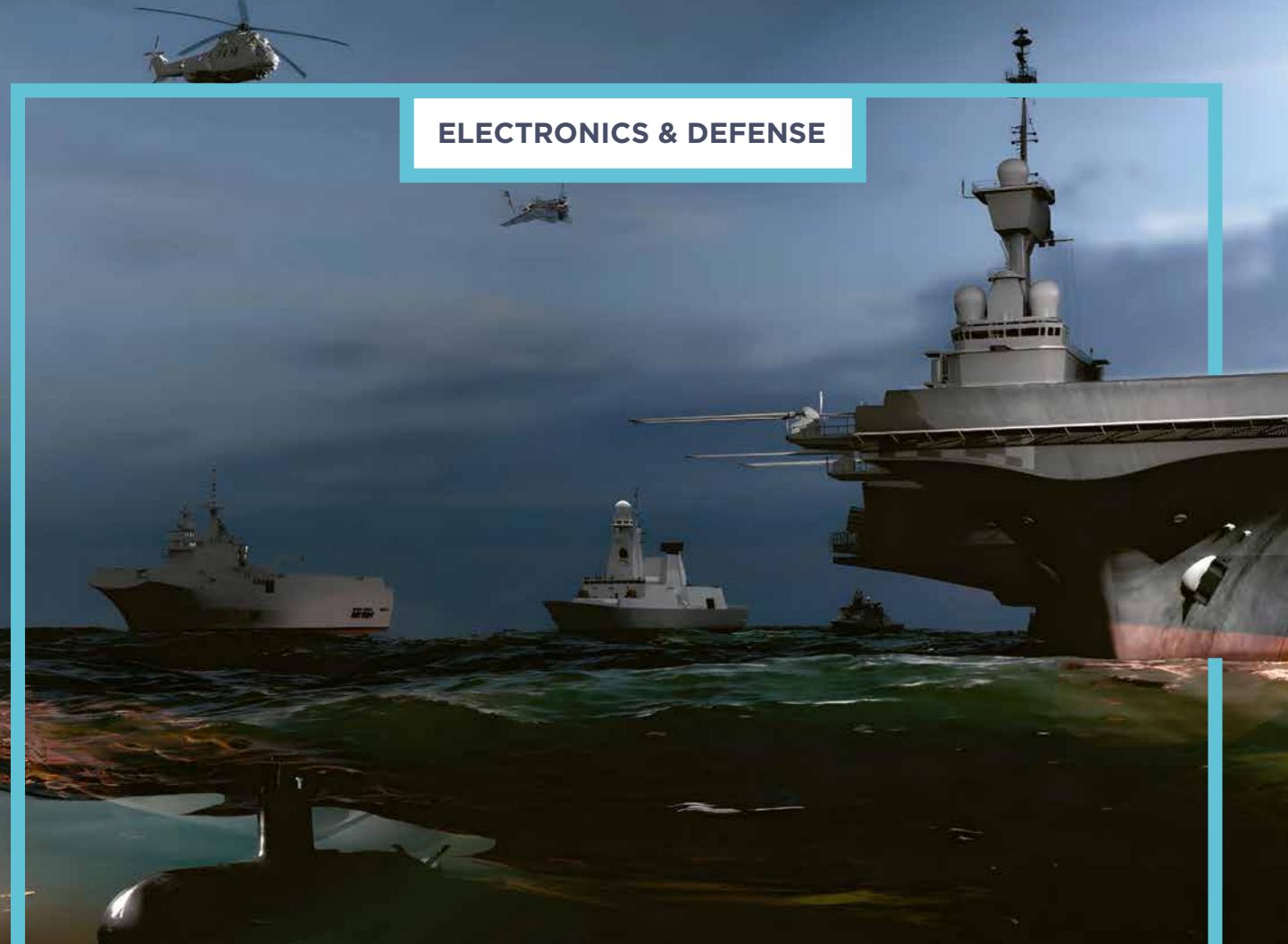


POWERED
BY TRUST

Safran Electronics & Defense
Etablissement de Malakoff
55 Boulevard Charles de Gaulle - 92245 Malakoff Cedex - France
Tél. : +33 (0)1 55 60 38 00 - Fax : +33 (0)1 55 60 01 95
www.safran-group.com

 **SAFRAN**

Safran Electronics & Defense may at any time and without notice, make changes or improvements to the products and services offered and/or cease producing or commercializing them.
Printed in France - Crédits photos © : Safran, Nexter, Thales, CMi/Cockpit 3000 Series, Stock, Fotolia - Design : Free-Lances / Agence - DR864 - 05/2022.



NAVAL NAVIGATION SYSTEMS

A game changer for naval superiority



 **SAFRAN**

YOUR REQUIREMENTS INDEPENDANCE & DISCRETION

ALL YOUR MISSIONS
require precise navigation
autonomy & endurance.

PRECISE NAVIGATION
IN AN ENVIRONMENT
WITHOUT LANDMARK

ACCURATE WEAPON &
SENSORS STABILIZATION

LONG ENDURANCE

ACCURATE & AUTONOMOUS
LOCALIZATION IN GNSS
DENIED ENVIRONMENT

NAVIGATION
SOLUTIONS INTEGRITY

75 YEARS OF EXPERIENCE
AS A MARKET LEADER

PERFORMANCE & RELIABILITY
AT YOUR SERVICE

TAILORED TO YOUR
REQUIREMENTS

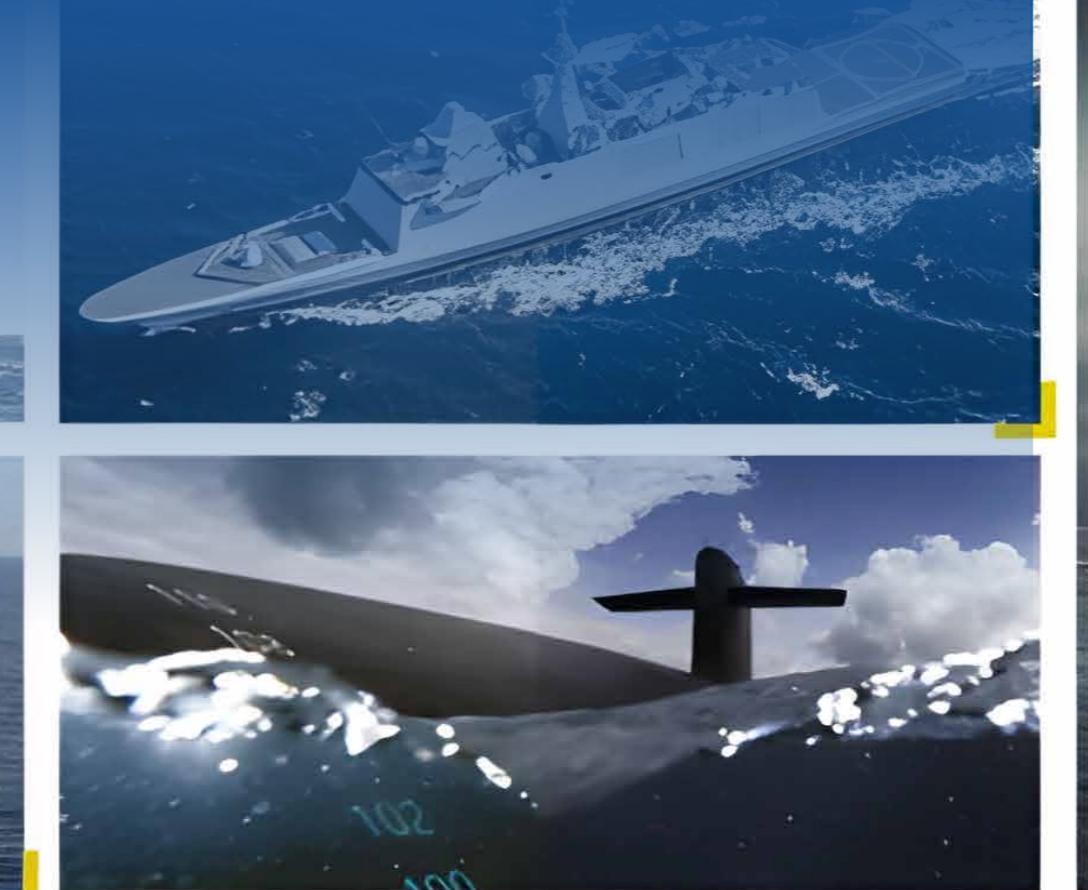
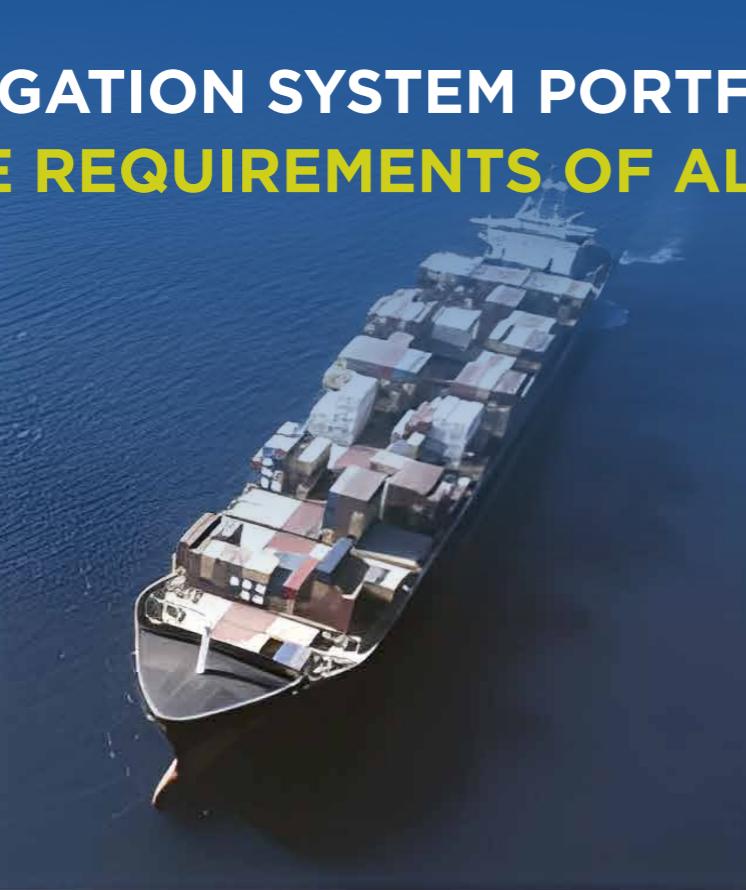
COMBAT PROVEN

OPTIMIZED LIFE CYCLE COST

JAMMING, SPOOFING AND MEAONING
ALGORITHMS DETECTION

SAFRAN INERTIAL NAVIGATION SYSTEM PORTFOLIO: DESIGNED TO MEET THE REQUIREMENTS OF ALL NAVAL PLATFORMS

HRG Crystal™ embedded



MARITIME				
BLUENAUTE™				
Product range	BLUENAUTE™ COMPASS	BLUENAUTE™ PREMIUM	BLUENAUTE™ TITANIUM	BLUENAUTE™ PLATINUM
Position (TDRMS**)				1Nm/1h
Heading (°seclat RMS)	0.4	0.2	0.08	0.08
Roll & Pitch(°RMS)	0.01			
MTBF	200,000 h			
Heave/Surgey/Sway	5 cm			

SURFACE VESSELS*			
ARGONYX™		GEONYX™M	
ARGONYX™SP	ARGONYX™HP	ARGONYX™XP	GEONYX™M
1Nm/4h 1Nm/16h	1Nm/24h	1Nm/48h 1Nm/72h	1Nm/8h
0.01		0.05	
0.01		0.03	
200,000 h			

SUBMARINES*					
BLACK-ONYX™		BLACK-ONYX™DUAL CORE			
BLACK-ONYX™SP	BLACK-ONYX™HP	BLACK-ONYX™XP	BLACK-ONYX™ DUAL CORE SP	BLACK-ONYX™ DUAL CORE HP	BLACK-ONYX™ DUAL CORE XP
1Nm/4h	1Nm/24h	1Nm/48h 1Nm/72h	1Nm/96h 1Nm/120h	1Nm/240h	1Nm/360h
0.01			0.01		
0.01			200,000 h		

* Subject to French export license approval
**Time Distance Root Mean Square (TDRMS)

GEONYX™M

GNSS-DENIED ATTITUDE AND HEADING REFERENCE SYSTEM (AHRS) / INERTIAL NAVIGATION SYSTEM (INS) FOR BOTH AMPHIBIOUS AND SPEED BOATS VEHICLES

Geonyx™ M provides attitudes and heading for systems such as guns, rocket launchers, radars & observation sights intended to be used on both amphibious vehicles and speed boats, with or without GNSS.

Robustness and reliability

Easily integrated into any type of vehicle or ship, including amphibious as primary AHRS/INS* system, Geonyx™ M is specifically designed to withstand stringent environmental conditions such as vibrations, shocks, climate and radio-environment. Thanks to the embedded HRG Crystal™, Geonyx™ M is the most reliable INS on the market.

Operational efficiency

Stand-alone, resilient, compact and robust, Geonyx™ M provides without any link to external sensor (such as a vehicle motion sensor and/or LoRa sensor):

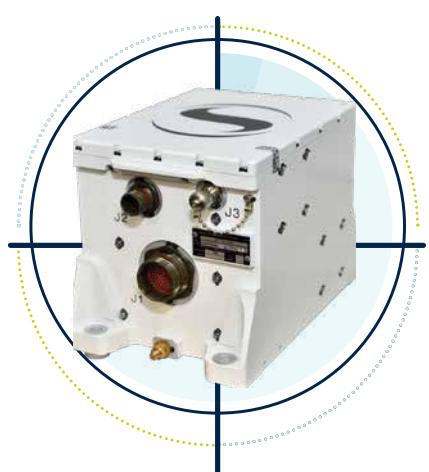
1 mils pointing accuracy at high latitude

Short alignment time

Position capability (INS) for land and naval platforms

GEONYX™M

High performance &
ultra effective life-cycle cost
Inertial Navigation System



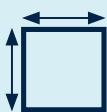
Pointing
accuracy
< 0.5 mils



Quick &
flexible
alignment



Hard-mounted
on guns



Optimized
SWAP*



Up to date
INTERFACES



Compliant
with latest
NAVIGATION
STANDARDS

EMBEDDED GNSS
(external GNSS
possible)

Environnement
MIL-STD-810

CANBUS
Ethernet
RS-422

Electrical I/F
MIL-STD-1275



Space & aeronautics
heritage



Gyrocompass
capacity



Jamming, Spoofing
and Meaconing
Algorithms Detection

EMC
MIL-STD-461

*Definitions on the last page

ARGONYX™ FAMILY

ACCURACY & COST EFFECTIVENESS FOR SURFACE APPLICATIONS

- **Scalability:** from small patrol boats to aircraft carriers.
- **Operational efficiency:** accurate attitudes & precise localization for sensors stabilization & weapons employment, even in GNSS denied environments.
- **Reliability:** Argonyx™ offers the highest MTBF of the market, and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

ARGONYX™

Trustful navigation



MTBF :
200,000h
5 year warranty



ITAR free

Optimized architecture	Flexible interfaces	Full naval MIL SPEC certified
The world's lightest naval INS	New user friendly HMI ¹	Shock: MIL STD 810 E & MIL S 901
Weight < 14 kg	Optimized interface with CMS ²	Vibration (w/o external dampers): IEC 60945 & MIL STD 167-1
Dimensions (mm) 253 x 262 x 414	Ethernet, RS-422, NMEA	Electromagnetic: MIL STD 461F
Consumption < 25 W	Flexible interface library	Temperature: -10 °C to +55 °C (operation) -40 °C to +70 °C (storage)

BLACK-ONYX™ FAMILY

TECHNOLOGICAL REVOLUTION FOR SUBMARINE APPLICATIONS

- **Submergibility & Autonomy:** Black-Onyx™ offers the highest autonomous navigation performance ever reached in the non strategic submarines market. With Black-Onyx™ Dual Core family those performances are multiplied, reaching navigation accuracies for the most submarines demanding applications.
- **Stealth:** totally silent inertial navigation systems.
- **Reliability:** Black-Onyx™ family offers the highest MTBF of the market and is maintenance free thanks to HRG Crystal™.
- **Easy interchangeability** with Sigma 40.

BLACK-ONYX™

Unlimited autonomy



MTBF :
200,000h
5 year warranty



ITAR free



Unrivalled
submergibility
performance

	Optimized architecture		Flexible interfaces		Full naval MIL SPEC certified
The world's lightest submarine INS	New user friendly HMI ¹			Shock: MIL STD 810 E & MIL S 901	
SWAP: Weight < 18 kg for Black-Onyx (< 25 kg for Dual Core)	Optimized interface with CMS ²			Vibration (w/o external dampers): IEC 60945 & MIL STD 167-1	
Dimensions (mm) 253 x 262 x 414		Ethernet, RS-422, NMEA	Electromagnetic: MIL STD 461F		
Consumption < 25 W (<50 W for Dual Core)				Temperature: -10°C to +55°C (operation) -40°C to +70°C (storage T°C)	
Strapdown, no moving parts	Flexible interface library				
Immune to magnetic stress					
Stealthy					

¹ Human Machine Interface

² Combat Management System

BLUENAUTE® FAMILY

COMPETITIVENESS FOR MARITIME OPERATIONS

- Best value maintenance free system.
- Outstanding reliability.
- Latest state of the art HRG technology.
- Immune to severe environmental conditions.

BLUENAUTE®

Robust & reliable
gyrocompass, AHRS & INS



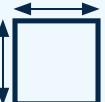
MTBF :
200.000h



in house



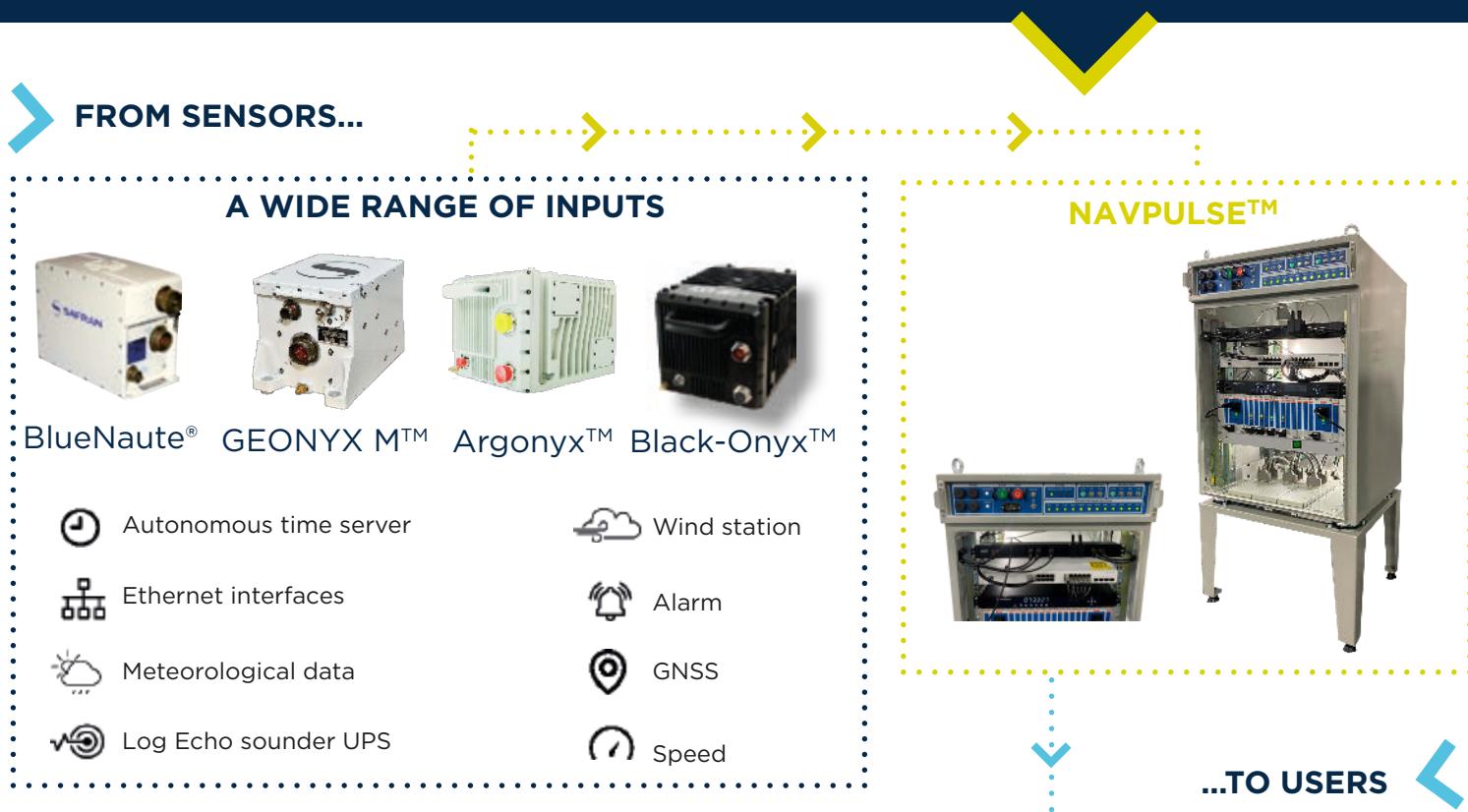
IMO & IMO HSC
certified

	Optimized architecture		Robustness		User friendly
Weight < 4.7 kg	Operational : -20 °C to +60 °C	COTS			
Dimensions (mm) 208x275x136	Waterproofness : IP66	Easy installation			
Consumption < 28 W		Maintenance free			

NAVPULSE, DATA DISTRIBUTION & PROCESSING CENTER FAMILY

SMART DATA ANALYSIS FOR NAVAL APPLICATIONS

Extracting the right information from a growing volume of data available onboard is increasingly challenging and time-consuming. Always attentive to its customers and partners, Safran has worked hard to offer new robust and capable Data Distribution & Processing Center, able to take up this new challenge. Because many ships require bespoke information distribution solutions, Seanapster is able to suit a large panel of military ships from patrol boats to frigates and submarines, and collects, processes & prioritizes real time data from various sensors. Seanapster then distributes the consolidated information to the relevant systems across your ship.



A UNIQUE SET OF PROPERTIES

- Sensor data & status acquisition
- Data processing (*hybridization, health monitoring, automatic or manual sensor selection, etc.*)
- Data distribution
- Autonomous time server (*time clock generator, time supervision, time stamp management*)
- User interface (*CDU, navigation system configuration & command, Graphical User Interface*)

A WIDE RANGE OF OUTPUTS

- ⌚ Bridge
- 📍 Optronics
- Combat management system
- ➡️ Aircraft alignment

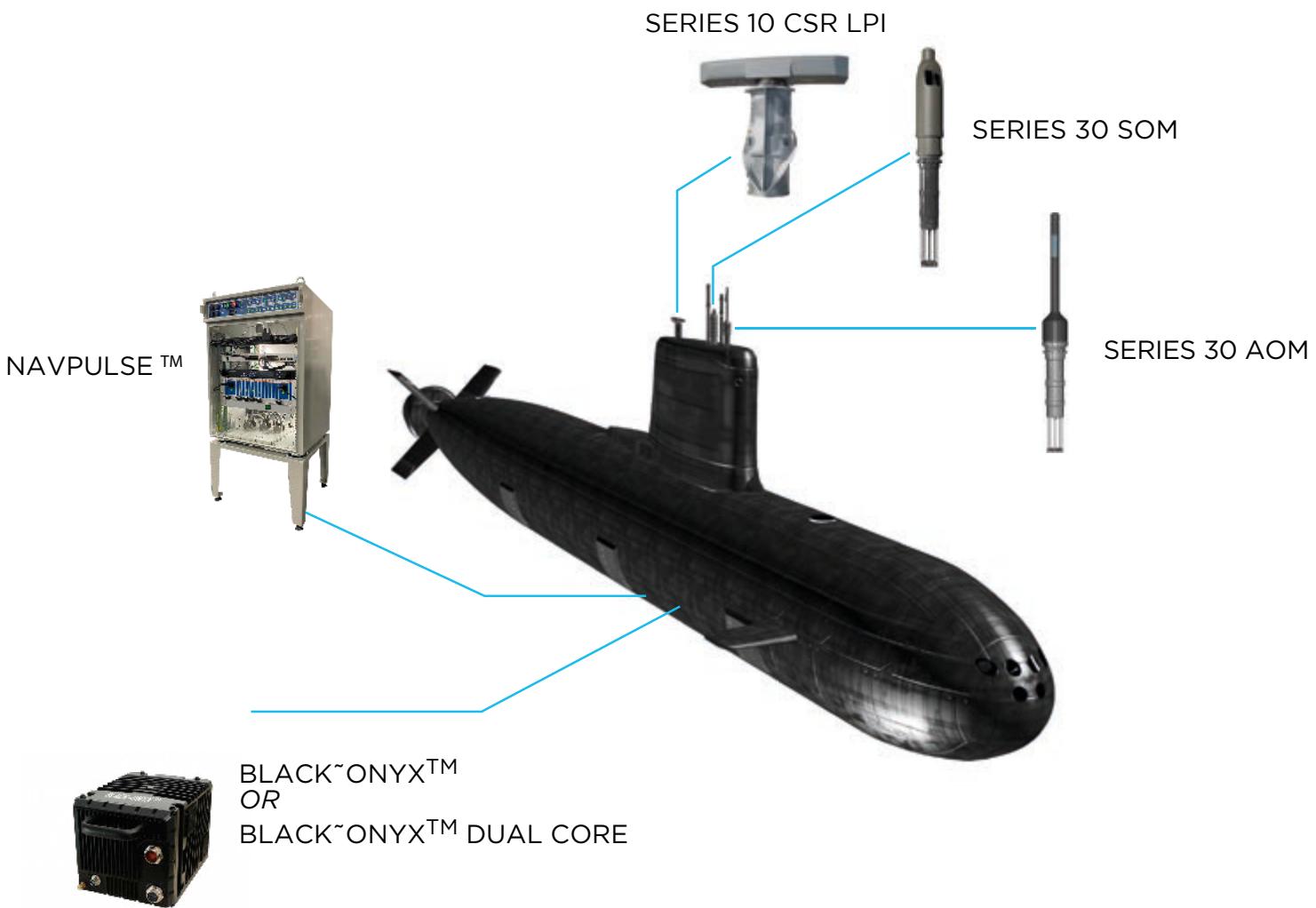
SAFRAN'S FULL SPECTRUM OF NAVIGATION

FROM SURFACE VESSELS



SYSTEMS FOR COMBAT MISSIONS SUCCESS

TO
SUBMARINES



OUR SUPPORT SOLUTIONS

Thanks to HRG Crystal™ reliability, Argonyx™, Black-Onyx™ and Black-Onyx™ Dual Core families have the best life-cycle costs on the market. This allows Safran to propose innovative support solutions that will boost your vessels and submarines' availability rate.

Safran offers flexible training programs and cost effective service support to assist you in your operations.



INTEGRATION

Worldwide strategic partnerships with companies that can perform product integration on any platform



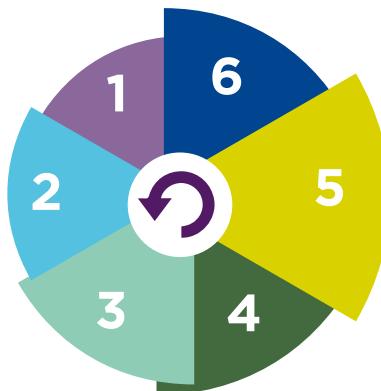
LOCAL DEVELOPMENT & MANUFACTURING

- Tailored specifications (HMI*, etc.)
- In depth manufacturing



TRAINING

- Operating training
- Maintenance training
- Trouble shooting & corrective training



TRANSFER OF KNOW-HOW

- Co-operation with local partners
- Transfer of maintenance
- Offset



WORLDWIDE SUPPORT

- Help desk and hotline
- Local service center
- Field service representative



INTEGRATED LOGISTIC SUPPORT

- Customer configuration management
- Engineering change management
- Obsolescence management
- On site technical assistance

SIGMA 40, MAINTAINING THE NAVAL INS REFERENCE

For decades, Sigma 40 has been the world reference in naval applications. Safran will keep manufacturing and supporting Sigma 40 in order to meet customers' requirements.

Since flexibility is part of Safran's culture, interchangeability between Sigma 40 and Argonyx™ & Black-Onyx™ is ensured to provide customers a wide range of options and prepare the integration of the disruptive new Inertial Navigation Systems families.

OUR NAVAL REFERENCES

40 navies equipped with Safran's
inertial systems worldwide

