephone
	http://www.fh-stralsund.de/	rektor@hochschule-stralsund.de	+49 3831456500
	https://www.jade-hs.de/en/	info@jade-hs.de	+49 44219850
	http://www.hs-wismar.de/en/homepage/	info@fz-wismar.de	+49 38417537218

Programs in Life Science and Blue Medicine	Website	Email	Telephone
	http://www.ttu.ee	ttu@ttu.ee	+372 620 2002
Marine Biology, Fish Biology and Fishery	http://www.sea.ee	meri@sea.ee	+372 6718942
aquaculture	http://www.emu.ee	info@emu.ee	+372 731 3001

Finland

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Aalto University	FI Helsinki	matching all blue sectors	Maritime Engineering, Water and Environmental Engineering, Machine Technology, ICT, Advanced Materials for Innovation and Sustainability, Cold Climate Engineering, Environmental Engineering	Energy and Environment Technology, Advanced Energy Solutions,
University of Helsinki	FI Helsinki	Machinery & Technology / Life Science & Blue Medicine	ICT	
Metropolia University of Applied Sciences	FI Helsinki	matching all blue sectors	Mechanical Engineering	Electrical Engineering
Satakunta University of Applied Sciences	FI Pori, Rauma, Kankaanpää, Huittinen	Machinery & Technology / Energy	Logistics, Maritime Management, Logistics, Sea Captain, ICT	Energy and Environment Technology
University of Turku	FI Turku	matching all blue sectors	ICT	Energy and Climate Research
Åbo Akademi University	FI Turku	matching all blue sectors	Logistics, Engineering, ICT, Business Competence and Process Management, Digital Transformation and New Business Models, Embedded Electronics, Energy Technology, Future Product Process, Material Efficiency and Naval Architecture and Marine Engineering, Technology Industry, Telecommunications and In	Energy technology, Renewable Energy
Turku University of Applied Sciences	FI Turku	matching all blue sectors	Engineering, Information and Communications Technology, Maritime Management, Captain, Machine Technology	Energy and environment Technology
Novia University of Applied Sciences	FI Vaasa	Machinery & Technology	Maritime Management, Sea captain, Maritime Technology/Engineering	

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Life Science Technologies	http://www.aalto.fi/en/	kirjaamo@aalto.fi	+358 9 47001
Food Sciences, Microbiology and Microbial Biotechnology, Life Science Informatics, Environmental Science, Climate Change and Sustainability Studies	https://www.helsinki.fi/en		+358 2941 911
Biomedical Laboratory Science, Bio and Food Technology	http://www.metropolia.fi/en/	kirjaamo@metropolia.fi	+358 9 7424 5000
	http://samk.fi/en/	kirjaamo@samk.fi	+358 2 620 3000
Biotechnology, Food Chemistry, Biomedicine, Maritime Law, Marine Biology	http://www.utu.fi/en/Pages/home.aspx	viestinta@utu.fi	+358 29 450 5000
Biochemistry, Fibre and Cellulose Technology, Environmental and Marine Biology	https://www.abo.fi/?lang=en	information@abo.fi	+358 2 215 31
Biotechnology	https://www.tuas.fi/en/	kirjaamo@turkuamk.fi	+358 2 263 350
	https://www.novia.fi/novia-uas/		+358 6 328 5000

Latvia

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Liepaja University	LV Liepaja	matching all blue sectors	Professional bachelor studies:computer science and IT;	Bachelor studies in nature and renewable energy resources management and engineering; mechatronics; master studies in ecotechnologies. Institute of Science and Innovative Technologies has developed wave energy transformer modules.
Liepaja Maritime College	LV Liepaja	Machinery & Technology	first level professional education establishment where three professional courses are taught – ship mechanics, logistics and ship piloting. Additional study courses for maritime specialists and sailors in order to rise the qualification are also offered.	
Turiba University	LV Riga	Life Science & Blue Medicine		
University of Latvia	LV Riga	Life Science & Blue Medicine		
Riga Technical University	LV Riga	Machinery & Technology	automatics and computers, computer systems, IT, robotics, electronics; engineering, mechanics, chemistry, material science; applied chemistry (master and doctoral), nanotechnologies of materials (master and doctoral).	
Riga Stradins University	LV Riga	Life Science & Blue Medicine		

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Professional bachelor studies in tourism management and recreation;	http://www.liepu.lv	liepu@liepu.lv	+371 63423568
	http://www.ljk.lv	kanceleja@ljk.lv	+371 63424880
tourism management and recreation	http://www.turiba.lv	turiba@turiba.lv	+371 67622551
biology, geography and Earth science, chemistry, physics, mathematics, computer science, medicine and pharmacy, molecular biology, cell biology, analytical chemistry, solid state physics, various directions of environmental science, modelling of environmental processes	http://www.lu.lv	lu@lu.lv, info@lu.lv	+371 67034444
	http://www.rtu.lv	info@rtu.lv	+371 67089333
biomedicine, professional higher education in medicine: balneology, environmental health and sustainable functioning	http://www.rsu.lv	rsu@rsu.lv, infocentrs@rsu.lv	+371 67409105

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Latvian Maritime Academy	LV Riga	Machinery & Technology	marine transportation (ship mechanics and electric automatic systems), bachelor - management of ports and shipping. Research directions also on efficiency, safety, security in shipping and quality systems in maritime processes.	
Ventspils University College	LV Ventspils	Machinery & Technology	computer science, electronics, ship navigation electronics	

Poland

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Częstochowa University of Technology	PO Częstochowa	Life Science & Blue Medicine		
University of Gdansk	PO Gdansk	Energy / Life Science & Blue Medicine		Oceanography, Geology
Gdańsk University of Technology	PO Gdansk	Energy / Life Science & Blue Medicine		Ocean Technology (Engineering), Energy
Gdański Uniwersytet Medyczny (Gdańsk Medical University)	PO Gdansk	Life Science & Blue Medicine		
Gdynia Maritime University	PO Gdynia	Machinery & Technology	Navigation, Mechanical engineering, Innovative Economy	
The Gdynia Maritime School (post-secondary non-public school)	PO Gdynia	Machinery & Technology / Energy	Deck department diplomma courses, Specialistic maritime courses, Professional sailor courses	Offshore courses
Polish Naval Academy	PO Gdynia	Machinery & Technology / Energy	Automation and Robotics, Mechanical engineering, Navigation, Maritime (Marine) Studies	Ocean Technology (Engineering)

Programs in Life Science and Blue Medicine	Website	Email	Telephone
	http://www.latja.lv	info@latja.lv	+371 67161125
	http://www.venta.lv	venta@venta.lv	+371 63629657

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Biotechnology, Biomedical engineering, Tourism and Recreation	http://www.pcz.pl	rektor@adm.pcz.czest.pl	+48 343255211
Marine ichthyology, Bioinformatics, Biotechnology	http://ug.edu.pl	rekug@ug.edu.pl	+48 585232407
Biotechnology, Biomedical engineering	http://pg.edu.pl	rektor@pg.gda.pl	+48 583471269
Blue Medicine	http://www.naukaibiznes.gumed.edu.pl	naukaibiznes@gumed.edu.pl	+48 583491009
	http://www.am.gdynia.pl	rektor@am.gdynia.pl	+48 585586442
	http://www.morska.edu.pl	szkola@morska.edu.pl	+48 586217541
	http://www.amw.gdynia.pl		+48 261262514

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Silesian University of Technology	PO Gliwice	Energy / Life Science & Blue Medicine		Mining and Geology, Environmental Engineering and Energy,
University of Silesia in Katowice	PO Katowice	Life Science & Blue Medicine		
Koszalin University of Technology	PO Koszalin	Energy / Life Science & Blue Medicine		Energy
Name of Institute of Higher Education	location	sector	programs in Machinery & Technology	Programs in Energy
University of Agriculture in Krakov	PO Krakov	matching all blue sectors	Engineering and Water Management	Renewable Sources of Energy and Waste Management,
University of Warmia and Mazury in Olsztyn	PO Olsztyn	Energy / Life Science & Blue Medicine		Renewable energy sources
Poznań University of Medical Sciences	PO Poznań	Life Science & Blue Medicine		
Poznan University of life science	PO Poznań	matching all blue sectors	Engineering and Water Management	Eco energy
Adam Mickiewicz University in Poznań	PO Poznań	matching all blue sectors	Geography / maritime economy, Water management	Geology
Poznań University of Technology	PO Poznań	Energy / Life Science & Blue Medicine		Energy
Maritime University of Szczecin	PO Szczecin	Machinery & Technology	Navigation, Mechanical engineering	
Pomeranian University of Medical Sciences in Szczecin	PO Szczecin	Life Science & Blue Medicine		
West Pomeranian University of Technology Szczecin	PO Szczecin	matching all blue sectors	Construction of Yachts, Water Management and Management	Ocean Technology, Renewable energy sources, Energy
Szczecin University of Technology	PO Szczecin	matching all blue sectors	Geography of the Sea and Coast, Marine and Coastal Geosciences	Oceanography

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Biotechnology, Biomedical engineering	http://www.polsl.pl	RR1@polsl.pl	+48 322371255
Biotechnology, Tourism	http://www.us.edu.pl	rektor@us.edu.pl	+48 323591956
Food Technology and human nutrition, Tourism and Recreation	http://www.tu.koszalin.pl	jmr@tu.koszalin.pl	+48 943478620
Programs in Life Science and Blue Medicine	http://www.ur.krakow.pl	rector@ur.krakow.pl	+48 126331336
Fishing, Technology of Medicinal and Proyotic Plants, Biotechnology	http://www.uwm.edu.pl	br@uwm.edu.pl	+48 895233880
Aquaculture Engineering, Bioengineering of Food Production, Biotechnology, Fishing, Tourism and Recreation	http://www.ump.edu.pl	info@ump.edu.pl	+48 618546000
Biotechnology, Pharmacy, Physiotherapy	http://www.ump.edu.pl	info@ump.edu.pl	+48 618546000
Biotechnology, Tourism and Recreation, Food Technology and Human Nutrition	http://puls.edu.pl/	rektorat@up.poznan.pl	+48 618487001
Bioinformatics, Biotechnology, Tourism and Recreation	http://www.amu.edu.pl	rectorof@amu.edu.pl	+48 618294000
Biomedical engineering	http://www.put.poznan.pl	Biuro.Rektora@put.poznan.pl	+48 616653537
	http://www.am.szczecin.pl	am@am.szczecin.pl	+48 914809400
Biotechnology, Physiotherapy, Cosmetology	http://www.pum.edu.pl	rektor@pum.edu.pl	+48 914800700
Fishing, Biotechnology, Food Technology and Human Nutrition, Tourism and Recreation	http://www.zut.edu.pl	rektor@zut.edu.pl	+48 914494015
Biotechnology, Tourism and Recreation	http://univ.szczecin.pl	rektorat@univ.szczecin.pl	+48 914441172

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Warsaw University of Life Sciences SGGW	PO Warsaw	matching all blue sectors	Engineering and Water Management	Macro-directional: Renewable Energy Technologies
Wroclaw Medical University	PO Wrocław	Life Science & Blue Medicine		
Wrocław University of Science and Technology	PO Wrocław	Energy / Life Science & Blue Medicine		Mining and Geology, Renewable Energy Engineering
The University of Wrocław	PO Wrocław	Energy / Life Science & Blue Medicine		Geological Engineering
Wrocław University of Environmental and Life Sciences	PO Wrocław	matching all blue sectors	Engineering and Water Management,	Renewable Sources of Energy and Waste Management

Sweden

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
Chalmers University of Technology	SE Gothenburg	Machinery & Technology	The Department of Shipping and Marine Technology is a leading actor in maritime research and education.	
University of Gothenburg	SE Gothenburg	matching all blue sectors	Maritime management, Maritime engineering, Material sciences, Naval architecture and Ocean engineering	Energy
Blekinge University of Technology	SE Karlskrona, Karlshamn	Machinery & Technology	mechanical engineering with emphasis on Structural Mechanics, Industrial economy, marine technology	
Lund University	SE Lund	Machinery & Technology	combustion engines, new fuels, non-fossil fuels, fuel efficiency, environmental technology related to shipping, material technology, nanotechnology;	

Programs in Life Science and Blue Medicine	Website	Email	Telephone
Biotechnology Systems Engineering, Biotechnology, Tourism and Recreation	http://www.sggw.pl	rektor@sggw.pl	+48 225931000
Pharmacy, Physiotherapy	http://www.umed.wroc.pl	rektor@umed.wroc.pl	+48 717840001
Biotechnology, Biomedical engineering	http://www.pwr.edu.pl	J.M.Rektor@pwr.edu.pl	+48 713202217
Biotechnology, Tourism	http://www.uni.wroc.pl	rektor@uwr.edu.pl	+48 713436847
Biotechnology	http://www.upwr.edu.pl	rektor@upwr.edu.pl	+48 713205101

Programs in Life Science and Blue Medicine	Website	Email	Telephone
	https://www.chalmers.se/	chalmers@chalmers.se	+46 317722155
Biotechnology, Life Sciences	http://www.gu.se		+46 317869062
	http://www.bth.se	info@bth.se	+46 455385037
	http://www.lth.se	info@lth.se	+46 731521521

Name of Institute of Higher Education	Location	Sector	Programs in Machinery & Technology	Programs in Energy
World Maritime University	SE Malmö	Machinery & Technology	postgraduate University, founded by IMO, safe, secure and efficient shipping on clean oceans	
Royal University of Technology/ KTH	SE Stockholm	Machinery & Technology	maritime engineering, naval architecture, nanotechnology, ICT	

Programs in Life Science and Blue Medicine	Website	Email	Telephone
	http://www.wmu.se	info@wmu.se	+46 40356300
	http://www.kth.se	info@kth.se	+46 703464240

Appendix 4 Data base blue actors: non-university research institutes

Germany

Name of Research Institute	Locations	Sector	Fields of Specification
AGP Fraunhofer Anwendungszentrum für Großstrukturen in der Produktionstechnik	Rostock	Machinery & Technology / Energy	maritime industry, research in techological methods, offshore wind, research in techological methods
AWI – Alfred-Wegener-Institute for polar and ocean research	Bremerhaven, Helgoland, Sylt, Potsdam	matching all blue categories	fundamental research in marine sciences
BAW – Federal Waterways Engineering and Research Institute	Hamburg	Machinery & Technology	shipbuilding, waterways, ship handling simulation, corrosion, coatings
CML – Fraunhofer Centre for maritime logistics and services	Hamburg	Machinery & Technology	ship and information management, sea traffic and nautical solution, transport market assessment
Deutsche WindGard Engineering GmbH: Wind canal centre	Bremen	Energy	testing facilities for research and enterprises in the wind sector
DSM – German shipping museum – research museum of Leibniz Society	Bremerhaven	Machinery & Technology	shipbuilding in a socio-economic context, ships as medium for knowledge transfer, shipping and the environment
EMB Fraunhofer Research Institution for Marine Biotechnology and Cell Technology	Lübeck	Life Science & Blue Medicine	marine biotechnology
GEOMAR Helmholtz Centre for Ocean Research Kiel	Kiel	matching all blue categories	fundamental research in marine sciences
GEOMAR-Biotech	Kiel	Life Science & Blue Medicine	marine biotechnology
Helmholtz Centre Geesthacht (Institute for Material and Coastal Research)	Geesthacht, Hamburg, Teltow	matching all blue categories	basic and applied research in coastal regions
HSVA – Hamburgische Schiffbau-Versuchsanstalt GmbH (Hamburg Ship Model Basin)	Hamburg	Machinery & Technology	testing facility for shipbuilding
IFAM – Fraunhofer Institute for Manufacturing and Advanced Materials	Bremen, Dresden, Oldenburg, Stade, Wolfsburg	Life Science & Blue Medicine / Energy	energy storage, environmental sensors, bio materials
IOW Institute for Baltic Sea Research Warnemünde	Rostock-Warnemünde	matching all blue categories	fundamental research in marine sciences
ISIT Fraunhofer Institut für Siliziumtechnologie	Itzehoe	Machinery & Technology	sensor systems for marine technology

Website	Email	Telephone
https://www.hro.ipa.fraunhofer.de/en.html		+49 3814968220
https://www.awi.de/en.html	info@awi.de	+49 47148310
http://www.baw.de/EN/Home/home_node.html	info@baw.de	+49 72197260
https://www.cml.fraunhofer.de/en.html	info@cml.fraunhofer.de	+49 40428784450
http://www.windtunnelcentre.com/	info@windguard.de	+49 47195209610
http://www.dsm.museum/	info@dsm.museum	+49 471482070
https://www.emb.fraunhofer.de/en.html	info@zv.fraunhofer.de	+49 45138444811
http://www.geomar.de/en/	info@geomar.de	+49 4316000
http://www.geomar.de/en/research/fb3/fb3-mn/geomar-biotech/	info@geomar.de	+49 4316004430
https://www.hzg.de/index.php.en	contact@hzg.de	+49 4152870
https://www.hsva.de/	info@hsva.de	+49 40692030
https://www.ifam.fraunhofer.de/en.html		+49 42122460
https://www.io-warnemuende.de/en_index.html	postmaster@io-warnemuende.de	+49 38151970
https://www.isit.fraunhofer.de/en.html	info@isit.fraunhofer.de	+49 4821170

Name of Research Institute	Locations	Sector	Fields of Specification
ISL – Institute for shipping and logistics	Bremen, Bremerhaven	Machinery & Technology / Energy	operative systems, simulation sand serious gaming for shipping and ports; simulation of offshore logistic
Name of Research Institute	locations	sector	fields of specification
IWES – Fraunhofer Institute for wind energy and energy systems technology	Bremerhaven, Bremen, Hannover, Oldenburg	Energy	testing and research facilities for drive technologies and components, compound material, foundations, nacelles and environmental surveys
Johann-Heinrich von Thünen Institute (Institute of Fisheries Ecology)	Hamburg, Braunschweig, Rostock, Trenthorst, Großhansdorf, Ahrensburg, Cuxhaven	Life Science & Blue Medicine	aquaculture
Max-Planck Institute for marine microbiology	Bremen	Life Science & Blue Medicine	fundamental research in marine microbiology
Offis Institute for Information Technologies	Oldenburg	Machinery & Technology / Energy	safety of maritime systems, human-machine-interfaces in navigation, IT for offshore wind
Offshore-Safety-Training Centre	Cuxhaven	Energy	emergency trainings centre for offshore industries
Senckenberg am Meer (German Centre for Marine Biodiversity Research)	Wilhelmshaven, Hamburg	Life Science & Blue Medicine	fundamental research on marine organisms
The Center for Welding-Related Instruction and Experimentation (SLV)	Rostock	Machinery & Technology / Energy	maritime industry, research in techological methods, offshore wind, research in techological methods
ZMT – Leibniz Centre for marine tropical ecology	Bremen	Life Science & Blue Medicine	fundamental research in tropical marine ecosystems

Finland

Name of Research Institute	Locations	Sector	Fields of Specification
Centrum Balticum	Turku	matching all blue categories	project coordination, communication
Finnish Environment Institute SYKE	Helsinki, Oulu, Jyväskylä, Joensuu, Kuhmo	matching all blue categories	fundamental research in marine sciences
Pyhäjärvi-instituutti	Kauttua	Life Science & Blue Medicine	fish and food
Union of the Baltic Cities Sustainable Cities Commission	Turku	Machinery & Technology / Energy	maritime activities, climate change and renewable energies

Website	Email	Telephone
https://www.isl.org/en	info@isl.org	+49 421220960
https://www.iwes.fraunhofer.de/en.html		+49 47114290100
https://www.thuenen.de/en/	info@thuenen.de	+49 5315961003
https://www.mpi-bremen.de/en/Home.html	contact@mpi-bremen.de	+49 4212028517
https://www.offis.de/en.html	institut@offis.de	+49 44197220
http://www.ost-cux.de/	kontakt@ost-cux.de	+49 47213995890
http://www.senckenberg.de/root/index.php?page_id=3325	dzmb@senckenberg.de	+49 44219475101
http://www.slv-rostock.de/	office@slv-rostock.de	+49 3816609820
https://www.leibniz-zmt.de/en/	contact@leibniz-zmt.de	+49 421238000
http://www.zmt-bremen.de/en/	contact@leibniz-zmt.de	+49 421238000

Website	Email	Telephone
http://www.centrumbalticum.org/en	centrumbalticum@centrumbalticum.org	+358 449072236
http://www.syke.fi/en-US	kirjaamo.syke@ymparisto.fi	+358 295252001
http://www.pyhajarvi-instituutti.fi/english/default.asp	toimisto@pji.fi (Office)	+358 28380600
https://www.ubc-sustainable.net/	sustainability@ubc.net	+358 22623172

Name of Research Institute	Locations	Sector	Fields of Specification
Valonia – Service Centre for Sustainable Development and Energy of Southwest Finland	Turku	Energy	renewable energies
VTT Technical Research Centre of Finland Ltd	Helsinki	Life Science & Blue Medicine / Energy	smart industry and energy systems, industrial biotechnology and food solutions

Latvia

Name of Research Institute	Locations	Sector	Fields of Specification
Food safety, animal health and environmental research institute "BIOR"	Riga	Life Science & Blue Medicine	food safety
Institute of Electronics and Computer Science	Riga	Machinery & Technology	smart integrated systems for data acquisition, processing and transmission
Latvian Institute of Aquatic Ecology	Riga	Life Science & Blue Medicine	basic and applied research on marine ecosystems

Poland

Name of Research Institute	Locations	Sector	Fields of Specification
Centrum Techniki Okrętowej S.A.	Gdansk	Machinery & Technology / Energy	maritime technology, shipping, offshore wind energy
Instytut Budownictwa Wodnego PAN	Gdansk, Szczecin, Lubiatowo	Machinery & Technology	shipping
Instytut Energetyki – Instytut Badawczy (IEn)	Warszawa	Energy	whole value chain of offshore wind energy
Instytut Maszyn Przepływowych PAN	Gdansk	Machinery & Technology / Energy	maritime technology, shipping, offshore wind energy
Instytut Meteorologii i Gospodarki Wodnej – Państwowy Instytut Badawczy (Institute of Meteorology and Water Ma	Warszawa	Energy	building of plants & systems
Instytut Morski w Gdańsku (Maritime Institute in Gdansk)	Gdansk	matching all blue categories	maritime technology, shipping, ports, offshore wind energy, blue biotechnology, marine aquaculture
Instytut Nafty i Gazu – Państwowy Instytut Badawczy	Krakov	Energy	building of plants & systems in offshore wind industry

Website	Email	Telephone
http://www.valonia.fi/en/	valonia@valonia.fi	
http://www.vttresearch.com/	info@vtt.fi	+358 207227070

Website	Email	Telephone
http://www.bior.gov.lv/en	bior@bior.lv	+371 67620513
http://www.edi.lv/en/home/	info@edi.lv	+371 67554500
http://www.lhei.lv/en/	hydro@latnet.lv	+371 67601995

Website	Email	Telephone
http://www.cto.gda.pl	marketing@cto.gda.pl	+48 583074697
http://www.ibwpan.gda.pl/index.php/pl/	sekr@ibwpan.gda.pl	+48 585222900
https://ien.com.pl/strona-glowna	instytut.energetyki@ien.com.pl	+48 223451200
https://www.imp.gda.pl/	imp@imp.gda.pl	+48 583460881
http://www.imgw.pl/	imgw@imgw.pl	+48 225694100
http://im.gda.pl/	im@im.gda.pl	+48 583011641
https://www.inig.pl/	office@inig.pl	+48 124210033

Name of Research Institute	Locations	Sector	Fields of Specification
Instytut Oceanologii Polskiej Akademii Nauk (The Institute of Oceanology of the Polish Academy of Sciences)	Sopot	Life Science & Blue Medicine	blue biotechnology, marine aquaculture
Morski Instytut Rybacki – Państwowy Instytut Badawczy (National Marine Fisheries Research Institute)	Gdynia	Life Science & Blue Medicine	blue biotechnology, marine aquaculture
Państwowy Instytut Geologiczny – Państwowy Instytut Badawczy (The Polish Geological Institute)	Warszawa	Energy	building of plants & systems

Sweden

Name of Research Institute	Locations	Sector	Fields of Specification
ESS European Spallation Source	Lund	Machinery & Technology / Energy	focus on material research (nano materials) inter alia for use in shipping technology and offshore energy (including wind)
RISE Research Institute of Sweden	Lund, Gothenburg, Stockholm, Borås etc.	matching all blue categories	safety & transport, ICT, energy and biobased economy, life sciences
SSPA Sweden	Gothenburg, Stockholm	Machinery & Technology / Energy	ship design & hydrodynamics, ports & logistics, naval technology, safety, security & risk, alternative fuels, energy efficiency, ocean energy
Swedish Windpower Technology Center	Gothenburg	Energy	research along the whole value chain of offshore wind energy

Website	Email	Telephone
http://www.iopan.gda.pl/index-pl.html	office@iopan.gda.pl	+48 585517281
http://mir.gdynia.pl/	sekretariat@mir.gdynia.pl	+48 587356232
http://www.pgi.gov.pl/	biuro@pgi.gov.pl	+48 224592000

Website	Email	Telephone
https://europeanspallationsource.se/	comms@esss.se (communication devision)	+46 468883000
https://www.ri.se/en	info@ri.se	+46 105166280
http://www.sspa.se/		+46 317729000
https://www.chalmers.se/en/centres/SWPTC/Pages/def	chalmers@chalmers.se	+46 317221637

Appendix 5 Identified topics for future cooperation projects

	Ida Viru	Southwest Finland	Schleswig-Holstein
Monitoring and Other Marine Technologies		**Smart water management/monitoring** (motor laboratory to conduct emission monitoring) Water cluster "Loura" wide knowledge in water treatment and measurment	**Marine technology, marine mining**
Maritime Technology (Shipbuilding)	**Shipbuilding – metal industry as a subcontractor.** Especially interested in cooperation with Finland, Turku region. Problem is that our metal industry enterprises has a lack of contacts outside the circle of partners. One cooperation possibility is **product development**, to learn from foreign partners	**Dismantling of used ships:** Interest in Europe?; floating constructions (like artificial islands etc.) (development of **laser welding**; lowering the costs of production through **new materials** for example) **Boosting start ups and subcontractors** in shipbuilding industry (Co-operation in start up theme, new platform for compies "Maritime digital supply space") **Ship bioenergy (especially biogas, LNG); Green shipping, Circular economy, autonomous shipping**	**Green shipping** (LNG, exhaust gas treatment, scrubbing etc.) **energy efficiency** (hull shape, streamlining of the fuselage, propellers shapes) **individual shipbuilding/ optimization** of shipbuilding by adapting shape and function to usage of the ship
Shipping		**Water transport in the cities,** logistics (**OnBoard-Med** (Harmonization of on Board Medical Treatment, Occupational **Safety and Emergency Skills** in Baltic Sea Shipping) -project at the moment) I**ndustrial modernisation/ logistics;** New model/ IT-solutions to reduce emission and waiting times in logistic chains (short cut platform/ optimizing ship cargo), partner in Scandria alliance network, **Green shipping**, making the maritime transport **more efficient** b**usiness model for autonomous shipping, , digital solutions**, **cargo flows**	**Digitalisation/ autonomous shipping**
Ports	Cooperation with Finland, the need to restart the **ferry line Sillamäe – Kotka** (or Hamina); more yachts are expected to visit our small harbours/ Small ports in Ida-Viru County are **developing infrastructure and services to invite here more yachts**	**Low carbon port activities; Industrial modernisation/ logistics** New model/ IT-solutions to reduce emission and waitingvvtimes in logistic chains (short cut platform/ optimizing ship cargo); Green shipping (TY), making the ports more efficient	

Riga Planning	Pomorskie	Skåne
Development of various constructions as an **artificial substrate** in the sea, different depth zones; **monitoring**	**Seabed mining** – operators, constructors; cooperation on building i.e. **safety system on the sea**	
Clustering in shipbuilding	Manufacturers of **electric marine propellers**, manufacturers of **energy stroring devices**, groups working on **autonomous vessels**; Fabrication of **new specialised vessel types for seabed mining**; new kind of **electric vessel**	**Low carbon shipping** as well as **unmanned shipping**
IT solutions for digitalization of shipping; Find cooperation partners, expand business borders, international projects		**Autonomous shipping** – making bsr fore runners
Cooperation in **small ports** for yachting services	Operators **transshipping large weights and sizes**, **New loading/ handling machinery**, **new logistic and transportation systems**	**Cost reduction in port operations**

	Ida Viru	Southwest Finland	Schleswig-Holstein
Building of Plants & Systems in Blue Energy		**Ship bioenergy** (especially biogas, LNG)	**Cost reduction** in construction and installation
Operation & Management in Blue Energy		**Oil spill control**	**Monitoring devices** for detection and surveillance of e.g. cracks
Blue Biotechnology		**Co-operation in chemistry** (Operates Smart Chemistry Park); Co-operation in **Life science** (Partner in EU-level in HealthTech); **Algae, medicine, chemistry**	**Blue biotech in food industry** (food security, legal aspects) **and health** issues
Marine Aquaculture	Interest but not specified	**Algae, circular economy applications**	**Efficient use of material flows** (circular economy); better knowledge and cooperation between sectors (blue biotech, aquaculture, energy, technology, machinery)
Health Treatments (Spa tourism)	**Marketing** – we can do the marketing together and introduce the region as a one whole/ unity. **Create cooperative packages, what we can sell together to Asia**	**Tourism**	No specialisation field yet, however tourism is under discussion as future field of specialisation
General Topics	In metal industry they have **lack of skilled workforce**	Availability of **skilled labour force** is acute question; to ensure **financial support for SMEs** in maritime technology value chain; **Maritime Spatial Planning** is a "hot" topic in Finland and universities are also interested of it	

Riga Planning	Pomorskie	Skåne
	New designs of offshore wind constructions; cooperation in building of **new engine**	**Cost reduction** in offshore wind (whole value chain)
	Installation, O&M operators and decommissioning in offshore wind sector	**Cost reduction** in offshore wind (whole value chain)
Yes, but not specified	Investigations for **marine devided compounds** with potential for m**edicine drugs and therapy treatment**	
Cultivation of **mussels and algae** without additional feeding at the sea; Exchange of best practice on **cleaning the sea** and **developing the coastal communities.**	**Desingers / design office**s in aquaculture sector; **combination with offshore wind farms;**	
Clustering, benchmarking and exchange of good practice, marketing, research		
Data exchange, **spatial planning**, **cluster and exchange between cluster**		A crucial challenge linked to this in turn, is the need for **specifically skilled labour**, a challenge that also will require **cooperation on education and training. Training field** needs should be analysed on a transregional level.

COORDINATOR AND EDITOR
SUBMARINER Network for Blue Growth EEIG
subcontracted by the Ministry of Economic Affairs, Transport, Employment, Technology and Tourism of Schleswig-Holstein

PUBLISHER
SUBMARINER Network for Blue Growth EEIG
Kärntener Str. 20
DE–10827 Berlin
info@submariner-network.eu
www.submariner-network.eu

LAYOUT AND GRAPHIC DESIGN
Eurydyka Kata | re:design (www.redesignstudio.pl)

www.smartblueregions.eu
#SmartBlueRegions

EUROPEAN
REGIONAL
DEVELOPMENT
FUND