

GAMBAS

Galileo Advanced features for the Maritime domain: Breakthrough Applications for Safety and security

European H2020 framework project for EUSPA
(Grant Agreement 101004292)

MAST Med 2022 Conference
02 – 04 November 2022



AGENDA

GAMBAS consortium

Context

Objectives

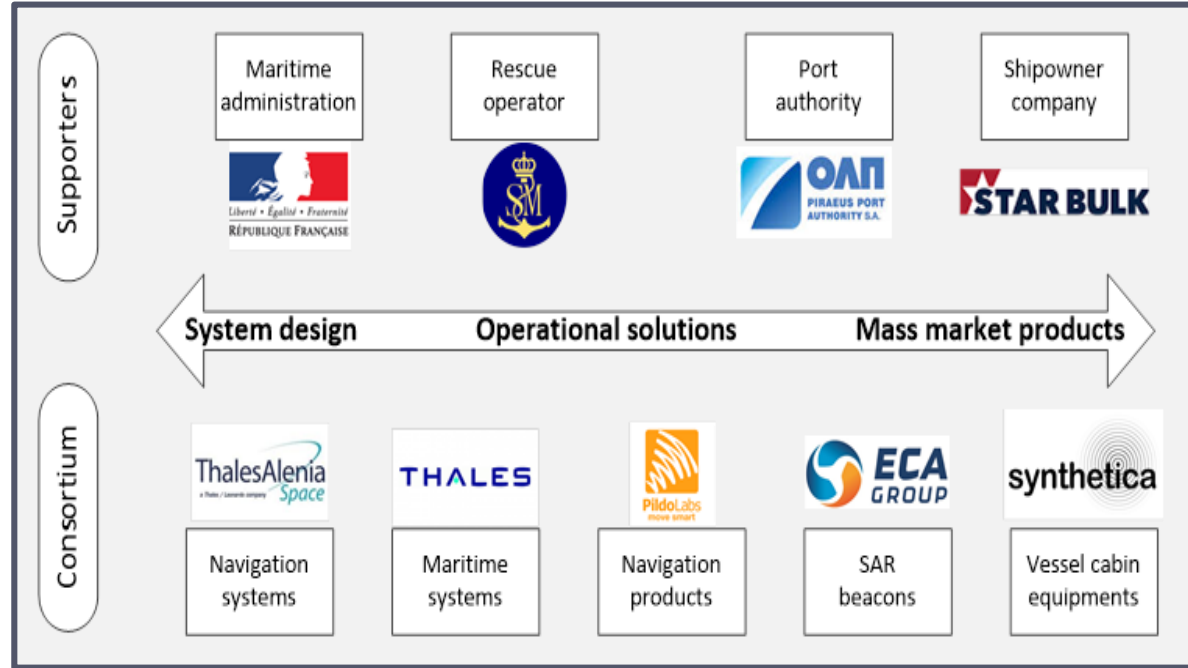
Galileo new services

Operational scenarios



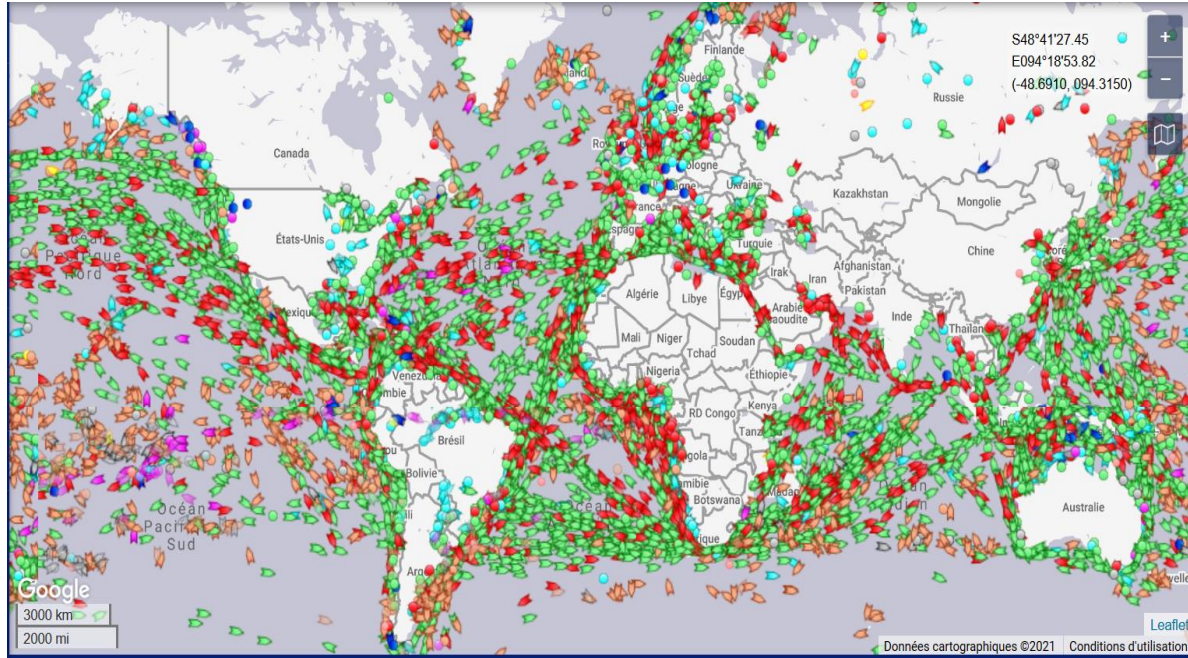
GAMBAS consortium

Partners and supporters from 3 European countries directly involved to address safety and security issues in the Mediterranean Sea



Context

A maritized world....

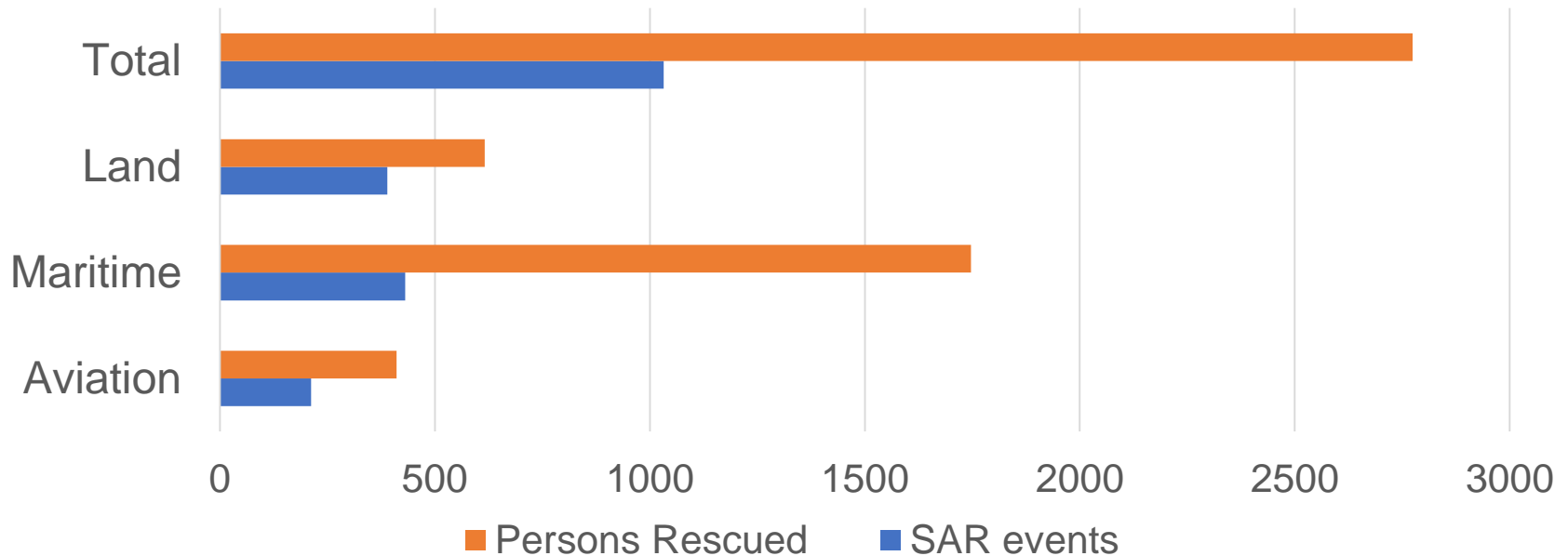


Global maritime traffic - Live map 9th June 2021 generated with [Marinetraffic.com/en/ais/](https://www.marinetraffic.com/en/ais/)

... subject to security and safety issues such as Search & Rescue (SAR) events...

2019 SAR events

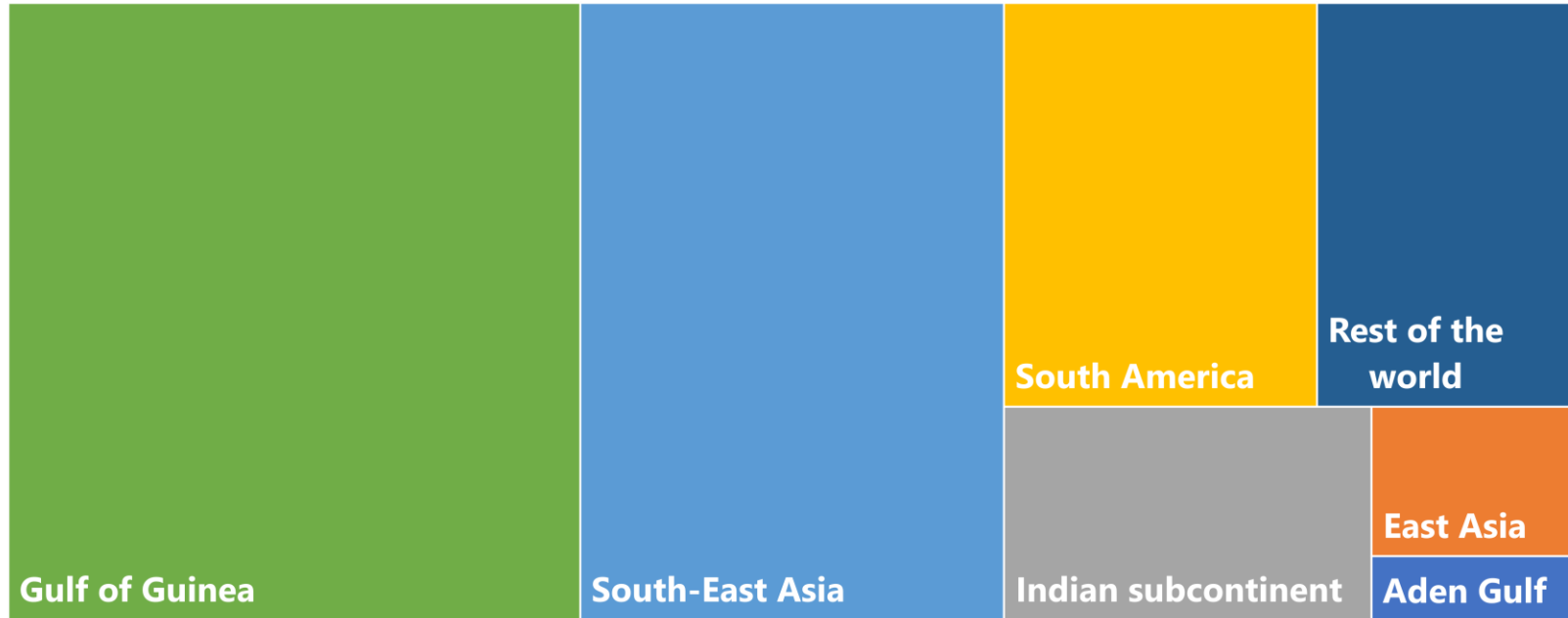
from 2019 Cospas/Sarsat annual SAR statistics report



Context

... piracy attacks ...

TOTAL PIRACY ATTACKS BETWEEN 2018 AND 2020



IMO Reports on acts of piracy and armed robbery against ships – Annual report 2019 – MSC.4/Circ.264 27 April 2020

Context

Selected Significant Climate Anomalies and Events in 2021



GLOBAL AVERAGE TEMPERATURE

The January-December 2021 average global surface temperature was the sixth highest since global records began in 1880.

ARCTIC SEA ICE EXTENT

During its growth season, the Arctic had its seventh-smallest annual maximum extent (tied with 2007) on record. During its melt season, the Arctic had its 12th-smallest annual minimum extent on record.

NORTHWESTERN U.S. AND WESTERN CANADA

An extreme heat wave affected much of the northwestern U.S. and western Canada during the last week of June. Canada set a new national maximum temperature.

EUROPE

Europe's 2021 temperature was the ninth-highest on record.

SOUTHERN EUROPE

An intense heat wave impacted parts of southern Europe. Sicily had a daily maximum temperature that if verified, would be Europe's highest maximum temperature on record.

ASIA

Asia had its seventh-warmest year on record.

TYPHOON SURIGAE

Surigae was an extreme cyclone, with the strongest maximum wind speed ever recorded for a storm during the months of January-April anywhere in the world.

WESTERN NORTH PACIFIC TYPHOON SEASON

Below-average activity: 23 storms, including 10 typhoons.

TYPHOON RAI

Rai was a strong and destructive typhoon. It made landfall in the southern Philippines on December 16, wreaking havoc across the region.

OCEANIA

Although Oceania had an above-average temperature, it was its coldest year since 2012.

SOUTHWEST PACIFIC CYCLONE SEASON

Near-average activity: 9 storms, including 4 cyclones

TROPICAL CYCLONE TAUKTAE

Tauktae was one of the strongest cyclones on record to make landfall on India's west coast.

NORTH INDIAN OCEAN CYCLONE SEASON

Near-average activity: 5 storms, including 3 cyclones.

SOUTH INDIAN OCEAN CYCLONE SEASON

Near-average activity: 12 storms, including 5 cyclones

CYCLONE SEROJA

Cyclone Seroja brought strong winds and record rainfall to parts of Western Australia. Seroja also affected Indonesia, causing historic floods and landslides.

ATLANTIC HURRICANE SEASON

Above-average activity: 21 storms, including 7 hurricanes. This was the third highest number of named storms on record.

AFRICA

The year 2021 tied with 2019 as Africa's third-warmest on record.

GLOBAL CYCLONE ACTIVITY

94 storms, including 37 hurricanes/cyclones/typhoons. The number of global hurricane-strength storms was the lowest in the 41-year record.

ANTARCTIC SEA ICE EXTENT

During its growth season, the Antarctic reached a maximum extent that was near-average. During its melt season, the Antarctic had its 12th smallest minimum extent on record.

NORTH AMERICA

North America had its seventh-warmest year on record.

HURRICANE IDA

Ida was a dangerous Category 4 hurricane when it made landfall in the U.S. state of Louisiana on August 29 – the same day that Hurricane Katrina did 16 years earlier. Ida caused significant damage to parts of Cuba and the southern and northeastern U.S.

HURRICANE GRACE

Grace was one of the strongest hurricanes to make landfall in eastern Mexico.

EASTERN NORTH PACIFIC HURRICANE SEASON

Above-average activity: 19 storms, including 8 hurricanes.

SOUTH AMERICA

The year 2021 was South America's sixth-warmest year on record.

... extreme weather events...

Please note: Material provided in this map was compiled from NOAA's State of the Climate Reports. For more information please visit: <http://www.ncdc.noaa.gov/socl>

Context

... illegal trade ...

- Human trafficking
- Environmental damage: pollution, wildlife
- Goods: fuel, counterfeit products, drugs
- Support to terror groups



Getty Images

Context

Legitimate Fishing

Authorized and **legitimate fishing vessels** operate with decent working conditions and **adequate equipment**. Stocks are fished at a sustainable rate. **Profits increase**.



Illegal Fishing

- 1 In an effort to **maximize profits**, unscrupulous operators look for ways to exploit fish stocks and management loopholes by **fishing illegally** or under-reporting catch.
- 2 **Overcapacity** leads to a decline in stocks, which is exacerbated by illegal fishing.
- 3 **Fewer profits** mean less money to invest in maintenance, repairs, and safety equipment, making **vessels unsafe** and conditions unacceptable.
- 4 Crews are then forced to work in **hazardous conditions** for longer hours and less pay to minimize operators' costs.
- 5 Fish stocks are **exploited** to unsustainable levels, **undermining** legitimate fishing operations and **food security**.



... or illegal fishing.

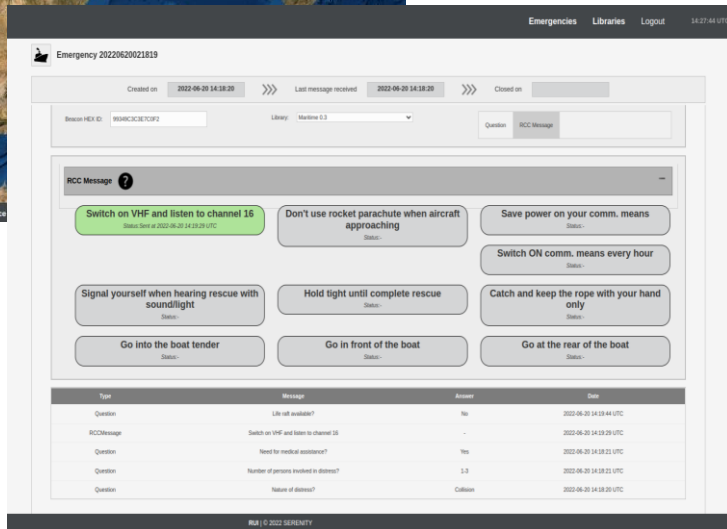
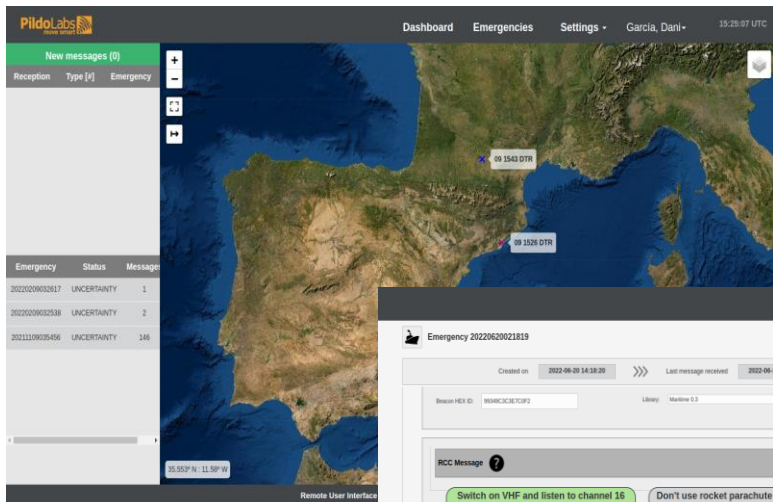
Objective #1: New generation SSAS beacon



**Supporting new Galileo
Return-Link services and
relying on state-of-the-art
waveform design**

- > Better discretion for enhanced security
- > New capabilities for more efficient SAR operations
- > Authenticated position for higher GNSS resilience

Objective #2: New tool for maritime SAR operators



Enabling new Galileo Return-Link & Emergency Warning Services in an ergonomic way for SAR operators

> New capabilities for more efficient SAR operations

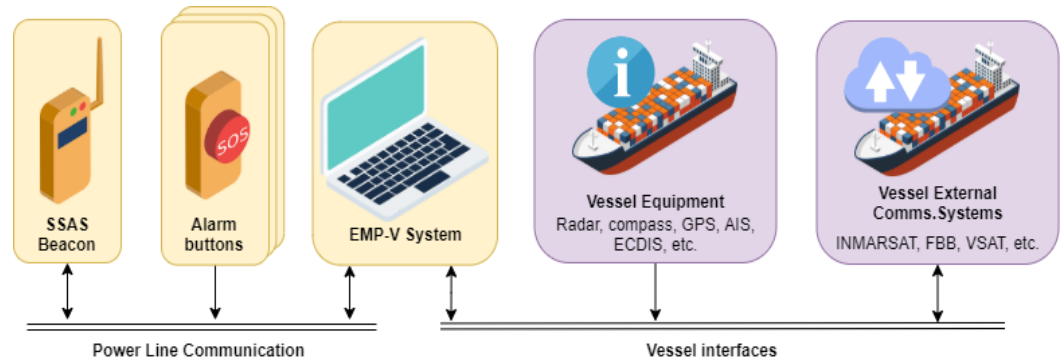
> Complete integration in existing procedures

> No additional workload for SAR operators

Objective #3: New modernized GMDSS

**Enabling new Galileo
Return-Link & Emergency
Warning Services in an
ergonomic way for
vessel's crew**

- > New capabilities for more efficient SAR operations
- > Complete integration in existing procedures
- > No additional workload for vessel's crew



Galileo new services

SAR/Galileo Return Link Services (RLS):

- Automatic Acknowledgement* (AA)
- Two Way Communication (TWC)
- Beacon Command Service (BCS)
- Distress Position Sharing (DPS)

Other Galileo features:

- Galileo OS NMA
- Galileo-based Emergency Warning Service (EWS)



*Service already operational

Galileo new services

Galileo SAR Return Link Services

Automatic Acknowledgement

– to provide an automatic acknowledgement to the beacon

Two-Way Communication

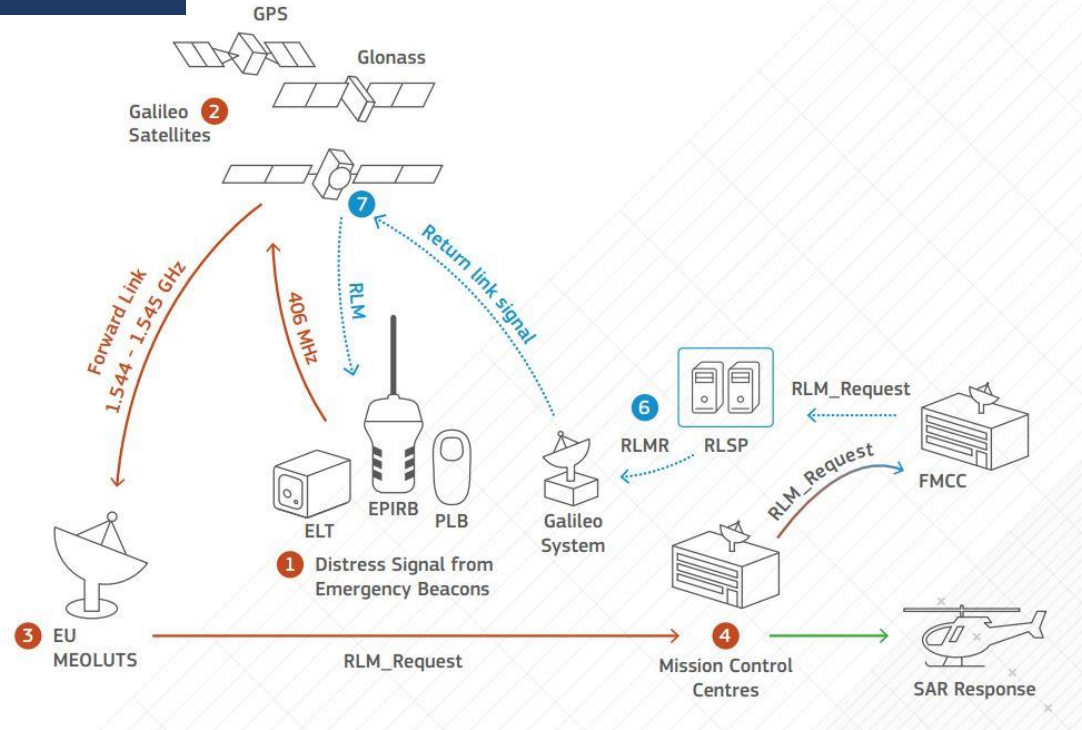
– to allow the SAR forces and the beacon user to exchange messages

Distress Position Sharing

– to inform GNSS handheld or manned devices about nearby activated distress beacons

Beacon Command Service

– to remotely activate/de-activate activate and deactivate distress beacons

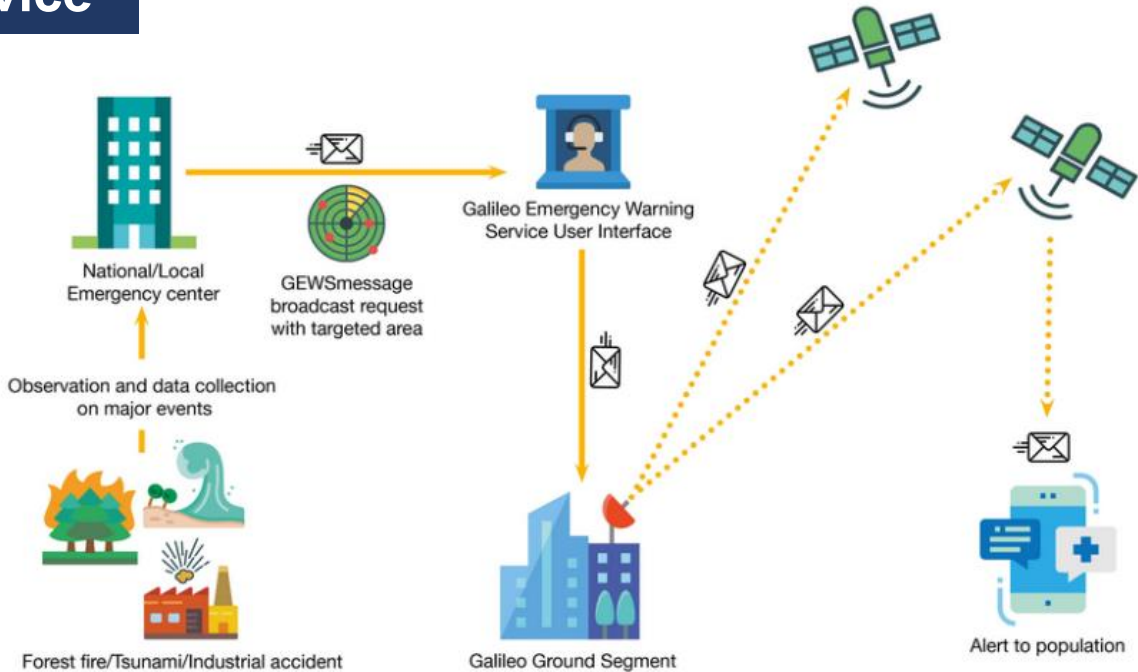


Galileo new services

Emergency Warning Service

An emergency warning is sent to all compatible Galileo receivers in a configured area.

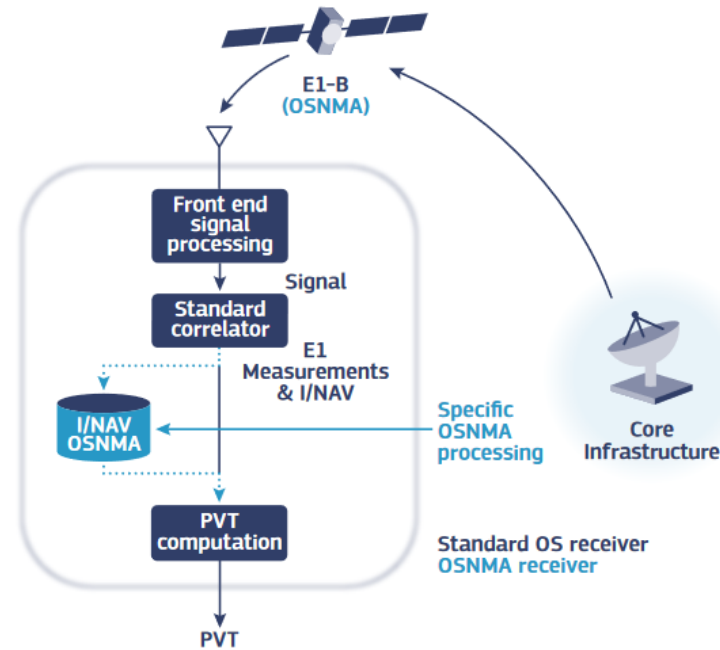
This feature will be embedded in the EMP (SAR operator) and EMP-V (Vessel)



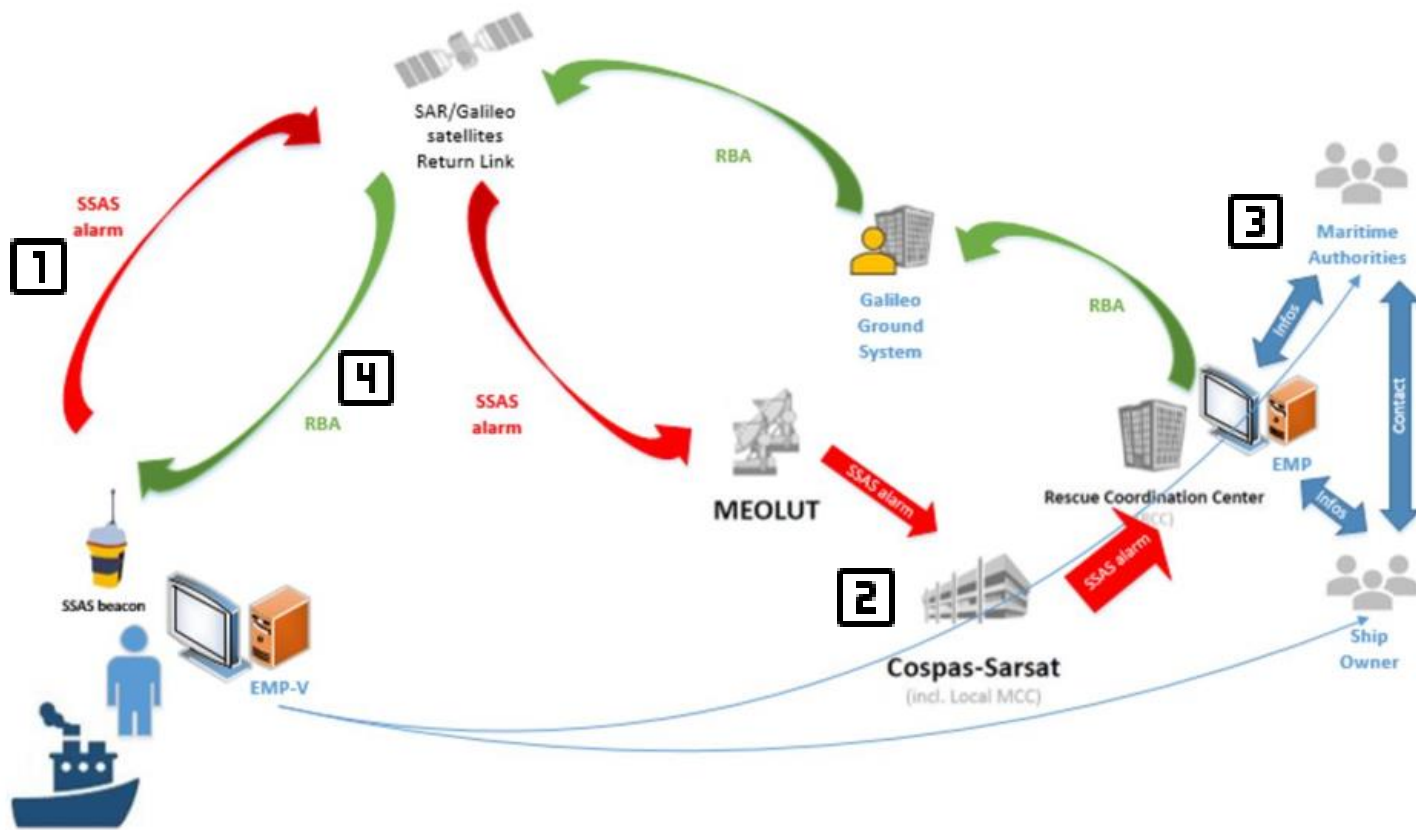
Galileo new services

New Galileo Open Service Navigation Message Authentication (OS NMA)

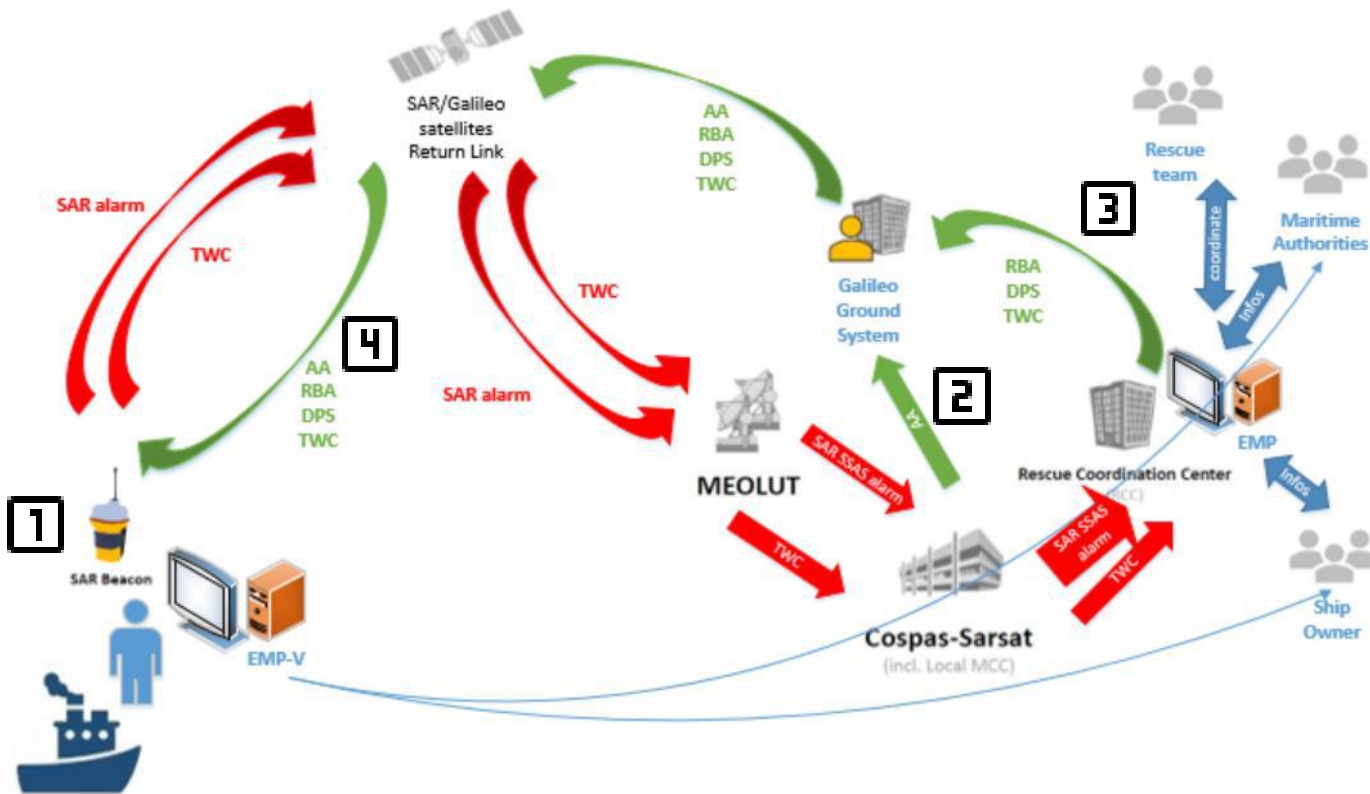
GNSS position of the Vessel Monitoring System (VMS) is vulnerable to jamming and spoofing (i.e. cyberattacks). OS NMA will increase the spoofing resilience of the GNSS system and will provide early detection of spoofing attempt to fishing control center



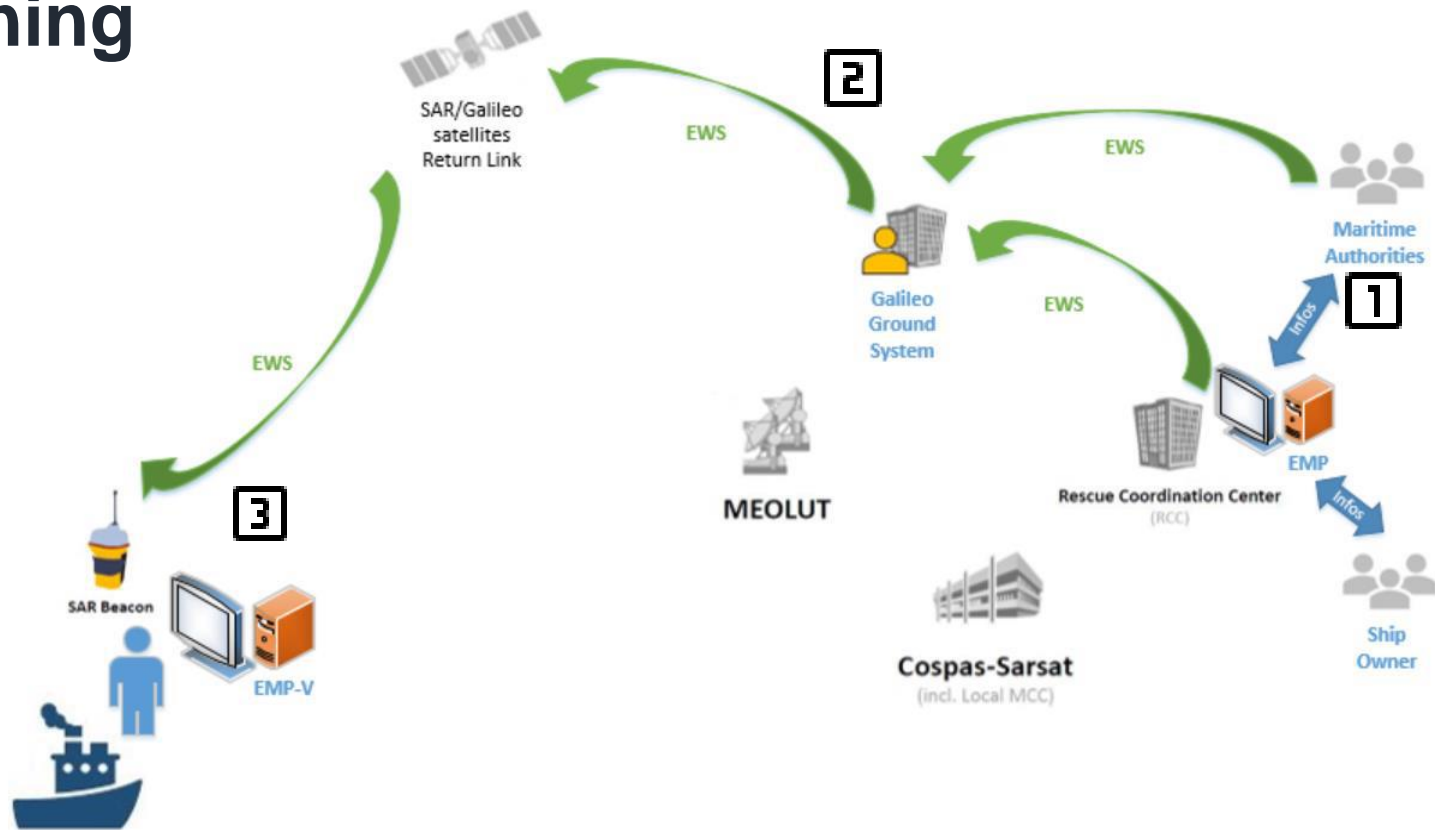
Operational scenario #1: Piracy attack



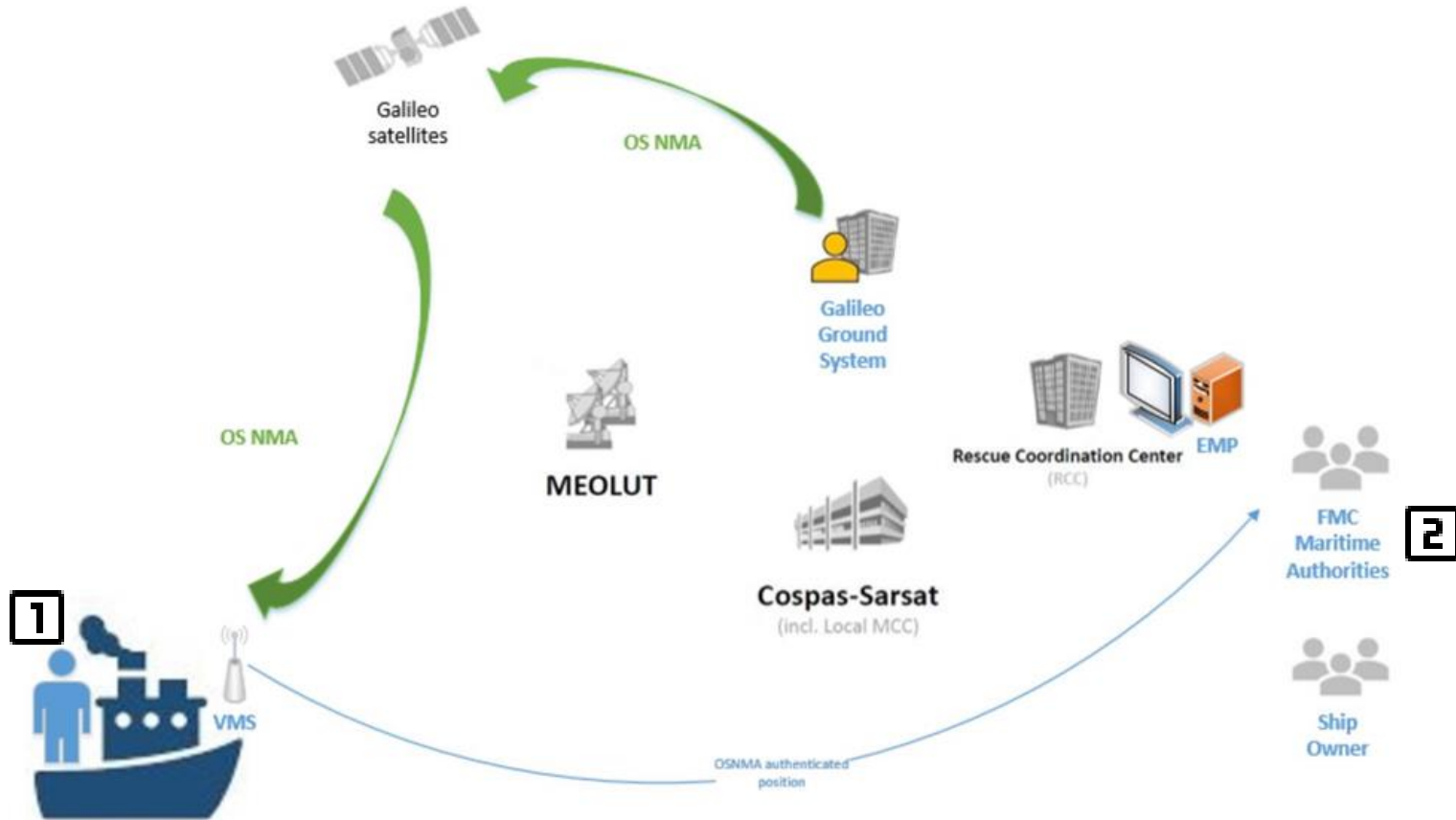
Operational scenario #2: Distress at sea



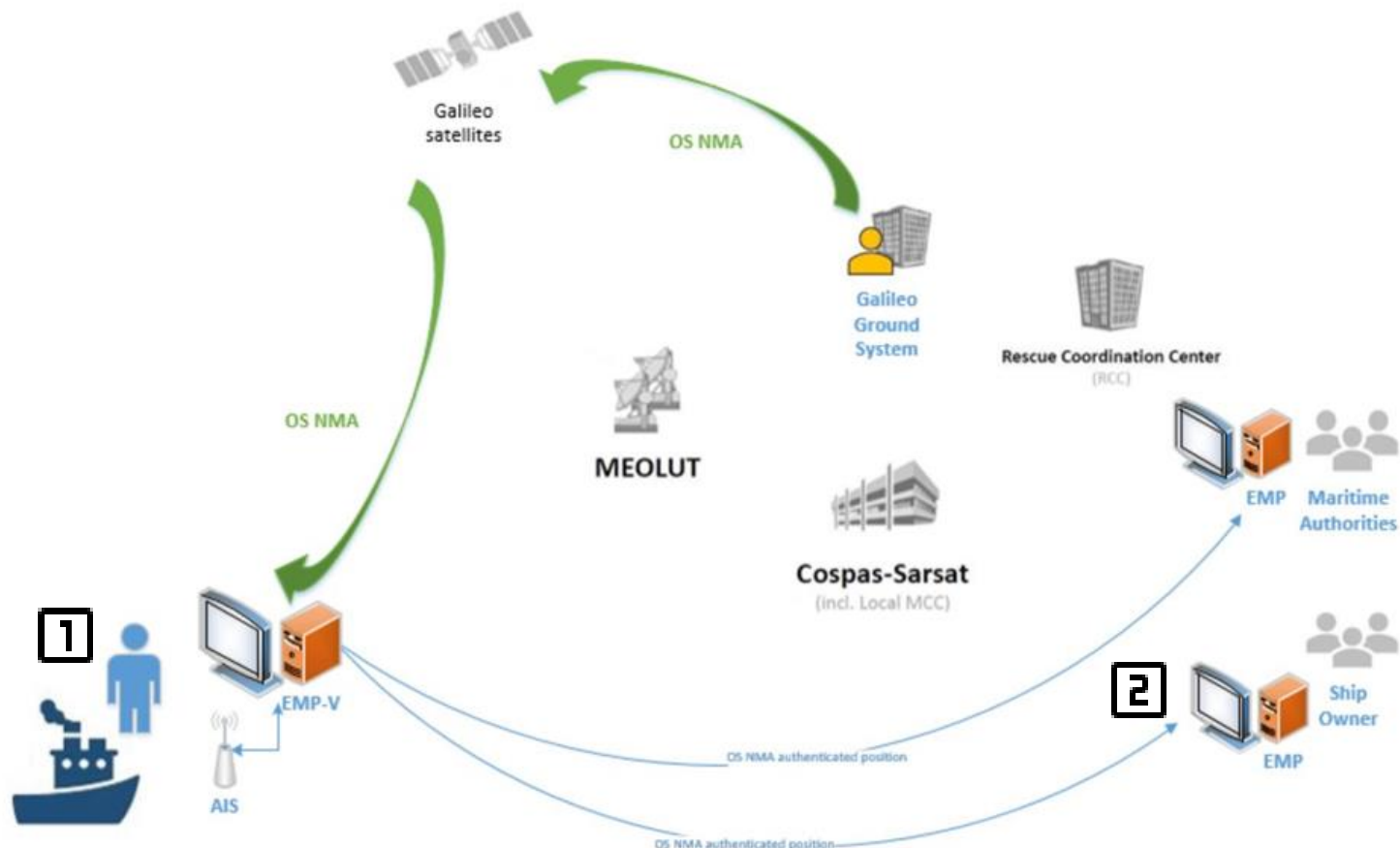
Operational scenario #3: Extreme weather warning



Operational scenario #4a: Illegal fishing



Operational scenario#4b: Illegal trade



Demonstrations



Demonstrations vs Scenarios

DEMONSTRATION	SCENARIO #1	SCENARIO #2	SCENARIO #3	SCENARIO #4a	SCENARIO #4b
	PIRACY	DITRESS	WARNING	ILLEGAL FISHING	ILLEGAL TRADING
	SSAS / EMP-V / EMP / RBA / OSNMA	Beacon / EMP-V / EMP / DPS / TWC / RBA / OSNMA	EWS / Beacon / EMP-V / EMP	OSNMA	OSNMA / EMP-V / EMP
GREECE	X	X	X	X	X
SPAIN		X	X	X	
GULF OF GUINEA	X	X		(X)	(X)

Summary

- **European Cooperation (Sp / Fr / Gr / others)**
- **International Cooperation (Togo)**
- **Maritime Awareness (EMP – EMP-V)**
- **Innovation**

Way forward

- **Finalize prototypes**
- **Organization of on-field demonstrations (2nd quarter 2023)**
- **Dissemination activities**
- **Standardisation (IMO, Cospas-Sarsat)**

Thank you for your attention



Want to know more about our project?
Any questions?

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