



Subsea Positioning and Communication Solutions
OI2018 Qingdao - October 2018



Just think about it...in everyday's life, we need positioning

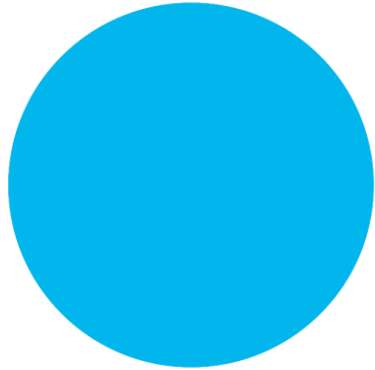
- To go to a given place without get lost
- To return to the same place afterward
- To get oriented, geo-referenced
- To document what we do, what we produce
- To meet
- To save time



Just think about it...in everyday's life, we need positioning

Oops, under sea surface...
it is very dark down there!
I cannot see anything!
my GPS is not working!

Where are we ?



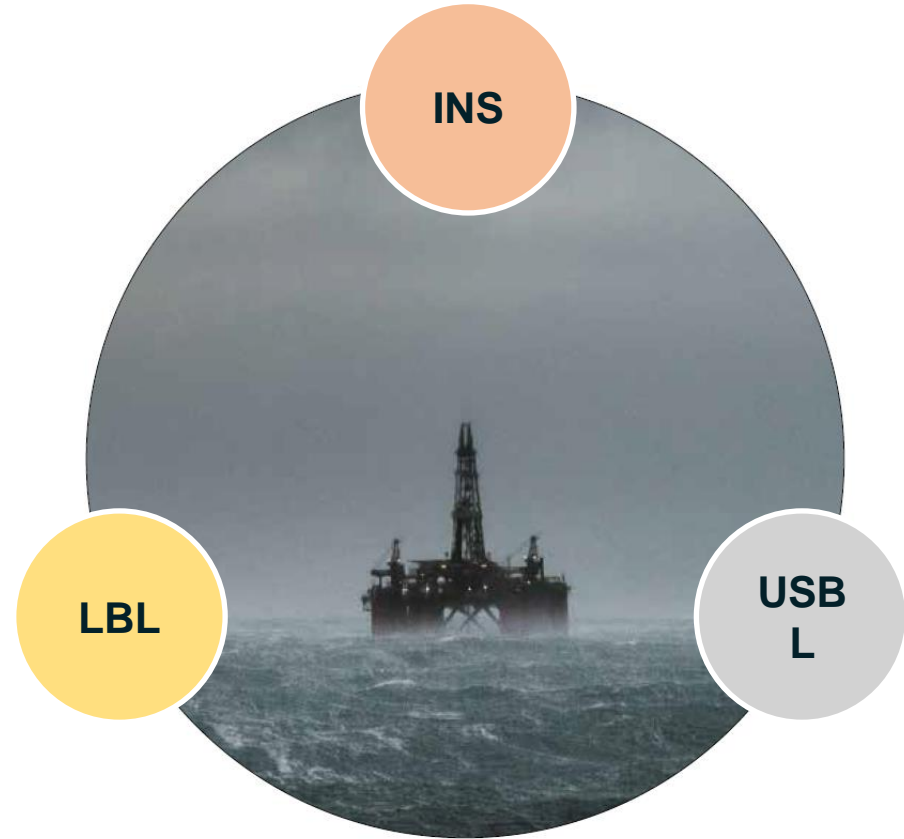
CANOPUS, subsea positioning as simple as GPS

CANOPUS system

Principles of subsea positioning

Over time various technologies have been invented, improved, combined together, for underwater positioning

- LBL, Long BaseLine acoustic positioning systems
- USBL, Ultra Short BaseLine positioning systems
- INS, Inertial Navigation Systems
- Combined solutions



CANOPUS system

Some already existing sensors...

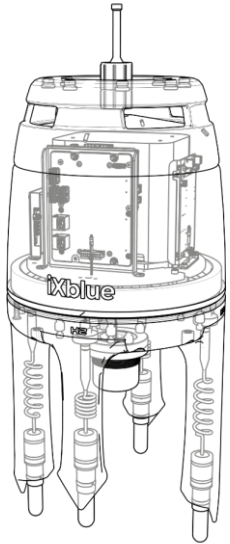
With its innovative approach iXblue already develops intelligent sensors and sub-systems to make positioning simpler:

- Hide the complexity of sensors inside the bottle
- Provide pre-calibrated systems when possible, or develop strategy to make calibration simpler (e.g. SLAM)
- Combine technologies and sensors to improve performance, reduce quantity of equipment (e.g. Sparse Array navigation)
- Have all sensors / sub-system use a common intuitive WEB-based Man Machine Interface

CANOPUS system

Some already existing sensors...

GAPS, the first pre-calibrated USBL on the market,
all-in-one, portable, universal tracking



RAMSES, the first acoustic transceiver
with SLAM algorithm and Sparse Array navigation capability

A common look and feel WEB MMI across the products range



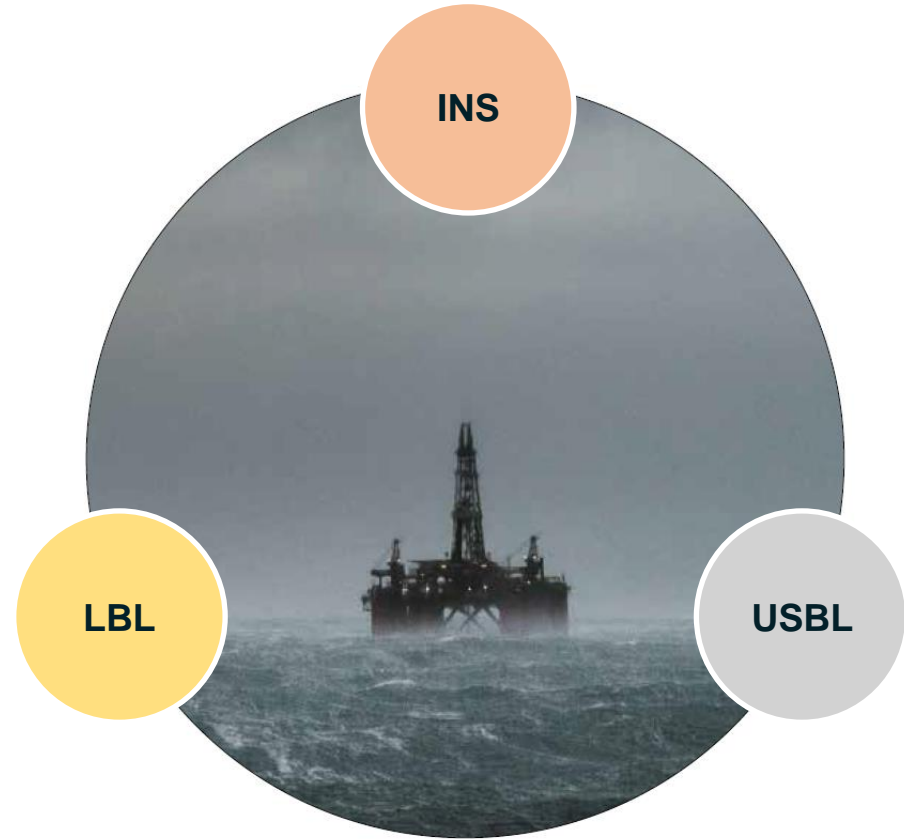
CANOPUS system

Some already existing sensors...

But things are still complex, requires long mobilization, expertise

Today most users are looking at simplicity, scalability, efficiency... time saving

A “push-button” like solution is expected then one can concentrate on our own job and forget about this technology



The iXblue CANOPUS projects aims at making these tasks simpler

CANOPUS project

The main goals

The project goals are multiple...

- Add missing or better components / products in the system (e.g. intelligent transponder)
- Implement required features in existing products (e.g. data transmission capabilities)
- Develop a system approach which aggregates all products in order to deliver a global solution (simplicity)
- Be able to address large project using iXblue products, or third party equipment (compatibility)
- Make sure the solution is versatile and scalable to fit most applications

CANOPUS project

A new smart transponder and transceiver



Designed to serve all applications ...

- ✓ 4,000 m water depth, deeper optional, corrosion resistant
- ✓ Extreme low power consumption for extended deployment periods (>4years or 1,000,000 pings)
- ✓ Open architecture: compatible with iXblue products range (Gaps, Ramses) and 3rd party existing equipment
- ✓ Robust telemetry link and high speed modem to communicate with other transponders, systems, and to surface
- ✓ Multiple users capability
- ✓ Accurate to the cm for range measurements
- ✓ Internal / external environment sensors included in base configuration, optional sensors, embedded data logger
- ✓ User interface (MMI) through WIFI communication. (the iXblue products Look and Feel!)
- ✓ Scalable electronic and firmware platform

CANOPUS project

A new smart transponder and transceiver

- The usual and convenient iXblue WEB-based MMI....
Not even necessary to plug to the beacon itself, it can be wireless!



Main	Acoustic	Sensors	Interfaces
System	Diagnostic	Maintenance	iXblue

Configuration Cancel Apply

Date & Time Cancel Apply

System: 2018/01/29 @ 16:54:21

Planning Cancel Apply

Start: 2018/01/30 @ 12:00:00 Yes 19°3'54"
Stop: 2020/01/30 @ 12:00:00 Yes 730°0'0"

Event log Cancel Apply

Logging: Loop when full
File size: 12.98 Ko Delete

Hibernation Cancel Apply

Wake Up Signal: 20000 Hz
Sleep Delay: 10 min

Network / WiFi Cancel Apply

Enabled: Yes
SSID: CANOPUS
Security: WPA
Key: CAFEFADE
DHCP: No
IP: 30.0.0.1
Mask: 255.255.255.0
Gateway: 192.168.64.250

Main	Acoustic	Sensors	Interfaces
System	Diagnostic	Maintenance	iXblue

Pressure	S. Velocity	Temperature	Inclinometer
Tilt	Release	External	

Configuration Cancel Apply

Enabled: Yes
Warm-up: 1 s
Protocol: None
Duration: 10 s
Recurrence: 1 m
Logging: Loop when full

Command ... (click to show/hide)

#1 - AAAA A, test
#2 - BBBB B, test
#3 - CCCC C, test
#4 - DDDD D, test
#5 - EEEE E, test
#6 - FFFF F, test
#7 - GGGG G, test
#8 - HHHH H, test

Sensor Check Start Stop

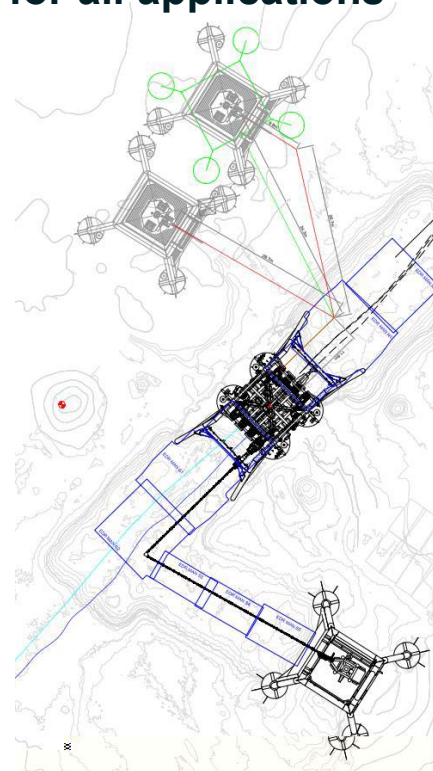
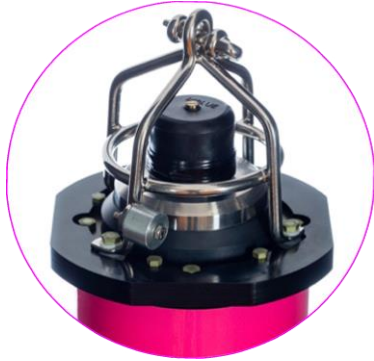
Command: #1 - AAAA Apply

Data: \$PIXCP,EXT,SIZ,10*7Z (x4)
\$PIXCP,EXT,SIZ,9*7Z (x10)
\$PIXCP,EXT,SIZ,8*7Z (x10)
\$PIXCP,EXT,SIZ,7*7Z (x10)
\$PIXCP,EXT,SIZ,6*7Z (x10)
\$PIXCP,EXT,SIZ,5*7Z (x10)
\$PIXCP,EXT,SIZ,4*7Z (x10)

Age: 0°0'0"
File size: 1.01 Ko Refresh Delete

CANOPUS project

A new smart transponder and transceiver ... for all applications



CANOPUS project

Supervision software. A game changer

- A new supervision software is provided to assist during the many steps prior to start putting anything at sea, and during the operations themselves.
- Forget individual sensors, have a broader view on the complete system preferably!

How many transponders must be deployed to ensure positioning accuracy?

How and where to deploy the transponders on the seabed to obtain the accuracy ?

How to calibrate my transponders?

What precision can I expect ?

How to configure the acoustic parameters (TAT, BT, ...) ?

What protocol must be used between the devices ?

What can be the data rate exchange between devices ?

How to estimate the lever arm ?

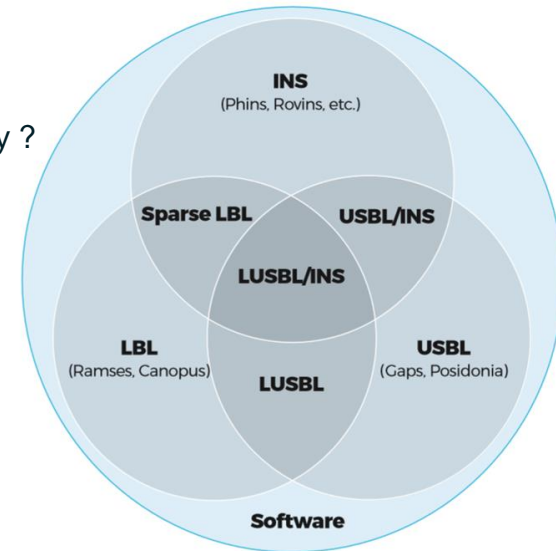
What are the quality check available on the positioning ?

How to produce an automatic report ?

How to check the positioning quality ?

Can I post-process the data ?

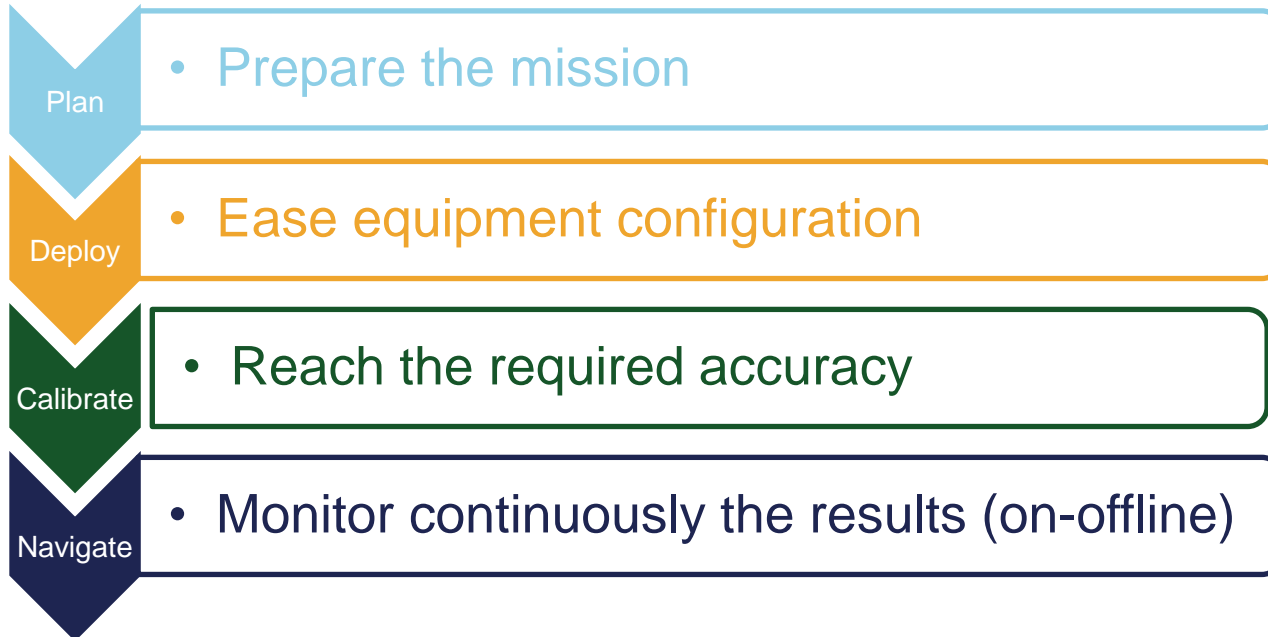
Etc...



CANOPUS project

Supervision software for a global system approach

- Four steps



CANOPUS project

Supervision software

Plan

Prepare the job (how many TP's, where, expected performance, etc).

Deploy and calibrate

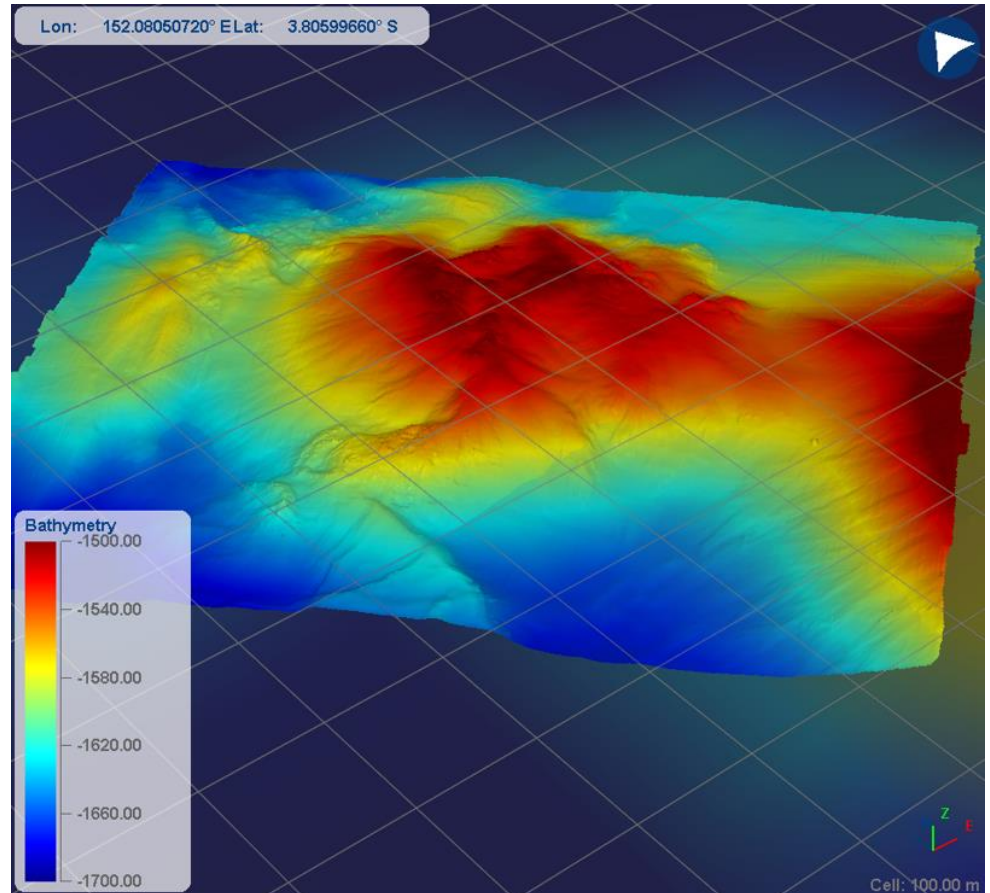
Configure and calibrate.

Operate and monitor

Produce QA/QC, reach expected performance. Raise alarms.

Post-process

Improve performance and additional QC.



CANOPUS project

Supervision software

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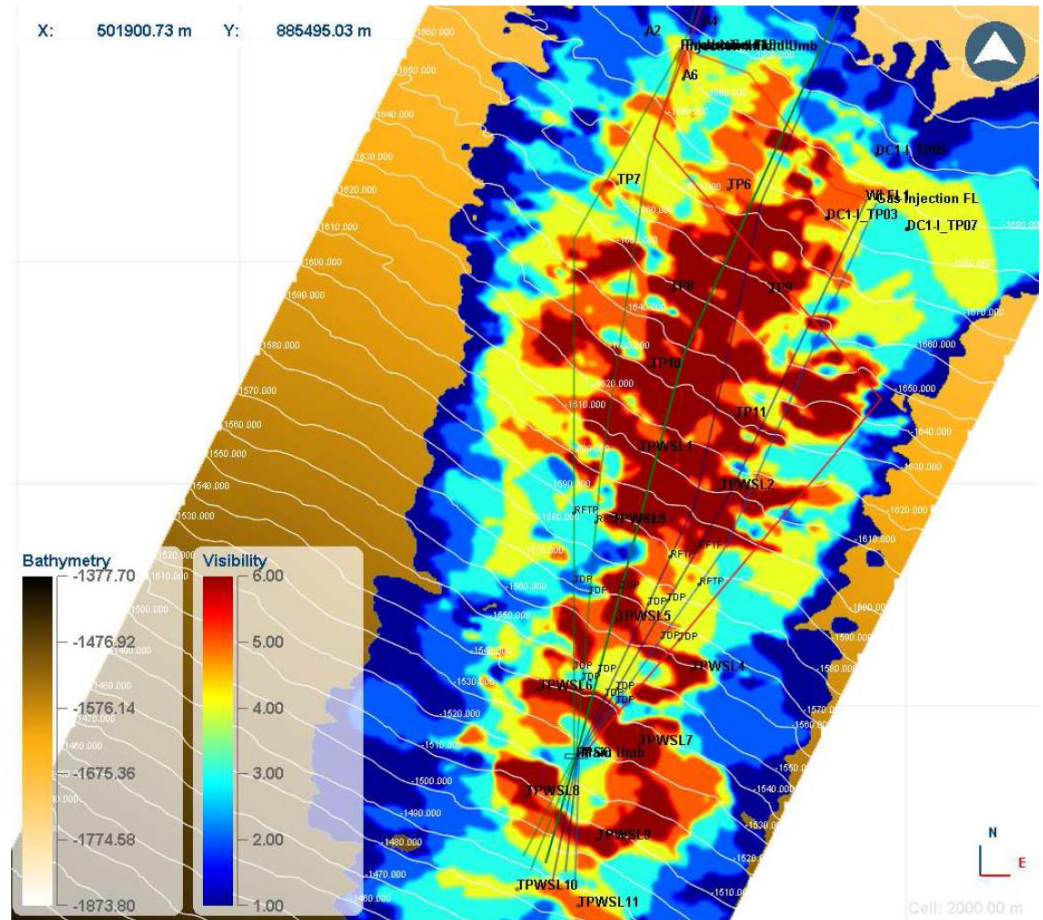
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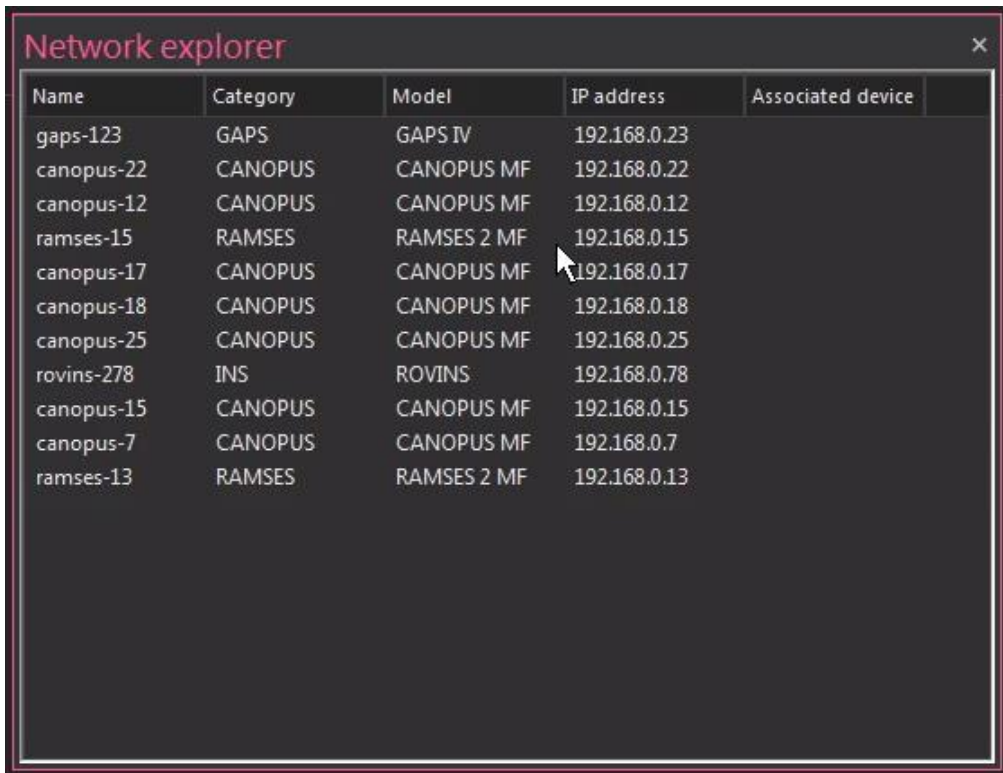
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The screenshot shows a window titled "Network explorer" with a close button (X) in the top right corner. The window contains a table with the following columns: Name, Category, Model, IP address, and Associated device. The table lists 12 devices with their respective details.

Name	Category	Model	IP address	Associated device
gaps-123	GAPS	GAPS IV	192.168.0.23	
canopus-22	CANOPUS	CANOPUS MF	192.168.0.22	
canopus-12	CANOPUS	CANOPUS MF	192.168.0.12	
ramses-15	RAMSES	RAMSES 2 MF	192.168.0.15	
canopus-17	CANOPUS	CANOPUS MF	192.168.0.17	
canopus-18	CANOPUS	CANOPUS MF	192.168.0.18	
canopus-25	CANOPUS	CANOPUS MF	192.168.0.25	
rovins-278	INS	ROVINS	192.168.0.78	
canopus-15	CANOPUS	CANOPUS MF	192.168.0.15	
canopus-7	CANOPUS	CANOPUS MF	192.168.0.7	
ramses-13	RAMSES	RAMSES 2 MF	192.168.0.13	



CANOPUS project

Supervision software

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CANOPUS FLD_P51

General

Pressure Sensor

Sound Velocity Sensor

Temperature Sensor

Inclinometer

Release Sensor

External Sensor

Transponder

Host name: canopus-22

IP Address: 192.168.0.22

Fixed position

Northing: 336709.00 m

Easting: 583456.00 m

Depth: 1510.00 m

Acoustic

CHORUS

Family: 00

Individual: 02

Standard

Common interrogation: CHORUS MF CIS 00-00

Individual reply: CHORUS MF IRS 00-02

Individual interrogation: CHORUS MF IRS 00-02

Common reply: CHORUS MF CIR 00-00

Turn around time: 650 ms

Blanking time: 1.20 s

Positioning level: 181 dBµPa @1m

Telemetry level: 184 dBµPa @1m

Sensors

Pressure

CANOPUS project

Supervision software

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Deploy and calibrate

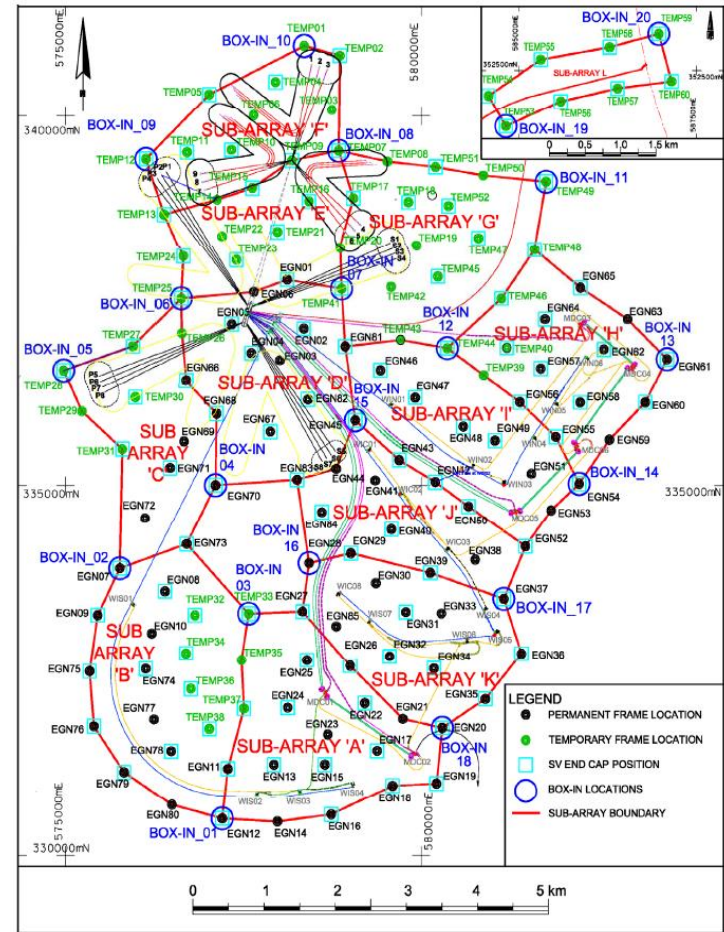
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CANOPUS project

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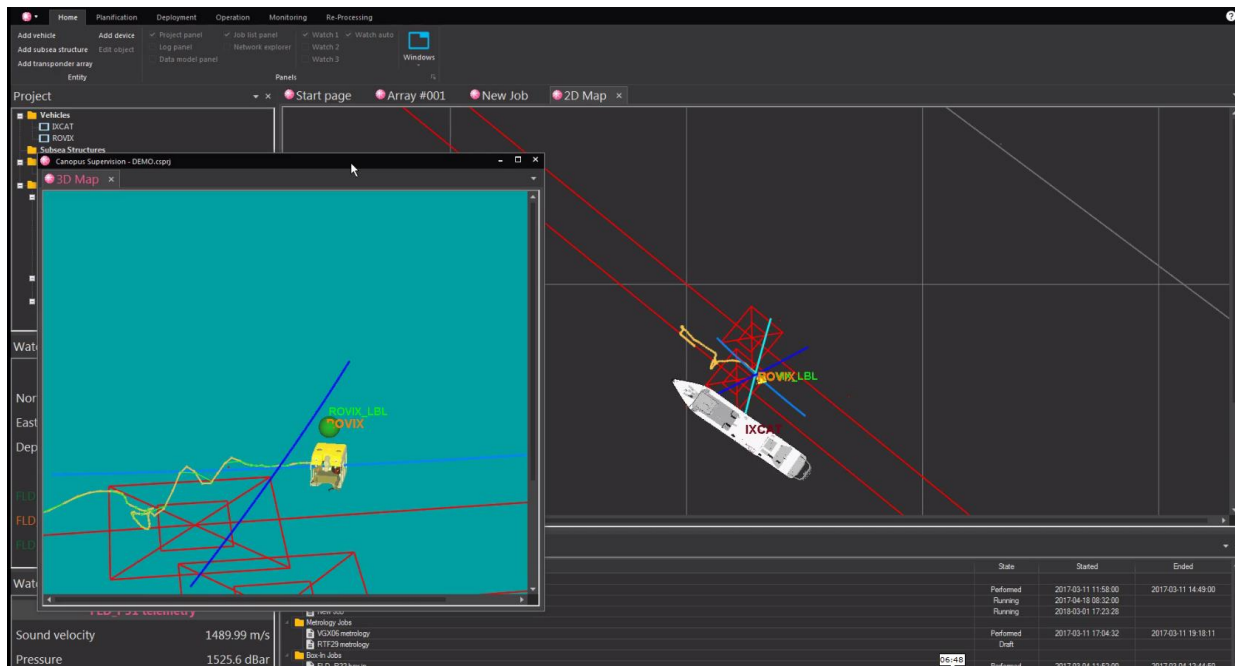
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CANOPUS project

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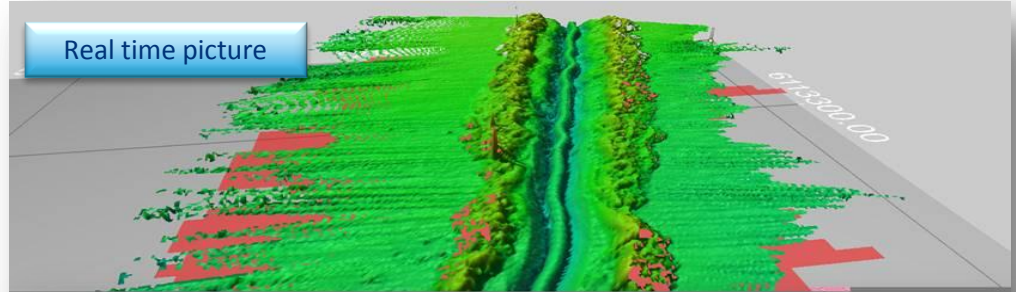
Operate and monitor

Produce QA/QC, reach expected performance. Raise alarms.

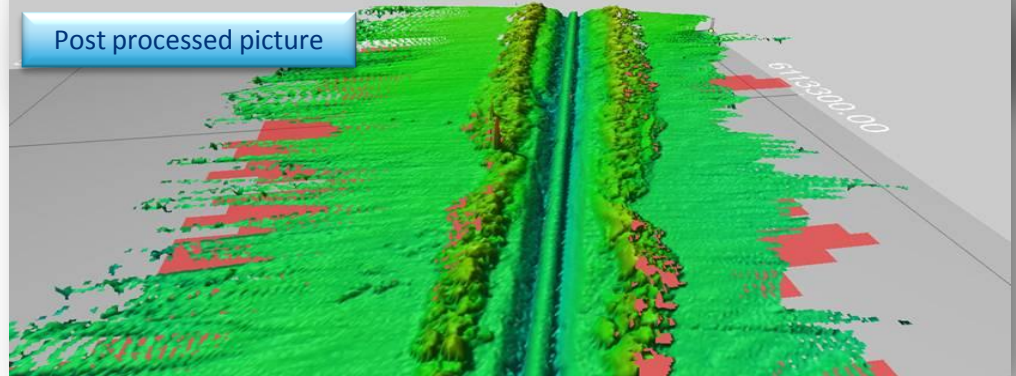
Post-process

Improve performance and additional QC.

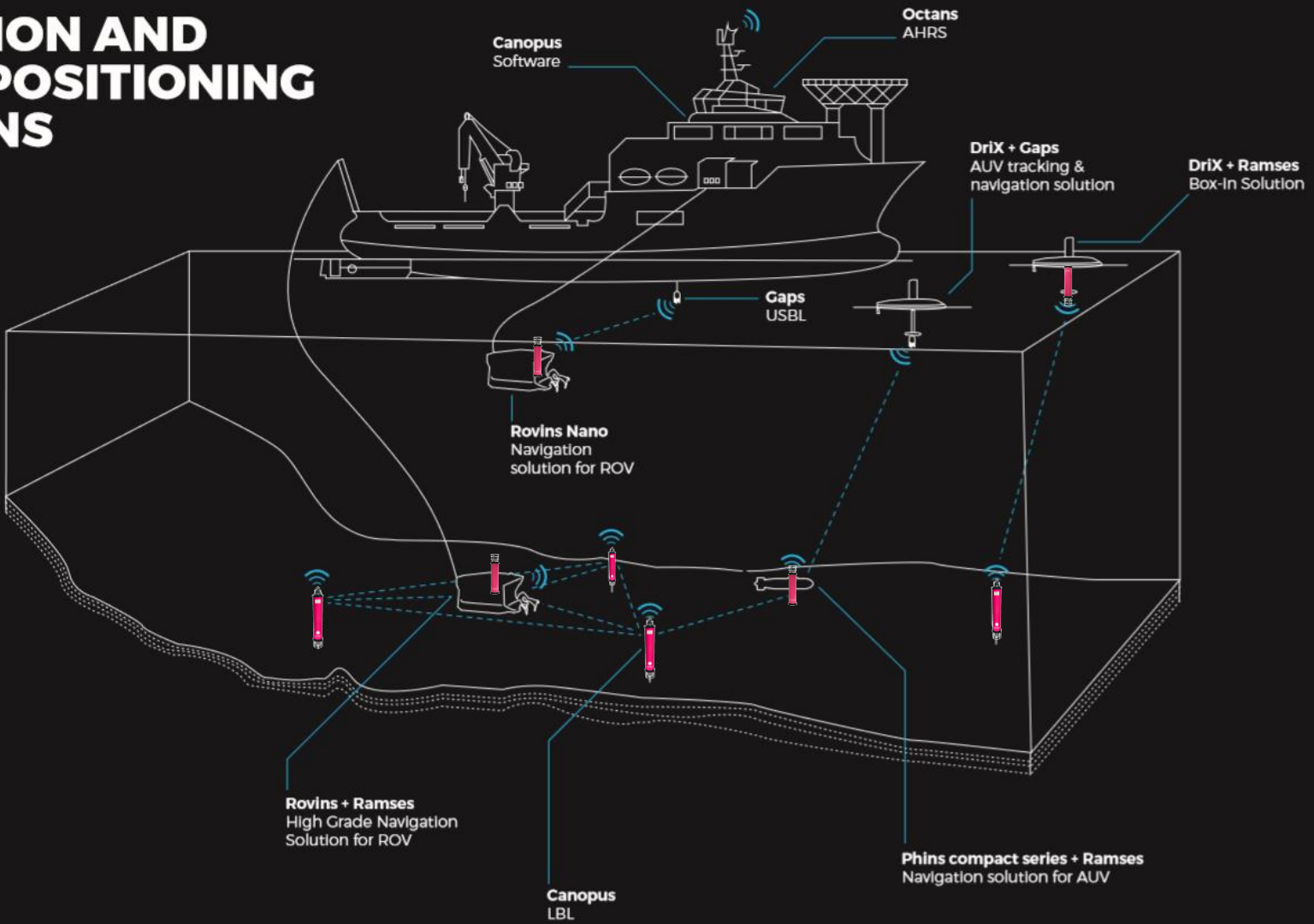
Real time picture



Post processed picture



NAVIGATION AND SUBSEA POSITIONING SOLUTIONS



Canopus Software

Octans AHRS

DriX + Caps AUV tracking & navigation solution

DriX + Ramses Box-In Solution

Gaps USBL

Rovins Nano Navigation solution for ROV

Rovins + Ramses High Grade Navigation Solution for ROV

Canopus LBL

Phins compact series + Ramses Navigation solution for AUV