
Integrating UAS into risk management process



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Distretto Tecnologico Aerospaziale

DTA s.c.a r.l. is a not for profit consortium society with the mission to increase the competitiveness of members and of the Apulian/Italian aerospace value network.

Action lines

- Research and technology development and demonstration projects
- R&I laboratories and infrastructures
- Systemic vision and actions
- International perspective
- Highly skilled professionals

Public and private research



Technology development



Space upstream and downstream



System and sub-system development and integrators



UAS/IAS ecosystem

Membership

- European Network of U-space stakeholder
- European Network of UAS Test Centers

Research organizations



System, sub-system and service development and integrators



Technology design and development



Solutions end users



Institutions



Integrating UAS into risk management process

Risk prevention

- Monitoring areas not accessible from space (canyons, mountains, ...)
- Specific natural risks not visible from space (radiation, small risk's source...)
- High precision, high granularity pictures

Value

- No persons at risk during operations
- Digitalization of the situation (and distribution to different decision making center)
- Higher operational endurance

Risk management

- Rapid remote data/pictures collection (situation awareness)
- More information for coordination of the emergency operations
- Urgent delivery
- Restoring of some services (ground TelCom)

SATNAV, SATEO, SATCOM are all required while operating UAS for risk management



DTA is supporting the development of UAS technologies and solutions for risk management
Some use cases are the object of this speech

Grottaglie Airport Test Bed

A research and UAS flight test infrastructure with the mission of being one-stop-shop for the provision of **simulation/experimentation/certification/presentation** services for research, development and promotion of products/solutions in UAS/IAS sector

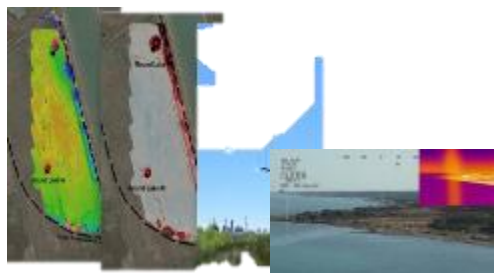
UAS sub-systems



UAS (Integrated systems)



IAS applications and services



IAS insertion into unsegregated air space



Exploited space assets:

- Earth observation
- GNSS
- SATCOM

Risk assessment and prevention: DRONE-TECH

System to monitor peri-urban areas looking for landfills and illegal dumpings

- Peri-urban, natural areas widely affected
- Air, ground, water pollution
- Wildfire (natural park)
- Impact on society and quality of life

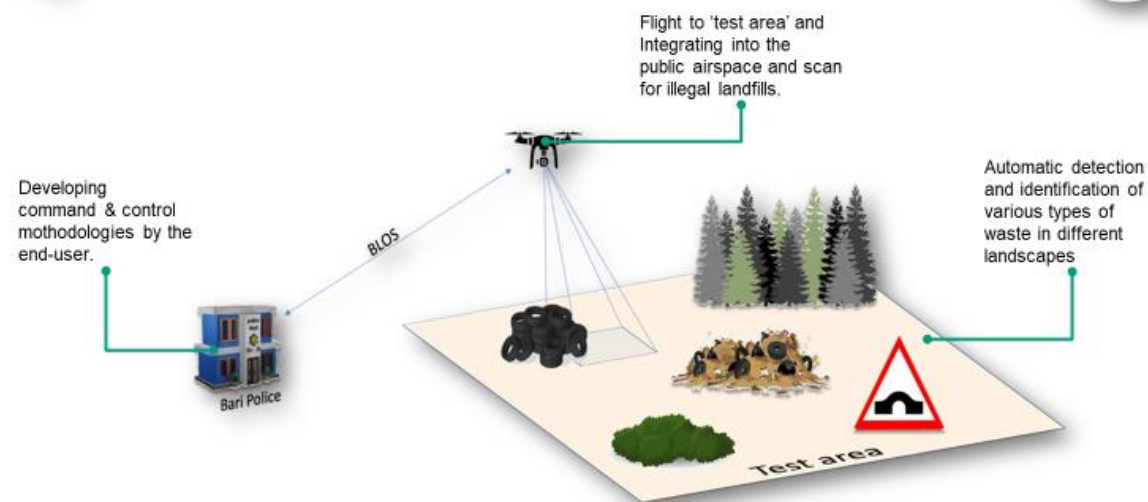
DRONE-TECH is prototyping a system based on BVLOS UAS operations to identify peri-urban dumpings/landfills

- ✓ Early identification of events
- ✓ Identify materials
- ✓ Prioritize interventions
- ✓ Safety of intervening teams

Consortium: DTA, UniBA, High Lander, Sightech, Municipality of Bari

Co-funded by: Minister for foreign Affairs and International Cooperation and Israeli Innovation Agency

SOLUTION OVERVIEW



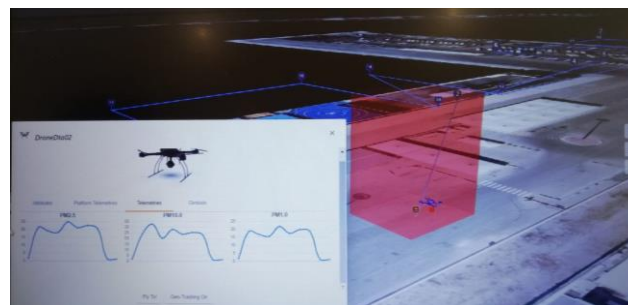
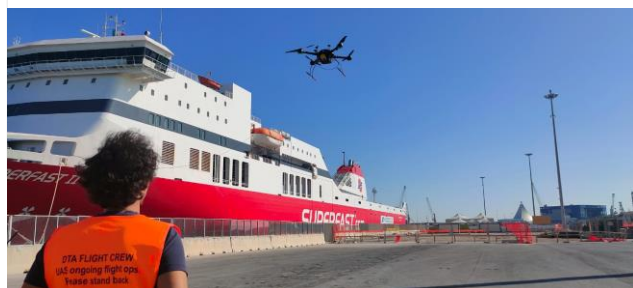
Exploited space assets:

- Earth observation
- GNSS

Risk assessment and prevention: CALLIOPE

Data management platform collecting environmental data through sea, ground, air, space sensors for One Health view in the city of Taranto

- 1) One Health Intelligence:** monitoring and predictive computing of human, animal and environmental **health** and of impact on biodiversity
- 2) Innovation Technology Hub:** prototyping smart IoT devices for sea, ground, air data collection tailored to the city of taranto, to be integrated with EO space services
- 3) Dissemination and Training Hub:** university-industry-end users knowledge transfer, support for start-up incubation



1) Animal Health Smart Devices



Prototipi da Sviluppare

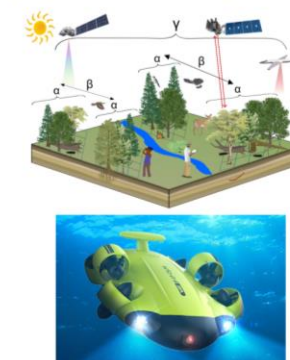


2) OneHealth Biobank



3) Integrated Human-Health Monitor

4) Dynamic Biodiversity Monitoring



Consortium: Municipality of Taranto + 30 partners
Co-funded by: Minister for Enterprises and Made in Italy,
program: Casa delle Tecnologie Emergenti

Risk impact reduction: U-space2

Advanced and Specialized Traffic Information Service, view of UAS traffic for different stakeholders, included state operators

- **Traffic Information Service (TIS)**
- Data presentation for real time situation awareness of UAS traffic for flight risk avoidance
- TIS tailored to needs of different classes of end users (UAS pilots and operators, mobility operators, State operators)
- **Space data:**
 - GNSS availability
 - Weather data
 - Limited State UAS data

Consortium: DTA, D-Flight, ADL, g-nous
Co-funded by ESA: Space for UAM



Figure 12: Display of the uncertainty sphere of a position in different time intervals: t=0 and t=1 sec

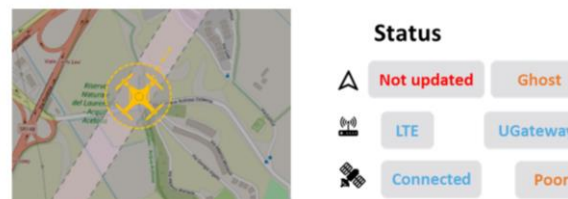


Figure 13: Display of a vehicle when the position is estimated

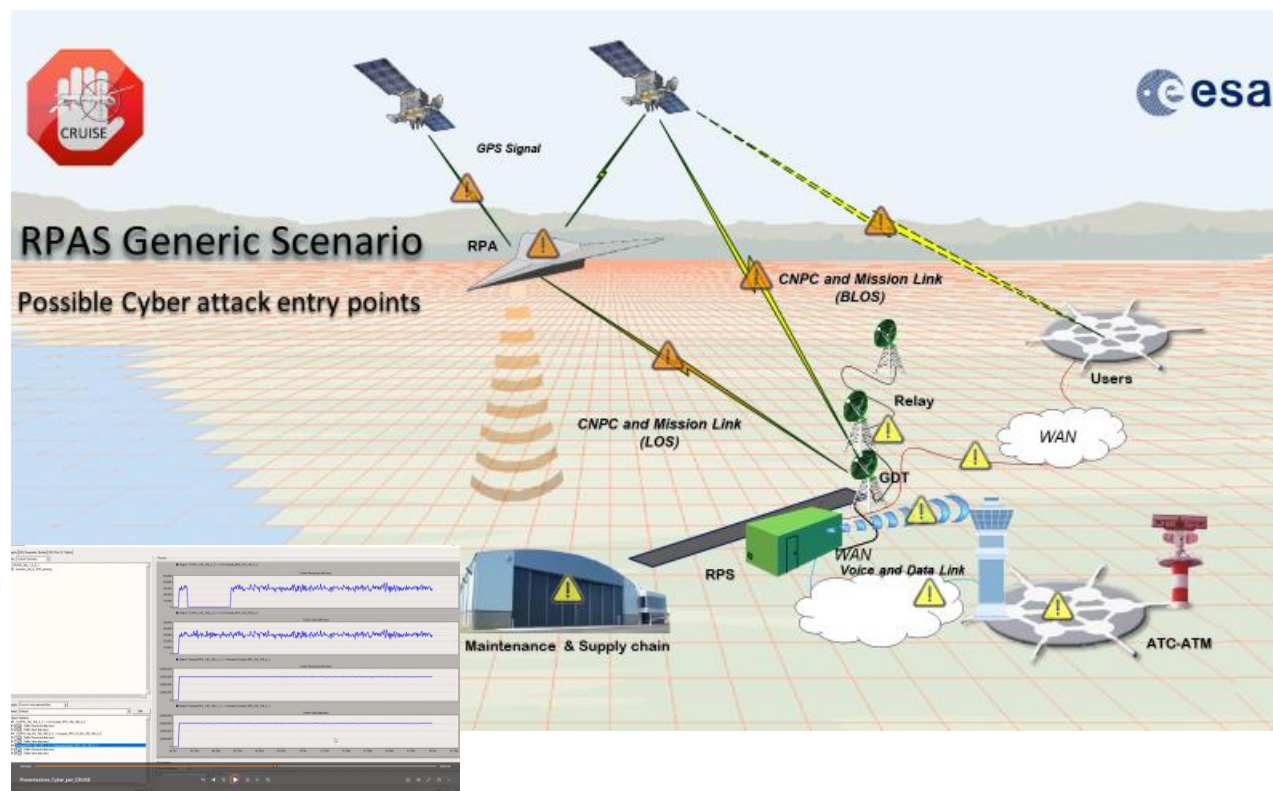
Risk impact reduction: CRUISE

UAS cyber vulnerability assessment infrastructural module fo GATB

Cyber security of RPAS against attacks on datalink

- Infrastructural module of GATB, networked with **Athena Fidus** satellite and Leonardo laboratory
- Vulnerability asesssment of UAS (including payload) on **ground and space communication channels**
- Security of C2 data link
- Security of payload data link
 - Certified collected data
 - Illegal gathering of data collected (i.e. journalist)

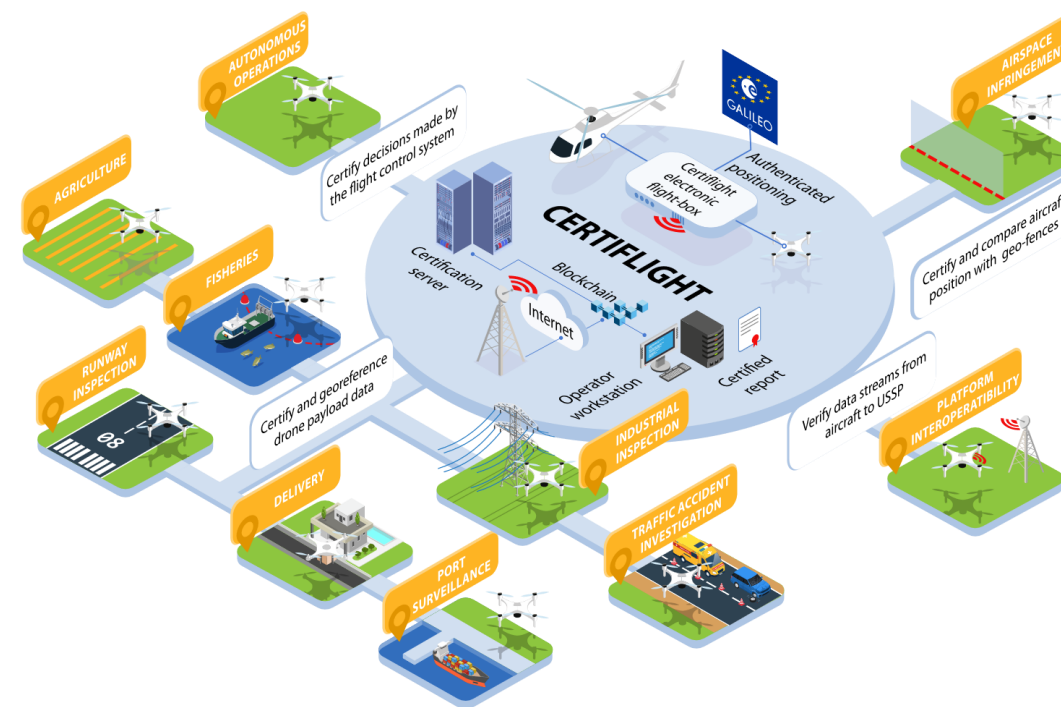
Consortium: Planetek, DTA, Leonardo, Telespazio, AdP
Co-funded by: ESA, BASS program



Risk impact reduction: CERTIFLIGHT

Certified E-GNSS remote tracking of drone and aircraft flights

A digital service for the generation of certified reports of flight tracks and the flight logs of UAS. The architecture is composed of a digital EGNSS/IoT Device installed on UAS, equipped with an **OSNMA Galileo/EGNOS** enabled receiver to guarantee the authenticity of position data at the origin. Tracking information is encrypted and transmitted to the Certiflight platform implementing an unalterable blockchain private node.



Consortium: TopView, d-flight, Upvision, Unifly, DTA, TSP, TUDelft, WAY4ward, AriaUnited, EUROUSC Spain, EUROUSC Italia
Co-funded by: Co-funded by EU, granting authority: EUSPA

Concluding remarks

UASs are an important tool for risk management

UAS introduce new approach to risk assessment and to capacity to face impact of catastrophic events

- Risk assessment effectiveness: timely assessment, area not covered by space EO
- Support in event management operations
 - Updated situation awareness (damage assessment, S&R)
 - Coordination of operations
 - Urgent transport
- GNSS and SATCOM are essential services for UAS operation in affected areas, availability and continuity are critical factors



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