Analysis of the Ship Monitoring System –
A Case Study for Constanta Port (Part 1)

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Abstract: - The main purpose of the present paper is to give an overview about the objectives, functions and activities of a Maritime Rescue Coordination Centre (MRCC) and its development and future trends within the maritime environment, as an integrated platform for coordination of the search and rescue of human life at sea activities in the SAR responsibility area, coordination of the activities for the prevention, investigation and response to pollution and any other breach of the marine environment in the MRCC responsibility area, and Vessel Traffic Services, in view with the European Union vision.

To support the background information on MRCC activity, every section of the paper refers to the concrete activity of Romanian MRCC as a case study. Its structure presents the Maritime Coordination Centre system with direct reference to its main components the search and rescue activity, SAR cooperation for aviation accidents and incidents at sea, the MRCC as National Contact Point, preparedness, prevention and pollution response, taking into consideration also the international and national specific legal aspects.

The work is also intended to describe the evolution and development of Romanian SAR and Pollution Response system during the past 8 years, since the establishment of the Romanian Naval Authority as governmental agency aimed to ensure the safety of navigation within Romanian navigable waters.

Further, the paper describes how VTS works and how it can evolve to its full scope, showing how the MRCC system has been implemented in Romania. Finally, an outlook is given to the monitoring and controlling systems within MRCC Constanta and their presentation.

Key-Words: - maritime, rescue, coordination, centre, search, rescue, pollution

1 Introduction

Saving lives at sea is the main mission of any MRCC (Maritime Rescue Coordination Centre). Therefore, the major task of a MRCC is to coordinate Maritime Search and Rescue operations within its area of responsibility. This task involves search and rescue of human life at sea and the tasks related to combating sea pollution and derives from International Conventions, such as the International Convention on Maritime Search and Rescue 1979 (The SAR Convention), International Convention for the Prevention of Pollution from Ships, 1973, as amended by the Protocol of 1978 (MARPOL 73/78), International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC-1990 Convention). In this respect the main MRCC attributions are: constant readiness to immediate search and rescue action, preparation of search action plans, coordination of the SAR operations, maintenance of the intervention units, cooperation with foreign SAR Services. Therefore a MRCC system comprises three main branches which are fed with data and information on incident management, search and rescue and VTS traffic.

As regards the SAR activity within the Black Sea region, the paper details the four functions of the Romanian MRCC - SAR management, mission coordination, communication, and mobile facilities, having in view Black Sea specificity as the most isolated marine ecosystem of Europe and one of the most sensitive to human activities.

Ever since calamities with oil tankers and offshore oilrigs happened, coastal pollution by oil slicks has been a major concern for sea boarding nations. Early detection and recovery of the oil spill are therefore of utmost importance. MRCC detection and combating sea pollution is a very important task, 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...
has to be integrated into VTS and MRCC systems in the near future.

Oil pollution and its expansion are widely recognized as one of the major threats to the marine environment of the Black Sea. This risk associated with heavy traffic requires coordination of all resources for emergency intervention at national or regional level. Given the importance of this matter, the dissertation presents the main benchmarks of the Black Sea Regional Contingency Plan and of the National Contingency Plan for Preparedness, Response and Cooperation in case of Oil Marine Pollution, as important instruments for Romanian MCC to accomplish its mission.

2 MRCC – General Presentation

2.1 Mission, overall objectives and functions
The main objective of any MRCC, according to their yearly plan, is to ensure search and rescue of the people in distress at sea and emergency transportation of the people from ships at sea to the land, which must be organized and carried out on a 24 hours basis within the geographical area stipulated in the national legislation and in the international agreements (conventions, treaties, etc.).

A distress position should be reached by an intervention ship within the shortest period of time from the time of alert, provided that the position is within country’s territorial waters. In case of alerts received by radio, the MRCC must acknowledge receipt, so the calling ship and all other ships concerned know that the MRCC has actually received the distress call and is dealing with it.

Maritime Search and Rescue, including medical evacuation from ships, shall be performed on 24 hours basis, within areas specified in the legislation on protection against accidents. The Search and Rescue service shall be able to rescue a person in distress, with a surface or airborne search and rescue unit (SRU) within the shortest time after a distress alert has been received at the Maritime Rescue Coordination Centre (MRCC).

In terms of communications, a MRCC should be capable of:
- receiving distress calls by the most rapid means available (if possible directly from ships at sea) in their area of responsibility and acknowledge receipt; alerting and activating search and rescue facilities;
- coordinating operations; and
- receiving information from (and transmitting information to) any person concerned, including in the form of maritime safety information.

This objective applies to all MRCC centres within their countries’ territorial waters and the economical zones.

SAR activity is usually organized to meet the requirements set in the International SOLAS Convention - 1974 (Safety of Life at Sea) and SAR Convention - 1979, both adopted by the country’s Government.

The SAR organization and methods should be planned and implemented in accordance with the IAMSAR Manual (International Aeronautical and Maritime Search and Rescue Manual).

According to the Maritime Law, Chapter 6, § 6, all merchant vessels closed to the incident area or those which are nominated by the MRCC coordinator shall participate in SAR operations. Their joint mission is to save human lives and valuables, and to prevent some other accidents which can arise during the incident. In some countries, thousands of volunteers participate to SAR interventions and also dedicate themselves to accident prevention. They are always available, day and night, all year round.

Aiming at increasing the efficiency of the MRCCs, by MARNIS Project, the European Union has undertaken measures to provide and implement a unified efficient model for the MRCCs belonging to its Member States, integrating under one roof SAR, OPRC and VTS activities and functions.

MARNIS is a Research Project of the 6th Framework Programme, requested by DG Tren, to propose a concept for Integrated Maritime Navigation and Information Services on a pan-European Basis for the years 2012 – 2020, and has a 19.5 Million Euros budget. The Solution is called the MARNIS Concept and is still in the process of being developed. MARNIS has demonstrated its concept in Geneva and Lisbon in September – October 2008, and now is in its 4th and last year. The Consortium consists of about 50 Partners and 8 subcontractors from 13 European Member States:
- Maritime, Transport and Port Authorities;
- branch organizations (Harbour Masters, Pilots);
- industry & IT companies;
- universities & research institutes.

MARNIS is coordinated by the Ministry of Transport - the Netherlands’ and cooperates with the following entities: DG Tren, EMSA, IALA, Paris MoU, European Space Agency (ESA), and other Maritime Authorities and Agencies from The Netherlands, Sweden, Norway, Lithuania, Germany,
France, Poland, UK, Spain, Portugal, Italy, Romania, and Malta.

The 7 core concepts of MARNIS are:
• improved procedures for reduction of the effects of accidents (mitigation);
• improved port entry clearance procedures;
• identification of high risk ships;
• preventive measures towards high risk ships;
• improved remedial measures (SAR and OPRC);
• proactive monitoring of ships traffic;
• increased cooperation between member states.

Improved remedial measures focusing on action are expected to reduce the risk of damage to lives and environment.

The 5 core functional components of MARNIS infrastructure – the legal framework are:
• port community system;
• port single window;
• national single window;
• maritime operational services (MOS);
• SafeSeaNet (SSN).

As regards the legal elements, the Directive 2002/59 article 19 (1) stipulates the measures relating to incidents or accidents at sea (Incidents/accidents as defined in Article 17). The Directive also stipulates that the “Member States shall take all appropriate measures consistent with international law, to ensure the safety of shipping and of persons and to protect the marine and coastal environment” while the Annex IV sets out a non-exhaustive list of measures available to Member States pursuant to the Article 19.

The measures available to Member States are:
• to restrict the movement of the ship or direct it;
• to give official notice to the Master;
• to send an evaluation team aboard the ship;
• to instruct the Master.

Also, conclusions of a study on SafeSeaNet, conducted by MARNIS for DGTran show that:
• SafeSeaNet (SSN) was developed to support the Directive 2002/59. SSN currently provides only limited support of operational activities.
• An integrated EU structure is missing.
• Recent EU maritime safety packages require an information system much broader than the present SSN.
• There are inconsistencies in directives which need to be acted upon.
• Directives do not state in all cases the functionalities behind the information requirements.
• There are different isolated databases that relate to different directives/authorities.

Conclusion of the SSN Study is that Directive 2002/59 does not sufficiently cover the legal aspects needed for implementation of MARNIS concept or elements thereof. Accordingly, MARNIS proposes that designation of a ship as a High Risk Ship should be founded on facts and circumstances based on as much as possible accepted rules and standards including a scientific method of risk analysis. As proposed legal elements for high risk ships, a Competent Authority can designate a ship as High Risk Ship if located within:
• territorial Sea and passage is not innocent (UNCLOS 21);
• contiguous Zone (UNCLOS 33);
• exclusive Economic Zone, EEZ (UNCLOS 55);
• SAR Region (SAR Convention).

In the MARNIS concept, the Coordination Centre has also been referred to as Maritime Operational Service (MOS) brought “under one roof”. One of the most important objective of MARNIS Project is to fuse Vessel Traffic Management (VTM), Search and Rescue (SAR) and measures to combat marine pollution (OPRC). The main task of the Project is combining SAR, environmental protection and VTM requirements for an MRCC to be able to monitor vessel traffic.

Maritime Operational Services (MOS) are seen as being “under one roof” completing the following functions:

- Remedial: Search and Rescue, Oil Pollution Response Coordination, Emergency assistance service – MAS;
- Security: Point of Contact;
- VTM: enforcement, proactive services, routine services;
- Maritime Safety Information – MSI.

These functions are provided by:
• maritime stakeholders: Customs, Pais MoU;
• other stakeholders: Civil Protection, Environmental, Health, On Land Rescue.

Under the EU recommendation for the legal elements of National Coordination centres and sub-centres, the EU Member States shall install national coordination centres, and sub-centres, and may share a common coordination centre.

Romania is one of the first EU member states which already implemented this model, by the MARNIS Project, and considering the following long run objectives:
• integration of all maritime functions – “under one roof”;
• acting preventive and proactive;
• Pro-activity to reduce the number of accidents;
• same information available for all maritime authorities;
• joint training and routines to develop and improve interoperability for watch standing operators in MOS (SAR, Distress Monitoring, Routine and Proactive tasks, MSI etc);
• increased conditions for “joint” decision making capability.

The main mission of a MRCC is to save lives at sea, to provide an effective SAR service for all risks. Under the new modern approach, its basic mission was extended by including additional aims, such as: to protect the marine environment, to fulfil the pollution response missions, to improve the safety and efficiency of navigation within the maritime responsibility area, as well as to monitor and manage the vessel traffic.

Accordingly, in order to provide an effective SAR service for all those at risk and to protect the marine environment, the main objectives of a MRCC can be identify as follows:
• to save 100% of lives at sea from any risk;
• to minimize loss of lives, injury, property damage and risk to the environment;
• to maintain the highest professional standards;
• to maximize MRCC and VTS efficiency through innovation;
• to improve co-operative SAR and response agreements;
• to coordinate prevention, response and limitation of consequences of pollution from ships;
• to monitor and verify ships on delivery of all generated waste including oil residues, to port reception facilities;
• to ensure the control of maritime traffic at the highest standard of safety and efficiency;
• to increase the safety and efficiency of vessel traffic and to prevent damages caused to the environment by vessels traffic within VTS area;
• to foster cooperative national and international agreements;
• to promote volunteerism;
• to permanently up-date the SAR units data base, including data exchange and close cooperation between MRCCs.

These long run objectives, should be detailed in short and medium run objective, and materialized through the MRCC attributions.

2.2. Structure and attributions

Usually, a maritime administration is the governing body responsible for SAR (Search and Rescue) at sea within the country’s SAR Region (SRR), according to the specific national legislation.

In most of the countries, a MRCC centre involves only the SAR activity, while in others it also involves the coordination of pollution prevention, investigation and response and VTS.

As a conclusion, there is no unique model for a MRCC structure, on global scale.

The European Union aims at organizing the MRCC activity within two major coordinates:
• coordination of the search and rescue of human life at sea activities in the SRR responsibility area;
• coordination of the activities for the prevention, investigation and response to pollution and any other breach of the marine environment in the MRCC responsibility area.

At present, only 4 EU countries comply with these requirements, Romania being one of them.

Depending on the length of their coastal line, some countries have organized more than one MRCC Centre. Romania has established only one MRCC Centre, which is located in Constanta port, the biggest Romanian maritime port. Constanta MRCC is a specialized department of Romanian Naval Authority, having the responsibility to apply all the requirements and recommendations of the international conventions to which Romania is a part and of the European Union.

Recent reports from “DET NORSKE VERITAS” (DNV) have concluded that:
• Losses from navigational accidents continue to rise at an alarming rate. Accidents have doubled over the last five years;
• A ship is twice as likely to be involved in a serious accident today compared to only five years ago;
• Behind is a shortage of qualified crews and heavy commercial pressures;
• Collisions, groundings and contacts now account for 60% of the most costly incidents. The costs of these accidents have doubled;
• The maritime industry needs to act on this immediately;
• Avoiding accidents requires a good safety culture, something which the maritime industry evidently needs to focus more on.

MARNIS brings the Maritime Operational Service (MOS) “under one roof” - the MRCC, combining Vessel Traffic Management (VTM), SAR and OPRC.

As regards the manning, the number of individuals for MOS management and watch
standing officers depends on the maritime traffic type and density, and size of Search and Rescue (SRR) and number of SAR cases.

This concept was proved by exercises, training and assessment at MRCC Milford Haven in the UK.

As MOS basic manning example, MOS “awareness stage” 24/7 implies emergency response coordinator (SAR Mission Coordinator), SAR operator for distress monitoring and VTM operator for routine and proactive service. This model depends on the traffic density, SAR and HAS volume. The operations also require: emergency manager (office hours and “on call”), MAS coordinator (temporary function), OPR coordinator (temporary function), enforcement coordinator (temporary function).

In the view of this approach, a MRCC should perform:

- coordination of search and rescue activities within its area of responsibility;
- prevention, coordination of marine pollution response;
- vessel traffic service;
- cooperation with competent authorities for Prevention of any illegal activities at sea, which can affect the state safety and security;
- participate to the investigation of oil incidents and evaluation of oil spill effects;
- management of CleanSeaNet service delivered by European Commission through EMSA, receives analyzed satellite images, for routine monitoring of illegal discharges from sea going ships and coordinates the activities of checking by aircrafts and surface units available;
- introducing alerts in SSN system and updating system database;
- collecting and centralization activity for the Co2-So2 emissions;
- monitoring sulphur rate of the vessels’ fuels;
- issuing CLC 92 Certificates;
- issuing Bunkers Certificates;
- elaborating pollution statistics for regional and international bodies, annually and upon request ;
- coordinate off-shore pollution response exercises;
- participate to national and regional pollution response exercises.

In order to throw together SAR, preparedness, response in case of marine pollution and VTS activities, starting April 2005, Romanian Maritime Coordination Centre has been established, within Romanian Naval Authority, consisting of two departments, SAR – Pollution (MRCC) and VTS.

Each rescue coordination centre shall be operational on a 24-hour basis and be constantly staffed by trained personnel having a working knowledge of the English language, as stipulated within SAR Convention. The Coordination Centre’s personnel are trained as SAR Mission Coordinator and On Scene Commander for Oil Spill response, complying with international standards.

3 MRCC Constanta Presentation

To meet and comply with the requirements set in the International Conventions SOLAS/1974, SAR/1979, MARPOL 1973/1978 and OPRC/1990, the Romanian Maritime Coordination Centre has been established since April 2005, within the Romanian Naval Authority, as the responsible authority to perform the SAR management, mission coordination and marine pollution response activities, and also to monitor the vessels’ traffic within the Romanian responsibility area. This way, SAR activities, marine pollution response and vessel traffic monitoring were thrown together.

Maritime Coordination Centre (MCC), through SAR - Pollution Department (MRCC) and VTS Department, performs its attributions on a permanent basis, 24h/day.

MCC has the full responsibility to organize and coordinate SAR activities, prevention, investigation and response to pollution and traffic-routing (VTS) as the designated authority to meet national and international requirements in these areas and abide by all agreements and international conventions ratified by Romania.

The Romanian MRCC cooperates with other Romanian organizations involved in rescue and response services, participating in the national and international activities such as exercises, organizing national and international cooperation, and initiating actions for drawing up agreements with national and international organizations involving SAR.

The Romanian Maritime Coordination Centre is part of the Maritime Operations Division of Operative Command for Marine Pollution Response, the National Plan of preparedness, response and cooperation in case of marine oil spill pollution, acting with maximum efficiency. MRCC Constanta has been also designated as national operational contact point (NOCP), according to the National Contingency Plan for Oil and HNS Pollutions.

All Maritime Coordination Centre staff is qualified and trained by authorized trainers of the International Maritime Organization and the Swedish Maritime Authority, to act as coordinators.
of SAR missions and coordinators of action response for marine pollution.

The Maritime Coordination Centre personnel is also responsible for coordinating SAR activities and marine pollution response coordinate in close collaboration with other designated SAR organizations from the Black Sea region. Training and exercises are carried out at regular basis, in order to improve the efficiency of their action, and to maintain a high response and preparedness level.

MRCC Constanta is responsible for the Romanian SRR in the Black Sea, within the limits of 44°10’–10°7 N latitude and 028°39’ – 31°4 E longitude. Within the Romanian SRR a GMDSS A1 area is established along the Romanian Coast. GMDSS A2 area is in force outside the VHF coverage.

The Romanian SAR – service uses the same VHF/MF equipment as the Coast Radio Station - Radionav Constanta. The working channels on VHF are also used by the SAR – service when needed. The Coast Radio Station associated is Radionav Constanta.

The Romanian MRCC performs the SAR functions according with the Romanian Maritime National SAR Plan. The Romanian MRCC evaluates SAR missions and oil spill response, in accordance with the main objectives of the Romanian Naval Authority policy.

As an obligation of EU costal member states, Romania through MRCC, performs the management of the CleanSeaNet service, which is a satellite based monitoring system for marine oil spill detection, tracing and surveillance by checking on scene the satellite images.

MRCC is also connected at SafeSeaNet (SSN) system for port and alert notifications. SSN consists essentially of setting up an electronic network between the maritime administrations of the member states in order to facilitate the implementation of EC maritime safety aspects.

MRCC is connected to the GISIS database, which is a Global Integrated Shipping Information System of the International Maritime Organization, for introducing all information regarding port reception facilities, SAR and pollution incidents.

The MRCC’s main objectives are to monitor ships, to ensure the control of maritime traffic at the highest standard of safety and efficiency, to increase the safety and efficiency of vessel traffic and to prevent damage caused to the environment by vessel traffic within VTS area.

As regards the international cooperation, MRCC is involved in the International Maritime Organization (IMO) working groups, within the Committee on Marine Environment Protection (MEPC) and Sub-Committee on Radiocommunications and Search and Rescue (COMSAR), providing technical assistance, issuing international legal regulation regarding SAR and Oil Response activities, improving training and qualification of SAR and Oil Response officers.

At EU level, MRCC is part of the Consultative Technical Group for Marine Pollution Preparedness and Response within the European Maritime Safety Agency (EMSA).

At regional level, in terms of SAR activity, MRCC participates to the Black Sea SAR Conferences, hosted on yearly basis by the Black Sea coastal states.

MRCC’s Director represents Romania within the Black Sea Commission, as Focal Point for Romania and Chairman of the Advisory Group on Environmental Safety Aspects of Shipping, established to ensure regional coordination to oil pollution emergency response and implementation of all relevant international maritime conventions.

References: