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IXBLUE & ECA

BECOME EXAIL

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Exail at a glance

1500
EMPLOYEEES

80
COUTRIES SERVED WORLDWIDE

20+
% OF TURNOVER INVESTED IN R&D

24/7
TECHNICAL SUPPORT

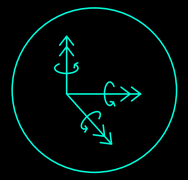
2000
COMPANIES SERVED EACH YEAR

250+
MILLION EUROS OF TURNOVER

21
FACILITIES IN FRANCE

A GLOBAL FOOTPRINT

Our expertise

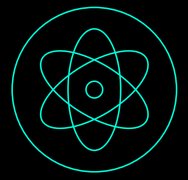


Inertial navigation

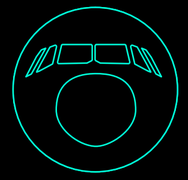
Subsea acoustic positioning and imagery

Autonomous vehicles, drones systems and AI

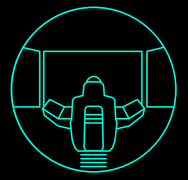
Ship equipment and protection



Photonics and quantum



On-board electronics and manufacturing & testing solutions for aeronautics



Training simulation

Mechatronics

exail

Vertical integration of technologies: from components to complex systems, with customers in all areas

Component division

High added value optical & critival components

EQUIPEMENTS

… Navigation, subsea positioning & mapping
Autonomus navigation

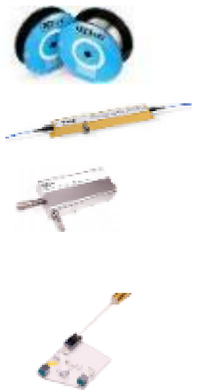
Vehicles

UxV

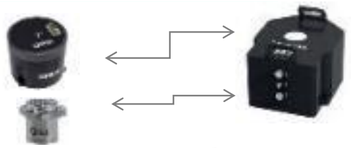
Systems & Services

Mine warfare & Hydrography solutions

PHOTONIQUE



INERTIAL NAVIGATION



SONARS & USBL & LBL

QUANTIC INSTRUMENTS

ONBOARD SYSTEMS

SIMULATORS

Uncrewed Surface Vessels

Unmanned Underwater Vehicles

UAV & UGV

Autonomous Vessels + Commande & Control Systems

Mine Hunrting Systems

Hydrographic Systems

REMOTE HYDROGRAPHY

SAIHC 19

AUGUST 29TH 2024

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UNCREWED PLATFORM DRIX

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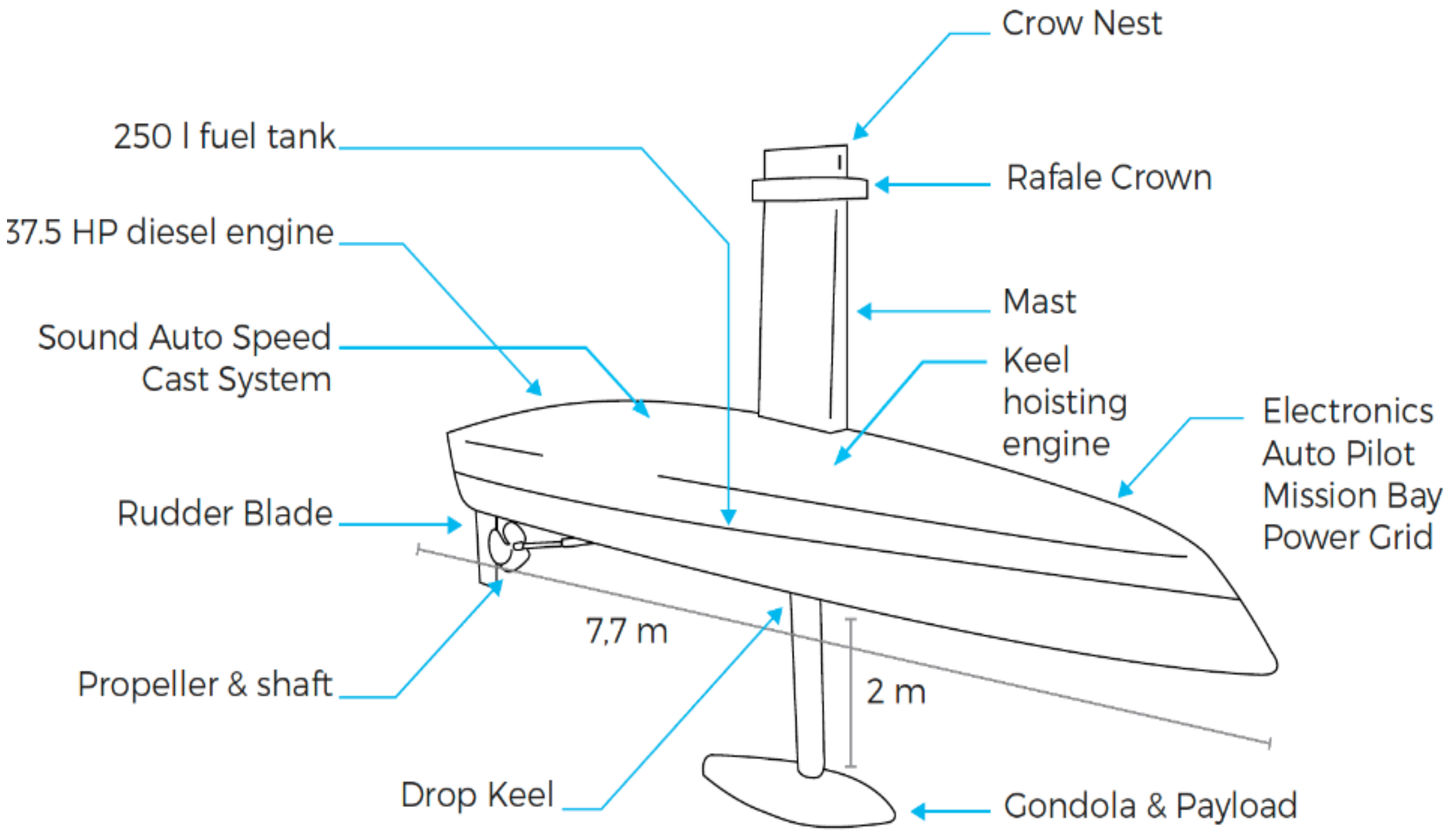
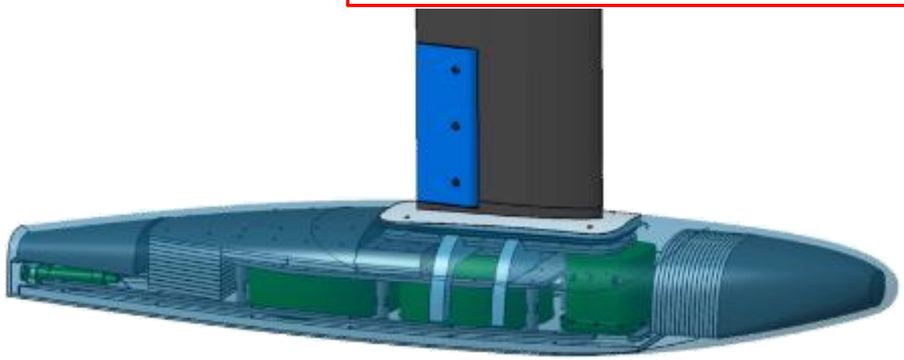
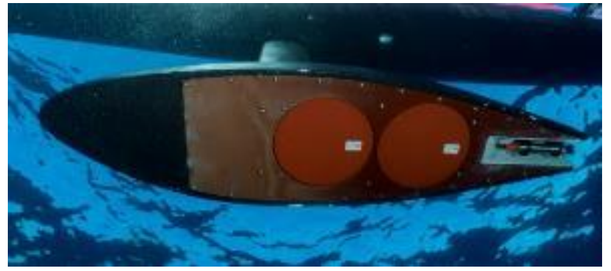
DriX USV in a Nutshell







Autonomy allows innovations in the design of the platform: Example of DriX

Main Dimensions	
Length Overall (LOA)	7,7 m
Beam:	0,82 m
Draft :	2,0 m
Light Weight :	1,4 Tons
Construction materials	
Hull & Deck & superstructure	Composite material

Performance	
Maximum Speed :	14 kt
Survey Speed :	8+ kt
Fuel capacity :	250 liters
Fuel Consumption (Survey):	2-3 L/h
Range :	650 nm@ 8kt
Sea keeping:	Seastate 5 in operation

Machinery	
STD propulsion:	1 x 38HP diesel engine
Power Generation:	Up to 3 kW

Dr

MISSION EQUIPMENT : Mission software, LIDAR, Video Camera, IR camera

MISSION PAYLOAD:	MBES, SBP, Magnetometer, Weather Station, SSS, Environmental Echosounder (EK80, SeapiX), …
COMMUNICATION:	WiFi, Maritime Broadband Radio (MBR) , SATCOM (Starlink),
AUTONOMY:	Up to 1000 Nm


THALES
iXblue

LOGISTICS – DOCKING, RECOVERY AND TRANSPORTATION

- Towed DDS
- Auto docking function
- Support vessel
- Floating pontons

- Export control free
- Land, sea, air

Land

Land & Sea

Air

Some references

Previous operation
Present positions of DriXs

Hydrography, Geophysical survey, Subsea Positionning, AUV C&C, …

TECHNICAL SOLUTIONS NAVIGATION SAFETY & SUPERVISION

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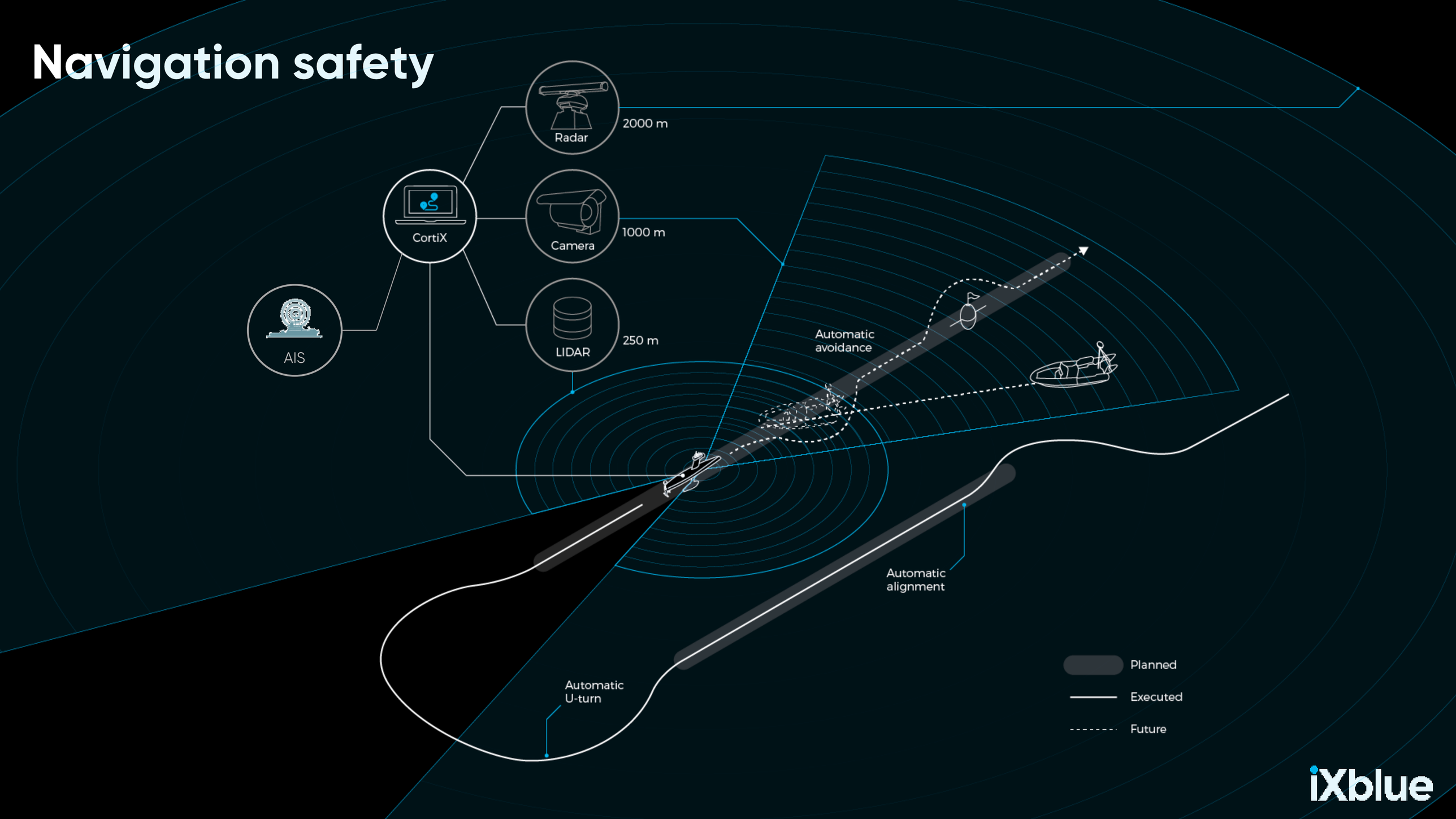
Navigation safety



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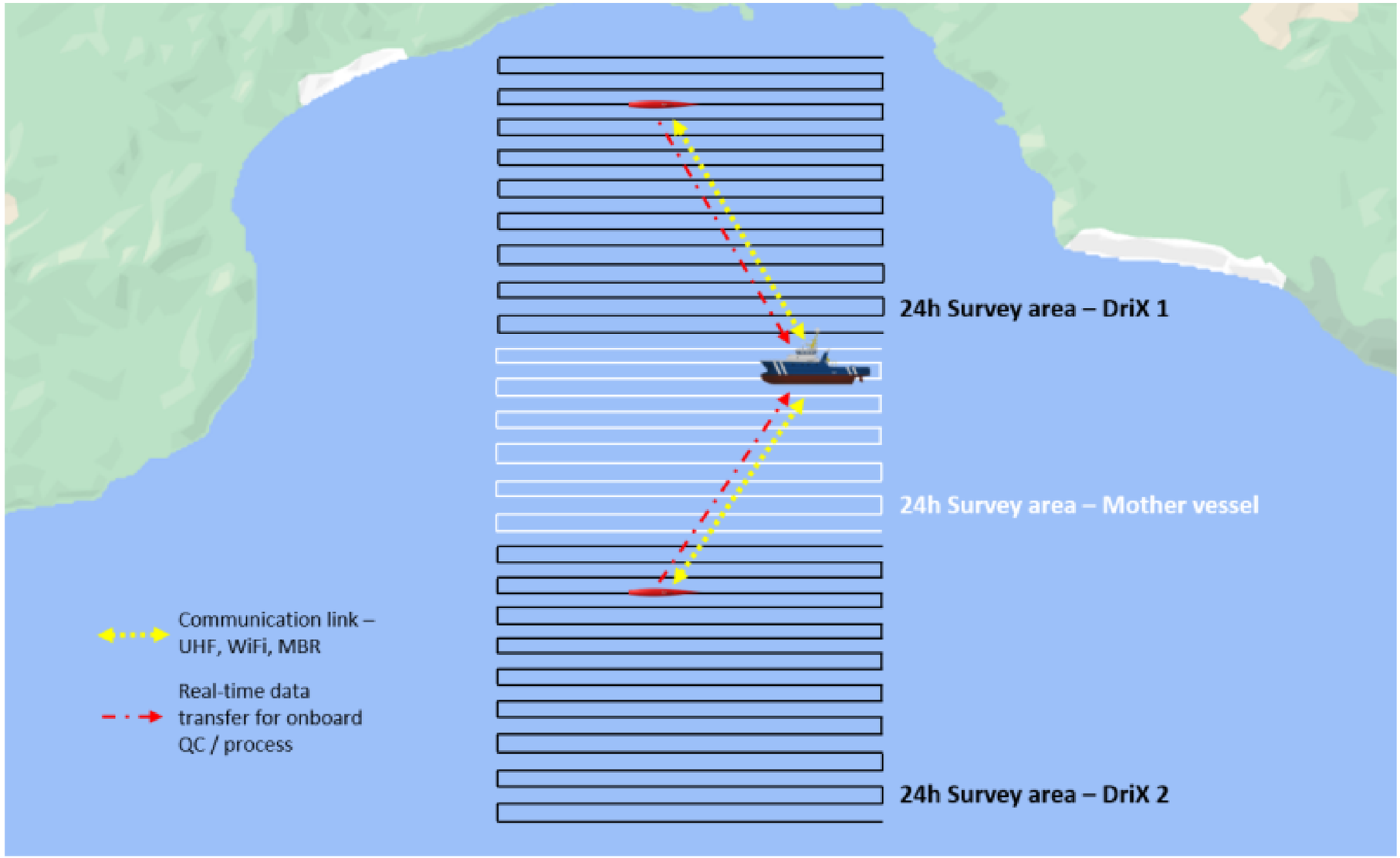
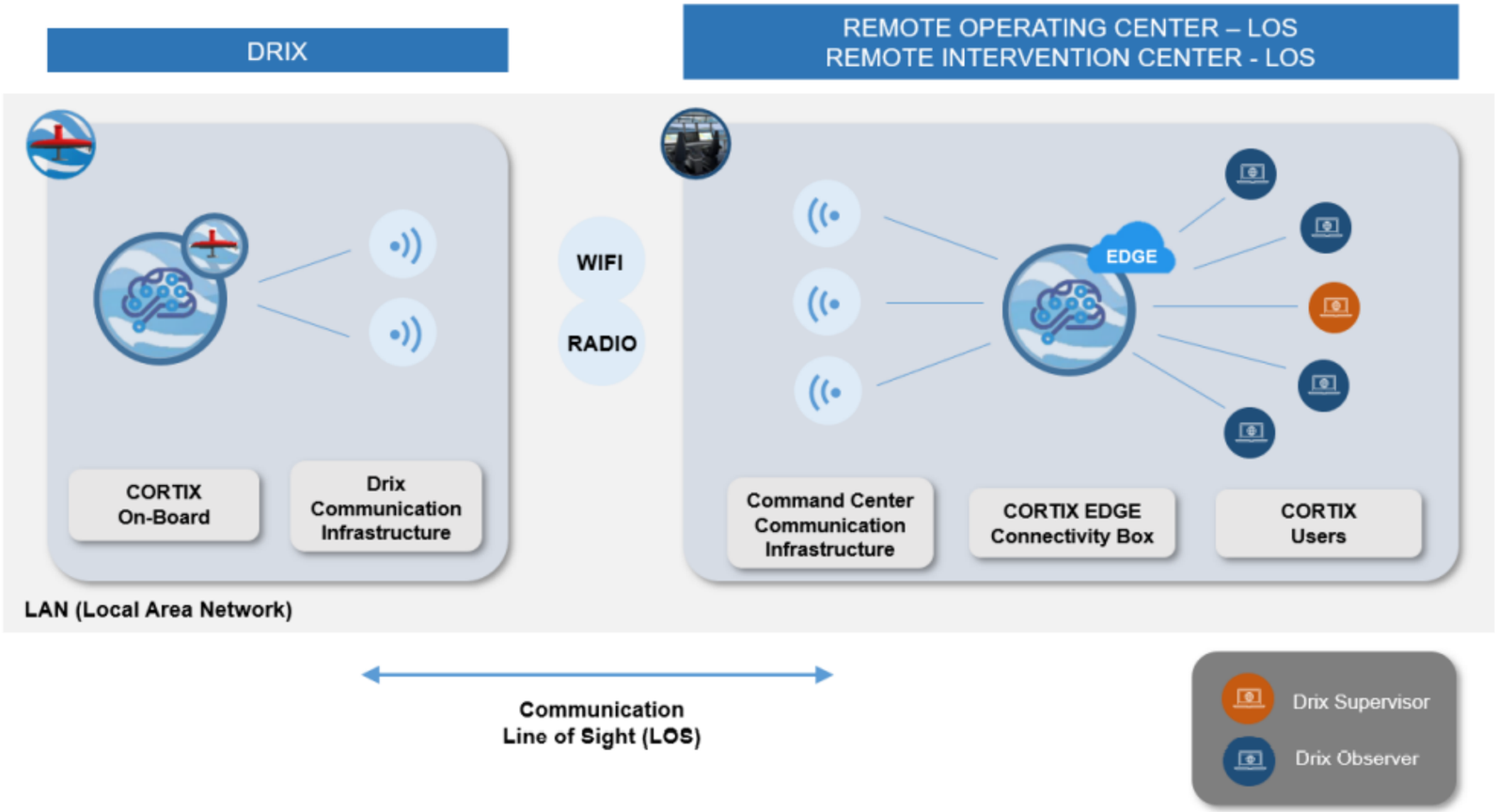
LINE OF SIGHT



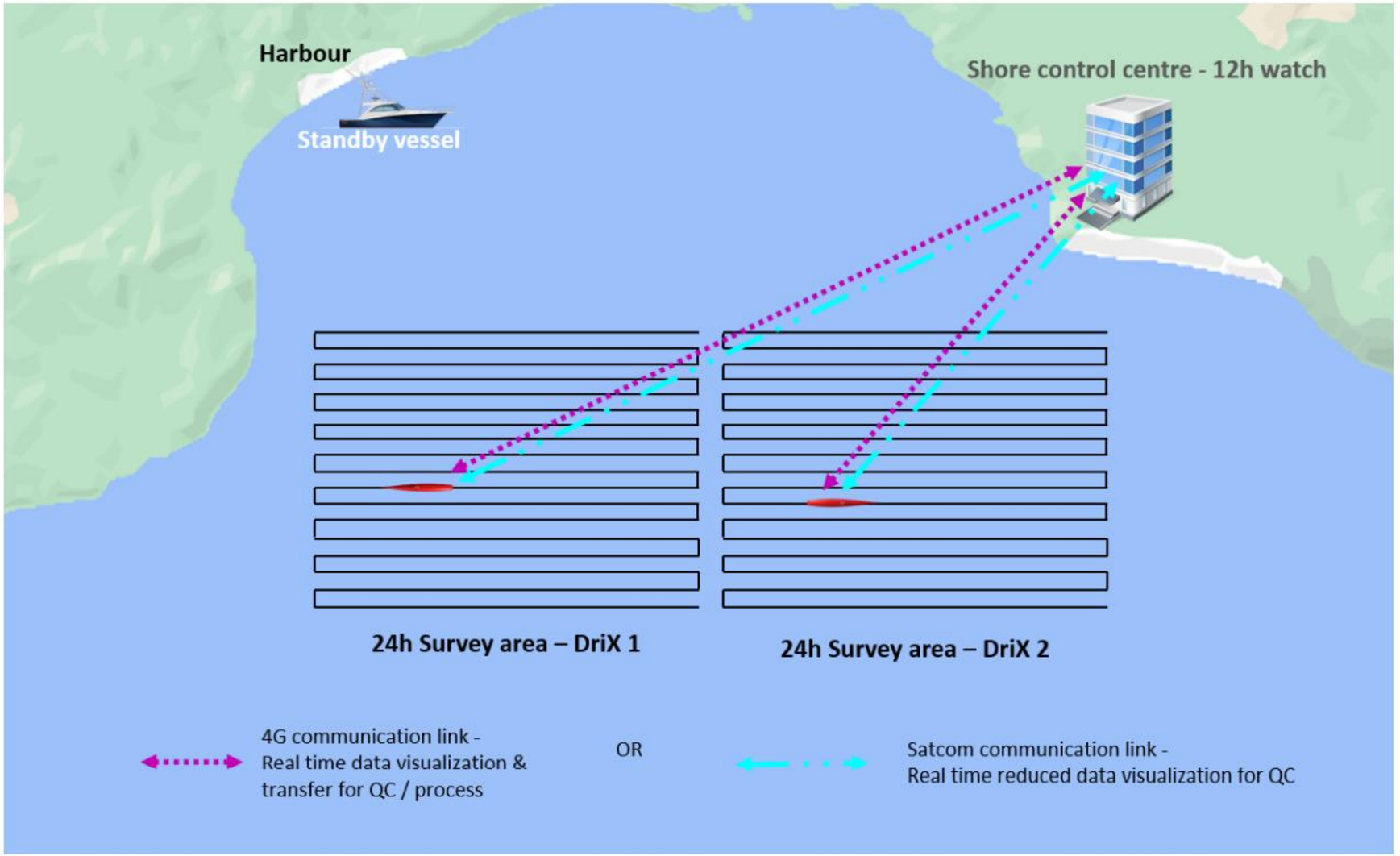
LINE OF SIGHT



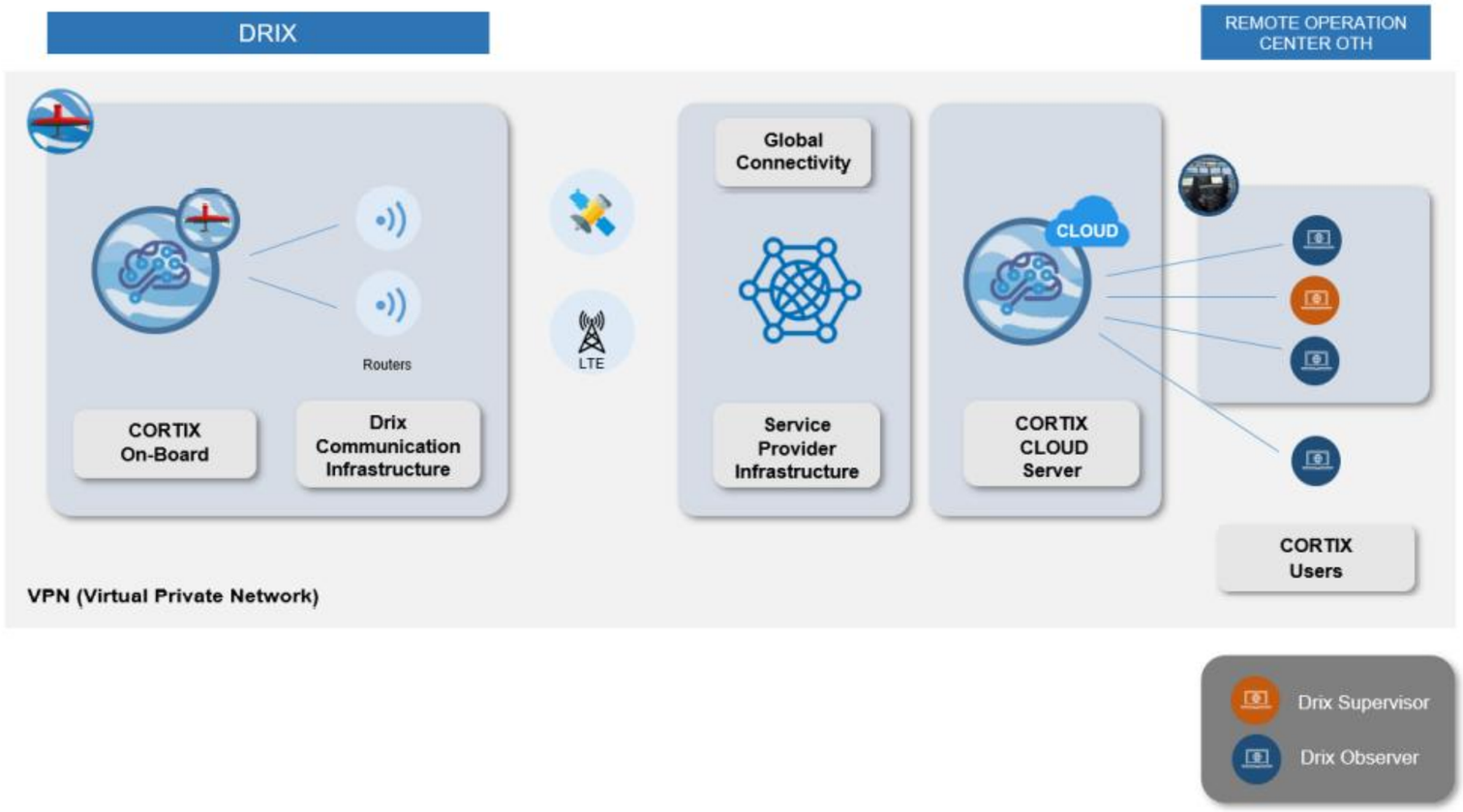
WIFI

Kongsberg MBR

OVER THE HORIZON



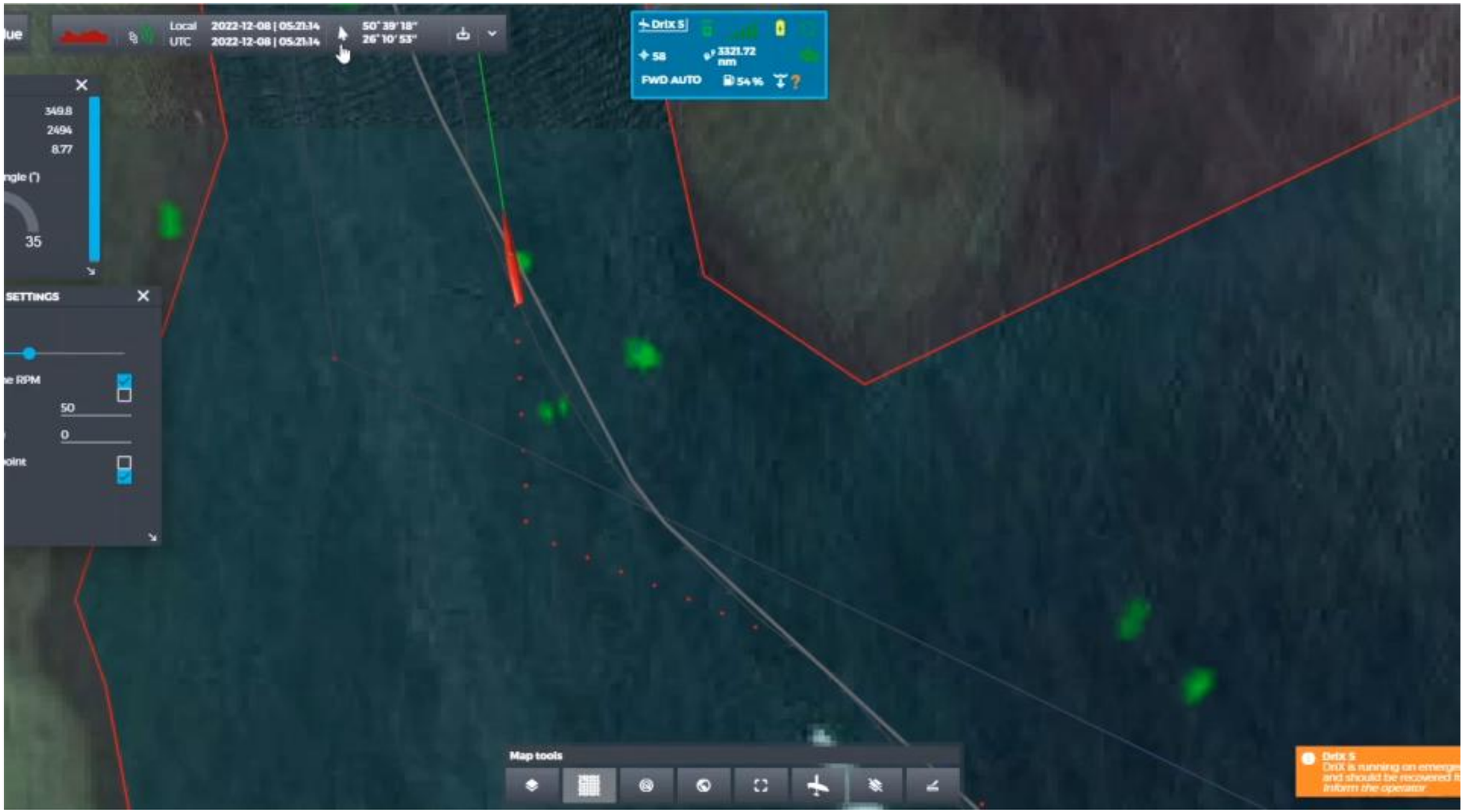
OVER THE HORIZON



4G

Iridium CERTUS (*)

Example of Autonomous Navigation in Restricted Waters



Dec 8, 2022 - Autonomous entry and collision avoidance in Mina Salman, Barhein.
(Speed 10 knots, video speed x20). CPA setting 100 yards

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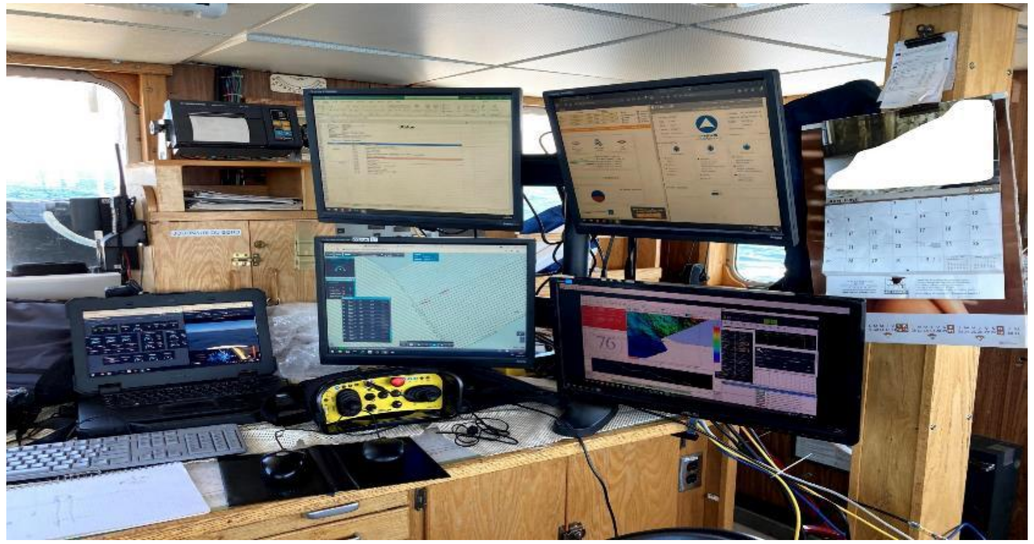
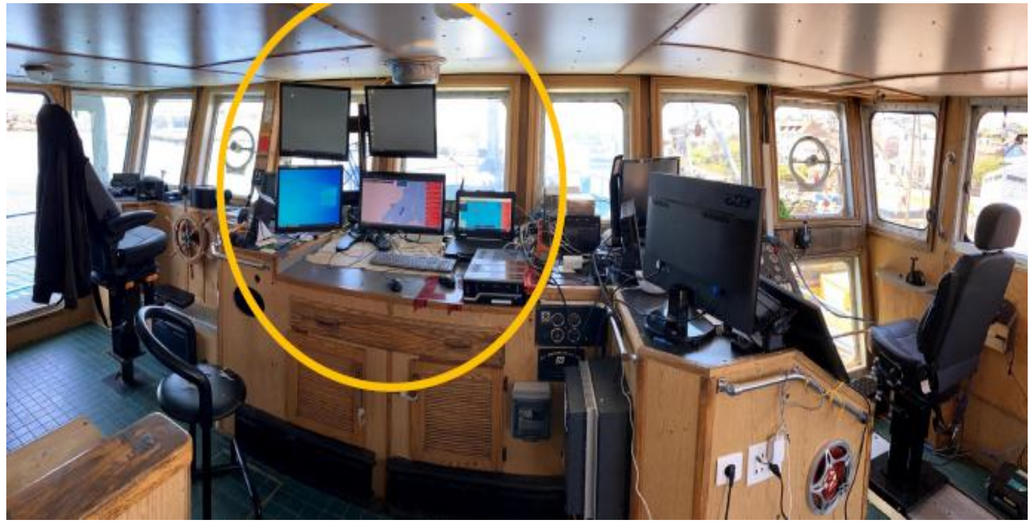
24h/24 ROCC (Remote Operated Control Center)

Shore, Ship or Island





Full permanent dedicated remote station or field work station,
The Exail ROCC is a flexible environment

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DRIX RETURN OF EXPERIENCE

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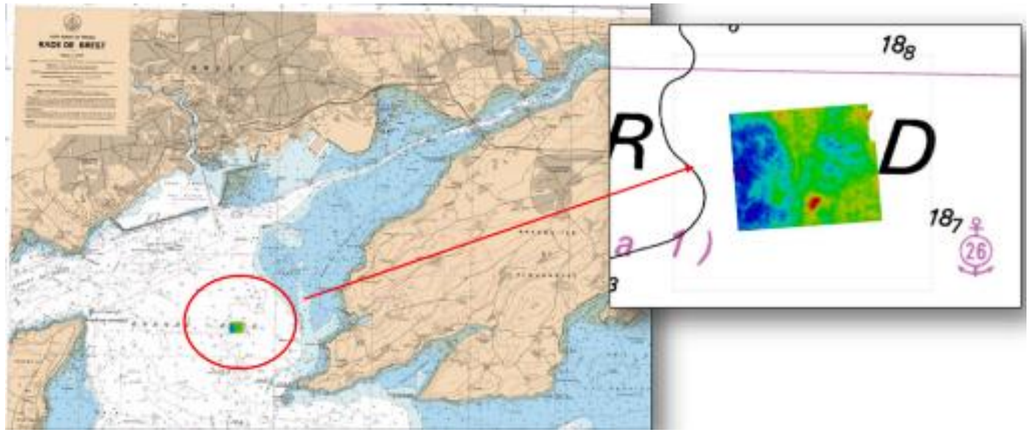
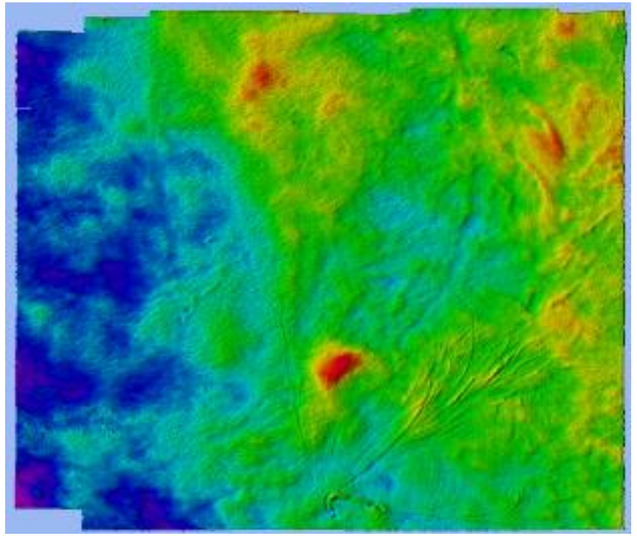
Case Study: Hydrographic Reference Site – Force Multiplier

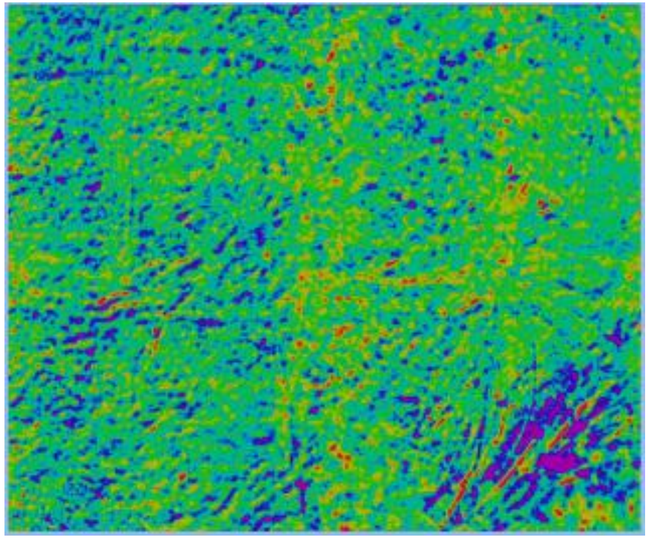
Data Qualification on SHOM (French Hydrographic Office)



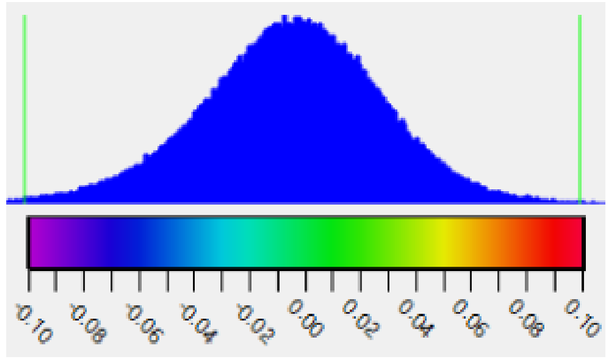
Outstanding achievements on meeting IHO exclusive order requirements for both uncertainty and data density @20m

Mean difference respect to reference	1cm
Mean standard deviation	3cm
Result repeated and valid at speed	4, 6, 8, 10 & 14kts





Differential map
DriX vs SHOM ref data set



Differential statistic distribution

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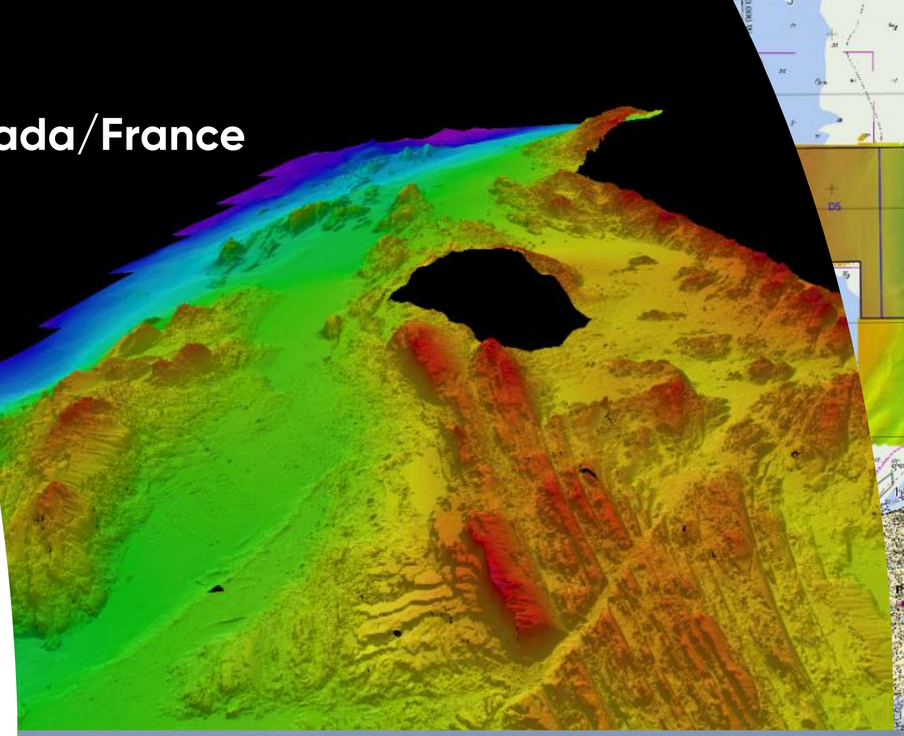
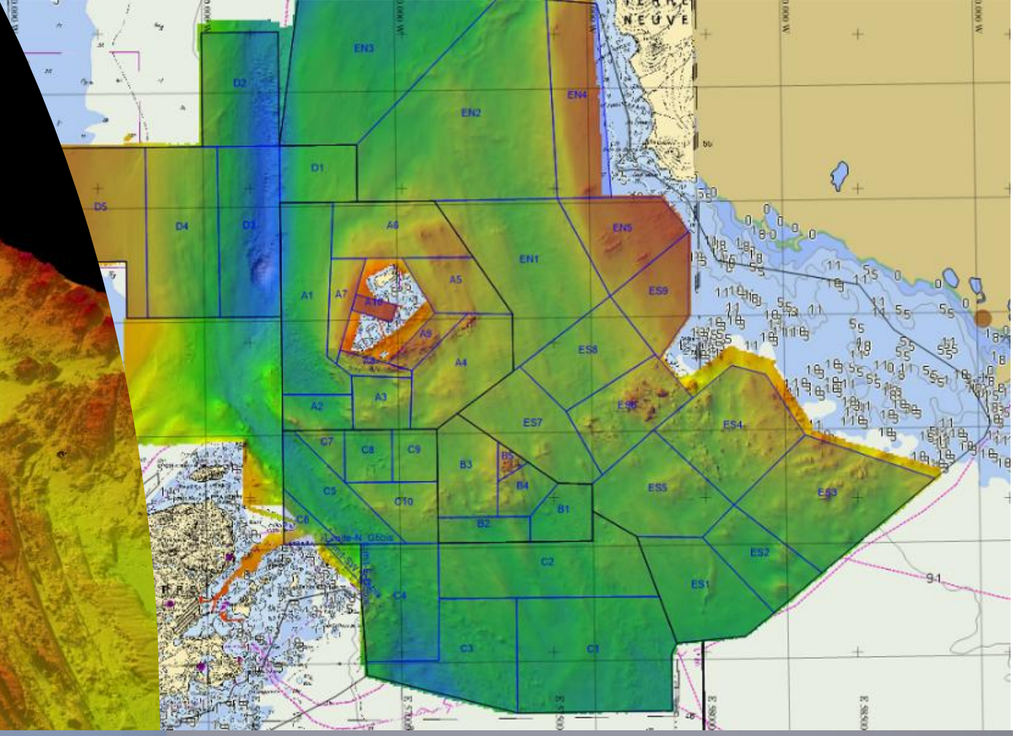
Case Study : large scale Hydrographic Survey Canada/France





North Atlantic
Saint-Pierre et Miquelon and Canada

2 Survey Objectives, 2 Clients
- Archaeological survey
- Sedimentologic model

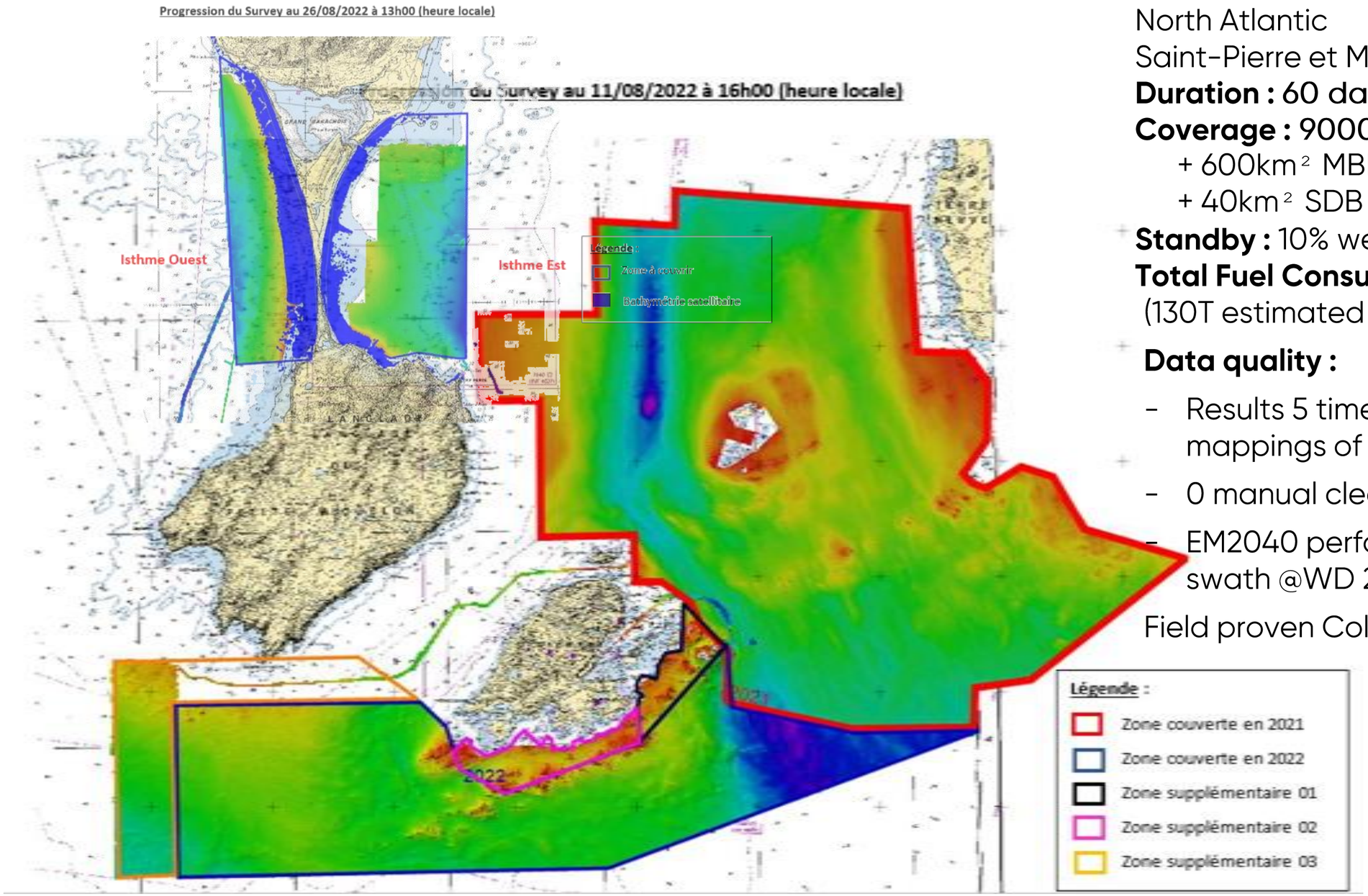
2 unmanned MBES-SBP campaigns
1 Satellite Derived Bathymetry

Manning: **1 engineer, 2 surveyors**

Operational observations:

- Av. SeaState 4
- Wind up to 45kts
- Current up to 2.5 kts
- Extremely Bad visibility
- Survey depth : 8 to 270m
- Satellite Derived Bathymetry: 0 to 15m

Data: > **6.0 Terabit**



North Atlantic
Saint-Pierre et Miquelon and Canada
Duration : 60 days
Coverage : 9000 survey Line KM Est.
+ 600km^2 MBES coverage
+ 40km^2 SDB product
Standby : 10% weather, No eq downtime
Total Fuel Consumption : 2.5Tons
(130T estimated for conventional vessel)

Data quality :

- Results 5 times better than previous seabed mappings of the area
- 0 manual cleaning
- EM2040 performed 30% better / 200m swath @WD 270m with the 400kHz

Field proven ColReg equipment

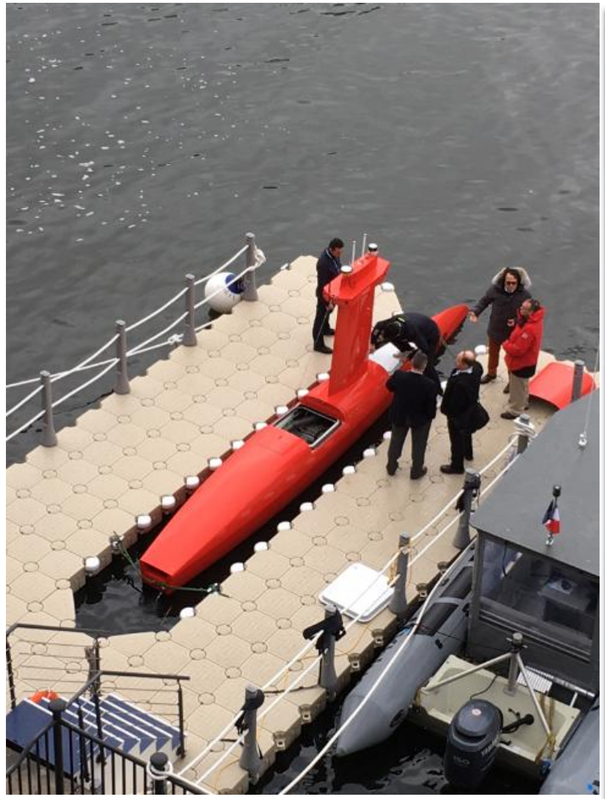
HR MBES SCOPE	DRIX (OTH Ops)	Opportunity Vessel
Archaeological search	9000 line km of survey in dynamic environment (current, wind and swell) Including some very near rocks operation.	
MOB	4 days Drix Pre Checked & Cal Transit by Ferry on container	5 days TT • 3 day days of mob • 1 days static calibration • Checks + 0.5 day Calibration at sea
Bathy Ops Speed limited by bathy Spec (6.5kts)	Operation: 60 Days Weather Downtime : 6 days July – August 2021 and 2022	Operation: 80 Days Weather Downtime : 24 days
Est. Fuel (Diesel)	40l/d **2.5 T**	Ops: 1 500l/d (24h) / Stby 300l/d **130 T**
CO^2 Equ **1l = 2.6kg equ CO^2**	**6.5 To CO^2**	**338 To CO^2** x50 times
Staffing on site • **For MBES scope only**	3	minimum : 6 crew + 2 survey
Man Hour Exposed at Sea (24h/24h at sea)	180h Launch & Recovery period	15500 h x86 times
Survey Efficiency factor	Line U-turn (2min MBES) No Re-Run / Full data density at high speed / No cleaning	Line U-turn (5 to 10min U-turn) 20% Re-Run due to pilot and environment 30% less speed to ensure data density after cleaning

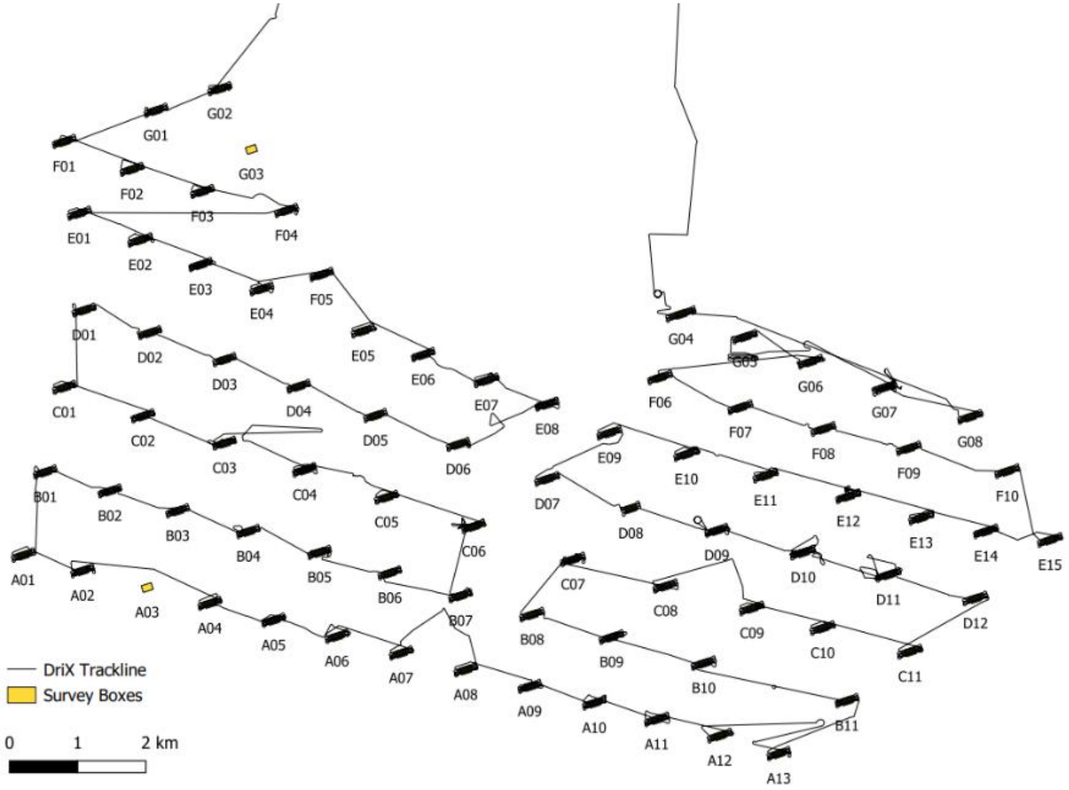
Case Study : Civil engineering geophysical survey

Offshore wind turbine

Objectives

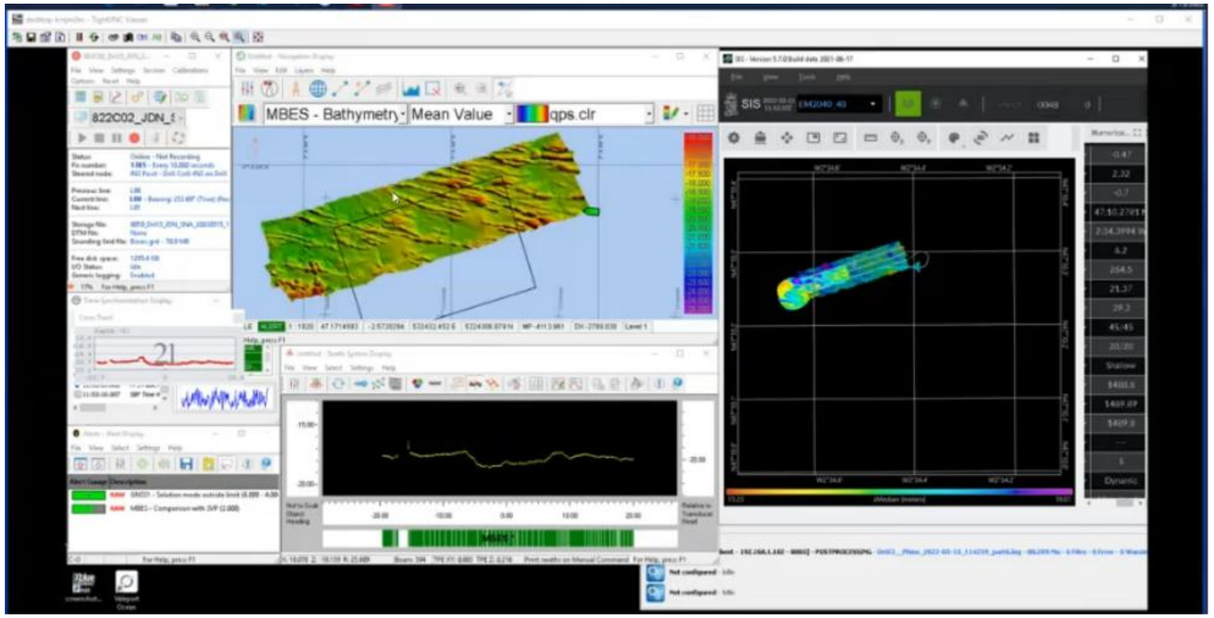
- 80 WTG - 200mx100m boxes to survey with MBES only
- Scouring and seabed inspection survey around wind turbine foundations.
- Over the horizon operation conducted in Saint-Nazaire (Fr) from La Ciotat (Fr) 800km away.

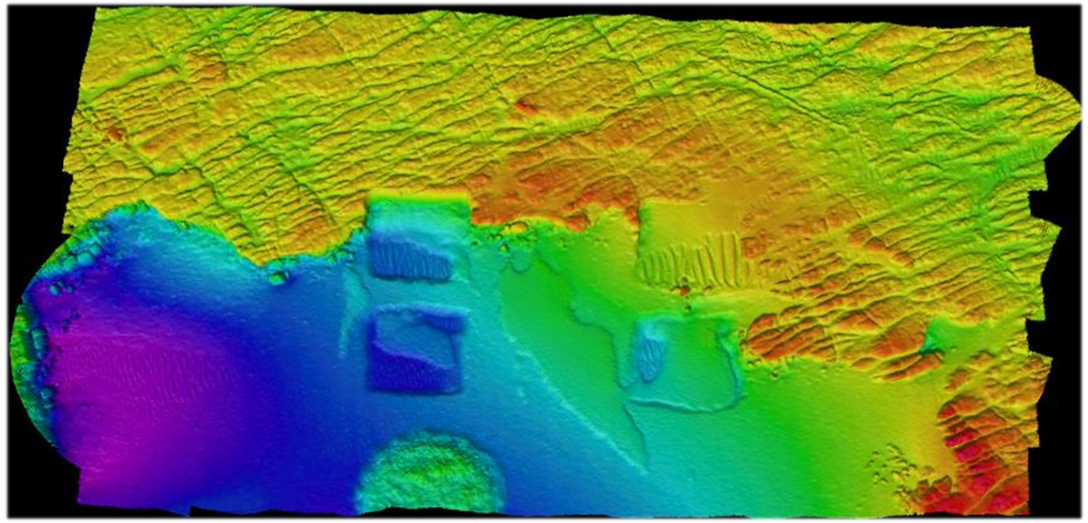




Case Study : Civil engineering geophysical survey

- 35 hours operation incl. transit from port to port
- 425 km line km
- Seastate 3 to 4
- Obstacles avoidance system ON
- And… outstanding bathymetric data quality





« *Différence moyenne sur zone de référence client : 0cm* »
Moyenne de 30 sondes / cellule de 0.5mx0.5m »

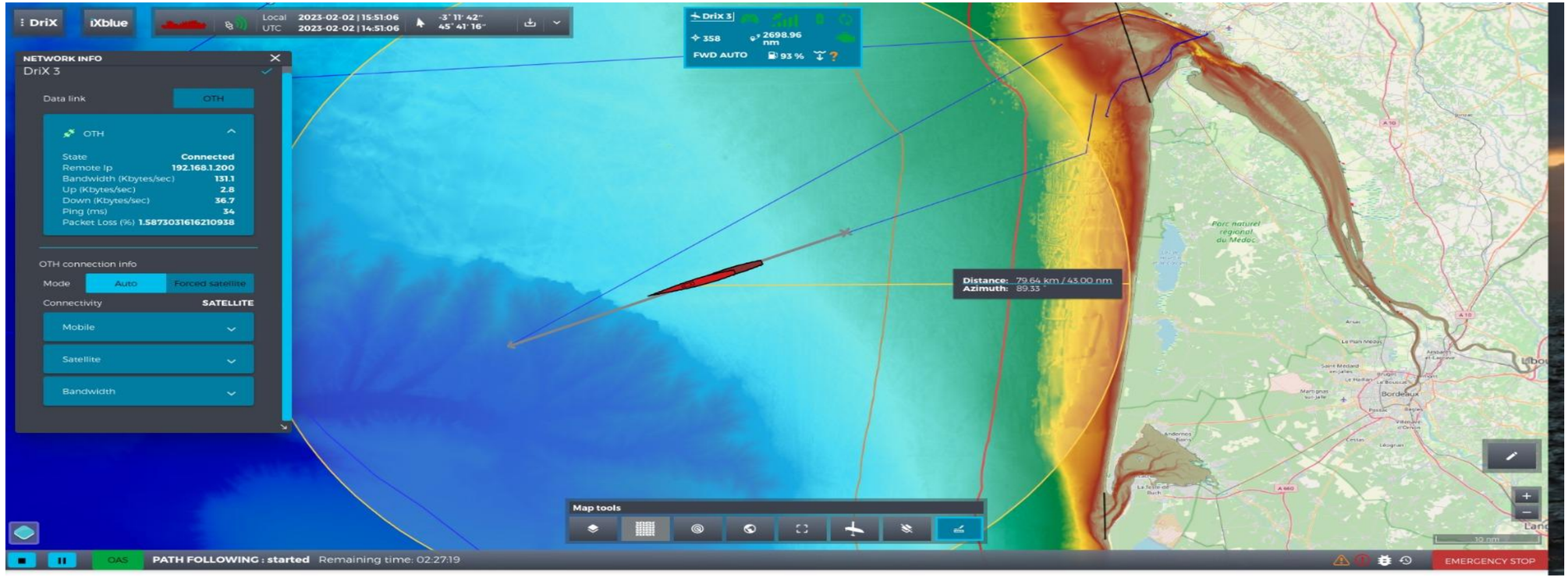
Maintenance MBES SCOPE	DRIX (OTH Ops)	Opportunity Vessel
	80 WTGs	
MOB / Demob	2 days Drix Pre Checked & Cal Transit by Road	• **4 to 5 days TT** • 2 days Vessel In/Out (Transit at least 2 days) • 2 day days of mob / Checks + 0.5 day Calibration at sea + 1 day Demob
Bathy Ops Speed limited by bathy Spec (5kts) No Xlines	35 hours 8 lines per WTGs March 2022	24/24 Ops – 4 days + 2 days weather tolerance 12/24 Ops – 8 days + 7 days weather tolerance
Fuel (Diesel)	50l/d **75l TT**	1 500l/d (24h) **9 000l TT** Incl. 2d Transit In/Out & Cal at sea
CO^2 Equ **1l = 2.6kg equ CO^2**	**0.2 To CO^2**	**23.4 To CO^2** x120 times
Staffing on site • **For MBES scope only**	2	minimum : 6 crew + 2 survey
Man Hour Exposed at Sea (24h/24h at sea)	8h Launch & Recovery period	About 1050 h x130 times
Survey Efficiency factor	Line U-turn (2min MBES) No Re-Run	Line U-turn (5 to 10min U-turn) Possible Re-Run due to pilot mistake

Case Study : Oceanographic observation

EEZ meteoceanographic and fish stock observation

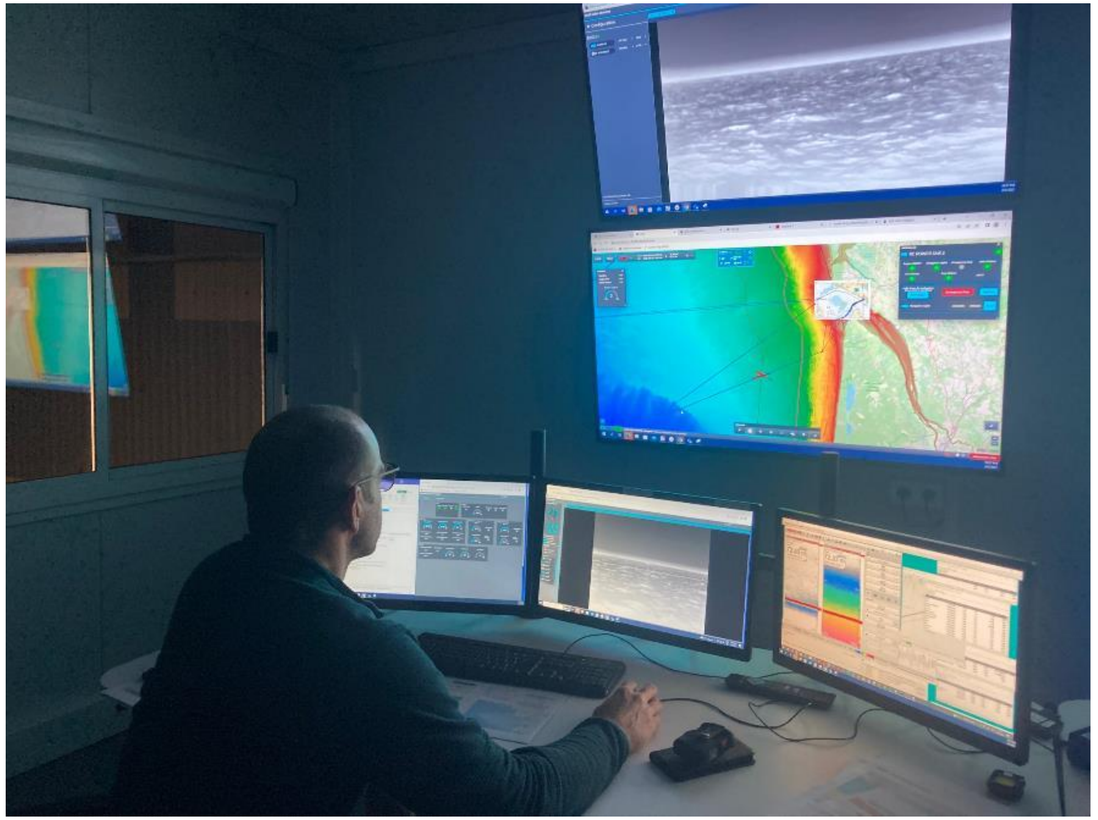
Objectives

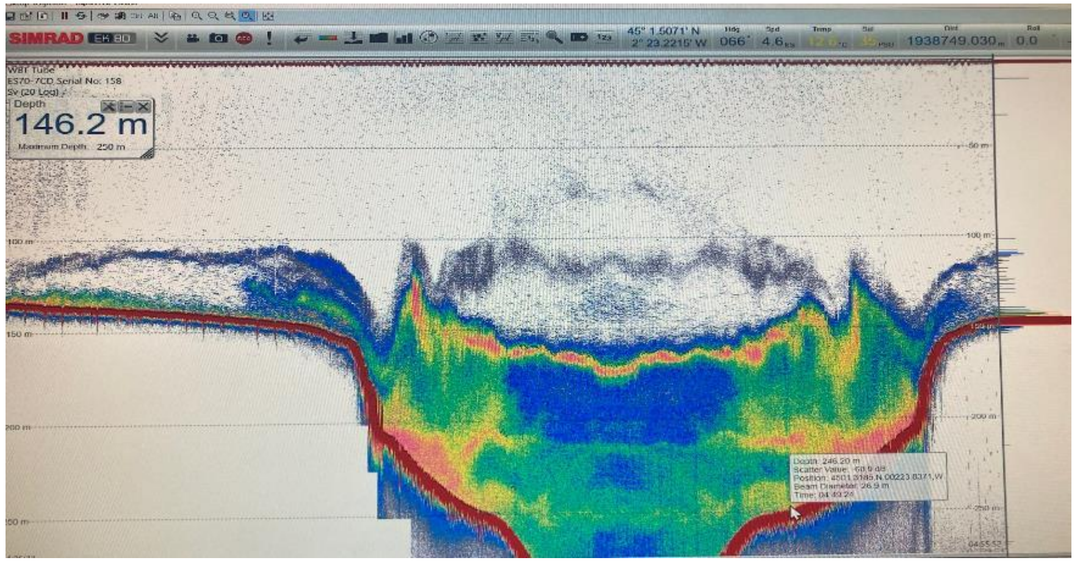
- February in the Bay of Biscay
- 1 month to realize 2500LineKm observation – up to 150Nm from the shore
- Waiting on daylight at sea
- Environnemental Sonar (EK80), Hydrophone, ADCP,CTD, Met-station
- Full Over the horizon operation conducted from La Ciotat (Fr) – 700km away, 2 pax in field



Case Study : Civil engineering geophysical survey

- Standalone - No support vessel
- 2500Km perfomed in 12 operation days
- 3 ports visited
- 4 days weather standby
- Seastate up to SWH = 3,20m, Period = 14s





Oceanographic assessment	DRIX (OTH Ops)	Vessel Oceanographic Institute
	2500 line km	
MOB / Demob	2 days Drix Pre Checked & Cal Transit by Road	• **4 to 5 days TT** • 2 days Vessel In/Out (Transit at least 2 days) • 2 day days of mob / Checks + 0.5 day Calibration at sea + 1 day Demob
Ops Speed 6 to 9kts accepted	12 days + 4 days Wx 12 segments : 8 to 12 hours each Each segments : 100 to 150Nm length	24/24 Ops – 12 days + 2 days Wx Idem
Fuel (Diesel)	50l/d **800l TT** Including mob and transportation	Europe 1 200l/d (24h) / Thalassa 3800l/d **17 000l TT / 55 000l TT** Incl. 2d standby
CO^2 Equ **1l = 2.6kg equ CO^2**	**2.1 To CO^2**	**44.2 To CO^2 - 143 To CO^2** x20 times – x65 times
Staffing involved on site	2	minimum : 8 crew + 6 scientists
Man Hour Exposed at Sea (24h/24h at sea)	24h Launch & Recovery period	About 4032 h x170 times
Survey Efficiency factor	Possible survey at higher speed LOW Noise level Availability – Force multiplier	

TECHNICAL SOLUTIONS TO INCREASE THE HYDROSPATIAL DATA GATHERING

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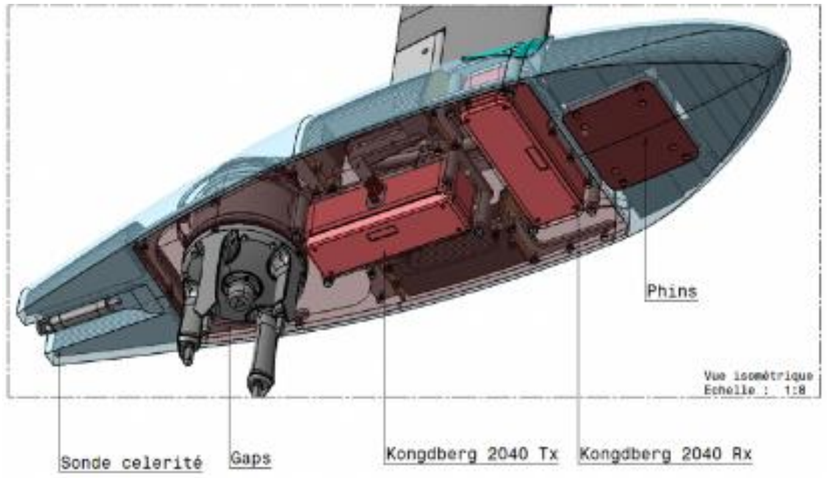
A universal platform

A gondola to house any type of relevant sensor – a serious trackrecord

Example of standard combination

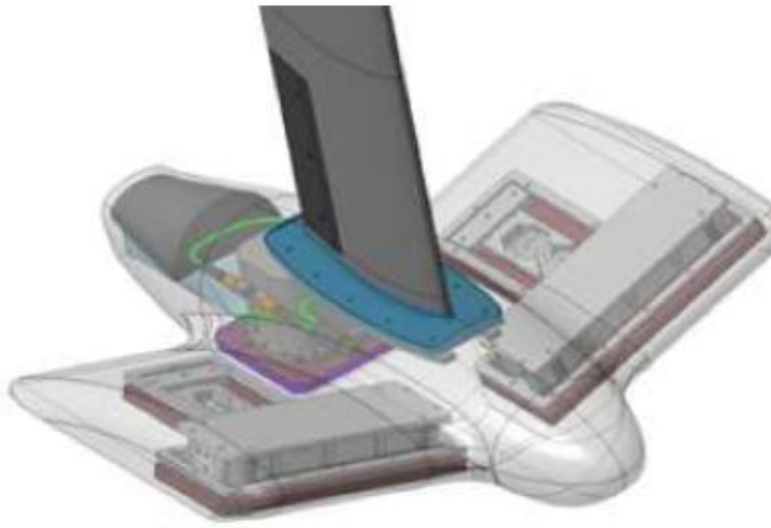
A GAPS USBL and a MBES



Integration track record:

- Multiple brands of MBES
- Side Scan Sonar
- Sub bottom profiler

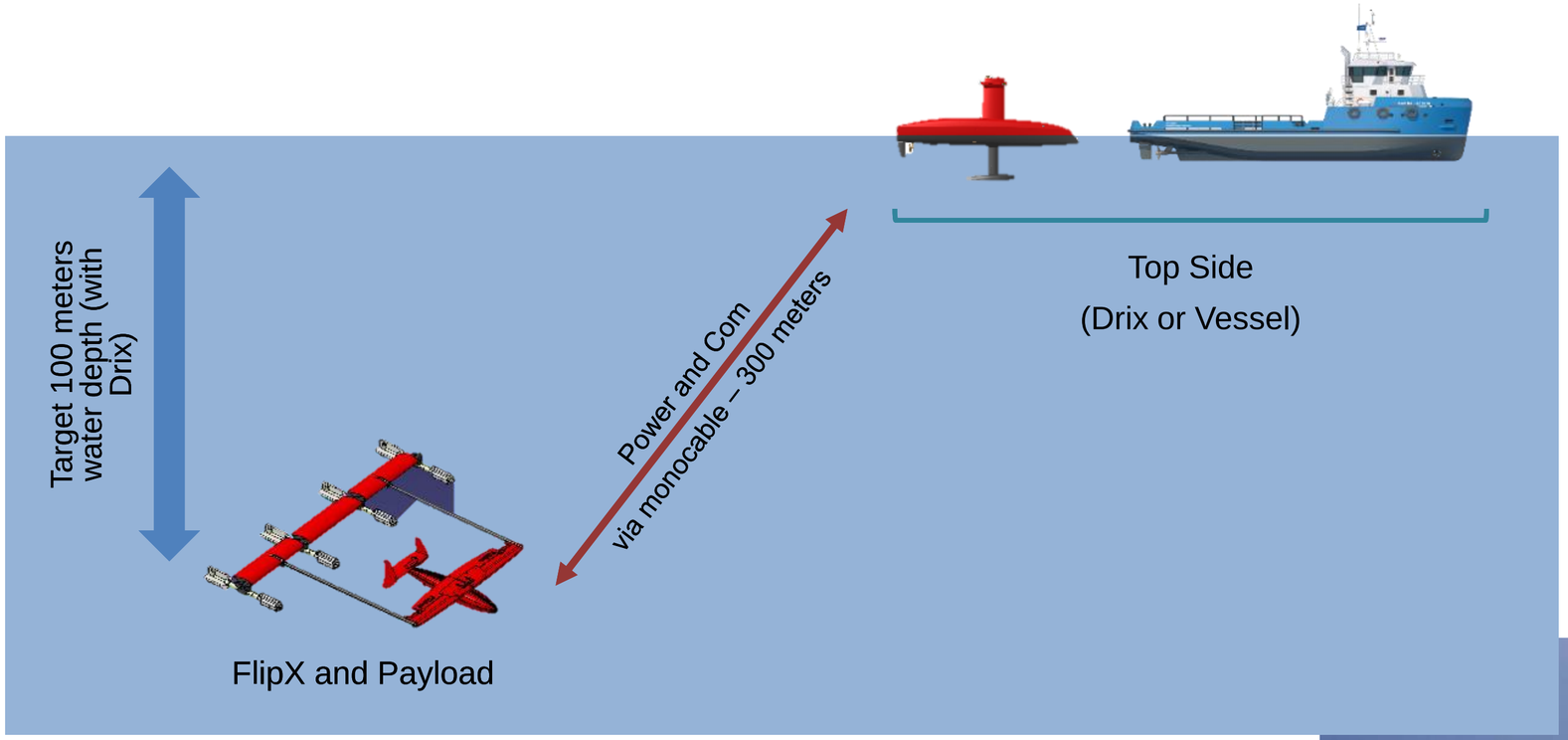
Various sizes and shapes

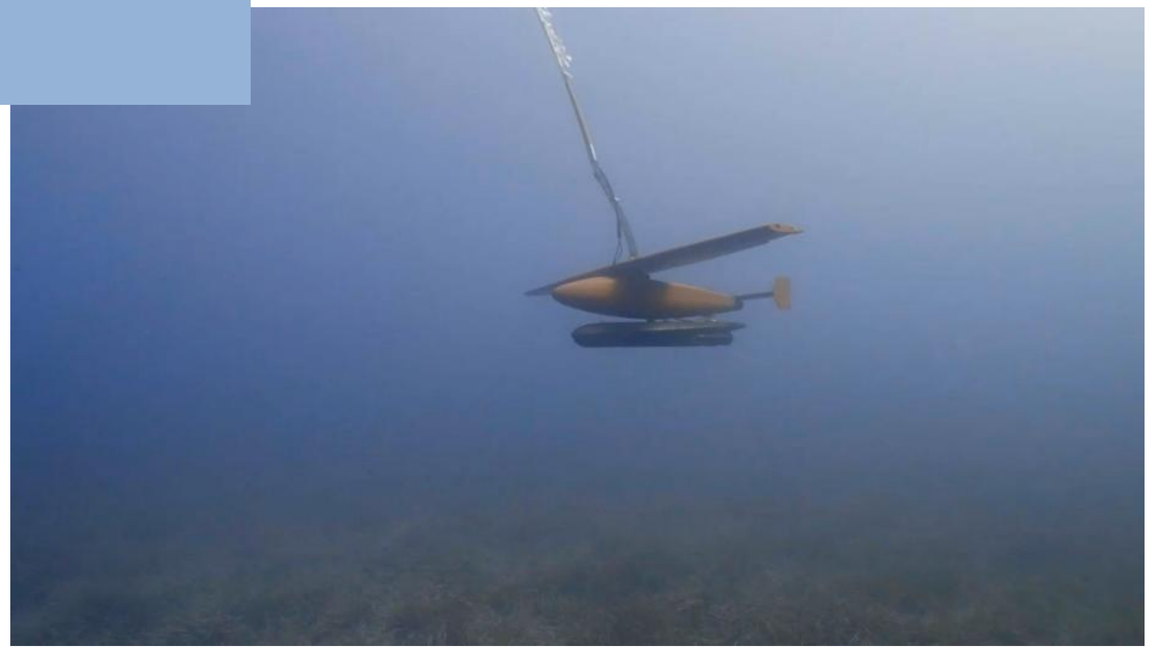


- USBL
- Acoustic modem

All customers requirement within

FLIPIX INNOVATIVE TOW WING





UP-COMING TRANSOCEANIC SOLUTION

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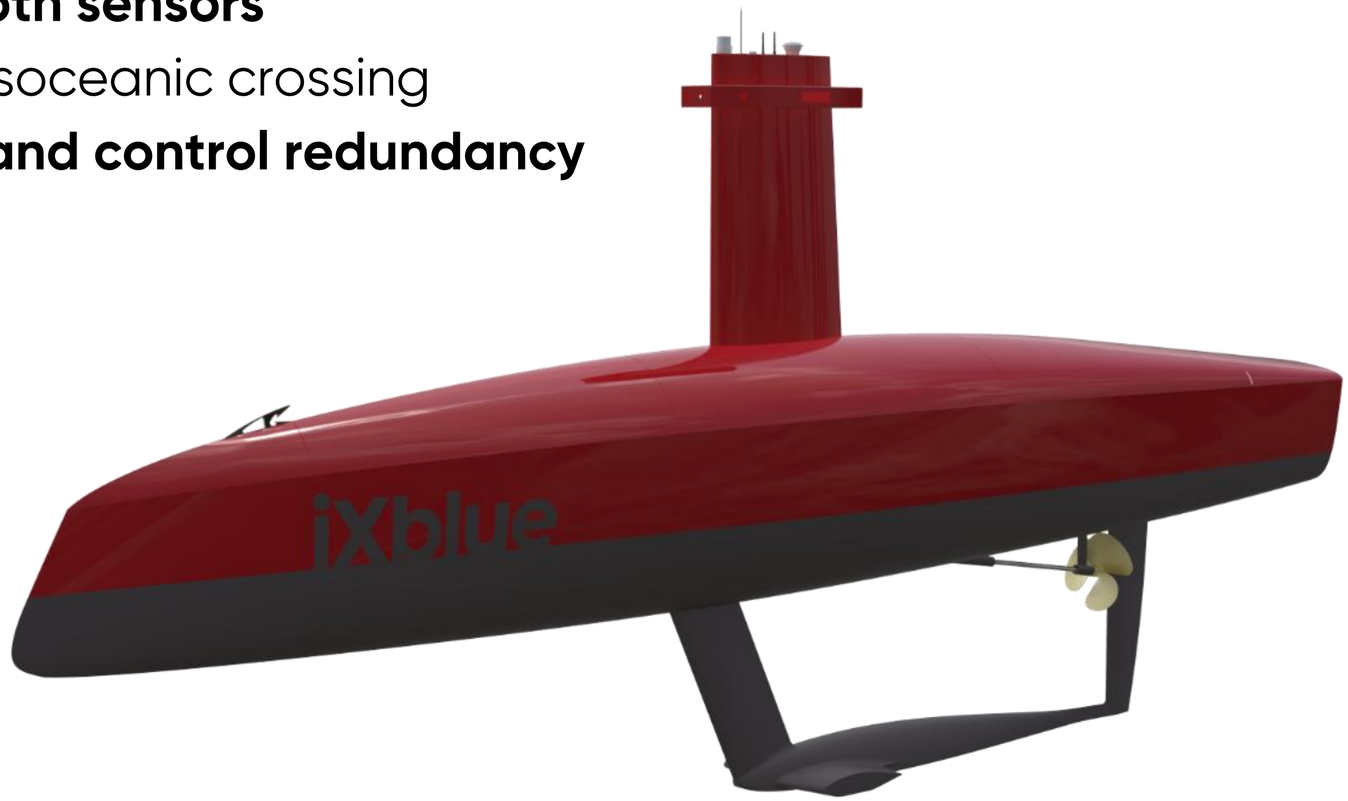
DRIX OCEAN

Moving towards long range (>20 days) capabilities

- To keep the **dynamic** and the key **differentiators** observed on DriX
- To keep **low manning**
- To enhance the **large payload offer** (higher power, heavier and larger payload)
- Be capable to carry **full ocean depth sensors**
- To offer **longer endurance** for transoceanic crossing
- To offer **full propulsion and command control redundancy**



CONCLUSION

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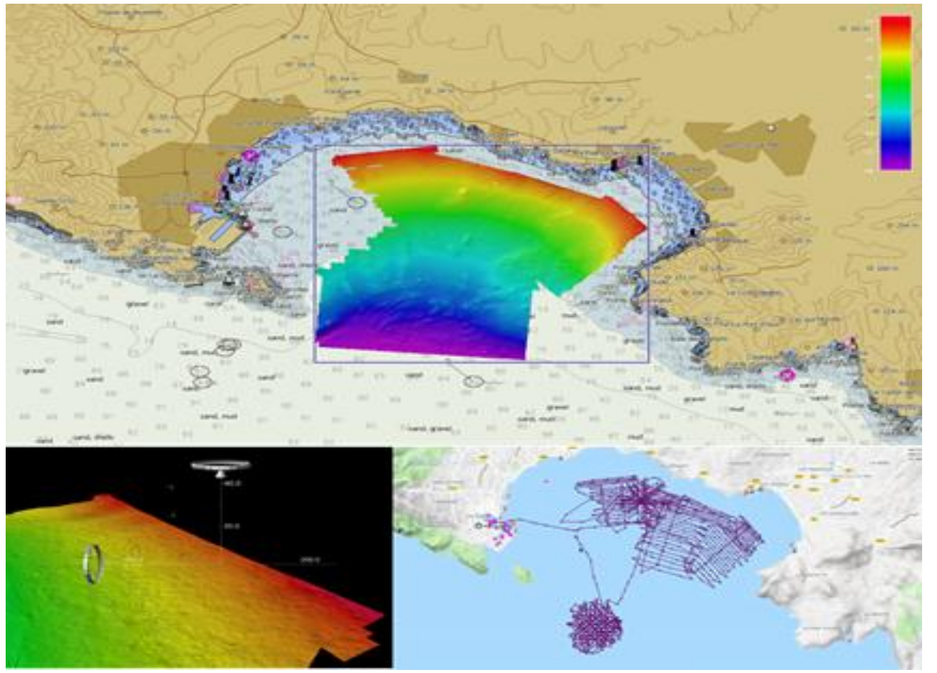
DriX USV Return of Experience

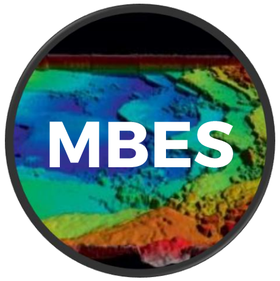
Massive reduction of survey costs

- **Standalone or Force Multiplier solution**
- **Drastic reduction of fuel consumption (- 90%)**

(fuel consumption: 2.5L/h at 10kts speed)

- **Sea proven in Sea state 5**
- **Reduced vessel downtime**
- **High speed surveys up 8 to 12 knots**
- **Line change : less than 1 minute**
- **Endurance 8 days @ 4kts / 3 days @ 8kts**
- **Over the Horizon / Radio / GPRS / Wifi com**





THANK YOU FOR YOUR ATTENTION

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