Final Project Conclusions

R-Mode Baltic

Project title	Project duration
Ranging Mode for the Baltic Sea	October 2017 - September 2020

Priority	Specific objective
Sustainable Transport	Maritime safety

Budget	Spent budget	Flagship project	EUSBSR Policy Area/Horizontal Action
3.43 million	3.1 million	x	PA Safe

Link to the project library	Link to the project's website
https://projects.interreg-baltic.eu/projects/r-mode-baltic-90.html	

Lead partner (country)	Countries involved
German Aerospace Center (DLR) (Germany)	DE, PL, SE, NO

Project summary

Teaser

The Interreg project R-Mode Baltic launched a technical system for a safer ship navigation, and placed the Baltic Sea as a first operational navigation test area for maritime terrestrial navigation on the global map.

The challenge

As Baltic Sea is known for frequent shipping accidents like groundings, collisions and other types of accidents, the challenge was to prevent and minimise the accidents´ frequency. The causes of the accidents are partly related to human-driven failures and partly to technical inefficiencies. The maritime users expressed their needs in more optimal solutions to ensure more accurate positioning, navigation and time information.

While navigating, the ships need to ensure safety when the established Global Navigation Satellite Systems (GNSS) fail due to interference or jamming. A technical system that would allow for safe ship navigation under these conditions was lacking. Signal disturbances would cause wrong positioning or temporary outages of the GNSS positioning equipment.

The project R-Mode Baltic intended to tackle the challenges related to disturbances and develop a new independent of GNSS system that would allow a safe and more accurate positioning.

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DE	DK	EE	FI	LT	LV	NO	PL	RU	SE
									

Project's highlights

The highlights present the project's main achievements and results, e.g. change brought for the target groups, pilots or tests carried out, and exemplary transnational work.

The R-Mode Baltic project as a forerunner

The R-Mode Baltic project became a forerunner for the implementation of the maritime terrestrial navigation system. The system is called R(anging)-Mode and enables to increase the safety of maritime transport. The project brought together research institutions, national maritime service providers and industry partners. The partners further developed the R-Mode technology and verified R-Mode as a suitable approach for coastal navigation.

Furthermore, the project started the standardisation process of R-Mode for maritime infrastructure. The first guideline for R-Mode on very high frequencies was finished. Further guidelines, recommendations and performance standards are under development. Additionally, the project introduced ship and shore site R-Mode prototypes.

The first worldwide large-scale R-Mode testbed introduced

The project set up the first worldwide large-scale R-Mode testbed. With its transnational character, the testbed brings Germany, Poland, Sweden, and Denmark together in their efforts to protect the environment and prosperity of the Baltic Sea region by reducing the threat of shipping accidents. The testbed provided a platform for a variety of tests and further development of the navigational system. Furthermore, it can be used for training, demonstration and gathering experience from system operation

Supporting material developed

Besides the R-Mode system applied in the southern Baltic, the project generated the material which includes R-Mode signal design for two communication systems, the approaches for digital signal processing and methods for positioning with the help of R-Mode signals. The Interreg project R-Mode Baltic used EUR 3.1 million from the European Union to improve maritime safety, prevent the increasing number of shipping accidents, to test the alternative technical solutions, and make available the documented work for broader use.

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Main Outputs

The main outputs present the project's main deliveries which are tangible and can be used by others outside the project.

Ranging-Mode technology developments

The project developed the R-Mode technology for the implementation into two types of broadcast signals widely available for maritime shore infrastructure. The documented work covers the results of R-Mode signal design for two communication systems, the approaches for digital signal processing and methods for positioning with the help of R-Mode signals. Furthermore, it displays the results of successful R-Mode tests in the port of Gdynia, at the Baltic Sea and in Germany. These documents address challenges and solutions for R-Mode and provide guidance to maritime service providers, manufacturers of navigation equipment, ship owners, pilots, and nautical staff.

https://www.r-mode-baltic.eu/publications/

R-Mode Baltic testbed

Eight maritime radio beacons were upgraded in order to transmit synchronised R-Mode signals. They span a transnational network which enables terrestrial navigation in coastal waters in the southern Baltic Sea. The project prepared four additional sites for the deployment of R-Mode ready base stations of the very high frequency data exchange system which were developed as prototypes. The testbed opened a variety of tests and further development of the navigational system and could be used for training, demonstration and gathering experience from system operation. The testbed addresses especially national maritime service providers and standardisation organisations to develop R-Mode as a world-wide accepted terrestrial navigation system.

https://www.r-mode-baltic.eu/

Follow-up/spin-off activities

These include specific new activities that have been inspired by or initiated during the project work and will be continued after its implementation.

The project consortium started the standardisation process of R-Mode in the organisation for maritime infrastructure. The first guideline for R-Mode on very high frequencies was finished. Further guidelines, recommendations and performance standards are under development or planned. The testbed will give valuable input to these activities.

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The project R-Mode Baltic 2 will implement long-term evaluations of the R-Mode performance and new R-Mode concepts in the Baltic testbed. Furthermore, the testbed will be extended by increased monitoring capabilities.

The R-Mode Baltic testbed is open to be used by other organisations and projects. The project partners are able to support actives at shore and ship sites. This could be the testing of new R-Mode concepts and equipment.

Administrative matters

These include specific good practices, financial implications, challenges as well as synergies and cooperation with other projects and the main drivers of the project (core partners).

Safe shipping is in the interest of all Baltic Sea states. For R-Mode Baltic it was important to include national maritime service providers of riparian states of a larger region in the project consortium. Furthermore, the goal to set up an operational R-Mode test system required in addition the expertise of different research institutions and the know-how of prototype development. The BSR Programme was perfect to bring all experts together and to enable the successful and sustainable implementation of our ideas.

R-Mode Baltic was an implementation project which was strongly affected by the Covid-19 pandemic. Successful completion was only possible after project extension and using flexibilities offered by the BSR Programme (budget flexibility, reallocation of budget).