

exail



**IXBLUE & ECA**

**BECOME  
EXAIL**

**exail**

# Exail at a glance



**1500**

EMPLOYEES

**80**

COUNTRIES SERVED WORLDWIDE

**20+**

% OF TURNOVER  
INVESTED IN R&D

**24/7**

TECHNICAL SUPPORT

**2000**

COMPANIES SERVED EACH YEAR

**250+**

MILLION EUROS OF TURNOVER

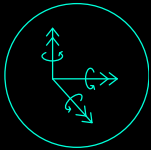


FACILITIES IN FRANCE

## A GLOBAL FOOTPRINT



# Our expertise



Inertial navigation



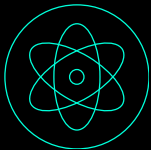
Subsea acoustic positioning and imagery



Autonomous vehicles, drones systems and AI



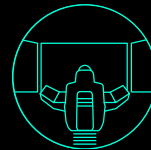
Ship equipment and protection



Photonics and quantum



On-board electronics and manufacturing & testing solutions for aeronautics

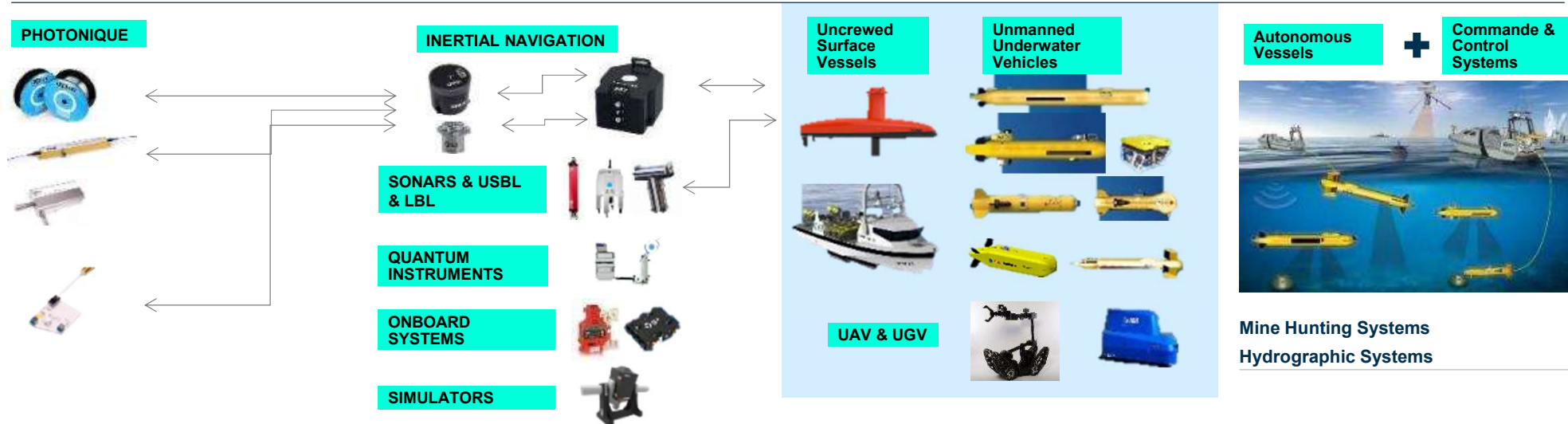
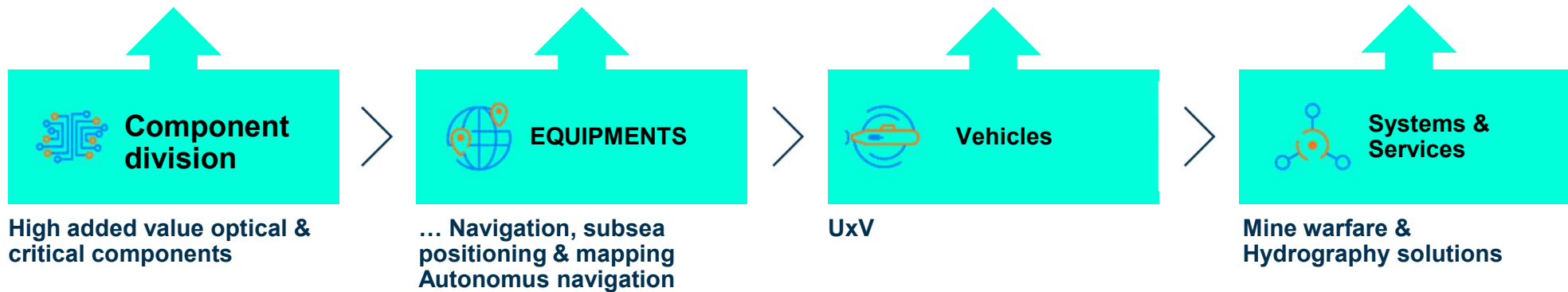



Training simulation



Mechatronics

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





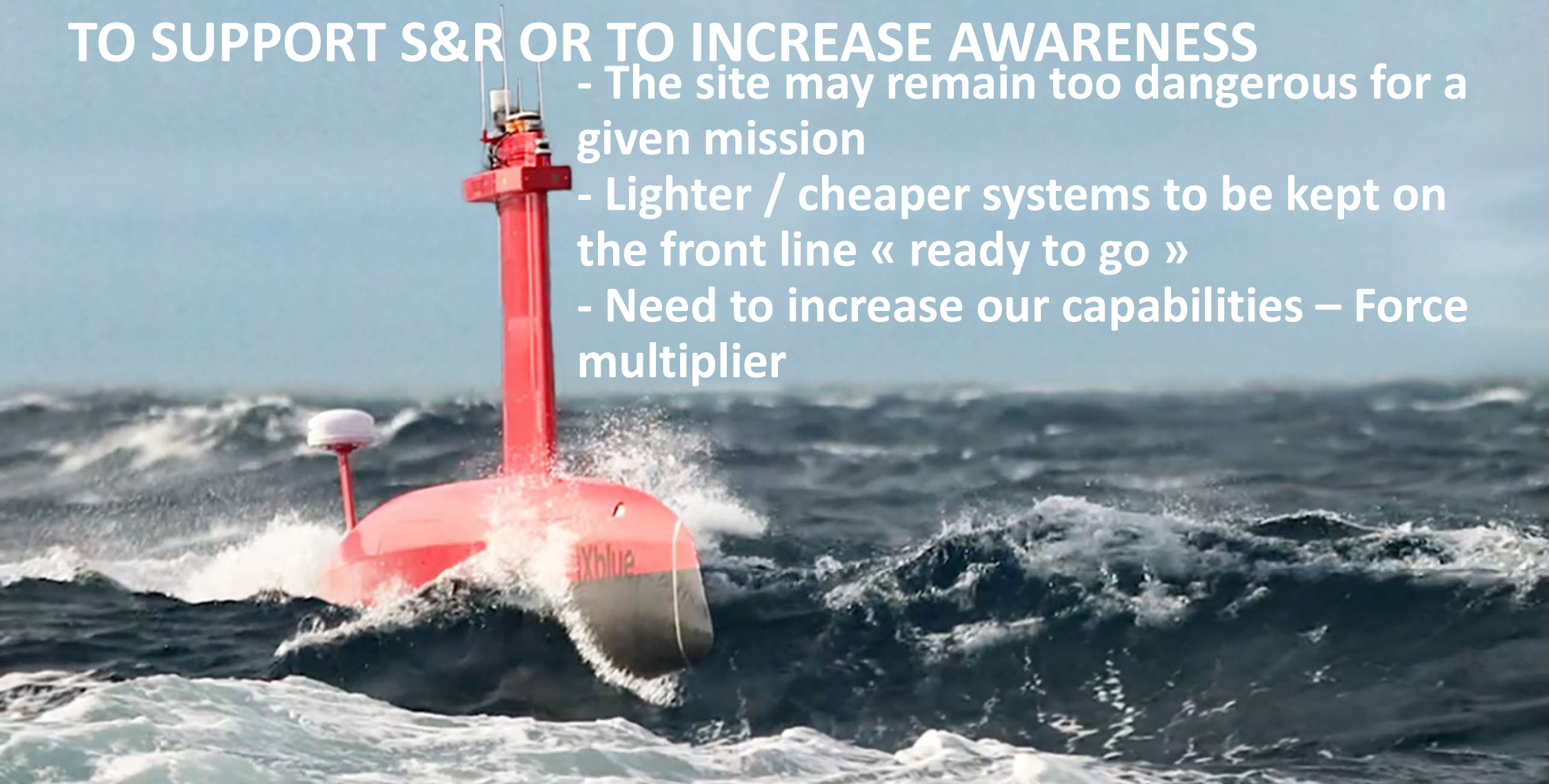
# REMOTE HYDROGRAPHY CONCEPT AS PART OF THE RESPONSE TO DISASTER TOOLBOX

CASABLANCA  
MAY 24

# WHY REMOTE OPERATED SOLUTION

## TO SUPPORT S&R OR TO INCREASE AWARENESS

- The site may remain too dangerous for a given mission
- Lighter / cheaper systems to be kept on the front line « ready to go »
- Need to increase our capabilities – Force multiplier





# EXAIL REMOTE HYDROGRAPHY SOLUTION:

## KEY STRATEGIC CHOICES

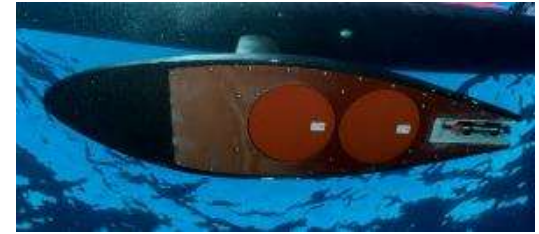
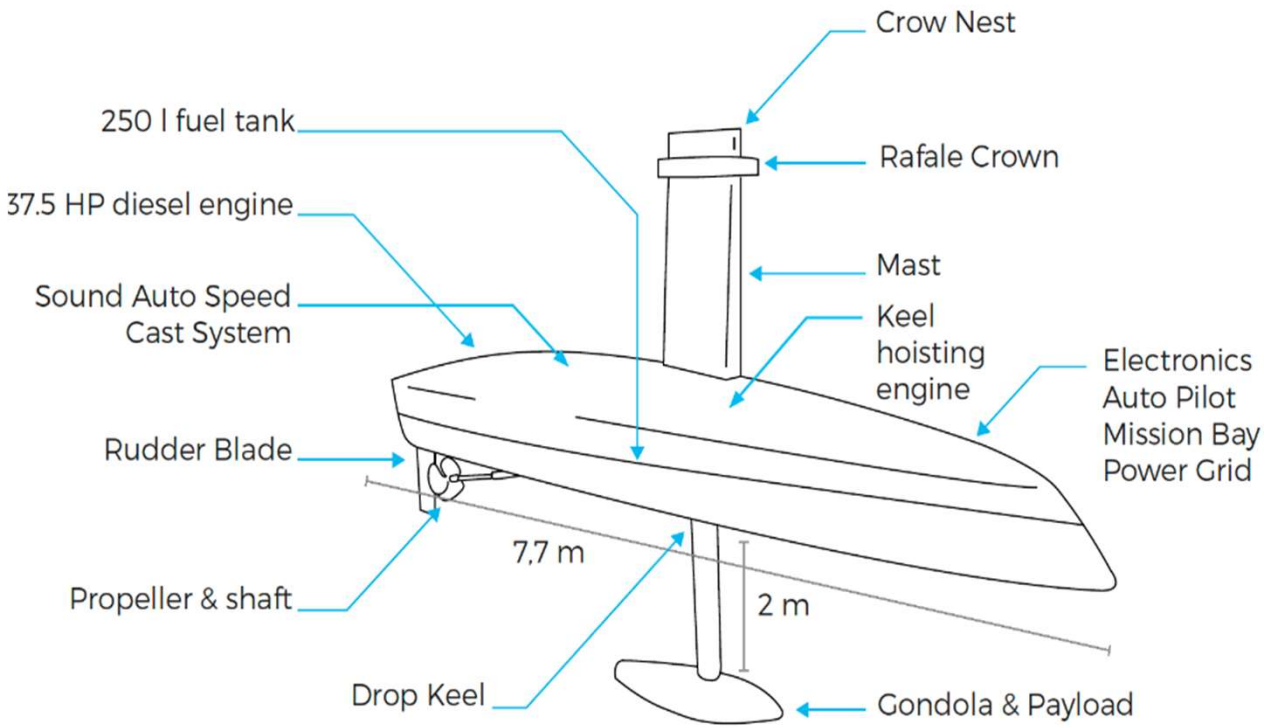
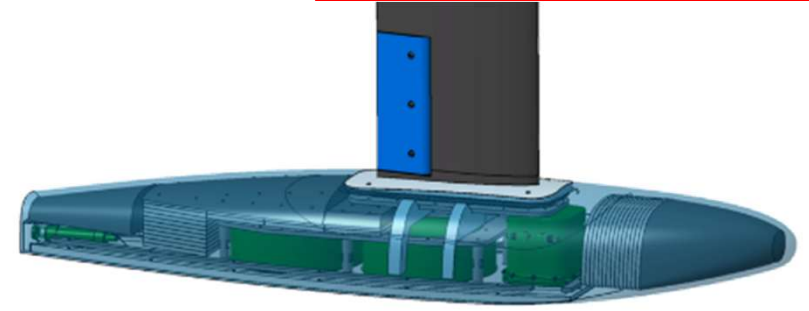
- INTEROPERABILITY
- STANDARDIZED
- PAYLOAD AGNOSTIC
- ENDURANCE
- PERMANENT SUPERVISION

FOR RAPID ENVIRONMENTAL ASSESSMENT



# DriX USV in a Nutshell

PROPERTY OF EXAIL



## 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
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### **Performance**

Maximum Speed :	14 kt
Survey Speed :	8+ kt
Fuel capacity :	250 liters
Fuel Consumption (Survey):	2-3 L/h
Range :	650 nm@ 8kt

### **Machinery**

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

DriX



MISSION EQUIPMENT :	Mission software, LIDAR, Video Camera, IR camera
MISSION PAYLOAD:	OPEN ARCHITECTURE – Surface and sub-surface sensors: CAMERAS, RADAR, RADIO RELAY, MBES, FLS, SSS, SBP, MAG...
COMMUNICATION:	WiFi, Maritime Broadband Radio (MBR) , SATCOM, IRIDIUM
AUTONOMY:	Up to 500 Nm to 1000 Nm



# DRIX FAMILY

# Maritime Autonomy Solutions



**DriX H-8**  
Medium range USV



**DriX H-9**  
Long range USV

<b>Length</b>	7,71 m	9 m
<b>Displacement</b>	1,6 t	2,1 t
<b>Endurance*</b>	< 10 days	< 20 days
<b>Speed</b>	< 14 kts	< 13 kts
<b>Fuel capacity</b>	250 L	550 L
<b>Range</b>	1,000 nm	2,000 nm
<b>Communications</b>	Wifi, 4G, Satellite communication, UHF radio	Wifi, 4G, Satellite communication, UHF radio
<b>Towing / launch &amp; recovery</b>	ROTVs towing capabilities	ROTVs towing capabilities
<b>Station keeping</b>	Hovering	Hovering
<b>MBES capacity</b>	3,000 m depth	3,000 m depth
<b>Transportation</b>	1x 40' High Cube container	1x 40' High Cube container
<b>Other</b>	Launch & Recovery system	

\* Endurance depends on speed, gondola size, towing capabilities

# Maritime Autonomy Solutions



## DriX O-16

Transoceanic range USV



## DriX O-25

Custom-made USV

15,75 m	25 m
10,5 t	80 t
< 30 days	< 30 days
< 16 kts	< 13 kts
2,300 L (dual hybrid propulsion)	20,000 L (hybrid propulsion)
2,500 nm	2,500 nm
Wifi, 4G, Satellite communication, UHF radio	Wifi, 4G, Satellite communication, UHF radio
ROTVs, Inspection Class ROVs, 1,000 m rated AUVs	ROTVs, Work Class ROVs, 6,000 m rated AUVs
Dynamic Positioning	Dynamic Positioning 2
Full ocean depth	Full ocean depth
2x 40' High Cube container	On cargo ship deck
Customizable stern section for additional payload integration	< 20 tons payload allowance



## How USVs reply to DISASTER RESPONSE TOOLBOX EXPECTATIONS

- Weather tolerance
- High quality survey platform
- Get the crew away from risk
- Rapid deployment
- Low cost and easy maintenance



## DISASTER RESPONSE DriX System

- **Weather tolerance**
- High quality survey platform
- Get the crew away from risk
- Rapid deployment
- Low cost and easy maintenance



**WE MUST BE READY TO SAIL, COLLECT DATA ASAP, EVEN IN ADVERSE WEATHER**



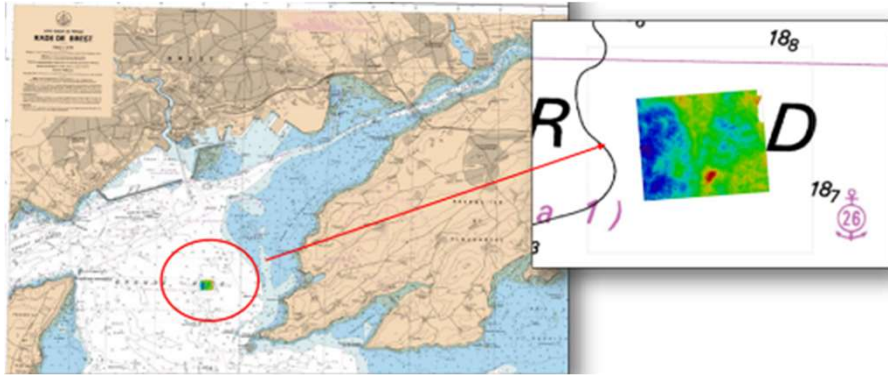


## DISASTER RESPONSE DriX System

- Weather tolerance
- **High quality survey platform**
- Get the crew away from risk
- Rapid deployment
- Low cost and easy maintenance

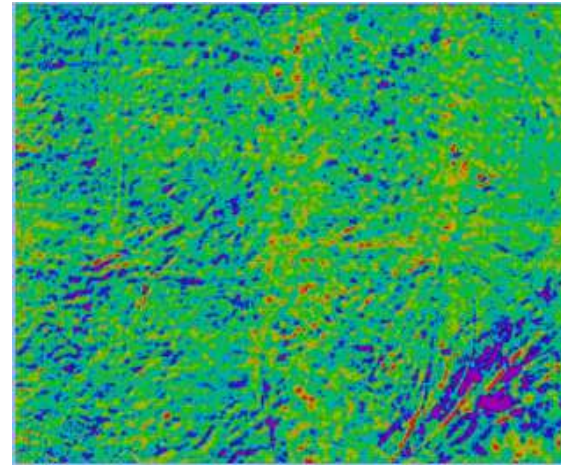
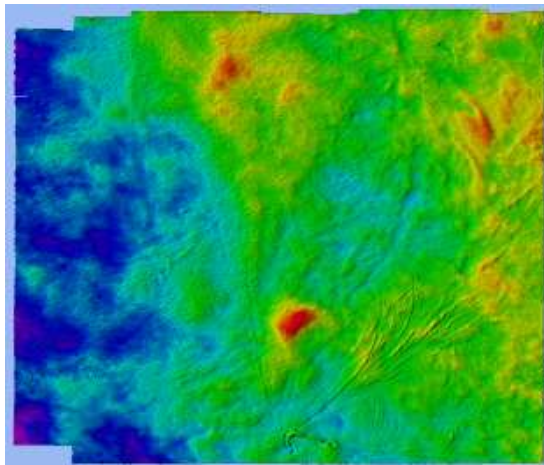
# Data Quality

## Qualification on SHOM - Reference area survey

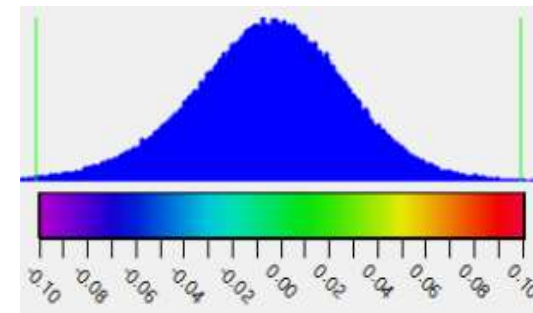


Outstanding achievements on meeting IHO exclusive order requirements in Uncertainty and data density @20m

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



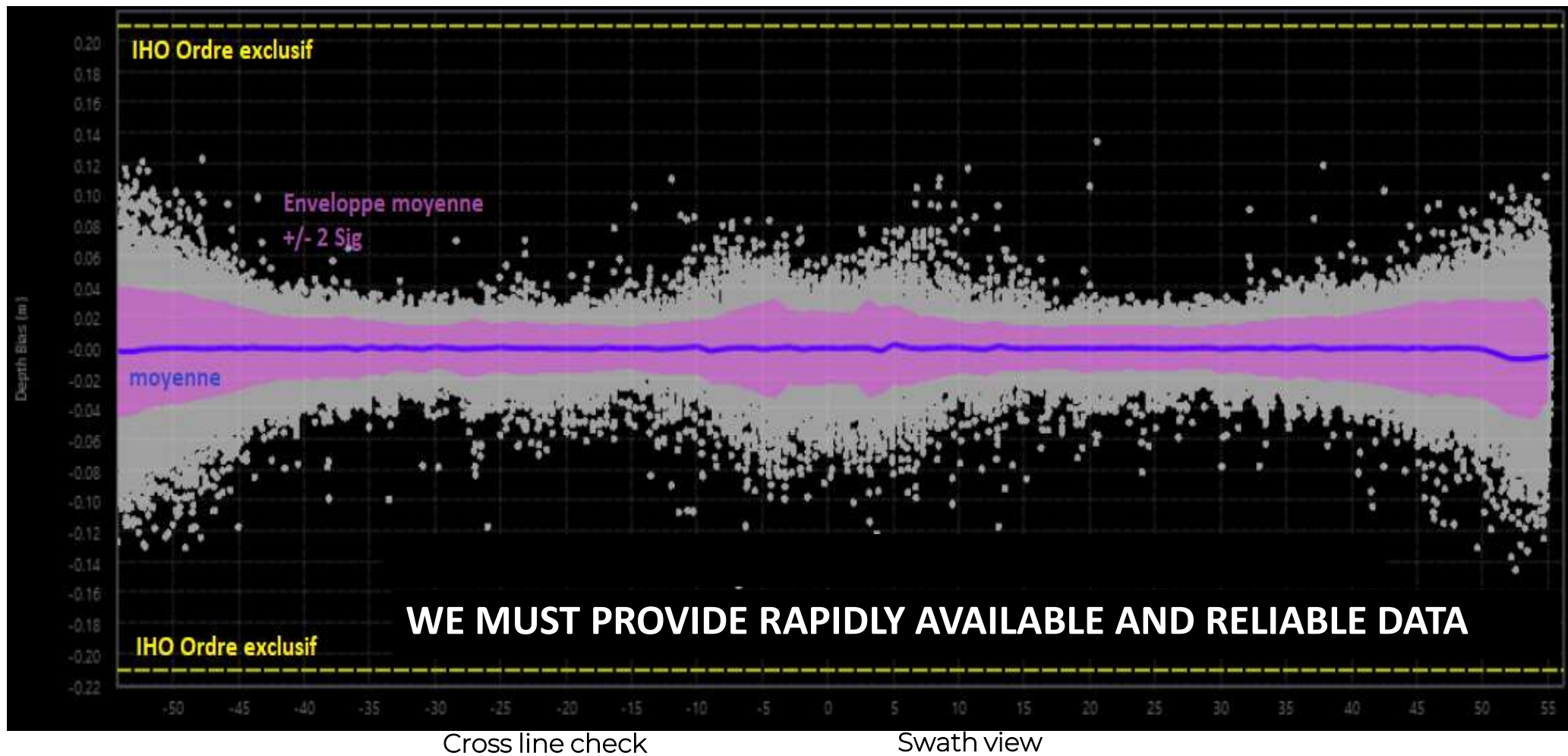
Differential map  
DriX vs SHOM ref data set



Differential statistic  
distribution

# Case Study: Hydrographic Reference Site

Qualification on reference area



# Return of experience hydrospatial data collection

## Autonomous remote – EEZ and Archeological survey Canada/France

North Atlantic – 650km<sup>2</sup> survey

- **Archaeological survey**
- **Sedimentologic model**

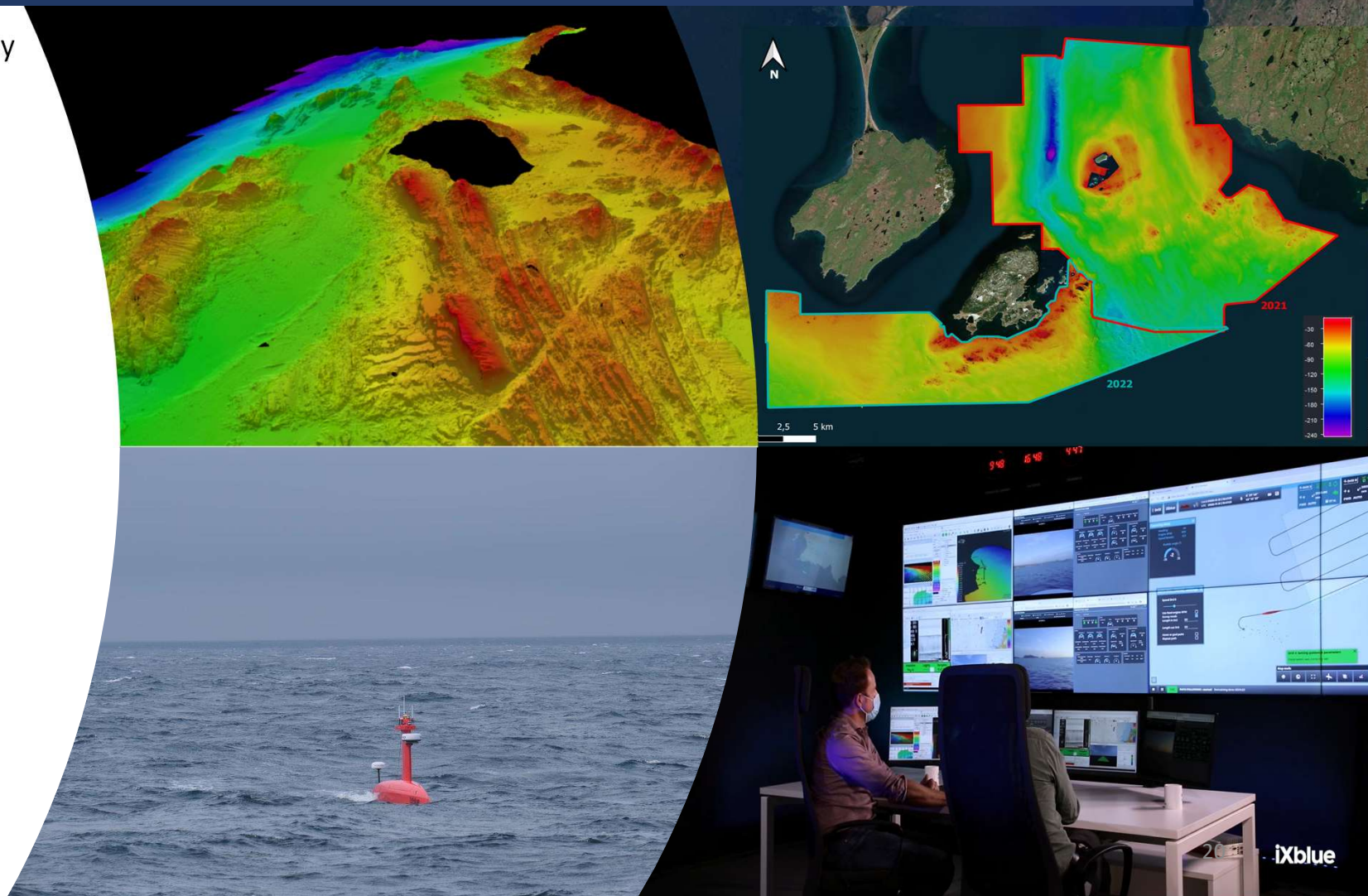
### Harsh Weather :

- Av. SeaState 4
- Wind up to 45kts
- Tidal current up to 2.5 kts
- Extremely Bad visibility



### Supervised Over THE HORIZON

- GPRS network
- Satellite communication solution

Data: > **6.0 Terabit**

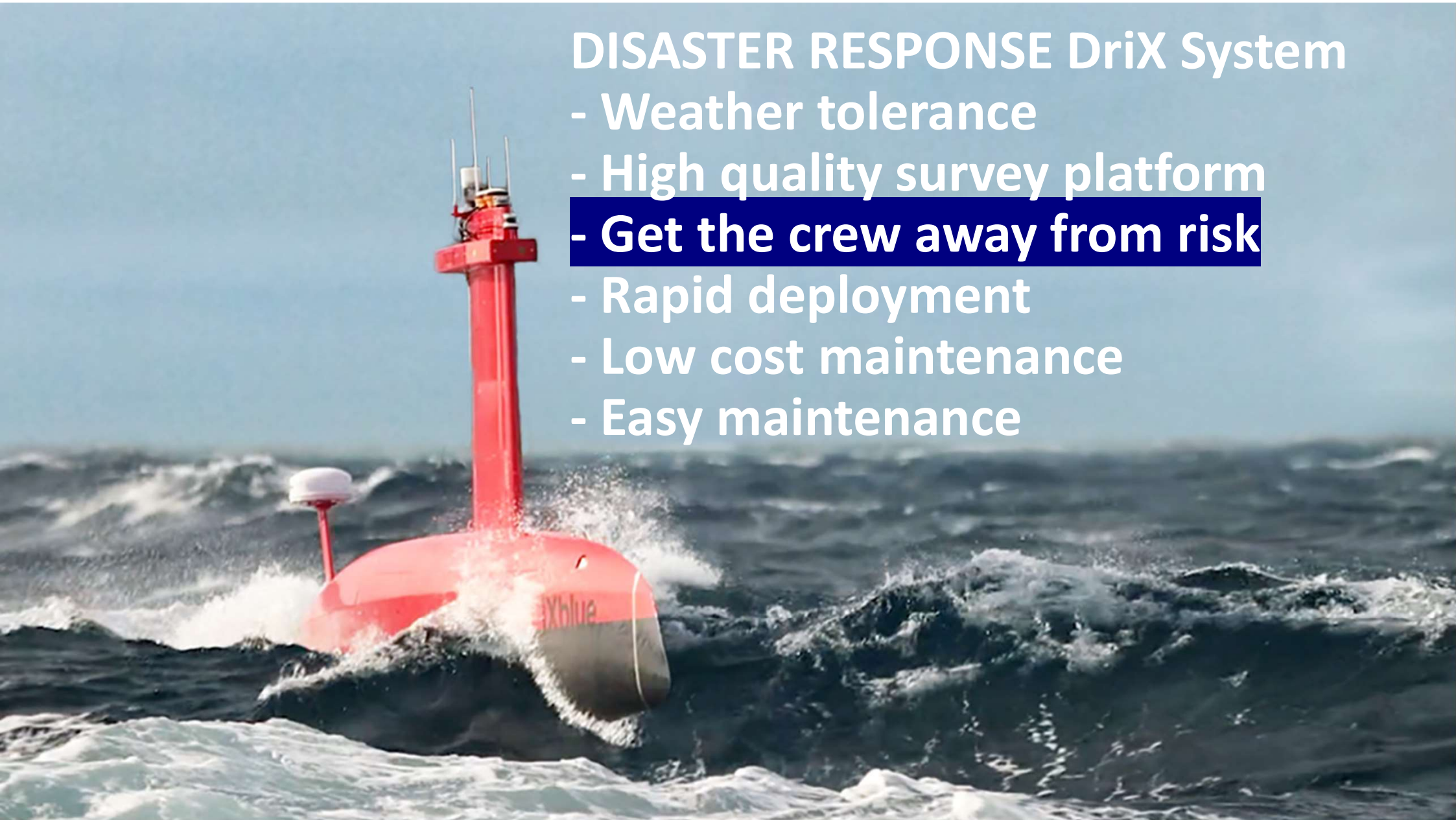


# Autonomous remote – EEZ and Archeological survey Canada/France

Benefits of DriX USV vs Vessels	DRIX (OTH Ops)	Opportunity Vessel
Archaeological search	<p><b>9000 line km – 650km<sup>2</sup></b>  <b>Water depth 5 to 270m</b></p>	
Survey Platform		 <p>© Alan Jugeau <a href="http://www.littoral-manche-atlantique.com">www.littoral-manche-atlantique.com</a></p>
Duration of Operation	<p><b>60 Days</b>            10% Weather downtime</p>	<p><b>80 Days</b>            30% Weather Downtime</p>
<p><b>CO<sup>2</sup> Equ</b>            1l = 2.6kg equ CO<sup>2</sup></p>	<p><b>6.5 To CO<sup>2</sup></b>  <b>98% savings</b></p>	<p><b>338 To CO<sup>2</sup></b></p>
Man-hours Risk Exposure	<p><b>180h</b>            99% Savings</p>	<p><b>15 500 h</b></p>

## DISASTER RESPONSE DriX System

- Weather tolerance
- High quality survey platform
- **Get the crew away from risk**
- Rapid deployment
- Low cost maintenance
- Easy maintenance



Would you like to be here?



**WE MUST SET HUMAN BEING AWAY FROM RISK**

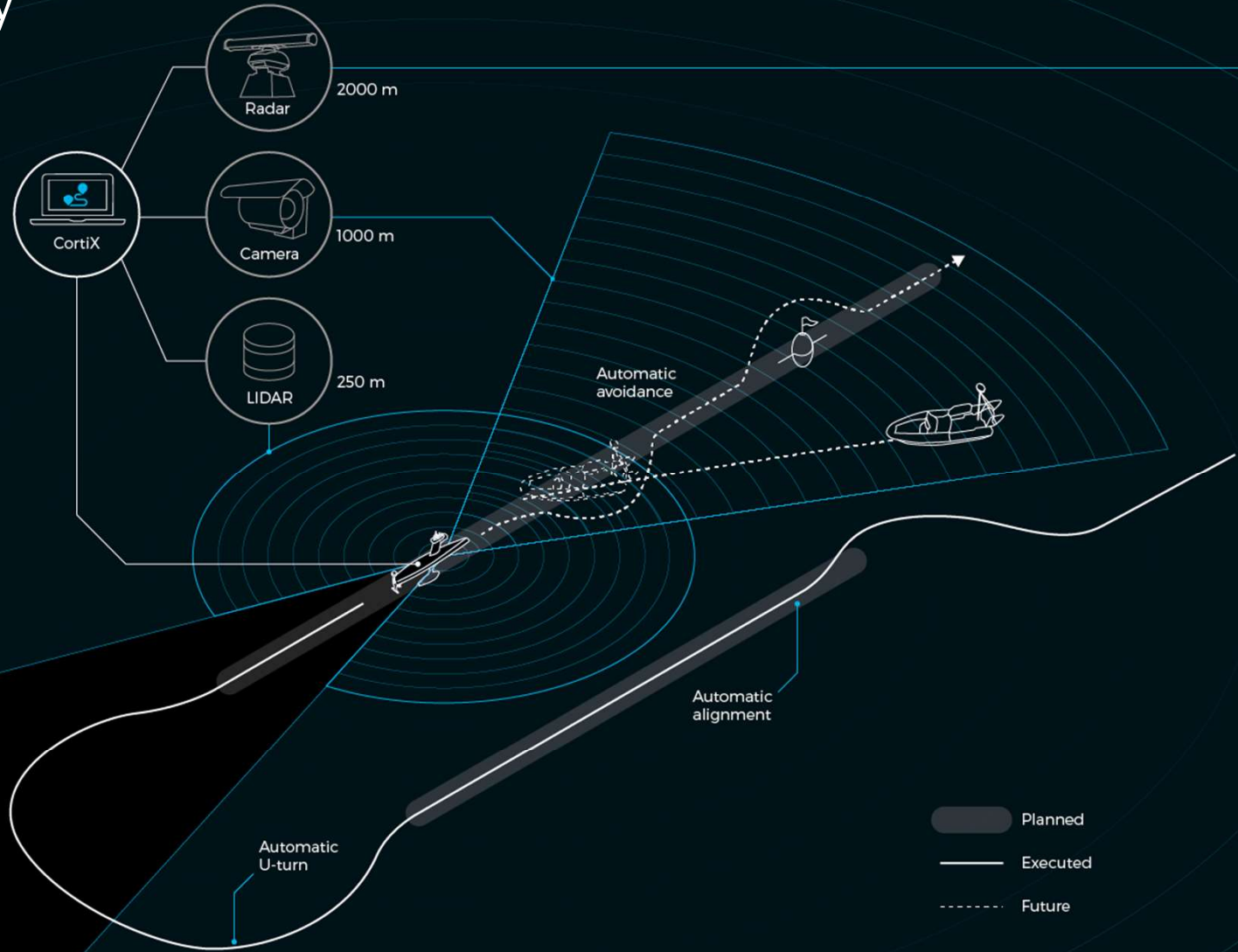


# EXAIL REMOTE HYDROGRAPHY SOLUTION:

- REMOTE SUPERVISION DRIX
- MULTI-DRIX OPERATION



# Navigation safety



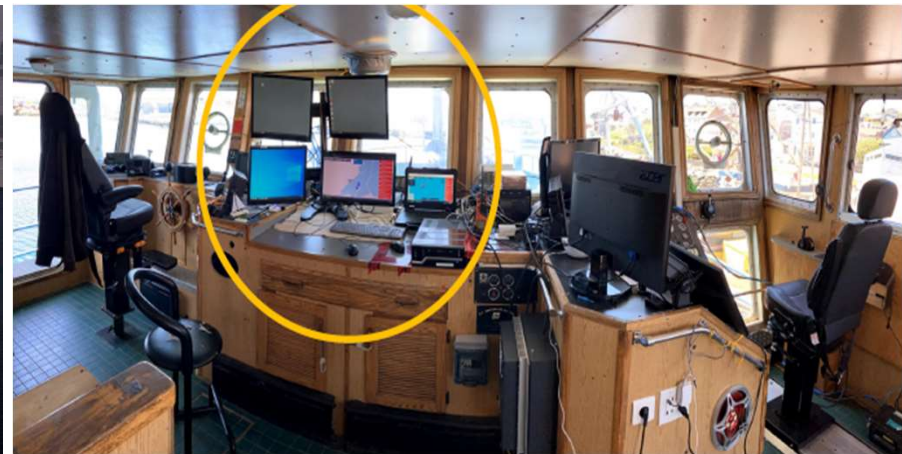
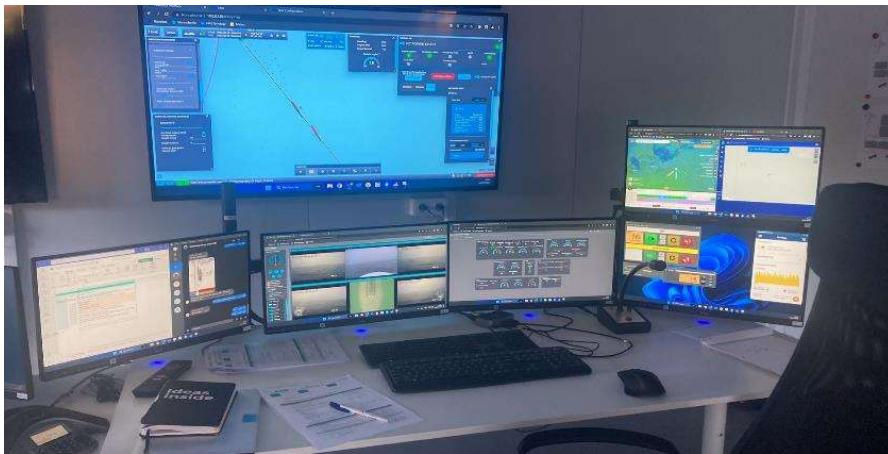
# Example of Autonomous Navigation in Restricted Waters



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

# 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

**iXblue**



## DISASTER RESPONSE DriX System

- Weather tolerance
- High quality survey platform
- Get the crew away from risk
- **Rapid deployment**
- Low cost and easy maintenance

# A SIMPLIFIED LOGISTIC



Road transportation on regular trailer



Sea shipment in a 40ft container



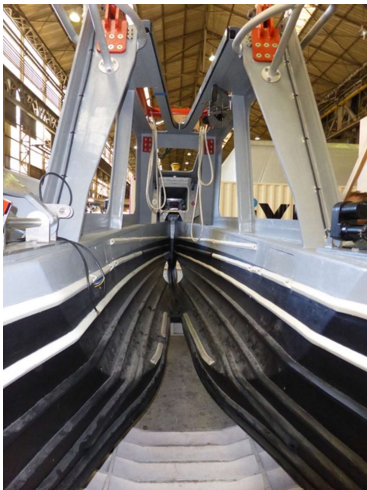
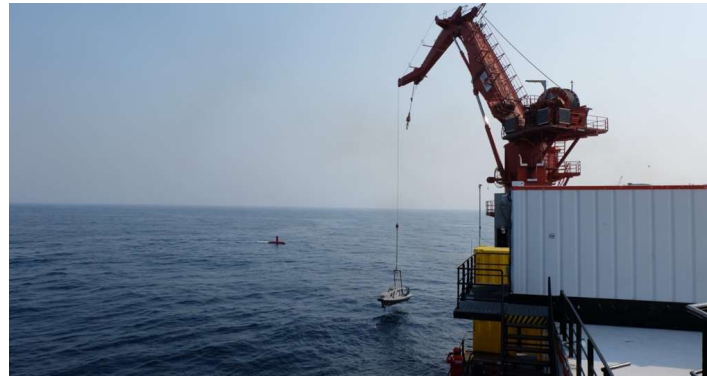
Air shipment in a crate

**Export control:**  
Considered as a stand-alone solution (Ease the shipping of dual-use sensors)

**WE MUST BE READY**

# LAUNCH AND RECOVERY FROM SHORE OR SUPPORT BOAT

## Launch and Recovery with Drix Deployment System (DDS)



DDS Compatible with:

- Davit crane
- A-Frame
- Deck crane

DDS can be used for  
Drix on-board storage

DRIX Auto-Docking



*EXAIL- Commercial in confidence*

# DRIX DEPLOYMENT SYSTEM

## Main Dimensions

Lenght Overall (LOA)	8.8 m
Beam:	2.3 m
Height (road transportation):	3.42 m
Displacement :	1.5 tons
DriX + DDS total weight:	3.2 tons

## Construction materials

Hull & superstructure (infusion)	Vinylester/E-Glass/balsa core
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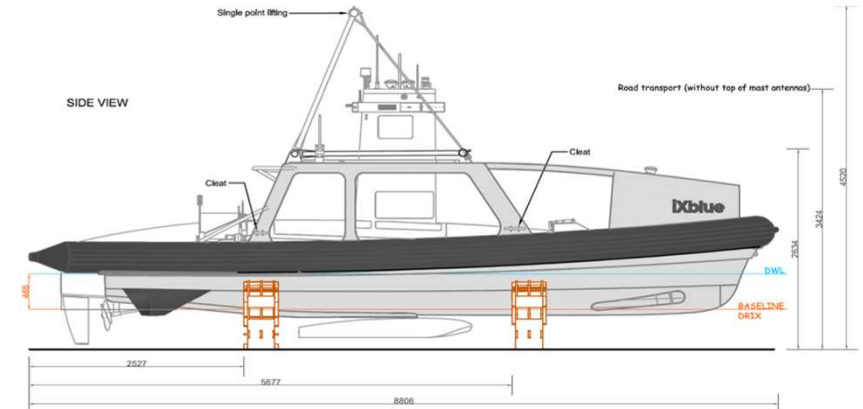
## Lifting Methods

- 1 single lifting point (central lifting point)
- 2 lifting points (rear lifting hoop and bowpad eye) (optional)

## Comms & Positioning

- 2 Wifi antennas (one on portside, one on starboard side) on the aft part
- 1 GNSS antenna and 1 QUADRANS®

DDS



**CLASS :**

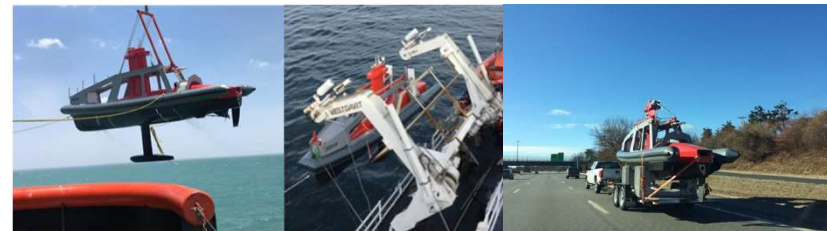
**BV lifting device**

**MISSION PAYLOAD:**

One Fully loaded Drix

**Lifted from:**

Mother vessel or pier - Deck crane, davit, A-frame



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## DISASTER RESPONSE DriX System

- Weather tolerance
- High quality survey platform
- Get the crew away from risk
- Rapid deployment
- **Low cost and easy maintenance**

# RELIABLE AND EFFICIENT

A ruggedized design for reliable operation and easy maintenance

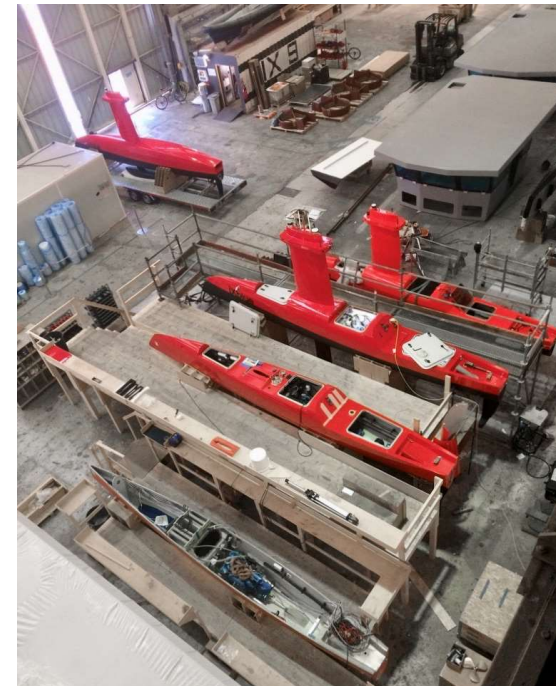
**A SIMPLE, RELIABLE  
POWERTRAIN**



A 38 HP diesel Engine

*EXAIL- Commercial in confidence*

**COMPOSITE  
CONSTRUCTION**



- Strong construction
- No corrosion
- Easy reparation

# KEY DIFFERENTIATORS VS A CONVENTIONAL SURVEY VESSEL

## CONVENTIONAL SURVEY VESSEL



VESSEL: 50-100 m  
Crew: 30 - 50 personnes  
Energy: 4 - 10 Tons diesel / day  
CO2: 90 kg/Nm

Investment: few 10s of M€

Maintenance: 1 M€/year

Need for logistic support  
Crew changes  
Safety at sea

## DriX – REMOTE HYDROGRAPHY

USV: 8 m  
2 people monitoring remotely  
Energy: 50 litres diesel / day  
CO2: 1.5 kg/Nm

Investment: 1.5 to 2.5 M€

Maintenance: 15 - 30 k€/year

Operational support from a shore control station or a mother vessel.



**YES WE MUST BE READY, BUT THAT READINESS MUST BE AFFORDABLE**



THANK YOU FOR YOUR ATTENTION

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