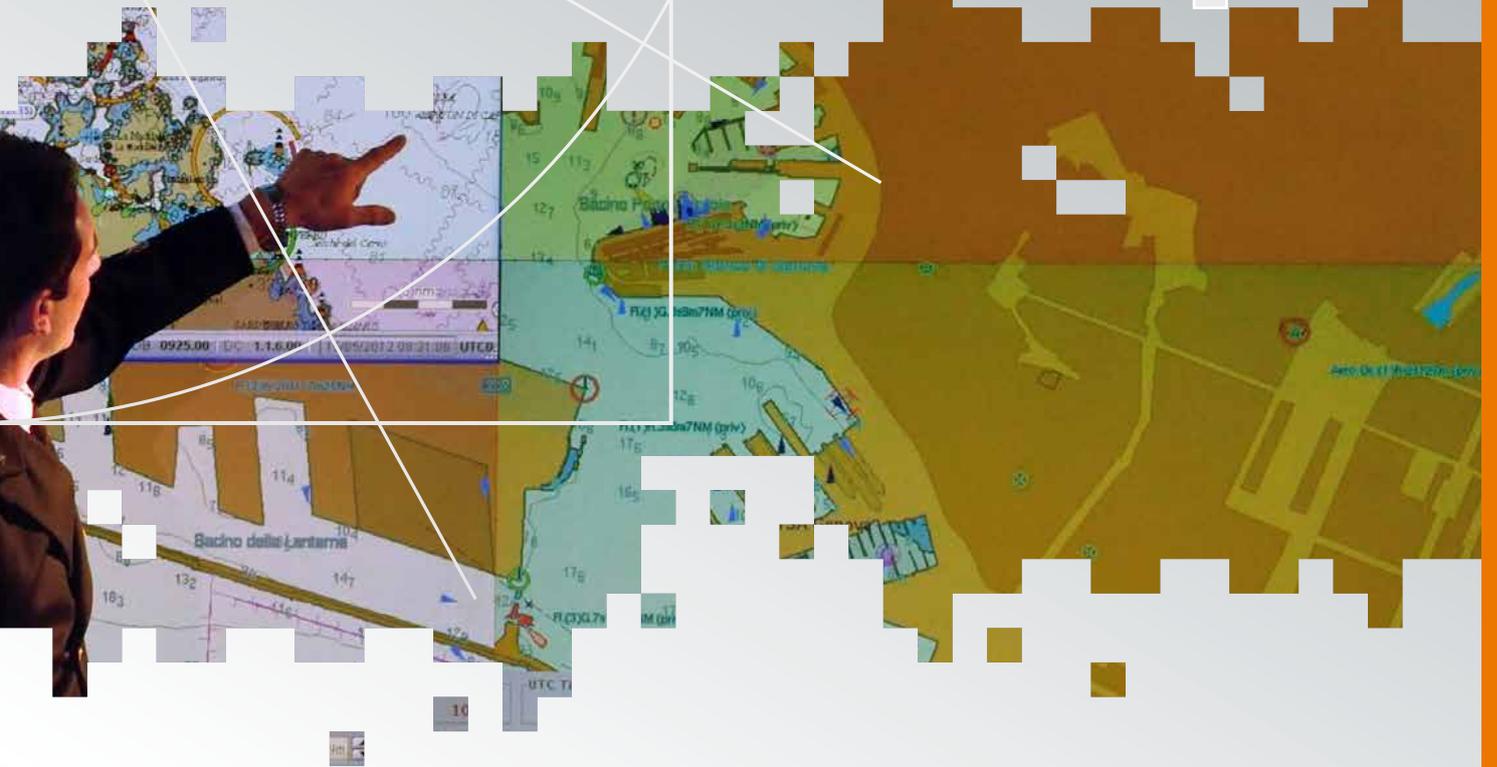




VESSEL TRAFFIC MANAGEMENT SYSTEM



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Leonardo Vessel Traffic Management System (VTMS) integrates and interconnects all the assets relevant to a safe and secure management of Maritime Operations, ranging from marine environment protection, traffic management, law enforcement, port efficiency and security at sea. Leonardo creates nation-wide system, seamlessly interconnected, to provide full integration of existing systems and sensors, improving interoperability and supporting coordinated operations concepts, like sensors remote control or automatic vessel identification.

The system is conceived to be inherently real time and based on an open architecture, in order to provide the best possible user experience in traffic management and the expandability requirements that are needed due to operational requirements evolution.

Leonardo VTS also integrates all the Port Security and Physical security aspects, paving the way for the next-gen VTS System, that not only copes with traffic organization and safety issues but also with security aspects.

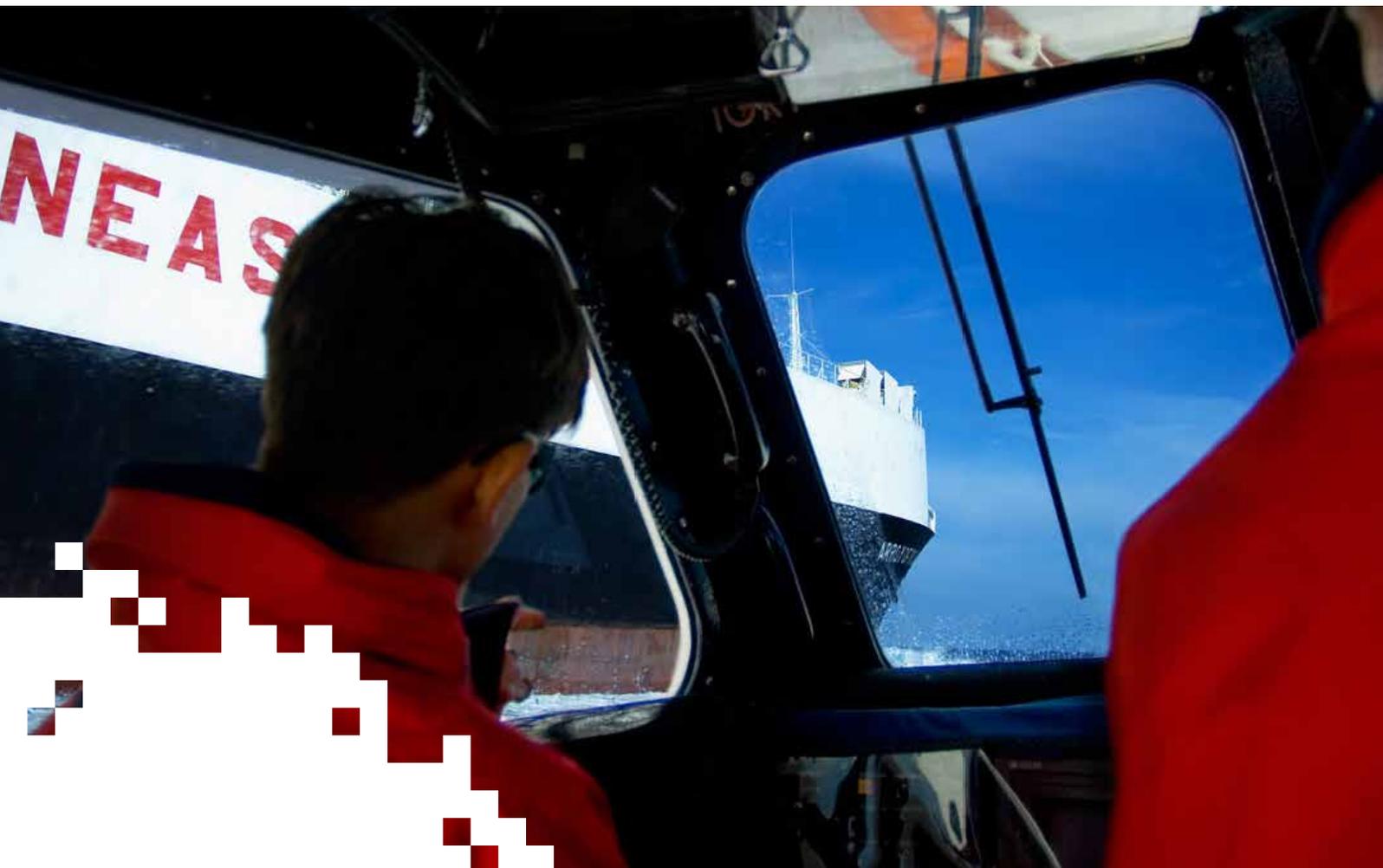
The main objective of Leonardo VTS System is to provide the maritime community with a fully integrated system able to support the fullest possible range of maritime applications.

SAFETY AND ENVIRONMENTAL PROTECTION AT SEA

- Collision avoidance and safe navigation
- Search and Rescue
- Oil pollution detection and environmental protection
- Environmental Mission coordination
- Dangerous cargo management

LAW ENFORCEMENT & SECURITY

- Border control and immigration
- Organized crime and smuggling
- Port protection
- Illegal fishing
- Cybersecurity



TRAFFIC MANAGEMENT

- Management of maritime traffic
- Navigation & Traffic efficiency
- Port management

The system has been developed in full compliance with IALA (International Association of Marine Aids to Navigation and Lighthouse Authorities) guidelines: “The purpose of a VTS is to improve the maritime safety and efficiency of navigation, safety of life at sea and the protection of the marine environment and/or the adjacent shore area, work sites and offshore installations from possible adverse effects of marine traffic in a given area”.

The main system capabilities include:

- Remote sensors monitoring and control
- Real time and off-line data archiving
- Global picture creation and management
- Support to operators’ decisions in critical situations
- Presentation of traffic navigation and vessel information
- External Systems Integration
- Simulation and Training

Presentation of traffic navigation and vessel information

- Single port monitoring with small local centres
- Nationwide control with Distributed, fail-safe data centers providing services to Operators

Leonardo has implemented worldwide several systems in the last 20 years, in particular the Italian Nation-wide VTS System, the Yemeni Nation-wide Coastal Monitoring and traffic Control System (NYVTS), the Polish Border Nation-wide Coastal Control System (ZSRN), the Turkish VTS and River Information System (RIS) in Serbia, among the most significant ones.

THE SYSTEM

The key concepts at the basis of VTS are the “integration, correlation and processing of heterogeneous information sources”, consisting both of sensors of different nature and external systems.



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In particular, VTMS integrates the following elements, which are constantly monitored to provide equipment status and information reliability in real time:

- Radars of any kind, Leonardo is also manufacturer of high end coastal surveillance radars.
- Automatic Identification System (AIS)
- Direction Finders
- Meteorological and Hydrographical Systems
- Electro-Optical Systems
- External Surveillance Networks
- Data Networks sharing information services about vessels
- Data Networks sharing information services about vessels or other organisations
- Port Management and Information System

CAPABILITIES

The System provides the following major capabilities:

- Operational Alarms and Events Correlation for Decision Support
- Traffic Picture Creation through Sensors Management
- Communications with Vessels and External Systems
- Risk Assessment
- Global HMI
- Disaster Recovery
- Simulation and Training
- Decision Support



KEY FEATURES

Leonardo VTS represents a cutting edge solution for maritime traffic control and port management, featuring:

- Extensive use of “best in class” technologies to keep the concept of an open architecture while maintaining the system completely integrated and up-to-date
- Proven capability to interoperate with European Standard systems (SafeSeaNet, CleanSeaNet, LRIT, etc.) as well as previously existing and custom systems
- Existing assets harmonization, projected requirements, planned infrastructures and capabilities

OPERATIONAL ALARMS AND EVENTS CORRELATION FOR DECISION SUPPORT

Leonardo VTS supports the operator in taking critical decisions in real time. The system suggests choices to face a dangerous situation according to threat kinematics, distance of the allied means, position and readiness state. Its decision support is based on an “event driven” architecture that alerts operators when an anomaly occurs.

Events are correlated even if they are different in nature, with the aim to extrapolate further information, which automatically provides operators with best strategy in dangerous situations.

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TRAFFIC PICTURE CREATION THROUGH SENSORS MANAGEMENT

The Sensor Management Capability controls every connected surveillance sensor and processor from a central location, typically the operator's console in a fully integrated fashion..

Each sensor is provided with a maintenance control panel that allows operators to modify the sensor settings. They can therefore modify a sensors behaviour to adapt the system response to local, time-variant environmental conditions. All available sensor data are used to create a unique, distributed traffic picture with system tracks, by means of sophisticated tracking algorithms.

Once generated, system tracks are compared against navigational rules, using state of the art decision support algorithms and generating alarms.

COMMUNICATIONS WITH VESSELS AND EXTERNAL SYSTEMS

Leonardo VTS provides outstanding communications capabilities using both standard VTS means and legacy or custom solutions, for example exchanging data over a analogue VHF channel. A secure interface is used to protect shared data against spoofing or malicious access.

Due to its modular architecture, several kinds of external systems can be interfaced with the system, first of all the Port Management Information System (PMIS), that is actually part of the Leonardo VTS itself.

REPORTS AND RISK ASSESSMENT

Leonardo VTS performs a unique capability: the dynamic reporting and risk assessment over all the vessels in range. Being the System fully DB-Centric it is possible to create dynamic reports, in any format, and carry out statistical analysis over any traffic datum.

Dynamic Reports can be tailored to the users' needs both in layout and contents. VTS Supervisors can create and publish a new report to correlate information and adjust the report layout to match their needs. Some of the most common usage statistics have been integrated in the tactical picture presentation, including a special risk assessment calculation tool to alert the operator when vessels in critical situations transit in the area.

ADVANCED HMI WITH CARTOGRAPHY MANAGEMENT

The operator's position is the single control point of the whole system. It is based on a layered 2D/3D view of the traffic picture and of the ENC (Electronic Nautical Chart) of the VTS Area. The plugin based HMI contains a full set of tools to ease VTS operators tasks and includes port security management. The HMI is designed to provide both a large scale, local traffic management, and a global view over the full globe, both in 2D and 3D. Any kind of cartographic datum, including standard ENCs, meteo layers, satellite images can be viewed in form of layers over the Main Map. Moreover, the full asset management for Search And Rescue missions and security missions is integrated.



SIMULATION AND TRAINING

Leonardo VTS includes a complete platform for simulation and training. It allows trainees to operate on a faithful copy of the operational system fed by sensor simulators.

It also provides the capability to overlap simulated scenarios to real traffic in order to provide a comprehensive test of the operators' ability in critical situations. The Simulator, i.e. the association of scenario generator and simulated system, can also feed the real system with test messages during test activities.

DISASTER RECOVERY

The System provides a complete set of Disaster Recovery solutions.

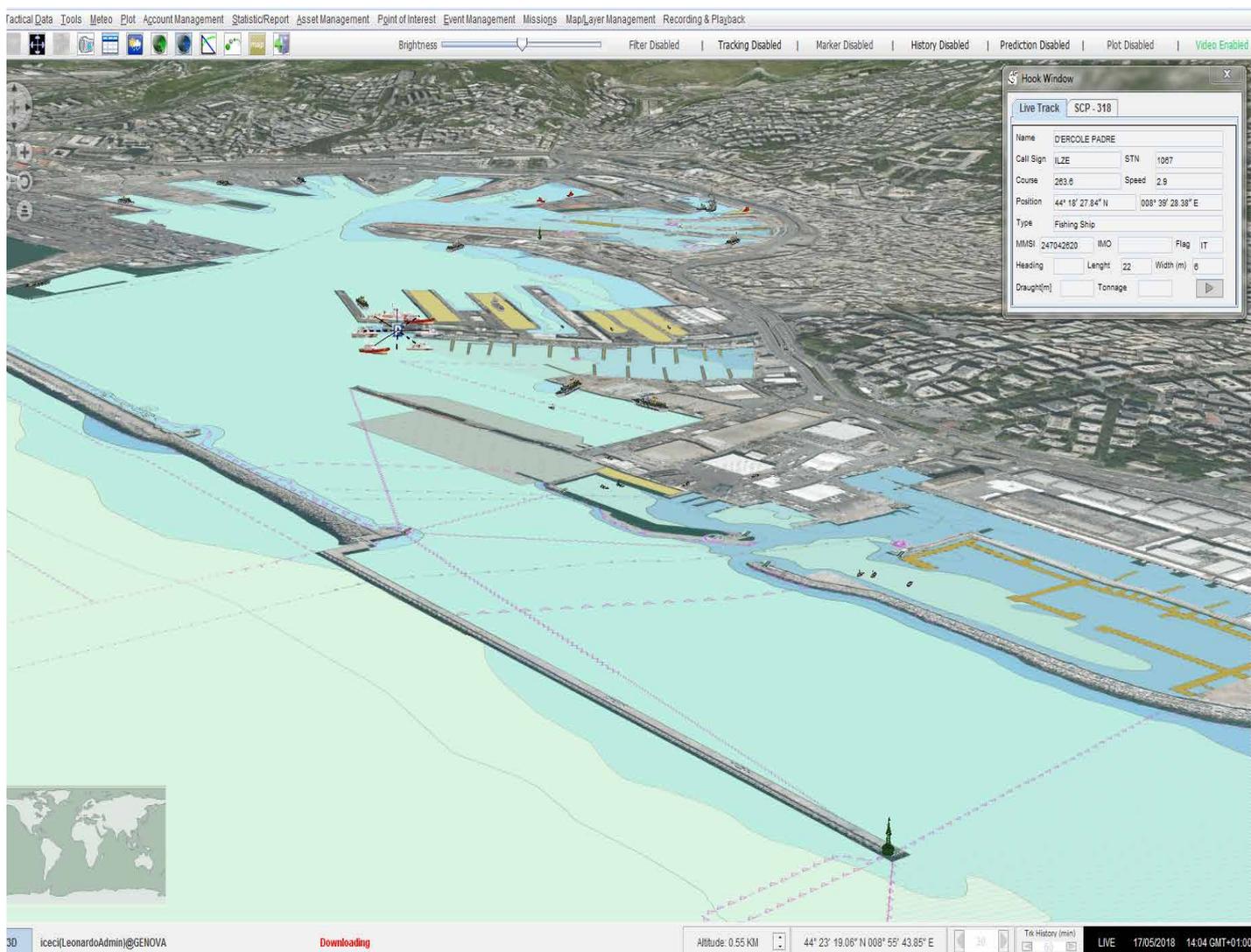
Two different solutions are available, according to system configuration, network bandwidth availability and overall System Mission Criticality:

Distributed Recording

A storage server is installed in each remote site in order to face network outages, when the network link goes down data stored in the local recording server are sent, on demand, to the connected control center for long term archiving.

Geographical D&R

Data Centers work as a distributed cluster providing services to the operators in a full fail safe solution. When a disaster occurs in one of the centers the System automatically switches to the adjacent one; switching includes database connections, real time data alignment and external systems connections.





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