Air & Vessel Traffic Management Systems

ARCHIMEDE

Archimede is the Selex ES solution that provides full Situational Awareness in Harbour Protection activities, through the integration of heterogeneous sensors and devices within a unique net-centric system.

Harbour protection is a prime concern in maritime security. Currently, marine access points are exposed and present themselves as high risk areas, appearing as possible avenues for attacks or illegal activities. These can arrive in several forms e.g. piracy, illegal substances entry, terroristic attacks and on different types of vehicles (surface, air and underwater). In this context, Selex ES has realized Archimede, a harbour protection system that provides intensive monitoring and effective response actions.

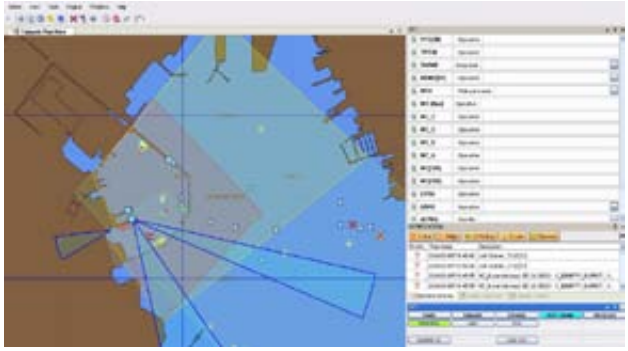
THE SOLUTION

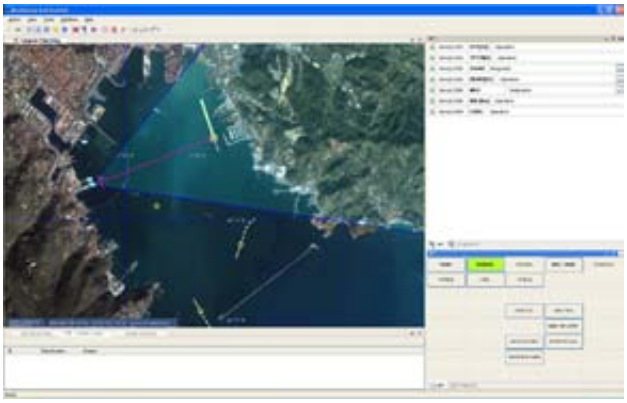
Archimede is based on the development of a unique system consisting of an integrated suite of different components like radars, electrooptical sensors, sonars, acoustic barriers able to exchange data and cooperate each other, for a smooth information management. To this aim, Archimede has been developed as a distributed and completely integrated system based on a NetWork Infrastructure (NWI) as backbone.

This open architecture allows the integration of different modules including Command & Control, effectors and communication, making the system very flexible and suitable for an optimal configuration according to the specific harbour applications.

Different prototype versions of the Archimede Harbour Protection System have been deployed and tested during several trials directed by both the Italian Navy and NATO, including the “NATO HPT’08 Trials” held in Eckernförde, Germany. The successful results of those trials led to the selection of Archimede as the harbour protection system designated for the protection of La Maddalena site on the occasion of the G8 2009 event, before it was moved to L’Aquila.

Moreover Archimede was used and tested by the Italian Navy in March 2010 in the Naval Base of La Spezia during the HARbour Protection EXercitation (HARPEX 2010); during this trial Archimede had been continuously operating for 48 hours. Dedicated to the achievement of Situation Awareness, Archimede represents one of the main assets of Selex ES in Maritime Security.





THE SYSTEM

The Archimede open architecture approach drove to the development of a standard tactical gateway based on a Distributed Data Service (DDS) middleware which makes heterogeneous system nodes interoperable with respect to a common tactical data domain. This gateway enables the exchange of different messages such as tactical data, control data, videos, health status messages and engagement orders.

The common Command & Control can manage different families of heterogeneous system nodes, which among others include:

- Sensors
  - RADARs (pier and vehicle mounted)
  - SONARs e.g.: pier-mounted, forward-looking SONARs installed below the hull of unmanned vehicles, diver-detection SONARs, etc.
  - Acoustic barriers
  - Opto/electronics (TV or thermal images)
- Effectors
  - Unmanned Vehicles (e.g.: Air/Surface/Underwater, remotely-operated/autonomous/swarms) and Manned Vehicles (Fast Patrol Boat)
  - Direct luminous/acoustic energy emitters

Through a user-friendly HCI and its system functions, the Command & Control module performs the management of the network infrastructure for:

- Activation of the distributed architecture
- Remote operation of the netted sensors for the surveillance
- Compilation of the Common Operational Relevant Picture for the achievement of the Situational Awareness
- Direction of amplifying sensors for the assessment of the situation
- Semi-automated assessment of the threat and the remote operation of the effectors for the implementation of defensive measures

KEY POINTS

Based on a system of systems approach, which results in an increased overall effectiveness and complexity of responses for improving Situational Awareness, Archimede represents an advanced solution that lays on the following main features:

- Open Architecture design: it allows to create a unique system with heterogeneous elements in particular with legacy systems
- Flexible configuration: the type, number and position of each component can be defined for achieving maximum effectiveness according to customer needs and requirements
- Fast deployment: the system can be realized with mobile subsystems, interconnected through a secure dedicated wireless telecommunication network
- Advanced data fusion and threat evaluation: the intensive use of complex algorithms provides the operator with the proper subset of information extracted from the tactical picture, reducing human errors

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