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Drones Beyond. 2022

Urban Air Mobility
Evolutions and perspectives





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Urban Air Mobility Evolutions and perspectives



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Drones Beyond. 2022

Context

Today cities collect 75% of the European population and are close to reach 80% in 2050; one eighth of the Europeans lives in one of the 26 cities with populations over a million and over 800 cities have populations exceeding 50,000 people. The need to make cities livable and sustainable is growing more and more thanks to new economic, cultural, educational and health services. Cities are the main sources of generation of work and GDP, but also the main producers of most polluting emissions (20% of the total) and waste, the most avid consumers of natural resources and energy (between 70 and 80 % of energy), with average water consumption per capita per day changing globally between 264 and 100 liters, responsible for 6.7% of annual land consumption. An unstoppable evolution that raises the need to plane and promote development in an eco-sustainable form, with low consumption of resources, socially inclusive and fervent with work.

To achieve this, cities focus on technological innovations, digital methods and networks of intelligent systems that constitute the tool to make their planned efficient and intelligent as well as to sustain the development of economic processes, services to the person, mobility, water management, waste management, building management and recovery ...

With the continuous decrease in the size of sensors and processors, with ubiquitous digital memory and wireless connectivity and thanks to the evolution of AI and IOT, drones are rapidly finding a number of new and productive uses and becoming active subjects of transformation of cities.

In this context, the Drones Beyond 2022 is conceived and designed by the DTA.

A summary moment of comparison and demonstration of the state of the art of the policies implemented by European cities, of the new programming and urban planning needs, of the operations and of the innovative services achievable with drones, of the infrastructures necessary to favor tests and experiments and of the citizenship relationship with these new technologies.

A great effort that allows us to realize the largest event ever made in Europe in an urban environment in terms of quantity and diversity of operations and demonstration activities carried out. A moment of launching the urban test range created at the Fiera del Levante in Bari, in collaboration with the Municipality of Bari, which joins and completes with the wider infrastructural dimension based on the Grottaglie airport, in an integrated system concept to favor development and testing of solutions, services and products for advanced air mobility. An event that gives visibility to our member and partner companies and that intends to inspire our young people in whose hands we will place our future and the future of aerospace. An event that crowns a further milestone of the DTA in the path of creation, development and consolidation of the Apulian Aerospace System, which we thought, designed and started almost 15 years ago, and has established itself over time as excellence and good practice in the national and European panorama. To those of our community who have once again contributed, and will contribute, to the success of the initiative, a sincere thanks that corroborates the commitment, determination and passion with which we operate, convinced that what we have done up to now will not be enough for tomorrow.

Giuseppe Acierno, DTA President



Bari open innovation hub

A new era of urban infrastructure development and a new family of professionals will guide the transformation of cities increasingly called upon to manage the growing urbanization process and the related problems it entails, in a sustainable way. The new urban engineers, called to conceive and develop new and integrated infrastructures and communication networks, will design cities with an integrated connectivity in infrastructures, buildings, streets, parks, trees and so on providing us with real-time information necessary for the daily life of millions of citizens. By the end of this decade, there will be 125 billion of connected devices worldwide. The new connected reality will lead us to interact with a smart device on average every 18 seconds, or 4,800 times a day and the cities will be teeming with sensors. Connectivity and Artificial Intelligence will drive the transformation of communities without escaping the new challenges of sustainability and energy transition.

In this scenario, the city of Bari is an open-air laboratory for the design, development and experimentation of innovative solutions for smart cities, planning its future together with its citizens and with the support and collaboration of the best public and private energies. dedicated to innovation and to the management of new urban problems through the use of new technologies.

The collaboration with the DTA goes in this direction, developed over the years with various initiatives and projects, and the realization of the Drones Beyond 2022 aims to be a moment of presentation, to citizens and the European community involved in the development of new forms of urban mobility, not only of the vision of a city of the future, but also of its placing itself, its functions, its skills, its infrastructures at the disposal of the business system, public and private research, new generations and citizens. This for jointly contribute to creating a city where new technologies are used to better guide traffic flows and avoid congestion, to cope with the immense logistical challenge of e-shopping, to find shops, restaurants and entertainment sites, to increase the tour commercial affairs, to improve safety in public spaces, or to better manage public services for all, especially for the elderly and with disabilities people, for minorities and tourists.

In this scenario, the collaboration with the DTA for the development and introduction of new urban services, through the use of drones and satellite systems and applications, constitutes an extraordinary lever for building the smart city paradigm.

Eugenio Di Sciascio, Deputy Major of Bari



Technological infrastructure

Grottaglie Airport Test Bed (GATB) and Drone Living Lab

Grottaglie Airport Test Bed (GATB) is the research and experimentation technological infrastructure DTA is realizing in collaboration with its public and private members to support the establishment of a distributed and networked knowledge center on UAS and AAM. As outcomes of the initiatives of DTA, and with the collaboration of Leonardo, ENAV, Telespazio, D-Flight, and other public and private members of DTA, the GATB is now composed of a real time simulation system and UAS flight test facility (including the airport of Grottaglie, operated by Aeroporti di Puglia) and enables research in UAS insertion into AMT, ATM/UTM interface, UAS autonomy, UAS ground and environment monitoring and logistic services (target applications of the Italian AAM roadmap). Other laboratorial modules are already planned to improve UAS flight test capabilities and to widen research and experimentation technology scope to include innovative propulsion systems, sensors and environment observation applications, PNT devices, urban air mobility.

The technological infrastructure is one of the arms of the Drone Living Lab DTA has established in collaboration with City of Bari and ENAC. DLL is an open innovation network coordinated by DTA to support the transformation of Bari into a smart city through UAS applications and space services. DLL supports the development of innovative solutions to solve concrete needs and problems of the public administration as well as other urban stakeholders of Bari.

DLL applies a development methodology based on users experience actual and long term problems to shorten time-to-market of innovation. Bari Local Police, participating in the project SAPERE, have exploited GATB to improve its knowledge and experience on using UAS in its activities and to design new applications. An experimentation of urban monitoring through UAS was also realized in collaboration with DTA.

Bari Open Innovation Hub is going to exploit GATB and knowledge DTA has accumulated to support development, experimentation and demonstration of UAM services into the city of Bari.

Start-ups, innovative SMEs, large enterprises are welcome to receive support in designing and developing solutions, based on aerospace technologies, for smart city and in experimenting and demonstrating them in the best safety and security conditions available in GATB and in Bari. Drones Beyond. 2022, while demonstrating state-of-the-art national UAM capacity and European trends and objectives, has established an experimental Urban Drone Range: flight control room, ground logistic infrastructures and services, air traffic coordination procedures have been designed and deployed exploiting R&I project results and will be available for future UAM technology and solutions experimentation and demonstrations.

Antonio Zilli, DTA



Smart city and Urban Air Mobility

Concept, technologies, perspectives

Even if the specific meaning of the term is still misty, we may clearly state that Urban Air Mobility (UAM) will be the next giant leap in the passenger and goods transport sector. Employing fully electric, highly automated and autonomous unmanned vehicles, air mobility will shift to areas barely available today, such as densely populated urban districts, and -- being habilitated by emerging technologies (such as the 5G, Artificial intelligence, and IoT) -- it will be characterised by large-scale in **Beyond** Visual Line of Sight operations (B-VLOS).

In a non-far future, it is expected that thousands of daily operations will be done safely for passengers, for airspace users, and particularly for people and property on the ground. Urban air mobility will integrate two separate and today unconnected domains, such as aviation and urban, and in all this, cities will be increasingly involved in its development.

Within this framework, therefore, it will be essential to establish a new and dedicated regulatory framework -- with governments, local entities and public services-- for providing permit-to-fly policies in urban areas. It will be challenging and demanding as it will require sustainable long-term development driven by technological and legislative measures. Integrating drones into airspace could be one of the most revolutionary steps in the mobility management of passengers and freight, but new airspace rules for share headings and reducing potential conflicts with other vehicles; and new dynamic segments (volumes) and high-speed corridors for unmanned commuters to fly in larger trajectories shall be required. At the same time, urban air mobility will be integrated into the metropolitan transportation system: ground-based infrastructure will be essential for enabling urban air operations, and this realisation will be a significant challenge for any city.



New urban infrastructure -- such as Heli/vertipads, ground stations, energy supply systems, lighting, emergency services and passenger facilities -- will be straightforwardly implemented thanks to new urban planning policies tailored to the specific risks of the urban environment -- such as confined areas (among buildings), GPS blockage and reflection, turbulence, and electromagnetic interference.

All the above will put decision-makers facing a rapidly changing market in services and technology solutions.

Drones Beyond '22 aims to provide answers to this new market. During Drones Beyond '22, several operational missions will be deployed - from infrastructure inspection to road monitoring, parcel delivery, and intermodal transportation. All these missions are being experimented with in the city of Bari and later implemented more generically in other urban areas. The idea here is to demonstrate possible new services and, more importantly, stimulate discussions with regulatory authorities about the frameworks needed to make them happen. The goal is to discuss - by settling a large round table of stakeholders - how to accelerate the permitting of flying over urban areas and how to deploy this new paradigm.

In the end, Drone Beyond '22 -- as thought -- will want to emphasise the following different perspectives:

- The ICT infrastructure perspective: thanks to the rollout of 5G communications, aerial platforms will employ massive data sharing. This emerging technology will habilitate near real-time communications, keeping city skies safe while maintaining situational awareness.
- The operations perspective: The existing air traffic management system must evolve: U-Space technology will provide new air traffic services -- including new legislation, new airspace management, and new information services -- all linked to the existing Air Traffic Control (ATC). With its unique capabilities, U-Space has the potential to stimulate flight planning, guidance, and monitoring in complex urban ecosystems
- Cities Perspective: the UIC2 (UAM Initiative Cities Community) association states that local authorities shall be engaged in the public use of urban airspace and that they will be the best actor in designing the rules for managing the significant amount of infrastructure that are going to be realised.

Michele Giannuzzi, DTA



Drones Beyond.

Concept

Continuing the path started with the 2021 event within the **MAM-MEDITERRANEAN AEROSPACE MATCHING** held at the Grottaglie airport in september 2021, the DTA proposes its approach to the development of AIR URBAN MOBILITY SYSTEM by presenting, alongside the conferences, also a series of demonstration mission, carried out both in real and recorded time, capable of representing some significant concepts and solutions with the aim of propose not only technological development paths but promoting the understanding, usefulness and safety of new systems and solutions in order to create values and benefits to the **COMMUNITY** involved (**ACCEPTANCE**).

When we talk about mission in the URBAN AIR MOBILITY SYSTEM, from the point of view of technological architectures we can mean three large areas:

BASIC INFRASTRUCTURES: ground facilities, which can essentially be represented in the various solutions relating to vertihub, vertiport, vertipad, vertispot and Distributed Coordination Centers;

OPERATIONAL FACILITIES: infrastructures for the control and management of flight activities, such as UTM/ATM Systems, Communication, Navigation, Safety systems;

SECURITY OPERATION CENTER: system for managing security from any point of view, in particular for Cyber Security aspects;

All this managed and controlled by a **CCC-COORDINATION AND CONTROL CENTER** operating on the one hand to coordinate and manage the provision of services and on the other to measure the performance of the various components of the system with a view to continually improving it.

What means "METROPOLITAN ADVANCED MOBILITY"?

Not just technological development but a new culture (paradigms/models) of the MOBILITY SYSTEM.

That means:

- Conceptual change of vision for integrated mobility management;
- New way of planning travelling (vehicles, people, goods);
- New design criteria for urban/metropolitan structures (buildings, roads, infrastructures, services);
- New dedicated ground facilities (vertihub, vertiport, vertipad, vertispot, COM/NAV systems, etc...);
- New platforms with new configurations and systems (piloted, automatic, autonomous systems);
- New operating (CONOPS) and use (CONUSE) rules;
- New safety/security concept for people and systems;
- New competence and professional skills;
- New facilities to support development, testing and certifications of platforms/solutions;
- New service architectures (data management /manipulation, knowledge management, learning systems, Decision Support Systems, ..);
- New driving capabilities and certificates;
- New and widespread communication languages.
-

The main missions that can be carried out in a Metropolitan Air Mobility System cover application areas of different types such as:

- **Environmental observation:** territory, roads, infrastructure, pollution, etc.
- **Transport/delivery:** people, goods, tools, etc.
- **Safety:** public events people search, tracking, etc.
- **Territorial mapping:** 2/3 D territory modeling, planning, abuse control, etc.
- **Flow management:** traffic, public events, emergency, etc.

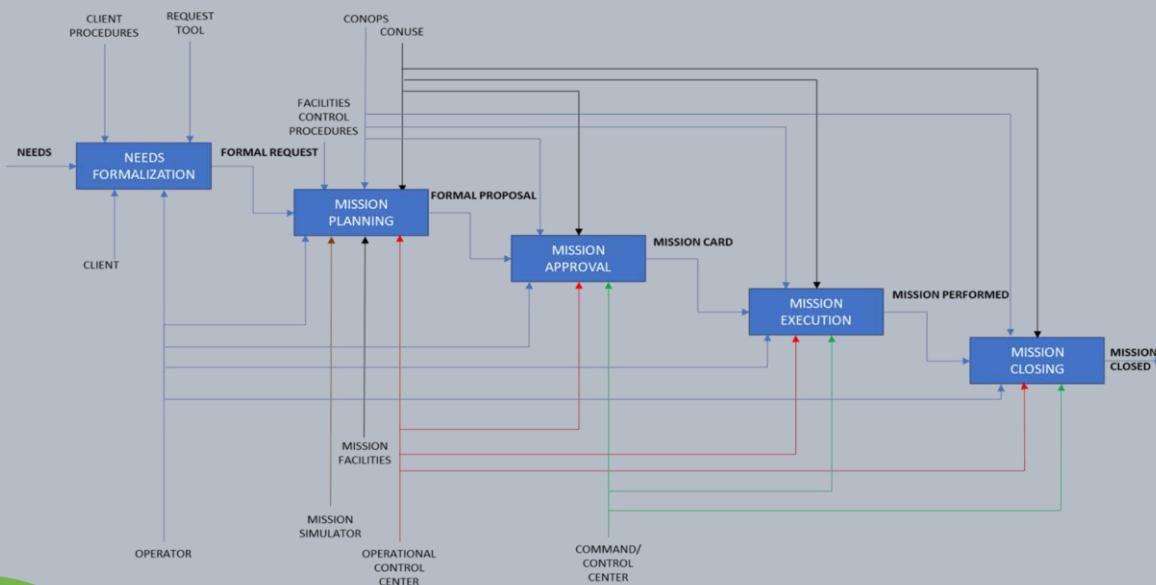
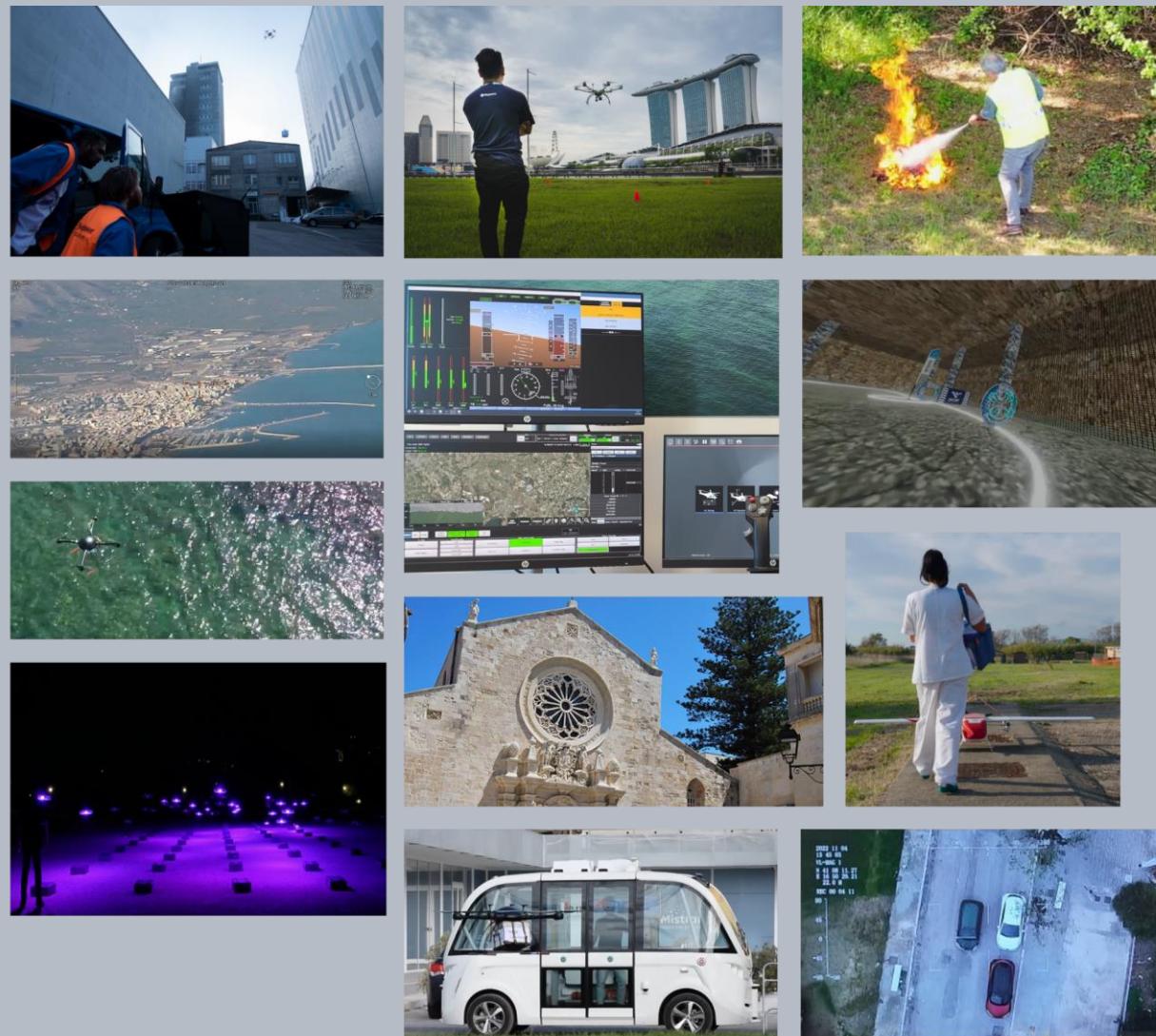
All these missions must include both operational procedures (**CONOPS**) for the management of the rules for the use of the aerospace and procedures for use (**CONUSE**) for the correct management of mission objectives.

Silvano Capuzzo, DTA

2022 Operations

1. **Basic mission demonstration (live)**
2. **Multiple and simultaneous UAS operations in a single sky (live)**
3. **Intermodal transport (live)**
4. **Non cooperative platforms management (recorded)**
5. **Ship to land delivery and port territory control (recorded)**
6. **Urban territorial control (live)**
7. **Mission control with radio-bridge (live)**
8. **UAS swarm light show (live)**
9. **Delivery of goods at home (live)**
10. **Platform and space control during a mission (recorded)**
11. **Coast Control (recorded)**
12. **Observation with solar platform (recorded)**
13. **Territorial observation with multisensors (recorded)**
14. **Vertiport Operations (recorded)**
14. **Mobile vertispot application (recorded)**
16. **Demonstration of aerial work (recorded)**
17. **Relief on architectural heritage (recorded)**

2022 Operations



1. Basic mission demonstration *(live)*

Scope

Presentation of the processes and facilities involved in the management of a typical urban air mobility mission, starting from the request to the closure of the same after its realization.

The main activities to be carried out, the various actors involved, the technologies and the components of the CONOPS and CONUSE processes are highlighted, with particular attention to specifying the actions for safety and the values that can be obtained with the new mobility system.

Demo

the ICOM elements (input, constraints, output, machinery) are presented in a demonstrating flow of the mission management.

2. Multiple and simultaneous UAS operations in a single sky *(live)*

Scope

Demonstration of the possibility of managing the missions of several platforms at the same time in a common urban space example of how in the future it will be possible to safely manage an increase in the use of drones simultaneously in urban areas, developing all the elements necessary in carrying out the missions (requests and authorizations, simulation and optimization of profiles, emergency control and management, control and space management, conflict resolution).

Demonstration of the validity of an urban test range for the development, experimentation and validation of solutions.

Demo

Three missions are carried out simultaneously, representative of a normal use of drones (observation and control of the territory, transport of goods, aerial work activities, etc.).

The ability to manage missions by the Control and Coordination Center is represented, guaranteeing the operational result with the demonstration of the continuous management of events (performance, safety).





3. Intermodal transport *(live)*



Scope

For a correct development of an Advanced Urban Mobility it is necessary to consider the use of various types of means (air, land, possibly also naval) to allow a correct creation of value (cost + risk-to-benefit ratio) and the solution can be the execution of the mission with the use of different means serially integrated.

Demo

The operation sees the use of a UAS in an intermodal transport scenario. The main phases of the operation are: departure from the vertipad, pilots handover, payload pick-up on the pier (to simulate delivery by a boat), take-off from the pier, pilots handover, return to the vertipad and delivery to a van for the “last mile” to the final recipient of the expedition.

4. Non cooperative platforms management *(recorded)*



Scope

Demonstrate the possibility of managing non-cooperative platforms inserted in a single USP space, guaranteeing the possibility of continuous traceability and the identification of problems deriving from their presence in a shared airspace (control/prediction of trajectories collision avoidance overflight of critical areas, etc.).

Demo

- Presentation of a simulation in an airport environment of the presence and intrusion of non-cooperative drones and of the procedures for controlling their activities;
- indication of the possibility of integrating systems for identifying the presence of noncooperative drones (radar and / or optical sensors).

5. Ship to land delivery and port territory control *(recorded)*



Scope

Demonstration of support activities in the management of the operations of a large port, both with regard to the transport of goods (land-ship logistics and vice versa) then to the environmental control of the port area and some operations of a port activity.

Demo

- Management of freight and food transport missions between ships in the roadstead and port facilities on land.
- Management of patrol missions of the port area to verify environmental conditions and support operational activities.

6. Urban territorial control *(live)*



with the support of the Municipal Police of Bari

Scope

- Presentation of a regular patrol mission of an urban territory;
- identification of a traffic problem and activation of a loitering flight over the area;
- actions to support the solution of the problem in contact with ground teams;
- presentation of other types of applications.

Demo

A traffic jam due to an accident between various vehicles is identified during a vehicle flow control mission in an area with high traffic intensity.

The view from above of the area involved and the surrounding urban area allows to provide the operations room with an image to support the deviation of vehicle flows, allowing the reduction of inconvenience for users until the problem is solved.

7. Mission control with radio-bridge *(live)*



Scope

The aim of the demo is to demonstrate how a network of ground infrastructures (like radiobridges) will not only enhance missions safety but also enable newer concepts of operations, where pilots remotely maneuver UAVs from different location in BRLOS conditions.

Demo

The operation sees the use of a UAS in tethered mode and a free UAS that will fly a random trajectory.

The tethered UAS will generate a wi-fi network that will allow the pilot at the RadioBridge station to communicate with the pilot in the Remote Ground Station allowing him to perform the function of backup pilot remotely.

The pilot at the RadioBridge Station will remain the commander of UAS, the pilot at the Tethered RadioBridge station will remain the commander of Tethered UAS.



8. UAS swarm light show (live)

Scope

The aim is not only to present a new concept of light show with great potential in the field of entertainment but also in every field of application where centralized control procedures of cooperating drone fleets will be necessary, such as for the urban transport of goods and people simultaneously in the same space.

Demo

The operation sees the use of 100 UAS in coordinated flight according to the concept of swarm.

The representation develops on the realization of various geometrical and pictorial figures, with the demonstration of the transition from one to another performed according to a pre-established scenography.

9. Delivery of goods at home (live)



Scope

One of the missions that may have more application will be the transport of goods of various types from point to point, in particular the possibility of home delivery of various types of products (food, medicines, emergency systems, etc.).

The mission presents a transport house from the warehouse of a hypothesis to the terrace of a house, demonstrating how precise automatic landings are possible on take-off / landing platforms, including mobile ones.

Demo

A service provider, having received a request for goods delivery from a distributor who has received a request from a customer, sends a suitable platform to the distributor's warehouse, where the requested load is hooked to the platform and then carried out transport and delivery to the customer's site.

10. Platform and space control during a mission (recorded)



Scope:

To present solutions related to main factors to be managed during the performing of a mission: the platform and the air space within which the mission takes place

Demo

- Mission Control Platform to give complete control over drone operations by solving the key problems limiting drone fleets. Mission Control was built to overcome these challenges and provide solutions for a range of industries.
- Universal UTM Solution: Unmanned Traffic Management (UTM) solution provides total airspace control — even in increasingly crowded skies: from pre-flight to post-flight and everything in between. Universal UTM offers next-generation air traffic management.



with the support of the Municipal Police of Bari

11. Coast Control (recorded)

Scope

Demonstration of the possibility of using drones in the performance of tasks by the Municipality in various areas of its responsibility (from the survey of pollution to traffic management, from checking the state of roads to the state of infrastructures and homes, from green management to waste management, etc.) through an application of coastal observation in urban areas to detect, with the use of multisensors (optical, infrared, multispectral) the conditions of the ground and the sea to verify the presence of anomalous conditions (pollution from spills, illegal landfills, altered marine conditions, etc.).

Demo

Stretch of coast is patrolled around the mouth of a watercourse where possible the presence of pollutants transported by the stream and dispersed in the sea as well as the identification of various types of waste deposited on the shore.

Optical and infrared sensors are used for immediate verification and multispectral for deferred analysis.

12. Observation with solar platform (recorded)



Scope

One of the main problems of aerial platforms is represented by the flight autonomy conditioned by the various on-board energy generation systems (thermal, electric, hybrid, tomorrow hydrogen).

The purpose of the demo is to present a solution of a fixed-wing aerial platform powered by solar energy that allows to guarantee long availability of energy and low incidence of payload for its generation.

Demo

- Presentation of the conduct of a mission with a solar-powered aircraft.
- Identification of the presence of a fire ignition and support for the intervention of the extinguishing teams.
- Presentation of future platform architectures for support in specific application solutions.



13. Territorial observation with multisensors *(recorded)*

Scope

Demonstration of the possibilities of data acquisition on the metropolitan territory both for extra-urban activities (e.g. agriculture, forestry sciences, topography, environmental risks, etc.) and for the acquisition of knowledge on the state of the territory and on the elements that can be connected with the presence on it of urban settlements (state of waterways, groundwater pollution, landfills, etc.), through observations with multisensors (O / I, multispectral, SAR).

Demo

Missions are performed with a Fixed-wing aircraft (better than the rotary wing for large-scale observations, possibly replaceable with tiltrotor) to demonstrate the diversity of knowledge acquisition using different sensors on various territorial areas (in particular a SAR sensor - Synthetic Aperture Radar).

14. Vertiport Operations *(recorded)*



Scope

Presentation of new infrastructural solutions, in particular towards the future transport of people.
Presentation of a systems for the management of intermodality of transport (exchange of various types of vehicles) in a vertiport with dedicated functions.

Demo

New concepts and new infrastructure solutions will be developed for departure and arrival, especially for passenger traffic and platform storage.
It will be fundamental to create solutions that make it possible to manage transfers between one mobility system and another in a simple and fast way.

15. Mobile vertispot application *(recorded)*



Scope

Presentation of a mobile system distributable on condition on the territory to be controlled.
Presentation of autonomous vertispot mobile with boxing drone for platform management, connectable with a remote control center capable of managing multiple vertispots.

Demo

Presentation of a typical mission to control the motorway environment and demonstration of the value that can be obtained through both a real-time view of events (e.g. traffic conditions, accidents, etc.) and a view compared with previous footage (e.g. infrastructure status) for maintenance activities of the facilities.



16. Demonstration of aerial work *(recorded)*



Scope

The transport of bulky goods in urban areas and support for installation and / or installation activities is certainly a very interesting area of aerial work carried out with the use of drones.
Particularly interesting is the support that can be made for transport on buildings of significant height where the movement of products at height today requires the installation of cranes with a considerable effort for their assembly / disassembly and non-continuous use, often with important need for spaces both on the ground and for maneuvering.

Demo

The demonstration presents some cases of aerial work with a platform capable of carrying up to 100 kg (system components, tools and various tools), in particular from the ground level to the roof level of some buildings in an urban area.
The development of platforms with greater load capacity will allow to expand the possibility of using drones and their programmed insertion.

17. Relief on architectural heritage *(recorded)*



Scope

The management of real estate and architectural assets requires continuous monitoring of their status for proper planning and management of maintenance.
The use of drones and sensors of various types, as well as the availability of new diagnostic systems that can be transported with these platforms, allow for the development of problem prevention actions on these assets, with important implications, including economic ones.

Demo

- Reconstruction through surveys with drones and sensors of the external and internal structures of the Cathedral of Otranto, the Church of Santa Maria Maddalena in Uggiano, the Palazzo del Seminario of Lecce;
- Identification of critical issues and support for the definition of a restoration and maintenance recovery plan.

2022 Operators



Distretto Tecnologico Aerospaziale (DTA) scarl is a no-profit public-private consortium whose members are the main regional and national research and industrial aerospace player.

Mission of DTA is the enhancement of competitiveness of the regional aerospace system through the development and widening of scientific knowledge, the strengthening of the technological capabilities and the implementation of an internationalization strategy.

The objectives of DTA is to contribute in the creation and development of regional physical and relational infrastructures and of technological assets for the growth of the regional aerospace value system.

The growth DTA stimulates is in line with the EU2020 strategy: smart, sustainable and inclusive growth.

d-flight pursues the development and provision of low-altitude air traffic management services for remotely piloted aircraft (APR) and all types of aircraft which fall into the unmanned aerial vehicles (UAV) category and any activity connected to them.

d-flight S.p.A. is part of ENAV Group, the Italian company responsible for management and control of civil air traffic in Italy.

d-flight – enabling autonomous flight.

DroneBase srl, was born in 2008 in Rimini experimenting with technologies and applications, learning from the experience of technological innovation on the product and the methodology of use, and is today perhaps the largest Italian manufacturer on the RPA market.

Through a craftsmanship qualified by certified construction processes and an engineering department capable of developing proprietary innovative technologies, DroneBase develops a line of vertical solutions characterized by safety, performance and great ability to customize with respect to application needs. "As professional researchers and developers we provide a multidisciplinary approach to the design of the products we create and the services we provide to customers".

ENAV group guarantees safety and reliability 24/7 for all flights handled from its control towers in 45 airports and 4 Area Control Centres in Italy, focusing on sustainability issues.

ENAV Group consists of ENAV, IDS AirNav, d-flight, Techno Sky and employs over 4,100 people. Thanks to its experience in Airspace Procedures Design, Flight Inspection, Training, Maintenance & Engineering and Met Services, ENAV is a leader in providing ATM solutions and services worldwide.

ENAV, Innovating the Sky

CETMA is a Research and Technology organization. This means that its activities are aimed both at generating new knowledge (Research) and at finding concrete applications of the new knowledge (Technology) for companies and institutions. It was born in 1994 following a special agreement between ENEA and MURST with the aim of promote business innovation, with particular reference to Southern Italy. CETMA has developed skills relating to materials engineering, computer engineering and industrial design. Using these skills in an integrated way, it is configured as a multidisciplinary subject for the innovation of products, processes and services able to promote and assist the growth and development of the national production system and to effectively address technological development activities.

Eagleprojects S.p.A. is a company founded in Umbria in 2016 that operates nationally and internationally. It is characterized by a strong innovative imprint in the research and experimentation of new technologies and can count on 400 employees and more than 100 collaborators. Since its inception, the company has experienced a constant growth, quickly affirming itself as a solid reality within telecommunications panorama. The activities carried out by Eagleprojects are attributable to the following main areas:

- design of civil works and technological networks (e.g. optical and mobile);
- construction supervision;
- software development, focusing on integrated web and mobile GIS platforms, AR/VR applications and streaming solutions;
- innovative surveying and terrain mapping (aerial and terrestrial photogrammetry, laser scanning) and passive fiber optic monitoring;
- AI and automation.

Exprivia is the head of an international Group specialized in ICT able to address the drivers of change in the business of its customers thanks to digital technologies. The Group has a team of experts specialized in different technological and domain fields, from Capital Market, Credit & Risk Management to IT Governance, from BPO to CyberSecurity, from Big Data to the Cloud, from IoT to Mobile, from networking to business collaboration up to the SAP world.

The offer includes solutions consisting of own and third-party products, engineering and consulting services.

With about 2,400 professionals distributed in 7 countries worldwide, Exprivia S.p.A. is listed on the Italian Stock Exchange on the Euronext Milan (XPR) market.

FlyingBasket is the first heavy-payload cargo drone company performing commercial operations in Europe. FlyingBasket is a cargo drone manufacturer and operator. The advanced capabilities and performance of our drones can substitute the use of cranes, helicopters or human transport for operations in different sectors like telecom, energy, logistics, forestry and construction. Born in 2015, it is now a solid reality in the drone industry, identified as a leader in the cargo drone segment. The company is based in Bolzano and was founded by the two South Tyrolean brothers, Moritz and Matthias Moroder. To this day the company counts +30 team members from all around the world.

High Lander is an innovative Israeli start-up company founded by a group of aviation experts that has developed two unique, software-only solutions, effectively overcoming the existing limitations of autonomous drone flights.

High Lander's groundbreaking airspace orchestration platform (Universal UTM) and its cutting-edge fleet management platforms (Mission Control) are paving the future for BVLOS (Beyond Visual Line of Sight) missions.

Many of our clients use our platforms for different missions in public safety, urban deliveries, robotic aerial security, and so much more!

With industry-leading abilities like drone-agnostic, 5G/LTE support, GPS-Loss handling, and remote identification – High Lander can easily handle any operation or regulation challenge.

Leonardo, a global high-technology company, is among the top world players in Aerospace, Defense and Security and Italy's main industrial company. Leonardo has a significant industrial presence in Italy, the United Kingdom, Poland and the USA, where it also operates through subsidiaries that include Leonardo DRS (defense electronics), and joint ventures and partnerships: ATR, MBDA, Telespazio, Thales Alenia Space and Avio. Leonardo competes in the most important international markets by leveraging its areas of technological and product leadership (Helicopters, Aircraft, Aerostructures, Electronics, Cyber & Security Solutions and Space). Listed on the Milan Stock Exchange, in 2021 Leonardo recorded consolidated revenues of €14.1 billion and invested €1.8 billion in Research and Development. The company has been part of the Dow Jones Sustainability Indices (DJSI) since 2010 and has been confirmed among the global sustainability leaders in 2021. Leonardo is also included in the MIB ESG index. Innovation, continuous research, digital manufacturing and sustainability are the cornerstones of Leonardo's business worldwide.

Nimbus Srl is an aeronautical company, certified UNI EN ISO 9001: 2015 and ISO 45001:2018 which designs and manufactures innovative Unmanned Aerial System (UAS). Nimbus's team consists of high-qualified mechanical, mechatronic, SW, electronic and aerospace engineer, which designed and produced our Nimbus PPL series 418 (quadcopter), Nimbus 612 EVO Plus XL (esacopter) – also with DDSS configuration - the "Nimbus VTOL" and the "Nimbus box".

Our UAS can address different scenarios, as visible-light video footage, visual and infra-red survey, structural analysis of industrial construction, agro-tech activities, VOR and ILS operations in airport facilities, high-voltage power lines inspections, delivery activities in the healthcare sector and many others.

Pipistrel Vertical Solutions (PVS) is the R&D division of Pipistrel. Pipistrel is a light aircraft manufacturer and only company in the world selling three different electric aircraft models, Taurus Electro, Alpha Electro and VELIS Electro that is the world's first electric powered airplane to receive a Type Certificate from EASA. PVS develops own battery and power controllers for general aviation class of aircraft and is the only company globally to have obtained EASA approval for propulsion-class batteries to be used in aviation for commercial application as part of a TC.

PVS designed more than seven different electric aircraft and developed aircraft propulsion batteries for NASA and Siemens projects. PVS is also a holder of a Design Organization Approval certificate issued by EASA.

Planetek Italia is an Italian Benefit Company established in 1994, which employs more than 100 women and men, passionate and skilled in Geoinformatics, Space solutions, and Earth science.

Planetek provides solutions to exploit the value of geospatial data through all phases of data life cycle from acquisition, storage, management up to analysis and sharing.

Planetek operates in many application areas ranging from environmental and land monitoring to open-government and smart cities, including defence and security, Space exploration and EO satellite missions.

Planetek Italia is Diamond Dealer of Hexagon Geospatial software and data provider of satellite images.

The Planetek group consists of four companies based in Italy and Greece, active in both national and international markets.

Salento Droni srls is an SME and is the first school for UAV pilots that deals with both their training and the creation of procedures for standardization and interoperability.

From our vision, the S.O.C. (U.AV. Security Operations Center) was born, a mobile operations room for UAVs, able to guarantee assistance 24 hours a day, 7 days a week for the control of the territory and fire accidents and security procedures from cyber attacks and data breaches against Drones.

Skyproxima is an Innovative Startup that enters the aerospace industrial world by offering solutions designed, developed and industrialized on the basis of the customer's operational needs. Drones and platforms are of new conception and provide robotic integrations (mechanical arms) and long-lasting operational capabilities (H24). The agreements signed with important British players make it possible to bring to the market the first airports for Skyproxima aircraft / drones with vertical take-off.

Sky Eye Systems Srl is an aeronautical Company with operational headquarters in Cascina (PI), established in February 2017. President and CEO is Eng. Massimo Lucchesini, former CEO of AerMacchi and General Manager of Alenia AerMacchi. Sky Eye Systems is owned by the OMA Company (Officine Meccaniche Aeronautiche) of Foligno. Sky Eye Systems has designed and manufactured the *Rapier* family, fixed-wing aircrafts, with a maximum take-off weight (MTOW) spanning from 25 to 50 kg, designed for both military and civil/government activities.

Skyports, Founded in 2018, is an Advanced Air Mobility company developing and operating landing infrastructure for the electric air taxi revolution, as well as using drones for a variety of business requirements.

Skyports Infrastructure plays a critical role in the Urban Air Mobility ecosystem; designing, building, owning, and operating vertiports that enable eVTOL operators to take off and land in and around cities across the world.

Skyports Drone Services uses drone technology to enable businesses to develop their logistics, capture key data, and improve operational efficiency. We are active in the rural deliveries, survey, surveillance and maritime verticals.

Sorvola srls is a start-up founded in 2021 with the following social purpose:• design, construction and provision of services through the use of professional drones to all production and commercial sectors and to public administrations. • Participation in research and development projects in the field of drone technologies and related payloads, for the experimentation of new services;• realization of sporting events, including for educational purposes, with FPV drones at regional, national and international level.

Soul Software is a software factory with more than 15 years of experience as consultant in different markets and as centre of excellence in the development of patent intended for Enterprise Application Integration (EAI) market. Soul Software has also an internal R&D department fully committed in the development platform simulator for the ATC\UTM market. We're involved in different national and European project to develop innovative software solutions enabler of drone usage in military, civil and urban contexts.

Telespazio, a Leonardo and Thales 67/33 joint venture, is one of the world's leading operators in satellite services. Its activities range from the design and development of space systems to the management of launch services, from in-orbit satellite control to Earth observation, from integrated communications, satellite navigation and localisation services to scientific programmes.

Telespazio has developed a new line of propositions in the drone's market, covering the end-to-end value chain, exploiting and integrating space based technologies and communications into drones, as elements of the final proposition to provide to the end users. Delivery, surveillance, monitoring and emergency response are among the most "mature" new applications that are now entering Telespazio proposition.

TopView srl is an innovative Engineering SME founded in late 2013 with the initial goal of exploring the growing UAS (Unmanned Aircraft Systems) market. Its mission is focused on the study and development of complex systems that use specific drones and sensors to add value to traditional production sectors. TopView's activities are focused on two macro-areas:

1. Integration of UAS platforms for the optimization of business processes.
2. U-space and digital aviation.

2022 Operators

UST Italia was founded in 2015, founding members was firmly convinced that it was successful to offer services on the market based on the sale of information with high added value, obtained from the analysis of remote sensing data using UAS platforms.

To achieve this both hardware platforms (UAVs equipped with payloads) and standardized flight operating procedures and data analysis were developed; at the same time a group of pilots was created, the UST Italia Drone Network, scattered throughout the country.

In 2022 the approach remains the same as at the beginning: UST Italia's Vision and Mission are based on a constant tension towards innovative solutions characterized by a high overall value, formal and design rigor, technical-scientific quality, ease of use and customer satisfaction.

UMS SKELDAR, a joint venture between Saab and UMS AERO Group, is Europe's leading provider of Rotary Unmanned Aircraft Systems (RUAS) platforms including, the unmatched NATO STANAG compliant SKELDAR V-200 and the compact, rapidly deployable SKELDAR V-150 designed to support tactical operations for surveillance, emergency response, homeland security, and defense. Incorporating a wide variety of payload options into its rotary Vertical Take-off & Landing (VTOL) fleet, UMS SKELDAR is engaged in a highly active research and development program enabling the company to provide solutions to defense, civil security, and maritime sectors globally. The company is headquartered in Switzerland, with twin manufacturing facilities in Switzerland (Möhlin) and Sweden (Linköping) and offers a comprehensive Unmanned Aircraft Systems (UAS) solutions portfolio. The company provides a total solutions capability globally, including development, manufacture, testing, training, consultancy, maintenance, managed services and finance options.

Vector Robotics specializes in professional UAVs production that stand out for flight autonomy and versatility of use. It became a reality when two professionals in the flight industry meet and shared their ambitious vision: to overcome technology limits and give drones new, unprecedented features. In 2017, Andrea Beggio, an engineer with 30 years of experience in professional drones building, and Vittorio Netti, an expert in aerospace engineering coming from experiences such as the DOME project (aimed at building drones for the exploration of Mars), decided to use their vast and complementary experience and their innovative approach with a common goal: challenge the current limits of technology. This is how EOS, the first model of Vector Robotics, was born. What makes the difference and gives our products an innovative and above-average engineering quality is the constant drive to overcome technological limits of the flight through an approach based on quick problem detecting and an iterative process of prototyping and testing.

DTM

