## Contents

**DCNS**

Welcome aboard! ........................................... 3
The sea, home to DCNS products for almost four centuries ........ 4
Championship, an ambitious growth strategy ....................... 5

**Surface combatants and submarines** ........................................... 6

**Submarines** ........................................... 6
Scorpene, an international benchmark in SSK design .............. 6
Barracuda next-generation SSN ........................................... 9
Le Triomphant-class SSBNs ........................................... 12
Andrasta, excellence in the littorals ........................................... 14

Surface ships ........................................... 16
FREMM, Europe’s biggest naval programme ......................... 16
PA2 aircraft carrier ........................................... 20
Mistral LHDs ........................................... 23
Gowind® OPV/corvettes enforce sovereignty efficiently .......... 25
Brave, a versatile replenishment and support vessel ............ 27

**Integrated solutions** ........................................... 28

Submarines’ systems ........................................... 28
SUBTICS® : Submarine Tactical Integrated Combat System ........ 28
F21 next-generation heavyweight torpedo for the French Navy .... 30
Contralto-S® ........................................... 31
C11 mod3 mobile underwater target ........................................... 32

Surface ships’ systems ........................................... 33
SETIS : Naval Tactical Integrated Combat System .................... 33
POLARIS - Compact and scalable Combat System .................... 35
Contralto-V® ........................................... 39
Sylver® vertical launchers ........................................... 40

**Innovations** ........................................... 41
SMX-25, remarkable speed and stealth ........................................... 41
Advansea concept ship, an advanced all-electric surface combatant .... 43
Eco-design, a federative approach ........................................... 45

**Service solutions** ........................................... 47
Equipment and Systems Support ........................................... 47
Supply chain management ........................................... 47
Obsolescence management ........................................... 47
Through-life support for surface warships and submarines ........ 48
Engineering services for higher efficiency ......................... 48
Naval bases and shipyards: Construction, modernisation and maintenance ...... 49
Education & training solutions ........................................... 50
Technology transfers ........................................... 52

Contacts ........................................... 53
DCNS

Welcome aboard!

DCNS – a world-class player in naval defence systems – acts as a prime contractor for naval shipbuilding, integration and support. However, the Group is also expanding into new markets in civil nuclear energy and marine renewable energy. DCNS’s success as an advanced-technology company with global reach is built on exceptional know-how, a vast array of industrial resources and a naval shipbuilding heritage stretching back to 1631 when Cardinal Richelieu set up France’s first naval shipyard. After giving the country the ships it needed to become a maritime power, the shipyards expanded steadily while developing their know-how and introducing innovations. Today, DCNS is a dynamic stand-alone company with the legal status of a public limited company (or société anonyme) under French law. While constantly expanding their expertise and introducing innovations, DCNS teams daily demonstrate their commitment to customer-focused solutions meeting ‘strict minimum’ needs. This approach has made DCNS a world leader in integrated warships, from design concept to construction and through-life support.

Almost 400 years’ experience in product innovation

1624: French Levant and Ponant fleets (Flotte du Levant & Flotte du Ponant) founded.
1858: La Gloire – the world’s first iron-clad, steam-powered battleship – laid down.
1899: Narval, an ancestor of the modern-day submarine, launched.
1967: Le Redoutable, France’s first SSBN, launched.
1980: Design work begins on La Fayette stealth frigate with design features later emulated worldwide.
2000: Charles de Gaulle nuclear-powered aircraft carrier enters service.
2006: BPC Mistral – first of a new warship class that is ideal for a wide range of civil, military and humanitarian missions – delivered.
2007: First cut FREMM frigate Aquitaine
2010: DCNS to self-fund construction of highly innovative OPV.
The sea, home to DCNS products for almost four centuries

DCNS’s key strengths include the ability to deliver innovative products that are among the most sophisticated in the world, yet tailored to the specific needs of each customer and prospective customer. The Group’s product portfolio includes:

- naval systems for surface combatants including FREMM multimission frigates, Horizon air defence frigates and Gowind OPV/corvettes, as well as next-generation mine warfare systems and UXVs (aka drones);
- submarines, from Barracuda SSNs and Le Triomphant-class SSBNs to the Scorpene family of conventional-propulsion submarines (SSKs) or Andrasta;
- services, including guaranteed-availability through-life support, modernisations, upgrades, repairs and maintenance for warships;
- underwater weapons, including MU90 lightweight torpedoes and F21 heavyweight torpedoes and torpedo defence systems;
- simulators for initial and ongoing crew training;
- civil nuclear engineering services, including equipment design, development and maintenance;
- innovative solutions in marine renewable energy (MRE) now being explored or developed by the Group’s MRE incubator, including floating wind farms, marine current and tidal stream generators, ocean thermal energy conversion (OTEC) and wave power systems.

Technologically complex programmes are DCNS’s core area of expertise. The keys to managing complexity begin with a talented workforce and training in the relevant technologies combined with people management and team-building skills to bring together DCNS centres, customers and industrial partners. For over ten years now, DCNS has been managing its industrial activities on environment-friendly lines. The Group was the first major European defence contractor to achieve ISO 14001 certification through a single environmental management system for all centres, demonstrating both our vitality as an industry leader and our commitment to environmental protection. Our teams are working to reduce the environmental impact of DCNS products. Our eco-design initiative takes environmental considerations into account throughout each vessel’s design lifecycle – from construction to operation, through-life support and decommissioning.

DCNS at a glance:

Heritage: almost 400 years
Revenue (2009): €2.4 billion
Order intake (2009): €4.1 billion
Staff: 12,000
Customer base: over 50 navies.
Championship, an ambitious growth strategy

With a proven track record in complex programmes, extensive industrial resources and exceptional talent, DCNS – always at the forefront of technological innovation – boasts contractor expertise across a range of areas offering excellent growth opportunities.

DCNS has undergone a profound transformation, changing in just a few years from a government administration to an efficient and profitable stand-alone company with an ambitious growth strategy for the years ahead. More specifically, the Group aims to double revenue over the next ten years.

The first priority is to maintain the Group’s status as the French Navy’s benchmark partner. The second is to expand into highly competitive sectors including naval defence exports, civil nuclear engineering and marine renewable energy. The prime condition for success is to improve Group performance by 30% over the next three years. Growth and higher performance will create value and jobs for the Group as well as our partners, suppliers and subcontractors. Growth and higher performance will also put the Group in a stronger position for future European alliances.

To meet this unprecedented growth target, DCNS must increase revenue in the following expanding markets:

- **Naval defence exports** (new shipbuilding and services). This market segment represents potential demand exceeding €3 billion per annum, particularly in Asia, the Middle East and Latin America. Leveraging its portfolio of tailororable, advanced-technology products and services meeting the latest defence and security needs of navies the world over, DCNS aims to become the world’s leading export naval shipbuilder; in May 2010, DCNS decided to self-fund the construction of highly innovative OPV. One of the keys to winning new business in the corvette/OPV sector is to achieve ‘sea-proven’ status attested by a world-class navy; a feat that is all the more challenging when the vessel in question combines innovations and unmatched efficiency. Hence the decision to make the proposed OPV available to the French Navy for three years.

- **Civil nuclear engineering.** In this fast-growing market, DCNS is simultaneously positioning itself as a prime contractor for subassemblies, an equipment manufacturer and a service provider. In ten years time, the Group aims to achieve annual revenue in this segment of €300 to €400 million.

- **Marine renewable energy (MRE).** Although still at an early stage, this market offers excellent prospects and is expected to expand to several billion euros per annum over the medium term. The first step is to increase R&D investment and contribute to projects to build prototypes and demonstrators. DCNS has set up an MRE incubator in Brest to win new business in this sector.

To turn these advantages to maximum account, the Group aims to improve overall performance by 30% over the next three years by rolling out a performance improvement plan based on six transformation guidelines:

1. New organisation;
2. Work differently;
3. Reinvent production processes;
4. Involve suppliers in the Group’s performance;
5. Significantly improve safety at work;
6. Develop management culture.

Our confidence in our capacity to meet these ambitious targets is based on our capacity to successfully take on the biggest challenges, from industrial projects to new visions of our business.
Surface combatants and submarines

Submarines

Scorpene, an international benchmark in SSK design

International standing confirmed

With ten units delivered or on order, Scorpene is a global benchmark in conventional-propulsion submarine (SSK) design. The two boats delivered to Chile – Carrera and O’Higgins – are operational and based in Talcahuano. Their performance in the course of international exercises has demonstrated the design’s remarkable capabilities as well as the quality of construction.

KD Tunku Abdul Rahman, the first of two Scorpenes ordered by Malaysia, was handed over in January 2009 as the first submarine ever to enter service with the Malaysian Navy. The second, KD Tun Razak, reached its homeport in July 2010.

Two navies now have Scorpene submarines in operational service.

The Indian Navy placed an order for six Scorpenes in October 2005. The first is scheduled for delivery in 2014 with the others to follow at a rate of one per year.

Scorpene gives DCNS an excellent baseline for meeting a wide range of needs, hence the operational requirements of all navies. Scorpene combines advanced technologies, competitive pricing and low cost of ownership.

The four conventional-propulsion submarines ordered recently from DCNS by the Brazilian Navy to renew its submarine fleet will be an evolution of the Scorpene design tailored to specific customer requirements.

Scorpene, a multi-role, blue-water, long-endurance SSK

Scorpene is a conventional-propulsion submarine (i.e. diesel-electric or diesel-electric + AIP) designed for all types of missions, including anti-surface warfare, anti-submarine warfare, deep strike, special operations and intelligence gathering.
Scorpene can perform these missions during peace, crisis or wartime. And it can do so from the high seas or littoral waters.

At the customer’s request, a Mesma air-independent propulsion (AIP) module can be added as a new-build option or as part of a modernisation programme. A Scorpene with a Mesma AIP module offers diving capabilities to rival any SSK anywhere.

**Advanced-technology SSK**

Benefiting from extensive French studies and research on acoustic discretion and hydrodynamics, Scorpene combines exceptional stealth with the highest performance currently available on the world market for a conventional-propulsion design. Vibration-free machinery and double-suspended rafts ensure excellent acoustic discretion. Hydrodynamic streamlining ensures low drag and smooth flow, hence minimal noise. The Scorpene’s efficient hull shape, plus its high-performance and tightly integrated sonar suite result in proven unrivalled listening capabilities right up to maximum speed.

Because they are made of HLES 80 high-yield steel, Scorpene submarines can operate at great depths in complete safety throughout their entire service life.

The highly automated and integrated platform and combat management systems mean that a Scorpene can be operated by a basic crew of just 31 working three watches. Reduced crewing and extended intervals between overhauls radically reduce the cost of maintaining and operating a submarine fleet.

Scorpene is fast and quiet. The powerful diesel generators can recharge the batteries at snorkelling depth in minimum time, thereby reducing the risk of detection. The engines also ensure the lowest indiscretion rate of any SSK on the world market. For submariners, the time a submarine spends each day recharging its batteries is one of the most critical performance parameters of all.

The permanent-magnetic propulsion motor operates at slower, hence quieter, speeds than earlier types, further improving acoustic discretion.

High-performance batteries contribute to increased submerged endurance, even at higher speeds.

The Subtics® fully integrated combat management system gathers information from multiple sensors and datalinks to generate a comprehensive picture of the tactical situation and deliver weapons appropriate to the circumstances.

This gives operators and officers full control over all available data and a level of situational awareness enabling them to take split-second decisions and conduct combat actions very efficiently indeed.

Thanks to its open, modular, flexible architecture, Subtics can be readily tailored to customer needs. Subtics CMSs are designed to interface with all modern weapons and countermeasures. The human-machine interface (HMI) can also be tailored to the organisational needs of each client navy and its crews. The extensive use of commercial off-the-shelf (COTS) software and hardware based on the latest industry standards ensures high availability and easy maintenance.

The Scorpene's weapons payload of 18 heavyweight weapons (i.e. torpedoes and missiles) and six launch tubes makes it the most heavily armed SSK in its displacement category. The sophisticated weapons handling system enables any weapon to be loaded into any tube quickly, safely and quietly.

Overall, Scorpene sets new performance standards across the board.
Tailoring design and shipbuilding to customer needs

Scorpene submarines combine modular design, an efficient basic layout and sea-proven technologies. The final design can be tailored to accommodate each client navy’s specific needs and capability requirements, as well as new technologies when available.

DCNS is open to partnerships and technology transfers with local shipbuilders, enabling them to provide through-life support, supply equipment and software or undertake shipbuilding work in line with national objectives. The Group’s constant aim is to give the client navy the self-sufficiency it seeks and ensure the long-term viability of its submarine force.

The two Scorpene for Chile and the two for Malaysia were built at DCNS and Navantia shipyards. India and Brazil, on the other hand, have decided to build their submarines under technology transfer agreements.

Scorpene Technical data

- Length overall: 66 to 76 m
- Diameter: 6.2 m
- Displacement, submerged: 1,790 to 2,010 tonnes
- Diving depth: > 350 m
- Max. speed, submerged: > 20 knots
- Endurance, patrol: > 50 days
- Complement: 31
- Armament: 6 launch tubes, 18 heavyweight weapons
Barracuda next-generation SSN

The next generation of DCNS-designed nuclear-powered attack submarines (SSNs) will give France a powerful tool meeting its political and military goals. Barracuda SSNs will expand the French Navy’s nuclear deterrent force (FOST) while at the same time giving it added flexibility to deal with an ever-growing array of challenges.

As one of the very few European prime contractors with the expertise, resources and industrial infrastructure to undertake shipbuilding projects of this complexity, DCNS is drawing on 50 years’ experience as a designer and builder of nuclear-powered submarines to develop this new-generation SSN combining the latest advances in acoustic discretion and nuclear propulsion.

The Barracuda is designed to undertake blue-water missions anywhere in the world; and to do so either alone or as part of a naval force. In a word, it will be the centrepiece of the military means ensuring French sovereignty. An attack submarine capable of massive deep strike operations, the Barracuda can also control vast maritime domains or deploy as part of a coalition force. Highly versatile, Barracuda SSNs will be assigned strategic defence missions, including the protection of SSBNs and aircrafts carriers. As attack submarines, they will be able to carry out sea denial missions. Overall, these new-generation capital ships will give France a highly strategic asset ensuring both its sovereignty and defence.

A new-generation SSN

Designed for both anti-submarine and anti-surface warfare, these next-generation SSNs will feature a totally new internal architecture as well as numerous technological advances. As a result, the design boasts low acoustic, magnetic, radar and visual signatures while featuring a powerful sonar suite with enhanced listening capabilities. Compared to its predecessors, the Barracuda offers a higher ‘acoustic speed’ (i.e. the maximum speed at which self-radiated noise is compatible with the reliable detection of other submarines).

The Barracuda’s mission capabilities will range from intelligence gathering to special operations (by deploying commandos and combat swimmers), mine laying, anti-surface warfare, anti-submarine warfare and land strikes, plus participation in joint operations wherever its interoperability and associated capabilities (discrete communications, tactical datalinks, etc.) are required.

The design will also incorporate the latest advances adopted for France’s Le Triomphant-class SSBNs and Scorpene SSKs.

High priority is being given to compliance with the latest civil standards and associated certification requirements.
Availability

In addition to outstanding capabilities, DCNS is developing cost-effective solutions from design to through life support to meet France’s defence budget constraints. The aim is to design a product meeting the Navy’s exact requirements (i.e. meeting but not exceeding). The design will thus be extremely coherent and offer excellent all-round performance.

The interval between major refits – known as refuelling and complex overhauls (RCOHs) – has been extended to ten years, with just one intermediate maintenance period per year. Drawing on lessons learned in the course of the design, development and through-life support of current-generation SSNs, DCNS is incorporating improved maintainability into the Barracuda design process from the outset. The Barracuda is also being designed for continual upgrades and engineering changes throughout its lifecycle.

Reduced crewing

Reduced crewing is made possible thanks to a fully integrated ship management system complete with maintenance aids and a similarly integrated combat management system complete with decision-making aids.

Barracuda submarines will carry a complement of just 60, compared with 70 for the Améthyste version of the current Rubis-class SSNs. Free bunks will be available to accommodate passengers or special operation forces.

The design also offers improved living conditions compared to earlier generations.

Environmental protection is being taken into account from the outset and throughout all phases of design, construction, operation and decommissioning. Barracuda SSNs will be Marpol compliant.

Combat system and weapons

The Barracuda will be equipped with a new-generation Sycobs integrated combat management system (CMS) and a new sonar suite including planar flank arrays. Sycobs is an improved version of the Subtics® CMS common to the Barracuda and the latest Le Triomphant-class SSBNs.

The Barracuda will be the first French submarine to use non-penetrating optronic masts and periscopes instead of conventional hull-penetrating types.

Hybrid steam-electric propulsion

The hybrid steam-electric propulsion system features a steam turbine and an electric motor ensuring optimal efficiency at all speeds and significantly extending the nuclear reactor’s lifetime.

Barracuda gets official go-ahead

The Barracuda programme calls for the delivery of six nuclear-powered attack submarines (SSNs) at an optimised production rate. Production considerations dictated the adoption of a modular construction methodology with each section being outfitted to an advanced stage before the sections are mated.

The first-of-class SSN Le Suffren is scheduled to enter service in 2017 after 120 months’ work and one every two years. The Barracuda is one of the most important programmes for the renewal of France’s naval forces.

Technical data

<table>
<thead>
<tr>
<th>Displacement, surface:</th>
<th>4,700 tonnes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall:</td>
<td>99 m</td>
</tr>
<tr>
<td>Speed:</td>
<td>&gt; 25 knots</td>
</tr>
<tr>
<td>Propulsion:</td>
<td>hybrid steam-electric</td>
</tr>
<tr>
<td>Weapons:</td>
<td>naval cruise missiles, F21 heavyweight torpedoes, SM39 anti-ship</td>
</tr>
<tr>
<td>---------</td>
<td>---------------------------------------------------------------</td>
</tr>
<tr>
<td>Complement:</td>
<td>60 crew</td>
</tr>
</tbody>
</table>
Le Triomphant-class SSBNs

An ambitious programme

The decision to entrust the development of France’s Le Triomphant-class nuclear-powered ballistic missile submarines to DCNS was taken in 1981. These new-generation SSBNs (French designation: SNLE-NG) were to offer improved performance, particularly as regards acoustic discretion. The development and construction phases represented the continuation of the earlier Coelacanthe programme. The fact that the first-of-class Le Triomphant was, at one and the same time, a prototype, a test bench and the first of a new class made the programme especially challenging. Each submarine benefited from lessons learned during the construction of its predecessors, beginning with SSBN Le Triomphant.

The Le Triomphant-class SSBN programme also benefited from a range of advanced technologies developed in the course of over ten years’ R&D and studies by DCNS design bureaux. Unprecedented acoustic discretion, a high-performance combat system and a high-reliability propulsion system make the class an ideal deterrent. These vessels also comply with strict nuclear safety requirements.

Three Le Triomphant-class SSBNs – Le Triomphant, Le Téméraire and Le Vigilant – are now operational with the French Navy’s strategic ocean force (FOST). SSBN Le Terrible, the first to carry the new M51 ballistic missile, is the fourth and last of the class. It was launched at a ceremony attended by the French President in 2008, was delivered in October 2010 and is expected to enter in service in the coming weeks.

SSBN Le Terrible successfully test fired the new M51 ballistic missile in (unarmed) development and acceptance launches in 2010. The other three will be modified to carry it as part of major refits.

Le Triomphant-class SSBNs

Le Triomphant-class SSBNs replace the earlier Le Redoutable class and their role with the Strategic Ocean Force (FOST). The improved performance of the Le Triomphant class, particularly their endurance and acoustic discretion, ensure both survivability and effectiveness as a deterrent force.

The size, sophistication, reliability and extremely high performance of Le Triomphant-class submarines place them among the most technologically advanced products in operation now and for a long time to come.
The Le Triomphant-class is the result of over ten years’ R&D mobilising the resources of not only French defence procurement agency DGA and DCNS, but also the French atomic energy commission (CEA) and a large number of French laboratories, university departments and industrial firms.

**New generation, improved survivability**

The SSBN deterrent principle hinges critically on the submarines’ discretion or stealth. The development and construction of the Le Triomphant class marks a disruptive change in the history of technology. In a word, these ultra-modern submarines are designed to win the ‘war of silence’ by simply disappearing into the ocean’s background noise.

Le Triomphant-class SSBNs are the biggest submarines in the French fleet.

Diving depth and speed as well as underwater navigation have also been significantly improved.

To achieve these new levels of acoustic discretion and diving performance, DCNS introduced design and layout innovations contributing to higher system reliability, reduced vibration, improved signal processing, also improved alloys, composite and sound-proofing materials, propulsion, power electronics and hydrodynamics as well as improved shipbuilding and assembly processes. These advances have benefited not only the entire French shipbuilding industry, but also a broad swathe of French industry in general.

SSBN Le Terrible, the fourth and last of the Le Triomphant class, is the first to carry the new SAD M51 deterrent weapon system and its M51 missiles. In particular, SSBN Le Terrible features:

- an extensively revamped combat system comprising the Sycobs CMS, a new submarine detection system (or sonar) and compatibility with the F21 heavyweight torpedo
- a global navigation system offering the same performance as the earlier version but costing significantly less to purchase and maintain
- an acoustic state surveillance system benefiting from lessons learned from earlier systems
- a new external communications system offering improved integration with systems used by other forces
- a revamped platform management system (nuclear powerplant, main motor, electrical plant, pilotage).

**Technical data for SSBN Le Terrible**

Length overall: 138 metres  
Diameter: 12.5 metres  
Displacement, surface: 12,640 tonnes  
Displacement, submerged: 14,300 tonnes  
Speed, submerged: > 25 knots  
Complement: 111  
Strategic weapons: 16 type M51 SLBMs  
Tactical weapons for self-defence: torpedoes and SM39 missiles
Andrasta, excellence in the littorals

Coastal defence

The Andrasta compact submarine is designed to operate in coastal waters, a theatre of growing importance to all maritime nations. It is also a fearsome adversary in deep water.

Andrasta combines a state-of-the-art design with stealth, agility and speed. A direct descendent of the Scorpene, it is remarkably effective for all types of operations in littoral waters.

Andrasta can undertake most missions normally assigned to full-size conventional submarines. Its small size and stealth make it ideal for all types of littoral missions, including special operations and intelligence gathering. In particular, Andrasta deters anyone and everyone tempted to explore littoral waters under its watch. It takes extensive resources and a great deal of time to locate an Andrasta submarine on its home turf.

Powerful sensors ensure significant operational advantages over all types of adversaries, especially in challenging coastal waters.

Combat system and weapons

Andrasta’s state-of-the-art combat system can accommodate new-generation heavyweight torpedoes and anti-ship missiles, ensuring ample firepower and making it a strong deterrent.

Systems and features for special operations include a trunk for combat swimmers.

A new market

Andrasta is ideal for navies big and small wishing to establish or expand a submarine force around a product offering unparalleled capabilities for littoral operations. Andrasta is the first design for a new segment of the conventional submarine market.
Andrasta draws heavily on proven solutions adopted for the Scorpene family. The layout and overall concept reflect the boat’s mission profile while ensuring a low purchase cost and a low cost of ownership.

Length overall: ~ 50 m
Displacement, surface: ~ 900 tonnes
Speed, submerged: > 15 knots
Submerged endurance: up to 5 days
Diving depth: > 200 m
Range: > 3,000 nm
Complement: 21
Surface ships

FREMM, Europe’s biggest naval programme

One multimission design concept, two versions

The FREMM multimission frigate programme is Europe’s biggest surface combatant programme. France has ordered 11 FREMM frigates. The contract for the first tranche of eight vessels was signed in November 2005 and that for the second tranche of three on 30 September 2009.

The French Navy will receive two versions: nine anti-submarine warfare (ASW) frigates carrying MDCN naval cruise missiles and two FREDA-type anti-air warfare (AAW) frigates, also known as the air defence version.

Next-generation frigates for Europe

Key FREMM missions will include air/sea dominance, active participation in joint operations and support for air/sea, carrier and amphibious assault groups. From 2012, these 6,000-tonne frigates will form the backbone of the French surface fleet.

The FREMM new-generation stealth frigates for the French Navy are designed to:

- protect the French Navy’s strategic ocean force (FOST)
- contribute to France’s standing risk prevention arrangements as part of broader provisions for the protection of its national interests
- contribute to intervention and rapid reaction capabilities for power projection missions using the deep-strike capability of their MDCN naval cruise missiles
- contribute to force projection operations by protecting carrier and amphibious assault groups against air, sea and underwater threats
- participate in maritime safety and security missions
- command a French or allied carrier or amphibious assault group.
FREMM frigates, a major industrial challenge

FREMM frigates will be produced at an average rate of one every ten months, a schedule designed to accommodate the concurrent construction of FREMM frigates for international customers. The programme represents an unprecedented industrial and technological challenge in European naval shipbuilding.

This is the only naval shipbuilding programme in the world to be based, since the start of the planning phase in 2002, on an industrial policy tightly tailored to prevailing budget constraints.

Taking advantage of the scale of the FREMM order, DCNS drafted the contracting and subcontracting arrangements to optimise in-house project coordination methods, improve project management tools and introduce further innovations in bid management and supplier-contractor relations.

Frigates for the 21st century

Advanced automation, optimal working and living conditions, ease of maintenance, high-performance combat capabilities and full Nato interoperability plus compliance with environmental protection requirements are among the emerging needs identified by navies all over the world. These requirements are also covered by the FREMM programme.

FREMM frigates will meet the current and emerging needs of the two launch customers (the French and Italian navies) and the first international customer, the Royal Moroccan Navy.

The ships also meet the latest Marpol environmental standards.

With 12 FREMM frigates on order, DCNS is proud of its role as prime contractor for Europe’s biggest naval programme. The Group also guarantees its FREMM customers long-term logistic support for decades to come, including the ongoing benefits of lessons learned given the number of ships ordered.

Optimisation of in-service support

DCNS designed FREMM frigates for ease of access and maintenance, two keys to improved operational availability. This design features wide lower-deck passageways, dedicated doors for equipment access and maintenance, and a deeper and longer engine compartment.

In addition to monitoring platform parameters, the Shipmaster® automated ship management system includes a predictive maintenance feature that helps to reduce the incidence of technical failures, hence the number of maintenance jobs to be done by the crew.

These characteristics are the direct result of general design guidelines to reduce downtime and improve operational availability.

Optimisation of crew activities

The optimisation of crew activities was a top priority throughout the FREMM design process. Key objectives included: increased automation with a view to workload reduction and simplification, careful attention to human-machine interface (HMI) ergonomics, optimised organisation of the combat information & command centre (CIC) and bridge, and the detailed analysis of all operator tasks.

Platform management functions are automated to a level enabling operators to focus on ship control and navigation on the one hand and operations on the other. The integrated bridge consoles cater for all essential operations including navigation, conning and communications. Under normal circumstances, the bridge operators manage and control all platform systems, monitor safety and security and coordinate any operations in hand through centralised systems. To
optimise bridge workloads, all operators work on multifunction consoles designed for real-time task reallocation; a major advance compared with dedicated consoles.

Overall, these features ensure that FREMM frigates maintain a high level of operational performance and make possible reduced crewing without compromising the crew’s capacity to respond to any and all situations. The French FREMM frigates will carry a complement of 108, or around half as many as previous-generation vessels with similar capabilities. They will, however, offer accommodation for 145 people in all, whether for a command team and/or mission specialists.

**Integrated high-performance CMS**

The Setis® CMS (combat management system) interfaces with all shipboard sensors, weapon systems and communications systems to make FREMM frigates front-line fighting ships in all domains:

- **ASW (anti-submarine warfare):** hull mounted sonar, very-low-frequency (VLF) towed array, NH90 helicopter and MU90 torpedoes
- **AAW (anti-air warfare):** Aster 15/30 missiles in Sylver® vertical launchers and MFR multifunction radar
- **ASuW (anti-surface warfare):** 76- or 127-mm gun and MM40 block 3 missiles
- **land strike:** 127-mm gun and MDCN naval cruise missiles
- **self-defence against asymmetric threats:** 12.7-mm machine guns or 20-mm remote-control machine guns.

The combat system was designed from the outset around a high-speed redundant data network serving all weapon systems.

To optimise overall performance, data from all sensors is correlated and displayed by the combat management system (CMS). The CMS can be reconfigured in real time so that combat information & command (CIC) operators and their multifunction consoles can be reassigned to different tasks to ensure both real-time task optimisation and an optimal match with the tactical situation. This innovation offers a clear advantage over dedicated consoles.

**Weapon systems**

The French Navy’s FREMM frigates will carry an NH90 helicopter, Exocet MM40 anti-ship missiles, MU90 torpedoes, Aster 15 anti-air missiles for self defence and, in the case of the AAW variant, Aster 30 missiles for zone air defence. ASW variants will carry MDCN naval cruise missiles for deep strike missions. The 76-mm main gun offers an excellent performance-efficiency tradeoff. The gun interfaces with an optronic fire control system and can be controlled via a CMS multifunction console or in local mode from the bridge under the control of the visual weapons director. Four 12.7-mm machine guns, mounted on the superstructure, are provided for defence against close-in targets including asymmetric threats.

**High-performance sensors**

The Herakles multifunction radar performs both medium-range anti-air surveillance and missile fire control for the ship’s self-defence and extended group defence systems. In addition to detecting aircraft and missiles, the multifunction radar interfaces with Aster missiles to provide an anti-air capability with mid-course guidance. The standard fit sonar suite includes an active hull-mounted sonar and a torpedo warning system. The ASW variant also carries an active very-low-frequency (VLF) towed array.

The Artemis IRST, or IR search & track system, contributes to ship self-defence by efficiently detecting and tracking infrared targets, including missiles. Exceptional performance and simple platform integration, make Artemis the world’s leading IRST product.
Communications systems to international standards

The external communications suite is designed to Nato standards and the ship’s needs as a command vessel. Full interoperability with Nato forces is provided by L11, L16, L22 and JSAT tactical datalinks. Internal communication services include messaging (interfacing with external messaging systems); internal/external conventional and wireless telephony (telephones, fax, videoconference circuits); order circuits and PA (public address) for orders and warnings; displays; closed-circuit video; internet and intranet connections (via the external communications suite); emergency communication and remote briefing system with the ship’s helicopter; monitoring and management of access to selected areas and applications.

Technologies and innovations

FREMM multimission frigates combine the latest DCNS technologies, best-of-breed subsystems and equipment and lessons learned from earlier frigate programmes for the French Navy, Nato forces and the Group’s own international customers.

The propulsion system’s hybrid architecture is a case in point. In silent mode the shaftlines and fixed-pitch propellers are driven by electric motors, ensuring the acoustic discretion required for ASW operations. In high-speed mode, the shaftlines are driven by gas turbines. An azimuth pod ensures safe quayside and harbour manoeuvring as well as emergency propulsion in the event of damage to the main propulsion system.

Technical data, FREMM frigates for the French Navy

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>142 m</td>
</tr>
<tr>
<td>Displacement</td>
<td>6.000 t</td>
</tr>
<tr>
<td>Max. speed</td>
<td>27 knots</td>
</tr>
<tr>
<td>Accommodation</td>
<td>145</td>
</tr>
<tr>
<td>Complement</td>
<td>108</td>
</tr>
<tr>
<td>Range</td>
<td>6.000 nm</td>
</tr>
</tbody>
</table>
DCNS has been working on definition studies for ‘PA2’, a second aircraft carrier for the French Navy, since 2003. The aim is to ensure the continuous availability at all times, to France and to Europe, of a key power projection capability, air/sea dominance and deep strike missions. From the time the PA2 project received the initial go-ahead in January 2005, DCNS and its partners launched a study to exploit the similarities between the British CVF (Carrier Vessel of the Future) programme and the French PA2 programme. This led DCNS to define a French version of the CVF, dubbed CVF-FR-V2i, to meet the PA2 requirement.

The need for a constantly operational carrier-based air wing was confirmed in the 2008 white paper on defence and national security. The French government has put off its final decision concerning this programme until 2012.

To maintain its skillset, DCNS continues to study, in liaison with the DGA, variants of the proposed carrier meeting the needs of the French Navy and international customers. These studies are conducted as part of the Group’s Championship improvement strategy to meet customer needs to the best of our ability and in compliance with strict budgetary guidelines.

The version presented at Euronaval 2010 has a displacement of 60.000 tonnes and is optimised for efficient flight deck operations (90-metre catapults, sizing of deck and hangar areas, munitions payload), high operational availability, low cost of ownership and compliance with Bureau Veritas Naval Rules for habitability and safety.

Carrier group centrepiece

The PA2’s capabilities include air/sea control over a wide area, strike attacks against land and maritime targets along with missions as the centrepiece of a French carrier group or in cooperation with allied forces. On operational deployments with an air wing of 40 aircraft, the PA2 will be able to carry out up to 75 air missions per day for extended periods.
Optimal availability

To increase the French Navy's force projection capabilities, every effort is being made to ensure that the PA2 offers high at-sea availability. In particular, DCNS proposes to apply lessons learned and the progress achieved in through-life support for French warships in recent years. Operational availability will be improved by ensuring that the ship is laid up less often and for shorter periods. Provision will also be made for easier access, handling and removal of heavy or cumbersome equipment.

Crew first

The PA2 is being designed for reduced crewing, specifically a complement of just 900. The ship will also accommodate an air wing of 620, a command team of up to 100 and up to 100 other passengers or crew for special missions. Every effort is being made to improve living and working conditions. Accommodation and living areas will be separated from work areas.

Platform and propulsion system

The design is for an ‘all-electric’ ship with a powerplant comprising three diesel-alternator sets in the engine room with a gas turbine and backup diesel-alternator set under the island.

Propulsion will be provided by three shaftlines with fixed-pitch propellers. The direct-drive electric propulsion motors will have power ratings of 2x19 MW for the port and starboard shaftlines and 25 MW for the centre shaftline.

Flight deck

The proposed design calls for two 90-m catapults and additional decks under the hangar deck to ensure more space for aircraft operations. The flight deck will be operational up to sea state 5/6. The air wing spaces will be both larger and more efficient. More specifically:

- fixed-wing aircraft will be launched at 300 km/h by two 90-m catapults
- flight deck launch rate will be one aircraft every 30 seconds, or a complete strike of 24 in about 12 minutes
- air wing and flight deck facilities will be fully interoperable with the latest aircraft types operated by leading navies.

The PA2 will be able to deploy an air group of 35 to 40 aircraft including some in the 15/25-tonne class:

- Rafale combat aircraft, in the F3 configuration, taken as the main sizing template, along with provision for three E-2C airborne early warning aircraft
- oblique runway inclined at 8°30' to ship's centreline
- midships island between the two lifts
- hangar with storage space for part of the air wing, but reserved primarily for aircraft maintenance
- additional storage areas for support equipment and optional items
- two starboard lifts, each with a useful payload of 36 tonnes, linking the hangar to the flight deck.

Combat system and weapons

The PA2 systems are designed to deploy and command an air wing and provide self-defence capabilities consistent with the defensive capabilities of the carrier's air wing and the carrier group as a whole.

The systems include the carrier's combat system – with its surveillance sensors, EW suite, self-defence systems and CMS – an integrated bridge with its navigation system, a multi-service network and the communications system. The Setis® CMS is based on that developed for the FREMM multimission frigate programme.
**Technical data (conventional propulsion option)**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall (flight deck):</td>
<td>285 m</td>
</tr>
<tr>
<td>Beam overall (flight deck):</td>
<td>69 m</td>
</tr>
<tr>
<td>Displacement (end of life):</td>
<td>62,000 t</td>
</tr>
<tr>
<td>Speed:</td>
<td>26 knots</td>
</tr>
<tr>
<td></td>
<td>&gt; 20 knots on (n-1) shaftlines</td>
</tr>
<tr>
<td>Accommodation</td>
<td>1,690</td>
</tr>
<tr>
<td>Flight deck, area:</td>
<td>13,400 m²</td>
</tr>
</tbody>
</table>
Mistral LHDs

Mistral-class force projection & command vessels are the biggest ships in the French fleet after the Charles de Gaulle aircraft carrier. In Nato terminology, Mistral-class vessels are classified as landing helicopter docks, or LHDs. These ships, featuring a flush flight deck, are also known as the BPC type, from bâtiment de projection et de commandement, for projection and command vessel.

Two Mistral-class ships are currently in service with the French Navy: BPC Mistral and BPC Tonnerre. BPC Dixmude, the third of the series, is under construction.

A tool of politics and diplomacy

Though still young, the 21st century has already brought significant changes in naval operations, including missions that are both more complex and more remote. Humanitarian and/or allied missions demand new and expanded sealift capabilities and even the capacity to reconfigure vessels en route or on site. The need is thus for vastly greater adaptability.

Mistral-class LHDs offer these capabilities and more. The type’s ultramodern hospital and two operating theatres meet the highest Nato design standards.

Force projection, peace-keeping and humanitarian support operations call for a shipboard command centre and long-term provisioning. This explains why the design includes a modular command centre complete with a high-performance communications suite that can be readily tailored to the command team’s requirements. Nato teams have already used and approved these capabilities.

From the moment it entered service with the French Navy, BPC Mistral demonstrated its operational capabilities during operation Baliste in 2006 in Lebanon involving the evacuation of several thousand civilians while supporting UN forces.
Multirole ships to meet new challenges

Mistral-class LHDs offer excellent facilities for humanitarian support, including a modern, flexible hospital and field extensions if required.

These vessels significantly improve force mobility, or the capacity to move troops and equipment, including helicopters, landing craft and main battle tanks.

Mistral family

DCNS designed the 21,000-tonne Mistral class to the French Navy’s requirements. In response to emerging operational needs identified by other navies, DCNS offers Mistral variants with displacements starting at 14,000 tonnes (Mistral 140). The entire family benefits from the operations-proven design of French Navy’s Mistral class.

Key features common to all Mistral-family vessels include a flush-deck architecture (i.e. unobstructed flight deck), multiple helicopter spots and excellent payload.

Alternative propulsion arrangements are also available, including conventional diesel or electric, all ensuring excellent manoeuvrability.

The design allows for simple technology transfers and cooperation with either naval or commercial shipyards with DCNS supervision or support.

The French Navy’s BPC vessels

With a displacement of 21,000 tonnes for a length overall of 199 m, Mistral-class vessels offer a speed of 19 knots and sufficient endurance and range for remote operations. As normally configured, a typical payload might include over 450 troops, 16 heavy helicopters, two hovercraft or four LCM landing craft and one-third of a mechanised regiment complete with armoured vehicles. These ships feature electric propulsion using azimuth pods and high-level automation compatible with a complement of just 160.

The 5,200-sq.m flight deck offers six helo spots: five for NH90/Tiger-class helicopters and one for a Super Stallion-class heavy-lift helicopter. The 1,800-sq.m below-deck hangar, served by two lifts, provides storage and maintenance space for 16 helicopters.

Each ship can also carry four LCM landing craft or two LCACs while each 95-tonne LCAC air-cushion landing craft can carry several armoured vehicles and infantry carriers, all stored in transit on a 2,650-sq.m deck.

Mistral-class vessels offer ample capacity as hospital ships or for humanitarian evacuation missions.

The Mistral 210’s 69-bed hospital includes two operating theatres and can be readily expanded using field extensions.

Mistral LHDs feature an advanced communications suite offering high-performance transmission and reception for joint forces operations and full interoperability with NATO and coalition forces. The suite combines internal communications and all forms of external communications, including radio, satellite links, internet, videoconferencing and tactical datalinks.
Gowind® OPV/corvettes enforce sovereignty efficiently

The Navy will be able to demonstrate the new vessel’s worth and operational capabilities in actual operations. Gowind OPVs offer users up-to-date assets.

DCNS-designed ocean-capable Gowind® OPV/corvettes give navies state-of-the-art assets for current and emerging missions from area surveillance to anti-piracy, counter-terrorism, fisheries policing, drug interdiction, environmental protection, humanitarian assistance, search & rescue at sea, and maritime safety & security (MSS).

Gowind® OPV/corvettes are affordable and configurable. In addition to excellent seakeeping and at-sea availability, all variants share the following key features:

- easy-to-operate and easy-to-maintain ship and systems
- unmatched capabilities for action at sea and operations by special forces, including a quick launch and recovery stern ramp for two RHIBs or USVs
- flight deck for helicopter or UAV
- 360° panoramic vision from bridge for sea surveillance, including asymmetric threats
- remotely operated, day/night proportional response capability to deal with asymmetric threats
- SATCOM and other communications channels to stay in touch with maritime surveillance networks.

The combat system can be tailored to the customer’s requirements, from ‘security’ level up to full combat capability. The family currently comprises four versions.

Gowind® Control is ideal for patrol and sovereignty missions in EEZs and littoral waters, including the fast deployment of special forces and commandos.

Gowind® Presence has the range, endurance and intervention capabilities, including a helicopter hangar for blue-water control missions.

Gowind® Action combines anti-air and anti-surface sensors and effectors, an efficient robust high-endurance mission management system (MMS) and interoperability.

Gowind® Combat has a full-scale MMS for full-scale multi-threat missions, including a full ASW suite with towed array sonar and improved stealth and survivability.
DCNS can also propose Gowind® variants tailored to customer needs (e.g. length, displacement, etc). DCNS has developed the Gowind® designs by drawing on expertise in integrated platforms and systems, as well as lessons learnt from client navies worldwide.

DCNS guarantees the support needed for local tailoring and shipbuilding according to customer needs.

DCNS is also proposing various associated maintenance and service solutions for cost-effective operations.

**May 2010: DCNS to self-fund construction of highly innovative OPV**

One of the keys to winning new business in the corvette/OPV sector is to achieve ‘sea-proven’ status attested by a world-class navy; a feat that is all the more challenging when the vessel in question combines innovations and unmatched efficiency. Hence the decision to make the proposed OPV available to the French Navy for three years.

With a length overall of 90 metres, the Gowind OPV will offer three weeks’ blue-water endurance, a range of 8,000 nautical miles and a top speed of 21 knots. The design includes full provision for an organic helicopter and reduced crewing by a complement of 30 as well as space for an additional 30 passengers. The proposed vessel is the entry-level representative of the Gowind family.
Brave, a versatile replenishment and support vessel

A versatile support vessel for coalition missions

The BRAVE support vessel is DCNS’s response to emerging logistic support needs identified by many navies. The design concept divides the ship into three zones:

• forward zone for platform management, living space and passenger accommodation
• midships zone for fuel tanks and replenishment rigs
• aft zone with storage space for dry cargo and munitions as well as workshops and, depending on the customer’s requirements, a vehicle storage area.

BRAVE support vessels are ideal for the underway replenishment of all types of products (dry cargo, fuel & other liquids and munitions), to provide logistic support for naval forces and to store and deliver all types of payloads, including dangerous substances.

The BRAVE design complies with the latest standards and regulations applicable to tankers, most importantly MARPOL. The fuel tank zone is of a double-hull design.

The deck architecture is optimised to facilitate cargo handling during both loading and underway replenishment (UNREP) whether via the rigs when connected to a receiving ship (CONREP) or using helicopters (VERTREP). To ensure that the basic design can be readily tailored to a range of payload and replenishment needs, the midship zone can be 'jumboised' by adding one or two hull sections. The aft zone can also accommodate various additional and optional modules (hospital extensions, shelters, etc.) for specific missions.

Many navies seek the capability to transfer bigger payloads more quickly. BRAVE ships can be equipped with one or two rigs, each handling both fuel and dry cargo. A BRAVE vessel with two rigs and two helicopter spots can thus transfer four dry cargo loads at a time.

Technical data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall</td>
<td>180 - 195 m</td>
</tr>
<tr>
<td>Beam</td>
<td>28 m</td>
</tr>
<tr>
<td>Displacement (approx.)</td>
<td>30,000 t</td>
</tr>
<tr>
<td>Payload (liquids)</td>
<td>up to 16,000 m³</td>
</tr>
<tr>
<td>Propulsion</td>
<td>various options</td>
</tr>
<tr>
<td>Speed</td>
<td>20 knots</td>
</tr>
<tr>
<td>Accommodation</td>
<td>&gt; 200</td>
</tr>
<tr>
<td>Flight deck</td>
<td>2 spots, 1 for a heavy-lift helo</td>
</tr>
<tr>
<td>Hangar</td>
<td>2 bays, each for a 10-t class helo</td>
</tr>
</tbody>
</table>
Integrated solutions

Submarines’ systems

SUBTICS® : Submarine Tactical Integrated Combat System

According to its performances and integration level, SUBTICS® optimizes every sensors and weapons capabilities and guarantees operational efficiency as required by today’s Navies. SUBTICS® fits to every types of new and modernized submarines.

As a benefit for the French Navy, SUBTICS® equips all SSN and SSBN, modernized or on new construction, and has been chosen to equip next SSN generation (BARRACUDA type).

On export markets, it is selected to equip every new submarines of AGOSTA, SCORPENE and ANDRASTA types as well as to modernize commissioned submarines such as U209, A12 and A17.

On board SUBTICS® have demonstrated their outstanding level of performances among which a unique capability to detect and track, at a high speed, very distant tracks as well as to successfully launch several types of weapons.

Key features

Submarines are increasingly faced with various missions: littoral and blue-water operations, stand-alone missions or within a naval force. To meet all these operational requirements, SUBTICS® offers the following “sea proven” capabilities:

- Highly efficient acoustic sensors including low frequency arrays and scalable data processing offering outstanding detection abilities of distant targets at high speed
- Highly efficient non acoustic sensors on the surface and at periscope depth offering a high level of discretion
- Complete communication facilities (from VLF to SHF), noiseless and fully integrated allowing submarine to interact in real time within a force
- Data synthesis from every sensors (optical, optronic, R-ESM and C-ESM, radar)
- Advanced, automatic and interactive target motion analysis
- Tracks identification and classification functionality
- Track fusion and association through an interactive track management tool
- Tactical, command and engagement aids with regard to geographical and tactical environment
- Tactical Data Links operation
- Fire and weapon control
  - Torpedoes : F17, SUT 266, TP617, Black Shark, F21
  - Missiles : SM39 and land-attack capability

Sales records

SUBTICS® currently in operation at sea:

- French Navy : every SSN and SSBN Le Terrible
- Chilean and Malaysian Navies : Scorpène SSK
- Pakistan Navy : Agosta 90B SSK
- Modernized submarines for Navies of South America and South-Eastern Asia (U209 SSK and others)
Over 20 SUBTICS® currently under production:

- French Navy: next generation of Barracuda SSN and rest of SSBN fleet
- Indian Navy: Scorpène SSK
- Numerous navies from South America and Asia as part of their submarines fleets modernization
- Brazilian Navy as part of their 5 submarines procurement
F21 next-generation heavyweight torpedo for the French Navy

The F21 heavyweight torpedo will replace the French Navy’s current-generation F17 mod2 torpedo carried by its SSBN fleet and has also been selected for the next-generation Barracuda-type SSN fleet.

The F21 is being developed in response to new and emerging operational challenges to offer the host submarine unrivalled dominance. Its discretion, range and fire power will give it an unrivalled tactical advantage over all adversaries. The new torpedo is designed to knock out enemy surface vessels and submarines.

The F21 features a range of innovations and advances in torpedo technology. While the high energy density AgO-Al primary battery offers both high maximum speed and greater range, the new-generation acoustic head guarantees improved search efficiency in all waters, from shallow to deep and from quiet to noisy. New-generation technologies also result in improved signal processing and enhanced overall performance.

Features include:
- ideal anti-ship/anti-submarine weapon
- can be fired in shallow or deep water
- one-shot lethality
- max. speed: > 50 knots
- range: > 50 km
- optical fibre wire guidance
- electric propulsion powered by AgO-Al primary battery
- new-generation acoustic head offering advanced capabilities in both surveillance and attack modes
- countermeasure resistant, all types
- complies with French nuclear safety standards for SSNs and SSBNs; high-stability warhead is totally immune to accidental detonation
- compatible with all submarines and surface combatants to NATO standards.

The F21 outperforms all heavyweight torpedoes currently in service. It has the intelligence and performance to guarantee tactical superiority. In many ways, it is more an unmanned underwater vehicle (UUV) than a conventional torpedo. F21, the most advanced heavyweight torpedo on the world market now and into the future.
**Contralto-S®**

The Contralto-S® torpedo countermeasures suite for submarines is designed to defeat latest-generation torpedoes. It uses acoustic decoys and is based on the 'confusion/dilution' principle.

Contralto-S® is designed for all types of submarines (i.e. SSKs, SSNs and SSBNs) and can be incorporated into new-build designs or added to existing boats as part of a refit or modernisation programme. Customers to date include the French Navy's SSBN and SSN fleets under the Nemesis programme and the Brazilian Navy for its new class of SSKs.

The operational ‘confusion/dilution’ principle represents the state of the art in torpedo countermeasures. Contralto-S® saturates an in-coming torpedo’s processors by creating and constantly renewing dozens of ephemeral acoustic targets, the only viable solution against latest-generation torpedoes.

Contralto-S® integrates fully with the host submarine’s combat management system. The instant an in-coming torpedo is detected, the system determines when to launch salvos of Canto® countermeasures while at the same time proposing evasive manoeuvres tailored to the submarine's tactical situation.

The Canto® effectors are operational from the moment they are launched, thus reducing the response time and improving the submarine’s prospects for survival when the threat is detected at short range. The acoustic cloud generated by the Canto® effectors confuses and disorients the in-coming torpedo in a few seconds so that it attacks successive decoys until it has exhausted its energy resources. Meanwhile, evasive manoeuvres enable the submarine to leave the area safely.

Key points:

- developed to counter advanced torpedoes
- integrated with host submarine’s CMS
- confusion/dilution concept
- rapid deployment, immediately disturbs torpedo behaviour.

Thanks to the speed with which it can launch Canto® effectors and the efficiency of the confusion/dilution principle, Contralto-S® is the only system that can counter latest-generation torpedoes. Overall, Contralto-S® is highly effective against all types of torpedoes. For Scorpene-type submarines, full integration with the Subtics combat management system (CMS) ensures the best possible protection.
CI1 mod3 mobile underwater target

ASW (anti-submarine warfare) crews need extensive training in both tactics and operational weapon handling. And effective training demands access to high-performance systems.

DCNS proposes a comprehensive solution in the form of the CI1 mod3 underwater target, effectively a high-performance unmanned underwater vehicle, or UUV. The CI1 mod3 target is ideal for training crews in:

- torpedo operations
- torpedo tactics
- sonar tracking.

The CI1 mod3 is ideal for firing practice using all types of torpedoes and all types of platforms. The target emulates the dynamic and acoustic behaviour of a submarine to attract the torpedo, then trigger its attack phase. The preprogrammed mission software enables the target to emulate all phases of a submarine mission (patrol, escape, etc.) to ensure that each exercise is highly realistic.

Over the last 15 years, hundreds of at-sea exercises and trials have been conducted using CI1 targets, including a major series as part of the MU90 lightweight torpedo development programme. Every month, the French Navy uses a comprehensive range of DCNS training services to conduct torpedo exercises. This customer has also ordered CI1 mod3 targets and trial services over a period of six years as part of the Artemis programme to develop the F21 heavyweight torpedo. CI1 mod3, the most recent version, offers performance compatible with the latest-generation heavyweight torpedoes.
Surface ships’ systems

**SETIS : Naval Tactical Integrated Combat System**

With the legacy of the well-known SENIT Combat System family, SETIS is a multi role integrated combat system using 21st century technologies to match the 21st century operational requirements, including current developments (Network Centric Warfare) and emerging operational needs (UXV integration and management, asymmetric threats etc.).

SETIS combines a large set of equipments, sensors or weapons to complete self-defense and attack in all warfare domains, area defense in dedicated warfare domains, and tactical control of a Task Force. The high capability of SETIS mainly relies on a full integrated Combat Management System which operates all the system functions.

Key features:

**Fully integrated system**
- Combat Direction System including a powerful and war-proven data fusion algorithms to detect and neutralize threats in real time
- Combat Support System for common recognized maritime picture, mission planning, air mission management, environmental conditions management, electromagnetic intelligence management...
- Command Information System to simultaneously manage real-time and non-real time information through multiple tactical data links and other civilian and military information systems
- Onboard training capability using embedded training environment
- Multifunction consoles with user-friendly human-machine interface
- Full integration with platform for whole-ship effectiveness.

**Flexible, scalable and evolutive**

For customized solutions DCNS recommends and integrates a large set of sensors and weapons to meet the specific requirements of every Navy. The extensive use of COTS (off the shelf components) in the SETIS core CMS guarantee high availability, maintainability and evolutivity of the Combat System.

**Joint operation capability**

SETIS is fully interoperable with national and allied tactical data links to allow all types of joint operations.
Fitted for modernization programmes
SETIS can be installed as part of warship programmes of modernization to improve awareness, interoperability, operational capabilities. SETIS is also adapted for technology transfer programmes.

Long term Support
DCNS, as the French Navy main prime contractor, owns all the expertise, industrial means and tools to provide long-term support during system entire lifecycle (maintenance, obsolescence management, technical facts recording and analysis, database updates…).

Sales record
- France : Multi-mission Frigates (FREMM)
- MOROCCO : FREMM Frigate
POLARIS - Compact and scalable Combat System

Latest member of the DCNS Combat Systems family, POLARIS is a sea-proven compact solution designed to fulfill Navies and Coast Guards’ needs for surveillance, littoral zone protection and Economical Exclusive Zone protection missions. The system is well adapted to be installed on OPVs, FACs, FPBs, LPD/LHDs…

POLARIS offers scalable functionalities that are built for maritime situation awareness, interoperability and surface warfare management.

The functional core is a robust, optimized and capable tactical system, which takes benefit of DCNS Combat Systems already in service.

Key features:

**Performing, easy to use and easy to install compact system**
Flexible and easy to upgrade, Polaris is proposed for new programs and is also perfectly suited for modernizations and renovation programs.

It features the capability to interface a great number of surveillance and identification sensors (radar, AIS and ADS-B, video and infra-red cameras, radar and communication ESM equipments,…). The improved anti-surface warfare version provides the capacity to operate guns and Surface-to-Surface Missile systems.

**Extended connectivity and interoperability**
Though it is compact, Polaris is the main node for networking a wide range of units or systems which contribute to the Maritime Safety and Security, among them:
- A Tactical Data Link (Allied or National Link),
- A Maritime Safety and Security system such as MATRICS,
- An Helicopter,
- Special Forces on board a RHIB,
- An Unmanned Air and/or Surface Vehicle,
• A Secure WIFI internal network.

**Fast upgrading**
In case of emergency, for instance to join a combined operation, Polaris can be deployed in order to drastically increase the capabilities of a vessel for short term dedicated missions including the addition of a tactical data link to ensure interoperability with a NATO group.

**Long Term Support**
DCNS, as the French Navy main Prime Contractor, owns all the expertise, industrial means and tools to provide long-term support during system entire lifecycle (maintenance, obsolescence management, technical facts recording and analysis, database updates…).

**Experience**
In 2009, Polaris has been sea and combat proven on board a French Navy Frigate to conduct operations during her participation to the ATALANTE mission. And more recently, additional French Navy ships have been fitted with a version of Polaris.
MATRICS - Innovative system for maritime safety and security

Traffic density, number and diversity of threats (smuggling, pollution, illegal immigration,…) and multiplicity of players make countries’ maritime safety and security missions increasingly difficult. As legacy systems have limited capabilities, new solutions are necessary.

MATRICS is an innovative, scalable and affordable solution providing permanent maritime traffic surveillance up to EEZ, with advanced threats assessment capabilities. MATRICS is based on DCNS relevant experience in complex naval information system and data fusion algorithms.

Key features:

From local surveillance to EEZ limits and beyond

MATRICS integrates existing infrastructure and sensors and reinforce coverage by adding new on board or shore based sensors and naval capabilities to provide maximum and permanent surveillance, from local coastal zones to EEZ or open sea.

MATRICS uses multi sensors data collection to generate the maritime traffic picture and shares this information among an infinite number of operators through a high data flow and secured network. MATRICS can be connected with other systems to extend maritime situational awareness to several countries.

Automatic detection of suspect events

MATRICS is the only proven solution providing innovative capabilities for automatic ships behavior analysis and 24 hours a day alert generation.

Threat identification and action

Every alert concerning suspect behaviour is automatically logged and recorded in the MATRICS data base. The most complex alerts are transmitted to operators who can classify the threat using an unique support tools set developed by DCNS.

In a crisis situation, MATRICS accelerates the decision-making process by submitting potential intervention plan to the competent authorities. In addition, MATRICS proposes dedicated tools and models for search and rescue missions (IAMSAR standard compliance).

Access to global maritime intelligence

Connected to existing databases in order to fully exploit all the necessary maritime information. MATRICS also integrates data from the environmental context: legislation, weather, bathymetry, cartography.
MATRICS provides immediate access to a ship’s complete history with permanent updating to improve the understanding and surveillance of maritime traffic.

New threats, new challenge, your solution MATRICS

MATRICS is based on French and European R&T contracts leaded by DCNS. As such, MATRICS is fully compliant with the future European sea border surveillance system definition.

MATRICS solution has been chosen in 2009 by French Maritime Rescue Coordination Centre – CROSS - for Search and Rescue missions (Marylin project)

I2C project

Improved maritime surveillance is a major challenge for European Union member states. In support of research in this important area, the European Commission has selected the I2C project led by DCNS supported by 20 European partners. Using a demonstration system currently under development, DCNS plans to prove that the concept meets EU security challenges in the Mediterranean.

The I2C European research & technology demonstration (RTD) project will last four years. The aim is to determine the feasibility of deploying a regional maritime surveillance and offender detection system. The demonstration system set up by DCNS and its partners on the SESDA coastal platform at Saint Mandrier and at two French operations centres for the Mediterranean will be used to study, develop and deploy this highly operational surveillance system.

The system will be able to detect – in real time, under all weather conditions and over a maritime domain extending up to 400 km from the coast – abnormal behaviour by both cooperating and non-cooperating vessels. The types of behaviour warranting attention include abnormally high or low speeds, standing still on the high seas, ships alongside each other and sudden changes of heading.

The aim is to analyse ships’ tracks and activities in real time, query databases and issue warnings on the basis of agreed guidelines and in concert with the relevant operational authorities. Myriad details on a screen are little help to traffic controllers who need simply to be alerted to abnormal vessel behaviour. Thanks to an extensive sensor network, I2C will offer the most accurate overview possible of the Mediterranean environment. This data will then be correlated with information from other sources.

The operational forces of authorities responsible for maritime security will thus have access to reliable information enabling them to decide when and how to intervene to achieve maximum impact in combating illegal fishing, immigration, drug trafficking and pollution.

This DCNS-led project will involve 20 European partners. DCNS’s contributions to the consortium will include expertise in advanced systems engineering and know-how in algorithm-based decision-making aids, a critical requirement for the automatic identification of abnormal vessel behaviour.
**Contralto-V®**

The Contralto-V® torpedo countermeasures system for surface combatants is designed to counter latest-generation torpedoes. Like Contralto-S®, it uses acoustic decoys and is based on the ‘confusion/dilution’ principle.

The operational ‘confusion/dilution’ principle represents the state of the art in torpedo countermeasures. Contralto-V® saturates an incoming torpedo’s processor by creating and constantly renewing dozens of ephemeral acoustic targets, the only viable solution against latest-generation torpedoes.

Contralto-V® integrates fully with the host vessel’s combat system. The instant an in-coming torpedo is detected, the system determines when to launch salvoes of Canto® countermeasures while at the same time proposing evasive manoeuvres tailored to the ship’s tactical situation.

The Canto® effectors are operational from the moment they are launched, thus reducing the response time and improving the ship’s prospects for survival when the threat is detected at short range. The acoustic cloud generated by the Canto® effectors confuses and disorients the in-coming torpedo in a few seconds so that it attacks successive decoys until it has exhausted its energy resources. Meanwhile, evasive manoeuvres enable the ship to leave the area safely.

Contralto-V® is compatible with a wide range of dedicated EW (electronic warfare) and ASW (anti-submarine warfare) decoy launchers, enabling DCNS to tailor the system to the customer’s needs and combine anti-torpedo and anti-missile systems.

Contralto-V® offers ideal protection for all surface combatants, including new-generation FREMM frigates and aircraft carriers. It can be readily incorporated into new-build designs or added as part of a modernisation programme.

**Key points**

- developed to counter advanced torpedoes
- integrated with ship’s CMS
- confusion/dilution concept
- rapid deployment, immediately disturbs torpedo behaviour
- compatibility with many launchers.

Thanks to the speed with which it can launch Canto® effectors and the efficiency of the confusion/dilution principle, Contralto-V® is the only system that can counter latest-generation torpedoes. Overall, Contralto-V® is highly effective against all types of torpedoes.
Sylver® vertical launchers

Sylver® modules on surface combatants serve as both safe storage silos and vertical launchers. The upper portion protects the missiles against environmental conditions, shock and vibration as well as projectiles and small-calibre bullets. The gas duct associated with each module protects the ship and crew by evacuating hot exhaust gases from the moment a missile motor ignites.

Sylver® launchers are compact, lightweight, easily installed and readily tailored to any warship architecture. They offer high launch rates while guaranteeing the safety of ship and crew even in the event of a missile malfunction. An inherently simple design ensures high reliability and ease of maintenance.

The Sylver® family includes launchers compatible with most types of vertical-launch naval missiles, whether in service or planned. Because the different versions share strong family traits, Sylver® launchers offer unprecedented mix-and-match flexibility. Sylver® A50 modules can store and fire not only Aster 30 missiles, but also Aster 15 missiles normally carried by the Sylver® A43 while the Sylver® A70 modules ordered for the Franco-Italian FREMM frigates can also accommodate Scalp Naval cruise missiles.

Sylver® launchers have been selected for the Charles de Gaulle aircraft carrier, the Italian Navy’s Cavour aircraft carrier, the French Navy’s La Fayette-class frigates, the Singapore Navy’s Formidable-class frigates, the Royal Saudi Naval Forces’ Al Riyadh-class frigates, the Royal Navy’s Type 45 destroyers and the French Navy’s Forbin-class and Italy’s Andrea Doria-class air defence frigates (Horizon programme). The Sylver® A35, the latest addition to the family, can accommodate missiles up to 3.5 m long, specifically, to date, the VL Mica from MBDA and the VT1 from Thales. Sylver® A70 can also store and fire Aster 15 and 30 missiles.
Innovations

SMX-25, remarkable speed and stealth

The 21st-century submersible

For this concept ship project, presented for the first time at Euronaval, DCNS focused on how to get what is essentially a conventional-propulsion submarine to a theatre of operations as quickly as possible. Powered by three gas turbines driving three water jets, the SMX-25 submersible is designed to achieve a sustained surface speed of 38 knots.

On reaching its designated patrol area, the SMX-25 will submerge and switch to battery-powered electric propulsion using two tractable pods. The batteries will be recharged in the conventional manner at periscope depth by diesel-alternator sets.

The SMX-25 will carry a full sonar suite enabling it to monitor the underwater battlespace. This traditional capability for submarines will be used in conjunction with surface sensors when the boat is semi-surfaced.

For underwater combat, the SMX-25 will have four torpedo tubes. It will also be equipped to deploy combat swimmers and their delivery vehicles and unmanned underwater vehicles (UUVs) from two dry-deck shelters in the sail. Access from the main deck to the shelters will be via a lift.

Innovation: the SMX-25 will feature special ballast tanks to maintain stable trim when semi-surfaced with only the upper portion of the sail above water. In this configuration, the boat will be able to use the same sorts of sensors (including an aircraft surveillance radar) and weapons as a conventional surface combatant (i.e. anti-ship, land-strike and anti-air missiles launched from vertical silos) while maintaining an extremely discrete radar signature. In this configuration, the boat can also deploy commandoes or unmanned aerial vehicles (UAVs).
A new deployment concept

The speed with which the SMX-25 will be able to reach a theatre of operations will call for a new deployment concept. The conventional submarine’s significantly slower transit speed means operations necessarily involve more planning.

With its speed, the SMX-25 will be able to change the balance of power in a given area on very short notice.

The SMX-25 will also be ideal as an advanced unit ahead of a projection force.

Technical data

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length overall:</td>
<td>109 m</td>
</tr>
<tr>
<td>Displacement, surface:</td>
<td>2,850 tonnes</td>
</tr>
<tr>
<td>Displacement, submerged:</td>
<td>4,560 tonnes</td>
</tr>
<tr>
<td>Max. speed, submerged:</td>
<td>&gt; 10 knots</td>
</tr>
<tr>
<td>Diving depth:</td>
<td>100 m</td>
</tr>
<tr>
<td>Endurance, patrol:</td>
<td>30 days</td>
</tr>
<tr>
<td>Complement:</td>
<td>27</td>
</tr>
<tr>
<td>Armament:</td>
<td>4 torpedoes, 16 missiles</td>
</tr>
</tbody>
</table>
Advansea concept ship, an advanced all-electric surface combatant

The timely development of good products meeting the needs navies are likely to face around 2025 presupposes first, knowledge of where we’re headed, and second, ideas about how to get there. The ADVANSEA (ADVanced All-electric Networked ship for SEA dominance) concept ship presented at Euronaval 2010 gives a first glimpse of what a next-generation all-electric surface combatant might look like.

To meet the future needs of Navies around the world, DCNS pursues a sustained R&D policy focusing not only on product improvement, but also on creative new concepts.

Advansea, a powerhouse of technology tailored to expectations

How to design and build a warship offering improved sensors, safety and stealth and compliance with environmental standards without jeopardising engineering/cost/scheduling requirements?

The answer, the design team believes, lies in three disruptive technologies and DCNS’s capacity to manage and coordinate their adoption by leveraging its expertise as both naval architect and a systems integrator specialising in surface combatants. The disruptive technologies are:

- Superconducting electric propulsion motors combining energy savings, reduced weight and size and optimal power ratings (10 MW/motor). Superconductivity is the property of certain materials whereby resistance to electric current falls to a value very close to zero at very low temperatures.

- Impulse energy storage devices that promise the instantaneous availability of large pulses of power.

- Real-time power flow management to users thanks to the convergence of combat system and platform management system technologies.

In each of area, DCNS engineering teams are working on the practical integration of these technologies in a shipbuilding environment.
In terms of naval missions, the aim is to design a warship for use in regional conflicts with a risk of intense combat. This means designing a ship combining improved means of threat detection, the capacity to respond quickly to such threats using gradual- and decisive-response weapons, and greater safety and comfort for the ship’s crew.

**First demonstrators around 2018?**

Although the ADVANSEA project described here is not intended to resemble in detail the product to which it may later give rise, it does help us to see the way forward. The first demonstrators may be available towards 2018. The project is also emblematic of DCNS’s determination to position itself as a world leader in all-electric surface combatants.

**Technical data**

**Sensors and stealth:**
- integrated topside: multi-sensor system (comprising radars, planar antennas and communication systems) integrated with superstructure for improved operational performance and lower observables
- organic USVs, UAVs and RHIBs or similar.

**Graduated and decisive response capabilities:**
- laser weapons, electric gun
- missile silos integrated with hull.

**Nautical qualities:**
- reversed stem
- quiet, high-efficiency propulsor

**Eco-design:**
- reduced environmental footprint
- reduced fossil fuel consumption.
As part of a broad sustainable development plan, the Group has drafted an environmental policy to control and reduce the environmental impact of DCNS activities and products. In addition to setting up an environmental management organisation and system in compliance with ISO 14001, the Group's eco-design strategy takes environmental considerations into account throughout each vessel's design lifecycle — from construction to operation, through-life support and decommissioning.

**Scope**

DCNS's eco-design strategy covers all environmental impacts of all types of vessels:

- **Lifecycle assessments (LCAs):** Analyse ship lifecycles with a view to reducing environmental impact of construction, operation and decommissioning.

- **Energy sources:** Select energy sources and prime movers with the lowest environmental impact, particularly as regards atmospheric pollution in sensitive areas (coasts, harbours, roads and ports).

- **Energy efficiency:** Optimise energy efficiency of ships.

- **Waste and emissions:** Minimise waste by improving storage facilities (smaller and safer), processing and recycling; use onboard recycling where possible (fresh water); reduce harmful electromagnetic radiation.

- **Traceability and decommissioning:** List and ensure traceability of dangerous substances used in ships; optimise processing and recycling of end-of-life materials.
Applications and R&D

So far, DCNS’s eco-design strategy has resulted in: a number of R&D projects in partnership with industrial firms and civil research organisations to develop better eco-tools and eco-technologies initiatives to assess the true impact of technical studies on projects: preliminary Ecoship design study demonstrating that it is possible to design a warship with 50% lower overall environmental impact and uncompromising performance for an additional cost payback of just five years.

Gathering momentum

DCNS’s eco-design strategy will gather momentum over the coming months and years as efforts are stepped up to meet customers’ growing environmental demands and as greater importance is attached to ‘cleaner’ warships that are more respectful of marine environments. DCNS consistently anticipates trends and is progressively integrating environmental impact considerations into all its warships from the design concept stage. All current projects comply with the International Convention for the Prevention of Pollution from Ships (MARPOL) and ‘green passport’ requirements. A ship’s green passport includes an inventory of all potentially hazardous materials used in its construction and details of where they are located.
Service solutions

DCNS proposes a wide range of services meeting the needs of navies all over the world.

Equipment and Systems Support

By developing support systems for each ship from the design concept phase on, DCNS helps navies to optimise ships’ life-cycle costs with efficient integrated logistic support solution.

DCNS designs, selects and integrates reliable and easy-to-maintain systems. DCNS enables customers to keep up with technological advances and improve obsolescence management, taking full account of its operational and budgetary constraints.

DCNS-designed maintenance plans and logistic flow can be refreshed to improve fleet availability while using the operational feedback of each ship.

Supply chain management

- supply chain organisation (logistic platforms, packing, transportation, etc.)
- adapted logistics (supply, inventory accounting, repairs, delivery)
- technical and organisational solutions (sourcing, qualification of manufacturers and repairers, quality assurance)
- logistics support (inventory plans, technical fact analysis, change management)

Obsolescence management

Our warships are designed to remain operational in a world of accelerating technological obsolescence; that has a direct impact on operational availability.

DCNS has developed a proactive and innovative obsolescence management process to help you to reduce both technical stop durations and the risk of a capability deficit.

DCNS’ logistic support services include:

- accurate, comprehensive document engineering
- obsolescence management
- technology and know-how transfers
- equipment and infrastructure supply
- training
- IT support systems
- technical assistance and advice.
Through-life support for surface warships and submarines

DCNS proposes a range of through-life support (TLS) services for naval systems, equipment, ships and entire fleets. Its proven expertise in naval technologies enables DCNS to offer customer support spanning all aspects of warship TLS and contributing to the client navy’s growing self-sufficiency.

Our TLS services draw on teams offering world-class expertise in:

- combat systems
- hulls and structures
- systems, subsystems and equipment
- propulsion
- weapon systems
- infrastructure
- IT systems

As a design authority for the DCNS-designed ships, the safety of your ship, getting back to operations after a technical stop, is guaranteed.

DCNS’ unrivalled TLS expertise enables navies to optimise processes guaranteeing the highest availability at the lowest cost. Services, from the simplest to the most sophisticated, include:

- diagnostics, expert appraisals, advice
- overhauls, maintenance and repairs
- equipment and system modernisation programmes
- ship life-extension programmes
- optimisation of support resources
- system performance optimisation.

Engineering services for higher efficiency

DCNS proposes a wide range of engineering services to improve your navy’s TLS programmes. These include:

- improvements to maintenance and processes at all levels
- engineering studies, recommendations, technical assistance and follow-up during all refits, lay-ups and modernisations (preparation, execution and acceptance)

All support services can be carried out in cooperation with local contractors or as part of a technology transfer programme.
Naval bases and shipyards: Construction, modernisation and maintenance

DCNS’ customer support services include expert appraisals, design, production, modernisation, maintenance and operation:

- Naval bases
- Shipyards
- Infrastructure and industrial facilities

DCNS services in these fields include:

**Naval base engineering and works**

DCNS’ engineering and production expertise offers value-for-money services for naval bases, shipyards and other infrastructure and facilities.

Each programme involves a dedicated team in charge of the coordination of job profiles and industrial means. Hundreds of engineers and technicians run projects stretching from technical assistance to EPC, including a panel of various skills.

- Conception and process: experts in naval bases and specific processes
- Engineering: experts and specialised technicians in the field of power, civil works, structures, mechanics, fluids, air-conditioning, handling, installation safety, lightning, electromagnetic compatibility
- Manufacturing and construction: skills in operation follow-up, works coordination, trial management, final qualifications
- Commissioning and start-up procedures, operations and maintenance

**Facility Management**

DCNS offers customers direct access to its engineers and technicians for missions such as the monitoring and optimisation of existing facilities. In setting up Defense Environment Services with environmental services specialist Veolia Environnement, DCNS is responding to the needs of customers that aim to outsource support services so that they can focus more closely on their operational missions. For instance, the French Navy has outsourced services to DCNS for the Île Longue naval base and facilities at Lorient. Many customers in the world have chosen such services.

**Facility availability**

The aim here is to ensure continuity of service for facilities located inside security areas. The services are based on DCNS’ know-how of the maintenance of the French Navy’s fleets of nuclear-powered submarines (SSNs and SSBNs) and Facility Management services for the associated infrastructure.

Working closely with a customer’s teams, DCNS can design an entire naval base to meet a navy’s operational needs in cooperation with local contractors and using local resources.
Education & training solutions

DCNS offers a complete range of courses and solutions designed to train all levels of naval and industrial personnel, from the start of a project through decommissioning and/or dismantling. These include:

- Modular and customised training courses
- Skills preservation
- Qualification support
- Process

For naval forces:

- Initial training at individual or group levels
- Training through to qualification
- Courses in different areas of expertise and specialisation

For support units/teams:

- Long-term assistance and support
- Theoretical training or refresher courses
- Practical training and tutoring in the shipyard or the naval base

Services, engineering solutions and contractual arrangements can all be tailored to customised requirements. Options include:

- Innovative long-term service contracting options, including public/private partnerships
- Computer-based training using generic, partial, full-scale and other simulators
- Virtual reality and augmented reality facilities
- Traditional university-style lectures
- Situational training
- Training prerequisites
- Supply of dedicated facilities, including ships and opposing forces
- Turnkey training centres and schools.

Worldwide, 10 navies trained and 300 DCNS-designed in service simulators.
Courses tailored to your fleet and ship life-cycles

- design
- shipbuilding
- technology transfers
- platform management and operation
- through-life support with know-how transfers
- refits and upgrades
- decommissioning operations.

Courses tailored to your industrial and naval resources

DCNS proposes education and training solutions to upgrade your industrial and naval resources, including shipbuilding and naval bases.

Modular, tailored solutions
- wide range of formats, including computer-based and simulator training
- your prerequisites
- courses for individuals and crews
- courses for armed forces personnel and contractors’ employees.

For crews, engineers, technicians and other employees
- individual and group courses (watch, crew, entire naval force)
- courses for subject and occupation specialists
- optimised learning curves
- refresher courses
- courses tailored to specific examinations and qualifications
- skill set maintenance.

Technical assistance, experts at your service

From the simplest to the most demanding request (advice, diagnostics, expert appraisal, engineering services, prime contracting), our experts are ready to help you in any harbour, at your shipyard or at sea. Responsive and highly qualified, they are ready to assist anywhere they are needed.
**Technology transfers**

Navies all over the world aim for the highest possible levels of self-sufficiency, DCNS offers a range of technology transfer, know-how transfer and associated services.

DCNS works with customer navies to audit existing skills and industrial resources and accurately define an appropriate level of autonomy.

To ensure that the necessary expertise is locally available, DCNS sets up partnerships with local contractors, proposing solutions tailored to each navy’s operational and budgetary constraints.
Contacts

DCNS
Corporate Communications
2 rue Sextius Michel
F-75732 Paris Cedex 15, France
+33 (0)1 40 59 50 00

Christophe Lachnitt
SVP, Corporate Communications
+33 (0)1 40 59 56 07
+33 (0)6 61 91 30 50

Emmanuel Gaudez
Press & Media Relations Director
+33 (0)1 40 59 55 69
+33 (0)6 61 97 36 63
emmanuel.gaudez@dcnsgroup.com

Solen Dupuy
Press officer
+33 (0)1 40 59 56 03
+33 (0)6 32 71 23 61
solen.dupuy@dcnsgroup.com

Virginie Lemière
Press officer
+33 (0)1 40 59 53 57
+33 (0)6 76 65 87 69
 virginie.lemiere@dcnsgroup.com

Marie-Laure Belle
Press officer
+33 (0)1 40 59 52 79
+33 (0)6 61 77 73 97
marie-laure.belle@dcnsgroup.com

Droits presse exclusifs