

Research & Innovation at Fincantieri

FINCANTIERI
The sea ahead



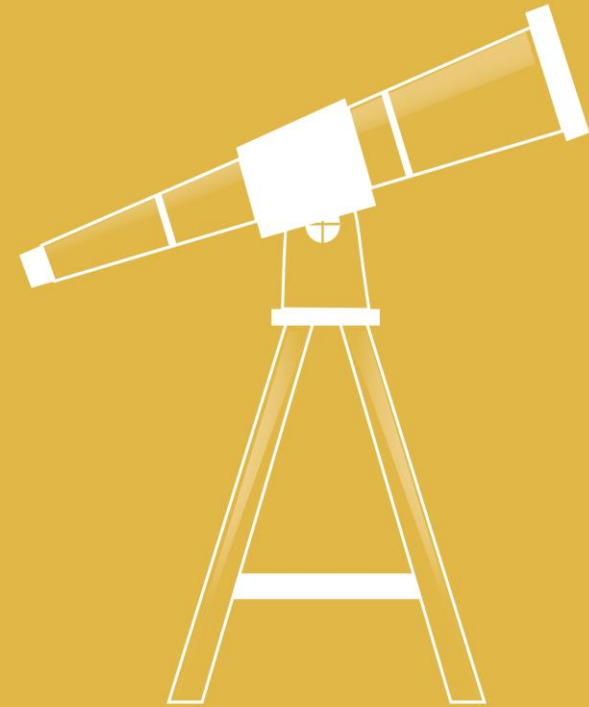

Table of Contents

Section 1	Fincantieri at a glance
------------------	-------------------------

Section 2	Fincantieri vision for 2030s
------------------	------------------------------

Section 3	How we manage Research & Innovation in Fincantieri
------------------	--

Section 4	A flavor of what is going on behind the scenes
------------------	--



Section 1

Fincantieri at a glance




Fincantieri at a glance

We are an Italian Group with a global footprint

Our figures

€ 5.8 bn
FY19 revenues

€ 32.7 bn
Total backlog^(1,2)



Our global reach

20
shipyards

4
continents

~ 19,800
employees

> 80,000
subcontractors







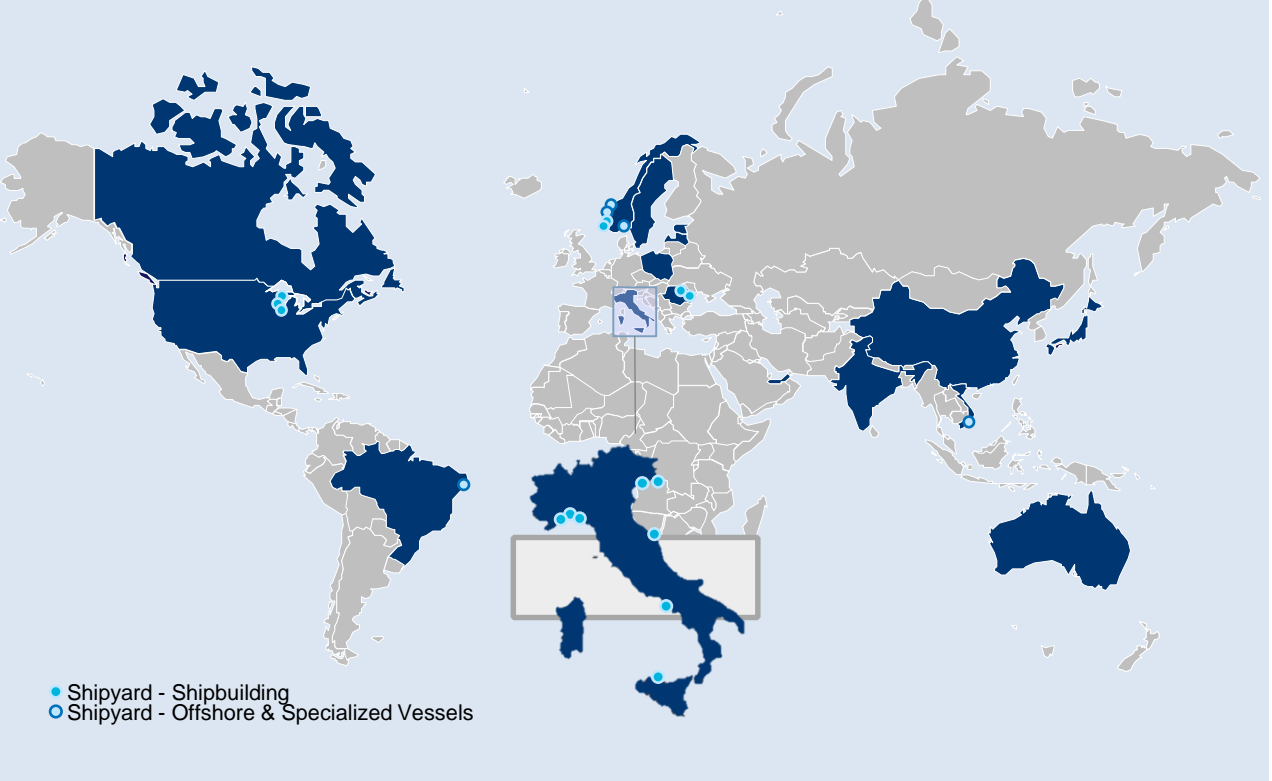
Our impact

4.5x
Economic multiplier⁽³⁾

5.9x
Employment multiplier⁽⁴⁾

47% of our employees are based in Italy and 82% of revenues come from international clients



We are the #1 Western designer & shipbuilder⁽⁵⁾ with 230 years of history and over 7,000 ships built

Note: all figures reported at December 31, 2019
 (1) At December 30, 2019;
 (2) Sum of backlog and soft backlog; soft backlog represents the value of existing contract options and letters of intent as well as contracts in advanced negotiation, none of which yet reflected in the order backlog
 (3) Value generated for each euro invested in shipbuilding according to the CENSIS "5th Report on the Economy of the Sea" (2015)
 (4) Fincantieri valuation according to Censis methodology based on Italian operations
 (5) By revenues, excluding naval contractors in the captive military segment. Based on Fincantieri estimates of shipbuilders' revenues in 2016



Products, clients and backlog

Diversified product portfolio with a wide client base and strong backlog

		Main products	Key clients	Revenues 2019 ⁽¹⁾	Backlog ⁽²⁾
Shipbuilding	Cruise	<ul style="list-style-type: none"> All cruise ships: <ul style="list-style-type: none"> Luxury/Niche⁽³⁾ Upper Premium Premium Contemporary 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <small>(4)</small> </div> <div style="text-align: center;"> <small>(5)</small> </div> </div>	 €3,574 mln 55.6%	
	Naval	<ul style="list-style-type: none"> All surface vessels (also stealth) Support & Special vessels Submarines 	<div style="display: grid; grid-template-columns: repeat(2, 1fr); gap: 10px;"> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> </div>	 €1,503 mln 23.4%	€ 26,828 mln (83 ships)
	Other	<ul style="list-style-type: none"> Similar businesses to our core ones where we operate opportunistically (e.g. Mega Yachts, Ferries...) 		€11 mln 0.2%	
Offshore & Specialized Vessels	<ul style="list-style-type: none"> OSV Fishery Ferries Offshore wind OPV Special vessels 	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <small>SOLSTAD OFFSHORE ASA</small> </div> <div style="text-align: center;"> <small>ISLAND OFFSHORE</small> </div> </div>	 €440 mln 6.8%	€ 888 mln (15 ships)	
Equipment Systems & Services	<ul style="list-style-type: none"> Marine systems, components & turnkey solutions Ship interiors Naval services Ship repairs & conversion 	<div style="display: grid; grid-template-columns: repeat(2, 1fr); gap: 10px;"> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> <div style="text-align: center;"></div> </div>	 €899 mln 14.0%	€ 1,736 mln	

(1) Before eliminations and consolidation adjustments
 (2) At December 30, 2019
 (3) Terminology used in the cruise sector to indicate smaller, more intimate cruises with fewer guests dedicated to more exploratory destinations (e.g. Alaska or polar regions)
 (4) Parent company of several brands, among which our clients are: Carnival Cruise Lines, Costa Crociere, Cunard, Holland America Line, P&O Cruises, Princess Cruise Lines and Seabourn Cruise Lines
 (5) Parent company of several brands: Norwegian Cruise Line, Oceania Cruises, Regent Seven Seas Cruises

Markets and positioning

Leadership in high-potential reference markets and solid track record

	End markets	Market Trend	Main Drivers	Track record
Shipbuilding	Cruise 	<ul style="list-style-type: none"> • Record order levels in 2019 • Significant impact of COVID-19, affecting Cruise operators' liquidity and operations 	<ul style="list-style-type: none"> • To be reviewed once the effects of COVID-19 will be quantifiable 	<ul style="list-style-type: none"> • World leader in the design and construction of vessels for all segments of the cruise industry • 95 ships delivered from 1990 to 2019 (8 delivered in 2019)
	Naval 	<ul style="list-style-type: none"> • Stable high margin business in the low double-digit range • Focus on accessible markets • Large programs under development (Italian Navy fleet renewal program, LCS program, Qatari Navy program, FREMM program) 	<ul style="list-style-type: none"> • Defence budgets for accessible markets • Global geopolitical situation • Naval fleet renewals 	<ul style="list-style-type: none"> • 128⁽¹⁾ ships delivered from 1990 to 2019
Offshore & Specialized Vessels		<ul style="list-style-type: none"> • O&G sector crisis and postponements of E&P projects caused a slowdown in related equipment industry (PSV, AHTS) • Segment diversification strategy (Fishery, Aquaculture, OPV, Special vessels) 	<ul style="list-style-type: none"> • Oil price and E&P investments • Demand of special purpose vessels for marine infrastructure and exploitation of marine resources • New business opportunities 	<ul style="list-style-type: none"> • 414⁽²⁾ ships delivered from 1990 to 2019
Equipment Systems & Services		<ul style="list-style-type: none"> • High potential and high margin business • Result of the insourcing of strategic activities • A minor, but growing, share of the total company's turnover 	<ul style="list-style-type: none"> • Shipbuilding programs ongoing • Fleet ageing and development of new technologies 	<ul style="list-style-type: none"> • Strong revenue growth to € 899 mln in 2019 (2016-2018 CAGR: +20.40%)

(1) Includes other products delivered by Naval business unit. Includes US subsidiaries pre Fincantieri acquisition, excluding 174 RB-M delivered since 2002
 (2) Includes other products delivered by Offshore & Specialized Vessels business unit. Includes VARD and predecessor companies



Technological leadership

Main achievements

- **Strong commitment to energy savings, emission reduction, high performance and high quality**
- **Strong technological know-how and design skills:** more than 100 prototypes in just over 15 years
- **R&D:**
 - ~90 projects ongoing
 - 2019 expenditure € 134 mln
 - Best-in-class R&D center (*CETENA*) in charge of developing new marine technologies across business units and for third parties

Example of innovative projects delivered / ongoing

Cruise



- *Carnival Vista*: “**ECO Notation**” by Lloyd's Register for exceeding environmental regulatory standards
- *Royal Princess*: **1st cruise ship fully compliant with new regulations**
- *Costa Luminosa & Costa Pacifica*: **Guinness World Record** for joint-christening of 2 cruise ships
- Contract with Ponant for the **first electric hybrid cruise icebreaker** with dual fuel propulsion (high-capacity batteries and LNG storage)

Naval



- **More than 20 prototypes developed** over the last fifteen years
- *Aircraft Carrier Cavour*: **world's most powerful non-nuclear propulsion system**
- *LCS Freedom*: **world's fastest steel frigate**

Offshore & Specialized Vessels



- Contract for the **most advanced and capable Cable Layer** in its market for Prysmian⁽¹⁾
- *Normand Maximus*: **largest offshore vessel ever built in Norway**
- *Skandi Africa*: “**Ship of the Year 2015**”⁽²⁾
- *AMC Connector*: **world's largest cable layer**⁽³⁾
- Contract for a **new-generation fish farming unit** for P/F Akraberg
- Contract for a **Service Operation Vessel** (the first for the Asian market) for Ta San Shang Marine⁽⁴⁾ to be operated by Ørsted

Source: Company information

(1) Award instituted by the major Nordic shipping magazine Skipsrevyen

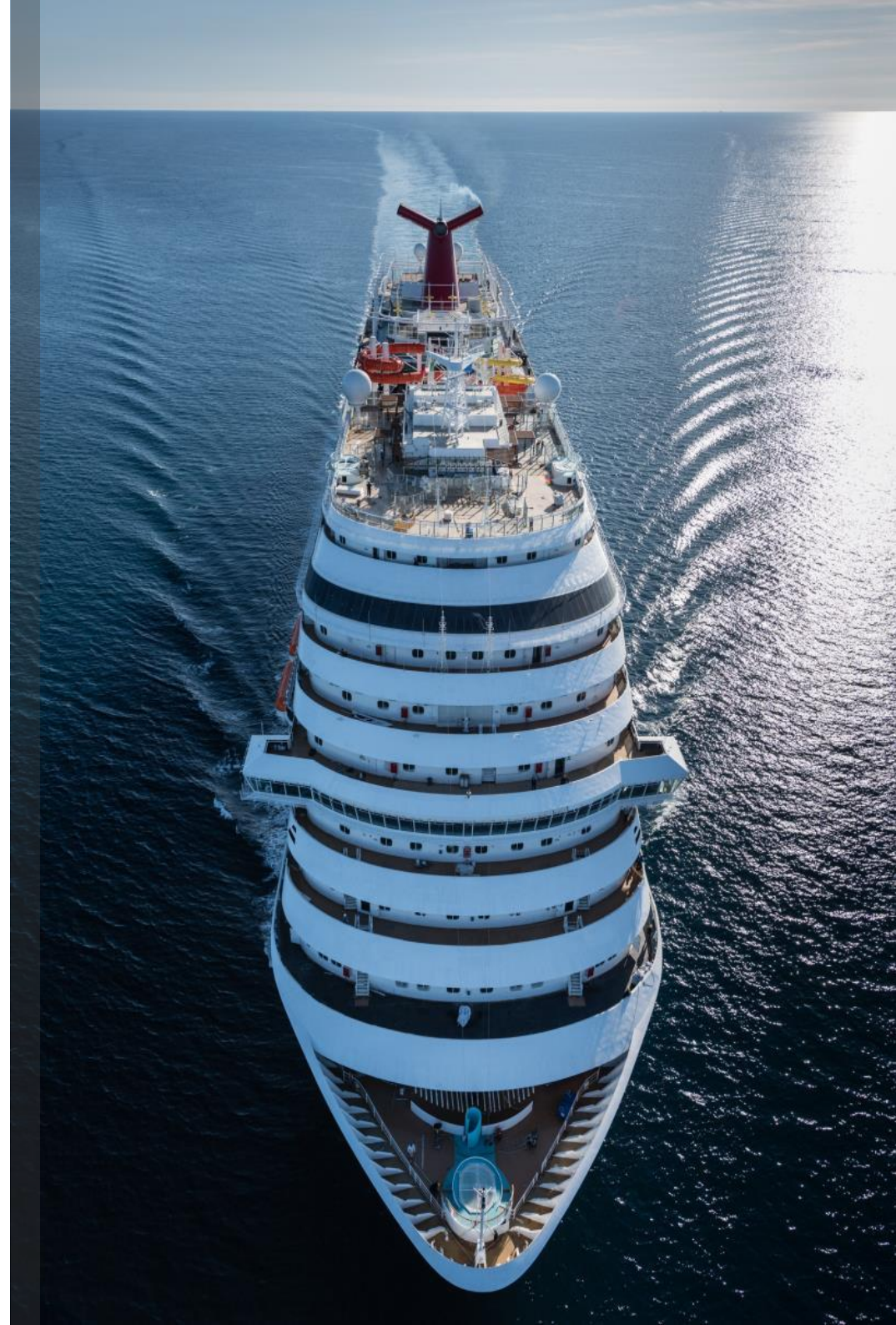
(2) In terms of loading capacity (2011)

(3) In terms of bollard pull at the date of construction (423 tonnes) (2009)

(4) JV between Mitsui O.S.K. Lines and Ta Tong Marine

Section 2

Fincantieri vision for 2030s



Several forces are re-shaping our market at an unprecedented pace

GLOBAL ECONOMY TRENDS

- Renewed interest for **Seas** as **strategic** resource pools
- **Service** based economy
- All devices are becoming **smart** and **connected**

NEW TECHNOLOGIES

- New **light** and **smart materials**
- **Big data**, AI, and **autonomous systems**
- Robots, **Cobots**
- **Virtual, augmented** and mixed reality



SHIP MARKET TRENDS

- Increase of **project size**, complexity and modularity
- **Multi purpose ships**, or platforms
- Life cycle **costs reduction**

EVOLVING REGULATIONS

- **Pollutant** emissions reduction
- Increasing **efficiency**
- **Safety** in operations and distress events



We are developing 5 visions for competing in the 2030s market...

Green Ship

- Development of efficient and sustainable solutions for **low-impact ships** (**energy** efficiency, **waste** and **pollutant** reduction, green energy production)



Smart Ship

- Introduction of **IoT solutions** for enhancing **services** available to the operators and their guest, **increasing** the **payload** added **value**, and enhance **safety** and **security**



Autonomous Vessel

- Development of **autonomous** vessels that are capable to **remotely co-operate** with an external control center, whilst **autonomously** taking **decisions**



Smart Offshore Infrastructure

- Development of **offshore multipurpose infrastructure** able to support different activities, such as aquaculture, production of energy and raw materials extraction



Smart Yard

- Adoption of solutions capable of **increase** the **productivity** and **enhance** the **safety** of the activities
- Development of a new **design** paradigm that will take into account the entire **lifecycle** of a **ship**



...setting demanding goals to achieve

Green Ship

- Increase ship **efficiency** by **30%**
- **Eliminate** ship **emissions** in **ports** and **halve navigation** emissions
- Promoting the introduction of **re-used or recycled** materials
- Decreasing onboard and underwater **noises**

Autonomous Vessel

- Develop on-board **systems** to support the average level of **autonomy** (e.g. **L4** as defined by LR)
- **Demonstrate** the use of an autonomous vessel to perform **completely unmanned** operations
- Avoiding **cyber security** vulnerabilities

Smart Offshore Infras.

- Doubling **offshore power** production per square mile, generated using marine technologies
- Promoting the installation of offshore **energy storage** devices

Smart Ship

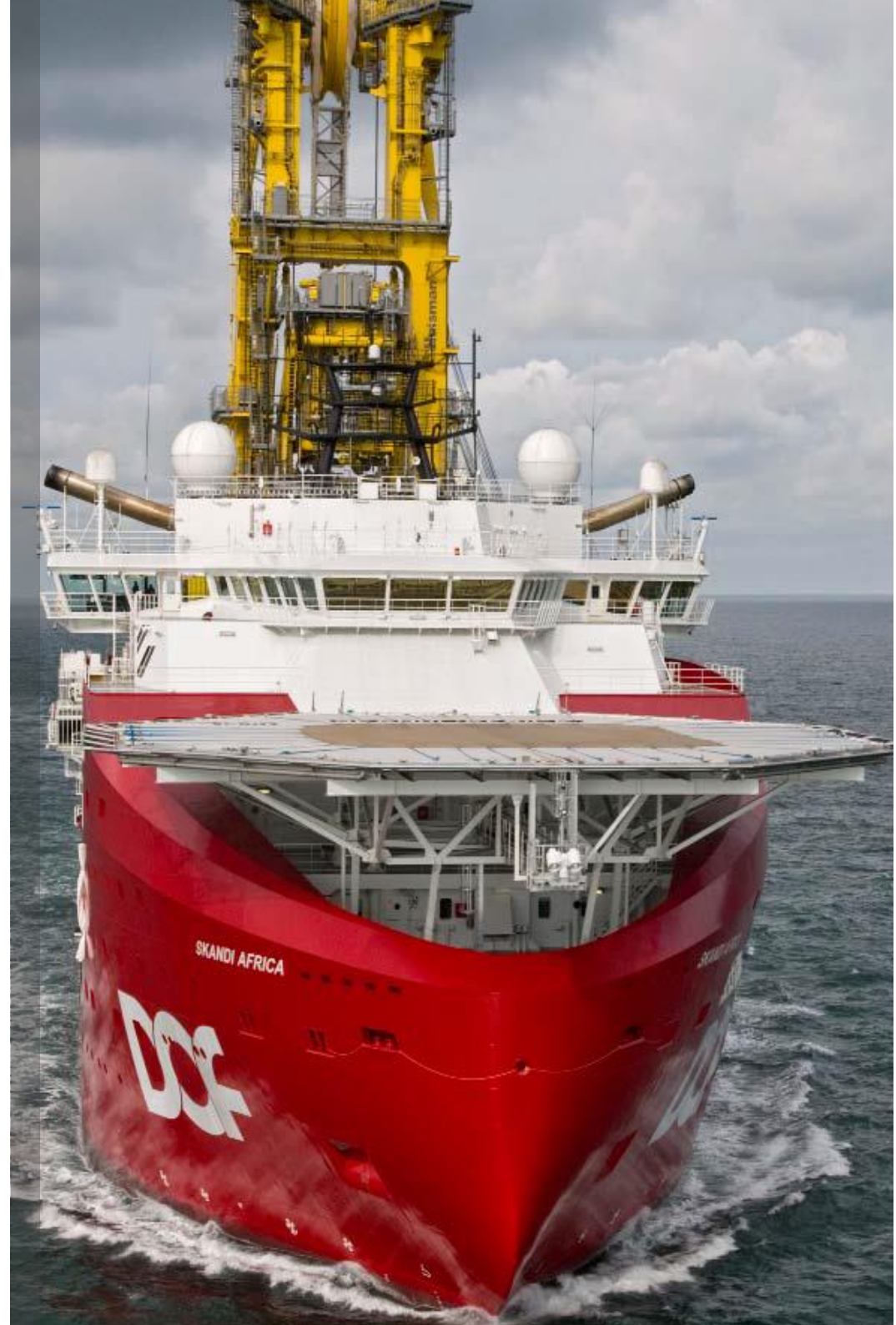
- Increasing the number of systems monitored by **sensors**, and their **integration**
- Create a **reference framework** for **cyber secure** interconnection between systems
- Enable **data exchange**/record in real time in **open formats**

Smart Yard

- **50% productivity improvement** by using **industry 4.0** technologies, to be implemented avoiding cyber security vulnerabilities
- **Monitoring** 100% of added value production activities
- Zero **safety** accidents during construction & maintenance
- Equipped workers with basic **health monitoring** devices and increase the number of life saving devices

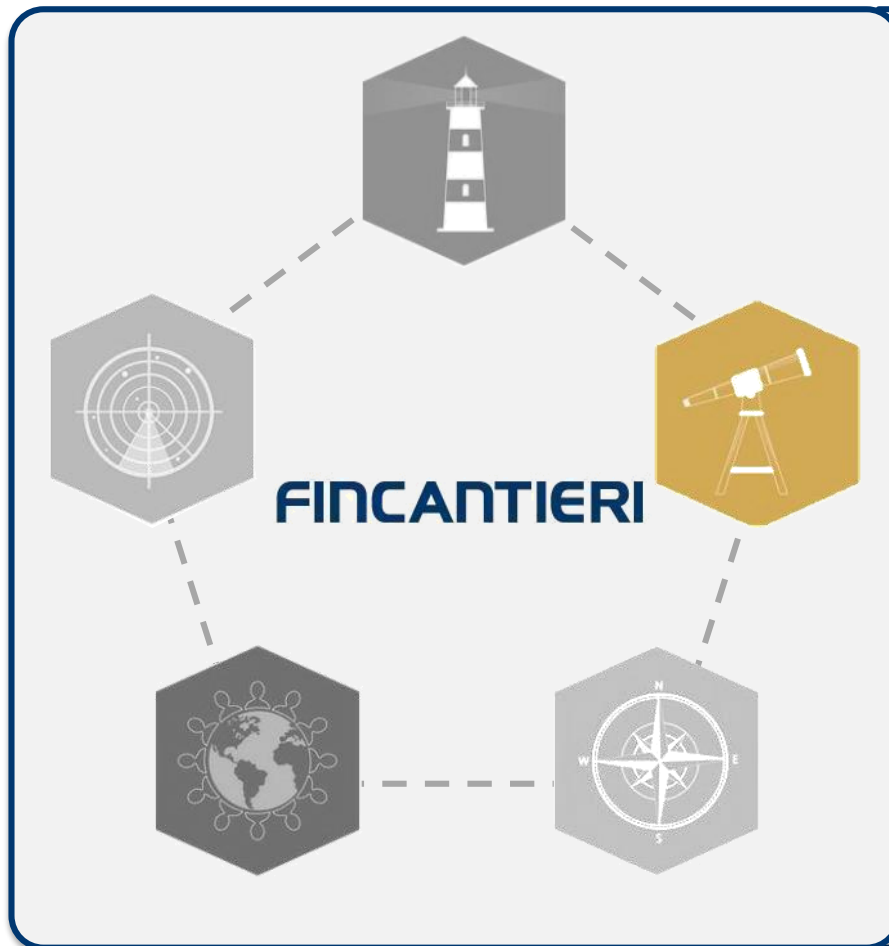
Section 3

How we manage Research & Innovation in Fincantieri



Innovation is one of our core values

FINCANTIERI GROUP CORE VALUES



CUSTOMER FOCUS

We meet customer requirements and we rigorously honor our commitments

INNOVATION

We aim at continuously improving our products and working methods through technological innovation

INTEGRITY

We take responsibility for our actions and we put great care into our work, adhering to strict principles of ethics, loyalty and professional fairness

PEOPLE

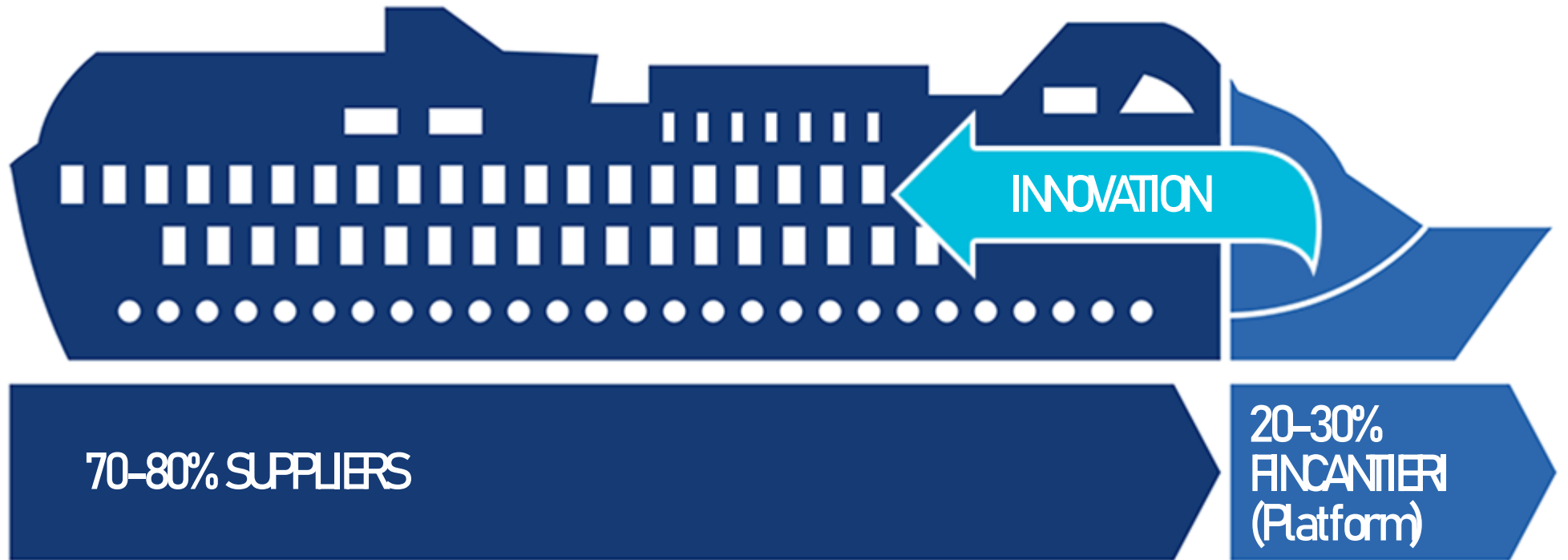
Everything we do focuses on enabling the growth, enhancement and training of people, based on the daily attention that we pay to the quality of our work and our relations with others

SAFETY

We ensure high levels of occupational safety and health



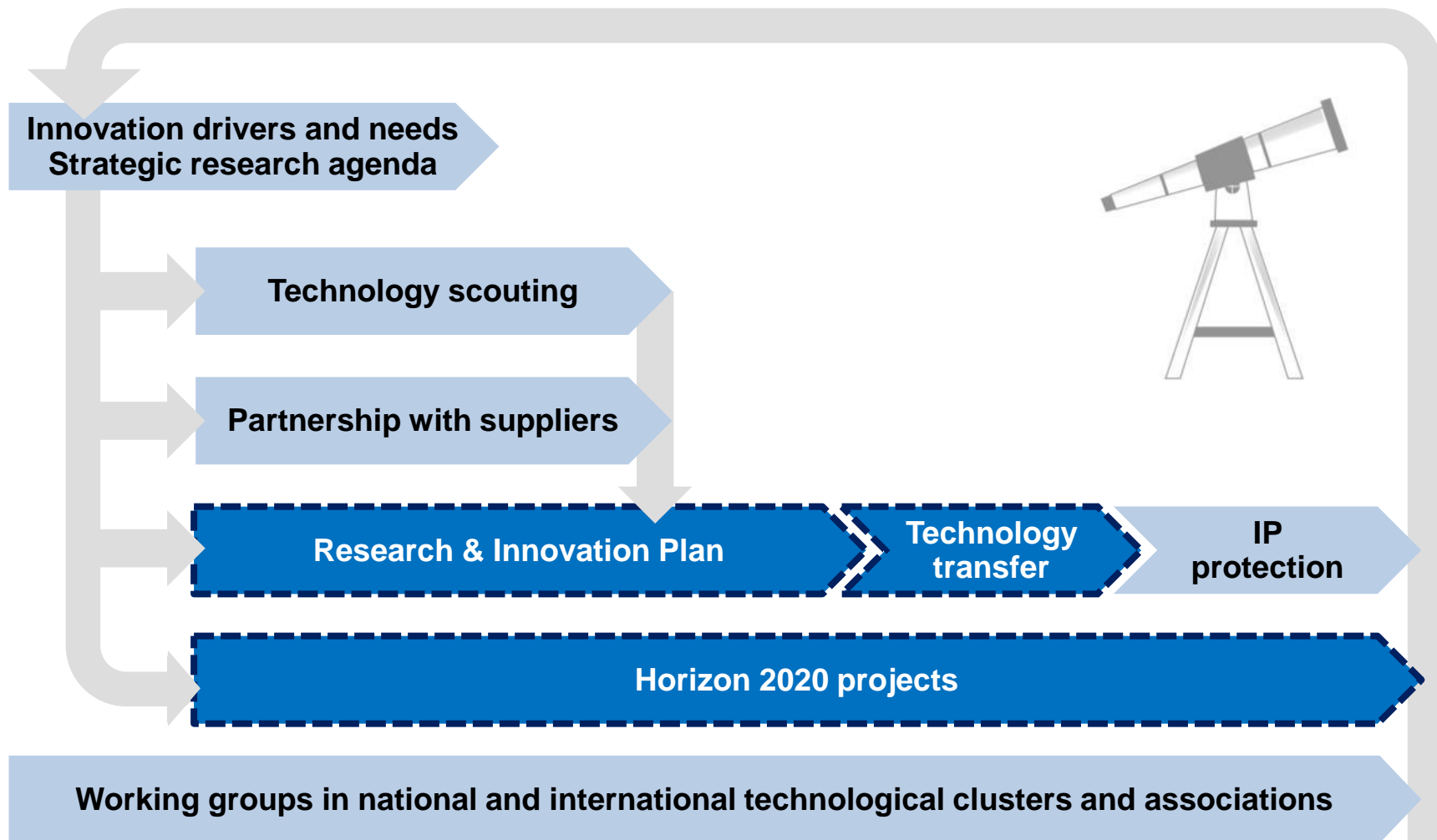
Why shall we champion innovation?



Fincantieri can use innovation to increase the value that is able to create and capture while building the ship

Value creation through innovation requires structured processes...

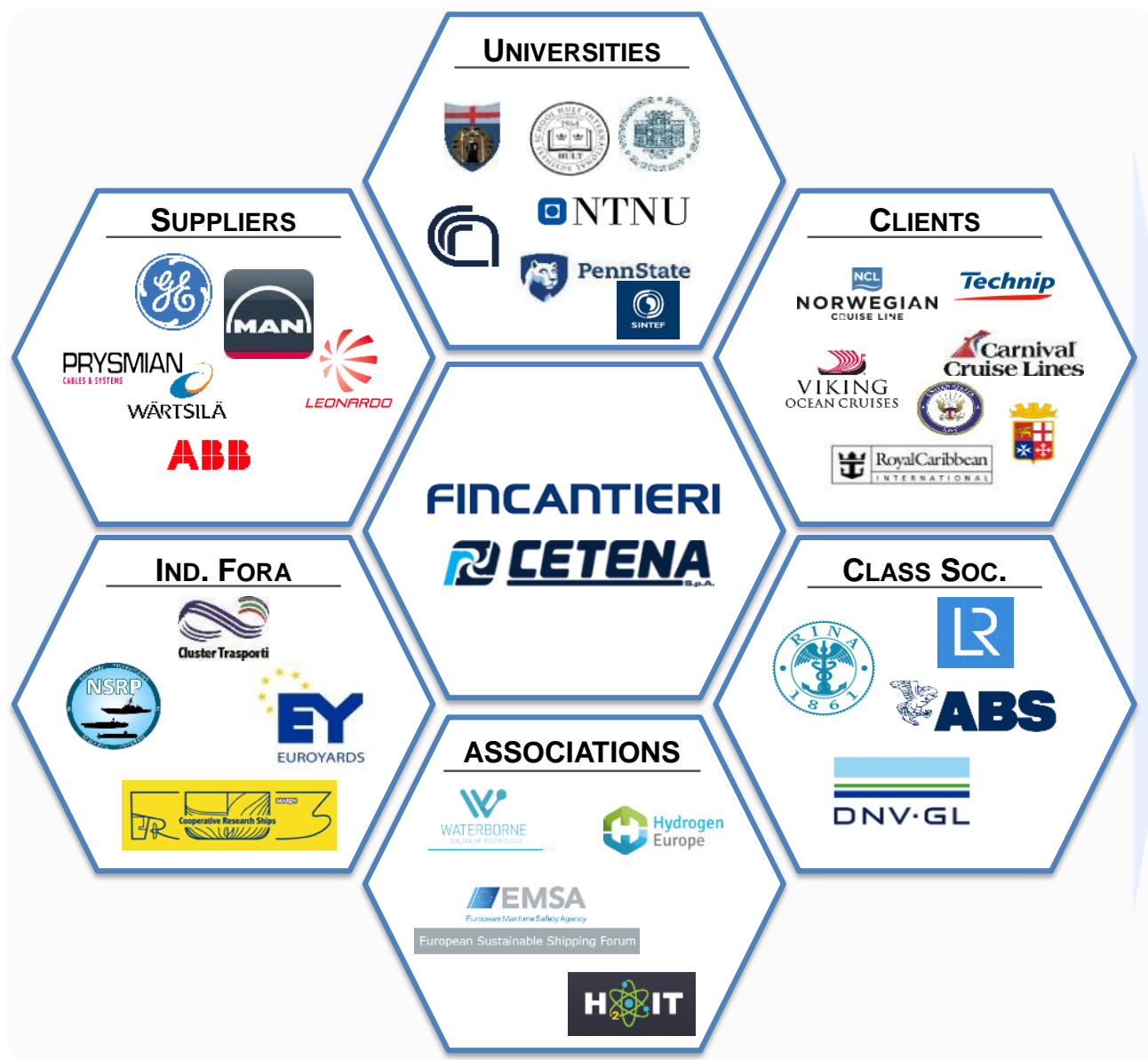
OUR CORE PROCESSES ARE DESIGNED TO DRIVE INNOVATION FORWARD



Focus of this presentation



We develop our strategies using a cooperative approach



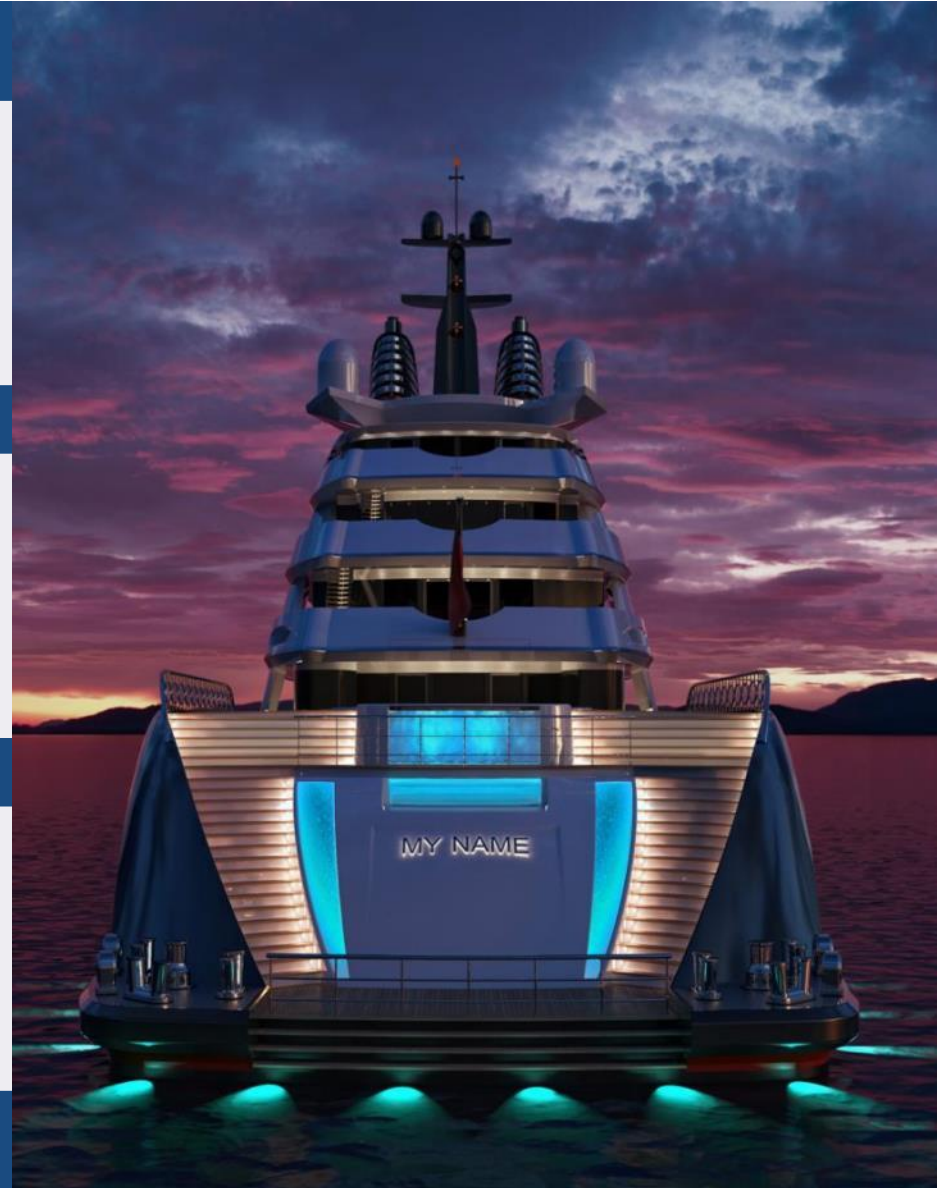
- Our order book is filled up to late '2020s
- We are in a position to start **medium to long term projects** that shall **anticipate** our customers' requirements
- We want to develop projects that are driven by the use cases / requirements (**business driven**) rather than by a **single technology**
- Such projects will be enabled by entering in long term strategic **partnership agreements** covering **research** projects and cooperation for **building** our ships
- We believe that we can build them within the **scope** of our **current commercial relationship**

Take home: we innovate when...

we design tailor made solutions to comply with the ship contract

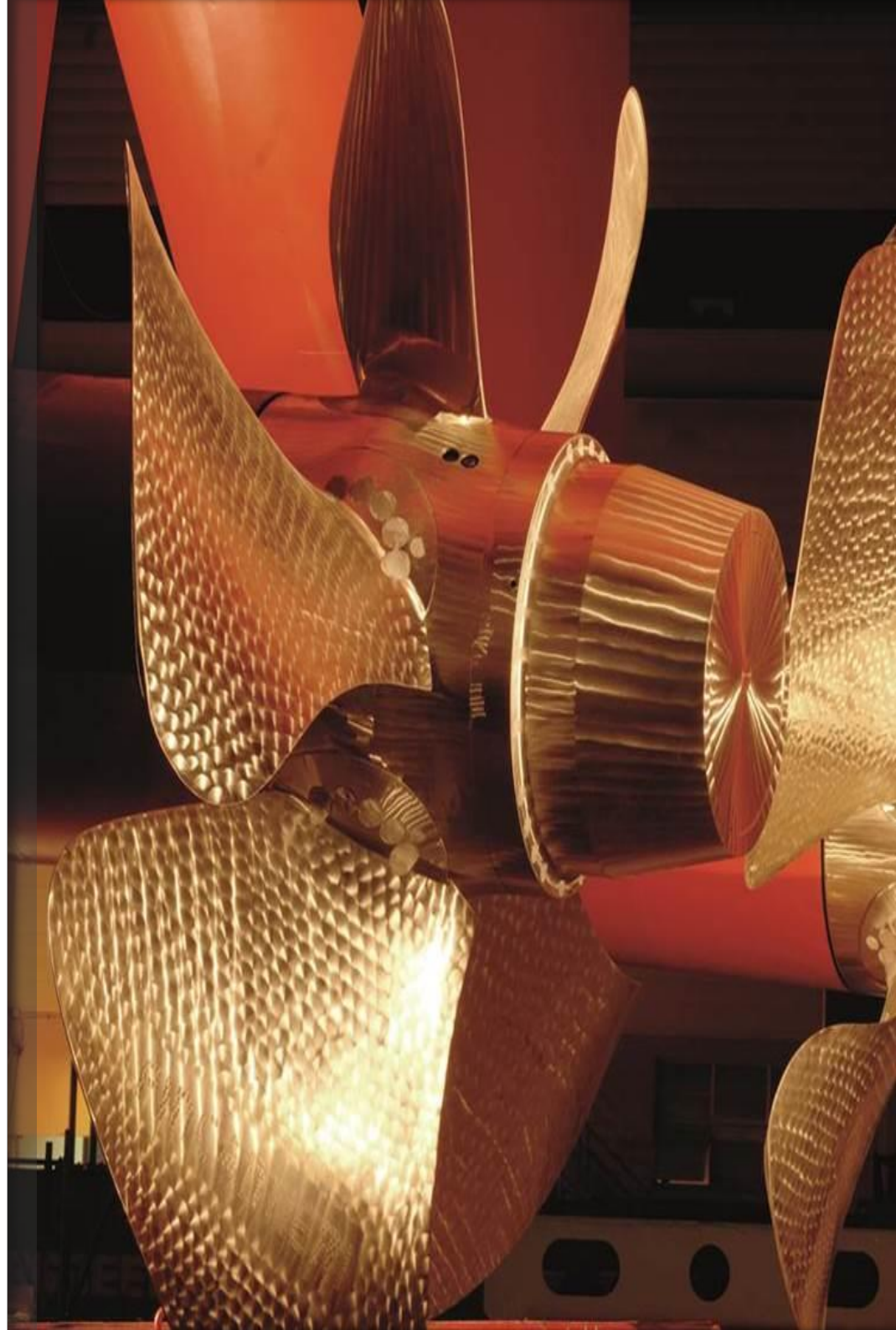
we run R&D projects to develop new solutions that are expected to enhance our competitiveness in gaining new contracts

we sketch solutions aimed at competing in the 30s, in our markets or in new ones, through R&D projects

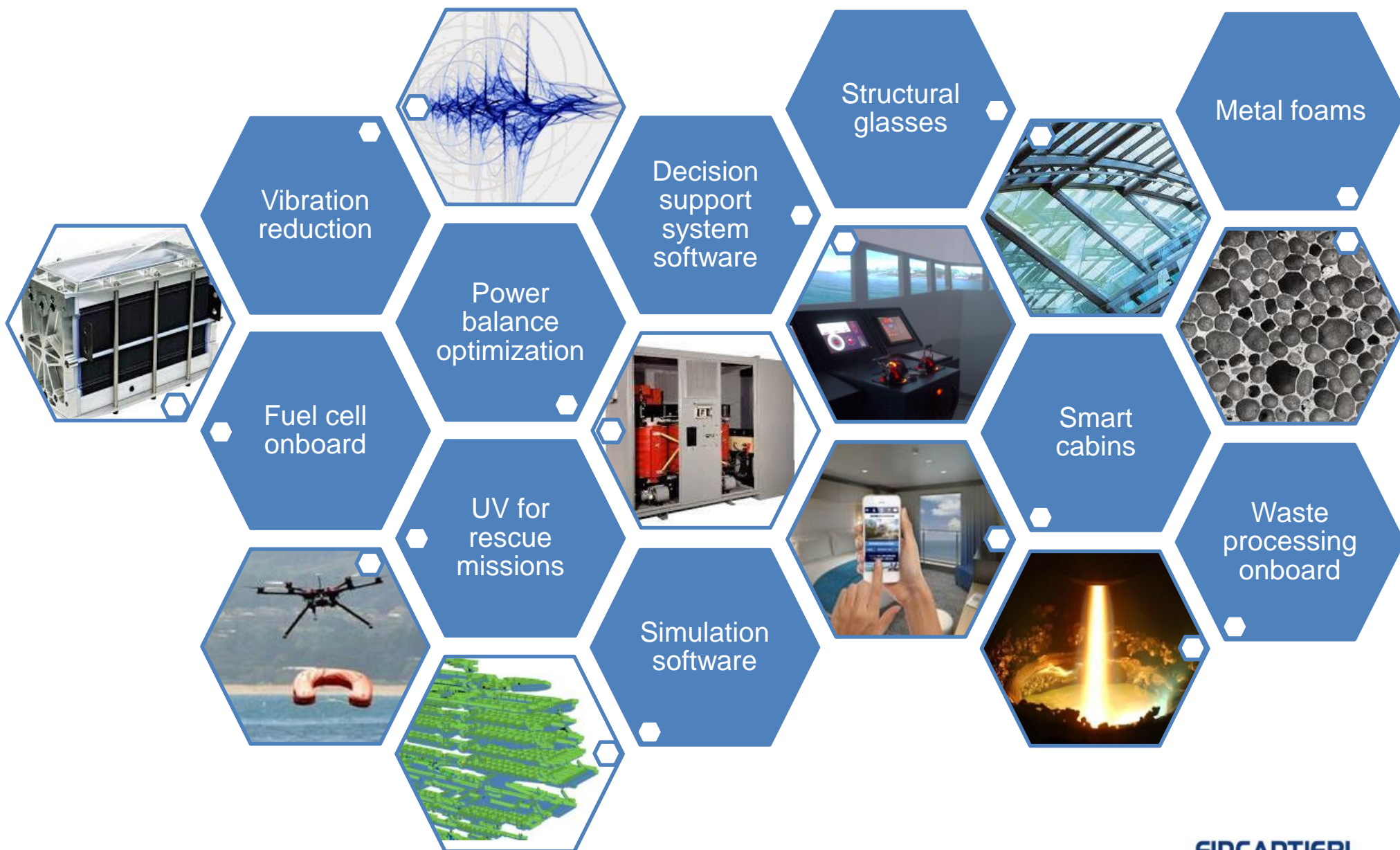


Section 4

A flavor of what is going on
behind the scenes

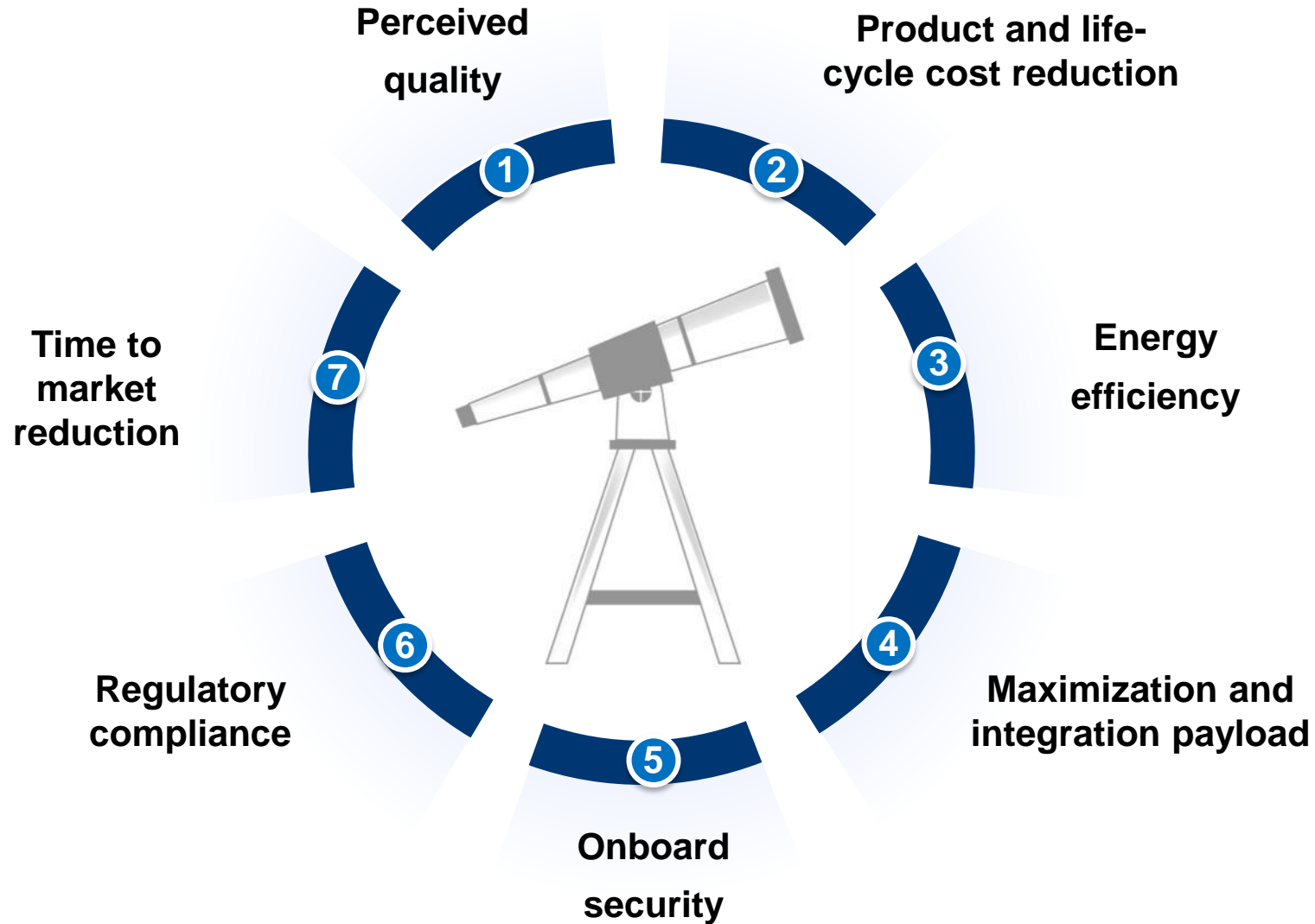


Our R&I initiatives are tackling very different problems...



... clustered around 7 main drivers...

WE STRUCTURE OUR R&I ACTIVITIES USING 7 MAIN DRIVERS



... with the goal of continuously improving our products

Costa Serena (2007)

Tonnage: 115 kt
Cabins: 1500



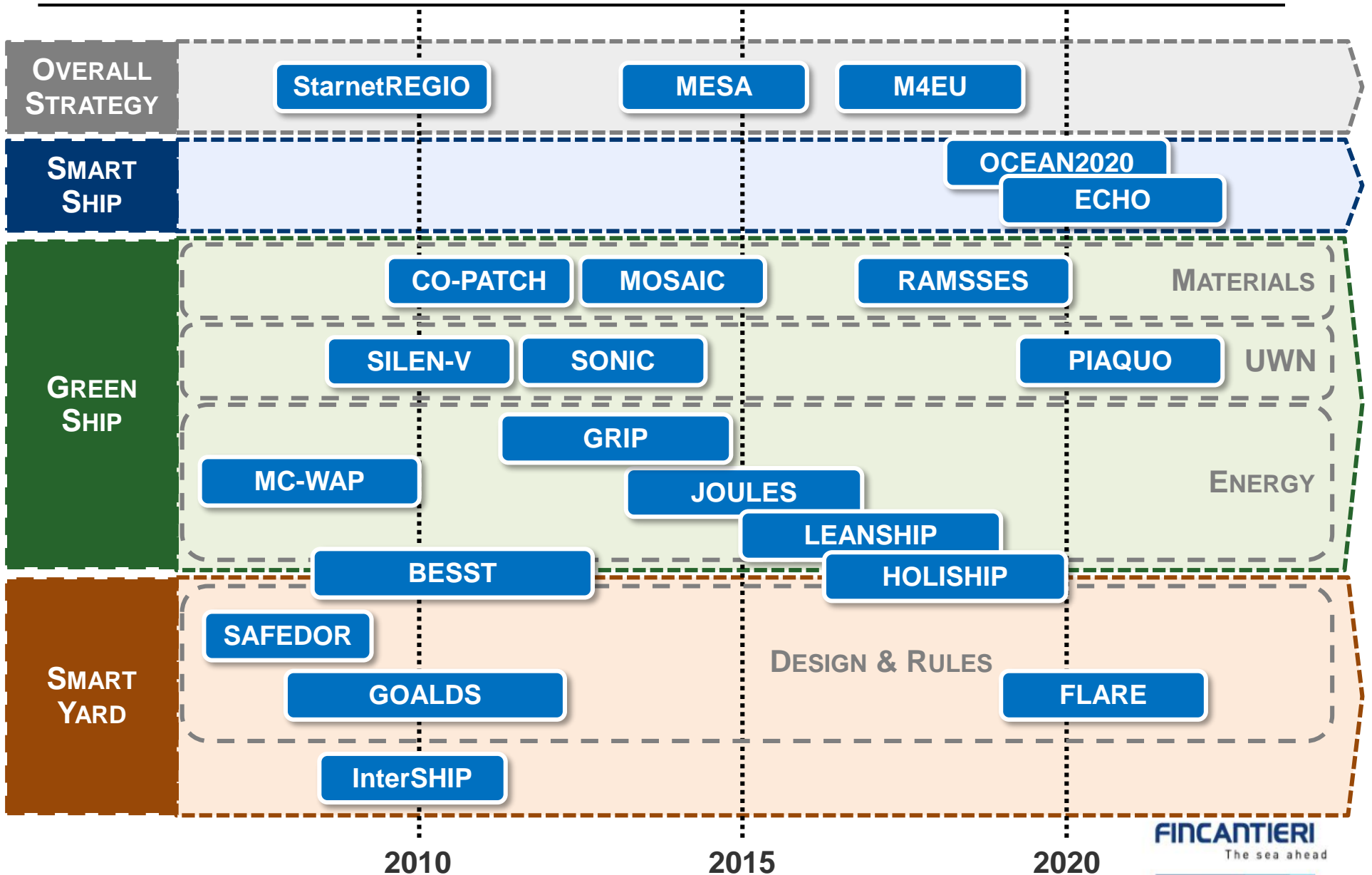
Tonnage: 153 kt
Cabins: 2067

MSC Seaside (2017)



Fincantieri contributed to several EU funded projects

HIGH LEVEL VIEW OF FINCANTIERI CONTRIBUTION TO PAST AND CURRENT PROJECTS



Large-glazed areas

Driver	Perceived quality
Goal	Realize larger glazed areas, in line with latest architects design.
Description	<ul style="list-style-type: none">• Study new structural reticular morphologies suitable for restoring the structural continuity in proximity of large glazed areas.• Evaluate the glass stiffness contribution in the steel structure.
Gains	<ul style="list-style-type: none">• The estimation of the glass contribution to the ship structural strength could result in a weight reduction.
Timing	Ongoing project – Scheduled end: December 2019
Partners	



Aluminum foam prefabricated balconies

Driver

Product and life-cycle cost reduction

Goal

Investigate the use of innovative materials for producing balcony panels.

Description

- Investigate the possibility of realizing aluminum foam floor for pre-fabricated balconies in substitution of aluminum extruded.
- Analyze the use of innovative technologies, such as friction stir welding, for realizing planar and curvilinear surfaces as, for example, balcony floorings and walls of complex geometry.

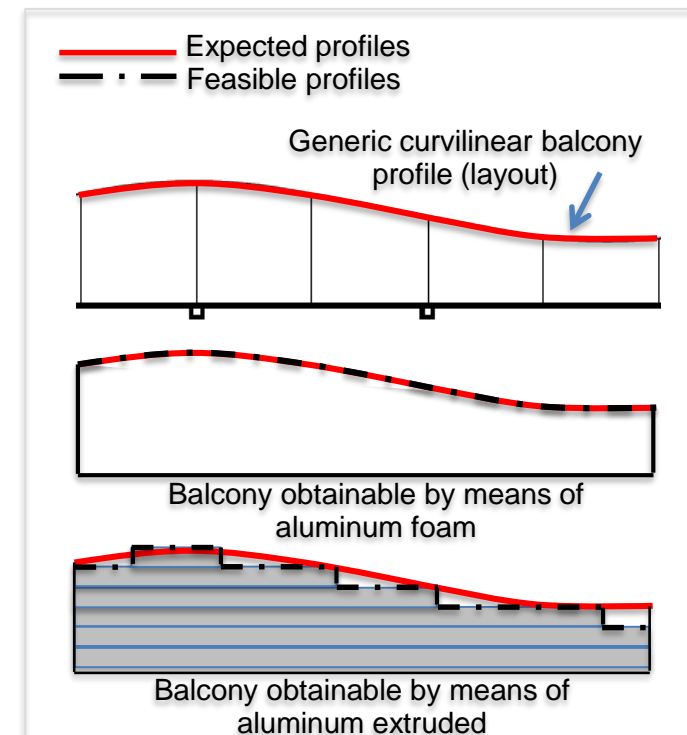
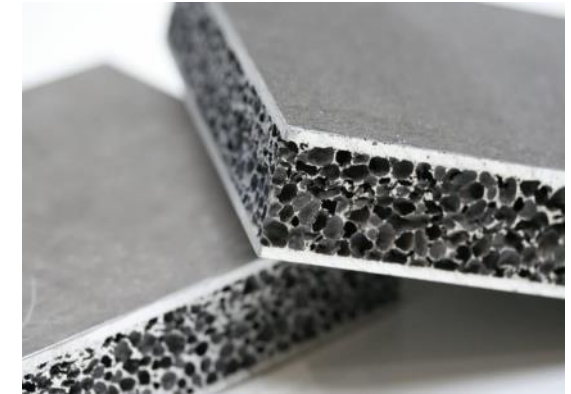
Gains

- Balconies lighter than the traditional ones and characterized by any curvilinear profile, with consequent improvement of the ship design.
- Easy maintenance and re-fitting.

Timing

Project completed – pending industrialization

Partners



CFD simulations for estimating aerodynamics and hydrodynamics coefficients

Driver

Energy efficiency

Goal

Carry out Computational Fluid Dynamics (CFD) simulations to improve the ship design and increase the energy efficiency.

Description

Perform CFD simulations additionally or alternatively to experimental measurements:

- for predicting the ship propulsive performance, such as the self-propulsion point;
- for numerically evaluating the ship aerodynamics coefficients and wind loads;
- to assess the added resistance and maneuvering in waves.

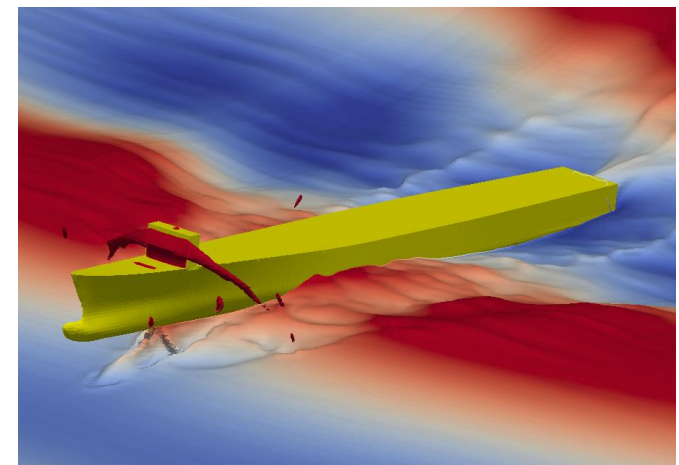
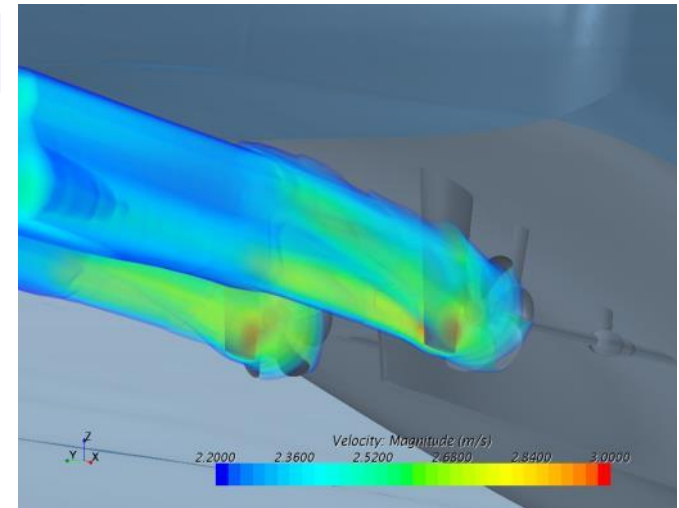
Gains

- Cost-saving and time-effective with respect to model tests.
- Ability to provide the customers with more complex products and alternative solutions if critical issues occur.
- Increase the overall energy efficiency by reducing the specific fuel consumption.


Timing

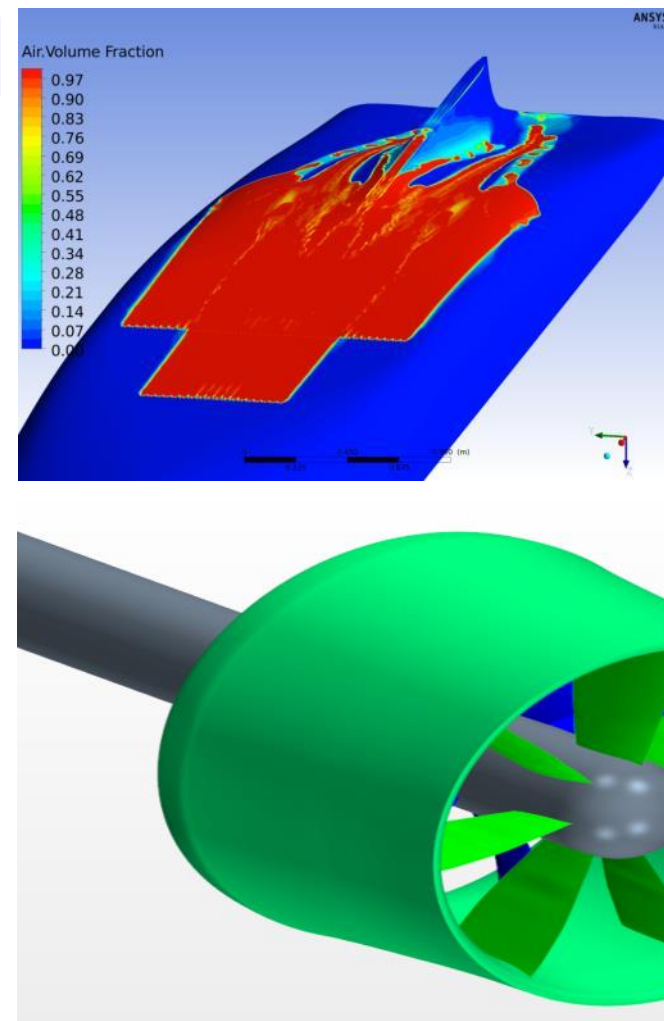
Ongoing project – Scheduled end: December 2019

Partners



CFD simulations for evaluating innovative propulsive solutions

Driver	Energy efficiency
Goal	Investigate the applicability of innovative techniques and solutions for reducing the fuel consumption of cruise ships.
Description	<ul style="list-style-type: none">• Numerically and experimentally investigate the applicability of Air Lubricating techniques to cruise ships, estimating the reduction in fuel consumption achievable by blowing air around the hull (with also analyzing the application of ultra-hydrophobic paint) and designing an onboard blowing plant.• Design and analyze a novel pump-jet system with improved propulsive performances with respect to traditional propellers, with also assessing its features in terms of produced noise and vibrations.
Gains	<ul style="list-style-type: none">• Thanks to the increase in efficiency, the reduction in fuel consumption will reduce air pollution.
Timing	Project completed – Available results
Partners	



CFD for evaluating the smoke extraction plant features

Driver

Regulatory compliance

Goal

Develop a numerical methodology to simulate the Smoke Extraction plant, that can be used during the design phase.

Description

- CFD models of flows inside several public spaces crossing at least two decks, such as atriums and theaters.
- Experimental measurements to correlate the smoke concentration with the view inside public spaces crossing at least two decks.
- Development of design guidelines for optimized Smoke Extraction plants.

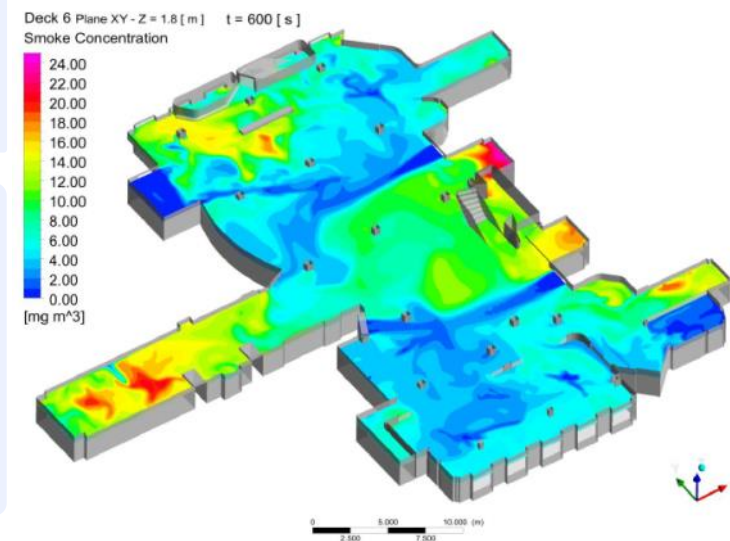
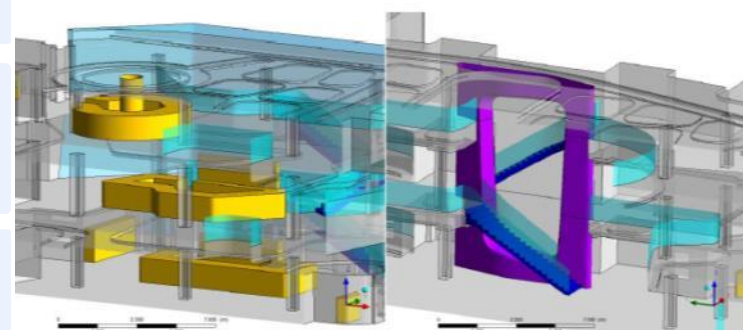
Gains

- Development of design guidelines for performing smoke extraction systems.
- Possibility to compare several design solutions in order to assess the most performing one.
- Reduced risk of no-passing of the Smoke Extraction Test thanks to a better knowledge of internal flows in atriums during the design phase.

Timing

Project completed

Partners



FINCANTIERI
The sea ahead

Fuel cells for cruise ships

Driver	Energy efficiency
Goal	Develop a laboratory to study fuel cells and evaluate prototypes to be installed onboard with the goal of building seafaring vessels and cruise ships powered by fuel cells.
Description	<ul style="list-style-type: none"> • Develop a laboratory for testing fuel cell prototypes and a small boat completely powered with fuel cells. • Develop a modular fuel cell power generation system for cruise ships able to supply up to 120 kW. A 30 kW one will be tested in an intermediate milestone • Design and develop prototypes of a dehydrogenation system, a LNG reformer and a methanol reformer will be realized and tested. • Investigate the use of High-Temperature Fuel Cells (HTFC) powered directly with LNG, in co-generative applications.
Gains	<ul style="list-style-type: none"> • Increase the design capability of Fincantieri and get ready to massively deploy fuel cells onboard, bridging the gap with the competitors and proposing more performing products to our customers.
Timing	Ongoing project –Scheduled end: May 2023

Partners



Microgrid architectures for onboard power distribution

Driver

Energy efficiency

Goal

Feasibility study for a cruise ship whose hotel area is fully powered by fuel cells, with one stack per main vertical zone.

Description

- Develop a preliminary layout for a ship that has a fuel stack per Main Vertical Zone and develop a new Energy Management System optimized for the new configuration.
- Design of a new electric network consisting of series of microgrids of approximately 1MW dedicated to each firezone. Each microgrid is powered by means of AC/DC conversion systems or through fuel-cell power system.

Gains

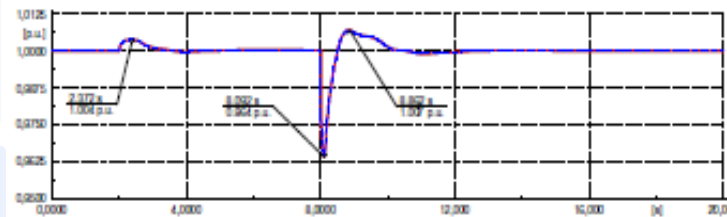
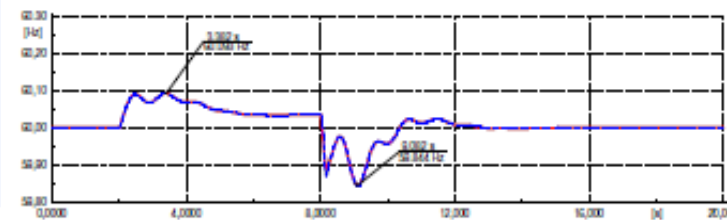
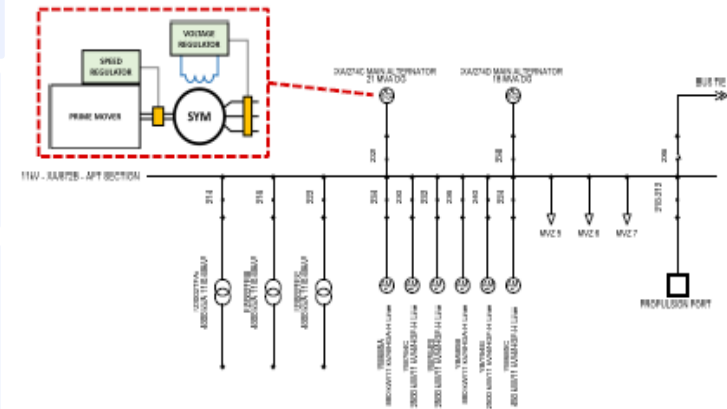
- Our solution will offer the opportunity to power an entire hotel area with fuel cell and increase the overall efficiency of the ship

Timing


Ongoing project

- **Preindustrial phase - completed.**
- **Industrial phase - pending.**

Partners

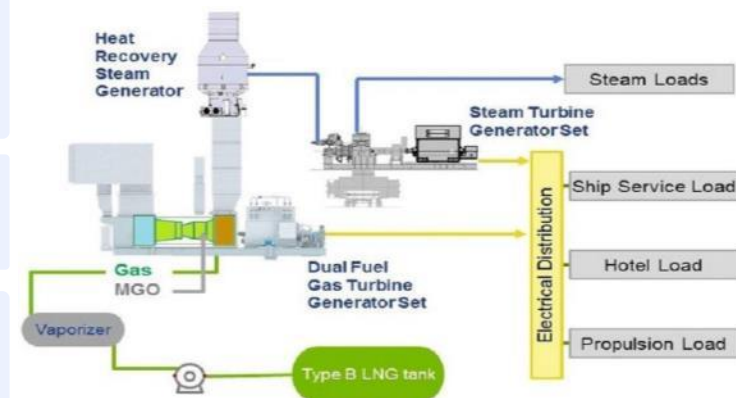
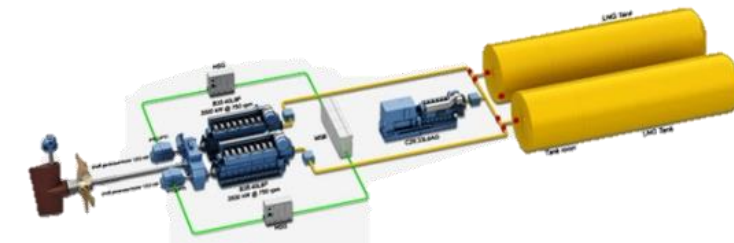


Onboard innovative solutions for using LNG

Driver	Energy efficiency
Goal	Define innovative power generation systems fueled with LNG for cruise ships applications.
Description	<ul style="list-style-type: none"> Identify and analyze a COGES combined system fueled with LNG which represents the best compromise in terms of energy efficiency, system dimensions and pollutant emissions compared to the traditional Diesel Internal Combustion Engines (ICE). Design and analyze, by means of a dedicated software tools, a cold recovery system integrated with the onboard machinery for increasing the energy efficiency.
Gains	<ul style="list-style-type: none"> The use of LNG fueled engines and of cold recovery systems will give us the possibility to build more efficient and eco-friendly ships.
Timing	Ongoing project - Scheduled end: October 2019
Partners	




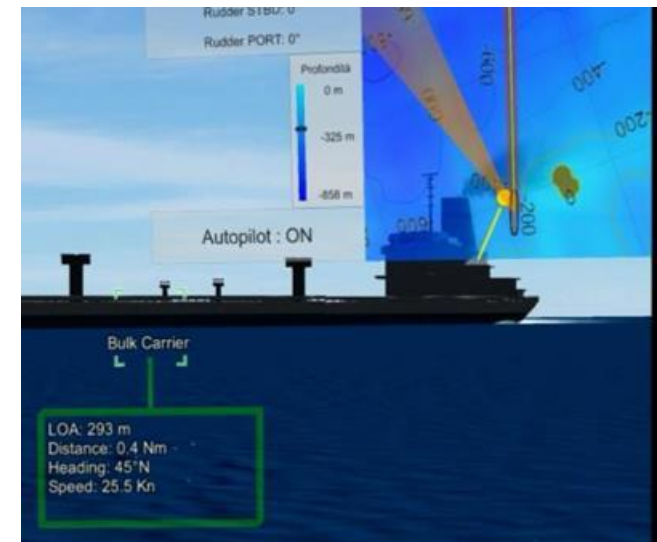
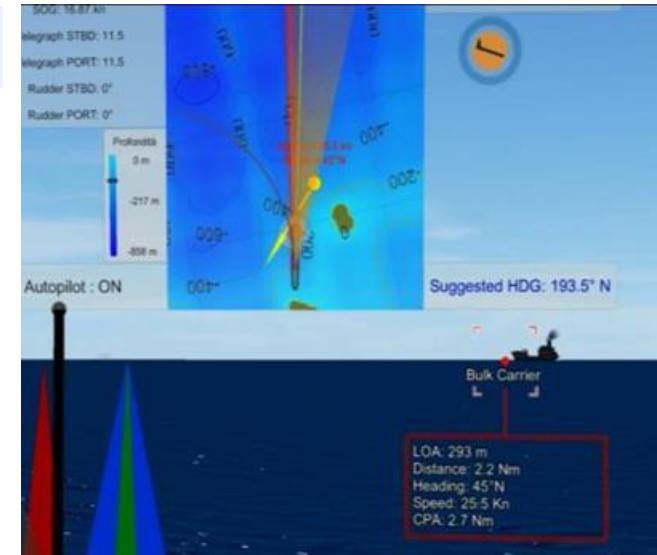
- F.-A.-GAUTHIER-



FINCANTIERI
The sea ahead

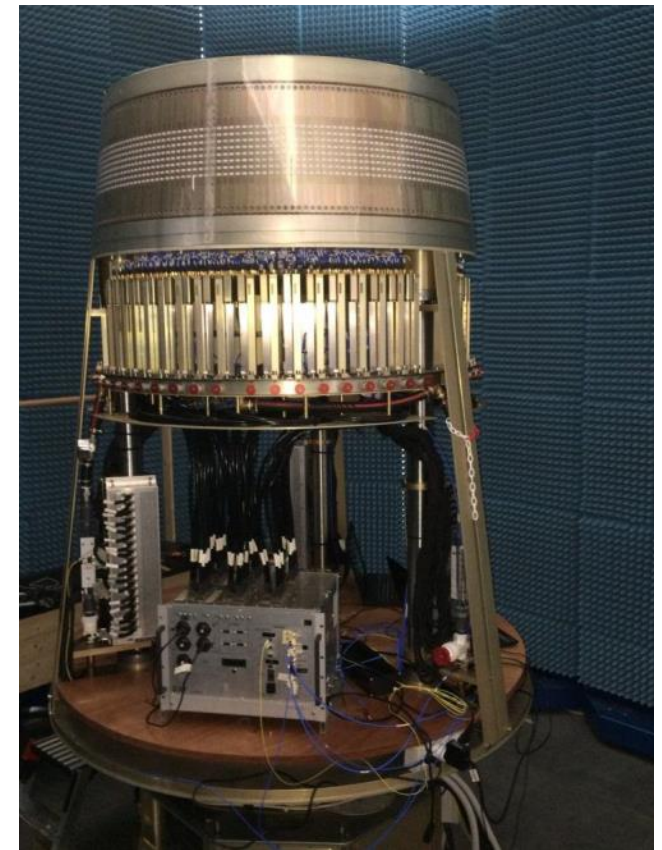
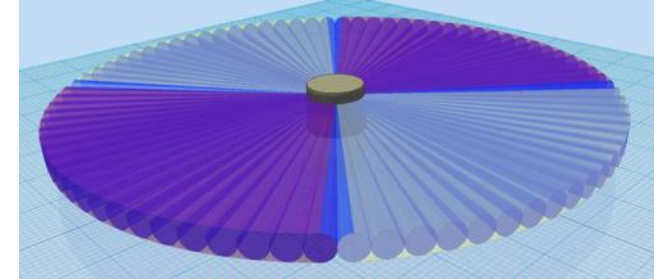
E-Navigation

Driver	Onboard security
Goal	Develop tools and systems to provide active assistance to deck officers.
Description	<ul style="list-style-type: none"> • Augmented and Virtual Reality systems to improve the situation awareness of the crew with the possibility of remote monitoring. • Improve the current management systems employed onboard to control route, position, speed, etc... • Develop new machine-to-machine systems to transfer data onshore and enable the remote monitoring.
Gains	<ul style="list-style-type: none"> • Develop the next generation tools to be used on the main deck to improve the situation awareness of the crew.
Timing	<p style="text-align: center;">Ongoing project</p> <ul style="list-style-type: none"> • Preindustrial phase - completed. • Industrial phase - pending.
Partners	




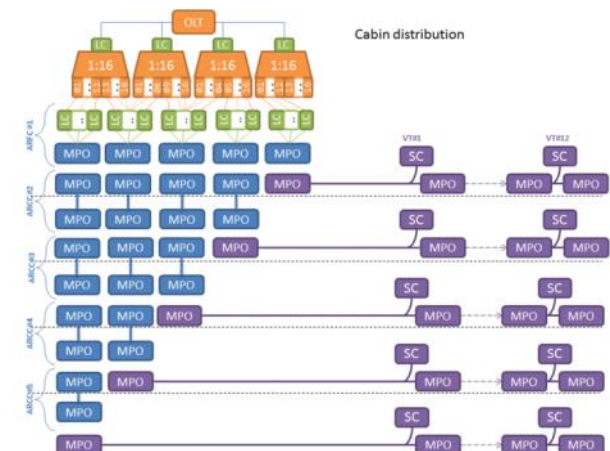
DRadar

Driver	Onboard security
Goal	Develop an innovative radar architecture to counteract low-altitude threats (sea skimmers, small boats, drones, periscopes)
Description	<ul style="list-style-type: none">• Develop a radar to allow very rapid target detection and track confirmation in heavily cluttered and highly jammed environment• Allows simultaneous azimuthal coverage over 360° with 30 km unambiguous range• Integrate countermeasures to remove jammer signals
Gains	<ul style="list-style-type: none">• Develop a new generation radar that allows detecting unconventional threats and react to them
Timing	Ongoing project
Partners	





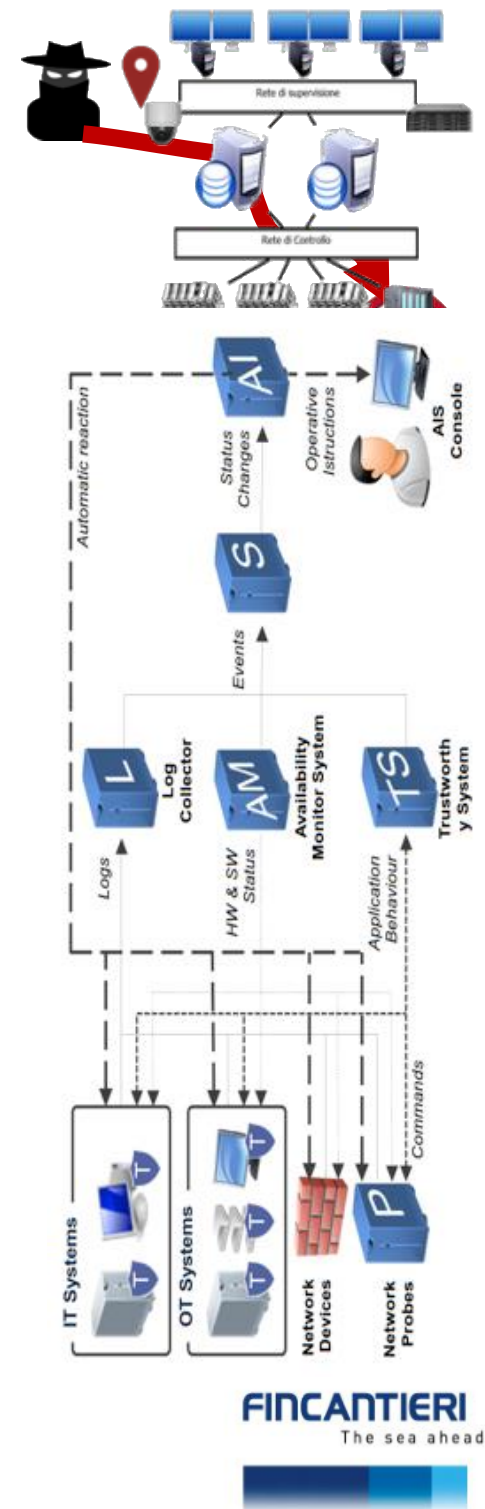
Fiber to the User

Driver	Perceived quality
Goal	Migrate the terrestrial service providers' Fiber To The Home (FTTH) solutions on a cruise vessel.
Description	<ul style="list-style-type: none">The project aims at changing the paradigm of distribution on board from (a big) "Campus" to (a small) "Metropolitan Area" using land based technology solutions that are well-known/used by telecom providers.Passive optical network will be used to provide infrastructure for several infotainment services (currently implemented through SDCN), with improved bandwidth performances. Pre-connectorized fiber cables, arranged in daisy-chain connection and implementing a logical star configuration, will be considered.
Gains	<ul style="list-style-type: none">Increase of delivered bandwidth.Significant cable reduction (with consequent reduction in space and weight) due to the logical star configuration.
Timing	Ongoing project - Scheduled end: January 2020
Partners	




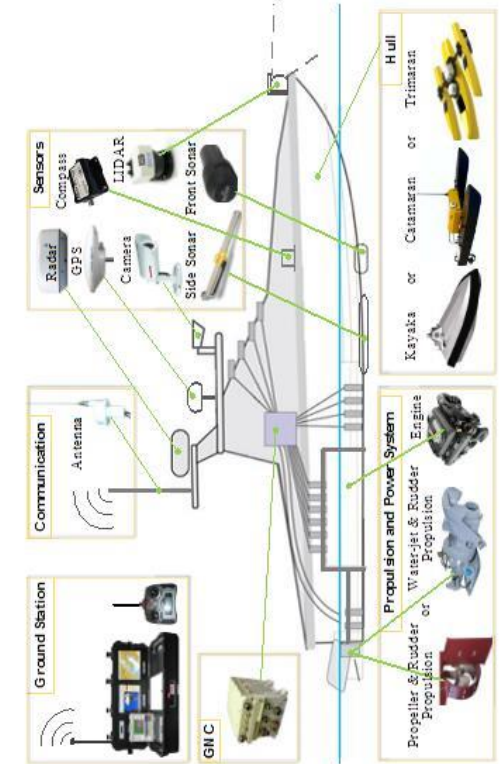
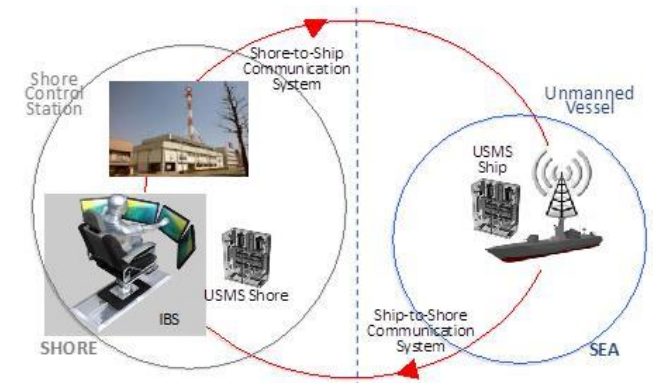
Improvement of the onboard cyber security

Driver	Regulatory compliance
Goal	Strengthen our internal cybersecurity competence center by developing a cyber-secure approach to the design of ship automation and passenger networks.
Description	<ul style="list-style-type: none"> Analyze the current design of ship networks (IT and OT networks) and assess their risk-level w.r.t. vulnerability from inside/outside cyber attacks Develop design guidelines and test procedures for the next generation ship networks. Develop test-bed for the cyber assessment of automation networks. Assess evolution-potential of the test-bed towards a cyber-range.
Gains	<ul style="list-style-type: none"> Cyber-security is becoming more and more important in maritime world, following the entry into force of the 2017 IMO circular regarding new cyber security requirements for ships.
Timing	Ongoing project - Scheduled end: 2022
Partners	 




Unmanned ship technologies

Driver	Operational cost reduction
Goal	Reduce the presence of human operators onboard.
Description	<ul style="list-style-type: none"> • Analysis of state-of-the-art sensors technology. • Development of a Situational Awareness System able to reproduce with high-fidelity the surrounding environment. • Development of a Navigation Guidance System able to automatically execute complex maneuvers in restricted/congested waters. • Assess the interoperability of an unmanned marine vessel working in cooperation with aerial and underwater drones. • Preliminary testing of the concept on an existing ad-hoc refitted vessel platform.
Gains	<ul style="list-style-type: none"> • Increase the automation level of onboard systems thus increasing operational efficiency. • Reduce the operational costs.
Timing	Ongoing project - Scheduled end: 2022
Partners	



Code Kilo

Driver	Life-cycle management
Goal	Collect and homogenize the data coming from the different ship sources and making them available to the End User on the cloud.
Description	<ul style="list-style-type: none"> • Definition of requirements • Identify the components of the data-sharing platform • Evaluate existing standards and technologies for data communication from various equipment • Development of missing standards and technologies to meet requirements • Assess and implement robustness and security of the data platform • Validation of the standards and technologies and set-up of a demonstration case • Evaluate IPR, licenses and industrialization issues
Gains	<ul style="list-style-type: none"> • Availability of operational ship data ashore to interested users.
Timing	Ongoing project - Scheduled end: March 2020
Partners	



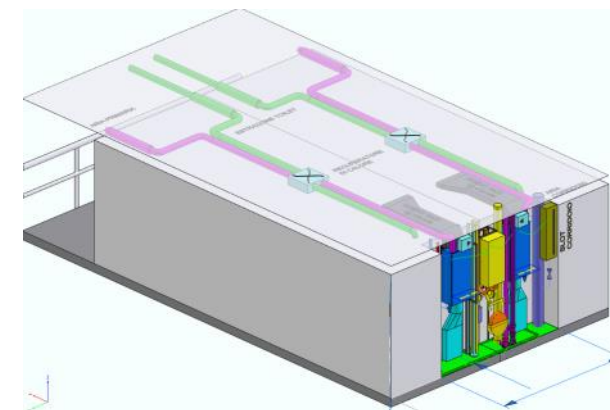
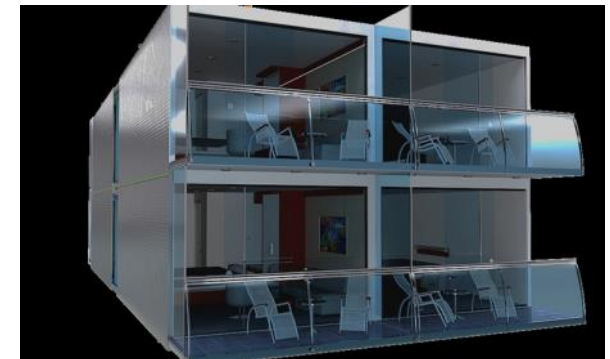
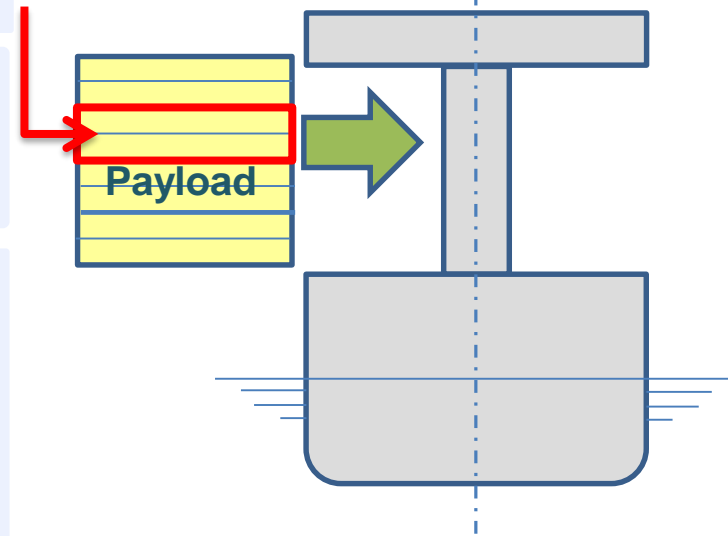
I WISH TO COMMUNICATE WITH YOU



Housing macro-modules and integrated structures for cruise ships



Driver	Time-to-market reduction
Goal	Feasibility study of a new ship concept with prefabricated housing macro-modules, potentially equipped with their plants and machinery.
Description	<ul style="list-style-type: none"> • Design cruise ships with higher cabins/TSL ratio (adding a deck for fixed volume) by means of a systematic reduction in the between-deck space, obtainable by making innovative modular housing solutions detached from the ship's resistant structure. • The innovative ship structure must allow the easy insertion of the prefabricated modules while maintaining the same structural resistance and vibration damping and guaranteeing same safety and comfort.
Gains	<ul style="list-style-type: none"> • Time-to-market reduction due to the use of prefabricated housing modules. • Increase in the payload because of the reduction in the between-deck space.
Timing	Project completed – pending industrialization



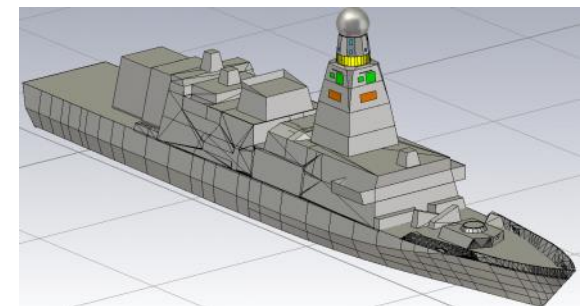
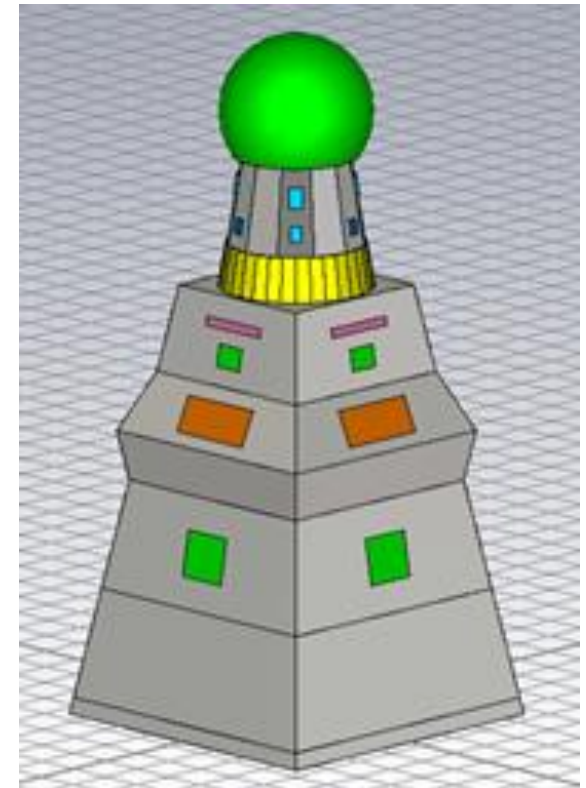
Partners





Integrated mast for the Military Naval System

Driver	Time-to-market reduction
Goal	Designing new-concept "integrated" mast and superstructures to provide modern installation and sensor solutions for new generation radio-radar antennas. Such tools will ensure uniform sensors coverage and Radar Cross Section reduction.
Description	<p>Development of two main technological demonstrators:</p> <ul style="list-style-type: none"> • Mechanical junction mast (GRP) – superstructure (Light Alloy) • Dihedral structure in composite material for RF antennas systems <p>Demonstration of the technological validity of solutions in the following areas:</p> <ul style="list-style-type: none"> • Mechanical and E.M. characteristics of materials • Mechanical characteristics of junction mast (GRP) – superstructure (Light Alloy) • Radar signature reduction and EMI (Electromagnetic Interference Control)
Gains	Improvement and optimization of the integration between the sensor suite and the ship platform
Timing	Project completed



Partners	
-----------------	--

Probabilistic load balance

Driver

Weight reduction

Goal

Optimizing the sizing and number of the onboard generating units and main electric equipment.

Description

- Analysis of existing database and onboard measurements.
- Development of a new methodology for the evaluation of the onboard electric loads, by using a probabilistic approach.

Gains

- Optimization of the number of generating machines.
- Optimization of the sizing of the generating machines and conversion equipment in different operating scenarios.
- Optimization of fuel consumption and reduction of pollutant emissions.

Timing

Project completed

Partners



Integration of Unmanned Aerial Vehicles (UAV)

Driver

Maximization and integration of payload

Goal

Physically and functionally integrating the Unmanned Vehicle Systems on the naval units, in terms of UVS operation and of data transmission from the UVS to ships and to the control centers.

Description

- Integration of UAV and to data transmission to ships and to the national and European control centers.

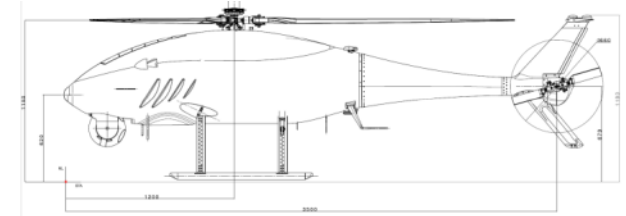
Gains

- Know-how improvement regarding physical and functional integration of UVS on military ships. This know-how is highly exploitable on other constructions or future projects. A topic of great interest for first level Marine Navies.
- Cooperation improvement among European companies and data exchange information on confidential topics.


Timing

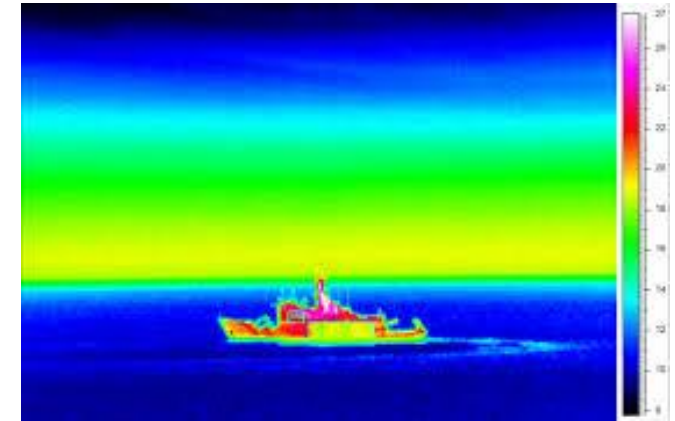
Ongoing project – Scheduled end: April 2020

Partners



Software suite for combat systems assessment

Driver	Time-to-market reduction
Goal	Developing a new simulation tool for the ship self-defense capability, in order to support the customer and the technical department during the preliminary ship design phase and the final acceptance phase.
Description	<ul style="list-style-type: none">• Development of a tool for scenario simulations to evaluate the performance of sensors and combat systems, in different naval tasks.• The tool evaluates the capabilities of ship sensors (Radar, ESM, JAMMER), and the performance of AAW Decoy (EM and IR) and GUN system, against anti-ship missile threat, considering the ship radar and IR signature, previously evaluated.
Gains	<p>Improving the support for preliminary design choices, considering different aspect :</p> <ul style="list-style-type: none">• Ship Radar Signature (RCS) and IR signature that can be evaluated, controlled and minimized.• Performance and effectiveness of ship combat system which can be analyzed in different operative scenarios.
Timing	Project completed
Partners	



Smart Track System for Inbound logistics

Driver

Product and life-cycle cost reduction

Goal

Cost reduction through introduction of RFID technology to track outfitting materials inside the shipyard and to improve materials management inside the shipyard.

Description

- Analysis of outfitting materials workflow and relevant tracking requirements.
- Analysis of the tags types and of the recognition system on the basis of the different kinds of outfitting materials.
- Preliminary definition of the tracking system architecture and identification of interfaces with the ERP system.

Gains

- Preliminary study on the project feasibility in terms of:
- assessment of situation “AS-IS” of material management in the shipyard.
 - identification of the best technologies to apply and definition of relevant basic notions on IT architecture.
 - assessment of benefits.


Timing

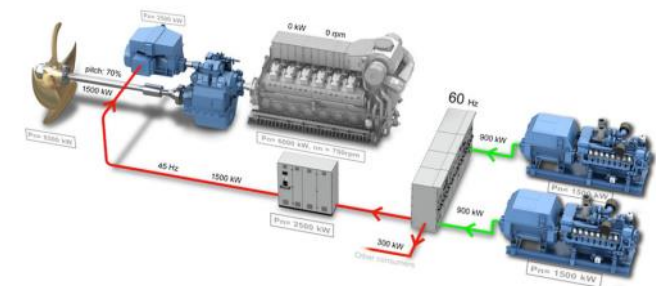
Preliminary assessment completed

Partners



Innovative electrical architectures for naval vessels

Driver	Maximization and integration of payload
Goal	Evaluating alternative solution for the on board power generation and distribution consistent with future special loads (weapons and sensors).
Description	<ul style="list-style-type: none"> • Analysis of the development of the mission requirements, which include innovative weapons and sensors in the naval field. • Analysis of the potential equipment available on the market and under development. • Identification of new components and possible technological gaps.
Gains	<ul style="list-style-type: none"> • Optimization of electric system design in terms of weight and dimensions considering the adoption of new components/technologies. • Knowledge of the impacts of the new user on the electric system. • Knowledge of alternative technologies available on the market for future onboard integration.
Timing	Project completed
Partners	



FINCANTIERI
The sea ahead



Lithium Battery for Submarines

Driver

Product and life-cycle cost reduction

Goal

Development of lithium ion propulsion battery for submarine with enhanced performances compared to lead acid battery.

Description

- Definition of the chemical composition of lithium cell.
- Design and construction of the Battery Management System.
- Design and construction of some string prototypes composed by cells, BMS and auxiliary systems.

Gains

Realization of a prototype of string of lithium battery (TRL 4)

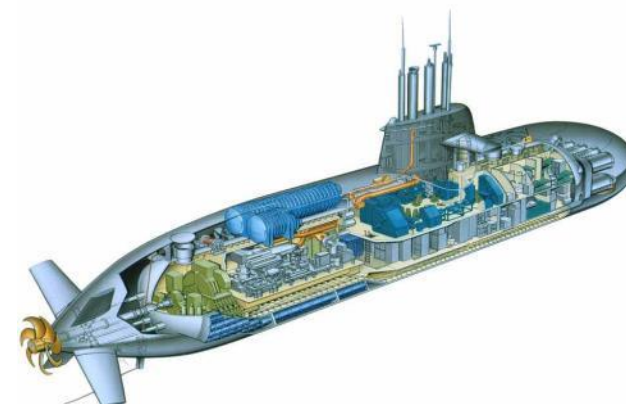
Timing

Project completed

Partners



SAPIENZA
UNIVERSITÀ DI ROMA



FINCANTIERI
The sea ahead

Emergency Blowing Device

Driver

Product and life-cycle cost reduction

Goal

Development of an emergency blowing system for submarines based on hybrid-type gas generators

Description

- Develop a Sub-scale gas generator prototype and performance validation
- Design Review by dynamic submarine model
- Develop a Full-scale gas generator prototype and performance validation
- Marinization and militarization of the prototype
- Real environmental test of full-scale prototype
- Develop of the complete blowing system and integration on board

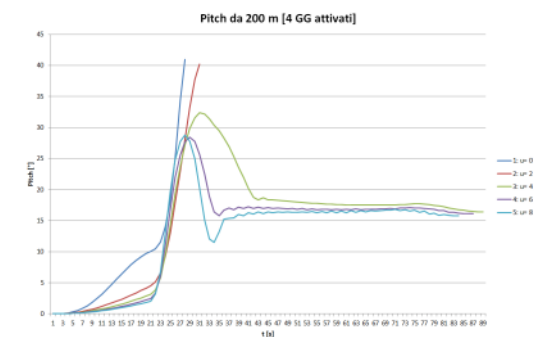
Gains

- Cost Reduction
- Hybrid system has no explosive systems on board
- Controlled emergence management

Timing

Ongoing project –Scheduled end: May 2021

Partners



EXperimental analysis of Exhaust

Driver

Product and life-cycle cost reduction

Goal

Validating the current procedure (performed by CETENA) for calculating the exhaust gases temperature close to the Combat System sensitive apparatus.

Description

- Presently a design methodology based on CFD calculations is used to assess the temperature, due to the exhaust gases plume, of the areas close to the combat system components located in the ship topside.
- A campaign of measurements on a ship of the actual temperatures, considering the boundary conditions, will permit to verify and increase the method accuracy.

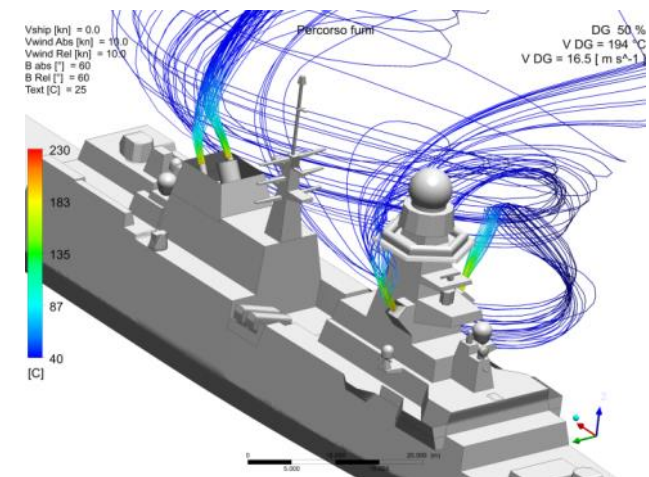
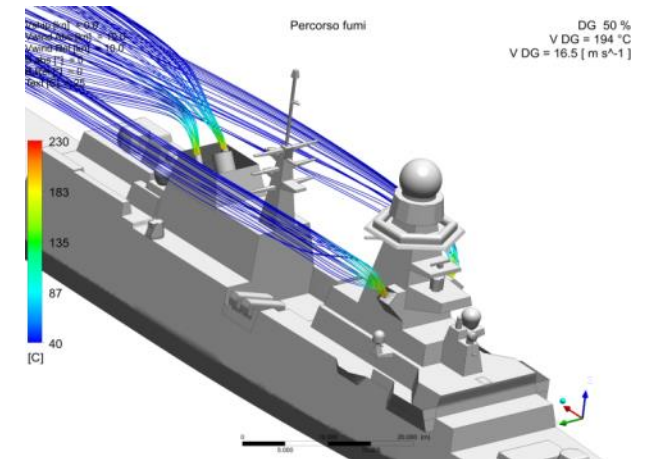
Gains

- Increased accuracy of the method currently used will enable to reduce the constraints to the combat systems components layout deriving from the exhaust gas plume.
- Reduced constraints will permit to define the combat system layout with less expensive solutions.

Timing




Project completed

Partners



FINCANTIERI
The sea ahead

Virtual reality for design review

Driver	Time-to-market reduction
Goal	Develop a single user and a multi user virtual reality design review application, with functionalities that allow for an easy reviewer/model interaction
Description	<ul style="list-style-type: none">• Develop new Virtual Reality tools for increasing the efficiency of the design review• Develop algorithms to translate 3D CAD models in light models that can be navigated smoothly• Develop an architecture that allows, local and geographical, single and multi user, access to the model• Test the user friendliness of the system to avoid «virtual sickness»
Gains	<ul style="list-style-type: none">• More efficient and more accurate design review process• Increase the efficiency and the effectiveness of design reviews
Timing	Project completed - Available product
Partners	 Arsenal  UNIVERSITÀ DEGLI STUDI DI TRIESTE  mare Technology Cluster FVG



FINCANTIERI
The sea ahead

Compressed natural gas (CNG) vessel

Driver

Product and life-cycle cost reduction

Goal

Develop a vessel for transporting compressed natural gas

Description

- Develop the design of a vessel specialized for the transport of compressed natural gas
- Assessment of gas containment technology
- Development of gas containment system with compression unit
- Construction of container prototype and monitoring system
- Laboratory tests of container prototype and monitoring system

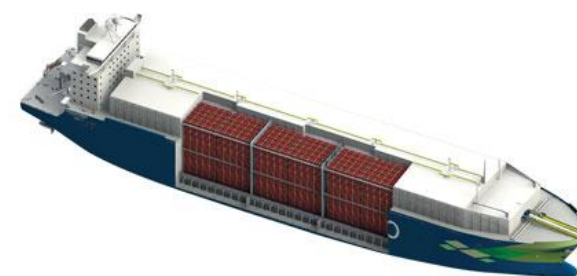
Gains

- New products – CNG vessel, gas containment system, innovative monitoring system
- New know-how in gas technology and supply chain

Timing

Ongoing project – Scheduled end: December 2019

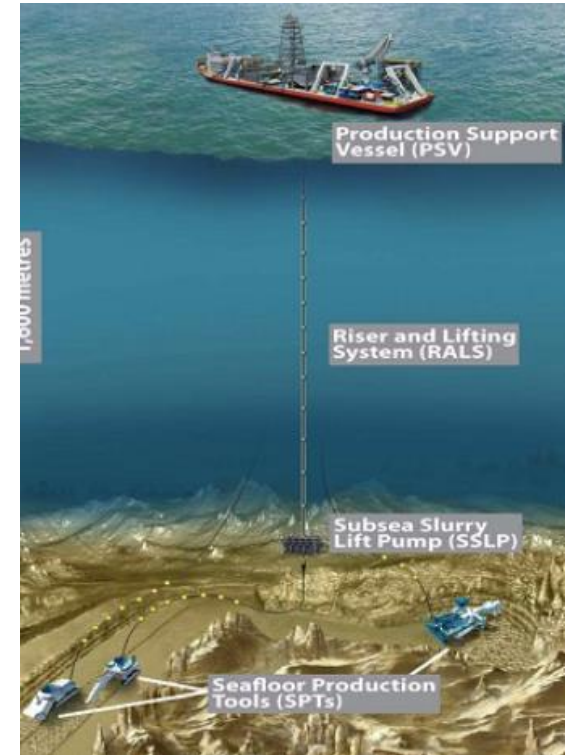
Partners



FINCANTIERI
The sea ahead

Deep sea mining

Driver	Perceived quality
Goal	Evaluation of the business potential and strategic options for market entry
Description	<ul style="list-style-type: none">• Assessment of market potential, requirements, drivers and industrial players• Review and analysis of current technology for deep sea mining• Value chain analysis and comparison with Oil & Gas• Assessment of Oil & Gas technology and vessels that could be applied in deep sea mining
Gains	<ul style="list-style-type: none">• Guidelines for the development of deep sea mining technology based on existing in-house know-how (vessels, drilling technology)• Guidelines for potential market entry
Timing	Ongoing project – Scheduled end: December 2020
Partners	



Source: Nautilus Minerals



Source: Nautilus Minerals



Modular production platforms

Driver

Product and life-cycle cost reduction; Perceived quality

Goal

Develop a concept of a modular floating platform for offshore operations, specifically for the early Oil & Gas production phase.

Description

- Feasibility study of the application of modular floating platforms in the early phase of Oil & Gas production
- Development of a new geometric configuration and equipment arrangement to reduce CAPEX with respect to current solutions using FPSO vessels
- Study of a gradual phased development of the floating infrastructure which numbers of process modules increase or change during the life exploitation of the field.
- Economic assessment of modular floating platform construction for early production

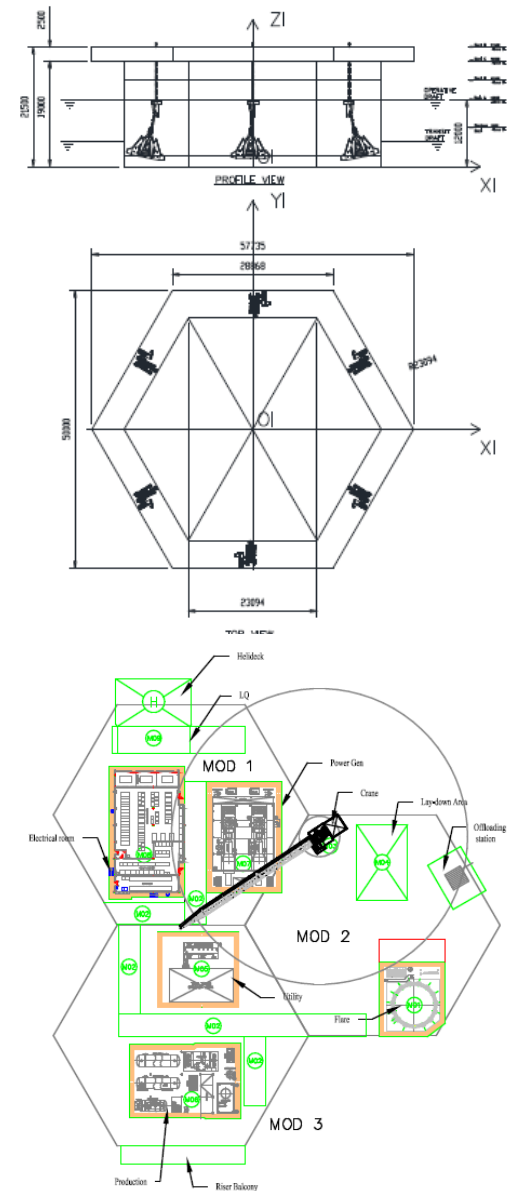
Gains

- More efficient early phase Oil & Gas operations (cost and time reduction)
- New configuration of early production systems with customizable platforms
- New know-how of drilling and production technology and floating platforms

Timing

Ongoing project – Scheduled end: December 2019

Partners



Stabilizers grease lubrication

Driver

Product and life-cycle cost reduction

Goal

Completely abandon the usage of lubrication oil for retractable stabilizers (removal of oil-water interface)

Description

- New design of mechanism lubrication system
- New design of actuation system internal components
- Design development based on new materials suitable for grease/dry lubrication
- Successful tests on a full scale model

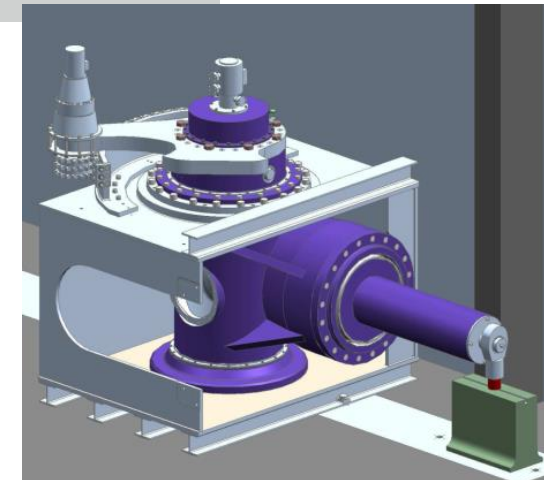
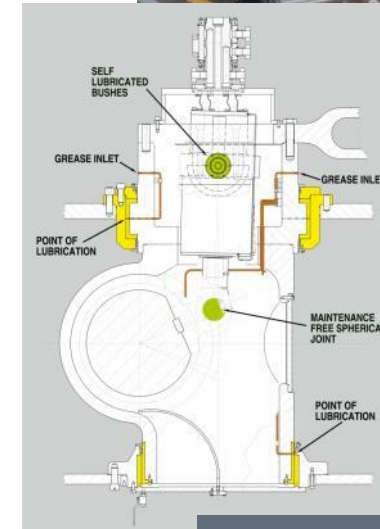
Gains

- Functional and detail design completed;
- Test campaign completed;

Timing

- **Project completed**
- **3 shipsets + 2 in option sold**
- **First sea test: springtime 2019**

Partners



FINCANTIERI
The sea ahead

New generation thrusters

Driver

Perceived quality

Goal

A new range of high efficiency thrusters
Noise and vibration effective
Thruster range up to 4 MW by 2019 (design completed)
Further development to be planned

Description

- Increasing distance between Blades and Vertical Pod Arm
- High efficiency new blade design
- Optimised Propeller Speed and Tip Speed
- Motor foundation redesign to reduce vibration transmission
- Hub and pod shape design for better hydrodynamic performances

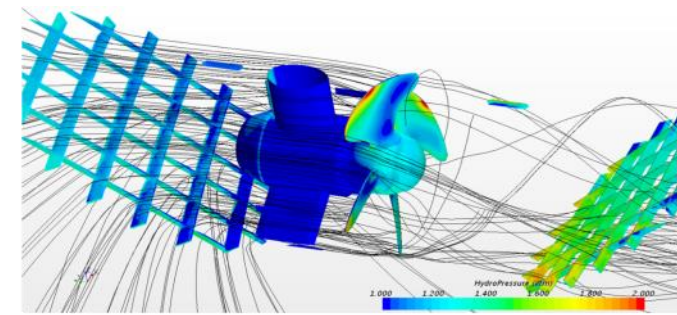
Gains

- Silent thruster, with minimized vibration
- High technology market share openings
- Product range extension

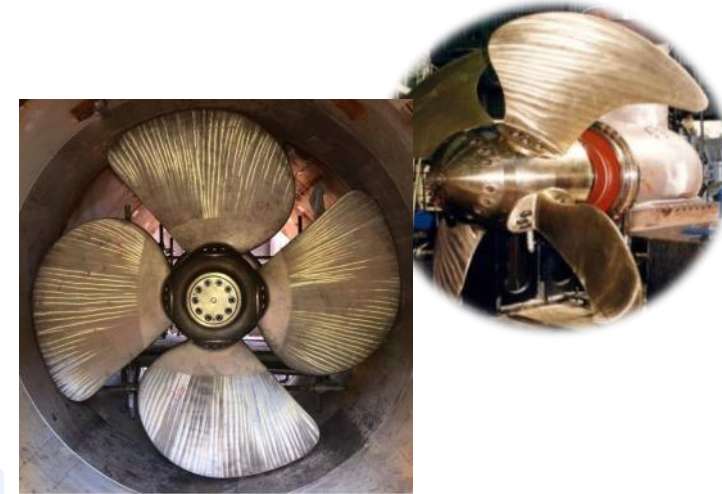
Timing

- **Size 28: delivered – first sea test January 2020**
- **Size 30, 34: on the market**

Partners



Less Flow Separation → Less Turbulence → Less Noise



FINCANTIERI
The sea ahead

Flumarturb: steam turbines blades profile

Driver

Product and life-cycle cost reduction

Goal

Development of aerodynamic profiles for highly loaded impulse steam turbine stages

Description

- Identify typical operating parameters for highly loaded steam turbine stages, especially targeted for onboard heat recovery applications
- Development of non-conventional aerodynamic nozzle and blade profiles suitable for the specific supersonic flow regime resulting from the high stage load
- Wind tunnel test and experimental validation of performance gain for the developed blade profiles

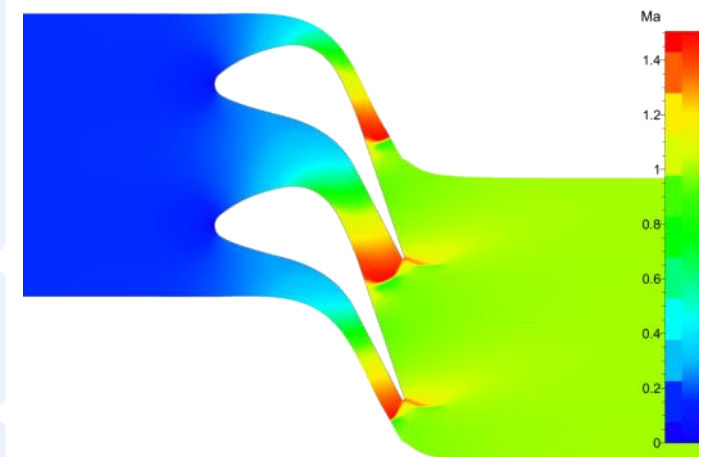
Gains

- Possibility to install lightweight and compact steam turbines, especially needed for onboard marine applications
- Cost reduction due to decreased number of stages

Timing

Project completed

Partners



FINCANTIERI
The sea ahead

New generation stabilizers: energy saving assessment

Driver

Energy efficiency

Goal

Provide a complete and reliable reference to precisely assess the influence of different fin opening configurations on total hull drag.

Description

Fincantieri Marine Systems together with Università Degli Studi Di Napoli carried out an extensive serie of model basin test on large scale model (suitable to reduce scale effects) and for a wide range of operative speeds comparing drag due to different configurations of fin stabilizers openings.

Gains

- A certified demonstration of the Stern to Bow stabilizer benefits, resulting in consistent energy savings in respect to the traditional bow to stern solution.
- Availability of reliable figures suitable to develop a software tool to provide accurate prediction of energy savings related to stern to bow opening.

Timing

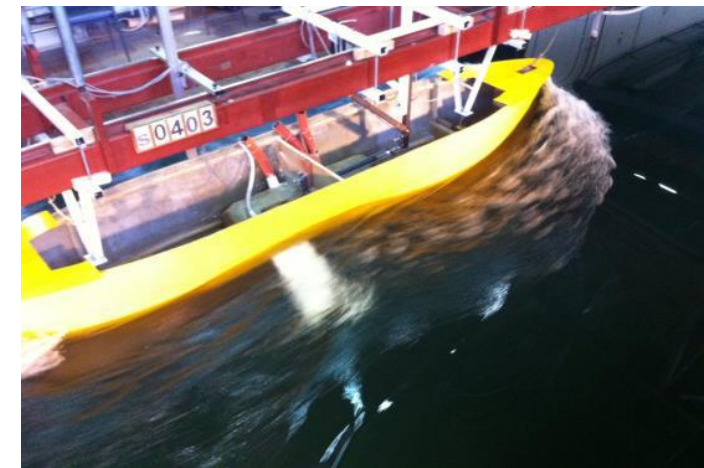
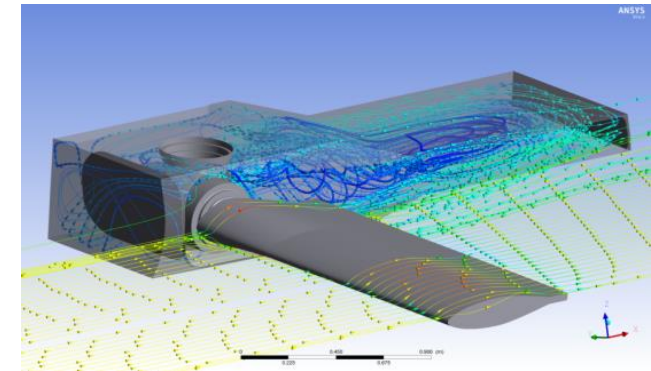
- **Assessment completed; results acknowledged by customers;**
- **Orders gained though validation of business plans feed by the energy savings figures given by the algorithm**

Partners



UNIVERSITÀ DEGLI STUDI DI NAPOLI

THE LARGE PART OF THE OPENING IS AT THE FOREMOST SIDE AND THE SMALL ONE IS AFT



FINCANTIERI
The sea ahead

Heat recovery steam turbine: THR

Driver

Energy efficiency

Goal

Development of high performance and cost efficient solutions suitable for heat recovery application onboard ships. Reduction of pollutant emissions.

Description

- Single shaft THR: simplified design with overhung shaft and casing mounted on the gear unit, designed to operate with saturated steam and deployed on a small footprint single skid. Design power range up to 3 MW.
- Twin shaft THR: multistage steam turbine with possibility of intermediate steam extraction. Extended power range up to 5 MW, with same design goals of compactness, robustness and simplicity.

Gains

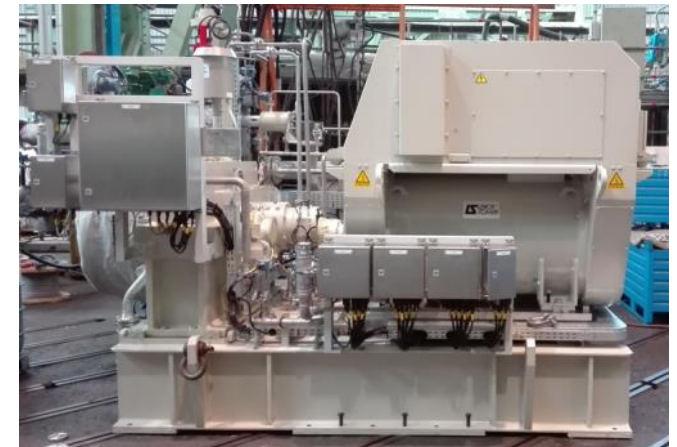
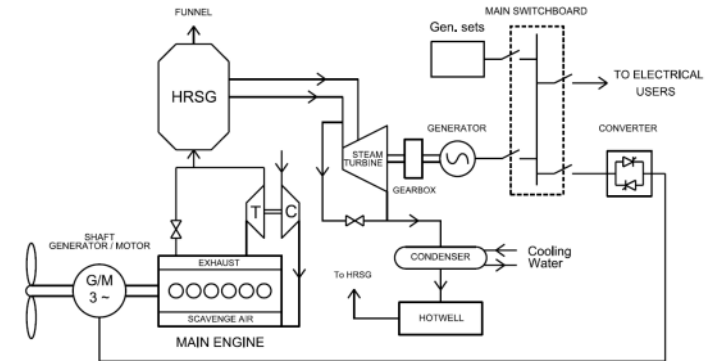
- Availability of lightweight and compact products required by marine applications
- Cost reduction due to simplified design choices
- High efficiency due to multistage layout

Timing

- Proven**
- **Three units installed and three in construction**

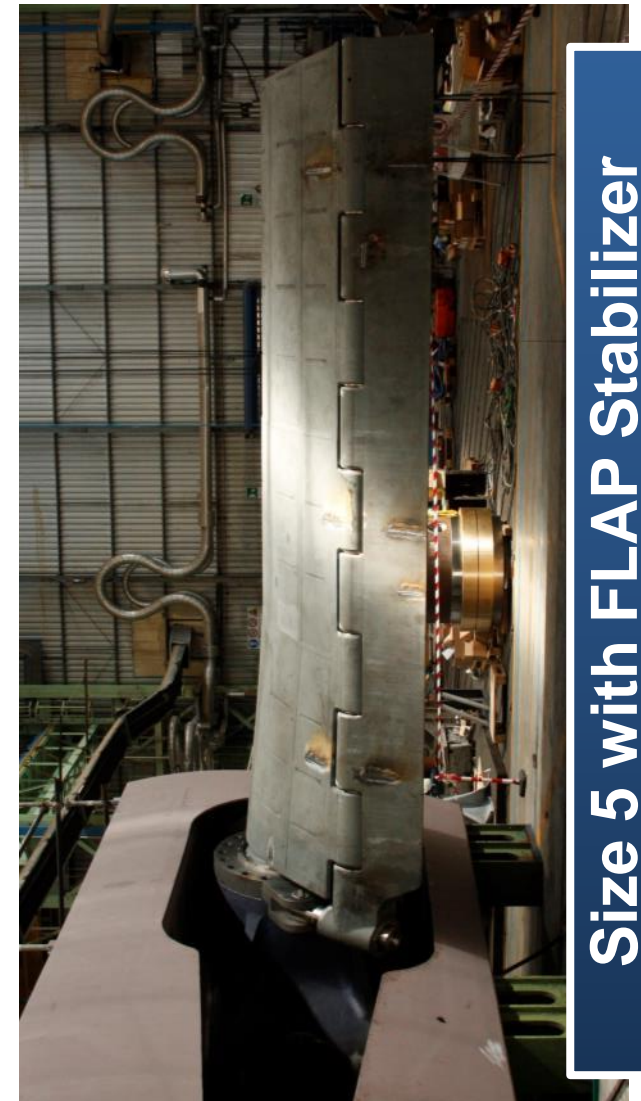
Partners

Fincantieri design and development



Size 5 stabilizer with flap (20m²)

Driver	Perceived quality
Goal	Increase stabilizers range
Description	A flapped version of the highest fin stabilizer size has been developed in order to improve stabilization capability when high performances are required for large dimensions ships.
Gains	<ul style="list-style-type: none">• Product range extension• Development of functional and detail design
Timing	<ul style="list-style-type: none">• On the market• 1 unit sold: first sea test Summer 2019
Partners	



Size 5 with FLAP Stabilizer



Therefore

- **Fincantieri stands out among its competitors thanks to its technical leadership**
- **We believe that innovation is paramount for preserving such leadership, and increasing the value that we deliver for our clients, and to our stakeholders**
- **Our proven strategy for fostering innovation builds upon the strong partnerships that we have created with our academic partners and the companies of our supply chain, fully embracing the open innovation paradigm**

