

Marek Grzybowski¹

THE BALTIC SEA AND SPACE CLUSTER – PENTAGON HELIX HUB OF THE MARITIME AND SPACE INDUSTRY AND INTERNATIONAL PROJECTS HUB

The BSS Cluster is a Pentagon Helix HUB organisation. It integrates the transfer of knowledge between science and business, supports social initiatives, local governments and administration, develops investor relations in the maritime and space industry. The cluster acts as a smart organisation. We view maritime and space business in a holistic manner. BSSC integrates technological, legal and economic solutions at the scientific, business and social level.

The Baltic Sea and Space Cluster is unique on a global scale. The Cluster was established on July 27, 2009. We started the incubation process of the cluster in 2000. After several years of incubation, the cluster began to operate in the *Triple Helix* formula. After a few years, as a result of participation in numerous international projects, it evolved into a *Quadralupe Helix* cluster. Today, the cluster works in the *Pentagon Helix* formula. It integrates the transfer of knowledge between science and business, supports social initiatives, local governments and administration, develops investor relations. The cluster acts as a smart organisation. We view maritime and space business in a holistic manner. We integrate technological, legal and economic solutions at the scientific, business and social level. *The* Baltic Sea and Space Cluster (previously: Polish Maritime Cluster) is an active member of the United Nations Global Compact and operates on the European Cluster Colla-

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boration Platform. It is a key maritime cluster in Central and Eastern Europe, an important cluster in the Baltic Sea Region and the European Union, a recognisable cluster on the global maritime economy market, as evidenced by partner cooperation with clusters operating in the United States, Asia and South Africa.

BALTIC SEA REGION OBSERVATORY

The Baltic Sea Region has the highest innovation level in the European Union. Sweden, Finland, Denmark and Germany are the leading economies in this area. Estonia and Poland belong to a group of moderate innovators while Lithuania and Latvia show little activity in this field. The same applies to Leningrad and Kaliningrad regions. A lot of innovations is introduced in maritime industries. The Baltic Sea Region Observatory monitors changes in the region and works on projects that aim to diminish the innovation gap in the area. We support transformation into more ecological and more resilient communities and economies through international cooperation.

In the Baltic Sea Region, clusters developed most intensively in the Scandinavian countries. In many cases, cluster initiatives have allowed for radical change in the region's production offer. For example, in Gothenburg, the development of cooperative relationships has contributed to the growth of automotive and telematics industries. A strong Medicon Valley operates in Denmark and Sweden. Located at the gateway to Denmark and Sweden it has a strong ecosystem and deep talent pool underpinned by world-class life science universities and research infrastructure. The strong Norwegian oil & gas offshore cluster has weakened due to low oil and gas prices. The Norwegian fish farm cluster is still a world market leader. The strong Danish Maritime Cluster has the support of A.P. Moller – Maersk, the leader on the maritime container transport market.

THE POLISH MARITIME CLUSTER AS THE PREDECESSOR OF THE BSSC

The PMC (now BSSC) has been strongly based in seaports, shipyards, the Pomeranian Special Economic Zone and innovative companies involved in the production and services within the maritime (and now also space) industry. Research and education are an important part of the cluster's activity. In the area of the former Gdynia Shipyard, the production profile was changed. Instead of simple vessels for container, ro-ro ships and bulk carriers, specialised vessels worth EUR 200 million are being built for the offshore industry, as well as research and special vessels. For example, in 2012, the most modern wind farm construction unit in Europe was built, and in 2014 the first electric ferry in the world was constructed. Ships were built also by Crist shipyard, a BSSC member.



Figure 1. Clusters in Europe
 Source: clustercollaboration.eu



Figure 2. Polish Maritime Cluster (currently: Baltic SeaSpace Cluster)
 Source: Marek Grzybowski

The BSSC operates in the form of an association under the Law on Associations; in addition, it operates on the basis of the Association's Statute, according to which the Cluster's duties include in particular:

1. supporting innovation and development in the field of research, involving entrepreneurs, central administration and local government, on issues related to the Baltic Sea Region together with land-water facilities along the Vistula River, fostering economic and social ties between Pomerania and the rest of Poland with the other countries of the Baltic Sea Region and acting as a coordinating institution by:
 - creating a cooperation network of enterprises, local authorities, universities and business environment institutions,
 - increasing the innovation and integration capacity of maritime enterprises and the Vistula Catchment Area, supporting the construction and development of innovative and competitive hubs, creating conditions for effective commercialization of research results of universities and R&D units,
2. consulting for enterprises, developing innovative technologies, supporting economic initiatives and preventing unemployment,
3. development of professional qualifications and skills of those working for the needs of the regional economy,
4. participation in European and global organisations, in particular in the organisation of European clusters,
5. participation in the implementation of the priorities and activities of the European Union Strategy for the Baltic Sea Region in the area of the cluster's operation,
6. developing the economic and logistic potential of the VI Pan-European Transport Corridor by cooperating with interested local authorities and economic associations, including the Association of Cities of the Amber Highway based in Gdynia,
7. participation in international fairs and other events.
8. co-creating the Polish maritime policy,
9. conducting information, education and lobbying activities in order to increase Pomeranian Voivodeship's attractiveness for investors,
10. ensuring the flow of information between Cluster members.

At the General Meeting of the Polish Maritime Cluster on June 28, 2018, a decision was made to expand the operations and create a Baltic Maritime and Space Cluster. Support for the cluster was declared by the Space Sciences Commission of the Polish Academy of Sciences and the Student Maritime and Space Cluster of the University of Business and Administration. Committees and chairman of the think-tank were appointed. The following Committees operate within the Cluster: – for maritime affairs; – for space affairs; – for law; – for education; – for smart specialisations; – for inland shipping.

BALTIC SEA AND SPACE CLUSTER – HUB OF PROJECTS

The decision to expand and create the Baltic Sea and Space Cluster proved to be proper. Support of the Space Science Committee of the Polish Academy of Sciences was efficient. The Student Maritime and Space Cluster of the University of Business and Administration was also active. Soon, on the international arena, the Baltic Sea & Space Cluster became a recognisable brand.



Figure 3. Baltic Sea and Space Cluster

Source: Marek Grzybowski

The cluster participates or is a partner in international projects conducive to the development of innovative regions and knowledge transfer, focusing on implementation of innovations in the maritime and space industries:

1. GALATEA [HORIZON 2020] – grow and accelerate your smart projects in new value chains of the European Blue Economy
2. ZEVinnovation project aims to establish a sustainable and efficient network for the development of innovative technologies
3. TENTacle – capitalising on TEN-T core network corridors for prosperity, growth and cohesion
4. ECOPRODIGI – eco-efficiency to maritime industry processes in the Baltic Sea Region through digitalisation
5. ELMAR – supporting South Baltic SMEs to enter the international supply chains & sales markets for boats & ships with electric propulsions
6. SMART BLUE REGIONS – seeks to enhance blue growth opportunities based on increased capacity of Baltic Sea Regions to implement Research and Innovation Strategies for Smart Specialisation (RIS3).

7. E-LASS – European network for lightweight applications at sea
8. InterMarE – strengthening the international activity of blue sector SMEs in the South Baltic Sea area
9. UMBRELLA – helps boosting cross-border cooperation capacities of Local Actors in the South Baltic Sea

GALATEA is currently one of the most important projects in which the cluster participates. It is an INNOSUP project, that is a cascade funding mechanism operated by clusters impacting a large number of SMEs. Indeed, 75% of the total budget of the project has to be redistributed to projects led by SMEs. It is a first simplified experience for SMEs to access EU funding.

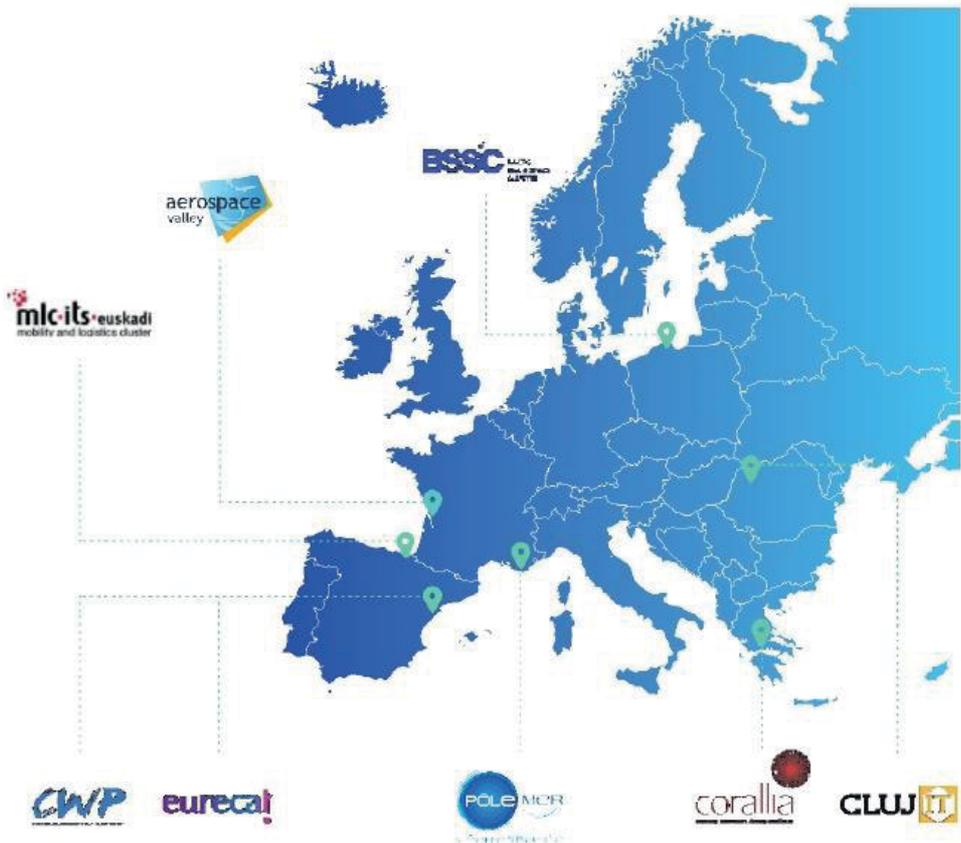


Figure 4. GALATEA Project partners map
 Source: GALATEA Project

GALATEA's overall objective is the development of new cross-sectoral and cross-border industrial value chains, supporting in particular innovative SMEs, which should be facilitated by clusters. It also aims at fostering the development of Blue Growth key industries in Europe to be competitive at the global level. This

development will be based on the construction of new industrial value chains and the reconfiguration of existing ones driven by the integration of technologies and know-how from aerospace and ICT communities to the following Blue Growth domains: ports, ships, shipyards and maritime surveillance. The project is led by Pôle Mer Méditerranée.



Figure 5. GALATEA Project area activities

Source: GALATEA Project

The task of GALATEA in a more concrete form is to create new bridges between actors from different sectoral and cultural ecosystems. SMEs' owners and their teams are facing new difficulties to keep their businesses afloat, For this reason we plan services regrading notably internationalisation of the businesses or even sustainability of the projects developed through GALATEA¹.

¹ Marek Grzybowski Interview with Clémence Le Corff and Diego Carballo: GALATEA – new cross-sectoral and cross-border industrial value-chains in the Blue Economy <https://www.eblueconomy.com/interview-galatea-new-cross-sectoral-and-cross-border-industrial-value-chains-in-the-blue-economy/> ExclusiveHomeInterviews

There are three steps aiming to support SMEs in their innovation development:

- Identification of needs: GALATEA will discuss with end-users from the 4 targeted domains in order to identify their needs and the challenges they represent for SMEs;
- Emergence of projects: through 2 different events, GALATEA will favor the discussions between SMEs and the emergence of project ideas to be submitted to the GALATEA Open Calls;
- Innovation support: GALATEA has launched a Call for vouchers and a Call for services aiming to select high-potential SMEs and support them in the development of their innovation projects.

Innovation Clubs aimed to create an open place where SMEs could meet between each other and exchange with experts from the maritime field. By using a Design Thinking methodology, within GALATEA Innovation Clubs, SMEs were able to brainstorm about the various challenges and suggest some innovative ideas on how to tackle these challenges. As the Innovation Clubs brought actors from various sectors, it was as well a place where complementarity between skills and experiences could be found.

Another BSSC joint undertaking, the **ZEVinnovation project**, aims to establish a sustainable and efficient network for the development of innovative technologies. The project's mission is to bring together professional stakeholders interested in innovative zero-emission technologies and provide lasting and tailor-made solutions that will eventually increase innovation ability across the EEA. The ZEVinnovation project aims to establish a sustainable and efficient network for the development of innovative technologies that will bring together active stakeholders.



Figure 6. ZEVinnovation Project Partners

Source: Marek Grzybowski

The ZEVinnovation network's ambition is to contribute to the strengthening of the transnational eco-system through the implementation of pilot programmes focusing on the collaborative development and market uptake of zero-emission

vessels while connecting the capacities of the EEA countries that have a strong maritime tradition and current pioneering initiatives. The project is implemented by multi-sectoral partners from Croatia, Norway and Poland: Center of Technology Transfer LLC (Croatia), Baltic Sea and Space Cluster (Poland), Inovacije i razvoj LLC (Croatia), ÅKP AS (Norway) and Vinco Innovation AS (Norway). Regardless of the differences in size and population, partner countries face common environmental challenges concerning resource limitations and vulnerability to climate changes. Transnational partners of the ZEVinnovation project are devoted to supporting enterprises across the EEA through networking and helping them achieve their growth ambitions through a diverse range of project activities².



Figure 7. ZEVInnovation Project HUB Idea

Source: ZEVInnovation Project

7 technologies allow the use of propulsion, which is supposed to enable sailing without CO₂ emissions to the environment. Experts say that we have at our disposal: an electric drive, a hydrogen-powered hybrid power plant, hydrogen fuel cells, a hydrogen + ICE, ammonia as a fuel source in combination with fuel cells or a diesel engine, as well as biofuel.

Alcohol, biomethane and ammonia are fuels that make it possible to achieve zero emissions of harmful substances in the exhaust gases of ships. These are the

² Marek Grzybowski interview with Boris Cosic Director Center of technology transfer IIC, <https://www.eblueeconomy.com/interview-boris-cosic-implementation-of-pilot-programs-focusing-on-the-collaborative-development-and-market-uptake-of-zero-emission-vessels/>

research results contained in the latest report by A.P. Moller—Maersk and Lloyd's Register – the result of studies from more than two years ago, when marine fuel was much more expensive than today. 80% of respondents believe that the maritime transport market needs zero-emission vessels (ZEV).

ECOPRODIGI is another important project in which the cluster participates. The project increases eco-efficiency in the Baltic Sea region maritime sector by creating and piloting digital solutions in close cooperation between industry end-users and research organisations. Ultimately, ECOPRODIGI supports the Baltic Sea region in becoming a front-runner in maritime industry digitalisation and clean shipping. ECOPRODIGI addresses both the environmental and economic challenges by increasing eco-efficiency at all stages of the vessel lifecycle from design and building to the use, maintenance, stowage, as well as conversion processes. In practice, ECOPRODIGI not only provides highly needed information about the key eco-inefficiencies of the industry, but also precisely develops and pilots digital solutions to better measure, visualise and optimise the industry processes (more info: <https://ecoprodig.eu/>).

The **TENTacle** is a project of the city of Gdynia whose implementation was supported by the BSSC Think Tank. It was the new flagship project of the EU Strategy for the Baltic Sea Region. One of the Gdynia main aims of participating in the project was to analyze the needs related to the transport node's development in the city. The TENTacle project was to help define the type of infrastructure and services necessary for the better and faster development of Gdynia and the entire Baltic Sea Region, and to identify what actions to take to maximise the advantage of the seaside location of the city.

– *The project helped acquire a great deal of knowledge that will allow to disseminate all activities related to transforming Gdynia into the TEN-T core network node by 2030* – explains Ryszard Toczek, TENTacle project manager in Gdynia. – *It was an introduction to the preparation and implementation of 23 investments implemented as part of the Baltic-Adriatic corridor's construction in Gdynia* (more: <http://tentacle.eu/>).

The **ELMAR** project aims to support SMEs in creating international supply chains as well as accessing foreign sales markets for boats and ships with electric propulsions. The project consortium consists of partners from Germany, Poland and Lithuania, representing regional development agencies, scientific institutions, branch associations of the yacht technology suppliers, owners of historical ships as well as electric boat producers³.

The cluster is also a partner of many international and local conferences where issues related to the implementation of innovative solutions in maritime economy are raised. The TRANSOPOT conference, the annual European Union Strategy Forum for the Baltic Sea Region and other similar events have been included in the annual calendar.

³ <http://electric-water-mobility.eu>

Scientific conferences with the participation of practitioners and startups are extremely successful initiatives of the Baltic Maritime and Space Cluster. They were implemented with the support of the Space Sciences Committee of the Polish Academy of Sciences and the Institute of Oceanology of the Polish Academy of Sciences. Conferences were also organised by universities from Pomerania: the College of Administration and Business, the Naval Academy, Gdańsk University of Technology and the University of Gdańsk.

The following conferences were held in the years 2018-2021:

- 09-11-2017 – Space Cluster. Intelligent Specialisation? Risk management, finance and insurance in space projects – University of Business and Administration in Gdynia.
- 08-03-2018 – Space and Sea, Institute of Oceanology, Polish Academy of Sciences, Sopot
- 20-09-2018 – Baltic Sea & (Outer) Space New perspective for our region, Institute of Oceanology, Polish Academy of Sciences, Sopot
- 22-11-2018 – Seaport + Space Infrastructure Synergic Network under common management, University of Business and Administration in Gdynia.
- 19-03-2019 – Autonomous ships. Inevitable reality at sea, Gdansk University of Technology.
- 18-05-2019 – Institutional Cooperation at Sea & (Outer) Space Essential adjustments needed to boost full potential, Gdańsk University, Law and Administration Faculty.
- 19-09-2019 – Remote sensing. Challenges in gather and sharing data Conference, Naval Academy Gdynia
- 14-11-2019 – Sea and underwater drones – Unidentified Sea Objects, Naval Academy, Gdynia
- 24-09-2020 – Smart Port. The merged sea & space network, Baltic Sea & Space Cluster, Space Sciences Committee Polish Academy of Sciences / Gdańsk Branch and Polish Space Agency (POLSA) -Gdynia – University of Business and Administration in Gdynia
- 19-11-2020- Artificial Intelligence. In search for synergy, Technical University of Gdańsk, Baltic Sea & Space Cluster, Space Sciences Committee Polish Academy of Sciences / Gdańsk Branch and Polish Space Agency (POLSA)
- 11-03-2021 – Baltic Sea. Reflection of the stars, Institute of Oceanology, Polish Academy of Sciences, Sopot
- 20-05-2021 – Launch of the Polish Space Rocket, Pomeranian University, Słupsk
- 23-09-2021 – Maritime and space safety, University of Gdańsk
- 18-11-2021 – Cosmos. Dialog between West and East, University of Warsaw



Figure 8. BSSC Conference in GDYNIA NAVAL ACADEMY

Source: BSSC

Successful strategic activities include B2B meetings organized by the Baltic Sea and Space Cluster. So far, fruitful meetings have taken place in many ports, shipyards, design offices and manufacturing plants related to maritime and space industries. In Poland, as an expert, PKM operates in the smart specializations of Pomerania. ISP1 – Offshore and port-logistics technologies; “maritime” specialisation, which includes: ship and offshore construction (e.g. placing offshore wind farms), logistics in ports and at their hinterland, use of biological resources of the sea. ISP 2 – Interactive technologies in the information environment, specializing in “ICT”, i.e. information and communication technologies, including: ICT solutions for production and services, ICT tools for managing urban space, management of large data sets, business use of satellite technologies. The BSSC was the initiator of the creation and development of the national smart maritime specialization. Innovative marine technologies in the area of specialized vessels, marine and coastal constructions as well as maritime and inland logistics and transport.

The positive attitude of companies’ CEOs, board members and employees to cooperation for the benefit of Polish maritime and space technologies gives measurable marketing effects and contributes to the synergy effect resulting from cooperation between business, administration and science. The members of the Baltic Maritime and Space Cluster in the recent years have strengthened their position on the international market, integrated their activities on the national and international forum by participating in international fairs and conferences, supporting the transfer of knowledge between business and science. One of the most important achievements of our cluster members is active participation in the creation of intelligent maritime specializations in Pomerania.

Marek Grzybowski,

President of the Board, Polish Nautical Society, Baltic Sea and Space Cluster