

**ESA SPACE-BASED SERVICES
FOR A SAFE AND SECURE SOCIETY**

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ESA UNCLASSIFIED - For Official Use

European Space Agency

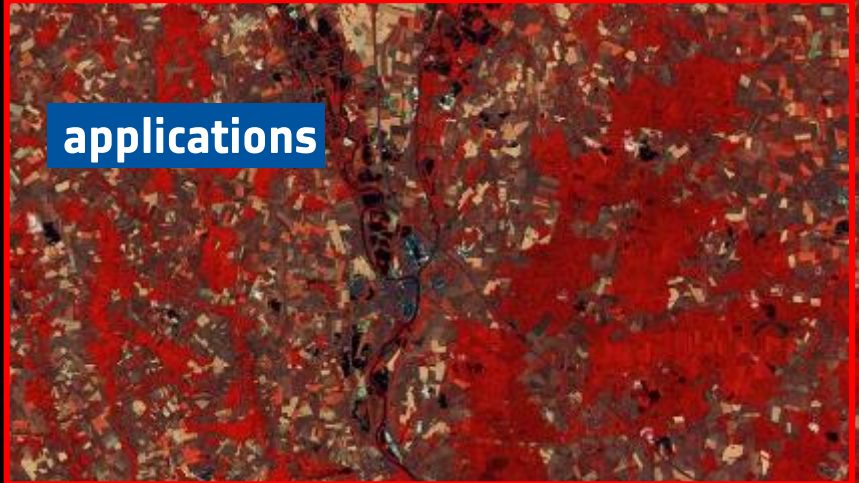
science



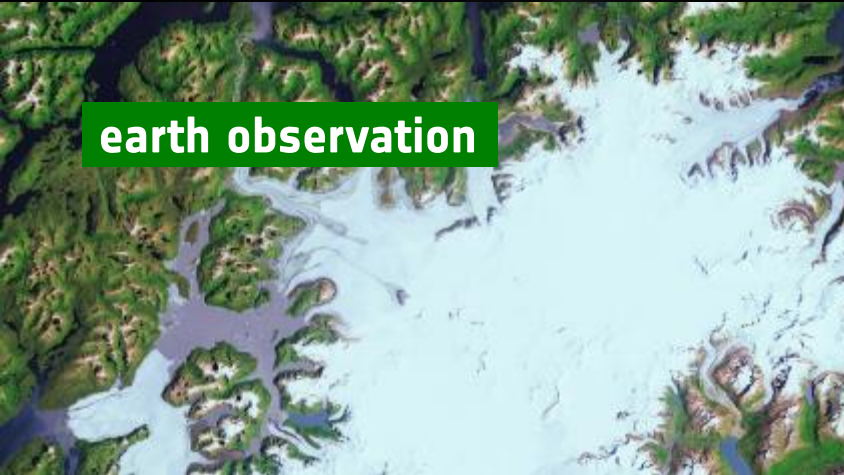
human spaceflight



applications



earth observation



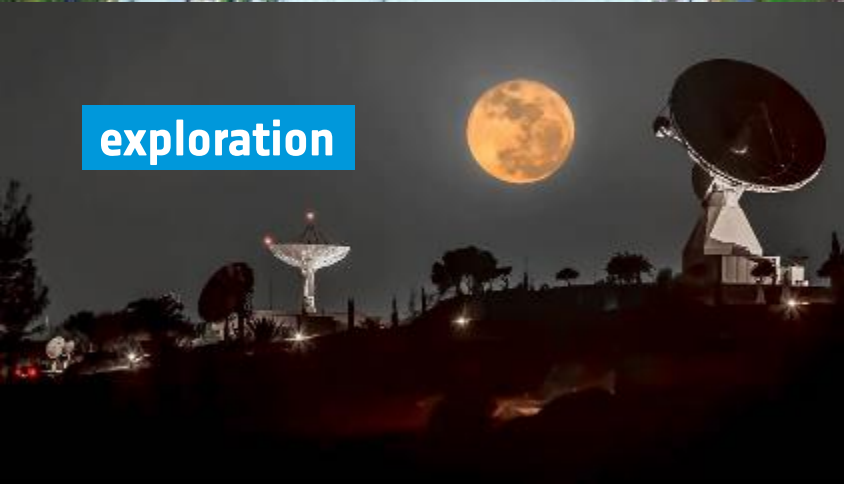
space transportation



navigation



exploration



technology



telecommunication



→ BUSINESS APPLICATIONS

Using **any space asset(s)** and integrating them with terrestrial assets for the **benefit of life on Earth**





Satellite Navigation

- Global Positioning Navigation
- Velocity
- Precision Timing
- Activity Tracking
- Route Optimisation
- Personal Security



Satellite Communication

- Reliable and Secure Communication
- Remote Connectivity (maritime, oil rigs, undeveloped areas)
- Backup to Terrestrial Infrastructure



Earth Observation

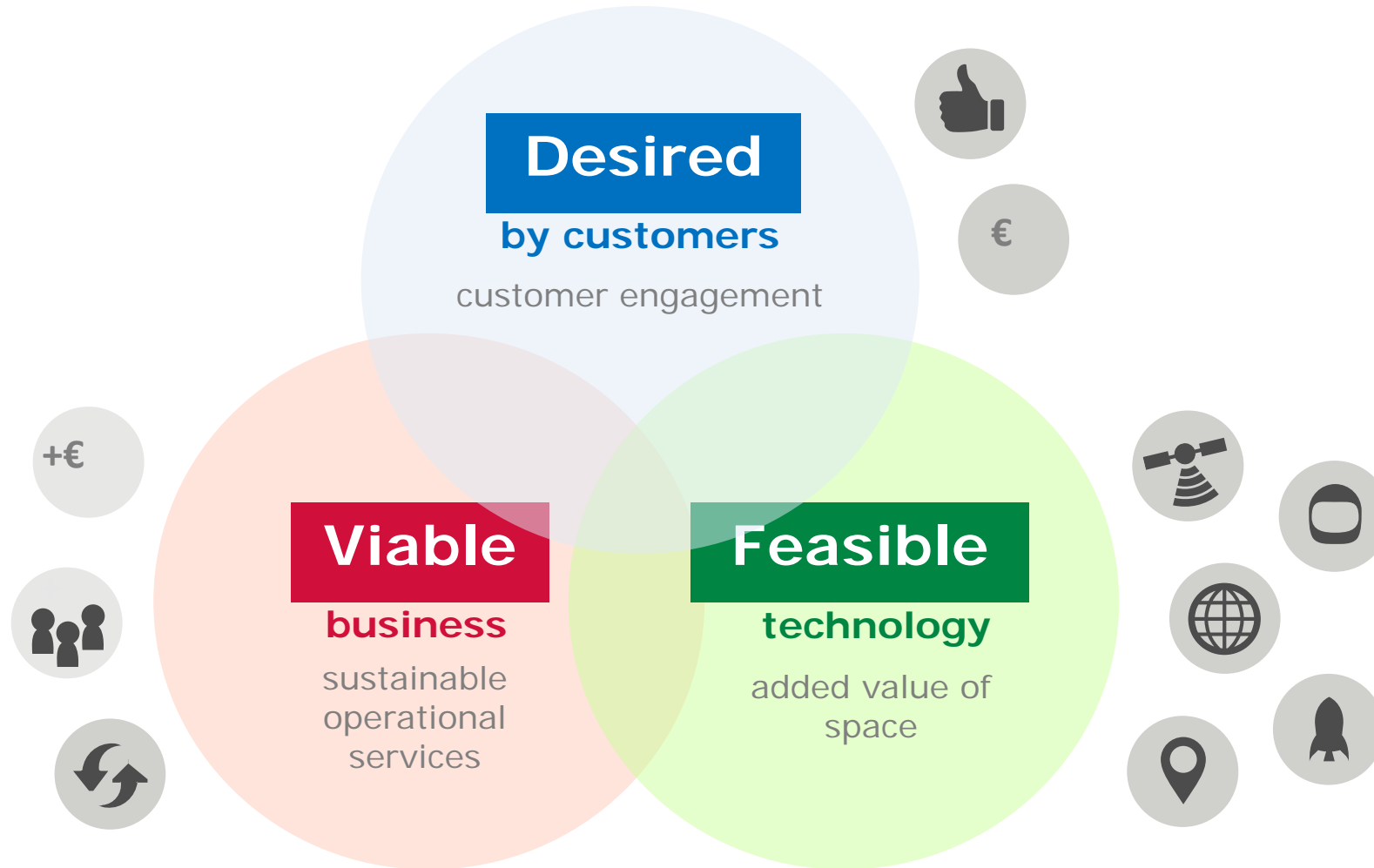
- Land, Sea, Air Monitoring
- Resource Mapping
- Environment Sensing
- Change Detection
- Weather and Pollution Forecasting
- Chemical and Physical Properties Detection



Spaceflight Technologies

- Augmented Reality
- Tele-operation Systems
- Health Sensors
- Procedures
- Big Data Processing
- Artificial Intelligence

→ ESA BUSINESS APPLICATIONS LOOKING FOR PROMISING SERVICES



→ OUR OFFER



**Zero-Equity
Funding
(€60k-€2M+)**



**Tailored Project
Management
Support
(technical &
business)**

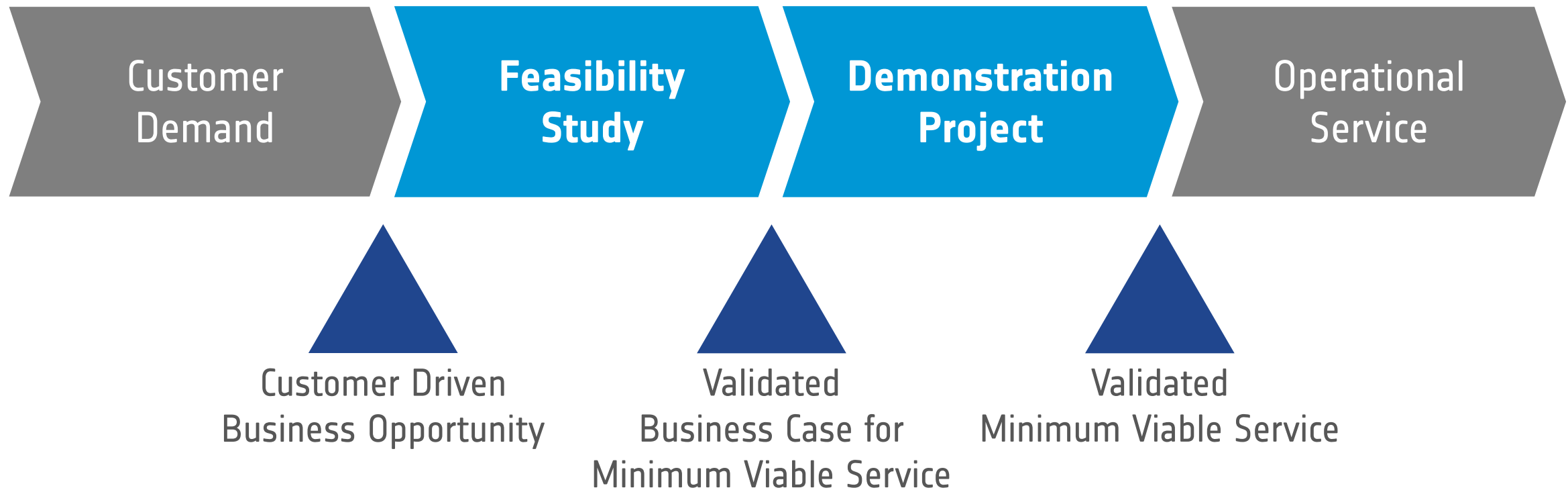


**Access to
Our Network
& Partners
(incl. Investors)**



**Brand
Credibility**

→ ACTIVITY IMPLEMENTATION





→ SPACE-BASED APPLICATIONS
AS ENABLERS FOR PUBLIC SAFETY

Example "B-LiFE"

business.esa.int/projects/b-life

B-LiFE - Biological Light Fieldable Laboratory for Emergencies

ESA IAP - ARTES 20 Project coordinated by the CTMA

B-LiFE has the support of the Belgian Civil Protection - Belgian Home Affairs

Integration of Space Applications

Satellite Communication



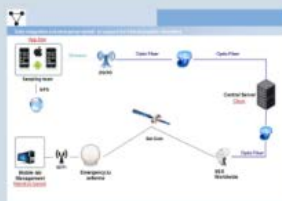
- Capacities :**
- Real time communication between field teams and command and control centers
 - Real time communication with remote experts
 - Broadband links for data, voice and video
 - Real time availability of evidence based results for decision makers

- Resources :**
- Emergency.lu services
 - Commercial satellites

Partner :
SES TechCom

Satellite Navigation

- Capacities :**
- Geolocation of collected samples
 - Tracking of field teams and equipment
- Resources :** GPS - GALILEO - EGNOS
- Partners :** Aurea Imaging, Eonix, Nazka Mapps



Data Integration

- Capacities :**
- Integration of analytical data, geolocation, mapping and reporting
- Resources :** Autonomous infrastructure for telecommunication, data bases and servers
- Partners :** Eonix , SES TechCom

Earth Observation

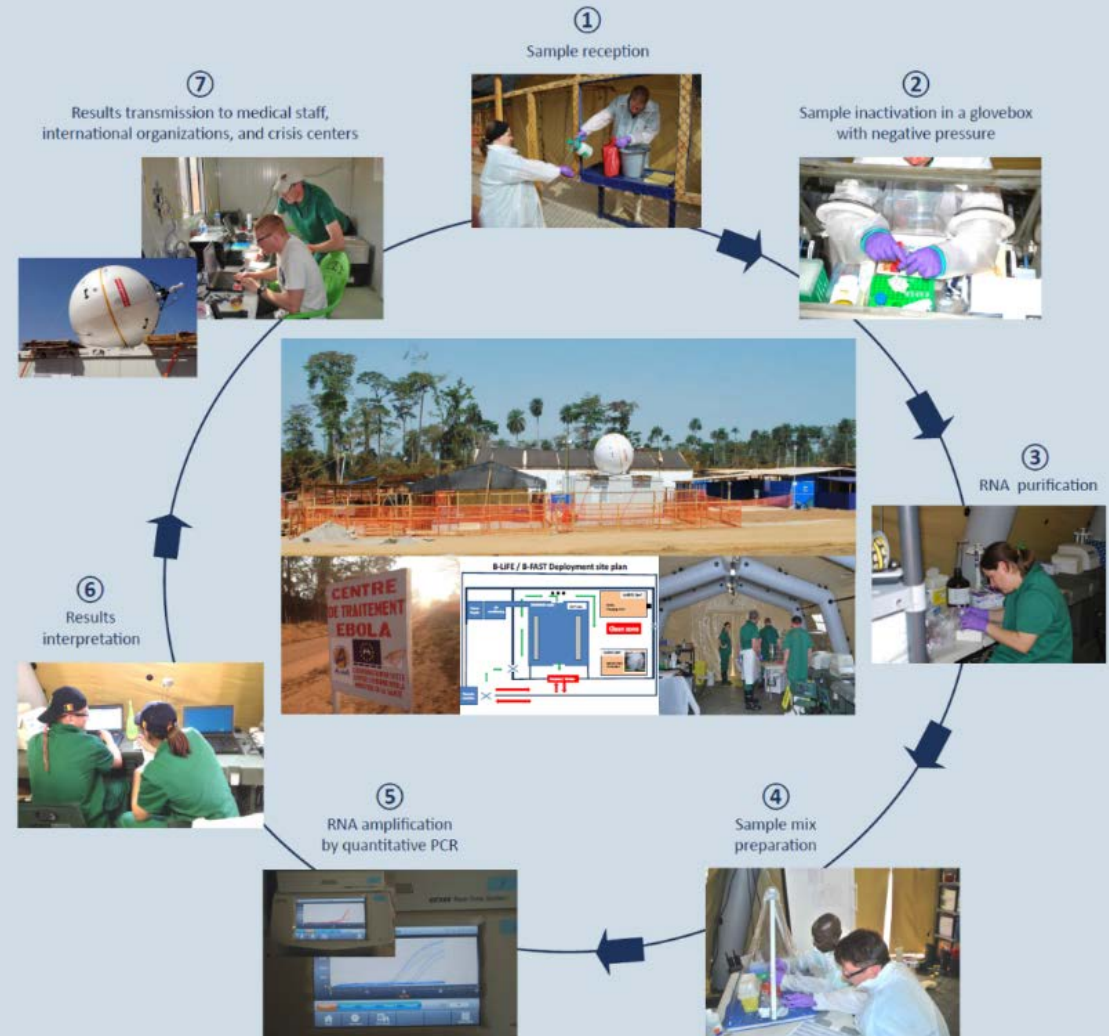


- Capacities :**
- Geographical information and maps of crisis area
 - Site selection and monitoring



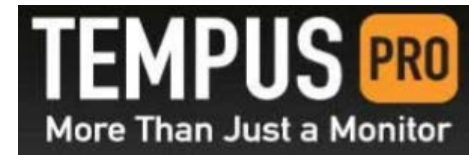
- Resources :**
- GMES / Copernicus services
 - Remote sensing satellites
 - Unmanned Aerial Systems
- Partners :**
Aurea Imaging, Nazka Mapps

Ebola Sample Pathway in the B-LiFE Mobile Laboratory in Guinea



Example "Amazon"

business.esa.int/projects/amazon



Real-Time Satellite Based Telemedicine Service for professional clinical users in remote locations making use of multiple space assets (Satcom, Satnav).

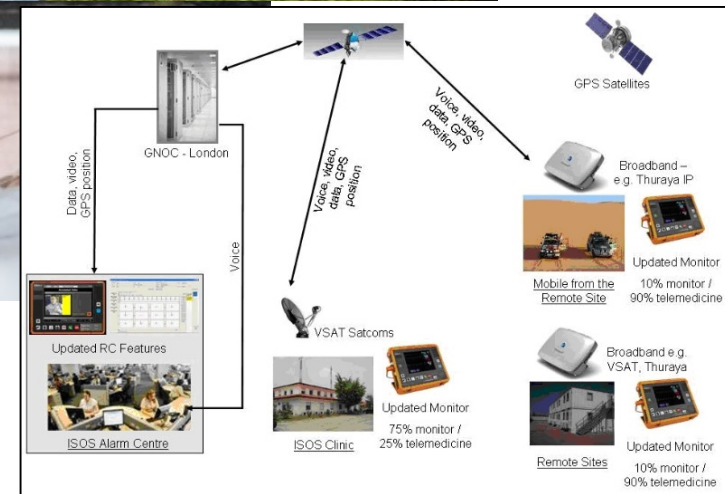
Highly compact medical device:

- conventional vital signs monitoring and defibrillator
- telemedicine capability (remote diagnosis).



Multimodal space-based services

- satellite broadband / narrowband and terrestrial communication capabilities,
- location-based patient information, including VoIP, streaming of data and medical imagery, video, **GPS positioning**



Target Customers:

- Governmental & private Emergency Medical Services entities
- Organisations involved in managing commercial healthcare in remote locations, e.g. iSOS or their customers

Target Users:

- Professional medical personnel (including military medics)

Company: RTD Ltd (UK)

Example “DroSecMa”

business.esa.int/projects/drosecma

Drone Security Management:

Use of multi-sensor technology to accurately detect and track intruding drones.



Sensors used:

- **RF sensors** to detect drone communications (drone brand agnostic) and thus the presence of drones, and perform triangulation to locate them. This can be coupled with steerable surveillance cameras.
- **Compact radar system** able to distinguish between birds and drones, but limited to line-of-sight detection.



Current DroSecMa customers:

- Car manufacturers: 130 drones in 6 months above their site
- Financial institutions/central banks: 10 intruders / week
- Prisons

Partnership with German CAA

SatCom: provides communication and connectivity where other networks are not available or not sufficient in view of bandwidth, reliability or latency.

SatNav: provides position data for localization of intruding drones. It also improves the localization accuracy of sensors.

Consortium: ESC Aerospace, DE



Example "AUDROS"

business.esa.int/projects/audros

Autonomous Drone Services in CBRNe operations:

- Fully autonomous 24/7 Remotely Piloted Aircraft Systems (RPAS)-based services for security and defense applications with special focus on CBRNe
- Based on a unique RPAS-HANGAR System to enable automatic taking-off and landing of the drone, allowing fully automated battery recharging/ swapping



Consortium: CZ, PL

Target users

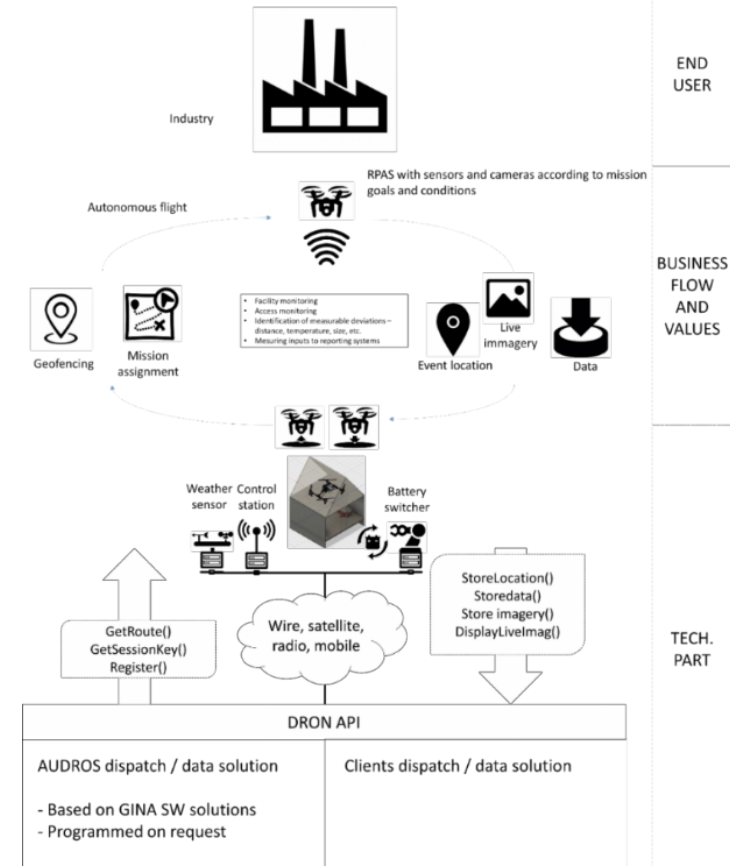
- Security and civil protection forces (civil protection, border police, fire brigades etc.)
- Private companies in different industries as security, transportation, mining, energy production, health and others;

Added Space Value

Earth Observation (EO): meteorological information and forecast are used to analyse possible situation development

Satellite Navigation (GNSS): crucial component to autonomous drone services and to rescue team management in the field.

Satellite Communication (SatCom): is used as part of the drone hangar to secure data transfer to remote dispatch/command.



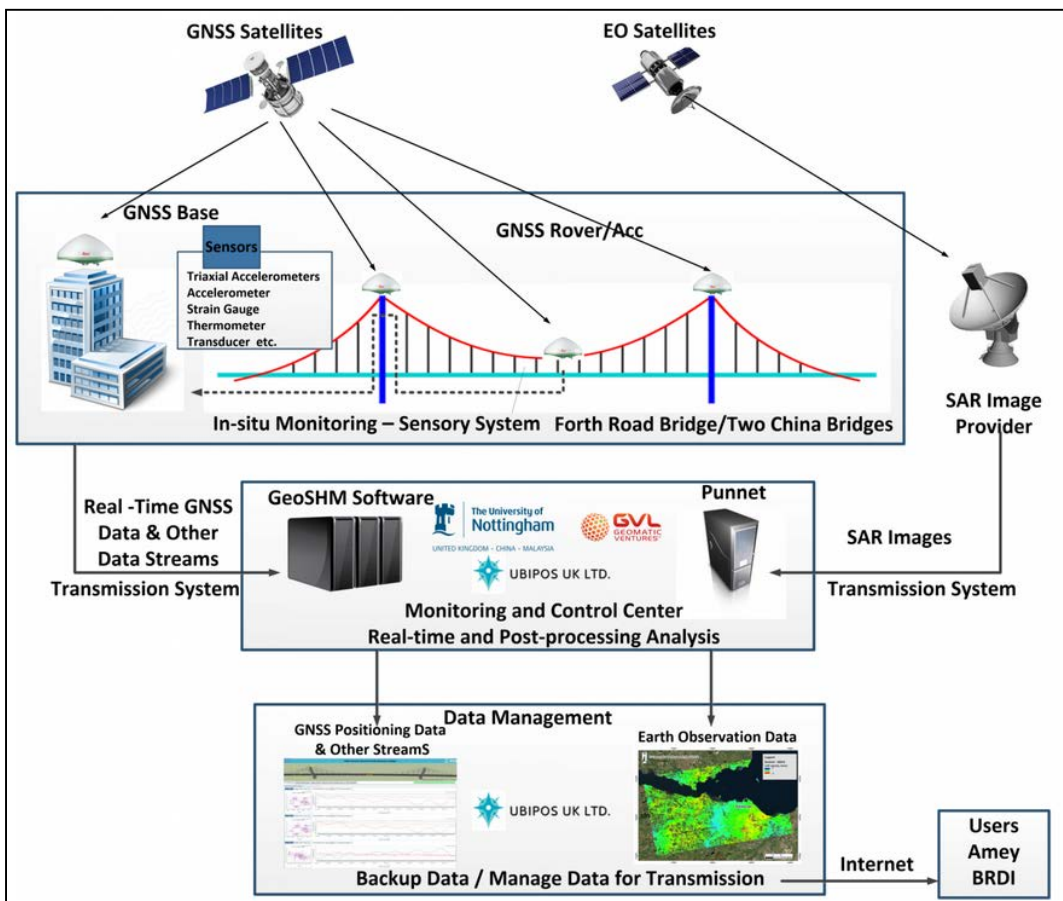
Example "GEOSHM"

business.esa.int/projects/geoshm-demo-project



GEOSHM - GNSS and Earth Observation for Structural Health Monitoring:

Structural Health Monitoring (SHM) service for the maintenance mainly of large bridges providing real-time measurements during normal and abnormal loading conditions, as well as a complete picture of the structure in its changing landscape, and identifying threats.



Forth Road Bridge in Scotland

Consortium: UK

Customers: Bridge operators in UK and China

- **Real-time 3D displacement** and acceleration data at key locations of the structure based on GNSS
- **Slow subsidence characteristics** of the supporting structures provided by Interferometric SAR (InSAR)
- **Estimates of long-term bridge motion**, e.g. affected by thermal expansion, based on GNSS and InSAR
- **Deformation estimates of a wide area of land surrounding the bridge** based on an integrated GNSS and InSAR data.

Example "LUMEN"

business.esa.int/projects/lumen

LUMEN - Light UAS in non-segregated airspace for Maritime and ENvironmental Surveillance:

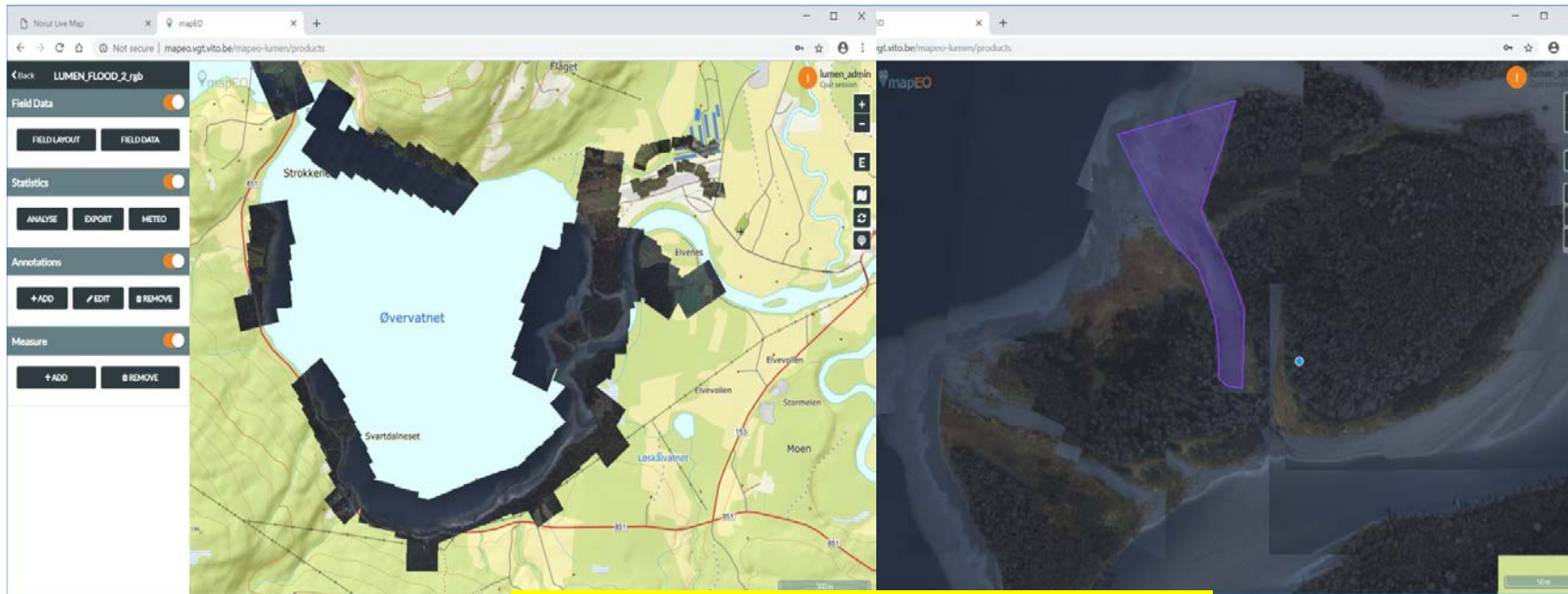
Real time monitoring and critical situation management services using a medium sized RPAS/UAS

- Two initial target use cases: flood extend mapping and maritime coastal monitoring



Consortium: BE, NO

Targeted Customers: maritime and civil protection authorities



Flood extend mapping available in near real time



Example "B-SURE"

business.esa.int/projects/b-sure

B-SURE

Rapid collection and bandwidth efficient secure communication platform of relevant field information to **improve situational awareness for disaster management authorities**. The baseline field platform is a **smartphone**, while operators access data and interact with the field users via web browsers online on secure servers.

The platform will include **deep learning algorithms** to rapidly classify imagery received by operators from field users to enable more efficient decisions and actions to be carried out.

Added Space Value

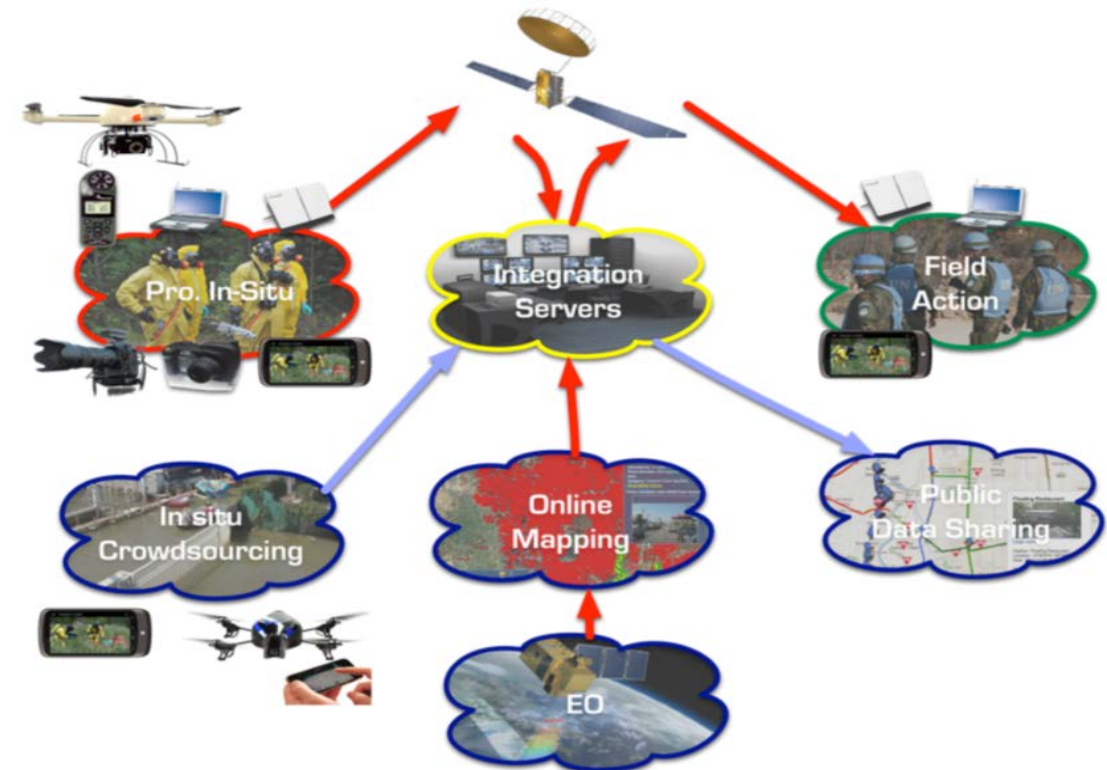
Earth Observation (EO): to provide rapid mapping for crisis and disaster management to improve situational awareness.

Satellite Navigation (GNSS): used for accurate positioning, and reliable location data

Satellite Communication (SatCom): required for disaster management when other networks are down, when out of coverage, or when security demands to not use local networks that can be intercepted.

Users involved: UN and a disaster management organisation (AHA Centre)

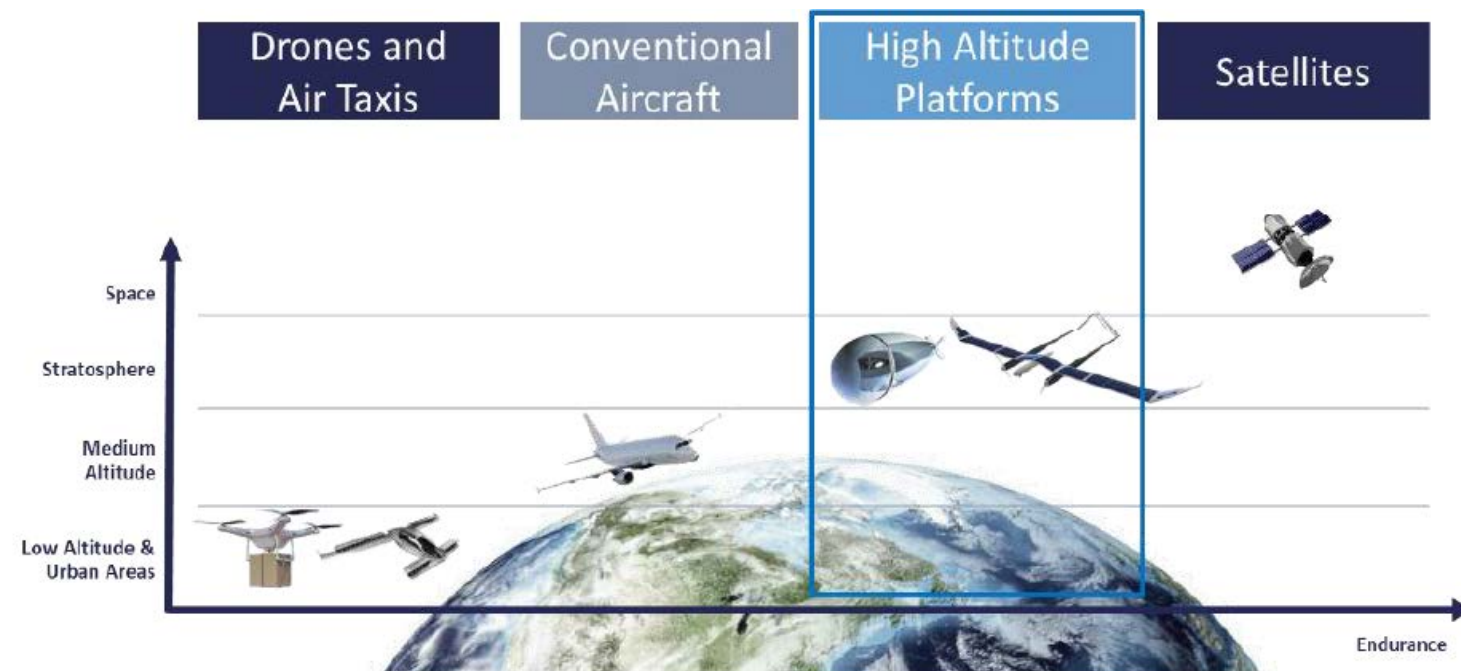
Consortium: NO, IE, DE





→ PUBLIC SAFETY
LOOKING FOR USER NEEDS & INNOVATIVE
IDEAS

HAPS : HIGH ALTITUDE PLATFORM SYSTEMS



Credit: Unisphere GmbH

- Unmanned aircraft (airplanes, airships or balloons)
- Positioned above 20 km altitude
- Very-long-duration flights counted in months
- Can remain continuously over an area for very long periods (persistence)
- Can be returned for maintenance & payload reconfiguration
- Flexible/short time to deployment
- **Interesting asset to answer to crisis situation needs**
 - **Emergency/public safety communications**
 - **Situational awareness**

5 Feasibility Studies conducted in 2018/2019 to assess the technical feasibility and business case of HAPS based services and define roadmap for services implementation and demonstration, in collaboration with



Demonstration projects under preparation

ESA BASS latest opportunities



“5G for Law enforcement and emergency response”

Call for Tenders (Feasibility Study and Demo Project)
Open till 13 Jan 2020

“Environmental Crimes”

Call for Tenders (Kick Start study)
Open till 28 Feb 2020



“Cybersecurity and space based services”

Call for Tenders (Feasibility study)

- Transport and Mobility (maritime, land, air, including autonomous vehicles)
- Energy, Utilities and Critical Infrastructures
- Financial Sector
- Public Safety

Closed on 14 November 2019, proposals under evaluation

→ OUR MESSAGE TO PSCE MEMBERS

- ESA is ready to further contribute to the development of innovative space based applications which may further support public safety.
- As a user driven program, we are looking for establishing collaborations with public safety user communities to understand their needs and requirements and support the design of solutions addressing them.

→ THANK YOU

→ [HTTPS://BUSINESS.ESA.INT/](https://business.esa.int/)

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