

# Smart and Uncrewed Shipping Webinar

*Rita Rinaldo  
Davide Coppola  
Piera Di Vito*

*Business Applications and Space Solutions  
European Space Agency*

# WELCOME TO THE WEBINAR! Before we start...

- Due to the number of attendees, please keep your microphones muted at all times and switch off the webcam function
- You can use the conversation function anytime to submit your questions. They will be addressed during the Q&A at the end of the webinar

# AGENDA

- What ESA Business Application offers
- Smart and Uncrewed Shipping call for opportunity
  - Opportunity
  - Objectives
- How to apply
- Open Questions & Answers session

# Purpose of the European Space Agency

“To provide and promote, for exclusively peaceful purposes, cooperation among European states in **space research and technology** and their **space applications**.”



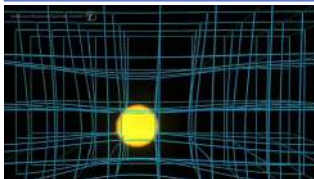
Article 2 of  
ESA Convention

ESA UNCLASSIFIED



# EVERYDAY LIFE AT ESA

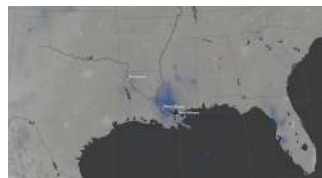
## Science and Exploration



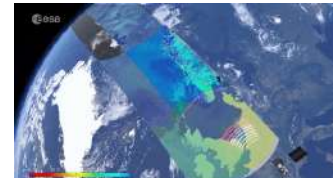
## Enabling and Support



## Safety and Security



## Applications



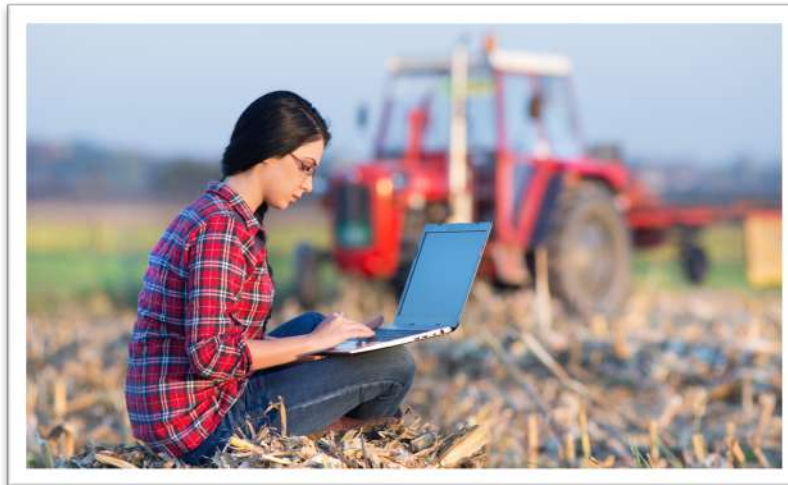
ESA UNCLASSIFIED

## Space Companies.



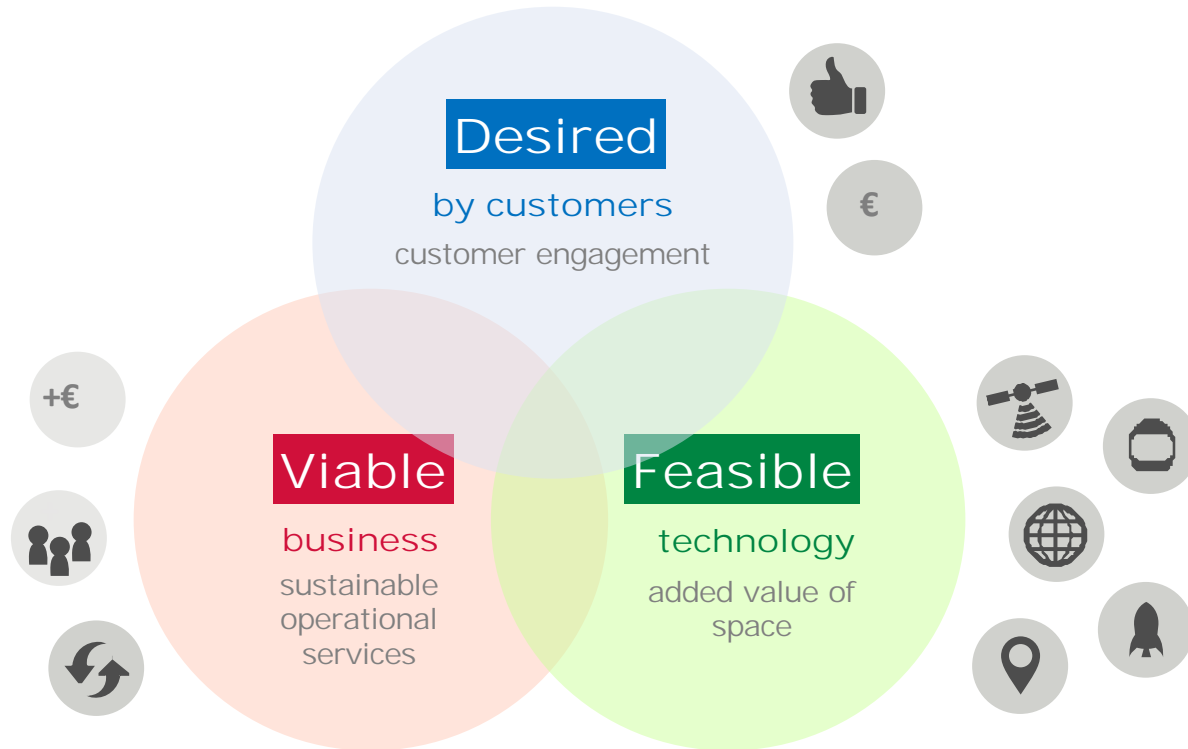
“Upstream”

## Also Space Companies



“Downstream”

# Looking for promising services



# → Space Applications

## Space technologies

Space Weather



Earth Observation



Satellite Navigation



Satellite Communication



Human Spaceflight Technologies



- Big Data analytics
- VR/AR
- Artificial Intelligence
- Megaconstellations
- 5G
- Crowdsourcing
- IoT
- Cybersecurity
- Blockchain



## Users and Markets

Maritime



Healthcare



Transport



Environment



Agriculture



Media



Energy



Education



Aviation



Financial





# Partners

## International Institutional Actors



space solutions

## European Institutional Actors

Frontex  
EMSA  
EU SatCen  
EDA  
EASA

## Vertical Industry and associations

ENTSO ENEL  
Friends of the Supergrid  
CarbonTrust  
Indian Energy Storage Alliance  
OneSea Alliance  
DMEC  
Global Sustainable Energy Alliance

UNICRI  
IOM  
Eurocontrol  
WWF

## Platforms/Foundations

Toilet Board Coalition  
The Plastic Bank  
Mirpuri Foundation  
Genius100 Foundation

## National Governments & Regulators

DCMS (UK)  
MID (IT)  
MISE (IT)  
IT Ministry of Education  
OPRED (UK)  
Traficom (FI)

## Smart Cities/Regions

Roma  
Torino  
L'Aquila  
Abruzzo  
Groningen

## Technology toppers

Vodafone  
AWS

## Space Agencies

JAXA  
AMS  
SANSA



# Space for smart and uncrewed shipping downstream services enabled by 5G and advanced PNT

- “Space for smart and uncrewed shipping” Announcement of Opportunity (AO) aims to support the development of space based downstream services and solutions relying on advanced technologies such as 5G and PNT (Positioning, Navigation and Timing) in the smart and uncrewed shipping domain.



## Sub-themes:

- Towards Shipping 4.0
- Monitoring of coastal areas
- Maritime surveillance
- Environmental sustainability

## Sub-theme 1: Towards Shipping 4.0

- Digitalization of maritime services and data platforms at sea and ports
- Developing predictive and digital maintenance solutions
- Support to efficient remote operations at sea
- Uncrewed shipping for inland waters and short term shipping
- Safe autonomous navigation and operations of uncrewed vessels

## Sub-theme 2: Monitoring of coastal areas

- Detection and monitoring of threatened coastal areas
- Monitoring land and water infrastructure in coastal areas
- Mitigating climate change impact risks along coastlines

## Sub-theme 3: Maritime surveillance

- Surveillance of maritime traffic
- Detection of illegal actions related to illegal fisheries
- Detection of oil-spilling and environmental pollution

## Sub-theme 4: Environment sustainability

- Impact of weather and current data on navigational footprint
- Reduction of emissions and environmental footprint of maritime transport
- Monitoring of marine-protected areas – preservation of biodiversity



## Enablers:

- Secure converged 5G networks
  - Precise navigation
  - Situational awareness data
  - AI/machine learning,
- ## Blockchain
- Robotics
  - Micro constellations

# Towards Shipping 4.0: Digitalization at Sea and Ports

## Possible applications include:

- **Digitalization of maritime services and data platforms at sea and ports**
  - Near real-time monitoring of port capacities and capacity-oriented statistical analysis of container ports, with the help of frequently updated high-resolution EO imagery that is interpreted by machine learning, to identify the number of shipping containers in the picture and used as input to statistical algorithms.
- **Predictive and digital maintenance solutions**
- **Support to efficient remote operations at sea**
  - Real-time monitoring of cargo in individual containers, using cargo-specific sensors (temperature, humidity, motion etc.) exploiting as example on blockchain-protected satellite link to transmit their data.



# Towards Shipping 4.0: Digitalization at Sea and Ports

Possible applications include:

- Uncrewed shipping for inland waters and short term shipping
- Safe autonomous navigation and operations
  - Remote monitoring and operation of autonomous vessels, by combining blockchain-secured 5G with satellite links as well as using satellite positioning to achieve accurate and reliable navigation. Correspondingly, prevention of ship collisions in densely trafficked shipping lanes, by continuously monitoring the position and course of vessels, and externally inducing course corrections if necessary.



# Monitoring of coastal areas

Possible applications include:

- Detection and monitoring of threatened coastal areas
- Monitoring land and water infrastructure in coastal areas
- Mitigating climate change impact risks along coastlines



# Maritime Surveillance

Possible applications include:

- Surveillance of maritime traffic
- Detection of illegal actions related to illegal fisheries
- Detection of oil-spilling and environmental pollution



## Possible applications include:

- Impact of weather and current data on navigational footprint
- Reduction of emissions and environmental footprint of maritime transport
- Monitoring of marine-protected areas – preservation of biodiversity





## Role of 5G

- Provision of low latency, high reliability data to support autonomous shipping
- Provision of high throughput data for remote piloting through travel corridors requiring it
- Support to port operations/logistics and surveillance through digital twins, massive IoT device (sensors, cameras...) network connectivity
- Support to port operations through robotics, machinery automation and remote control
- Cargo/goods tracking and state monitoring
- High throughput data for AR/Immersive Reality for ship construction support and/or maintenance



# Smart and Uncrewed Shipping : first wave timeline

ACTIVITY	ESA PROJECT FUNDING (UP to % of ELIGIBLE COST)
Feasibility Study	50%**
Demonstration Project	50%**



## Call for Proposal Objectives

- Promote the development of sustainable integrated downstream services in the domain of smart shipping and/or unmanned shipping;
- Develop any necessary innovative space-based technologies such as converged 5G networks and advanced PNT (Positioning, Navigation, Timing),
- Advance the safe integration of unmanned maritime vessels in the maritime traffic
- Provide pre-operational demonstrations to the prospective users and customers of the proposed services show-casing the benefits deriving from the utilization of space
- Promote the international dimension of the proposed services

- 1) Project summary and rationale
- 2) Customers/Users and their needs
- 3) Application/Service viability
- 4) System and implementation aspects
  - Project team
  - Service architecture
  - Implementation approach
  - Financial and Management

The tenderer shall inform their National Delegation(s) of their intention to participate to the AO, prior to the submission of the outline proposal.

Feasibility studies (FS) that investigate the technical viability and business potential of services that use both 5G and satellite/space-based data. FP shall:

- Be customer/user driven and present a strong sustainability potential.
- Propose a service demonstrating the benefits of the utilisation of integrated space assets
- Include a viability analysis
- aim to evolve the targeted applications and services to marketability and operational roll-out, potentially through a Demonstration Project after successful completion of the feasibility study.
- address one amongst use cases described in the documentation
- address one of the set of requirements proposed by the involved stakeholders. Alternatively, the Bidder shall propose a set of requirements derived from the discussion with potential users, which shall be involved in the study
- identify the required technology/product developments related to 5G satcom and/or PNT technologies required for the development of the service

# Demonstration Project: Outline Proposal Content

- 1) Project summary and rationale
- 2) Customers/Users and their needs
- 3) Application/Service Value Proposition
- 4) System and implementation aspects
  - Project team
  - Service architecture
  - Implementation approach
  - Financial and Management

The tenderer shall inform their National Delegation(s) of their intention to participate to the AO, prior to the submission of the outline proposal.

# Demonstration Project Key Requirements

Demonstration Project (DP), dedicated to the implementation and demonstration of pre-operational services. The DP shall:

- Be customer/user driven (including user involvement and active participation in the project)
  - Propose a service demonstrating the benefits from the utilisation of space assets with clear potential to become sustainable.
  - address at least one amongst the thematic areas
  - provide a measurable socio-economic impact,
  - address one of the set of requirements proposed by the involved stakeholders. Alternatively, the Bidder shall propose a set of requirements derived from the discussion with potential users, which shall be involved in the study
  - utilize one of the proposed assets/areas listed in the AO for of the pilot. Alternatively, propose a different assets/areas for the pilot as instrumental to achieve the proposed business case.
- When Technology/Product Developments are proposed, they shall:
    - be instrumental to the proposed service
    - be related either to 5G satellite telecommunications, EO data or PNT technologies
    - be novel with respect to state-of-the-art products

# Value of Space



Spaceflight  
Technologies



Satellite  
Communication



Satellite  
Navigation



Satellite  
Earth Observation



Space  
Weather

A number of examples of how space can support innovation in this domain are listed below:

## 5G Satellite Telecommunications

- Provide connectivity to vessels out of range of terrestrial connectivity means.
- Act as a back-up to terrestrial communications.

## Advanced PNT technologies

- Provide positioning, navigation and tracking capabilities to vessels, cargo and relevant machinery utilised at ports.

## Satellite Earth observation

- Detecting and monitoring environmental impact such as coastal erosion, effects of dredging, water quality and pollutant output....
- Surveys of protected areas to ensure the safety of marine animal populations (with respect to shipping operations).
- Mapping, radar and bathymetry data to support navigation, and as input to shipping simulation models....



## How to Apply

1. Register by completing online questionnaire on [ESA-STAR Registration](#) (minimum 'light registration')
2. Download the official tender documentation (Invitation to Tender) and create 'Bidder Restricted Area' via EMITS :
  - *Smart and Uncrewed Shipping*
  - Write your Outline Proposal using the template provided **in the Tender documentation** and email it at [business@esa.int](mailto:business@esa.int) and [5G@esa.int](mailto:5G@esa.int) *before the 15<sup>th</sup> June 2021*.
1. ESA will inform you whether your outline proposal has been selected .
2. Write your Full Proposal and obtain Letter of Support from [National Delegation](#)
3. Submit your proposal via [ESA-STAR Tendering](#) by 15<sup>th</sup> September 2021

# Basic principles

## Tender documentation:

on <emits.esa.int>

Announced under “Intended Invitations to Tender (IITT)”

Published under “Open Invitations to Tender (ITT)”

(⇒ registration required to access tender documents)

Submission of proposals electronically in ESA-STAR

The screenshot shows the ESA emits interface. The top navigation bar includes 'emits', 'ENTITIES', 'LOGIN', 'ESA Home Page', 'Industry Information', 'Entity Registration', 'Service Desk', and 'Help'. The main content area displays details for a tender, including:

- Price Range:** 200-500 KEURO
- Products:** Non Space Procurement/Services
- Techology Domains:** Others
- Establishment:** ESTEC
- Directorates:** Directorate Telecom & Integrated Applica
- Department:** Integrated & Telecom-related Applica Dep
- Division:** Applications Demonstration Projects Offi
- Contract Officer:** Plesche, Claudia Ria
- Industrial Policy Measure:** N/A - Not apply
- Last Update Date:** 19/06/2017
- Update Reason:** Loaded a new Clarification(English version)

Below the metadata, there is a list of documents for download:

- Letter of Invitation, 123898 Bytes
- Statement of Work, 374464 Bytes
- Contract Conditions, 254579 Bytes
- Tender conditions, 196017 Bytes
- Clarification-e 1, 52339 Bytes
- Clarification-e 2, 38416 Bytes

A 'Transfer' button is located below the document list, with a dropdown menu set to 'selected documents as' and 'relative to your email-address'. Below the transfer button, there is a 'Current Expression of Interest' link.

- For **competitive tender activities (ITT)**, interaction with ESA experts is not possible during the opening period.
  - **During the opening period**, questions have to be **formally** addressed to the **contracts officer** and will be answered via **clarifications** to the ITT in **EMITS**
- All submissions for activities as response to competitive tenders are based on **templates available in the tender package**.
- Proposal templates provide **additional explanations on the content**
- **Read carefully** the explanations and **answer to the point** (be concrete and focused)
- **Do not confuse quality of content with quantity**
- **Evaluation criteria can be found in the ITT Letter of Invitation**

- The proposals submitted in reply to the call shall be implemented in the context of ESA BASS GPL or the 5G SPL programme lines of ARTES. The 5G satellite telecommunications product and technology developments shall be implemented as part of the 5G SPL while developments related to novel PNT solutions will be implemented through the NAVISP (Navigation Innovation and Support Programme) Element 2 programme.
- Proposals that include only product and technology developments are not eligible to be addressed under this call. The bidder can submit those proposals in the context of the ARTES C&G Open Call for Proposal funded through 5G SPL should they relate to 5G satcom product/technology developments, and NAVISP Element 2 Open Call for Proposal should they relate to the PNT product/technology developments.
- The service provider shall be part of the bidding team to ensure the commercial operational roll-out of the proposed service following completion of the project.
- The Agency will admit for evaluation only (Outline and Full) Proposals from a bidding team composed of an economic operator - being a Prime or Subcontractor - residing in any of those States that have subscribed to BASS GPL or to the 5G SPL .
- To date, Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Romania, Sweden, Switzerland and the United Kingdom have subscribed to BASS GPL.

## FUNDING ELIGIBILITY

- The tenderer shall inform their National Delegation(s) of their intention to participate to the AO, prior to the submission of the outline proposal.
- Letter of Authorisation from bidding team's national delegation(s) is needed and must be submitted as part of the Bidder's Full Proposal. Without this letter, the proposal is not eligible.
- The contacts of the National Delegations can be found at <https://business.esa.int/national-delegations>



# THANK YOU FOR PARTICIPATING

<https://business.esa.int/funding/invitation-to-tender/smart-and-uncrewed-shipping>