



Unseenlabs

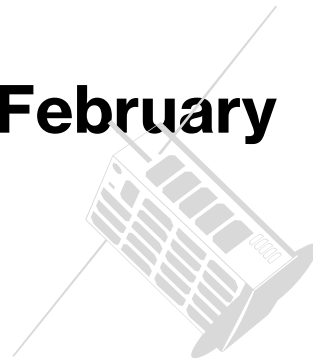
World leader in space-based RF detection

**Contribution of data-relay constellations to the
UNSEENLABS service for Maritime Domain
Awareness**

**IoT4EO 2023 Workshop 16th February
2023 ESTEC**

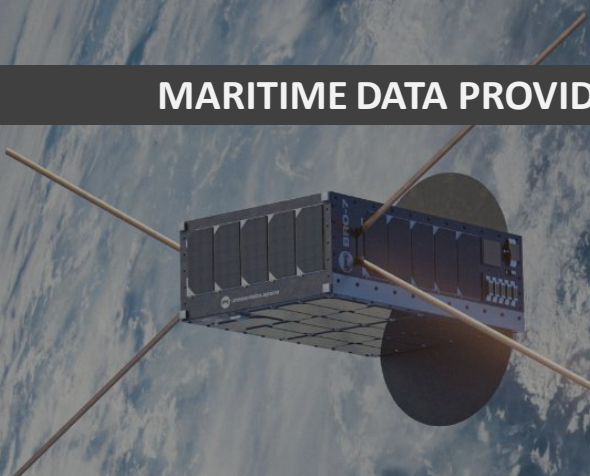
Rosario RUILOBA

Reference: USL-ESA-PRE-074



OUR COMPANY

MARITIME DATA PROVIDER



Created in 2015 - Based in France

PROVEN SPACE GRADE TECHNOLOGIES

dedicated to
Maritime Domain Awareness



OUR SERVICES

We operate a **signal detection** and **geolocation** service of a wide range of Radio Frequency transmitters with our unique **mono-satellite** technology



We serve **customers worldwide** with **actionable data and insights** to help them fight against illegal or undeclared activities at sea



Our constellation in orbit and next steps...



The image displays a horizontal timeline of seven rocket launches. Above each launch image is a circular logo representing the mission. The logos include: a stylized eye with 'WISDOM BEGINS' (BRO-1), a gold star with 'UNSEENLABS' (BRO-2 & 3), a blue globe with 'UNSEENLABS' (BRO-4), a blue globe with 'UNSEENLABS' (BRO-5), a blue globe with 'UNSEENLABS' (BRO-7), a green diamond with 'UNSEENLABS' (BRO-6), and a blue globe with 'UNSEENLABS' (BRO-8).



Launch	Rocket	Date
Launch of BRO-1	Electron - Rocket Lab	August 19, 2019
Launch of BRO-2 & 3	Electron - Rocket Lab	November 20, 2020
Launch of BRO-4	Vega - Arianespace	August 17, 2021
Launch of BRO-5	Falcon 9 - SpaceX	January 13, 2022
Launch of BRO-7	Falcon 9 - SpaceX	April 1, 2022
Launch of BRO-6	Electron - Rocket Lab	May 3, 2022
Launch of BRO-8	Falcon 9 - SpaceX	January 3, 2023



The new operational reference for Maritime Domain Awareness

> see the unseen



	  RF	AIS	OPTICAL	SAR
UNCOOPERATIVE VESSELS DETECTION	✓	✗	✓	✓
COVERED AREA	VERY LARGE	—	SMALL	MEDIUM
UNIQUE & UNFALSIFIABLE IDENTIFICATION	✓	✗	UNCERTAIN	✗
EASE OF DATA IMPLEMENTATION	HIGH	HIGH	MEDIUM	LOW
ALL WEATHER CONDITIONS	✓	✓	✗	✓
DATA ACCESSIBILITY	✓	✓	✓	✓

Maritime surveillance: still many challenges to address



MARITIME TRAFFIC

90%

of goods are transported by sea

74,500+

vessels in the world trading fleet
(> 100 GT) in 2022

IUU FISHING

15%~20%

of fish comes from **illegal fishing**

Between 11 & 26 million tons of fish
each year



80% of the time, the position of ships is unknown or inaccurate

PIRACY

One major incident recorded everyday
worldwide is related to piracy

In 2021, the global cost of piracy was estimated at \$24B

POLLUTION

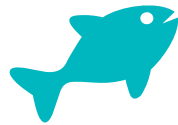
Only 1%

of maritime polluters degassing at sea
are prosecuted





OUR MARKETS



Fishing



Civil
Governments



Maritime
Insurers



Shipowners



Offshore
Energy



Business
Intelligence



Environment

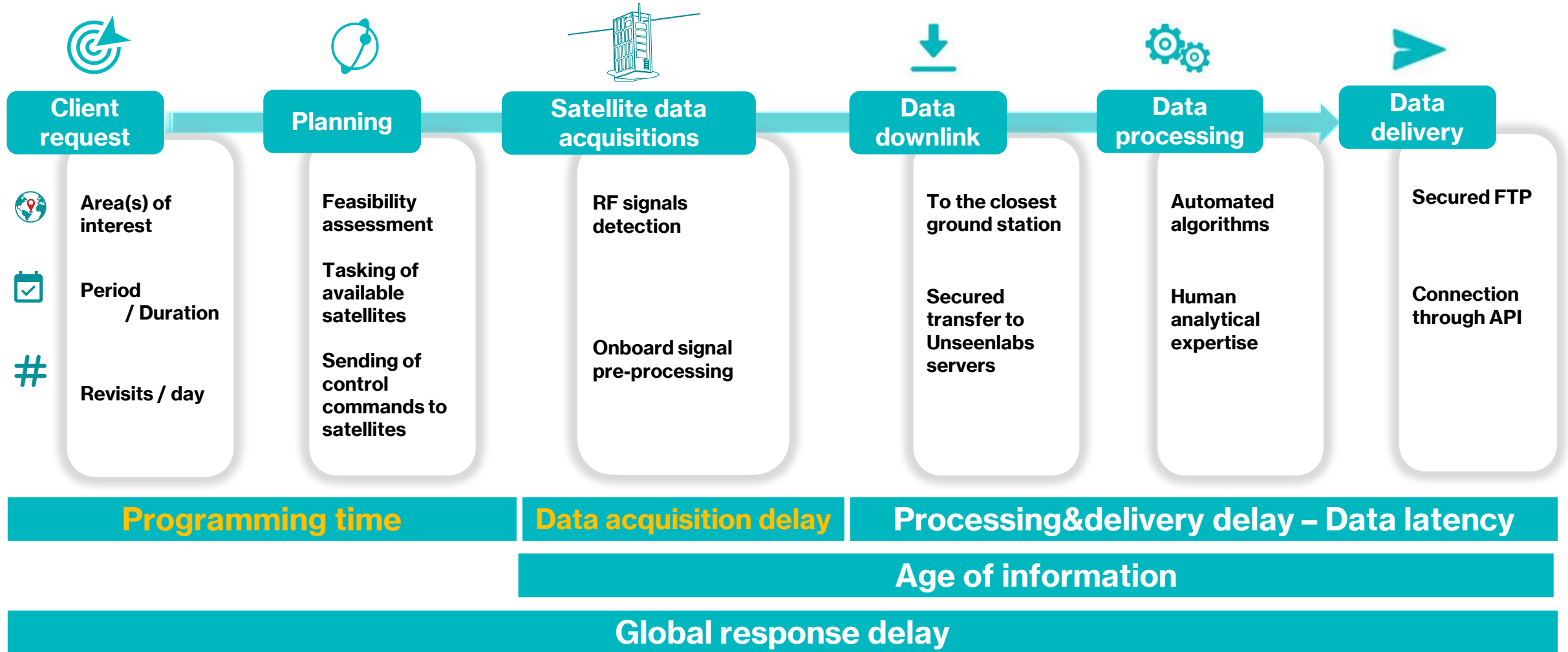
Optimisation of full demand-delivery cycle



- Global optimisation of full demand-delivery cycle is key for all EO missions but it is particularly important for Maritime Domain Awareness :
 - The oceans cover large areas but are mostly empty, thus information for “tip and cue” to focus on suspect activities is necessary as soon as possible
 - Moreover, in some cases urgent actions are required at sea -> data have to be acquired very quickly and have to be downloaded as soon as possible on ground
 - Space-based RF data are essential since in-situ information does not exist or is not useful (AIS is switched off on vessels engaged in illegal activities, dark vessels)
- Fight against illegal fishing
- Commodities protection against piracy
- Off-shore energy production protection
- Polluters prosecution ...
 - will be facilitated if suspect behaviour can be investigated in short delay by actions focused on specific regions



Space-based RF detection process: Optimisation

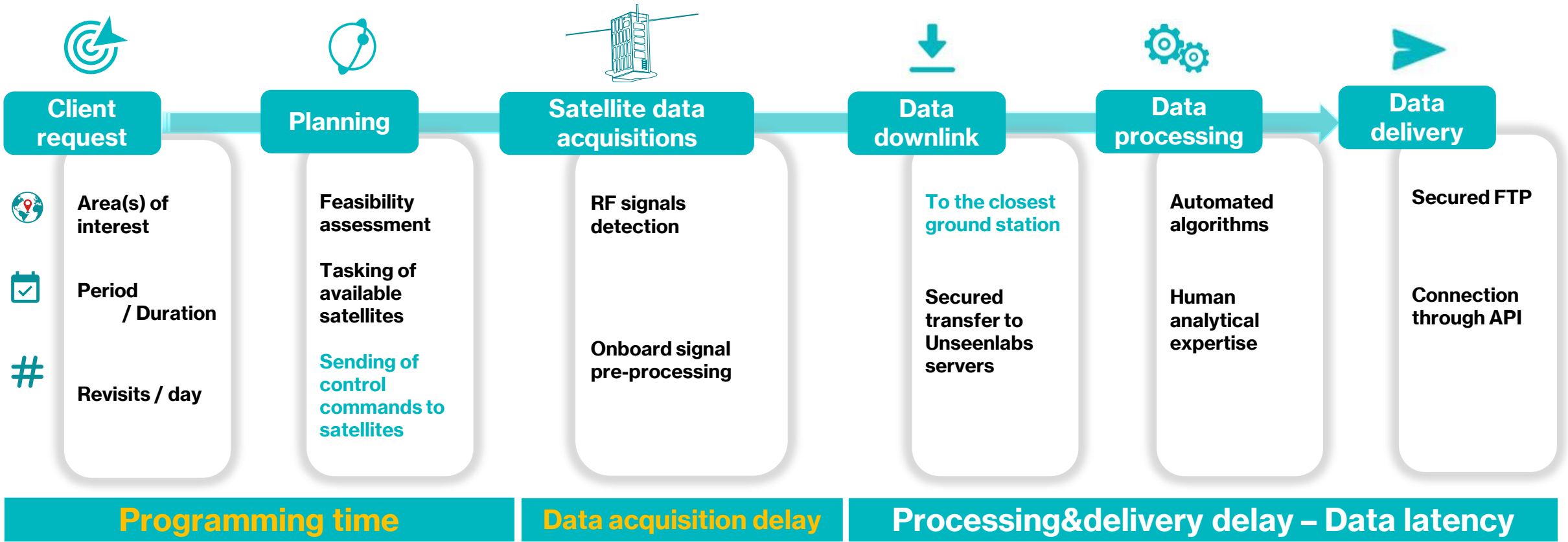


Response optimisation: External support



- Optimisation activities are continuously performed by UNSEENLABS teams for reducing data acquisitions planning and processing delays
- External support/services are welcome for:
 - Reducing delay from planning definition to satellite tasking -> particularly important for emergency response
 - Reducing delay between data acquisition by the satellite and data reception on-ground
- The use of data-relays will also bring real benefits to system capabilities by:
 - Enhancing the acquisition capacity of each satellite by downloading data often,
 - Increasing the constellation revisit frequencies by making following satellites available for data acquisition
 - Decreasing the time needed for each satellite to download its data on the ground.
- These improvements added to the enhancement of demands and data processing (automated algorithms, historical databases...) contribute to radically reduce the age of information, enabling maritime stakeholders to act more rapidly on the ground.

Space-based RF detection process: External services global response optimisation



Optimisation of data transfer from ground to satellite: TC transmission
 Optimisation of data transfer from satellite to ground: data downlink



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