



The future of Vessel Traffic Management in Europe

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MarNIS – Maritime Navigation and Information Services – is an Integrated Research Project within the EU 6th Frame Work Programme, formed to further the use of advanced and future technology within E-Navigation. A four year project, MarNIS was initiated in November 2004 with a budget of €18.2m (€12m EC contribution) and has 44 partners and 12 sub-contractors from 13 countries.

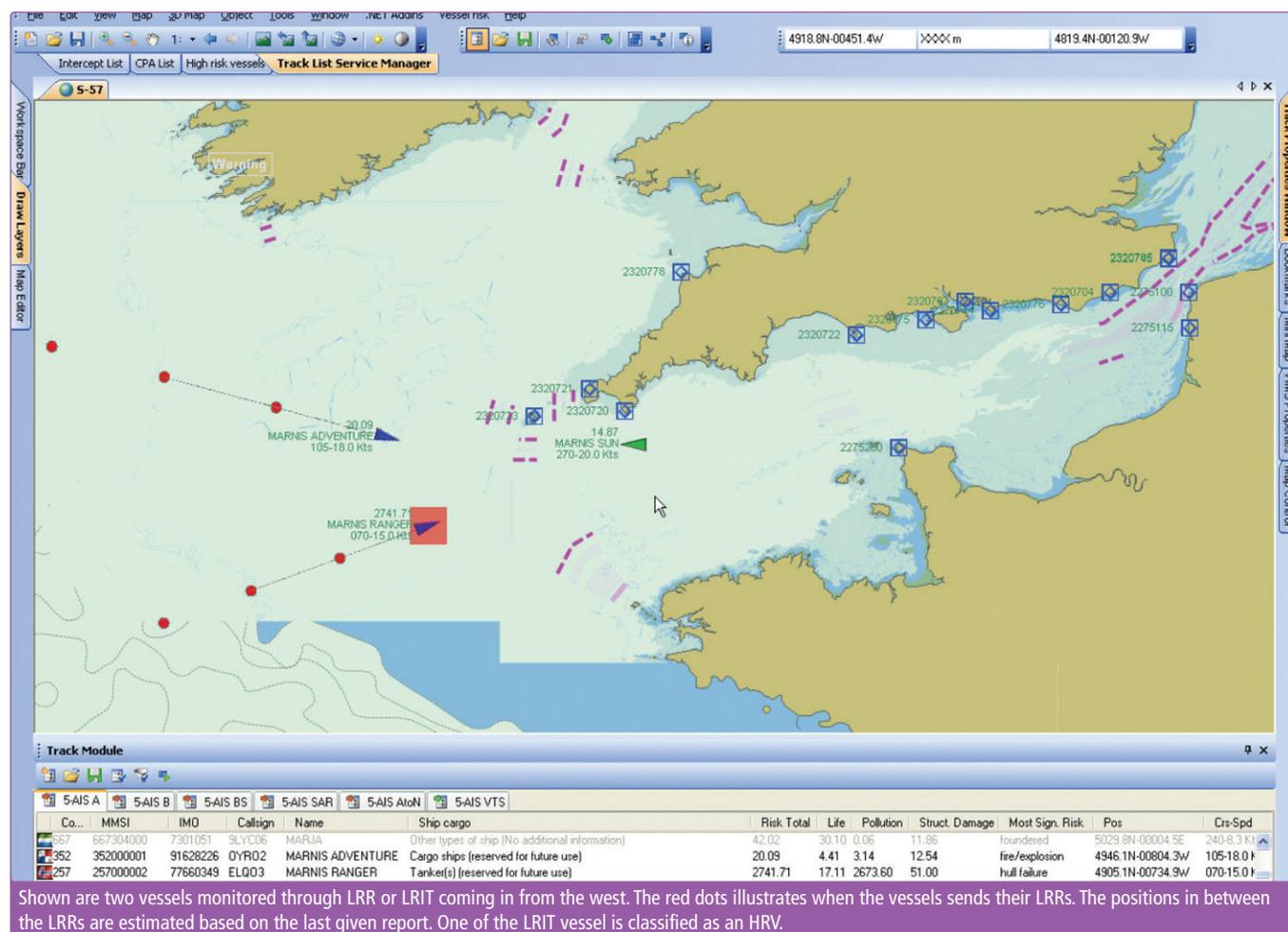
A vast breadth of knowledge and experience within the consortium comes from Ministries of Transport and Port Authorities, Professional organisations (Harbour masters, Pilots), Industry & IT companies, Universities & Research Institutes, from across Europe. These pan-European partners will be instrumental in bringing the use of advanced technologies to the forefront within Vessel Traffic Management systems (VTM). The technology focus of MarNIS includes:

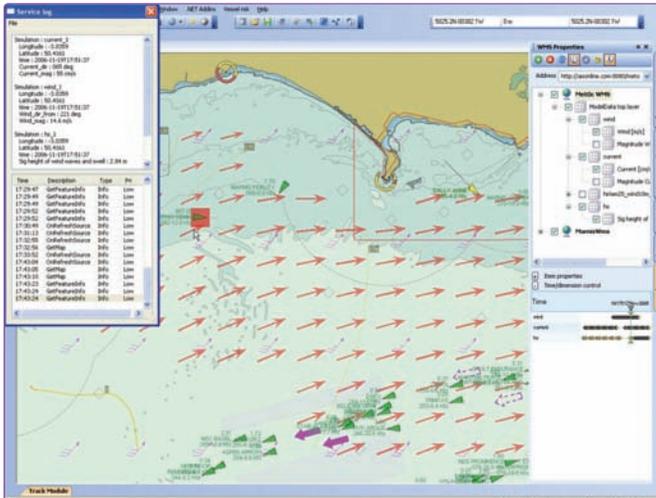
- Automatic Identification System (AIS)
- Long Range Identification & Tracking (LRIT)
- Galileo (Position/Communications)
- Synthetic Aperture Radar/Side-looking Airborne Radar/Satellite based sensors

These technologies will be coalesced into one operator facing system, currently labelled the Maritime Operations Service (MOS) centre. The background of the MOS concept is varied but a major goal is to avert past disasters such as Braer/Erika/Sea Empress/Prestige. Through use of new technology and the breadth of experience in the MarNIS consortium, it is predicted that a new, more pro-active rather than reactive VTM equivalent will avert such disasters. The intention is that a MOS operator(s) can view and utilise information from specialised services at one operator station, including: Coastal VTS, Oil Pollution Response, Search & Rescue and Maritime Assistance Services (MAS).

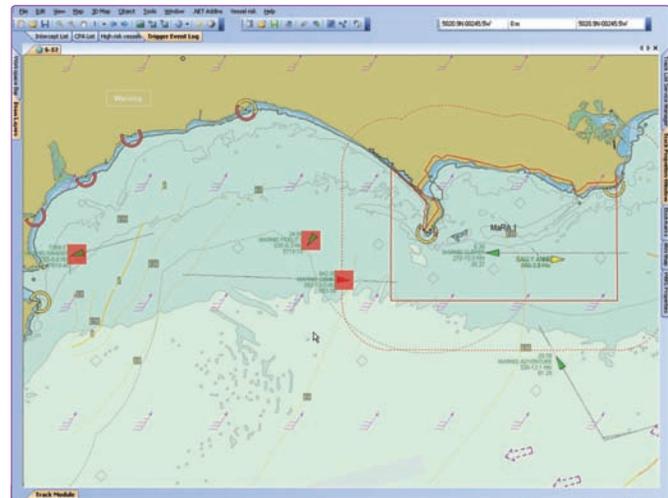
C-Scope User Interface

Kongsberg Norcontrol IT has been developing the interface and operator system that will form the front end of a MOS centre. The Kongsberg Norcontrol IT C-Scope User Interface software formed the platform for an in depth MOS demonstration, which was held at the MCA's Highcliffe Training Centre on 13 & 14th Feb 2007. The event, attended by MarNIS members and stakeholders from all over Europe, demonstrated progress against a scenario set in 2012 and demonstrated many of the benefits of the





Shown how weather forecasts can be accessed and displayed through the use of WMS. In this example the user has selected wind, sea current and significant wave heights (yellow lines labelled with height in meters). The information is overlaid on the electronic chart. The user can also request to see the forecast data close to a given location by clicking in the chart.



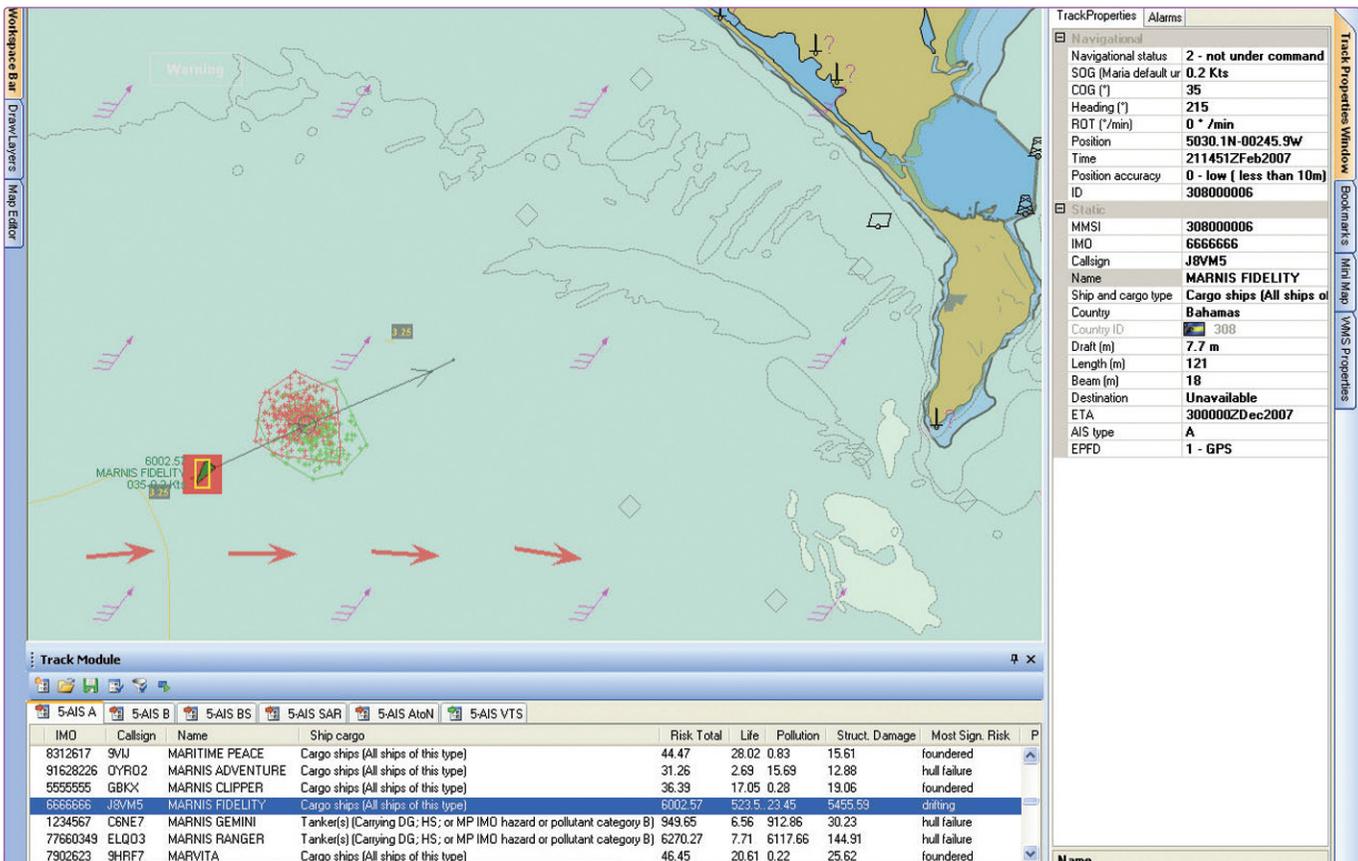
Shown are the results from a ship drift simulation for a given high-risk vessel that suffers from an engine failure. The result is accessed and displayed using WMS. The black arrow heads illustrates where the vessel most probably will be after one hour, two hours, etc. The framed dots illustrates the set of results from the Monte Carlo simulation.

MOS concept, such as:

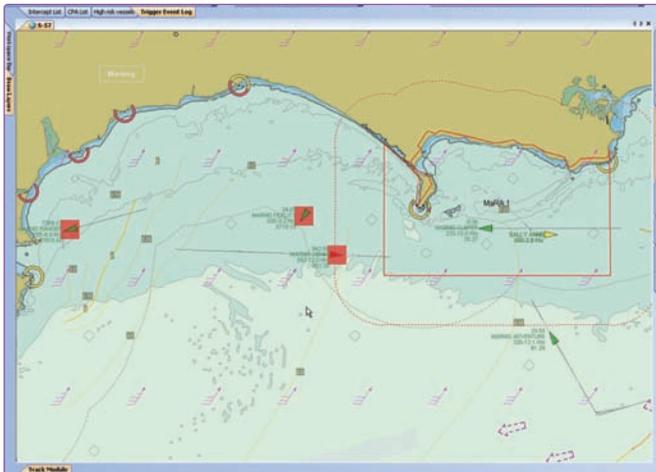
- Identification of High Risk Vessels (HRV)
- Vessel Traffic Management in coastal waters
- Dynamic Routing of vessels
- Electronic transfer of data from one authority to another
- Use of LRIT
- Combined monitoring of Search & Rescue (SAR) and Oil Pollution Response (OPR)
- Blending of existing SAR and OPR into a new MarNIS structure

- Use of resources to manage a marine incident
- Use of MOS for other public interest activities.

The MOS version of the C-Scope User Interface produces the Traffic Image via AIS, Radar and other sensors, including the forthcoming LRIT and Long Range Reporting (LRR). A key focus of the MOS concept is to create a pro-active service by introducing MarNIS Risk Areas (MaRA), which enable the operator – in the case of the demo, an MCA VTS operator based at a coastal MRCC – to set alarms when vessels enter certain pre-determined areas.



Shown are the results from a ship drift simulation for a given high-risk vessel that suffers from an engine failure. The result is accessed and displayed using WMS. The black arrow heads illustrates where the vessel most probably will be after one hour, two hours, etc. The framed dots illustrates the set of results from the Monte Carlo simulation.



Shown is a high-risk vessel entering the buffer zone of a MarRA. The vessel symbol then turns red. This will happen only for vessels that are classified as high-risk vessels.

MaRA are extremely dynamic and are implemented based on several factors including live weather, current and tide data, and real-time AIS and other database information of every vessel in the area. Furthermore, each vessel is assigned a dynamic risk value based on algorithms using information such as distance offshore, type of vessel and risk to human life/environment. This information is gathered via the various integrated MOS data inputs in order to automatically generate a risk value, enabling operators to prioritise and gain a greater understanding of the current and future evolving situation.

Information Integration

One of the top priority objectives for C-Scope within the MOS concept is Information Integration. The system needs to smoothly handle requests and utilise information from other internal/external specialised systems in addition to fusing the additional information with the existing ENC and track information for an innovative and coherent graphical user interface. It will also handle service requests made by other internal/external systems, all using international standards for information access and exchange.

The modified C-Scope User Interface for the MOS concept utilises a Web Map Service (WMS), a standard from Open Geospatial Consortium (OGC) for accessing geo-referenced data. WMS can be used to share, access and display GIS-related information such as:

- Weather
- Satellite images
- Oil spill areas and other objects detected from Synthetic Aperture Radar imagery (and airborne SLAR)
- Results from drift simulations
- Dynamic MaRAs (MarNIS Risk Areas).

ABOUT THE COMPANY

Kongsberg Norcontrol IT is the world's leading VTS, VTMS, and AIS network solutions provider, with over 170 VTS systems and AIS networks worldwide. Since the delivery of our first VTS system in 1978, Norcontrol VTS systems and AIS networks have been installed in the world's largest and busiest ports, waterways, offshore oil and gas fields, and coastal areas. In November 2005, Kongsberg Defence & Aerospace AS (KDA), acquired 100 per cent ownership of Norcontrol IT. While we remain a separate, private company, Kongsberg Norcontrol IT is now integrated into a newly established division within KDA: Land Systems & Surveillance, which provides maritime and land based surveillance systems for civilian, military and other public installations at national and international levels.

Functionality of the integrated WMS includes:

- GetCapabilities
 - Request sent by C-Scope to the WMS about what types of map layers, time spans, etc. that are provided
 - The server gives back a list of map/chart layers provided, and C-Scope structures them into a user interface panel from which the user can choose.
- GetMap
 - Request sent by C-Scope to the WMS for one or more of the provided map layers, with given time and coordinate span
 - The server gives back a raster file (.png) with the map layer(s) that C-Scope will put transparently on top of the ENC.
- GetFeatureInfo
 - Request sent by C-Scope to the WMS for detailed map/chart layer information at a given position on the ENC
 - The server gives back the details that C-Scope will display in a separate window.

Virtual shop

The UK's Maritime & Coastguard Agency (MCA) has played a large part in the continuing development of the MOS and the MarNIS project. However, the MarNIS Project is intended to develop a solution for ports and waterways across Europe. Each maritime domain has its own set of issues to face, meaning that much like the VTMs of today, every MOS will differ in some way.

In order to ensure that each port can validate the necessity for an MOS, MarNIS is developing a so-called VTM Assessment toolkit, which consists of three modules. The first can be seen as a sophisticated checklist designed to provide an overview of the VTM area in terms of safety, security and efficiency. The second module will help ports to carry out operational risk assessments and to prioritise any hazards, providing risk control options. Based on the chosen risk control options and the VTM assessment, the third module is designed to provide strategic advice in the form of a virtual shop.

The stock of this virtual shop is filled with state of the art techniques, products, and new, and proven concepts. The advice that the strategic shop module provides via the virtual shop will be a combination of suggestions on techniques and the needed level of VTM. In this way, a suitable MOS level can be ascertained for any size of port. The Port of Rotterdam together with UK-based ABPmer have driven the research/development of the virtual shop.

A fourth module to be added in the future will provide a cost benefit analysis comparing the investment in safety measures and VTM against the cost of maritime accidents and incidents.

No matter what the requirements of a port may be, the MOS concept provides a strong architecture for the future of VTM and the safety, security and efficiency of a port. By drawing in all possible data into the C-Scope User Interface software, a port and organisation will have a single point of control for all of its operation. The concept is still in progress, but the future of VTM in Europe is looking very bright indeed, thanks to the work of MarNIS.

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Maritime Domain Awareness Solutions for VTS & ISPS Requirements



Kongsberg Norcontrol IT solutions include:

- Vessel Traffic Service (VTS) Systems
- Vessel Traffic Management Information Systems
- Port Security Systems
- Automatic Identification Systems
- AIS Networks
- Port Management Information Systems
- Offshore Collision Avoidance, Safety and Security Systems
- Coastal and EEZ Surveillance Systems

Our heritage includes more than 30 years of maritime domain awareness and nearly 200 system deliveries

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