DCNS Presents...

I2C

Integrated System for Interoperable sensors & Information sources for Common abnormal vessel behaviour detection & Collaborative identification of threat

Mid-Term Conference

24-25 SEPTEMBER 2012
TOULON (FRANCE)

AIRSHIPVISION · AJECO · ARMINES · ASTRA · ClearPriority · DCNS · ecomer · ERIC VAN HOOYDONK LAWYERS

FURUNO · IDETUDIAN · KONGSBERG · METEO SIM · ONERA · Rockwell Collins · SOFRESUD · ZEPPELIN

CONTENTS

I2C INTEGRATED PROJECT WHICH HAS NOW CROSSED THE HALFWAY MARK.

I2C is integrating data processing and exploitation capabilities for detection of all types of vessels (small, medium and large) and for identification of threats at sea in order to quickly report to authorities and plan relevant actions. During the project demonstration phase (2013 to 2014), I2C prototype shall collect data from networked coastal stations, service providers and deployed patrols at sea (aircraft, vessel, balloon, etc.) to continuously track suspicious small boats locally and merchant/fishing ships widely over the Mediterranean basin.

Small boats are either detected from new coastal radar technology such as Frequency Modulation Continuous Wavelength (FMCW) radar or high resolution optical cameras. FMCW radar has very high angular resolution for ranging, velocity and imaging application. Also, the short wavelength of the electromagnetic fields used has excellent performance in rain, humidity, fog and dusty conditions. An installed FMCW prototype has been experimented in I2C and provided very promising results.

In the EEZ (exclusive economic zone) water, country has responsibility; therefore new sensors such as High Frequency Surface Wave (HFSW) radar shall be deployed. HFSW radar operates using the propagation of electromagnetic energy waves, over the sea, in the HF Band by means of a Surface Wave which propagates far beyond the line of sight of current radar. Already I2C deployed HFSW radar prototype has been experimented and provided very good detections. Alternatives are patrol assets at sea (vessel, aircraft and balloon) to provide surveillance of hot spots over targeted area of interests.

As the small boat density may be high along shore lines as well as medium and large vessels density may be significant in the EEZ, I2C has developed innovative capability to automatically detect suspicious ones and issue alerts to operators for deeper analysis and decision making. Detections are based on rules combining various conditions (on track profiles, on navigation, on geographic area, on intelligence, on vessel data files, etc.) on layered information in the situational picture. These rules are setup by operators from their knowledge on, for example, dangerous migrant trips (i.e., with sea Beaufort above 6, mid-night without moon, on board very old small fishing vessel, along known migration routes, etc.).

As coordinator, I am pleased to invite you, as key users, to participate to the I2C Mid-Term Conference where real demonstrations are done and provide to you precise insides and results on next generation of innovative integrated maritime surveillance systems. Looking forward to meeting you at this conference.

Best regards.

MICHEL MOREL, I2C coordinator

WHAT IS I2C INTEGRATED PROJECT?

I2C is a four-year European research project funded by the European commission under FP7, which started the 1st October 2010.

The project, coordinated by DCNS, is involving 20 European partners including 5 research centres, 6 industrial companies, and 9 SMEs as well as representatives from operational organisations such as the CeCLAD-M, Gendarmerie Maritime, French Maritime Affairs, FRONTEX, etc.

In the framework of EUROSUR (European external border surveillance system) programme guidelines, I2C project aims at setting-up and experiment an end to end integrated innovative maritime surveillance system. This project allows to:

- **Test ways of data fusion from a set of new and conventional sensors** deployed at sea shore and on board assets at sea, and other available information such as meteorological forecasts, vessel and harbour files, regulated zones and geo data, intelligence, etc., to carry out intelligent situational picture including documented alerts on detected suspicious vessels.
- **Develop and integrate innovative capabilities to generate alert** on detected suspicious vessel from operational rules and tools for identification of the most plausible associated threats to early keep informed decisional authority to plan relevant actions.

With this integrated project, in the future, scaling studies/designs can be performed that propose the functional architecture of advanced generation of maritime surveillance systems at any specific shore locations, so authorities can commission their end to end information system based on the I2C project innovative capabilities, the operational architecture and campaign exercises feedbacks.

I2C integrated demonstrator is a unique deployed technical platform for interoperable multi-sensor data process refinement and management, and correlation of many other information of interest for reliable, continuous, permanent and all weather surveillance of any vessel tracks and activities over wide maritime territories and fight with success against irregular migration and serious crimes at sea.

OBJECTIVES OF THE MID-TERM CONFERENCE

I2C PROJECT WILL HANDLE ITS CONTRACTUAL MID-TERM CONFERENCE (T0 + 24 MONTHS) ON THE 24 AND 25 SEPTEMBER 2012.

It is an important milestone to communicate and assess on the overall technical and system integration progresses made so far. So, specific themes will be exposed to the stakeholders by the project team with the contributions of partner company leader of the work packages:

- **User expectations for advanced surveillance system.**
- **Definition of the architecture to set up situational pictures from vessel tracks and many other available online information** (meteorological forecasts, geo and oceanographic data, vessel and harbour bases, intelligence, etc.).
- **Visits to the platforms (Mourillon, the project processing centre,** and Saint-Mandrier shore sensor installations) and demonstration from operational on how to detect suspicious vessels and for identification of the most plausible associated threats.
- **Description of the campaign exercises** and the added values to be demonstrated.
- **Project next phases, exercises implementation and user involvements.**

PROGRAM

MONDAY 24 SEPTEMBER 2012

PALAIS NEPTUNE, "COLBERT" ROOM

- **1:30 pm:** Registration (Hall)
- **2:00 pm:** Welcome Speech – Patrick Baraona, Maritime Competitive Cluster in Toulon
- **2:10 pm:** European Framework of I2C – Paolo Salieri, DG EN
- **2:20 pm:** Overview of EUROSUR – Oliver Seiffarth, DG HOME (tbc)
- **2:30 pm:** I2C Developments
  - I2C added values comparing to existing systems
  - I2C data and information collection capabilities:
    - Deployed platforms and sensors
    - Information service providers
  - Concrete case with display of a trajectory
  - Multi-information layered situational picture
  - Alerts on detected suspicious vessels
    - Automatic alerts from rules editor
    - Manual alerts from operator analysis
  - Identification of the most plausible threats
- **3:30 pm:** Coffee break and visit of the exhibition
- **4:30 pm:** Round-table: User needs and expectations for demonstration
- **5:15 pm:** Perspectives
- **5:30 pm:** Visit of the exhibition
- **7:30 pm:** Social Event: Free visit and Buffet at the National Maritime Museum in Toulon (close to the conference site)

TUESDAY 25 SEPTEMBER 2012

DCNS MOURILLON / SAINT-MANDRIER

- **8:30 am:** Start of the day 2: attendees will be separated in two groups, G1 and G2
- **9:00 am:** G1: First session of live demonstration of the I2C centre at DCNS Le Mourillon, G2: Visit of the French MRCC in La Garde, equipped with I2C prototype
- **10:30 am:** G2: Second session of live demonstration of the I2C centre at DCNS le Mourillon, G1: Visit of the French MRCC in La Garde, equipped with I2C prototype
- **12:00 am:** Lunch time with the two groups at the IBIS STYLE HOTEL
- **1:30 pm:** End of lunch
- **2:00 pm:** Visit of the Saint-Mandrier platform
- **4:00 pm:** End of the day 2

EXHIBITORS' LIST

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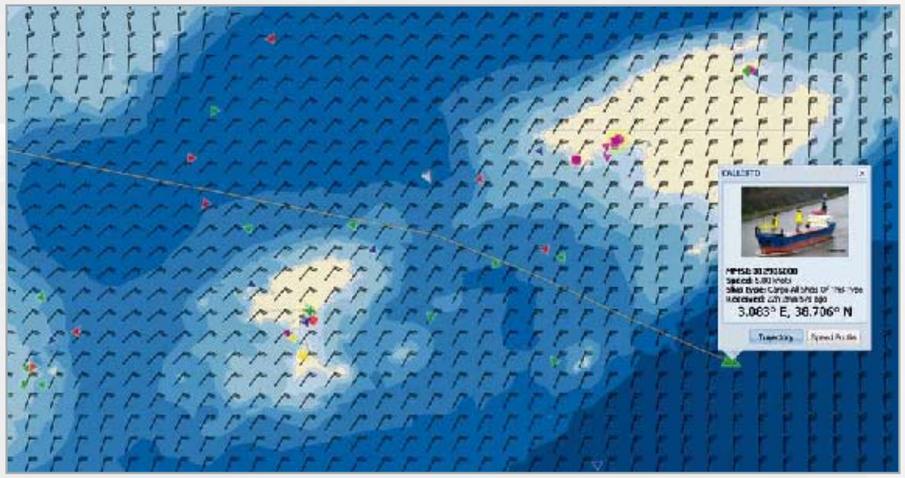
PRESENTATION
The CRC (Crisis and Risk research Centre) aims to formalise and unify the knowledge in the field of risk prevention and crisis management. The laboratory conducts research in close partnership with private companies, public authorities and the European Union. The centre amalgamates multidisciplinary scientific expertise: scientific engineering, geography, law, computer sciences, management. In the I2C project, ARMINES realises, on one hand, an Electronic Document Management (EDM) to manage and share the interpretation reports produced by experts, and, on the other hand the processing, archiving and dissemination of geo-referenced data (regulatory, meteorological and oceanographic) to describe an intelligent traffic picture.

PRODUCTS/SERVICES
- Partner of consortiums for R&D Maritime Domain Awareness projects: SCANMARIS, TAMARIS, SARGOS, SISMARIS, I2C.
- Creation of PREVENTEO: company offering innovating solutions to the management of Hygiene, Safety and Environment.

REFERENCES
- Member of the Industrial Safety Chair.
- Publications and presentations at international scientific conferences.
- Edition of the *RSEmag* journal (www.rsemag.com/) specialised on risk, safety and environment.



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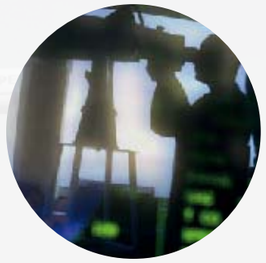

PRESENTATION
DCNS is a leading European player on the world market for naval defence systems. The Group designs, builds and supports surface combatants, submarines and mission critical systems and equipments incorporating the most advanced technologies. In I2C project, DCNS is coordinator and leads the functional requirements specification, the overall system architecture and integrates the prototype installed in many operational centres for evaluation and user feedbacks to improve capabilities. Prototype, to set up structured and layered multi-information situational picture to early detect any suspicious vessel (small, medium and large) and for identification of threats.

PRODUCTS/SERVICES
- Coordinator of many R&D national and European projects on maritime awareness such as ScanMaris, TaMaris, SisMaris and I2C.
- Partner of PERSEUS consortium and leading the functional requirements specification, the system of systems archictecture (NAF framework) and the Mediterranean Western exercise one which is to set up and disseminate to National coordination centres the European Situational Picture from collected national detected vessel tracks.
- Installed on experimental patrol vessel *(L'Adroit)* component to detect suspicious vessels from provided surface tactical situation from the on board Combat Management System.

REFERENCES
- MARYLIN is a Search and Rescue system, certified IAMSAR and deployed in all operational centres (CROSS) of French Maritime Affairs.
- TSMP (Multi-Platform Tracking) is a system to set up, in real time, situational picture from networked assets at sea.
- SIC 21 (Information System for Commanding) as a partner for developping various applications based on multi-information sources.

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PRESENTATION
Furuno Finland Oy is specialised in integrated navigation and surveillance systems.
In I2C project company is responsible for common operational traffic picture and coastal radar station.

PRODUCTS/SERVICES
- Integrated navigation systems for ships and patrol boats.
- Maritime surveillance systems.
- Green border surveillance systems.
- Life cycle services.

REFERENCES
- Finnish Border Guard maritime surveillance system.
- Finnish Border Guard offshore patrol vessels integrated bridge and surveillance systems.
- Finnish Border Guard patrol boat integrated navigation and surveillance systems.
- Estonian Border Guard offshore patrol vessel integrated bridge and surveillance systems.
- Finnish Navy integrated bridge systems for FACs, minelayers, minehunters and multipurpose vessels.
- Finnish border guard green border surveillance system.
- Finnish Defence Forces ground surveillance system.

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PRESENTATION
The Team SMAC uses Multi-Agent Systems to help detecting and dealing with abnormal behaviours.

PRODUCTS/SERVICES
- Adaptive Multi-Agent System.
- Multi-Agent Systems for Abnormal Behaviour Detection.
- Self-Tuning Multi-Agent System able to Learn Ship Behaviour from Feedbacks.

REFERENCES
- Nicolas Brax, Jean-Pierre Georgé, Marie-Pierre Gleizes, Eric Andonoff, Jean-Pierre Mano – *Détection de comportements illicites par SMA adaptatif : application à la surveillance maritime.* In: *Journées Francophones sur les Systèmes Multi-Agents*, 2011.
- Nicolas Brax, Eric Andonoff, Marie Pierre Gleizes – *A Self-adaptive Multi-Agent System for Abnormal Behavior Detection in Maritime Surveillance* in KES-AMSTA, 2012.
- Jean-Pierre Georgé, Bruce Edmonds, Pierre Glize – *Making Self-Organising Adaptive Multiagent Systems Work.* In: *Methodologies and Software Engineering for Agent Systems,* publ. Kluwer, 2009
- Carole Bernon, Marie-Pierre Gleizes, Sylvain Peyruqueou, Gauthier Picard – *Adelfe, a Methodology for Adaptive Multi-Agent Systems Engineering.* In: *International Workshop on Engineering Societies in the Agents World,* 2003.

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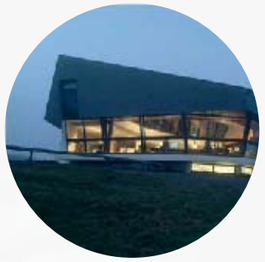

PRESENTATION
Kongsberg Norcontrol IT (KNC) is a subsidiary of Kongsberg Defence Systems and part of the Kongsberg Group. KNC has designed and installed complex and effective maritime surveillance solutions for more than thirty years. References include almost 250 installations in more than 40 countries.
In the I2C project, the primary task for KNC is related to the CITP (Common Intelligent Traffic Picture) module. KNC is the CITP work package leader and will together with the other partners develop CITP prototypes for concept evaluations and demonstrations.

PRODUCTS/SERVICES
- Coastal Surveillance Systems.
- Offshore Surveillance Systems.
- Port Surveillance Systems.
- River Information Systems.

REFERENCES
- Maritime and Port Authority of Singapore (Port of Singapore and Singapore Straits).
- Maritime and Coastguard Agency, United Kingdom (Straits of Dover).
- Norwegian Coastal Administration.
- Swedish Maritime Administration, Sweden/Royal Danish Administration of Navigation and Hydrography, Denmark (The Sound).
- Gujarat Maritime Board, India (Gulf of Khambat).
- Petroleos Mexicanos – PEMEX, (Gulf of Mexico).
- US Coastguard and LA Pilots (Los Angeles, Long Beach).

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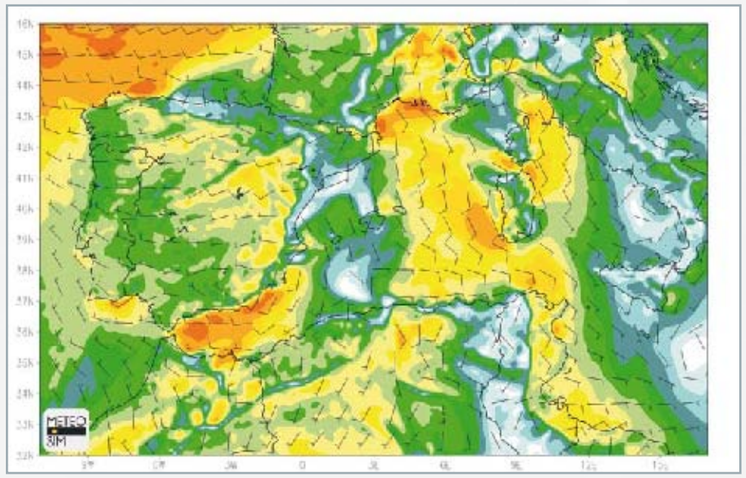
PRESENTATION
Meteosim is a technological consulting company that provides solutions to sectors and industries whose activities are weather-sensitive. At I2C, our responsibility is to provide available meteorological data and periodic high resolution atmospheric and maritime forecasts over the surveillance zone. To this purpose, three coupled models have been set up: a mesoscale meteorological model (WRF), a wave model (WaveWatch III) and an ocean model (ROMS). Furthermore, Meteosim retrieves real-time available observations from land stations, sea buoys and ships.

PRODUCTS/SERVICES
- Meteo Ocean Consultancy: Offshore operation and infraestructures, oil spills, historical data.
- MetOcean Forecast: Transportation, professional sailors and high competition.
- Risk Management and Civil Protection: fire and chemical risk forecasting.
- Air Quality Consultancy: public administration and private companies.
- Air Quality Forecasting systems: cities, harbours and airports.

REFERENCES
- Iberdrola (2007): Historical ocean study.
- Repsol (2012): Oil spills system.
- Bentos (Chile, 2012): Offshore operation.
- America's Cup (2007, 2010), Acciona Team Vendée Globe (2012): MetOcean Forecast.
- Civil Protection Catalonia's Government (2005-2012): Risk Management.
- Junta de Andalucía (2012), Bureau Veritas (2012): Air Quality consulting.
- Spanish Ministry for Environment (2012), City of Barcelona (2012): Air Quality Forecasting Systems.



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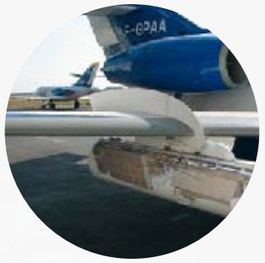
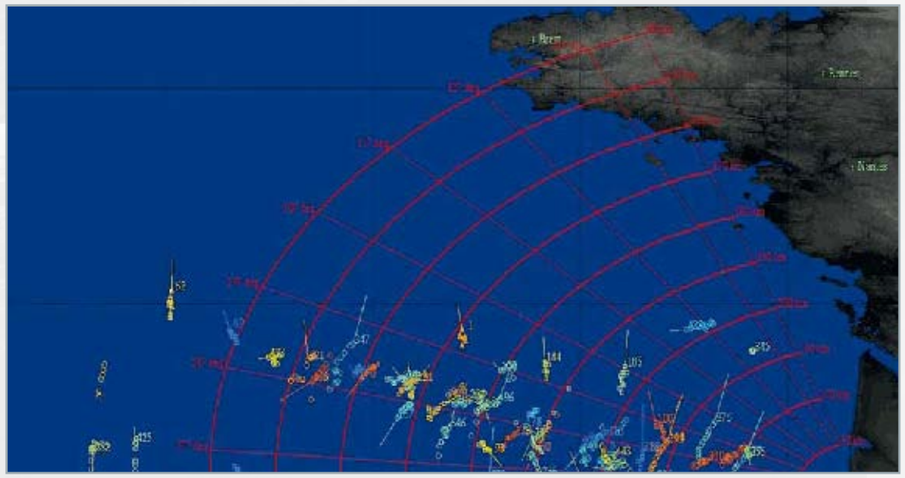


PRESENTATION
ONERA is the French national aerospace research centre.
Our contribution to the I2C project:
- HFSW radar to track vessels up to EEZ limits;
- equipped aircraft for local node observation;
- reasoning modelling and multi-criteria process to support threat identification;
- information indexation and retrieval.

PRODUCTS/SERVICES
- Long range HF radar technology, output processing (sea clutter correction and tracking).
- Aircraft sensors payload integration and campaigns.
- Ontology and model based technology to support event interpretation and threat identification.
- Semantic based data/information indexation and retrieval.

REFERENCES
- Real time detection and tracking by the surface wave radar deployed at Biscarrosse, France.
- SETHI system: the new generation flying lab and one of its pods.



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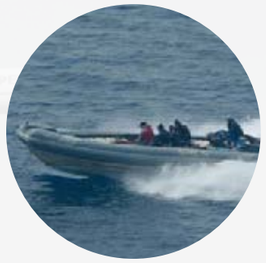

PRESENTATION
Since its labelling in July 2005, Pôle Mer PACA has become a key actor in sustainable development and maritime security and safety in the Mediterranean area.
Pôle Mer PACA intends to turn our regional area into a highly attractive territory for maritime companies, research and training centres.
Our two strategic fields of activity are safety and sustainable development divided in five areas:
- maritime safety and security;
- ship and nautical industry;
- ocean energy resources;
- marine biological resources;
- environment and coastal engineering.

PRODUCTS/SERVICES
Our aims:
- to encourage the emergence of innovative collaborative projects and support them in the search for funding;
- to act as an agency of sustainable economic growth implementing an integrated maritime policy;
- to contribute to maritime industry development;
- to act as leading maritime cluster representing a keeping growing network of over 320 members with strong local base on Mediterranean coastline area;
- to maintain strong links with twin cluster in Bretagne as well as developing network in the related domains in France and at an international level.

REFERENCES
Key figures:
- 320 members: 60% of them being SMEs, 2/3 of Industries, 1/3 in Research & Development representing 100,000 jobs.
- 92 labelled projects, 143 granted projects for 371 M€.

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PRESENTATION

Rockwell Collins (NYSE: COL) is a pioneer in the development and deployment of innovative communication and aviation electronic solutions for both commercial and government applications. Our expertise in avionics, electronics, mission communications, information management and simulation and training is delivered by nearly 20,000 employees, and a global service and support network that crosses 27 countries.

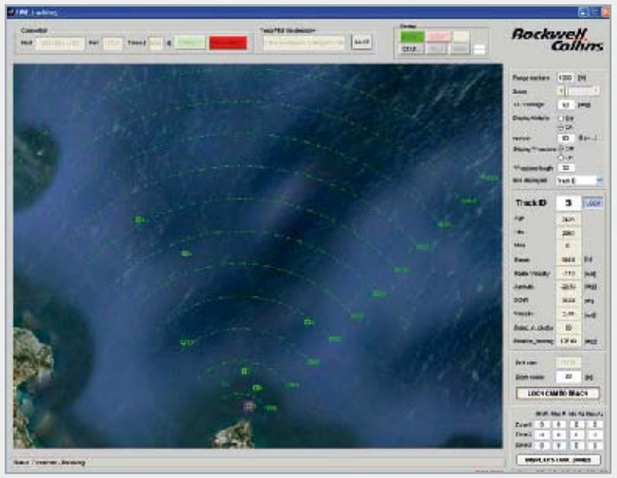
Rockwell Collins has developed in the frame of I2C project a small form factor, low cost, low power radar prototype for the detection of small targets by high sea state at range up to 11 km.

PRODUCTS/SERVICES

- Integrated systems for mobile platforms.
- Communication.
- Navigation.
- Surveillancence.
- Situational awareness.
- Automated flight control.
- Information management.
- Cabin management.
- Simulation and training.
- Global service and support.

REFERENCES

- DGA (French MOD), DGAC, etc. French, European and US Aircraft Manufacturer and Integrators.
- Large accounts: Banks, Insurances, Administrations, Medias.
- Foreign Ministries of Defence Airlines.
- Data Processing Manufacturers, Value Added Resellers (VAR), third Party Maintenance (TPM).



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PRESENTATION

SOFRESUD is a high tech SME specialised in embedded systems and naval engineering.
Initially focused on National Defence activities with the development of the Quick Pointing Device (QPD), an advanced target designation system which ensures last resort protection of military ships, SOFRESUD at present uses its know-how in study and development of complex technical systems to propose innovative systems dedicated to maritime security of civil naval platforms.
The role of SOFRESUD in I2C is to design, to develop and to maintain a vessel database which aggregates static or semi-tatic information about ships from various data sources. The issue is to have available in a single structure all potentially relevant attributes to enrich the common situational picture and pave the way for abnormal behaviour detection.

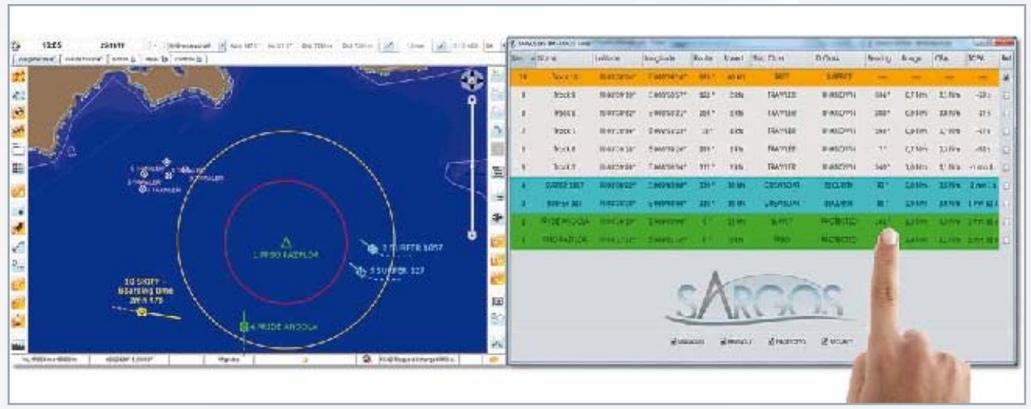
PRODUCTS/SERVICES

Products:
- Quick Pointing device (QPD) and by-products;
- CVAO (Computer-aided visual inspection of metallic structures);
- SARGOS (global alert and graded response system dedicated to offshore infrastructure protection against malevolent intrusions).

Skills:
- hardware and software development of embedded systems;
- management of programmes;
- systems Integration;
- technical-operational simulation;
- databases;
- decision making systems.

REFERENCES

- QPD: first level supplier for main naval military programs (FREMM, T45, HORIZON, SKOLDJ, SAWARI 2).
- Maritime Surveillance: SCANMARIS, SISMARIS, I2C, PERSEUS (Vessel database).
- Maritime Security: SARGOS, BIMAC.



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