Space Applications supporting Digital Transformation in Public Safety

Announcement of Opportunity

16th February 2022
Volker Schumacher
European Space Agency
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

- ESA and ESA Space solutions
- ESA ARTES 4.0 Space Systems for Safety and Security (4S) Strategic Programme Line
- 4S Announcement of Opportunity “Space Applications supporting Digital transformation in Public Safety”
  - Background and Objectives
    - Guest Speaker S. Sanna (ADL S.R.L.): Overview of results 4S User Study Public safety
  - Areas of application, Activities, Funding
- How to apply?
- Open Questions & Answers session
**Purpose of ESA**

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

**Facts and figures**

- Over 50 years of experience
- 22 Member States
- 8 sites across Europe and a spaceport in French Guiana
- Over 80 satellites designed, tested and operated in flight
space transportation

science

human spaceflight

earth observation
telecommunications and applications

navigation

exploration

operations

technology
ESA SPACE SOLUTIONS

The largest space innovation network in the world

• ESA Space Solutions is the go-to place for great business ideas involving space in all areas of society and economy.

• ESA Business Applications is part of ESA Space Solutions that supports the development of sustainable services utilising space assets.

• Supporting European start-ups and SMEs to develop businesses using space technology and data.

• Offering funding, business and technical support to help to generate socio-economic benefits.
ESA SPACE SOLUTIONS OFFERS

- Zero-equity funding (from €50k to €2M+ per activity)
- A personalised ESA consultant
- Technical support and commercial guidance
- Tailored project management support
- Access to our international network of ESA and partners
- Access to our network of investors
- Credibility of the ESA brand
Space Systems for Safety and Security (4S)
Space Systems for Safety and Security - 4S

**ARTES**

**Act on Offer** - Boost industry innovation, competitiveness and ability to timely deliver

**Act on Demand** – Support public organisations to trigger and implement their initiatives

**Next Generation Space Systems for Safety and Security**

**TRUST**

Even in times of crisis or disaster

**SECURE COMMUNICATIONS**

**RESILIENT DIGITAL INFRASTRUCTURE**

**SOVEREIGN SYSTEM DESIGN - MANUFACTURING - OPERATIONS**

Act on Offer - Boost industry innovation, competitiveness and ability to timely deliver

Act on Demand – Support public organisations to trigger and implement their initiatives

**4S**
4S Announcement of Opportunity

Space Applications supporting Digital Transformation in Public Safety
What is Digital Transformation?

A definition

- Digital Transformation is defined in ESA’s Digital Agenda for Space (EDAS) as “the change of business by altering the business strategy, operations, products and objectives through adopting digital technologies. This in turn shall accelerate growth of the business and enable new types of innovation and creativity.”

- This transformation, driven by the increase in using digital technologies across Industry 4.0, such as Artificial Intelligence, Simulation, Cloud, Internet of Things (IoT), Big Data Analytics, and AR/VR, is also very much central to Space 4.0.

Example: Digital transformation in zoos (ConnieAI)
Digitalisation, Connectivity & Sustainability

Satellites will play a critical role as part of the 5G and 6G seamless networks, to fuel the lucrative 5G and 6G economy.

The New era of Digitalisation and Connectivity will transform the way we interact, produce, live and work. 5G & 6G will enable a large-scale Digital Transformation of Traditional Industry Sectors which are not digitalised yet. Satellites will play a critical role as part of the 5G and 6G seamless networks for truly global coverage and new connectivity networks will be designed to be Environmentally Sustainable.
Foster the development and showcase of innovative applications enabled by secure satellite telecommunications (possibly complemented with other space assets) to support Digital transformation in Public Safety.

Demonstrate the key benefits enhanced secure communications can bring in combination with the ongoing digital transformation which has allowed opening up new opportunities for the public safety sector.
Public safety stakeholders to be involved

- Fire Brigades
- Law Enforcement
- Emergency Services
- Civil protection
4S User Studies - Objectives revisited

Engage with representative stakeholders and users to identify with them trends, gaps, limitations, needs, expected evolutions, etc. of their sectors & select a list of promising applications.

Ensure Safe and Secure Transportation
- aviation
- maritime
- road/land
- rail
- manned
- unmanned

Support Public Safety & Law enforcement
- Emergency Services
- Civil protection
- Maritime surveillance
- Border surveillance

Utilities (Energy, water, telecom)
- Finance
- Health
- Infrastructures monitoring
- Logistics

Protection of Critical infrastructures & Essential services

Follow-up: Demo Projects for early to pre-operational services demonstration towards user communities.

- 4S User studies were initiated in 2020
- completed in 2021
Guest speaker

Stefano Sanna (ADL S.R.L.)
FIRST RESPONDERS APPLICATIONS SATELLITE TECHNOLOGY (FAST)

Satellite applications for Public Safety
Emerging safety and efficiency needs are driving demand for security and connectivity in the Public Safety sector

1. Ensure safety and security of operations
   - Ubiquitous coverage
   - Highest reliability
   - Low latency & high capacity

2. Increasing need for information from the field
   - Cloud platforms
   - Cybersecurity

3. Increasing cross-border cooperation

...with impact on the Public Safety sector
- Assessed how SatCom technology can support operations and coordination during public emergencies, crisis management and disasters
- Collected the needs of three vertical: Law Enforcement, Fire Brigades, and Emergency Services

We collaborated with the European Space Agency in the technological and business assessment of new applications leveraging satellite communication in these domains.
The study, after a consultation with the end-users, focused on three applications on which satellite could have a relevant role

**Application selected**

- **Connected vehicles**: Smart connected vehicles enabling fleet management and optimized routing during interventions based on hybrid connectivity (cellular, satellite)

- **On demand monitoring of impacted areas based on UAV**: UAV Command and Control link for monitoring activity in BVLOS and payload data communication link (e.g. HD cameras, Thermal cameras, smoke detectors)

- **On field broadband connectivity**: Adoption of vehicles (Cell of wheels) or drones (Cell of wings) capable to restore broadband connectivity
  - Adoption of portable devices capable to provide broadband connectivity to nearby devices
The three applications are impacted by multiple macro trends

<table>
<thead>
<tr>
<th>Application</th>
<th>UAV</th>
<th>IoT</th>
<th>Wearables</th>
<th>Broadband communication systems</th>
<th>Analytics &amp; data science</th>
<th>Robots</th>
</tr>
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<tbody>
<tr>
<td>Connected vehicles</td>
<td>-</td>
<td>✓</td>
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<td>On demand monitoring of impacted areas based on UAV</td>
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<tr>
<td>On field broadband connectivity</td>
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The use of SatCom will bring benefits in terms of cost savings, operational, safety and quality of service improvements

<table>
<thead>
<tr>
<th>Application</th>
<th>Benefit</th>
<th>Key elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected Vehicles</td>
<td>![Gear, Time, Shield, Trophy]</td>
<td>• Reduction of intervention time due to optimized routing</td>
</tr>
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<td></td>
<td></td>
<td>• Boost of safety of the officers due to alert notifications</td>
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<tr>
<td></td>
<td></td>
<td>• Predictive maintenance will reduce the number of vehicle failures events</td>
</tr>
<tr>
<td>On demand monitoring of impacted areas based on UAV</td>
<td>![Gear, Time, Shield, Trophy]</td>
<td>• Improvement of the quality of the service offered</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• The exploitation of UAVs will lead to increased efficiency,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>covering a wider area in a faster way versus land vehicles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Increase the safety of the operations, keeping out of danger the officers</td>
</tr>
<tr>
<td>On field broadband connectivity</td>
<td>![Gear, Time, Shield, Trophy]</td>
<td>• Support operations in remote or distressed areas by enabling</td>
</tr>
<tr>
<td></td>
<td></td>
<td>officers to communicate</td>
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<td></td>
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<td>• Increased safety during operations and greater coordination</td>
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<td>both between officers and with the control center</td>
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The integration of Terrestrial and NTN is a crucial development for emerging applications in the public safety sector

<table>
<thead>
<tr>
<th>Application</th>
<th>SatCom Role</th>
<th>Key elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connected Vehicles</td>
<td>![Icon]</td>
<td>• Satellite can provide narrowband IoT hybrid connectivity</td>
</tr>
<tr>
<td>On demand monitoring of impacted areas based on UAV</td>
<td>![Icon]</td>
<td>• Satellite can be adopted primary link for BVLOS Autonomous Flight in either C2 and Payload Download use cases</td>
</tr>
<tr>
<td>On field broadband connectivity</td>
<td>![Icon]</td>
<td>• Satellite provides a primary link in case of emergency situations in order to restore the communication in the distressed area</td>
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Connected vehicles and BVLOS UAVs are still under development, while on field broadband connectivity is already mature.

<table>
<thead>
<tr>
<th>Application</th>
<th>Technology development</th>
<th>Market readiness</th>
<th>Satellite positioning</th>
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<tbody>
<tr>
<td>Connected Vehicles</td>
<td>Improvements in terminal SWAP and cost of capacity</td>
<td>Willingness to integrate application into operational procedures</td>
<td>Satellite plays a hybrid role by providing communication in rural areas</td>
</tr>
<tr>
<td>On demand monitoring of impacted areas based on UAV</td>
<td>Autonomous UAVs and light weight terminals to be developed</td>
<td>High cost of adoption and regulatory issues</td>
<td>The satellite link is an enabler for BVLOS autonomous flight</td>
</tr>
<tr>
<td>On field broadband connectivity</td>
<td>Improvement in bandwidth and cost of capacity required</td>
<td>High cost of connectivity</td>
<td>Satellite is the main solution to restore connectivity in emergency</td>
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Legend: Low  ○  →  ●  High
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<tr>
<th></th>
<th>Our proposed recommendation for the SatCom sector</th>
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</table>
| 1 | **Aggressively seek cost reduction of SatCom link**  
    Industry should push hard to reduce the cost of capacity per Mbps in order to win new clients but also to enable complex and advanced applications that require ubiquitous and continuous data usage |
| 2 | **User Terminal to be designed for specific end-user needs and at lower cost**  
    User Terminal is a key element for SatCom market penetration, smaller and low power devices are needed to unlock the addressable use cases with the minimal end-user capex |
| 3 | **Integrate the SatCom offering with the terrestrial networks**  
    Hybrid multilink systems are an imperative to increase satellite penetration in the market. Work side by side to make the whole communication system seamless and coupled with terrestrial networks |
| 4 | **Make the satellite eco-system more interoperable**  
    Communications protocols and standards should be more integrated and interoperable among different constellations as global end-user could use several services |
| 5 | **Iteratively engage end-user to stimulate awareness for the SatCom**  
    Several safety critical services could be widely covered by the Satellite, even with current space assets, end-users should open to dialogue with SatCom sector in defining operating requirements |
WHAT ARE WE LOOKING FOR?

1. Address one (or more) application area(s) and propose to design, develop and demonstrate one (or more) service(s) relevant for this (these) areas. Other applications areas may be proposed by Tenderers, if identified by representative stakeholders of relevance for their operations.

2. Be customer/user driven (i.e., involve in the project representatives from users’ communities).

3. Shall set-up a pilot trial/demonstration to verify and deploy in a pre-operational environment the proposed service(s) with the involvement of the engaged users/customers.

4. Prove the benefit of including safe and secure satellite telecommunications systems for the proposed service(s).

5. Include the potential service provider as part of the tendering team.
Use Case Examples

“New normal” ways of secure working including secure remote access for teleworking and creation of new opportunities for cross-agency collaboration e.g. enabled by connecting shared databases through digitalisation.

Secure SatCom supported communication systems connecting frontline responders to provide extensive coverage, high resilience, security and public safety functionality.

Internet of Things (IoT) providing connected devices for on field monitoring and connected vehicles, e.g. enabling fleet management and optimised routing during interventions based on hybrid connectivity (cellular, satellite).

Broadband communication systems providing on field broadband connectivity, for instance provided by vehicles (Cell of Wheels) or drones (Cell of Wings) capable to restore broadband connectivity or by portable devices capable to provide broadband connectivity to nearby devices.

On demand monitoring of impacted areas based on UAV providing increased efficiency, covering a wider area in a faster way versus traditional land vehicles, providing increased safety and providing vital information concerning the operations.

Treating location data in full compliance with GDPR. People’s precise geographic coordinates denote a great lot of personal data. This issue is particularly important in disaster management, where finding the right balance between location precisions and being still GDPR compliant should be addressed for making location data and personal privacy becomes sound from end-users and disaster manager perspectives.
How to apply?
**SME**'s are fulfilling the criteria defined in the European Commission Recommendation of 6 May 2003 (2003/361/EC) or as updated.

** with no commercial interest in product/service. The funding of Universities or Research Institutes shall not exceed 30% of the total allowable cost.

ESA will bear up to the above defined percentage of the acceptable project cost, and the remainder has to be financed by industry, institutions and users participating in the activity, and may be in cash or in-kind.

The applicable funding level of the individual prime- or subcontractors is subject to authorisation by the involved National Delegation(s).
Where to find the information

business.esa.int

- Scroll down to the part “Featured Opportunities” to see all activities currently open or in preparation.
Where to find the information

business.esa.int

- Scroll down to the part “Featured Opportunities” to see all activities currently open or in preparation
- Opening and closing dates for Outline proposal submission
- Outline proposal template
- Call scope document
**Roadmap**

1st step
Submission of Outline Proposal

- Call for OP opening 1st March 2022
- Deadline 12th May 2022

2nd step
Submission of Full Proposal

- Call for FP opening End Sep 2022
- Deadline Nov 2022

***OPENING DATE: TBC SOON. CLOSING DATE IS TENTATIVE***
Funded participation to 4S Strategic Programme Line is open to any company and/or organisation residing in the following Member States:

Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Spain, Switzerland, and the United Kingdom
1. Registration (minimum ‘light registration’) on ESA-STAR Registration [https://esastar-emr.sso.esa.int]

2. Download the documentation associated to this Announcement of Opportunity [=> esa star ref]

3. Prepare your Outline Proposal using the template provided

4. Submit your Outline Proposal to ESA via web submission form and to your ESA National Delegation(s)*.

5. The Tenderers whose Outline Proposal is positively evaluated, will be invited by the Agency to prepare a Full Proposal.

*The contacts of the National Delegations can be found at https://artes.esa.int/national-delegations
DEMONSTRATION PROJECT: OUTLINE PROPOSAL CONTENT

1. Project summary and Rationale
   - Background, The team, experience and connections
   - Including participating entities to the demonstration trials
   - Service description, Space Assets

2. Business Plan
   - Customer segments
   - Value proposition, revenue streams
   - Key resources and dependencies, Key activities, Key partners
   - Cost structure, competitors

3. System and Implementation aspects
   - User requirements
   - System/ service architecture
   - Implementation approach, Starting point prior to start, risks

4. Financial, Management Administrative
   - Key activities, cost & duration, key resources, risks

Deadline: 12/05/2022 (TBC)

- There is a Template
- Be concise and factual
- Read the documentation!!

The bidder shall confirm that the Outline Proposal has been sent to the National Delegation.

Submit on web form
Thank you for your attention

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Downstream Business Applications Department
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Open Questions & Answers Session