ELECTRONICS DIVISION

LEONARDO

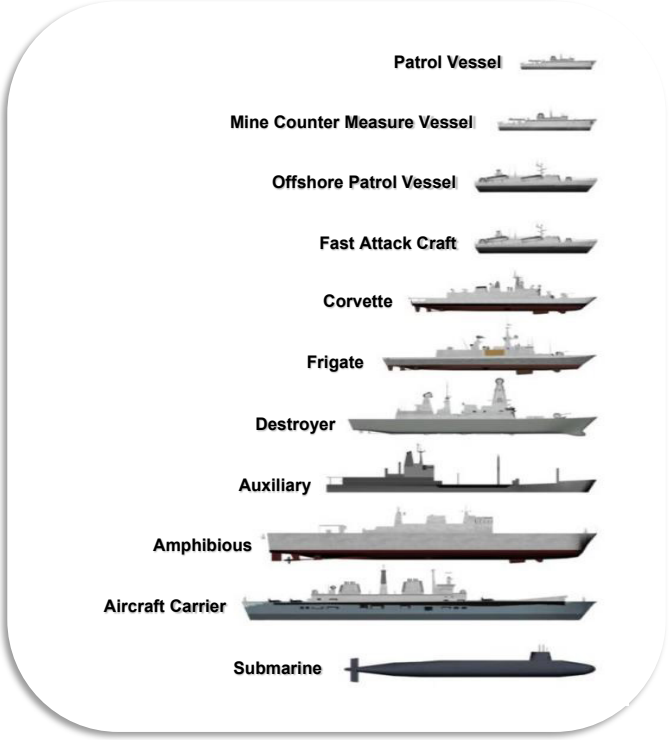
NAVAL SYSTEMS

LEONARDO

- 100 years of experience in Naval Systems
- Solutions for Mission Critical Needs
- Continuous commitment for research and development
- Specialized systems for each type of naval unit
- Advanced technologies and hitting solutions
- Naval Systems and extended lifecycle support

Leonardo is an international provider of advanced defence systems for surface combatant vessels, auxiliary vessels and submarines. The company is able to equip all classes of vessels, each according to their mission requirements.
The company:

- Is customer-driven throughout projects
- Designs turn-key combat systems which integrate company equipment or a combination of those and third parts technologies
- Delivers reliable naval systems for the most demanding battlespace and environmental conditions at sea
- Runs low-risk projects thanks to a structured planning and design methodology.
- Has provided equipment for more than 100 naval military units of varying size across 40 different Navies.
- Is able to provide any equipment for all kind of vessel, from CMS to Radars, from IFF to Communications, from Guns to Torpedoes and Sonar, till EWS solutions and SAM and SSM systems through sister companies (i.e. Elettronica and MBDA).



MAJOR ACHIEVEMENTS

Landing Helicopter Dock

Multipurpose Patrol Vessel Class

FREMM Class Frigate

Corvettes Class

Amphibious ship Class

Minehunter Class

Offshore Patrol Vessel Class

Fast Attack Craft Class

DELIVERING RELIABLE COMBAT SYSTEM SOLUTIONS

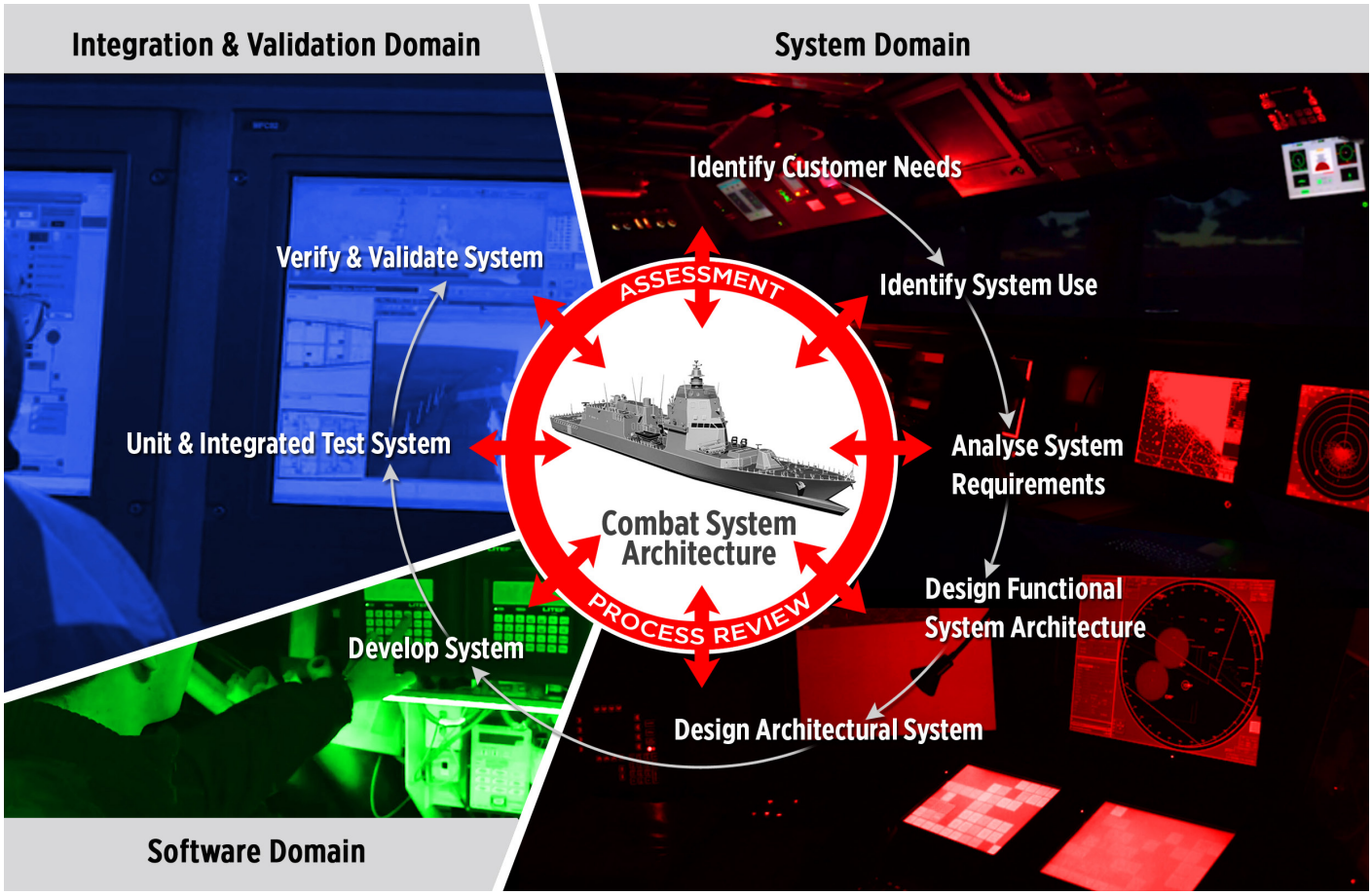
The company runs very low risk integration. This is possible due to the company's use of a design methodology which uses proven tools and processes to validate its combat system's architecture before anything is physically installed on-board.

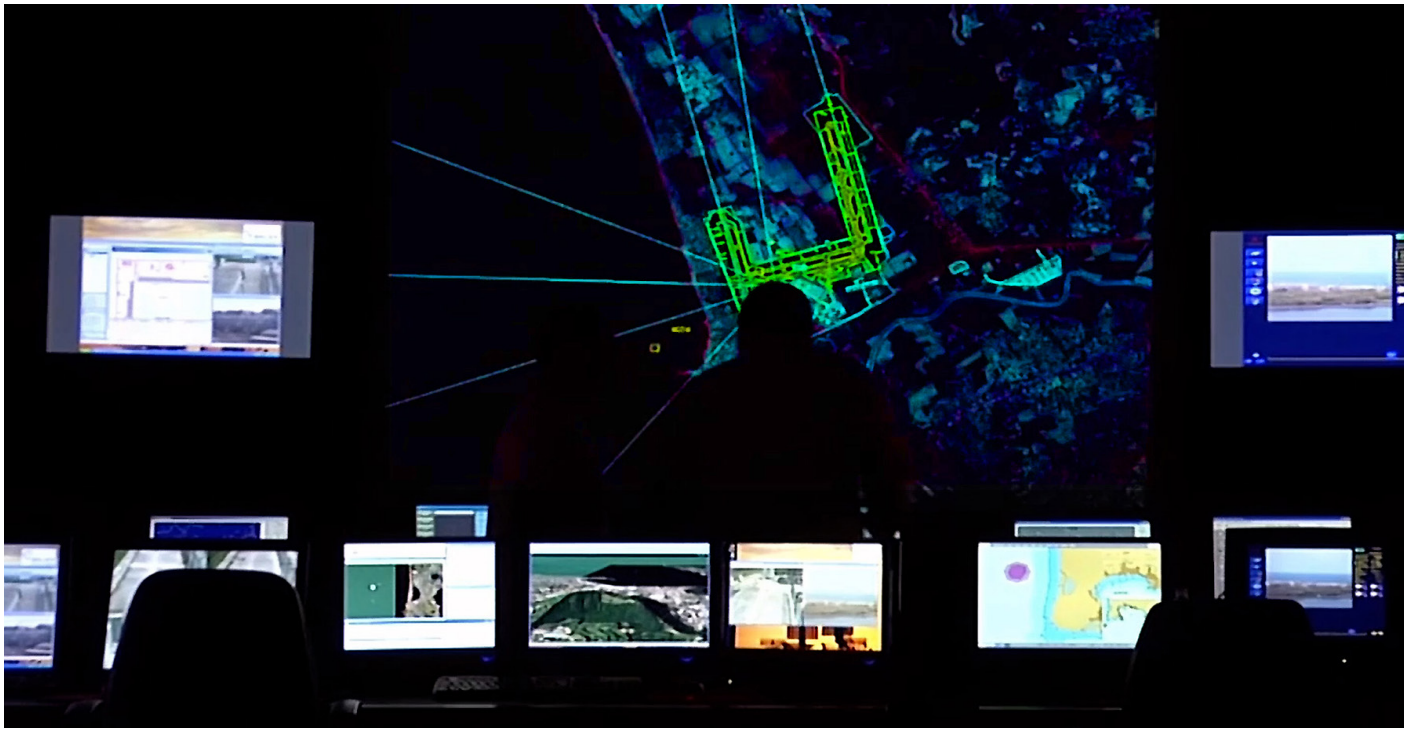
Modern Naval Combat Systems require new holistic approaches and processes to manage overall complexity. This is why we have developed a number of design methods, tools and processes that come into play at the combat system's analysis phase.

The Integrated Systems Functional Modeling (ISFM) is a design method developed by the company to perform a complete analysis across the entire system's life-cycle, from requirements specification to system integration within a simulated environment, up to the test and validation.

Combat system's design phase starts with the CONOPS definition and also takes into account factors such as the expected operational scenarios the combatant vessel will face, the number of missions it will sail, target detection performance requirements, physical constraints of the vessel, the operational doctrine for weapon assignments and the desired reaction time and/or range of capabilities in engaging targets.
Once the requirements are defined, a deeper analysis of each is performed in order to design a functional architecture for the system. This architecture in turn ensures that the preliminary components of the combat system meet the overall performance requirements.

If the requirements are met, the architecture is fixed and the software development phase starts. This is followed by a number of phases covering integration and validation, first ashore and finally on-board the vessel in harbor and at sea.





DESIGNING AND TESTING COMBAT SYSTEMS TO EQUIP THE FUTURE SURFACE COMBATANT VESSELS

The company designs and validates the combat system architecture integrating the software of the Combat Management System (CMS) within a simulated environment known as Land-Based Test/Training Site (LBTS). The LBTS includes dedicated simulators of the vessel's sensors and effectors to test the CMS. Depending on the scenario, the data used in the testing can be either synthetic or based on real environmental data.

The LBTS, in addition to simulating equipment, can integrate the real, physical parts of the combat system, allowing to test equipment and CMS software working togheter before their prior to being installed onboard the vessel.

The LBTS itself can also be supplied to a customer alongside the combat system, providing a number of benefits including the ability to:

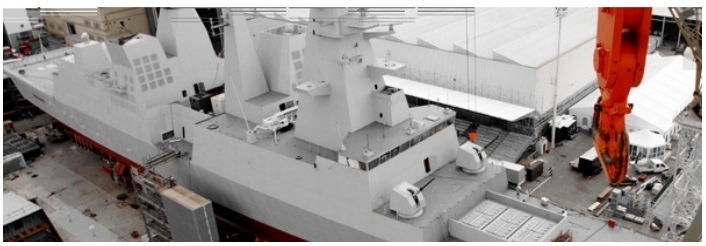
- Test and validate new equipment, either updates or upgrades software, testing it before installation on board.
- Maintain and update specific component of the CMS software through dedicated configuration control tools.
- Insert new technologies according to new requirements or the established system growth plan.
- Create an integration site which features physical representations of a vessel's main assets.
- Run crew training simulations; the LBTS can work seamlessly alongside other vessel's LBTS centres and the real fleet.

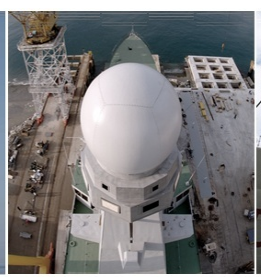
SUPERIOR AWARENESS AND NETWORK ENABLED ASSETS

Combat management systems, command support systems, strategic support solutions and advanced C4I support (including land-based naval C4I) are all key to integrate and distribute information throughout Armed Forces' networks.

The capability to process and convey secure information to each specific level of the command chain, according with the operational doctrines, is a tactical and strategic need to meet the requirements of modern armed and security forces, and not just limited to the joint operations.

The company is able to support customer's naval information requirements at both tactical and strategic levels, ensuring the effective management of intelligence across the fleet.



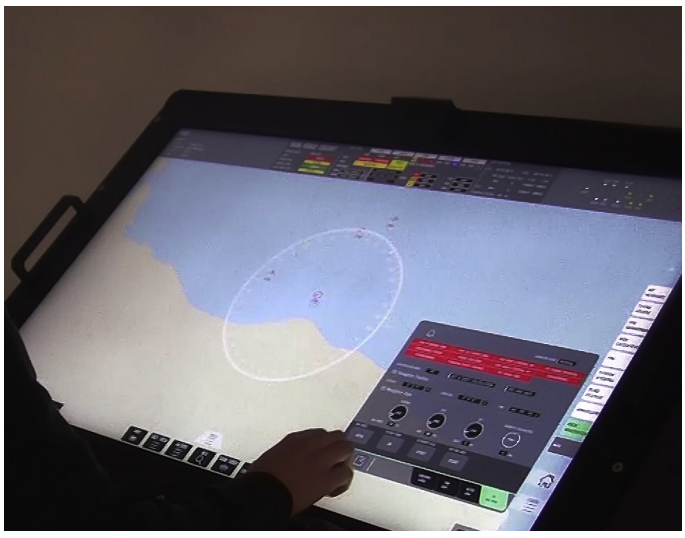


COMBAT MANAGEMENT SYSTEM “ATHENA®” MK2

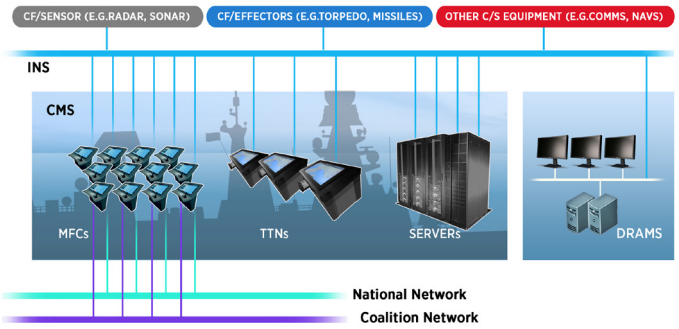
The state of the art Combat Management System ATHENA (Architecture & Technologies Handling Electronic Naval Applications) MK2 provides officers and operators with the complete situational awareness of the battlespace at sea, above and under the water, in order to plan and quickly execute the reaction.
ATHENA® MK2 is modular and scalable, designed by the company to perform a full range of missions according to military standards:

- Anti-Air/Surface/Submarine Warfare
- Naval Firing Support and Littoral Warfare
- Maritime Security Operations and Situation awareness enhancements through Intelligence Library and Jane’s data
- Search & Rescue and Patrolling operations
- Aviation Support for UAV, helicopters and aircrafts
- Underwater Sensor Management
- Mine Warfare Management
- Submarine Systems Management
- Unmanned Vehicles Mission Management and Control
- Interceptor Organic Boats control

ATHENA® MK2 covers all battle management functions, maximizing the integration of sensors and effectors within a multi-layered application, to comply with the most demanding requirements for Anti-Air Warfare, Anti-Surface Warfare & Naval Firing Support, Littoral Warfare, Anti-Submarine Warfare and Mining Warfare missions and scenarios.
With a range of non-combat data processing functions accessible from the system’s multifunction consoles, ATHENA® MK2 is also useful in non-combat scenarios. These include law enforcement, maritime security operations, search and rescue missions, disaster relief operations, maritime pollution control, the surveillance and control of sea lanes and navigation routes and government escort duties.



ATHENA® MK2 performs Threat Evaluation and Weapon Assignment (TEWA) in accordance with operational doctrine as well as Force TEWA (FTEWA) at force level to coordinate hard-kill resources.
ATHENA® MK2 takes into account the customer’s operational doctrines with regards to sensors management, picture compilation, threat evaluation, engagement assessment and effector management and control.
ATHENA® MK2 is able also to provide functions for Local and Distributed Training, Data Recording, Mission Debriefing, accessing to local and distributed information databases, as well as to cohaliction and national networks and resources.



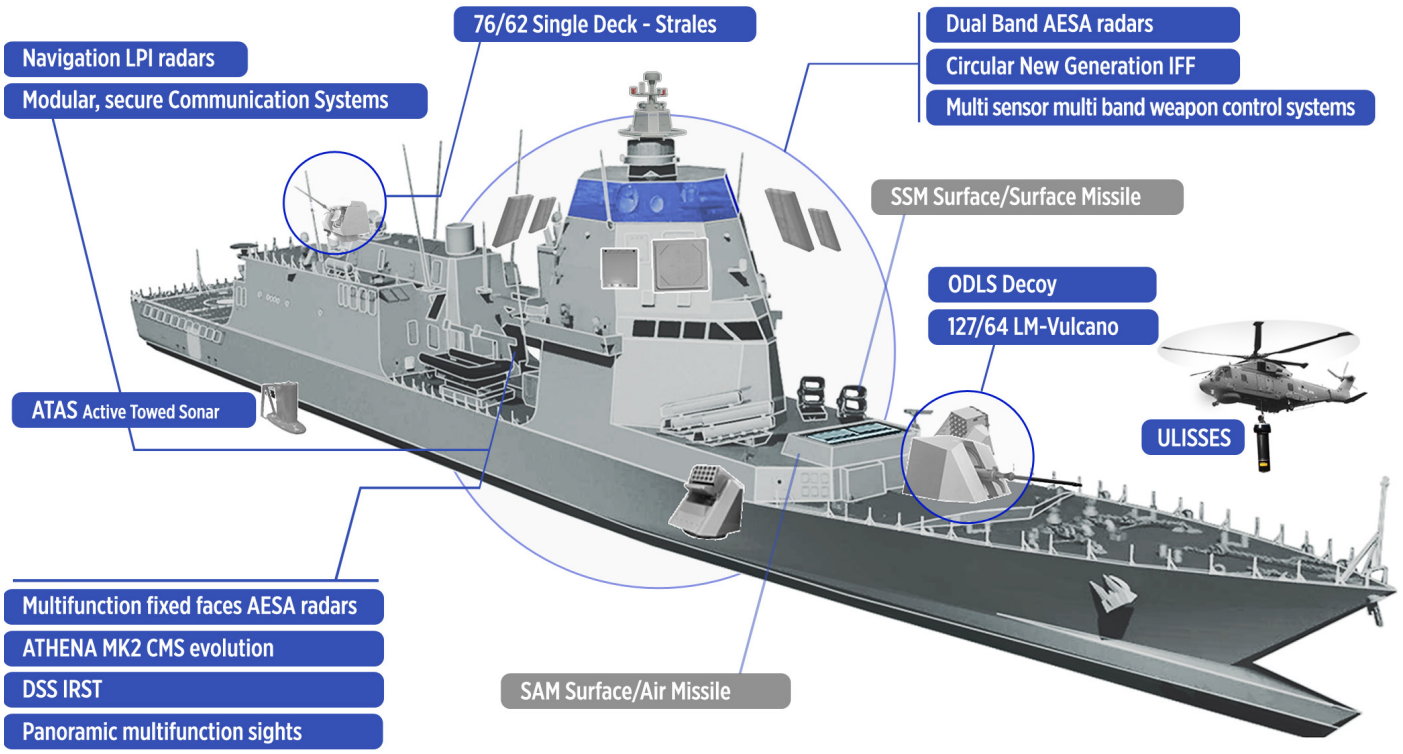
ATHENA® MK2 is able to:

- Manage a variety of sensors, collecting and integrating the data gained from each sensor’s unique detection capabilities to provide the best possible threat evaluation
- Control weapon assignment and the management of a vessel’s various effectors to maximize the effectiveness of the combat system in response to any threats
- Provide information integration and data-mining services for intelligence collected by national and allied assets during joint and cooperative missions.
- Control specific Submarines sensors and weapons

ATHENA® MK2 can gather, process and provide visualization for all types of sensor data including that from radar, optronic sensors and video (from Interceptor Organic Boats and/or UAVs).

The system has advanced tactical and planning decision support features and can be easily integrated with maritime C4I systems.

The newest natural interaction allows to grant the easiest and most effective CMS training, both onboard and ashore, and the quickest information access system, with the best performance respect with all the other Combat Management Systems on the market.



COMBAT SYSTEMS INTEGRATOR

Combat Systems Integration is an area in which we have a great deal of experience. The company has executed a number of challenging naval programmes of varying complexity using low-risk approaches that have benefitted from comprehensive design phases.

Able to deliver combat systems that are state-of-the-art whilst remaining reliable, the company can turn ships into combatant surface vessels suitable for a wide range of missions.

We deliver combat systems that integrate:
Sensors (active, passive, above water, underwater, etc..) which gather information on the local situation to evaluate the current level of threat; effectors (active, passive, above water, underwater, etc..) which defend or attack in response to threats.
ATHENA® MK2 both integrates the data collected from the sensors and controls the effectors, ensuring the combat system delivers the highest possible performance during any operations at sea.

A number of guns were integrated either within our Fire Control Systems or Combat Management Systems.

Leonardo experiance in C/S activities and the strict collaboration with MBDA, allows also to grant a complete Missile Integration, both for SAM and SSM solutions. In this field Leonardo integrated with its CMS the following Missile Systems: ASTER 15/30, ASTER 30 B1NT, VL MICA, SIMBAD RC, TESEO MK2, MILAS, Sea Sparrow ESSM BL II.

We are able to provide turn-key Combat Systems solutions through the integration of all products by Leonardo (including former Otomelara and WASS ones), MBDA (Surface-to-Air Missiles supplier) and Elettronica (Electronic Warfare Systems supplier) or alternative manufacturers.

In addition, we are able to act as a ‘mast integrator’. Here, the company integrates non-rotating sensors and communications systems within a ship’s mast, providing multiple and high reliable lines of sight and compact architecture while avoiding electromagnetic conflicts.

INTEGRATION, NAVIGATION AND COMBAT MANAGEMENT SUPPORT SYSTEMS

The company provides and integrates any navigation systems within the Combat Management System architecture.
We are able to provide turn-key navigation systems solutions based on the company's Navigation Data Distribution Unit (NDDU). The NDDU gathers data from a number of navigation sources such as gyros, meteo data, speed log and DGPS and properly distributes this information to the combat system network.

The information can then be used by the combat management and fire control systems to aid with ballistic calculations and support ATHENA with the definition of a vessel's engagement plan. ATHENA also integrates any W-AIS system to correlate all information and data available.

Additional capabilities can be added to a vessel's combat system architecture in order to improve a crew's awareness, especially against asymmetric threats such as fast attack craft or attacks which take place outside of formal conflicts.

The recurring theme in asymmetric warfare scenarios is that attackers will aim to find the most unconventional method (i.e.: jet sky. small and very fast armed boats, etc..) and unexpected time to attack. In response to this, the ATHENA combat management system is ideally suited for handling Communications Intelligence (COMINT) through enhanced integration of Communications-Electronic Support Measures (C-ESM) as part of overt or covert reconnaissance operations and network-centric warfare. With this capability, naval units can exploit the electromagnetic spectrum and intercept their adversaries' communications to counter conventional, asymmetric, criminal, or terrorist threats against coastlines, national borders, and logistics channels.

We can select and integrate any Remotely Piloted Air Systems (RPAS), Unmanned Underwater Vehicles (UUVs) and/or video data provided by Interceptor Organic Boats within its ATHENA combat management system.

The Automatic Dependent Surveillance-Broadcast (ADS-B) system can be added to the combat system architecture to support an airborne fleet and to complement data processed by the ATHENA combat management system to provide the aviation support capability.
Integrated Platform Management System (IPMS) solutions can also be integrated as well as supplied to provide features such as ship safety and security management and guidance, and navigation management.

The company designs and integrates any type of multifunction console and provides tactical tables solutions.

Our tactical table displays a common operational picture on large multi-touch displays (55"-60"). The tactical table can integrate data from external sources and provide mission planning, mission execution monitoring, mission control and debriefing facilities.

Remote control panels can be provided in order to allow the distribution of essential information to wherever it is needed.

THE MOST COMPREHENSIVE RADAR PORTFOLIO

The company has one of the most comprehensive radar portfolio covering ka-band, X-band, C-band, and L-band. The wide range means a customer can find a perfect fit for a given application, be it navigation, air and surface surveillance, tracking or over-the-horizon scanning. With multifunction capabilities on offer, the range of radars can meet even the most demanding requirements.

For littoral surveillance, the SPS-732 operates in X-band and offer ranges of more than 180km. This 2D multi-role radar can be installed onboard small and medium surface combat vessels to fulfill a variety of operational roles. With its newly functionality, including continuos zoom, LPI capability and ISAR analysis it currently is the state of art for Surface Surveillance Radars.

For surface combatant vessels of 400 gross tons and above, the KRONOS® NAVAL HP can be fitted onboard. Offering Active Electronically Scanned Array (AESA) technology in the C-band, KRONOS NAVAL HP is the only multi-function radar on the market with an antenna group that weighs less than 1000 kilograms. KRONOS NAVAL High Power is able to provide increased performance in range detection.

Also part of the KRONOS family, the **KRONOS® GRAND NAVAL** is a multi-function AESA radar that acts as main asset of the Principal Anti-Air Missile System for heavy surface combatant vessels. Applications of the **KRONOS GRAND NAVAL** include extended self-defence and area protection, air and sea surveillance, multi-target tracking, volumetric search and guidance for multiple active missiles.

For early warning, the L-Band multifunctional fully digital AESA radar **KRONOS® POWERSHIELD** performing an instrumental range up to 1500km. It can provide surface combat vessels with enhanced anti-tactical ballistic missile (ATBM) capabilities up to TBM600 and TBM1300 early warning.

The last and more powerful multimission multifunctional radar produced by Leonardo is the **KRONOS® DBR (Dual Band Radar)**. It is a fixed faces C-band and X-band solution at the top of the performance, ables to grant not only standard AESA 3D Air and Surface surveillance and tracking, but also ATBM functionality against TBM600 targets, missile guidance, up link and Fire Control System capability.

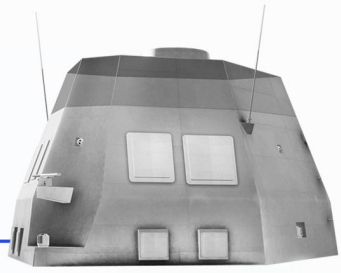
The SIR-M family of radars range from simpler compact variants to sophisticated architectures that can integrate both rotating or fixed-face / conformal antennas is the IFF most comprehensive solution on the market, coupled with Leonardo IFF transponder and interrogators up to Mode 5 and S. And the PAR720 is one of the most used Precision Approaching Radar, installed on board of Italian and export Aircraft Carriers.

AESA RADAR

KRONOS GRAND NAVAL

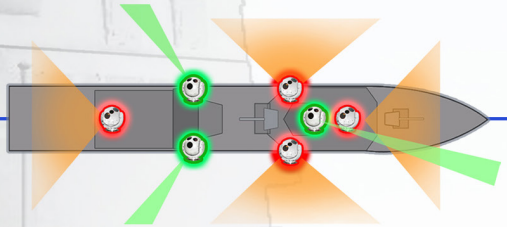
KRONOS NAVAL / HP

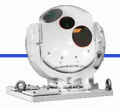
KRONOS POWER SHIELD



KRONOS DUAL BAND

OPTRONICS





DSS IRST

IRST SASS

JANUS N

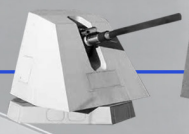
CMS COMBAT MANAGEMENT SYSTEMS

ATHENA MK2

COMMUNICATIONS

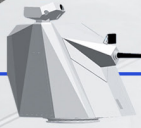
V/UHF WAVEFORM SET

ARTILLERY GUNS

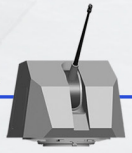


127/64 LW

76/62 STRALES



MARLIN 40L



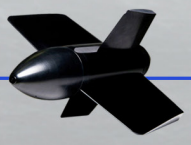
MARLIN 30WS

25MM KBA

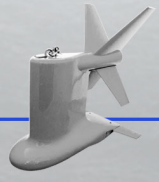
LIONFISH UL

C310

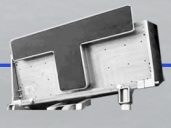
UNDER WATER SENSORS and WEAPONS



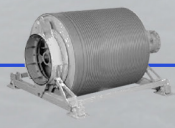
BLACK SNAKE (TDS)



ATAS (VDS)



THESAN



HMS

NAVAL EQUIPMENTS

SENSORS

SPS 732

IFF-SIR-M-E-CA

IFF-SIR-M-E-NR

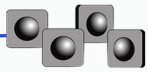
PAR 720

NAVIGATION RADARS

ONLY INTEGRATION

EW

ESM



ECM

FIRE CONTROL SYSTEMS

NA30S MK2

NA30S

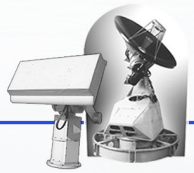
MEDUSA MK4/B

NA25X

V/UHF HF COMMS INT

SDR

AIRBORNE INTERCOMMUNICATIONS SYSTEM



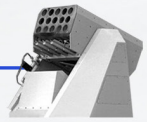
HF SATCOM

TACTICAL DATA LINKS (LINK 11,16,22)

SWITCH AND ROUTER/RADIO GATEWAY

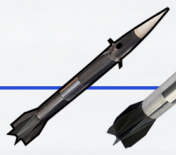
Datalink Processing

M-DLP

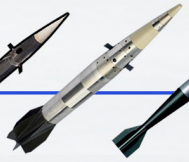


ODLS 20

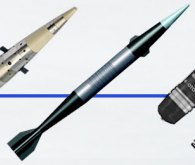
AMMUNITIONS



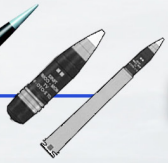
DART



VULCANO 127



VULCANO 76



STANDARD AMMUNITION

ONLY INTEGRATION

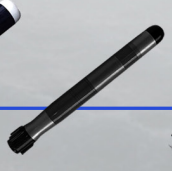
MISSILE

SSM
Surface/Surface Missile

SAM
Surface Air Missile

MDS

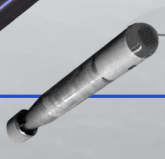
A.244/S MOD.3



BLACK ARROW

BLACK SCORPION

BLACK SHARK



MU90

ULISSES

OPTRONICS SYSTEMS

The company is a leader in **Electro-Optical** technologies and systems, providing high-performance products for the most demanding customers' requirements worldwide. This position is based on the company's research and manufacturing experience in the core elements of an EO system including its infrared detector, stabilized EO director and image processing algorithms. The company has a great deal of integration expertise installing EO products on naval vessels, land vehicles and avionic platforms.

MEDUSA MK4/B

MEDUSA MK4/B is a lightweight Gun Fire Control System (GFCS) for anti-air and surface warfare, based on enhanced and unmanned self-stabilized EOIR pedestal, which is modular and open to a variety of cameras selection. It is able to control medium/small caliber guns, and provides passive surveillance for sea control, search and rescue operations and main asset against surface asymmetric threats.

JANUS

Janus is an electro-optical, multi-functional, panoramic aiming and anti-aircraft sight. Janus is fitted with passive IR, TVCCD and laser range finder sensors to meet a modern vessel's day and night surveillance requirements. The sight is ideal for maritime navigation and patrol, search and rescue and harbour surveillance and protection.

DSS-IRST™

The new Distributed Static Staring IRST with its distributed sensor architecture allows to perform a full panoramic and wide elevation coverage, without blind sectors due to ship infrastructures. This system allows a full 360° coverge and can also support the night navigation and the situation awareness.

COMMUNICATIONS SYSTEMS

The company is uniquely placed to lead the delivery of Network Enabled Capability. We have proven, in-service, modular, scalable, secure systems, designed to function at the heart of modern military operations, enabling interoperability with allies, joint forces and civil authorities for effective exploitation of information. The company is a founder member of EURO MIDS and also provide Information Assurance services, including digital forensics, vulnerability testing and ICT security consultancy.

Naval Unit with the external communication facilities required to operate in various mission scenarios, such as patrol or fleet operation, joint operation with helicopters and maritime patrol aircrafts and in combined missions with national and international authorities or armed forces.

DL/M-DLP Subsystems

The Tactical Data Link/Multi-Data Link Processor (TDL/M-DLP) enhances the vessel's combat management capabilities enabling command and control integration in the network centric scenarios. Our solution integrates a number of different links (including Link 11-A/B, Link 16, Link 22, J-REAP, VMF and proprietary Link LEO) and provides the naval platforms with the ability to exchange with air and ground assets, in real time and via suitable Leonardo data link modem.
It is also alligned to last STANAG standards for NATO Data Link:

- STANAG 5511 Edition 6
- STANAG 5516 Edition 4
- STANAG 5522 Edition 2
- STANAG 5616 Edition 4
- STANAG 5602 Edition 3 (Link 11, Link 16 and Link 22)
- STANAG 5518 Edition 1

RADIO SUBSYSTEMS

The SWave® Naval Radio subsystem provides HF, VHF and UHF new-generation radio equipment designed to bring all devices of Swave® family deliver IP over Air (IPoA) voice/data/video on SCA Software-Defined-Radio core architecture. The new SWave Family of Maritime Radio equipment includes the following products:

- 150W HF Maritime, Desktop and Rack-Mounted, Modular Radio Transceiver Unit
- 500 W and 1Kw HF Maritime Rack-Mounted Radio Transceiver Units
- HF Maritime High Rack-Mounted Multi-Channel Radio providing specific combinations of basic radio modules such as, for example, 2x1Kw radio
- 100W VHF/UHF Maritime, Desktop and Rack- Mounted, Modular Radio Transceiver Unit
- VHF/UHF Maritime Multi-Channel Radio
- 5/10kW HF Maritime High Power Transmitters

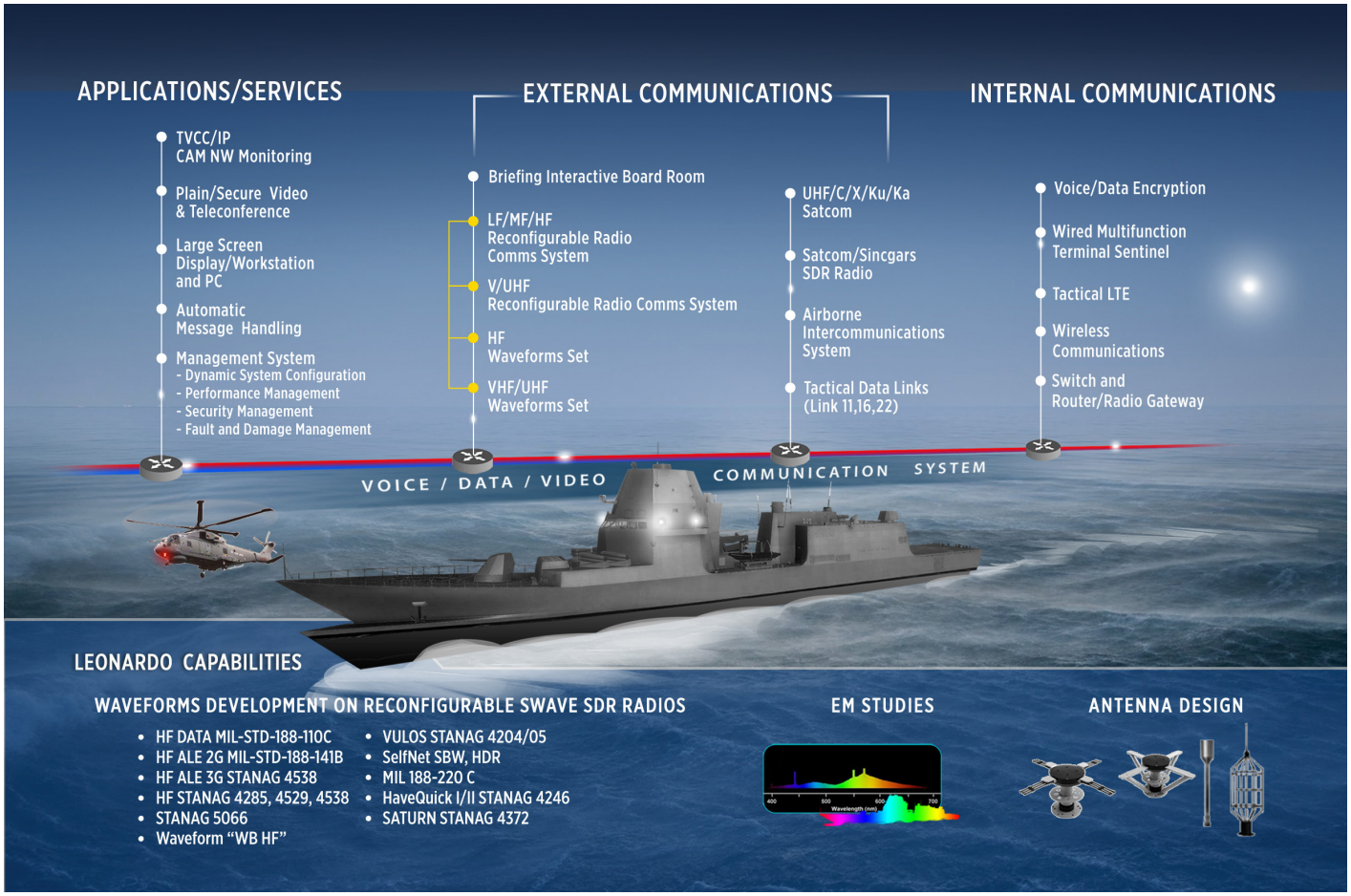
SWave Radios are designed around a highly modular concept, adopted both at system and module levels. It fully embodies the Common Core Radio (CCR) as the basic building block.

The CCR is a new generation, multi-band, multirole, multi-function HF/VHF/UHF single-channel low-power transceiver specifically designed to extend capabilities of SDR Swave family to Naval Communications Domain. SWave HF carriers satisfy short, medium and long range ship-to-ship and ship-to-shore plain/secure voice/data communications. Automatic Link Establishment (ALE 3G) function is available to support operator for critical sky wave transmissions.
New V/UHF SDR carriers are used for line-of-sight plain/secure voice/data communications with military and civilian air, sea and ashore assets. High robustness EPM waveforms (Frequency Hopping) are available for immunity against intentional jammers.

All radios conform to the legislation in force in term of maximum emitted power, available in either vessel aboard or stationary land Installation.

SWave Naval radios

Specifically designed for maritime environment, the SWave Radio portfolio is the keystone of Naval Communications System, offering solutions for different naval scenarios. An example is the stationary multichannel SWave installed in 19” rack on Patrol vessels, fully interoperable with 150HF/100VHF-UHF modular transceiver unit on small ships or on rigid inflatable boats.



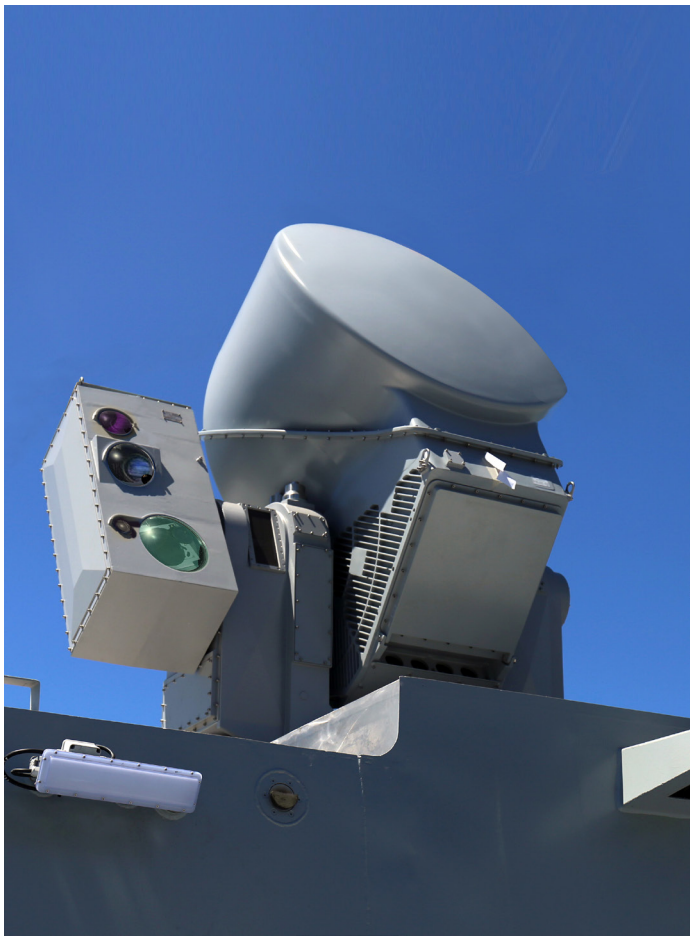
THE GUN FIRE CONTROL CAPABILITIES PROVIDER

A key part of any naval combat system is the gunfire support capability against air/surface threats.
Our family of Gun Fire Control Systems (GFCS) integrate any vessel's navigation suite to provide a basic, but already effective, combat system architecture for small combatant vessels.

NA-25X is a GFCS that can control all caliber of guns used in anti-air and anti-surface combat scenarios. Support for close-in weapon systems and ammunition control is built-in and up to three guns of varying caliber can be controlled by the NA-25X's processing unit.

The NA-30S includes all of the NA-25X's capabilities and in addition also interfaces with a continuous-wave transmitter. By doing this, the NA-30S supports the successful engagement of airborne and surface threats by illuminating the targets. The latest version, NA-30S Mk2, is designed to operate with a dual-band radar to provide superior tracking performance and special ammunition support.

NA-30S Mk2 combines features of GFCS in X-Band and the ammunition illumination capabilities provided by NA-30K, the GFCS of the STRALES system.
The number of gunfire control systems on a vessel is scaled in accordance with the combat system's requirements and its need for multiple lines of sight.
The gunfire control systems can be combined with either electro-optic sensors or radars within a variety of integrated artillery systems.
These systems can autonomously perform effective short and medium-range inner-layer defence.
Each GFCS can be integrated within a vessel's combat management system architecture in order to perform according to its specific operational doctrine.
We can also provide one of the smallest GFCS available; the Medusa Mk4/B. An EO/IR GFCS based on a multi-sensor pedestal with up to four passive sensors, the Medusa can integrate laser, infrared and TV camera sensors (both black and white and/or colour).



MEDIUM AND LARGE CALIBRE GUNS

76/62 SR

76/62 mm Gun is the state-of-art of medium calibre naval guns, with the highest performance on the field.
From our long experiance in naval combat system activities the world class 76mm gun is now available in different configutation for better fit with vessel and operational requirements and constraint: Compact, Super Rapid, Multi Feeding, Above Deck and Strales.
With Strales version it is possible use the guided DART ammunition for Close Inner Defense also in absence of a brand new FCS such as NA30S Mk2.

127/64 LW

The 127/64 LW gun is the top of class large calibre naval gun provided by Leonardo. It is fully developed for granting the usage of the state of art guided ammunition .

Using Vulcano guided ammunition, it allows an extended range up to 70 Km, for landing target firing, Naval Support FIre activities and Naval Gun Support operations, using also a dedicated processor unit for integrated and stand alone solutions.

GUIDED AMMUNITION

76 mm DART

Leonardo is the market leader in guided ammunition design and production.

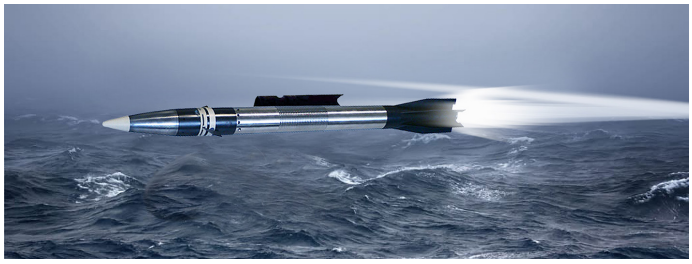
DART is the brand new 76mm amno for inner layer defence agains sea skimmer missiles.

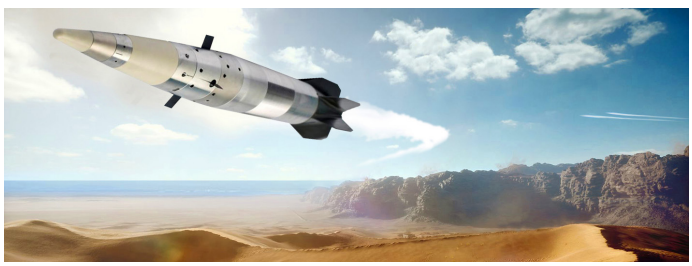
It grants an high manouvrability and a range up to 8 km, which, combined with an hitting probability up to 98% allows to grant Close Inner Defence using only a three amno salvo and simultanous salvo against up to two incoming threats.

76 mm and 127 mm VULCANO

Vulcano ammunitions, both for 76 and 127 calibres, allow to provide state of art Leonardo Guns with and extended range using a gps guided solution.

Thanks to this two ammunitions, completely integrated in the Leonardo multifeeding solution, our guns can cover up to 45 Km and 70 km of effective range at maximum hitting probability, increasing the defence and offence areas and granting a surface naval dominance and a complete and effectivness air defence.





SMALL CALIBRE WEAPONS

LionFish® Small Caliber Gun

The LionFish® is a modern, fully stabilized, electrically operated and remotely controlled naval weapon system that can be fitted with a range of single (12,7mm, 7,62mm , 5,56mm or 40mm Automatic Granade Launcher) or multi barrels cannons (12,7mm, 7,62mm or 5,56 mm).

It is a highly effective short-range self defence system, well fit for small vessels, as well as the secondary armament for any class of ship, with different configuration: Hitrole LN, Hitrole N and Hitrole G, characterised by different increasing weights and performances.

The high capacity of the ammunition storage (750 rounds 20mm), provides the necessary operative flexibility and autonomy for close-in protection against sea and air based threats.

ODLS20

ODLS20 is a Multiple Decoy Launcing System able to defense the vessel against torpedoes, missiles, and asymetric threats. It can be also provided with dedicated decoys for anti-piracy and S&R missions, characterising the equipment as a dual-use system on board of any kind of vessel.

Marlin WS

The Marlin - WS is an advanced system developed to meet the meeting requirements of modern naval warfare at best level of effectiveness and suitable either as main armament for small size vessels or as secondary armament for larger ship, with no deck penetration and simple installation.

The MARLIN - WS is a highly accurate and reliable multi-role system, particularly effective in the simultaneous engagement of multiple targets such as swarms of Fast Inshore Attack Crafts.The MARLIN – WS can be fitted with either a 25mm or 30mm cannon.

40L70 and Twin

40L70 Medium Caliber Gun plays a leading role as a 40 mm naval system, thanks to the extremely reduced mass, the small dimension, the easy installation (no deck penetration required) and its modern and completely digital technology.

The full integration between high rate of fire and modern programmable ammunitions allow the system to engage efficiently and effectively a large number of targets.
The gun mount operates with a high fire rate capable to manage a dual feeding ammunition system.
It can be proposed also in dual barrel version for better Close Defence.

COUNTERMEASURES AND TORPEDOES

Lightweight Torpedo

Leonardo is the market leader for lightweight torpedos, with a complete catalogue composed by MU90 project, A244/S mod.3 and the new Black Arrow.

With its complete catalogue Leonardo can propose different solution against conventional and nuclear submarines, as well as ships.

In particular the last generation lightweight Torpedo, Black Arrow, is designed to be launched both from conventional platforms and Unmanned veichles and with its newly lithium-polymers technology battery, it results the most cost-effectivness in the market.

Underwater Countermeasures

Using its long expertise in producing torpedoes, Leonardo has developed highly efficient torpedo countermeaseres, such as MJTE, self manouvering underwater decoy effective against any kind of torpedo, ables to simulate different targets' acoustic echoes in a perfect way.
It could be launched using the mixed decoy launcher ODLS20 or the dedicated one against underwater threats C310 and its precedessor C303/S, as well as any NATO 130mm standard decoy launcher.

Black Shark Heavyweight Torpedo

Black Shark is the last generation of heavyweight torpedos, designed to be multipurpose, with the possibility to be launched both from submarines and surface vessels, constrasting any kind of underwater threat.

It is a long range, fully stealth, wire guided and self homing torpedo with 21'' standard diameter.

It is provided with an innovative acoustic head, called ASTRA (Advanced Sonar Transmitting and Receiving Architecture), which represents the state-of-art in passive acoustic head and allows to use its data as an extention of the standard sonar suite, via remote data transfert till the Black Shark is wired, both in medium and high frequency.

Black Scorpion Mini Torpedo

In a complex international scenario in which the ASW is rapidly moving from deep blue waters to littoral and coastal areas warm shallow waters, Leonardo has accomplished a sinergy in the field of MTE countermeasures System, upgraded some weapon sections in electronic, sensors and energy fields and created a very small (5") torpedo: BLACK SCORPION, able to be fired both from vessels and helicopters

SONARS

Thesan

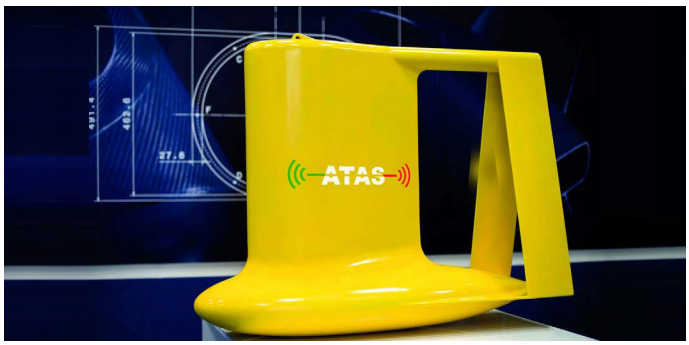
Thesan is a mine avoidance and navigation bow mounted sonar, which grants a complete defence agianst moored and submerged mines, divers and diver delivered objects.
It is also able to grant high navigation performance in both deep and shallow waters.

ATAS

ATAS is an Active Towed Array Sonar system, working both in Active and Passive Mode at different depths, till 300 mt from the sea surface. It works with low and medium frequencies and provides panoramic surveillance (active and passive), automatic classification and torpedo alarms.
The system is able to perfrom LOFAR, DEMON and Multiple Line COherence Analysis and compare the resukts with a Classification data File (owned by the final customer). It allows also to perform manual classification and identification of sonar echoes.

Black Snake

Black Snake is a light and compact towed array sonar designed to be effective against attacking torpedoes. It can be coupled with C310 countermeasures system for automatic decoy and MJTE launch without any human or Command and Control system.
It is a sonar working in passive mode with a very reduced footprint; it is possible to install it also on small boats and not only on large vessels. It is designed for passive noise detection, fast classification and noise localization (only bearing).



MCMV TURNKEY SOLUTION

Mine Counter Measure Vessels

Leonardo has a long experiance in Combat System for Mine Counter Measure Vessels (MCMV) for Italian and foreign Navies.

Our long term collaboration with Intermarine shipyard, leader in the MCMV production based on innovative zero signature materials, allows Leonardo to provide a complete and state of the art solution based on innovative CMS, Mine sweeping dedicated misisons, Unmanned Veichles control integrated in the C2, and a complete Sensor Suite for mine avoidance and mine field definition.

MCMV Solutions

Leonardo and Intermarine MCMV are made with a **Monocoque Single-skin** without reinforcement based on GRP magnethic material, which allows to perform missions against mines in a more secure and effective way.
The leonardo experiance in C/S provisioning and integration allows to enrich the possible missions of a MCMV with also self defense and Patrolling. In this direction The Italian Navy requested to provide an innovative project which combines the potentiality of an OPV with a MCMV.

OCEAN2020

OCEAN2020 (Open Cooperation for European Maritime Awareness) is a project consortium, led by Leonardo and made of 42 entities (large companies, research institutes, MoDs and small enterprises) out of 15 European countries, in the field of System of Systems Integration of Maritime Surveillance System empowered by unmanned systems.

The consortium was appointed as winner for the EU PADR US-01-2017, funded from the European Union's Preparatory Action on Defence Research under grant agreement No 801697 and implemented by the European Defence Agency.

The first OCEAN2020 Live Demonstration Trial (known as Mediterranean Sea Demo) was focused on demonstrating the integration of Unmanned Vehicles with existing Naval Systems (enhanced with prototype capabilities for integration of UxS), using operational assets as military with their CMS (Combat Management Systems), satellite systems, National MOC (Maritime Operations Centres), and a prototype of European MOC (Maritime Operations Centre).
The demonstration was held in November 2019 in the Gulf of Taranto, under the technical coordination of Leonardo and the operational coordination of the Italian Navy.

It implements a complete command and control chain with a remarkable number of multinational assets (5 warships controlling 9 unmanned systems) deployed at sea and 4 communication and space centres, led by the EU Maritime Operation Centre prototype in Brussels. Unmanned vehicles operated in air, surface and underwater domains.

Multinational participation mitigating operational gaps and providing synergy effects was demonstrated integrating different assets with different capabilities provided by the different participating nations (e.g. the UW capabilities of the unmanned systems controlled by the French ship, with output data and video sent in real time to the MOCs and ships of other nations, extended the overall operational capabilities of the latter).
Unmanned systems were safely operated and demonstrated their capabilities to enhance surveillance in a maritime environment, providing data, images and video from their sensors to participating assets, National MOCs and the EU MOC prototype.
The demonstration scenarios involved the combined tactical use of multiple (and multi-domain) UxS in the same operational area.
UxS were successfully integrated with host ships.

OCEAN2020

SERVICES AND SUPPORT SOLUTIONS

The company has more than 50 years' experience in designing supportability programmes and providing in-service support for combat systems delivered worldwide.

We provide services and support solutions as Integrated Logistic Support, In-Service Support and Customer Logistic Support.

Integrated Logistic Support includes:

- Logistic studies as obsolescence management and in-service systems analysis
- Maintenance concept definition
- Technical publications
- Training (CBT)
- Initial Provisioning and Spare Parts on board and ashore
- Special Tools & Equipments
- Augmented and Virtual Reality Tools
- Warranty

The maintenance concept and maintenance organization are defined according with MIL-STD-1388. Spare parts are sized according with the ship's mission profile. The company can provide through life cycle support solutions based transfer of capability up to third and fourth levels of maintenance

In-service support services includes tailored scope of supply for ILS as well as: Naval base support and monitoring

- Dedicated tutorial programmes
- Customized services
- Maintenance and field engineering support
- Service level agreements

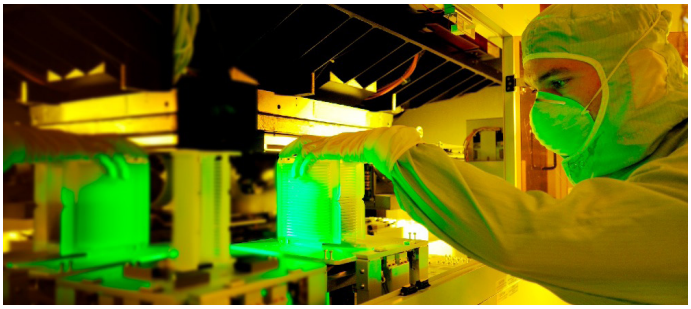
Extended services and support solutions can be customized taking into account the following solutions.

Computer Basic Training

To provide the customer with independency in the training at every operational level.

T1 Module: Remote Monitoring

The T1 module performs the remote monitor/display of the operating parameters, status and failure messages with the direct link to the related technical documents like IETM manuals.



T2 Module: Remote Control

The T2 Module gives the "maintenance remote control" facilities providing operating and configuration parameters modification, according to the user profile and the equipment status.

T3 Module : Remote Diagnosis

The T3 Module performs the equipment data processing and analysis in order to make a deeper diagnosis and anticipate possible failures. It provides failures propagation to next higher assembly using FMEA/FMECA tables, Boolean and fuzzy logic, Bayesian networks and correlation/reciprocal relation algorithms.

T4 Module : Remote Configuration

The T4 module carries out the on site system configuration using the RF-Id technology in real-time. It provides an easy way to manage installed assets and to track maintenance activities.

T5 Module : Remote Collaboration

The T5 Module performs remote support services through an innovative collaborative environment using the most advanced audio/video streaming facilities. These services are also integrated with Customer Support Service Desk that provide the whole technical assistance services.

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