A Marine Information System (MIS) for Environmental Monitoring

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The ability to remotely detect and monitor oil spills at sea is becoming increasingly important due to the high demand of oil based products. As a consequence, shipping routes are becoming very crowded and the likelihood of oil slicks occurring is also increasing. In this frame, a fully integrated remote sensing system can act as a valuable monitoring tool. We propose an integrated and interoperable system able to monitor ship traffic and marine operators, using sensing capabilities from a variety of electronic sensors, along with geo-positioning tools, and through a communication infrastructure. Our model is capable of transferring data, freely and seamlessly, between different elements of the information systems (and their users). In this way different data are brought together, easily and in a consistent and usable form in order to facilitate dynamic links between different models and analytical processes.

The Marine Information System (MIS) provides integration for remote sensing data, field experiment results, and estimates from simulation models. Additionally it provides tools for data storage and retrieval, data manipulation and analysis, as well as for presentation; all these will be provided through a common interface.

The MIS consists of a connected group of subsystems for performing data storage, data mining and analysis over data warehouses, decision-support, as well as a web-GIS portal for the access and usage of the products and services released to System Managers and end-users. Operationally, the following sub-systems with their roles and interconnection have been established into the MIS platform: SAR image processing, Hyperspectral-thermal image analysis, Mathematical simulation for forecast models, Dynamic risk maps management, Autonomous Underwater Vehicle (AUV) management and data analysis, Marine traffic monitoring through AIS, Environmental Decision Support (EDS), and Data mining and warehousing through operational and historical databases.

Moreover several scenarios over case study sites are defined to better specify the desired and planned functioning of the system. These explain, through a schematic description how the different sub-systems contribute to the identification and management of oil pollution events, how their processing is organized, how their data flow into the system and how users interact with them. Each scenario is described in terms of its purpose, actors involved, pre- and post-conditions, flow of events and actions, alternative flows, exceptions, and inclusions of other scenarios.

All these scenarios, through the EDS System, converge in case of polluting events, to use cases supporting the emergency intervention and coordination with the responsible authorities.

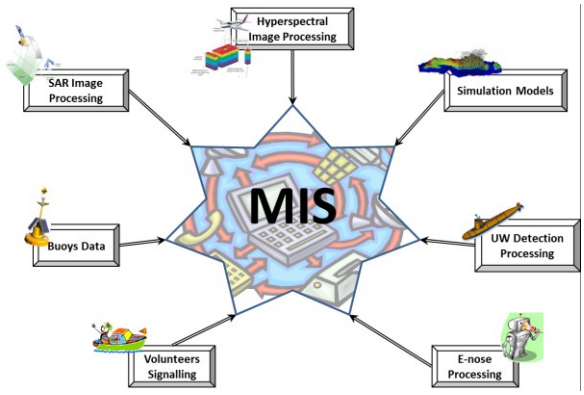

Figure 1: The MIS as the integrating system for all the sensor platforms.

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