STYRIS
Coastal Surveillance Systems
Enforcing Border Integrity
Maritime Domain Awareness through the provision of:

- Advanced Radar Processing for small targets
- Multi Sensor Data Fusion
- Recognised Maritime Picture
- Automatic Abnormal behaviour Analysis
- Real Time Command and Control (C2)
- Multi Agency System compatibility

Border Security enforcement
- Protection of state jurisdiction and security of borders
- Navigational Safety, Traffic Separation Schemes, Mandatory Ship Reports,
  Support to coastal defense

Detection of illicit activities
- Early detection and alerts of suspicious behaviours
  Fight against smuggling, trafficking, illegal immigration, piracy, and terrorism
  Control of fisheries

Search And Rescue (SAR)
- Supervise Search and Rescue operations
  Realtime planning and support
  Coordination of activities across a range of external organisations

Environmental Protection
- Alerting authorities to protect critical assets:
  O&G platforms, wind farms, nuclear plants, Naval bases
- Prevention against accidents
  Fight against pollution

UNDERSTANDING THE COASTAL SURVEILLANCE MISSION AND MEETING ITS CHALLENGES

Delivering End-to-End Solution...
- Airbus is a system integrator and prime contractor
- Delivering turnkey and proven solutions
- Compliant with international standards and local environment factors
- Fully scalable systems with growth potential
- Design to cost
- Commitment on performances

In-House Integration Capabilities
- Unique platform to challenge our product against real time sea conditions
- Outdoor platform representative of a coastal station
- Live trials at sea on cooperative and non-cooperative targets tests and
- Benchmark of sensors
- Innovation and new technology evaluation
- Optimization of software processing in real time/life conditions
**Target behaviour Analysis**

STYRIS® CSS offers a tool for automatic suspicious behaviour detection based on a powerful alert rules engine. Behaviour analysis is fully configurable according to customer needs and includes detection of vessels stopping on high sea, abnormal routing, sudden change of speed or direction, black listed vessel already involved in previous incidents. This tool is complemented by an alert management tool to assist the Operator in prioritizing alerts that may be raised concurrently. The system helps to assess threats with a table where alerts are sorted by priority level.

**Recognised Maritime Picture**

STYRIS® provides at a glance a maritime picture built from data acquired by various sensors along the coast displayed on electronic charts (S-57/S-63, Tiff, Raster, etc.). Radar tracks are “recognized” automatically by correlating AIS and other data sources such as database or manually by the Operator tagging a target after radio or Electro-Optic identification.

**Focus on Threats**

The STYRIS® CSS Filtering module provides Operators a sharper view on the target of interest they have to deal with. Filtering is an ideal function to disseminate the exact amount of targets required by the Operator to fulfil his mission. It helps focusing on tracks of interest, and is adapted to the Operator’s mission and clearance. Targets can be filtered according to various criteria such as cargo, origin, attention level, not reported vessel, etc.

**User Centred Design**

STYRIS® assists the Operators by a number of advanced automatic monitoring functions. The STYRIS® HMI is the result of Airbus long and extensive experience delivering Coastal and Port solutions worldwide, incorporating feedback from Users and Operators from different sites where Airbus maritime systems have been deployed.

**Cost Effectiveness**

Solutions based on COTS hardware with low maintenance costs and Software Oriented Architecture (SOA) supporting easy system evolution to protect your investment.

**System Reliability**

Coastal Surveillance Systems being Mission Critical, STYRIS® CSS incorporates the technical means and redundancy to ensure highest system availability at highest performance.
STYRIS Command & Control for multi sensor data fusion, user interface and aid to decision tools

Maritime radar for long range detection and tracking of targets at sea

Land radar for perimeter surveillance and intrusion detection

Electro-optical systems for recognition and identification of suspicious targets

Radio, RDF and AIS for communication and localization / identification of vessels

Mobile STYRIS for intervention means and mobile surveillance
AID TO DECISION

Real Time Command & Control (RTC2)
To allow Operators to react quickly, with the most efficient means, STYRIS® CSS is enhanced by a set of tools including Command and Control (C2) actions.

Once a target is recognised as a potential threat, the RTC2 tools help the Operator to react / on time by dispatching information on the field and managing multi stakeholders events such as interception according to customer Standard Operating Procedures (SOP) and chain of commands.

Search And Rescue (SAR)
The STYRIS® CSS SAR module relies on GMDSS standard and utilizes system’s radio and detection means such as Radio Direction Finder (RDF) for automatic detection and location of distress calls to raise alerts to the Operators.

In addition STYRIS® supports SAR Operations coordination with specific tools such as Mission planning, Rescue Units asking, Drift modelling to estimate the drift of a stopped vessel or to define of Search Patterns.

Record, Replay and Pattern Analysis
STYRIS® CSS provides a tool to synchronously replay recorded events of past hours or months. The system permanently archives all data (sensors data, tracks, events...). When using the “Replay mode”, the Operator can replay all the data in a synchronous mode in order to reproduce the maritime situation at a given time period of a specific event. This feature is also used to support Operator trainings.

The increasing number of sensors and data sources in large CSS systems makes a real-time analysis nearly impossible for events which require a longer observation time. The STYRIS® traffic analysis tool allows a better understanding of the maritime activity in a given area over a long period of time to determine patterns that behaviour detection engine.

Database
STYRIS® comprises a fully integrated database system. It is modular and includes the capability to integrate various sources of information. The user can rely on own knowledge, existing databases such as Lloyd’s, live sources of information or proprietary and intelligence databases.

All relevant Vessel Database information accessible in one click (incl. last voyage owner, certificates, inspection, change history, black list, etc.)
STYRIS® has been designed so that the same user interface can be deployed from a stand-alone laptop to an established and structured organization with multiple command and control centers with multiple layers of authority.

STYRIS® can be accessed and controlled at various levels:
- Local console, where Operator is in charge of specific sector and receive tasks issued by higher level to respond to incident and activities.
- Regional Center, where missions are planned and 24/7 operations are conducted. Those sites are usually equipped with a number of Operator and supervisor consoles together with a large display.
- National control centre, where high level information is gathered and strategic decisions taken. This site is mainly equipped with large display with specific functions for briefing, debriefing or crisis management.

The HMI design was developed to achieve the best ergonomics and provide:
- awareness of the complete maritime picture generated from fused data of the sensors;
- intuitive means for the Operator to retrieve detailed information related to the objects displayed and interact with the functions (sensor settings, cameras control, etc.),
- a “calm” visual context where only events which require immediate Operator attention are displayed more prominently.

**Web and remote access**

STYRIS WEB gives access to unclassified - tent or filtered view of the maritime picture via intranet, internet for allied services (customs, police, pilots, etc.). It can be accessed from any internet browser or mobile device such as a laptop through a simplified HMI.
Radar
Radar is the only sensor capable of accurately locating non-cooperative targets in all weather conditions.

Effective surveillance of coastal borders, approaches to ports and harbours or land perimeter requires the use of very sensitive radar systems and advanced processing software. Having integrated more than 1000 radars, Airbus capability ranges from conventional radar to latest technology such as solid stage, frequency diversity or electronic scan (AESEA) radars.

The STYRIS® system provides an efficient and flexible means of processing and displaying data from multiple radar systems. It uses advanced processing algorithms to fuse track data and analyse targets patterns to identify suspicious behaviour.

The unmatched capabilities of STYRIS® radar extractor and tracker enables the tracking of very small, fast and agile targets and has the intelligence to maintain tracks in the most adverse weather conditions. The system is able to manage the transition of radar targets through shadow zones and effectively suppresses ghost tracks providing high reliability and very low false alarm rates.
**Electro-Optical Systems**

Electro-Optical (EO) systems used in conjunction with radar and AIS provide a valuable sensor component for the identification and the confirmation of targets either during the day or at night.

The systems also provide the potential for the identification of targets at very long ranges. Moreover, by using the tracking ability of the radar and AIS, the camera can automatically slew to the target position and continuously track the target thus removing the need for manual operation.

STYRIS® provides full control of Electro-Optical system and incorporates added value features such as Panoramic view, Video Motion Detection, augmented reality, visualisation of camera's line of sight and field of view on the maritime picture.

STYRIS® allows an Operator to use the tracking ability of the Radar subsystem to automatically pan, tilt and zoom an EO device toward a target, and to follow it continuously. This capability greatly reduces the problems of manually operating to follow a target.

**Tailor-made Electro Optic solutions**

- CCD camera
- EMCCD camera
- Infrared Cooled and Uncooled camera
- Active laser range gated camera
- Panoramic Camera
Radio over IP and LRAD
The STYRIS® CSS incorporates a Radio over IP (RoIP) Communication module fully compliant with GMDSS and providing a very efficient way to handle voice communications involved in coastal surveillance (HV/MF/VHF, TETRA radio subsystems). STYRIS benefits from the latest VoIP progress with its improved digitization, Push-to-talk management and radio control. Therefore it is very easy to add, remove or modify the set of radios available to one Operator. The Radio “touch screen” HMI is dedicated to manage communications from a list of available radios channels from a single transceiver to a nationwide radio network.

Long Range Acoustic Device (LRAD) is an above water acoustic hailing device designed to send messages, warnings, and tones over long ranges providing a means to communicate and deter intruders. LRAD systems are fully integrated into STYRIS providing slew to cue functionality on targets of interest. As any other radio channel, LRAD can be used to communicate with vessels and controled from the Radio over IP module.

Automatic Identification System (AIS)
AIS sources automatically report vessel identity and position; AIS data will be fused with radar tracks enhancing vessel identification. STYRIS® integrates base stations, receivers, transponders or networks compatible with the international standard ITU-R.M1371.

Radio Direction Finder Radio Direction Finders (RDF) are sensors that support surveillance operations by finding the direction (azimuth) of radio transmission source. The STYRIS® CSS RDF module is used to support routine surveillance missions, Search & Rescue, Radio Spectrum scanning and interception of illicit communications.

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**MOBILE UNITS**

**Integration of Mobile Surveillance Units**

STYRIS® comprises specific module to interface with authority’s vehicles, aircrafts and vessels deployed in the area. Connected to the shore-based command and control center, this module extracts and sends data from sensors onboard surveillance units (truck mounted radar, ship borne ARPA radar, UAV’s camera, etc.) and provides a maritime picture information onboard on tactical console.

Via the Airbus Maritime Group we can take advantage of our full airborne Intelligence Surveillance Reconnaissance (ISR) capabilities integrating helicopters, Maritime Patrol Aircraft and Unmanned Aerial Vehicles as required by the end user.

STYRIS® compiles a maritime picture which can be accessed remotely on the move which significantly increases the protection of critical areas and reaction time on threats.

STYRIS® monitors the patrol units in the area and allows an Operator to select the “best interceptor” according to patrol unit’s status, performances (max speed, endurance) and actual position. The on-board console grants the reception of mission orders and visualization of live targets position and recommended interception trajectory.
Airbus is the market leader in coastal surveillance with a thorough understanding of threats, environmental conditions and operations issues. Thanks to 30 years of experience and over 250 systems delivered to fully satisfied Customers including Coastguards and Navies worldwide, Airbus is well placed to provide tailored solutions and services to meet specific Customers’ needs:

- Operational Studies
- Concept of Operations (CONOPS)
- Design and Technical specifications
- Selection and trials of sensors
- Sensors (Radar, EO, radio, RDF, AIS, etc.)
- network performances analysis