



bringing land and sea together



BLAST

Bringing Land and Sea Together

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Harmonising spatial information across the North Sea region

With the purpose of Bringing Land and Sea Together, the BLAST project addressed coastal management and maritime safety in the North Sea region.

From 2009 - 2012, 17 governmental organisations, universities and private companies from 7 North Sea countries collaborated to harmonise and integrate spatial data across the land-sea boundary.

Funded by the European Union's Interreg IVB North Sea Region Programme, the project produced several state of the art results that will contribute to more harmonised and collaborative planning and management around the North Sea.

Up to the boundaries

BLAST produced an array of digital tools and platforms for addressing a fundamental and historical challenge surrounding spatial data.

Traditionally, spatial data on the landward side have been collected and maintained by topographic mapping or cadastral agencies and used primarily for spatial planning, administrative management and nature conservation.

Spatial data on the seaward side have been customarily collected by hydrographic offices, with the main purpose of supporting marine navigation and ensuring safety at sea. This has created a disconnect between land and sea data, and a varying quality of

data used for planning and management of vulnerable and sensitive marine areas and coastal zones.

Crossing the boundaries

BLAST addressed this disconnect by demonstrating how spatial data for marine and coastal areas can be harmonised, whether across administrative, national, physical or ecological boundaries. This booklet highlights the results that the BLAST partners achieved over the course of the project. It also identifies how the project's results, prototypes and programmes can be accessed by the partners and by interested stakeholders after BLAST's completion.



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The project

Results



REVIEW AND DOWNLOAD

To review and download the results of the BLAST project, visit www.blast-project.eu.

The opposite page is an overview of the downloadable reports and materials at the website.

LAND AND SEA MODEL

- A **transformation tool** for converting between national vertical reference frames and a shared North Sea vertical reference frame
- An analysis of new techniques for **surveying shallow-water areas** in the coastal zone, based on trials on the Danish and Flemish coasts
- An **INSPIRE-compliant metadatabase** that catalogues all the geodata used in the BLAST project
- A report on a trial **integration of topographic and hydrographic data**

NAVIGATING THE NORTH SEA

- A comparison of information flow between mariners and the hydrographic offices in Germany, Norway and Denmark, and a prototype **Maritime Data Collection System** that can streamline this data flow
- A prototype **North Sea Mariners' Routing Guide**
- An analysis of how **3D navigational tools for the maritime sector** can improve safety at sea
- A tool that can **identify inconsistencies between adjacent ENC cells**
- A trial application of the IHO's SNPWG (Standardisation of Nautical Publications Working Group) data model for **converting nautical publications to chart features**

MARITIME TRAFFIC HARMONISATION

- An analysis of **user needs for an improved maritime traffic monitoring platform** for the North Sea region
- An animation that demonstrates how BLAST's **contributions to developing SafeSeaNet** have underpinned improvements to traffic monitoring in the region
- A study of new web services and a platform for **better utilisation of AIS data in monitoring regional shipping traffic**
- A validation of concept of the **software system now in use at the North Atlantic Information Management Centre (NAIMC)**

CLIMATE CHANGE IN THE COASTAL ZONE

- A **survey of Integrated Coastal Zone Management policies and best practices** around the North Sea
- A review of **scenarios for future sea level rise** in the North Sea region
- An analysis of **climate change adaptation strategies**
- A **review of sustainability indicators** for Integrated Coastal Zone Management
- A **web-based decision support system (COINS)** to assess the impacts of climate change in the coastal zone

A land – sea model

that can improve coastal zone management

The quality of data covering coastal regions can be limited for a number of reasons: land- and sea- surveys don't always match up at the coastal margin, techniques for surveying low-water areas are limited, and the highly dynamic coastal environment can change more rapidly than maps and charts can be updated.

Linking the land and sea

In order to integrate geodata across the land-sea boundary and across national boundaries, BLAST addressed several existing issues. The first was a challenge related to vertical datums.

Evening out the surface of the sea

Each country in the North Sea region has its own model of how the earth, including the seabed under the North Sea, is shaped. As a result, each country's model of its own territorial waters in the North Sea is distinctive. If these models in their respective vertical datums were joined up, there would be a "wall of water" where their at-sea boundaries meet.

To remedy this issue, BLAST created a shared North Sea vertical reference frame and a transformation tool that permits users to convert data from one vertical datum to another. This now means that more intensive investigations of North Sea phenomena can be conducted, including modelling of sea level rise across the region.

Identifying the coast(s)

Harmonised planning along the coast, in the intertidal margin and in shallow-water areas often requires a com-

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prehensive view of the coastline. Since tides make the coastline a dynamic feature, the coast can be mapped in numerous ways, depending on the situation. For example, electronic navigational charts typically identify the coast based on the lowest astronomical tide (LAT); this is done to ensure the safety of navigation. On the other hand, land maps generally utilise local tidal observations such as Mean Sea Level (MSL).

To address this issue, BLAST extracted the best-scale coastlines from land maps and from electronic navigational charts, and combined them in a single map; the result demonstrates significant differences between the two coastlines. The new linked terrestrial-marine map, including its differentiation of the land- and sea-coastlines, underlines the fact that existing maps and charts are developed for their respective purposes, and not necessarily for work across the coastal margin. It

also underlines a need for a more streamlined foundation for planning cross-coastal development and conservation.

Surveying low water

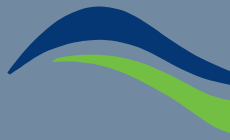
Due to the challenges of surveying shallow waters, the depth information for many areas along the coastal margin of the North Sea is of limited quality. Survey ships have difficulty navigating in shallow water areas, and therefore many areas are represented by outdated survey data. BLAST investigated several new techniques for surveying these shallow coastal areas, based on airborne LiDAR and shore-based Argos radar. With better knowledge of these shallow areas, nautical charts can be improved and coastal zone planning can be strengthened significantly.

Decisions about the future development of the coastal zone are strongly dependant on accessibility of up-to-date and reliable geographic information and accompanying metadata. BLAST applied its harmonised land-sea model in the creation of a Coastal Indicator System (COINS) that can be used to assess the future impacts of growth, development and climate change in the coastal zone.



TWO UNIQUE COASTLINES

The image below depicts an electronic navigational chart of an island in Plymouth Sound, UK. In the chart, the line between the blue and green areas depicts where the lowest tide level can be found; the green area represents the intertidal area around the island, which is ordinarily dry at low tide and inundated at high tide. The yellow area represents the land, which is assumed to be always dry, even at high tide. The dark blue line that is superimposed on the chart depicts the coastline from a land map of the island. There are only few locations in the image where the electronic navigational chart and the land map "agree" on the placement of the coastline.



COINS

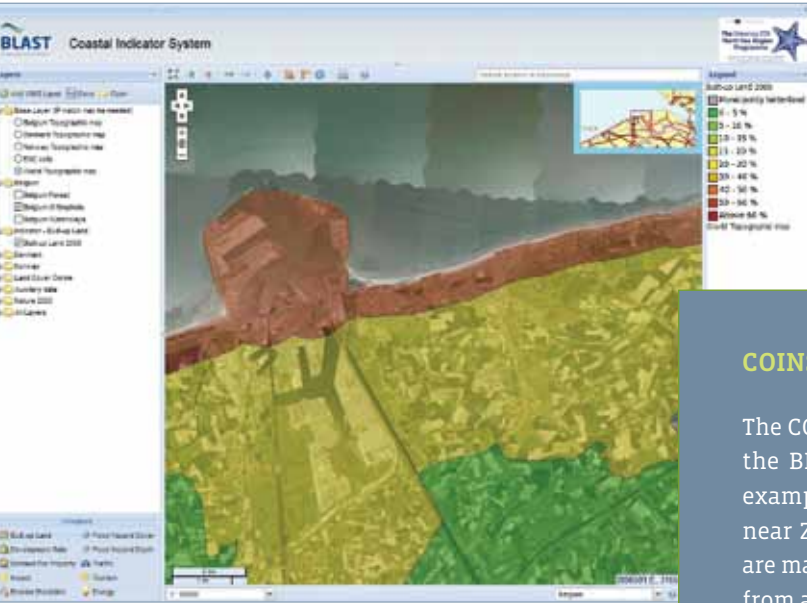
for coastal planning

In a context of climate change, planning in the coastal zone can be challenged by the array of activities that occur here. From wind- and tidal-driven renewable energy devices to maritime traffic to key vulnerable ecosystems, there are many stakeholders and interests in the coastal zone. To generate development and conservation plans that are sustainable and well-fitted to the surrounding region, integrated coastal zone data are essential.

Since the importance of Integrated Coastal Zone Management (ICZM) was recognised at the World Summit in Rio de Janeiro in 1992, specialists have worked towards new ways to manage sensitive coastal areas. The European

Expert Group on ICZM has developed a set of 27 indicators to monitor the sustainable development of the coastal zone. BLAST used a selected set of the sustainability indicators as the foundation for a new decision support system called COINS (for COastal INdicator System).

Through a web-based platform, COINS shows harmonised land-coast-sea data for the North Sea region, and illustrates how the ICZM indicators can support assessment of the future impact on the region's diverse coastal zones. COINS concentrates on the ICZM indicators particularly related to the impact of climate change: maintaining undeveloped stretches of coast, protecting the natural and cultural heritage of the coastal zone, assessing threats to coastal zones posed by climate change, and determining potential for renewable energy generation.



COINS FOR ICZM

The COINS system is available through the BLAST website. To the left is an example analysis of the coastal zone near Zeebrugge, Flanders, where there are many pressures on the coastal zone from activities both on land and at sea.

Harmonised maritime information

that reinforces safety at sea

With a focus on safety at sea and improved information about maritime conditions, BLAST presented several new approaches to how critical maritime information can be collected, applied and distributed.

Navigating by more harmonised information

As part of the BLAST project, hydrographic offices, coastal authorities, industrial stakeholders and mariners came together to develop new approaches for ensuring that the information used to plan and navigate by is accessible, updated and harmonised across the North Sea region. While international standards shape how each country develops and presents its nautical information to navigators, these standards are subject to interpretation. As a result, mariners often need to consult many disharmonised information sources in order to plan cross-boundary voyages.

Reinforcing the North Atlantic Information Management Centre

With the existing functionality of SafeSeaNet as a foundation, BLAST examined new opportunities for wider interoperability of maritime traffic information in the North Sea. BLAST members proposed new functionality for the North Atlantic Information Management Centre, which opened in Haugesund, Norway in 2010. The Centre exchanges real-time vessel-related information to countries around the North Sea region, and BLAST's contribution focused on simplifying the maritime information that the Centre's personnel monitor and distribute.

Finding the gaps

The BLAST partners collaborated to create several platforms for harmonising nautical information. The first was a tool that identifies discrepancies between elec-

TRAFFIC MONITORING IN ACTION

See an animation of how BLAST helped to simplify the data managed by the North Atlantic Information Management Centre at blast-project.eu.



tronic navigational chart (ENC) cells. Finding inconsistencies between adjacent ENCs from different producers has historically been a labour-intensive process that was prone to errors.

The ENC harmonisation tool can identify shifts in depths, contours, discontinuities in cable depictions, gaps between cells and similar discrepancies, all of which can cause electronic charts' users to question their accuracy.

3D at sea

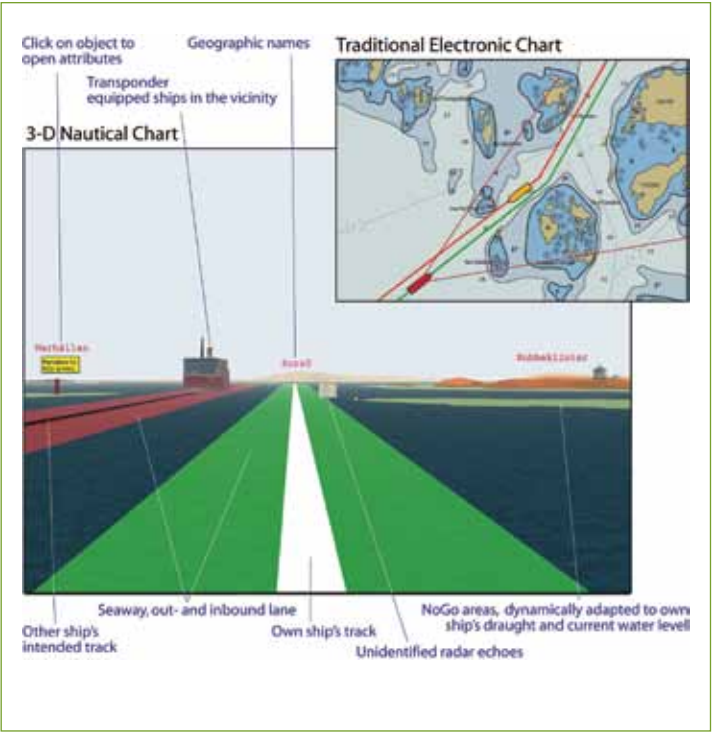
As ships get bigger, with minimum under-keel clearances and the use of locks and swinging space to the maximum, port navigation is becoming increasingly challenging. BLAST investigated one solution to this challenge in the form of a 3D test model that can allow navigators to follow a 3D model of their own ship in correct real-time position through a GPS interface, using near real-time water level. This allows navigators to see exactly where their ship is located in relation to the sea surface and port constructions during manoeuvres.

BLAST created a 3D viewer that ships can use to improve their navigation, not only in port but also at sea. This initiative was underpinned by studies showing that, in critical navigation situations, 3D visualisations can minimise mariners' reaction times.

Linking chart data across the North Sea

To improve the basis for mariners to plan voyages across the North Sea, BLAST created a prototype North Sea Mariners' Routing Guide. The guide includes harmonised nautical publications information from all the countries across the region. It also integrates contact information, legal restrictions, reporting requirements and other auxiliary information for three test areas in Germany, Norway and Denmark. While creating the Routing Guide, the BLAST partners tested a data model for linking nautical publications and charts that has been proposed by the Standardization of Nautical Publications Working Group (SNPWG) under the International Hydrographic Organisation (IHO).

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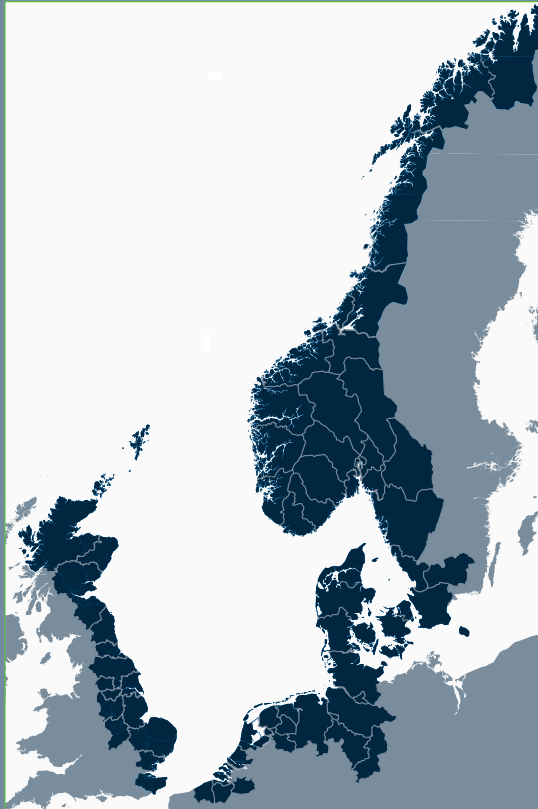
Direct access to hydrographic offices

For three partner countries, BLAST examined the administrative distance between mariners, who continually make observations at sea, and Hydrographic Offices, which are charged with creating and maintaining nautical charts and publications.

To reduce this distance, and to improve the flow of information between mariners and chart authorities, BLAST created a Maritime Data Collection System. This online platform offers a chart viewer and a publications viewer for test ports in Germany, Norway and Denmark. Through the online portal, mariners and other web us-

ers can propose changes or updates to nautical charts and publications based on their own at-sea observations.

Also part of the Maritime Data Collection System is a switchboard that permits the flow of proposed changes and updates between maritime authorities, ensuring that all relevant actors are involved in ensuring the conditions at sea are as safe as possible for navigation.



© North Sea Region Programme

Main partners

- Norwegian Hydrographic Service (lead partner)
- Norwegian Coastal Administration
- National Survey and Cadastre - Denmark
- Danish Coastal Authority
- DTU Space (National Space Institute) - Denmark
- Local Government Denmark
- Aalborg University - Denmark
- Federal Maritime & Hydrographic Agency - Germany
- Jeppesen GmbH - Germany
- T-Kartor AB - Sweden
- Malardalen University - Sweden
- Natural Environment Research Council - United Kingdom
- Seazone Solutions Ltd. - United Kingdom
- UK Hydrographic Office
- Agency for Maritime and Coastal Services - Belgium
- Delft University of Technology, Faculty of Aerospace Engineering - the Netherlands

Sub-partner

- Hjoerring Municipality - Denmark

Associated partners

- National Environmental Research Institute (Aarhus University) - Denmark
- Lolland Municipality - Denmark
- Port of Oslo - Norway
- Swedish Maritime Administration
- Icelandic Maritime Administration
- Kristiansand Municipality - Norway

The Interreg IVB
North Sea Region
Programme



Investing in the future by working together
for a sustainable and competitive region

