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The COVID-19 pandemic has not stopped work on innovations in maritime transport. An agreement has recently been signed to prepare the ports to handle unmanned ships.

Eight leading maritime countries have created a new network that will support the preparation of ports for handling autonomous ships. The new agreement was called MASSPorts because it concerns the operation of Maritime Autonomous Surface Ships (MASS). Representatives from China, Denmark, Finland, Japan, the Netherlands, Norway, Republic of Korea and Singapore were convened during a network meeting for the launch of the event on 4 August. The International Maritime Organization (IMO), International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), as well as International Association of Ports and Harbors (IAPH) also joined MASSPorts initiative.



The operation of fully unmanned vessels in ports is still not legally possible. In addition, to handle such ships, appropriate infrastructure is necessary, for example, allowing for automatic mooring. Ports must have adequate infrastructure to ensure safe sailing. These are not the only challenges. The initiators of the MASSPorts network highlighted the need to develop standards for autonomous units and wharfs where these ships will moor and electric ships will charge their batteries. It is also necessary to establish a common terminology so that technical, legal and organizational solutions guarantee full ship safety in ports. These problems were widely discussed by the members of the Baltic Sea and Space Cluster during the scientific conference “Sea Port + Space Infrastructure. Synergic Network Under Common Management” in 2018. The results and conclusions of the research can be found in the book *Per Mare ad Astra. Space Technology, Governance and Law*. It discusses technical, organizational and legal aspects related to the integration of knowledge in the field of marine and space technologies. The book was published by the Polish Academy of Sciences, Gdańsk Branch.



“Autonomous navigation is an important part of our plans to be a future-ready port. We see MASS having the potential to enhance navigational safety and increase productivity,” said Quah Ley Hoon, Chief Executive of the Maritime and Port Authority of Singapore. Network participants will focus on developing detailed guidelines and conditions for the operation of autonomous ships in ports. Port operations are to take place under the IMO Interim MASS Test Guidelines. The problem is to coordinate the movement of manned and unmanned ships. This problem was checked at the Port of Gdynia in 2019. We would like to remind you that attempts to operate unmanned vessels have already been successfully carried out at the Port of Gdynia. Two members of the Baltic Sea and Space Cluster: Marine Technology and Centrum Techniki Okrętowej (Maritime Advanced Research Centre) presented their vessels on the waters of the port of Gdynia last year. It was the first maneuver of two unmanned units without interrupting handling and vessel traffic in the port in the world.



„The Hydrodron 1 presented by us is the result of an order for the implementation of an autonomous / remotely controlled multitasking surface platform for operations in limited waters”, informed Prof. Andrzej Stateczny, director of Marine Technology. „Hydrodron can measure in harbors, anchorages, lagoons, bays and lakes, rivers and other small water areas”. Hydrodron was created as part of the project entitled “Development of an autonomous / remotely controlled floating platform dedicated to hydrographic measurements in limited waters”. The project was carried out as part of the competition of the Polish National Center for Research and Development: INNOSBZ.

Maciej Lang from Echogram (a member of the BSSC Cluster) has been conducting bathymetric measurements, searching for underwater obstacles and creating the 3D bottom numerical models using an unmanned vessel for several years. At the conference “Autonomous ships—Inevitable reality at sea” the use of this unit at the Faculty of Ocean Engineering and Shipbuilding was presented. The conference was organized by the Baltic Sea and Space Cluster and the Space Sciences Commission of the Polish Academy of Sciences from Gdańsk and took place at the Gdańsk University of Technology.

“We are aware of the fact that conventional shipping will remain a reality in our port but we are also convinced that smart ships and even autonomous ships will be visiting Rotterdam as well. Smart ships need smart ports. Innovative co-operation between ports, the industry and shipping are the key,” said René de Vries, State Harbourmaster of Port of Rotterdam Authority.

Great Britain is consistently preparing to accommodate autonomous ships in ports. In November last year, Maritime UK published the third version of its Code of Conduct, which contains updated guidelines for the operation, assessment and deployment planning of MASS. Work is also underway within the IMO. Its goal is to support the autonomous ships operations in ports. The IMO started work to identify the safety, security and environmental aspects of MASS operations in line with existing IMO standards in 2018. Maritime and Port Authority of Singapore CEO Quah Ley Hoon said: “Autonomous navigation is an important part of our plans to be a future-ready port.”

Participants in the MASSPorts network will benefit from the experiences of countries and ports that undertake practical activities in the use of autonomous units in transport and other port functions. Japan has greatly accelerated work on the development of autonomous ships. It aims to reduce the workload of seafarers and the risk of accidents, and to improve the efficiency of maritime transport. Japan, however, is still in the research phase and is focusing on three types of autonomous technologies: autonomous navigation (collision avoidance), remote-controlled navigation and automated mooring.

The Republic of Korea has declared that it will invest approximately \$130 million. in the development of autonomous navigation systems and their application on ships in 2020-2025. Korean researchers are working on developing intelligent maritime infrastructure and services such as smart ports and maritime satellite communications. The project of the unmanned vessel commissioned by the Maritime Safety Administration (MSA) has been working in China for several years. A special group of experts has been established. The “Unmanned Multifunctional Maritime Ships Research and Development Project” is coordinated by the Zhejiang MSA department with the support of Wuhan University of Technology.

The Baltic Sea Region is very active in innovation and initiatives related to the development of MASS. The One Sea project was established in 2016. It will generate not only a vessel, but also a DIMECC (Digital, Internet, Materials & Engineering Co-Creation) system. The consortium members are: ABB, Cargotec (MacGregor and Kalmar), Ericsson, Meyer Turku, Rolls-Royce, Tieto and Wärtsilä. Design and implementation activities are supported by the Finnish Marine Industries maritime cluster and the Finnish Tekes fund. This organization integrates the activities of about 2,000 innovators from various fields, over 400 organizations, 69 shareholders and over 10 project coordinators. There are also foreign partners of the platform from China, Flanders, Italy and Germany. According to the announcements of the project participants, unmanned ships in the Baltic Sea should already be in 2025.

The Danish Maritime Administration (AMD) has launched a program to build and operate an autonomous ship. The conceptual phase of AMD is carried out by the Technical University of Denmark (DTU). The feasibility study and the commercial unmanned vessel project are financed by a special Danish Maritime Fund. Norway is very

advanced. The Norwegian companies Wilhelmsen and Kongsberg established the world's first autonomous ship operator. The Yara Birkeland unmanned container ship (120 TEU) was built in Norway at the initiative of the Yara fertilizer factory in Herøya. The hull built in Romania (80 m long and 15 m wide) is equipped at the Vard shipyard. It is an electric ship with the possibility of autonomous operations. Yara Birkeland is a product of the Norwegian Maritime Cluster, which includes, among others, the fertilizer manufacturer Yara, KONGSBERG, DNV GL, Marin Teknikk, SINTEF Ocean. The initiative received organizational and financial support (NOK 133 million) from the Norwegian maritime administration.

Poland also has achievements in the design, construction and use of small MASS. Companies and universities operating within the framework of the Baltic Sea and Space Cluster have already completed successful projects related to the development of autonomous ships. The Baltic Sea and Space Cluster will provide financial and expert support to small and medium-sized companies that will present projects supporting the construction and operation of intelligent units in open waters and in ports as part of the GALATEA project. Pomorskie Voivodeship, Ports in Gdynia and Gdańsk, Pomeranian Special Economic Zone, Gdynia shipyards and other members of the Cluster declared their support for innovative activities. BSSC members have the knowledge, experience and will to create innovative projects in maritime industries. The European Commission supports us financially. The conditions for active involvement in the processes of creating and implementing innovations in shipyards, ports and sea transport were created. There are good chances that Polish solutions will find application in the new MASSPorts network.