

## MRCC OOSTENDE: NEW TECHNOLOGIES FOR A SAFER NORTH SEA

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### Abstract

On 1 June 2006, a new Maritime Rescue Coordination Centre (MRCC) will be commissioned by the Shipping Assistance Division of the Ministry of the Flemish Community, offering a state-of-the-art and integrated platform for Vessel Traffic Monitoring, Incident Management and Search & Rescue functionalities to ensure safety and to coordinate rescue actions at sea. This paper gives a preview of the advanced Traffic Monitoring functionalities as they will be available in the MRCC.

### Introduction

The challenge to monitor and guarantee the safety and efficiency of shipping at sea, requires a continuous effort from maritime authorities and coastguard organisations. Dramatic accidents like on 13 December 2005 the capsizing of the fishing boat Z.122 Noordster in British waters, always remember us that efficient deployment and quick coordination of rescue actions at sea are of vital importance. The recent incident with the Panamese container vessel MSC Eleni and the RoRo vessel Kaduna in front of the Flemish coast on 23 May 2005, again draws the attention of governmental maritime administrations and authorities to their responsibilities. These responsibilities to constantly guarantee and monitor the safety at sea, require a continuous improving and investing in the best available technologies.

Existing radar and traffic information systems, procedures and working methods as available in VTS or MRCC coastal monitoring centres are being challenged with new technologies like the introduction of AIS, the information exchange with the European maritime information network SafeSeaNet, and the adoption of new ICT technologies and software tools. Furthermore, existing infrastructure has to be constantly renewed and new technology should always call for new opportunities. From the legal aspect as well, new regulations, recommendations and directives from both an international level (IALA & IMO) and a European level (EC) offer new perspectives and have implications on the VTS and MRCC operating procedures and systems.

Moreover, the amount and complexity of new activities a maritime administration is being challenged with in the coastal zones, is constantly increasing. These new activities include safety monitoring, risk assessment, coastal zone management, trans-national information exchange, etc. As well, special attention must be given to the monitoring of ships and navigation in the vicinity of windfarm areas in construction or in exploitation. Safety issues related to shipping routes alongside these constructions are a major issue for maritime authorities: the VTS and MRCC traffic monitoring systems will play an essential role to perform this task.

This paper gives a practical demonstration on how the challenges mentioned above are being tackled within the organisation of a MRCC (Maritime Rescue Coordination Centre). A renewed MRCC will be commissioned in Oostende (Belgium) in June 2006. This state-of-the-art MRCC will be linked to and will be exchanging information with maritime authorities (port and VTS authorities, the EC/EMSA,...) or with other partners in the Belgian Coastguard Organisation.



Fig. 1. MRCC Oostende.

### MRCC Oostende system overview

The major task of a MRCC is to coordinate Maritime Search and Rescue Operations within the Belgian SAR zone (geographically identical to the EEZ zone). This task involves search and rescue of human life at the sea and the tasks related to combating sea pollution, and results from International Conventions such as the International Convention on Maritime Search and Rescue established in Hamburg on April 27, 1979 (The SAR Convention) such as:

- constant readiness to immediate search and rescue action;
- preparation of search action plans;
- co-ordination of the SAR operations;
- cooperation with foreign SAR services;
- cooperation during the SAR service with other organisations such as all other partners within the Belgian Coastguard organisation.

Therefore a MRCC system comprises three main applications which are relying on the exchange of data and information as shown in Fig. 2.

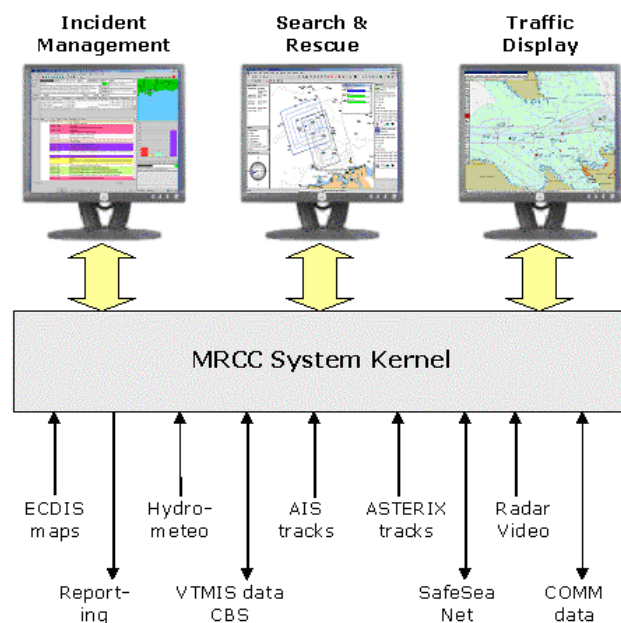


Fig. 2. MRCC software architecture.

## ***Incident Management System (IMS)***

The IMS system supports and enhances all operational activities in an Emergency Control Room like a Maritime Rescue Coordination Center (MRCC). It helps to manage the core tasks of communications, resource deployment and incident management such as:

- call logging and history;
- incident recording;
- resource deployment and monitoring;
- incident management;
- information and message handling.

The integration will be achieved through the use of some of the latest developments in IT including Voice over IP, CTI (Computer Telephony Integration) and spatial databases.

The IMS uses a Graphical User Interface (GUI) and includes a scrolling window, a hot key, a radio log, message catalogue addressee list, incident log presentation and mapping. Many of the message input forms (including the incident logging form, broadcasts, standard incident messages) are user-designed and hence can be laid out as required. These forms are created/updated using tools provided in the IMS system. This facility will allow a MRCC to collect and present information in exactly the format as required.

'Action Plans' can be compiled through the system. These action plans can then be called up to provide guidance and an audit trail throughout the running of an incident. The action plans as prepared for the MRCC, will be covering all SAR actions and MRCC communication flows with other partners of the Belgian Coastguard organisation, as described in common procedures for cooperation between all different Belgian Coastguard partners and services.

## ***Search and Rescue System (SAR)***

The Search and Rescue Information System is a software tool concerned with the accurate determination of search areas for lost people, vessels and objects at sea together with allocation of SAR resources to systematically searching those areas. It is compliant with the UK Coastguard CG3 methodology used by many organisations throughout the world, including NATO.

The SAR planning tool application is summarised in the following features list:

- SAR Model Configuration
- SAR Visualisation
  - Model Output and Reporting
  - SAR Target Probability of Detection (POD)
  - 'drag and drop' allocation of SAR resources to search areas
  - Pre-configured databases of SAR targets and SAR resources
  - Graphical manipulation of search areas
  - Automatic re-calculation of SAR information
- Integrated GIS
- Current Flow Data Visualisation

## ***MRCC – Integration of applications***

The integration of the various MRCC applications is being managed by an integrated VTS/ECDIS application. The Traffic Monitoring display is interfacing to the SAR application to

integrate search areas, patterns and target objects for the support of SAR operations, calamities and the follow-up of daily tasks. The necessary SAR information is transferred and visualized by the VTS/ECDIS application. The integration is mainly done by exchanging application specific information such as search areas or incident states. The core integration is done by the VTS/ECDIS application which is also responsible to serve the web-based access with the integrated information. Map data (S57) is used in all three applications.

### **Advanced radar detection tools**

The radar information, which is available in the MRCC, could be used for other applications useful for other coastguard or maritime partners. An example is the possibility to detect oil spills on the water-level, currents and wave directions of the sea level, or even the topography of the sea bottom. Based on the systems and radar information available in the new MRCC, tests will be carried out at the end of 2006 to investigate the technological possibilities to provide additional information that could be of value to other maritime partners or coastguard partners. Early detection and recovery of the oil spill is one possible future example of this advanced radar software technology. Detection and combating sea pollution is very important as public awareness is high after several accidents with oil vessels in the near past. Therefore, efficient oil spill detection during day and night conditions, based on existing VTS and MRCC systems could be an asset for the coastguard organisation in the future, as an additional source of information, complementary to the already available technologies or procedures for oil slick detection. Combined with information about current predictions this would greatly help to coordinate respective actions.

These radar software technologies increase efficiency and safety at sea and on board. Illegal oil spills can be detected through existing VTS radar infrastructures. The conditions of an incident, like currents, sea bottom topography, water level, etc. can be reconstructed because raw radar data can be stored and made available. In man over board situations, a search and rescue operation can be more efficient because current vectors can be measured, providing an accurate prediction of water movement in time, allowing accurate determination of the position of the person.

Integration of this radar software processing tools in an existing MRCC system, could be of added-value to provide more information to other coastguard partners.

### **Windfarm risk assessment and decision-making tools**

The real-time traffic image of the North Sea as available in the MRCC, together with chart information of activities in specific zones of the Belgian EEZ zone, offers opportunities to add extra software tools for management-level decision-making tools in case of incident management, action plan assessment or incident investigation.

Specifically for the risk assessment, planning and coordination of vessel manoeuvring or rescue actions in the vicinity of a windfarm area, a software tool Rembrandt is foreseen in the new MRCC.

'Rembrandt' is a real- and fast-time ship-handling and manoeuvring simulator. It is principally designed for the following applications:

- manoeuvre rehearsal;
- ship performance and operational assessments;
- assessment of port arrangements (berths, channels, etc.);

- assessment of tug requirements;
- ship-handling training;
- incident investigations.

This tool will be used in the risk assessment of ship manoeuvring and rescue operations within or in the vicinity of windfarm areas in the Belgian North Sea, and will be integrated as extra functionality onto the MRCC software platform.

### ***Maritime communication platform***

Apart from the advanced Traffic Monitoring functionalities, the MRCC will be equipped with a state-of-the-art Maritime Communication platform from Frequentis. This fault tolerant and fully digital platform will be integrated with external information sources such as DSC (Digital Selective Calling) calls and Navtex messages in order to guarantee maximum safety at sea. This communication platform offers an easy-to-use and integrated touch-screen user application to the MRCC operator, allowing quick communication in case of incidents or rescue actions.

## **Conclusions**

### ***MRCC Oostende technologies***

The renewal of the MRCC Oostende was awarded after a European tender procedure to a multi-disciplinary consortium formed by the companies Barco, Fabricom GTI and Tein Telecom. The new MRCC will be commissioned on 1 June 2006 by the Shipping Assistance Division of the Ministry of the Flemish Community and will replace the current monitoring system to become an integrated, state-of-the-art rescue and co-ordination centre.

The MRCC Oostende traffic monitoring technologies and systems integrate an advanced version of VTS systems (OPScenter VTS from Barco, Belgium) with an Incident Management System (VISION from Fortek Ltd., UK) and a Search & Rescue module (SARIS from BMT Renewables Ltd., UK).

With the new system, operators will be able to display traffic data from different external sensor sites. The MRCC system solution includes the integration of data from an existing AIS network, information from existing hydrological and meteorological measuring systems and databases, voice communication facilities, combined radar video, track and voice recording and replay functionalities, information exchange on regional level with Port and VTS authorities (Central Broker System), information exchange on European level using the SafeSeaNet (SSN) network, and allows browser-based access to an integrated traffic image and SAR incident logging for coastguard partners.

If there is an incident, the MRCC can rely on a lean, reliable and state-of-the-art solution, which fully supports all port control and maritime rescue activities and fulfils the role of a National Competent Authority (NCA) within the European context of SafeSeaNet. In this way, the MRCC Oostende will be able to comply with all obligations as set out in the EU Monitoring Directive (2002/59) and as followed up by the European Maritime Safety Agency (EMSA).

Along with its role as rescue coordination center, the new MRCC will also provide a separate incident management crisis meeting room and press information center. For this purpose, a large-scale high-resolution videowall is foreseen in the crisis meeting room, providing 24/7 operational capability with multiple inputs and adjustable screen layout functionalities.

Videoconferencing functionalities as well are foreseen in this crisis meeting room to allow all members of a MRCC crisis meeting in Oostende to communicate with other essential partners in the Belgian Coastguard Organisation, from which the Navy base in Zeebrugge and the national Rescue Coordination Centre in Brussels are two major key partners alongside the MRCC.

### ***Future vision***

Advanced Traffic Monitoring solutions today are no longer stand-alone systems reserved for major ports, waterways and maritime authorities, but are becoming increasingly significant for maritime rescue coordination and incident management. Integrated traffic management systems and solutions will more and more have to offer a high-performance and highly reliable maritime service to other maritime partners or customers based on the gathered and consolidated information. This is especially the case for an MRCC in the coordinating service it has to offer to quickly and adequately inform other Coastguard partners in case of an incident or rescue action, enabling them to perform their tasks and responsibilities as efficiently as possible.

Traffic Management solutions should focus on integrating traffic management with rescue coordination services and external information sources and databases supporting a common-operational-picture visualization for ports, waterways, coastal and maritime safety and security. The nature of maritime crisis management means that different authorities or organisations, like all coastguard partners, search and rescue or safety-related authorities, emergency response services, security-related or anti-terrorist authorities, port authorities,... are dispersed in virtual organisations. All partners and authorities work together (e.g. in the Belgian Coastguard organisation) to look at situations, assess the risks, identify potentially critical situations that may develop into crises, develop strategies for avoidance, mitigation or aid, plan for these and then implement.

Continuous re-planning and updating based on integrated information support is essential as the situation changes. For this purpose, all information data as captured and consolidated in the MRCC, will be made available to partners on an operational level, to ensure a high degree of group awareness of how the situation is managed in order to support timely, accurate and effective decisions to be taken by each partner throughout critical situations.

### ***Next generation of integrated solutions***

In the future an integrated solution should not just cover the integration at the presentation level but also at the database level. This will allow integration of a large range of data sources, real-time information and models. These simulation & training tools will support the persons behind the systems (not only persons on the operator-level, but also on the managerial or decision-making level) by helping to compliment their experience and knowledge in the best way.

Functionality	Name	Forecast timeframe						Example maritime use
		History	Real time	Hours	Days	Weeks	Years	
Vessel Traffic Services	VTS	X	X	X				Collision avoidance
Automatic Identification Systems	AIS	X	X	X				Ship and cargo identification
Incident Management	VISION	X	X	X				Incident response
Search and Rescue Planning	SARIS		X	X	X			Search and rescue response
Oil Spill Information	OSIS			X	X	X		Oil spill dispersal response
Traffic Simulation and Forecasting	Rembrandt			X	X	X	X	Long term growth in traffic and collision risk
Search and Rescue Resource Planning	SRMD						X	Long term need for search and rescue resources

Fig. 3. Integrated traffic monitoring solutions and functionalities.

A true surveillance environment as such in a Maritime Rescue Coordination Center (MRCC) is designed to provide a real-time collaborative work environment for monitoring, response dispatching/co-ordination, access/flow control, recording and overall systems control for 24/7 operations.

The MRCC Oostende is offering a highly advanced and integrated system platform, supporting state-of-the-art vessel traffic monitoring, incident management and search and rescue functionalities, and is ready to cope with the challenges of the future.