Aerospace Districts: Acceleration of the Strategic Transfer of Regional Advancements

Former successful connections and case studies

D1.2 – Former successful connections and case studies

Abstract:

T1.2 *Former successful interregional connections analysis* has the purpose to identify and examine existing connections between the various ecosystems covered by the AD-ASTRA project. This activity is of paramount importance for the development of the project, in order to create on these examples the building blocks for the joint action plan that will support each of the 5 ecosystems in growing in a harmonious and coordinated way. In particular, in deliverable D1.2, general information about networks that involve at least two partners participating in the AD-ASTRA project ("successful connections") are reported, but also networks that involve only one partner of the project, but that may represent a positive and successful example to be considered as a reference for further development. These are called "case studies". This will include the connections between companies, commercial or innovation agencies and consortia, research and education centres, and clusters, through existing networks or European projects. The deliverable will be an exhaustive list of connections, projects, initiatives, networks, etc. This analysis will need further development during WP2 (during co-creation workshops) in order to refine these success stories into best practices to draw a joint action plan valuable for each ecosystem involved.

Keywords:

Innovation, aerospace, international cooperation, innovation ecosystems, capabilities.

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Acronyms and Terminology

Term	Definition
ACA	Airport Carbon Accreditation
AD-ASTRA	Aerospace Districts: Acceleration of the Strategic Transfer of Regional Advancements
AD'OCC	Agence Régionale de Développement Economique
ADS	Airbus Defence and Space
AIAE	Asociación de Ingenieros Aeronáuticos de España
ARCAS	Aerospace College Alliance of Sino Universities
ASSURED-UAM	Acceptance Safety and Sustainability Recommendations for Efficient Deployment of Urban Air Mobility
ATM	Air Traffic Management
ATSEP	Air Traffic Safety Electronics Personnel
AV	Aerospace Valley
AZO	Anwendungszentrum Oberpfaffenhofen GmbH
BIC	Business Incubation Centre
BO	Bologna
CAA	Civil Aviation Authorities
CAS	Commercial Authentication Service
CCI	Chambre de Commerce et d'Industrie
CEAS	Council of European Aerospace Societies
CICLoPE	Center for International Cooperation in Long Pipe Experiments
CIRA	Centro Italiano Ricerche Aerospaziali
CIRI aerospace	Centre for Industrial Research on Aerospace
CISE	Centro per l'Innovazione lo Sviluppo Economico
CNES	Centre National D'Etudes Spatiales
CTA	Cherenkov Telescope Array
DTA	Distretto Tecnologico Aerospaziale
EACP	European Aerospace Cluster Partnership
EASA	European Aviation Safety Agency

EAQG	European Aerospace Quality Group
EELISA	European Engineering Learning Innovation and Science Alliance
EEN	Enterprise Europe Network
EC	European Commission
ECARE	European Clean Aviation Regional Ecosystem
ECATA	European Consortium for Advanced Training in Aerospace
ELCA	European Lightweight Cluster Alliance
ELSE	Enterprise Lazio Sardegna Europe
ENAC	Ecole Nationale de l'Aviation Civile
ENSMA	École Nationale Supérieure de Mécanique et d'Aérotechnique
E-R	Emilia-Romagna
ERA-STAR	ERA - Space Technologies Applications & Research for the Regions and medium-sized Countries
ERDF	European Regional Development Fund
ESA	European Space Agency
ESCP	European Strategic Cluster Partnership
ESRIN	European Space Research Institute
ESTACA	École supérieure des techniques aéronautiques et de construction automobile
ESTEC	European Space Research and Technology Centre
EU	European Union
ETSIAE	Escuela Técnica Superior de Ingeniería Aeronáutica y del Espacio
FAA	Federal Aviation Administration
GIA	Grado en Ingeniería Aeroespacial
GIC	Information Centre Chile
GMES	Global Monitoring for Environment and Security
GNP	Gross National Product
GSC	GNSS Service Centre
GyOTA	Grado en Gestión y Operaciones del Transporte Aéreo

HAS	High Accuracy Service
ICAO	International Civil Aviation Organization
ICCAIA	International Coordinating Council of Aerospace Industries Associations
ICT	Information and Communication Technologies
INAF	National Institute for Astrophysics
INTA	National Institute of Aerospace Technologies
IPR	Intellectual Property Rights
IR4I	Innovation & Research for Industry
ISAE-SUPAERO	Institut Supérieur de l'Aéronautique et de l'Espace
MOU	Memorandum of Understandings
MS	Master of Science
MSE	Marine South East Limited
NAG	Netherlands Aerospace Group
NEREUS	Network of European Regions Using Space Technologies
NIDV	Netherlands Industries for Defence and Security
OEM	Original Equipment Manufacturer
OS	Open Service
R&D	Research and Development
SITAEL	Space, Science, Industrial & IoT Solutions
SKA	Square Kilometre Array
SME	Small and Medium-sized Enterprise
TIS	Technology Innovation Support
UAH	University of Alcala
UAM	Urban Air Mobility
UC3M	Universidad Carlos III de Madrid
UIC2	Urban Air Mobility Initiative Cities Community
UM	Urban Mobility
UniBO	University of Bologna
UniFE	University of Ferrara

UniMORE	University of Modena and Reggio Emilia
UniPR	University of Parma
UPM	Universidad Politécnica de Madrid
WP	Work Package

List of Figures

Disclaimer

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Table of Contents

1 Introduction

AD-ASTRA (Aerospace Districts: Acceleration of the Strategic Transfer of Regional Advancements) project, is *per se* a connection, hopefully successful, among five European regions involved in the aerospace sector at different levels of development and evolution. More info about the project will be reported at section 2.1.

This document corresponds to the report D1.2, which is the second deliverable of the first work package of the AD-ASTRA project. As a reminder, work package (WP) one, Ecosystem network analysis, has the following objectives:

- Identification of the existing innovation capabilities and networks;
- Analysis of the former successful connections;
- Future regional development megatrends.

This work package is organized in three tasks (T):

- T1.1 Innovation inventory creation (connections, technical and innovation capabilities);
- T1.2 Former successful interregional connections analysis;
- T1.3 Future regional developments and megatrends.

The purpose of task T1.2 *Former successful interregional connections analysis* is to examine how existing connections in the various ecosystems covered by the AD-ASTRA project may contribute to the project's objectives. In particular, in this deliverable, general information about networks among European partners are reported considering networks that involve at least two partners participating in the AD-ASTRA project, reported as "successful connections", but also networks that involve, at present, only one partner of the project, but that may represent a positive and successful example to be considered as a reference for further development. These are called "case studies".

Having a set of networks already established (set of best practices and success stories) is of paramount importance for the development of the project, in order to create on these examples the building blocks for the joint action plan that will support each of the five ecosystems in growing in a harmonious and coordinated way.

This work will build on the findings of T1.1. In this report, the inventory will be deepened to better illustrate how stakeholders/networks have developed connections and the impact they have on collaboration.

Each ecosystem in the AD-ASTRA project has a set of actors that help foster interregional connections between ecosystems. Each of these actors in the ecosystems has developed connections at the local, regional, or European level.

Connections allow actors to interact with each other to improve their capabilities. For example, they gain access to a larger pool of resources, including expertise, knowledge, and funding, enabling them to tackle more complex projects. Connections can also lead to greater competitiveness and innovation by connecting diverse

perspectives. Connections can also lead to broader impact of activities undertaken by actors. For example, actors with a European network can provide a platform for small and medium-sized enterprises (SMEs) to access new markets and customers.

Once interregional connections are mapped, this panorama will allow the AD-ASTRA project to build on them and to identify gaps. AD-ASTRA project will then explore potential future regional developments and megatrends.

2 Successful Connections

Former successful interregional connections have been analyzed starting from networks (based on project, clusters, European associations, trans-regional agreements, etc.) already existing among the partners involved in this project. Of course the first one, is the current AD-ASTRA project, but other examples have been collected.

2.1 AD-ASTRA project (HE-EIE)

AD-ASTRA (https://aerospacedistricts.eu/) is a project about the positive interconnection among innovation ecosystems, with a focus on aerospace sectors. As shown in Figure 1, the project aims at the development of a connected, competitive, interregional innovation ecosystem between five European regions (Emilia-Romagna, Madrid, Occitania, Apulia and South Holland) with:

- a shared interest in fostering aerospace sectors, enhancing the cross-contamination to and from other innovative sectors (*e.g.*, automotive, biomedical, agri-food, big data);
- different innovation readiness levels;
- aerospace districts with different levels of maturity and consolidation.

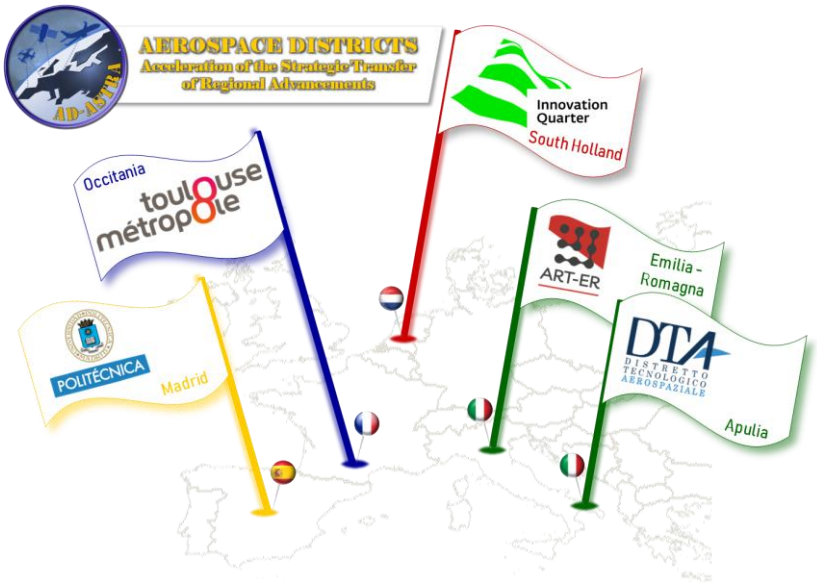

Figure 1. Partners of AD-ASTRA project.

"Diversity generates wealth": the collaboration of these markedly diverse regions, furthermore represented by partners from different spheres of the Quadruple Helix, will be a growth opportunity. The establishment of a solid and long-lasting collaborative European network, able to exploit complementary skills, experiences, territorial and industrial vocations, will contribute to create a "critical mass" in European strategic sectors such as innovation and aerospace, where global

competition leads to a confrontation with actors of increasing size and requires innovative models and approaches.

This ambitious goal will be achieved through an iterative process:

- starting from the collection, analysis and systematization of the experiences (competencies, technologies, networks) of the partner regions with reference to their aerospace districts;
- analyzing the future evolutions of the ecosystems, in response to technological, economic, political, and social megatrends;
- correcting or validating hypotheses and evolution models with the support of stakeholder groups;
- defining an action plan for the development of each of the regional aerospace ecosystems, valuing experiences and good practices stemming from other regions and strengthening spin-in and spin-out processes to and from other industrial sectors and territories.

2.2 NEREUS

Network of European Regions Using Space Technologies (NEREUS) is the only European association of its kind in that the responsibilities for governing the network lie with the regions that comprise its membership (Figure 2). NEREUS represents the interests of European regions that use space technologies whilst simultaneously highlighting the regional dimension of European space policy and programmes. The key mission of NEREUS, as a unique thematic network for matters of regional Space Uses, is to explore the benefits of space technologies for European Regions and their citizens as well as to promote the use of space and its applications.

Figure 2. Partners of AD-ASTRA project which participate also in the NEREUS program.

NEREUS provides a platform (https://www.nereus-regions.eu/) for all regions seeking to better use space applications to implement efficient public policies for the benefit

of citizens. It is recognised as a key interlocutor by the European institutions and their representatives; the network occupies a unique position in the European landscape and allows the voice of regional authorities to be heard by European decision-makers. NEREUS thus benefits from a close relationship with the European Commission (EC) and the European Space Agency (ESA), expressed in joint projects such as Copernicus4Regions.
The NEREUS network has three main objectives:

- Policy dialogue aimed at improving the understanding of space technologies, defending the key role of regions in the development of space technology applications, and ensuring that the regional dimension is taken into account in European space-related programmes.
- Interregional cooperation and collaboration with partners, enabling public and private actors in the region to be supported in their efforts to obtain European funding, improving exchanges between the different actors and sectors of the space sector with other sectors, and building and promoting partnerships within the network, in particular for the creation of consortia.
- Outreach through communication activities that help influence regional space capabilities and inform about the potential of space applications and the impact of the added value of space on the daily lives of citizens.

To carry out its activities and achieve these goals, the NEREUS network relies on a number of working groups that bring together various regional space capabilities experts to provide strategic advice to the NEREUS Steering Committee.
NEREUS activities thus reflect several goals and priorities as defined in the network's roadmap. In particular, it aims to strengthen the network and increase the rallying of regional experts and actors by working towards a better alignment of the different regional space policies and by promoting interregional projects and connexions in order to reinforce a territorial dynamic in synergy between the different regional actors (public authorities, research centres, development agencies, SMEs, etc.).

2.2.1 Emilia-Romagna

Emilia–Romagna (E-R) is a full member of NEREUS, actively involved in the network also from a management perspective. One member out of eleven of the management board is indeed the ART-ER executive director, recently appointed (April 2023).

Generally speaking, E-R is a leading Italian region in terms of economic development and industrial competitiveness in Southern Europe having a strong orientation to invest in research, innovation, and sustainability. Some of the regional industrial clusters (*e.g.*, automotive, robotics and engineering, medical equipment, food, and ceramics) embrace the new technology challenges and thus hold a leading position in the world market. Due to its wide ecosystem, in human and technological terms, the idea to find opportunities for collaboration and offering knowledge and experience to other NEREUS regions become increasingly concrete in 2020; as a consequence, in the same year, E-R became a full member of the NEREUS program, strengthening the

position of the region that may also count on the presence of Alma Mater University of Bologna as an associate member.

The Space Industry in E-R represents 1% of the regional GNP (Gross National Product) and has approximately 150 companies and 4.500 employees specialized in aviation (civil, commercial and military, ground field services), space vehicles, and satellites. Moreover, E-R invests in the support of the local network of research centers and institutions directly involved in space research, such as:

- National Institute for Astrophysics (INAF);
- The "Northern Cross" Radio Telescope in Medicina (Bologna - BO) – one of the world's biggest transit radio telescopes;
- Square Kilometre Array (SKA) – an international program for a new generation radio telescope that will be based in 3,000 kilometer-wide areas located in Australia and South Africa;
- Cherenkov Telescope Array (CTA) – the international project finalized to design and build the largest ground-based gamma-ray detection observatories in the world (in the Canary Islands and Chile);
- Interdepartmental Centre for Industrial Research on Aerospace of the University of Bologna (CIRI aerospace);
- Center for International Cooperation in Long Pipe Experiments (CICLoPE): a research laboratory for fluid dynamics study, which allows the worldwide best space and time-resolved measurements in turbulent pipe flows.

Since the space economy and research programs of E-R offer highly sophisticated instruments for planning and managing complex processes linked to climate change, industrial transformation, and new social needs, a strong involvement of the region within the NEREUS' activities is expected. In this view, the local organizations are looking forward to building partnerships with NEREUS members and partners and engaging in interregional collaboration to better exploit space-based data and services and transform them into information and knowledge relevant to E-R's industrial and territorial policies. The region is ready to share experiences and best practices about the development of new solutions that can serve as a stimulus for other regions in Europe and the world. Actually, space applications help in finding good solutions to regional challenges like climate change, the sustainability of the agricultural sector, digitalization, and innovation, protection of cultural heritage, territorial planning, and cohesion. NEREUS is therefore an ideal platform to gain more insights into the opportunities related to space.

2.2.2 Occitania

Occitania region is a founding member of the NEREUS network, which was launched in 2007. It is the leading European region as far as designing and manufacturing space systems and applications are involved.

Among others, the region hosts the Toulouse Centre National D'Etudes Spatiales (CNES), the French space agency, but also Thales Alenia Space and Airbus Defence

and Space, the principal contractors in European space systems. It is also home to the headquarters of the most significant innovation cluster in France in the fields of aeronautics, space and embedded systems, Aerospace Valley.

In 2018, the space industry in Occitania represented 13,000 jobs (more than a quarter of the European number) and almost 2,000 businesses. Most of these entities are located on the territory of Toulouse Metropole:

- CNES: the French Space Agency develops research and innovation in space, on various subjects such as global warming, the rise of oceans, ice melting are daily research topics on top of space exploration. CNES is also a main contributor to the ESA.
- Thales Alenia Space, a French Italian group based in Cannes and Toulouse, is an international satellite producer. The Toulouse site builds telecom and weather forecast satellites
- Airbus Defence and Space develops activities related to Space exploration, weather and climate studies, deforestation monitoring and secure communications. In its Toulouse based division the complete stages of design, development, integration, assembly and test of satellite systems are performed. These satellites more particularly offer capabilities for Earth Observation, Meteorology, Space Sciences and Telecommunication.

2.2.3 Madrid

Comunidad de Madrid is a full member of NEREUS, where it is represented by the Fundación Madri+d; The Madri+d Foundation is an initiative of the Government of the Community of Madrid created in 2002 to manage the Regional Plan for Scientific Research and Technological Innovation. In 2014, it was designated as the competent body for the evaluation of the Madrid University System in order to guarantee the quality of the training programs of the universities in the region. In addition, from their beginnings the Foundation is committed to the dissemination of scientific knowledge, bringing scientific culture closer to society.

Madrid is the leading centre for finance and services and the second largest industrial region in Spain. It has a high potential for scientific creation and research thanks to the concentration of public R&D resources on its territory: it counts 15 universities and over 50 academic research centres, 27.3% of all spanish scientists and 44,480 employees in R&D activities. Furthermore Madrid has over twenty technology transfer centres concentrating on aerospace, biotechnology, security, logistics, health and financial services, and Information and Communication Technologies (ICT) in a powerful network of parks and clusters.

Aerospace has a prominent role in Madrid. Madrid holds a 65% stake of the national aerospace turnover (83% in space alone). Many proposals associated with the ERA - Space Technologies Applications & Research for the Regions and medium-sized Countries (ERA-STAR) network have been led from Madrid, especially within the Galileo and Global Monitoring for Environment and Security (GMES) programmes. Madrid has been selected to host the third Galileo ground centre to be implemented by 2013.

Madrilenian companies actively participate in the annual European Satellite Navigation Competition (Galileo Masters).

Madrid hosts the European GNSS Service Centre. The European GNSS Service Centre (GSC) is set to be an integral part of the European GNSS infrastructure and provides the single interface between the Galileo system and the users of the Galileo Open Service (OS), the High Accuracy Service (HAS) and the Commercial Authentication Service (CAS). The GSC is conceived as a centre of expertise, knowledge sharing, custom performance assessment, information dissemination and support to the provision of value-added services enabled by the Galileo OS, HAS and CAS core services. The European Union (EU) Agency for the Space Programme is responsible for the GSC and is supported by Spain, which provides the Galileo Programme the necessary hosting GSC infrastructure and facilities. The GSC is located in a fully secured environment in Madrid, Spain, within the National Institute of Aerospace Technologies (INTA) facilities at Torrejón de Ardoz, overseen by the Spanish Ministry of Defence.

2.2.4 Apulia

Apulia, a region in the Southeast of Italy, is a full member of NEREUS. It covers 6.4% of the national territory and is a highly dynamic region for development policies in the aerospace sector. Thanks to the funds assigned to Apulia under EU cohesion and convergence policies, the area has seen the emergence of new enterprises, strengthened existing ones, and reinforced productive, technical, and scientific competencies. As a result, the Apulia space industry has gained international recognition. The regional aerospace district, Distretto Tecnologico Aerospaziale - DTA s.c.a.r.l., collaborates closely with Apulia to coordinate and develop scientific-technological content, with both parties committed to consolidating strategic capabilities for research, technology, and industrial leadership in the European space industry.

The Region considers research, innovation, and competitiveness policies, particularly space policy, paramount. This led to its membership in the NEREUS Management Board in 2013 and its subsequent appointment as Chair in 2014. NEREUS was established in 2008 and was chaired by Apulia from July 2014, under former President Nichi Vendola and President Michele Emiliano till 2018.

The DTA and the Department for Economic Development of the Apulia Region have deeply contributed to NEREUS in recent years.

In the Apulia region, the space sector holds significant economic value as it impacts both the industrial and services system. Moreover, it benefits citizens, companies, and public authorities by fostering service innovation, improving service efficiency and quality of life. This has resulted in regional/local institutions having a role in shaping demand, playing an essential role in space policy formulation and indirectly guiding related production sectors.

The Apulian space industry comprises SMEs in the advanced tertiary sector, space components, guidance and monitoring systems, planetary exploration, and advanced sensor systems. Notably, the industry is marked by rapidly expanding businesses

such as Space, Science, Industrial & IoT Solutions (SITAEL), PLANETEK, IMT, and Geophysical Applications Processing. In addition, some departments of the University of Bari, the University of Salento, and the Politecnico di Bari also contribute to the sector's growth.

2.2.5 South Holland

South Holland (Provincie Zuid-Holland) is a full member of NEREUS. With 84 private companies, 33 government agencies and knowledge institutes and almost 5.000 full time jobs, South Holland is home to 80% of all space activities in the Netherlands. Associate NEREUS member Airbus Defence & Space is also located in this province and with 200 fte the largest private space employer in the region.

Research centers and knowledge institutions directly involved in space research are:

- ESA - European Space Research and Technology Centre (ESTEC); the technological heart of the European Space Agency; the incubator of the European space effort where most ESA projects start and are guided through the various phases of development.
- TU Delft Faculty of Aerospace Engineering with its research programs and facilities, like the Space Cleanroom, which enables assembly, integration and testing of small satellites, including propulsion test stands.
- SRON Netherlands Institute for Space Research is the Dutch national expertise institute for scientific space research. Since the foundation of the institute by university groups they have provided key contributions to instruments of missions of the major space agencies, ESA, NASA, and JAXA. As a national expertise institute, SRON stimulates collaboration between the science community, technological institutes, and industry.
- The Leiden University Observatory; carries out world-class astronomy research and develops key technologies for astronomical discoveries
- TNO Space & Science Instruments has specific capabilities: TNO is the national research institute and has unique expertise in manufacturing high-precision optical components, so called high-end optics manufacturing. TNO manufactures customer-specific components – mirrors and lenses – that are integrated into innovative and compact systems, leading to new products such as space instruments.
- Delft Space Institute (TU Delft); combines the strengths of different faculties of TU Delft to enable and cutting-edge research in the space domain. The focus is on Sensing from Space, Distributed Space Systems and Space Robotics.

Since 2019 South Holland has a longstanding partnership with Free Hanseatic City of Bremen (also NEREUS Full Member). The program "Connecting Space Regions" aims to foster international cooperation in the area of aeronautics and space and is comprised of official keynotes, presentations and/or panel discussions. A unique long term B2B matchmaking tool by the Enterprise Europe Network (EEN) enables participants to expand and foster their business contacts. Target audience are

representatives from aeronautics and space institutions and companies (research, business & startups).

2.3 PEGASUS

PEGASUS (https://www.pegasus-europe.org/) is a network of European aerospace universities founded in 1998 and currently has 30 members in 12 different European countries. Today, more than 3,000 aerospace engineers graduate each year with a Master's degree from the member institutions of PEGASUS. Specifically, as could be seen in Figure 3, Madrid, Occitania, Emilia-Romagna and South Holland are members of PEGASUS and are connected therefore by means of this association.

Figure 3. Partners of AD-ASTRA project which participate also in the PEGASUS program.

The goal of PEGASUS is to provide highly relevant education and research programs to attract the best students and scientists. Achieving these goals requires coordinated change, staff and student exchange, and innovation. To this end, the network PEGASUS conducts a wide range of research projects on space-related topics, including space technology, air transport, design, safety, and aerodynamics.

The PEGASUS network establishes working groups to carry out its activities. These are established as needed. For example, a working group on women in space technology has been in place since 2011.

In parallel to the PEGASUS network, the PEGASUS foundation was established in 2007. Its goals are:

- To promote cooperation between universities in the field of aerospace engineering, with a focus on EU countries;

- Improve the quality of services provided by universities to students, the European aerospace industry, European Member States and the European Union
- Facilitate organized contacts with universities that are not potential members of the PEGASUS network due to their internal organization or geographical location.

PEGASUS thus provides a means to network European universities with a focus on aerospace topics, bringing together research teams and students.

2.3.1 Emilia-Romagna

Alma Mater Studiorum - University of Bologna (UNIBO) has been admitted as a Full Partner in the PEGASUS Network during the 43rd Council meeting held in Seville (Spain) in November 2019. The admission as a Full Partner was granted after a 2-year probationary period in which UniNIBO demonstrated its involvement in the activities of the network and high-quality standards in teaching and research. From an educational point of view, UNIBO offers two curricula: Aeronautics and Space. The main goal and expected learning outcomes of these two Master of Science (MS) courses do not vary, but the aeronautical and astronautical engineer professional profiles are more defined. They both have solid backgrounds and apply analytical tools, numerical simulation techniques, and experimental laboratory methods. Professionally, graduates will be able to produce physical/mathematical models to analyze aircraft and spacecraft requirements and performance and the physical environment they move in. They may also study advanced methods for air traffic monitoring and control using information processing and telecommunication systems in aerospace environments.

Actually, the number of people involved in PEGASUS Network from E-R perspective are:

- Full professors: 9
- Associate professors: 12
- Assistant professors: 7
- Researchers: 7
- PhD candidates: 6
- MSc students: 88

A strong commitment among the participants of this network from an academic point of view is also demonstrated by this project, where part of the partnership was born within the Pegasus framework (connection among UniBo, Universidad Politécnica de Madrid, Institut Supérieur de l'Aéronautique et de l'Espace (ISAE-SUPAERO), and TU Delft).

2.3.2 Occitania

There are five French members in the PEGASUS network, out of which two are in Occitania: École supérieure des techniques aéronautiques et de construction automobile (ESTACA) Paris, École Nationale Supérieure de Mécanique et

d'Aérotechnique (ENSMA) Poitiers, Ecole de l'air Salon de Provence, Ecole Nationale de l'Aviation Civile (ENAC) and ISAE-SUPAERO in Toulouse. The first three councils of the PEGASUS network were held in Toulouse in 1998 and 1999 (ENSICA, SUPAERO and ENAC). Both Occitania schools, ENAC and ISAE-SUPAERO, are located on the territory of Toulouse Metropole. They are highly influential schools in the fields of aerospace. More specifically:

- ENAC provides a range of twentyeight higher education programs. Since its creation in 1949, ENAC has provided training to civil aviation personnel such as professional pilots, Air Traffic Controllers, Air Traffic Safety Electronics Personnel (ATSEPs) and technicians for Civil Aviation Authorities (CAA) or Air Navigation Service Providers. The school has several partnerships with international stakeholders such as International Civil Aviation Organization (ICAO) or European Aviation Safety Agency (EASA).
- ISAE-SUPAERO is one of the leading aerospace schools in France providing a solid multidisciplinary core curriculum. It originates from the cooperation of two former schools: ENSICA (1945) and SUPAERO (1909). Emmanuel Zenou, Head of International at ISAE-SUPAERO, is currently chairman of PEGASUS network. Several Memorandum of Understandings (MOUs) have been signed by the Council of European Aerospace Societies (CEAS) and Aerospace College Alliance of Sino Universities (ARCAS).

2.3.3 Madrid

Universidad Politécnica de Madrid (UPM), is a founder member of PEGASUS since 1998. UPM is represented in PEGASUS by one of its 18 engineering schools, the School of Aerospace Engineering, located in the Moncloa campus in the city of Madrid.
The School of Aeronautical and Space Engineering (Escuela Técnica Superior de Ingeniería Aeronáutica y del Espacio - ETSIAE) is part of Universidad Politécnica de Madrid, one of the most prestigious universities of the technological field in Europe. ETSIAE is a member of PEGASUS, and it is also part of the European Consortium for Advanced Training in Aerospace (ECATA), a European consortium joining six aerospace companies and seven academic institutions (including ISAE-SUPAERO and TU Delft from AD-ASTRA).

ETSIAE is a reference centre both at national and international levels in the field of education, research, innovation and technological development in space engineering. Good proof of this is the number of students enrolled, exceeding more than 3,500, and an increasing demand, the 250 teachers forming the teaching and research faculty who take part both in cutting-edge research projects and as well as in educational innovation projects, different mobility agreements with top foreign universities and agreements with companies and institutions of the field to undertake internships.

ETSIAE does offer two official undergraduate's degrees: the Undergraduate's Degree in Aerospace Engineering (Grado en Ingeniería Aeroespacial - GIA) and the Undergraduate's Degree in Air Transport Management and Operations (Grado en Gestión y Operaciones del Transporte Aéreo - GyOTA) and it extends its training offer to include different postgraduate programmes: Master's degrees, Ph.D studies and its

own degrees offering the most complete and specialised vision in Spain of the different areas of this sector.

The facilities, located within the Moncloa International Campus of Excellence (Ciudad Universitaria), have an extension of 36,500 m^2, equipped with all the infrastructures and resources required to ensure the quality and social engagement, as well as talent, versatility and leadership that are key elements defining its graduates.

2.3.3 South Holland

TU Delft is one of the founding partners of the PEGASUS network and one of the first members to sign the final partner agreement in 2002. TU Delft is currently the Chair of the working group Best Practices in Education, of which ISAE-SUPAERO and ENAC Toulouse are members. Moreover, TU Delft is also a member of the working group Academic Aerospace Research (chaired by Aachen University).

With 200 scientific staff, 300 doctoral candidates and 2,800 Bachelor's and Master's students, the faculty of Aerospace Engineering at TU Delft is one of the largest, most multifaceted scientific communities focusing on aerospace and related areas (such as wind energy) in the world. Their mission is to be a world-class faculty of Aerospace Engineering, renowned for modern teaching practices, high-profile research, hyper-modern laboratories and facilities, and pioneering innovations. Current areas of research include novel aerospace materials, Particle Image Velocimetry, CubeSat, Airborne Wind Energy and several others. Currently ten research chairs are grouped under four major departments:

- Flow Physics and Technology
- Control and Operations
- Aerospace Structures and Materials
- Space Engineering

The Faculty plays a significant role in national organisations such as the National Aerospace Laboratory, the Netherlands Agency for Aerospace Programmes and the Netherlands Organisation for Applied Scientific Research. Collaborations with numerous international and multinational industries through research groups abroad as well as in the Netherlands ensure that the Faculty remains at the forefront of the latest developments in the aerospace industry. Besides PEGASUS, the European network of prestigious aerospace universities, the faculty plays a major role in the IDEA League (TU Delft, ETH Zurich, RWTH Aachen, Chalmers institutes and universities)

2.4 ERASMUS+

Erasmus+ (https://erasmus-plus.ec.europa.eu/) is a European programme funded to support education, training, youth and sport in Europe. It has an estimated budget of €26.2 billion; almost double compared to its predecessor programme (2014-2020). This new 2021-2027 programme places a strong focus on social inclusion, the green and the digital transition, and promoting young people's participation in democratic

life. It supports priorities and activities set out in the European Education Area, Digital Education Action Plan and the European Skills agenda. The programme also:

- Supports the European Pillar of Social Rights
- Implements the European Youth Strategy 2019-2027
- Develops the European dimension in sport

Moreover, Erasmus+ offers mobility and cooperation opportunities in:

- Higher education
- Vocational education
- School education (including early childhood education and care)
- Adult education
- Youth
- Sport

Erasmus+ offers numerous opportunities for students at Bachelor, Master or Doctoral levels. Studying abroad is a central part of this program and it has been shown to have a positive effect on later job prospects. It is also an opportunity to improve language skills, gain self-confidence and independence and immerse yourself in a new culture. Actually, the universities and institutions in the five regions of AD-ASTRA actively exchange students and staff by means of this mechanism (Figure 4).

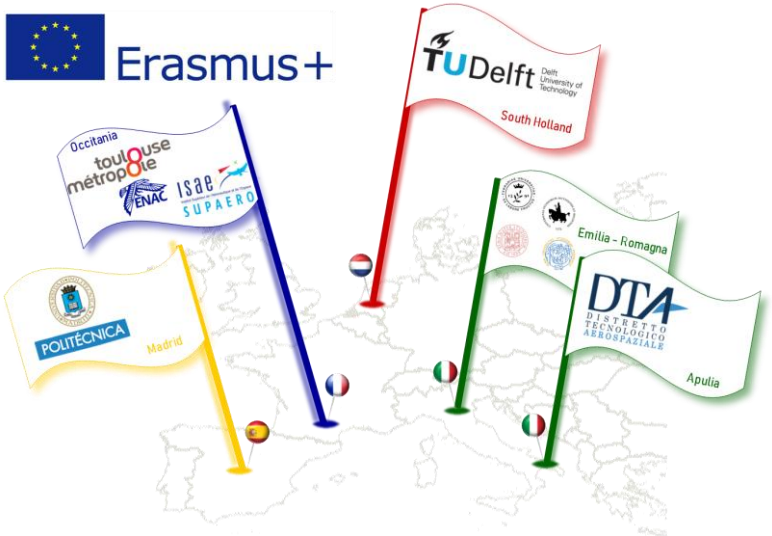

Figure 4. Partners of AD-ASTRA project which participate also in the Erasmus+ programme.

2.4.1 Emilia-Romagna

UniBO, University of Ferrara (UniFE), University of Modena and Reggio Emilia (UniMORE) and University of Parma (UniPR), in continuity with the past experiences within the Erasmus+ 2014 – 2020, are taking part in all the actions of the new Erasmus+ 2021- 2027 Programme. Indeed, internationalization has been defined as a crucial and transversal dimension in the strategic plan of all E-R universities.

Actually, Erasmus+ Programme is considered a fundamental instrument to contribute to the realization of the strategic goals of the university, with particular regard to the international dimension of education and on the third mission (knowledge transfer to society). Indeed, the Erasmus+ Programme encompasses the evolution of the concept of internationalization, shifting from an internationalization based on the mobility of people to a comprehensive internationalization based on the movement of minds, shifting from being a goal per se to covering a transversal service role to education, research and third mission. In this context, the goal of a massive (in numerical terms), holistic (in terms of the participation in all the actions) and widespread (in the sense that all universities of E-R region are involved) participation in the Erasmus+ 2021-2027 Programme is to progressively reach a real comprehensive internationalization. This will be possible through the overcoming of existing cultural and organizational barriers and positioning the cultural and professional growth of all the members of the academic community at the centre of the whole process. In this path, the cultural and professional growth of all members of the community is fostered not only by transnational and international mobility paths, but also by the creation of an international environment capable to provide international and intercultural competences relevant for a global labor market and for a responsible and participated role in the community.

2.4.2 Occitania

Toulouse Métropole, as a public body, has five accreditations for ERASMUS+. Up to 632 mobilities can be implemented in the coming six years. More particularly it has developed a network of Europe referents throughout the territory, who can make the link between the citizens in the territory and the ERASMUS+ programme.

What's more, on the Toulouse Metropole territory, all the universities, individually and gathered through the Université de Toulouse federation, and also the engineering schools that offer aerospace curricula (namely ISAE-SUPAERO and ENAC) and several other schools and universities take part in the ERASMUS+ programme. Exchanges of students and staff can therefore take place in Europe thanks to this programme.

2.4.3 Madrid

The four public universities in Madrid, UPM, Universidad Carlos III de Madrid (UC3M), Universidad Rey Juan Carlos I, University of Alcala (UAH) that offer curricula in aeronautics and space engineering and in space sciences participate in the ERASMUS+ programme, and exchange every year students and staff with many different universities in Europe, including of course those from the regions member of the AD-ASTRA project.

2.4.4 South Holland

The National Agency Erasmus+ is run by Nuffic, located in The Hague, South Holland. All three academic universities (LDE - Leiden, Rotterdam, Delft) participate in

Erasmus+, as well as all Universities of Applied Sciences and some Vocational Education and Training organizations.

2.5 MAE - Moving towards Aerospace

MAE is an Interreg Europe Project just started with the aim to respond to the need for a sustainable and innovative transition of specific manufacturing value chains (*i.e.* automotive and nautical), in response to the challenges related to green transformations. The aerospace sector may represent a proximity outlet, an opportunity for innovation, a future perspective towards which companies from sectors traditionally present in the regions involved can move. The challenge for public actors is to create an ecosystem that supports this transition, ensuring the involvement of stakeholders, a responsible approach and the necessary support structures and skills for SMEs. As reported in Figure 4, the partners involved include actors from E-R region (CISE - *Centro per l'innovazione lo sviluppo economico*; City of Forlì) and South Holland region (TU Delft; City of Delft) and may represent a further connection that may be exploited among the partners of the AD-ASTRA project (Figure 5).

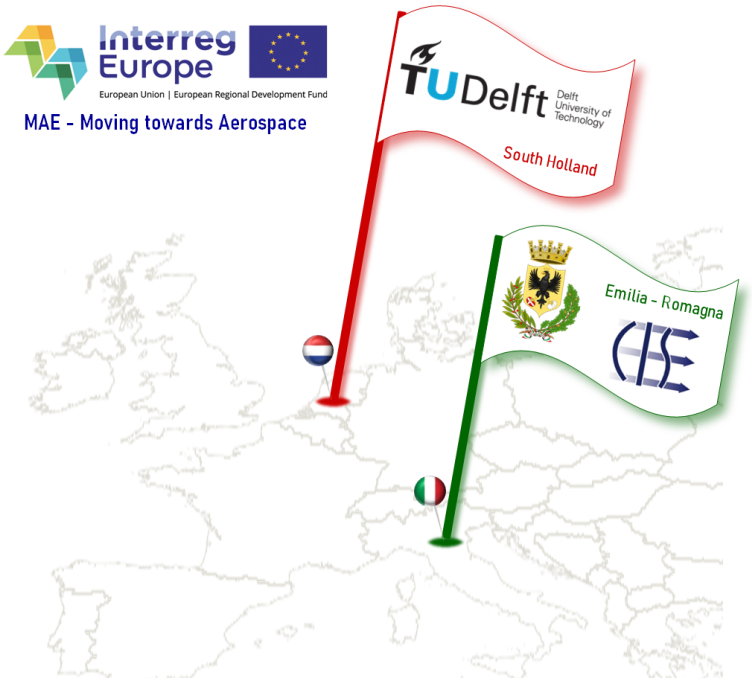

Figure 5. Regions of AD-ASTRA project which participate also in the MAE programme.

2.6 Enterprise Europe Network

The EEN (https://een.ec.europa.eu/) was launched on 7 February 2008 and provides support for SMEs with international ambitions. Co-funded by the EU's COSME and Horizon 2020 programmes, the Network's aim is to help businesses innovate and grow internationally.

The Network is active in more than 60 countries worldwide. It brings together 3,000 experts from more than 600 member organisations, including:

- chambers of commerce and industry
- technology poles
- innovation support organisations
- universities and research institutes
- regional development organisations
- advice for international growth

EEN advisory services support businesses seeking to expand into international markets. The services cover a wide range of regulatory areas and market intelligence:

- Compliance with EU regulations and standards (e.g. CE marking);
- Access to international markets – market intelligence and capacity building;
- International public contracts –access to cross-border procurement and EU tender opportunities;
- National and regional finance and funding – identification of sources of finance and investor-readiness training;
- EU funding schemes and application support;
- Intellectual property rights (IPR) – patents and IPR applications and exploitation strategies;
- Energy and resource efficiency – identification of technologies and finance opportunities;
- Management improvement – capacity building;
- Support for business innovation.

Enterprise Europe Network innovation support services are available based on an assessment of the needs and development phase of the business. Network experts can provide one-to-one services to support innovation capacity building. Services include innovation audits, advice on intellectual property, marketing and access to finance.

2.6.1 Emilia-Romagna

In Italy (www.een-italia.eu) the network includes 55 partner organisations, part of the Chamber of Commerce system, business associations, regional development agencies, research centres, universities, laboratories, technology parks, local authorities.

This network is substructured in six cross-regional consortia of the EEN:

- ALPS extension
- B.R.I.D.G.€conomies
- Enterprise Lazio Sardegna Europe (ELSE)
- FRIEND EUROPE
- SIMPLER
- EMS2EU

SIMPLER is the access point for Emilia-Romagna and Lombardy to the services of the Enterprise Europe Network. SIMPLER's services are free and are mainly aimed at companies, in particular SMEs, their associations, public and private research centres, universities and public bodies, in any field of expertise and application, including of course Aerospace.

SIMPLER services are provided by eleven partners of the consortium. Among them, there is ART-ER (the leading partner of AD-ASTRA) and other four subjects coming from the E-R region: Unioncamere Emilia-Romagna; Promos Italia – Local Unit of Ravenna; Confindustria Emilia-Romagna; CNA Emilia-Romagna.

2.6.2 Occitania

Enterprise Europe Network Sud-Ouest is the south western branch of EEN in France. It covers the perimeter of the two regions: Occitanie and Nouvelle Aquitaine. Two of the four partner structures are located in Occitania: Chambre de Commerce et d'Industrie (CCI) Occitanie and Agence Régionale de Développement Economique (AD'OCC), the regional development agency. In total, thirty eight advisors work for the network in the south west of France. They support enterprises on three major topics: digital and environmental transition, and resilience.

2.6.3 Apulia

The Apulia Region - by means of the DTA - encompasses initiatives that facilitate financing mechanisms, foster innovation ecosystems, and facilitate networking through the ENEA node of the EEN in Apulia. In particular, activities will focus on:

- Growth and development in foreign markets;
- EU legislation, European policies, internal market and international standards;
- Assistance to facilitate access to finance;
- Contacts with Italian and international public and private investors;
- Development of partnerships (trade missions and international fairs, search for partners for commercial/production/technological cooperation, identification of partners for participation in European projects);
- Analysis of innovation management and improvement capacities;
- Advice on the management of intellectual and industrial property;
- Support for technology transfer, open innovation and patent brokering
- Finding partners for technological cooperation;
- Exploitation of research results;
- Follow-up service for companies benefiting from the SME - H2020 - EIC pilot project.

2.6.4 South Holland

Since 2022, InnovationQuarter provides one fulltime EEN liaison officer representing the province of South Holland.

2.7 European Aerospace Cluster Partnership

The European Aerospace Cluster Partnership (EACP - https://www.eacp-aero.eu/) was established in 2009 and is a permanent partnership between collaborating European aerospace clusters. The consortium currently comprises forty five aerospace clusters from eighteen different countries and was initiated by the city of Hamburg in 2009 and co-funded by the European Commission.

The EACP is a networking hub that gives European aerospace clusters a permanent platform for information exchanges, policy studies and mutual cooperation. It is managed by Hamburg Aviation, which is why Hamburg constitutes the focal point for all partners. Hamburg screens calls from the European Union for certain thematic domains, gathers international project proposals, supports the search of project partners and pools all contacts of forty five different aerospace regions in Europe.

The EACP network operates in an informal, decentralized and flexible way that is based on an organizational set of continuous working groups (skills, technology, strategy, supply chain, and internationalisation), temporary project consortia and bi- or multilateral *ad-hoc* partnerships. The main objective resides in the global competitiveness in Europe through intense inter-cluster collaboration. This goal is pursued within the three major fields of action: knowledge exchange (cluster excellence, funding schemes, and role of clusters), push innovation (skills & qualification, EU projects, connecting member clusters) and strengthening the position of the EU (internationalisation, supply chain infrastructure, global competitiveness). All EACP activities follow these guidelines to improve competitiveness in a European context.

EACP membership is open to aerospace clusters in member states of the European Union and adjacent countries. In order to be admitted to the network, a member must represent all segments of the regional aerospace sector, including industry, R&D and administrative bodies. The main focus should be on civil aviation, with a minimum of 60% of the represented stakeholders hailing from this background.

EACP includes (part of) the following AD-ASTRA members:

- Innovation & Research for Industry (IR4I) - Emilia-Romagna
- Aerospace Valley - Toulouse, Occitanie
- Madrid Cluster Aeroespacial - Madrid
- DTA - Apulia
- Industry association Netherlands Aerospace Group (NAG) - South Holland

2.8 European Aeronautics Science Network

The European Aeronautics Science Network (EASN - https://www.easn.net/) is an Association of scientists and engineers in the space sector that provides another means of connection among the five regions of AD-ASTRA. More in detail, it is an open association networking academia in aviation and space research with the aim to:

- structure Europe-wide academia thematically and regionally;

- create conditions for facilitating academic upstream research at national, European and international levels;
- support academia to respond to its key role within the European aerospace research community in incubating new knowledge and breakthrough technologies;
- disseminate knowledge, new technologies and innovation.

Currently EASN counts about 300 members, affiliated to almost all significant universities active in the European aerospace ecosystem. They represent all European countries, and of course include members from all five regions participating in AD-ASTRA. Its Belgium based Technology Innovation Support (TIS) branch is a member of the Aerospace Valley ECARE project, which will be mentioned later in this document.

2.9 Council of European Aerospace Societies

The Council of European Aerospace Societies (CEAS - https://ceas.org/) is an International Non-Profit Association, with the aim to develop a framework within which the major Aerospace Societies in Europe can work together.

CEAS members include sixteen European national aerospace societies (including France, Italy, The Netherlands and Spain), with roughly 35,000 individuals who are professionals in the aerospace industry.

In Spain, the national aerospace society member of CEAS is the Asociación de Ingenieros Aeronáuticos de España (AIAE), located in Madrid. The purpose of the AIAE is:

- foster links and cooperation among Aeronautical Engineers;
- contribute to the development and progress of Aeronautics, serving as a consultation and help center;
- serve as a consultation center for the State, Aeronautical Engineers and Corporations that cultivate studies related to Aeronautics.
- defend the professional rights of its members by the legal means at their disposal and manage as many legal provisions as are agreed for the development and effectiveness of the profession of Aeronautical Engineer, ensuring compliance with those that are issued.
- establish the closest and most cordial relationship with the Associations and Corporations of Engineers that may exist, both in Spain and abroad, being able to adhere to the coalition organizations that comprise them.
- organize and attend national and international conferences.

As far as Occitania territory is concerned, as mentioned in 2.3.3, ISAE-SUPAERO has signed a Memorandum Of Understanding with CEAS.

In Italy, the national aerospace society member of CEAS is AIDAA – Associazione Italiana di Aeronautica e Astronautica, located in Rome (Lazio), so not in the regions involved in this consortium, but of course with many members spread all over the national territory and also in the regions involved.

2.10 European Research Establishment in Aeronautics

The Association of European Research Establishments in Aeronautics (EREA - https://erea.org/) includes INTA (Spain), Office national d'études et de recherches aérospatiales (ONERA, France), Nederlands Aerospace centre (NLR, The Netherlands) and Centro italiano ricerche aerospaziali (CIRA, Italy).

The European aviation industry has gone through an extensive process of integration. At the same time, the air transport sector has undergone integration into multinational mega-carriers, while regulation is now a European responsibility. Closer European cooperation is also being established in the area of security and defence. All of these developments have created the current environment for the EREA research organisations, which were originally founded to meet national requirements. The change of focus from national to European clients has driven further cooperation among European research establishments.

EREA was founded in 1994 to tackle the European challenges that national research establishments began to face.

Madrid hosts the largest public RTO in the aerospace sector in Spain, INTA; it is a Public Research Organisation that depends on the Spanish Ministry of Defence. INTA is responsible for performing scientific research activities and prototypes in its field of knowledge, as well as for providing technological services to companies in the industry, universities and other institutions. INTA specialises dually in technological research and development in aerospace, aeronautics, and hydrodynamics, and in security and defence technologies.

Among the main tasks that INTA is responsible for, it is worth mentioning:

- The performance of various types of tests for checking and certifying materials, components, equipment, systems and subsystems.
- The provision of technical advice and services to official entities and organisations, as well as to industrial and technological based companies.
- Its role as the technological centre for the Ministry of Defence.

2.11 European Aerospace, Security and Defence Industries

ASD (https://asd-europe.org/) is the voice of European Aerospace, Security and Defence Industries, representing over 3,000 companies and actively supporting the competitive development of the sector in Europe and worldwide. It has direct members, active in 18 countries, including 22 major European companies and 23 National Associations. ASD members together employed 879,000 people and generated a turnover of €238 billion in 2021.

For the benefit of European industries and in the collective interest of its members, ASD seeks to:

- act as a single voice to promote the best interests of the Industry in dialogue with the EU Institutions and other stakeholders;

- contribute to shape effective policy and legislation at European and global level by advocating common positions;
- promote international cooperation and dialogue with other international associations and organisations;
- raise awareness about the benefits of our sectors to a large variety of audiences: politicians, decision-makers, businesses, the media, general public, NGOs and other stakeholders;
- act as the central intelligence hub for expert knowledge on industry-related issues.

ASD concentrates on issues covering civil aviation, defence, security and space. It is committed to sustaining and growing a competitive sector. It is to achieve this strategic objective that ASD analyses, formulates and establishes policy positions for the industry on key strategic sectoral issues, cooperating with industry and EU institutions on a number of market developments and technology research projects.

ASD also coordinates European and international policy, communications, analysis and provides support to its members' requirements and needs to help their development, offering the best networking and learning opportunities in the sector. In addition, the advocacy activities undertaken by ASD help create a suitable policy framework within which members can successfully develop their businesses.

ASD has affiliated associations: ASD–STAN and ASD-CERT, together with the European Aerospace Quality Group (EAQG), form the quality-related services of ASD. The purpose of these services is to contribute to improvements in quality and reduction in costs throughout the value stream by maintaining cooperation between European Aerospace Companies in business areas.

At global level, ASD is a member of the International Coordinating Council of Aerospace Industries Associations (ICCAIA). ICCAIA provides an avenue for the world's aerospace manufacturers to offer their industry expertise to the development of the international standards and regulations necessary for the safety and security of air transport. Recognized by the International Civil Aviation Organization (ICAO) with observer status, ICCAIA actively participates in the work of ICAO regarding the environment, air navigation and air transport matters. ICCAIA also interacts with such regulatory authorities as the EASA and the United States' Federal Aviation Administration (FAA).

With this approach, ASD enables a unified voice on the number of fora where industry needs to be active and engage with European Institutions. Spanish industries or multinational companies with sites in Spain which are members of ASD have their headquarters or at least facilities in the region of Madrid: Airbus, INDRA, MBDA, Navantia. TEDAE, the Spanish Association for Defence, Security, Aeronautics and Space Technology Companies, is also a member of ASD and it is based in the city of Madrid.

Several companies located on the territory of Toulouse Metropole are members of ASD. Airbus, Safran, Liebherr, Sopra Steria, Thales are some of them.

The Netherlands Industries for Defence and Security (NIDV) is a full member of ASD and located in The Hague, South-Holland. The NIDV links companies, knowledge

institutions, and the government within the Netherlands. Since being founded in 1984 by the ministries of Economic Affairs and Climate, Foreign Affairs, Defence, and industry partners, the NIDV ensures the sustainable positioning of the Dutch defence and security sector both at home and abroad. The NIDV acts as information provider, advocate and service provider for the Dutch Defence and security sector.

2.12 European Space Agency

The European Space Agency (ESA - https://www.esa.int/) has establishments in three of the regions of AD-ASTRA: Madrid, Occitania and South Holland (Figure 6).

Located in the region of Madrid, ESAC, the European Space Astronomy Centre, is the 'home' of ESA's space telescope and planetary missions, the place from where science operations are conducted, and where all of the scientific data produced are archived and made accessible to the world. The region of Madrid also hosts a Business Incubation Centre of ESA (ESA-BIC Madrid) in order to help companies to improve their businesses into the space sector (Figure 7).

The ESTEC is located in Noordwijk, South Holland and is ESA's largest facility in Europe and the technical heart of the organisation. Most ESA projects are born here and guided through the various phases of development. Some 2800 engineers, technicians and scientists develop and manage all types of ESA missions.The same area also hosts the SBIC Noordwijk, the ESA-BIC of South Holland, established in 2003, with the aim to integrate the use of space technology into new businesses.

As for Toulouse Metropole in Occitania, it hosts the ESA BIC Sud-France incubator, coordinated by Aerospace Valley competitiveness cluster. What's more, the Toulouse CNES centre also hosts half a dozen ESA members in its premises, to work with them and industry on the NEOSAT programme aiming to improve the leadership of the industry for telecom satellites, including on the topic of electric propulsion.

Italy is also very active within the framework of the ESA, even if none of its laboratories is located in the two regions involved in the AD-ASTRA project. Indeed, the European Space Research Institute (ESRIN) of ESA is located in Lazio, where an ESA-BIC is also located. A second ESA-BIC is located in Piedmont, while a third one has been announced for the Apulia region in Brindisi for the beginning of 2024.

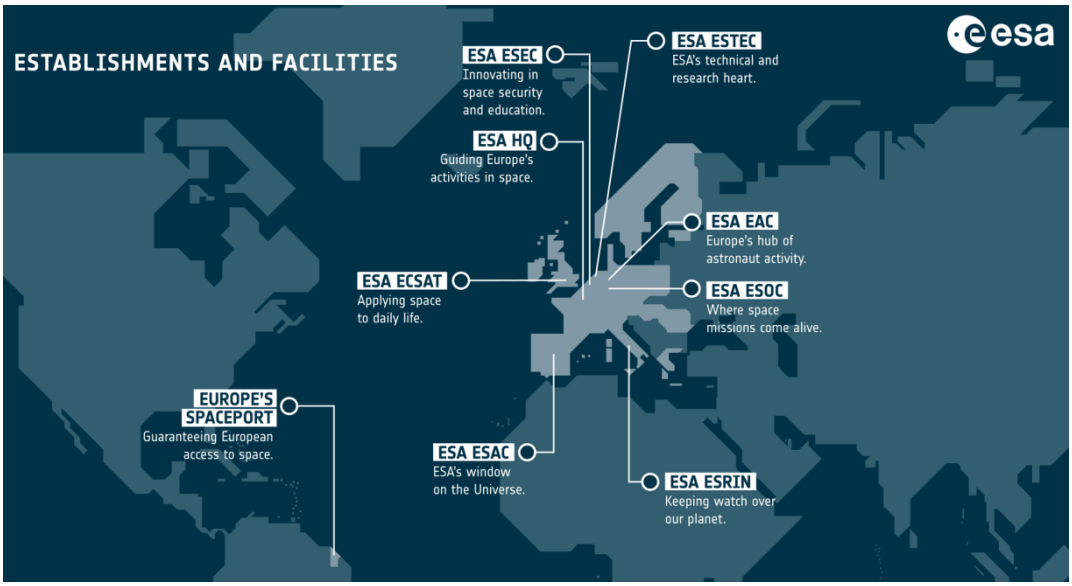

Figure 6. ESA establishments and facilities.

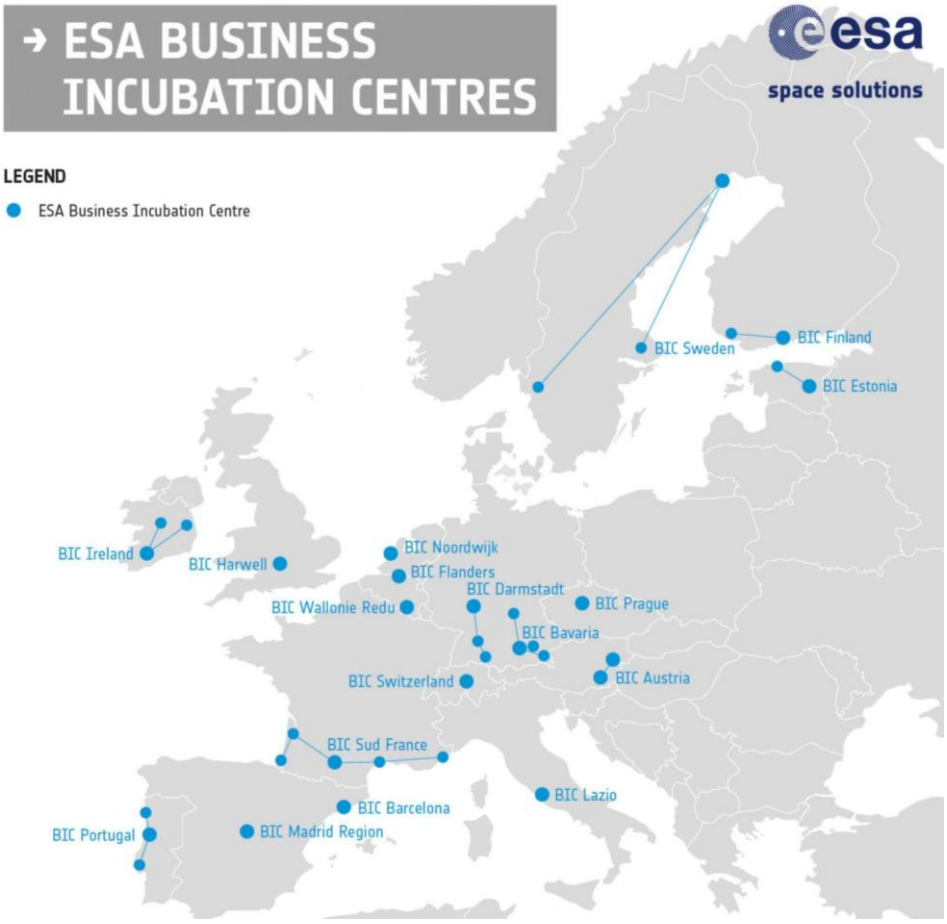

Figure 7. ESA Business Incubation Centres (2017).

2.13 Airbus

Airbus (https://www.airbus.com/) has sites in Madrid, Toulouse and Leiden, with respect to the AD-ASTRA project.

One of the largest sites of Airbus is in the city of Getafe, in Madrid, where the different activities of this original equipment manufacturer (OEM) are present (R&D, design, manufacturing and assembly) for commercial aircraft, military aircraft, space and defence. The region also hosts a wide range of companies in the supply chain of Airbus.

As one of the company's three founding nations, Spain is home to major production facilities for commercial aircraft, helicopter, space and defence activities, not least final assembly lines for all Airbus Defence and Space military aircraft. The company has also established dedicated Research and Development Centres where projects at the leading edge of science and technology are researched.

Integrated in the global Airbus industrial set-up and feeding into the company's major aircraft, defence and space programmes, approximately 12,300 highly qualified employees work on design, development, manufacture and support of aircraft and major components across eight sites located in three of Spain's main regions (autonomous communities) of Madrid, Castile-La Mancha and Andalusia.

The company's site at Getafe, in Madrid, is Airbus' third largest site and where the national headquarters are located. It is also home to Campus Futura, an advanced and efficient location designed to encourage collaboration, diversity and new ways of working among employees.

Today Airbus is Spain's aerospace and defence champion, leading the bulk of Spain's national and cooperative aerospace and defence programmes. Driving the national industry, Airbus Spain spends approximately €2,200 million annually on the national supply chain, while generating exports worth more than €4.3 billion per year (60% of Spain's A&D exports) and providing a GDP contribution of €3.57 billion (2019 figures).

Airbus is the leading supplier of aircraft to the Spanish Air Force, the country's prime for national and ESA-led space programmes and, as the largest helicopter company and provider, supports Spanish helicopters in operations with the National Police Force, the Guardia Civil and emergency services, helping to save lives on a daily basis.

Through more than 50 agreements with 8 different universities, Airbus Spain has provided a total of 453 scholarships in 2019, exceeding the record annual average of the 2,200 scholarships offered between 2017-2019. Airbus is also working to define a structure in the field of Vocational Training for the aerospace sector in Spain by leading the identification of future competencies, the development of training programmes and the implementation of Vocational Training degrees. This is a crucial aspect to foster the talent ecosystem in Spain.

Airbus Defence and Space Netherlands (formerly Dutch Space) is a Dutch aerospace company that focuses on the production of solar panels and equipment for space travel. It emerged in 1995 from an independent department of the Dutch aircraft factory Fokker.

It is the European market leader for the production of solar panels for this market segment, and the company has several relatively large projects to its name. The company has about 200 employees. Its headquarters and R&D facilities are located in Leiden, its manufacturing facility is established in neighbouring Oegstgeest.

Besides the Defence industry Airbus DS NL provides products and services for ESA, EU and NASA missions. In addition to these leading players in the international aerospace industry, other (commercial) organisations also find their way to Airbus DS NL. Airbus currently works on new developments in the fields of nanoelectronics, energy production, strong but light materials and ultrasensitive sensors.

In the region Occitanie, Airbus represents more than 28,000 people out of the 48,000 it employs in France. The company's headquarters are situated in its Toulouse-Blagnac site.

Toulouse has a long history of aviation and hosted the pioneers of «Aéropostale» like Saint-Exupéry, Latécoère and Mermoz were based. In the 1960's Toulouse was chosen by the French government as the site for the French aeronautical industry. Airbus SAS originates from the Sud-Aviation consortium created at that time, which itself became Airbus Industrie in 2001, a branch of EADS and then Airbus Group in 2014. The final name of Airbus came in 2017.

The area around Toulouse-Blagnac airport hosts Airbus Commercial Aircraft (also called Airbus SAS) five assembly lines: one for A330 planes family, another one for A350 family and 2 lines for the A320 family. The former A380 line is now also dedicated to the A320 family for the A320Neo, to answer the growing demand for that plane. It also includes other facilities for cabin outfitting and aircraft painting. The plane parts from several other Airbus facilities mainly in Europe (the UK, Germany, Spain or even other Airbus facilities in France itself) are gathered and assembled there. One of the 5 super cargo planes A300-600ST, nicknamed Beluga, can be seen daily in Toulouse sky, linking the Occitanie site with the other facilities in Europe to fly the different parts of the plane towards Toulouse. Last year Airbus SAS sold 700 planes, which represents a more than two-fold increase in 20 years.

The area near Toulouse-Blagnac airport also hosts other facilities for cabin outfitting and aircraft painting as well as the Henri Ziegler Delivery Center where customers receive their aircraft and can fly away.

Toulouse Métropole territory also encompasses the Airbus Defence and Space (ADS) branch born in 2014. ADS represents 6,000 people between the sites of Toulouse, Elancourt and Sophia Antipolis. On the Toulouse site, it employs 2,600 people. Airbus Defence and Space in Toulouse involves in access-to-space (with Ariane group), in satellites and orbital system manufacturing, telecommunication services and value-added imagery and services

ADS is in a partnership with the French ministry of Defence and Space and achieves flight tests for the A400M military transport aircraft in cooperation with Airbus flight test facilities in Spain.

Both Airbus branches in Toulouse (Airbus SAS and ADS) cover a large pool of local subcontractors and SMEs that make a part of the supply chain.

To complete the panorama, Toulouse also hosts the Airbus Training Center for customer airlines' flight crews and general staff. Another training center is called the Lycée Airbus, a professional school training more than 300 young people every year to work in aeronautics. Finally the Airbus Saint-Eloi factory in Toulouse manufactures pylons to integrate engines in the wings.

Another branch of Airbus can be found on the territory of Toulouse Métropole, namely Airbus Atlantic in Colomiers but it has no direct link with any of the other partners' regions in this project.

Figure 8: European Airbus sites map.

2.14 Thales Alenia Space

Thales Alenia Space (https://www.thalesgroup.com/) has sites in Madrid and Toulouse, with respect to the AD-ASTRA project, and in several locations in Italy (Figure 9).

Thales Alenia Space in Spain is located in the Madrid region, and has over 33 years of experience in the design, manufacturing and delivery of innovative solutions for the space market. It has contributed to more than 600 satellites, space probes and space vehicles for all types of space missions spanning telecommunications, navigation, Earth observation, exploration of the Solar System and the Universe, for space agencies and satellite operators all over the world.

With a strong commitment for innovation, Thales Alenia Space in Spain offers solutions throughout the satellite value chain: payloads, subsystems, equipment and ground segment systems. It has delivered over 4,000 equipment and subsystems that accumulate 200,000,000 hours of operations in orbit without failure.

Thales Alenia Space has 2000 m^2 of clean rooms (ISO 8) with the capacity for the production of more than 250 equipment per year, including an optical detection laboratory (ISO 5) for the integration and test of optical observation systems. Since 2021 it has a 600 m^2 and 12.5 m free height satellite AIT clean room facility equipped for the assembly, integration and test of large satellite payloads and instruments.

In France Thales Alenia Space employs 4,800 people and is located in two industrial sites. The group's headquarters are to be found in Cannes, and the French headquarters are located in the Toulouse site.

In Occitania, Thales Alenia Space develops and delivers high-technology solutions for telecommunications, navigation, Earth observation, environmental management, exploration, science and orbital infrastructures.

The Toulouse site is now the biggest site of the group. It employed 2,600 people in 2020 and hired 300 people in 2022, with a view to hire some more 80 people in 2023 thanks to the new Space Inspire satellite that will be assembled on Toulouse site. The workforce with the whole supply chain counts some 3,200 people.

The activities on the Toulouse site are telecommunication payloads for satellites constellations (like Space Inspire), navigation like the Galileo constellation which is essential for the Toulouse site, but also altimetry, ground segments, system engineering (optical, early warning, scientific missions, end-to-end telecom systems).

Figure 9: European (and USA) Thales Alenia Space sites map.

2.15 Eurocities

EUROCITIES (https://eurocities.eu/) is the reference network for Europe's major cities (nearly 200 cities) in bringing their voice to the EU political sphere and influencing the EU agenda, acting as a platform for members to share their knowledge and expertise on innovative urban solutions and trends.

This network, which brings together nearly 200 major cities in some 40 countries, brings their voice to the European Union, promotes exchanges and the development of urban projects.

The Eurocities Mobility-Transport Forum is a platform for sharing and transmitting expertise and experience in the field of sustainable and innovative urban mobility.

Eurocities' forums are composed of working groups with a specific objective, scope and mandate. The activities of each group range from developing statements to influence an EU policy-making process, to organising a lobbying or knowledge-sharing event, to developing and implementing an EU-funded project.

Since 2020, each forum meets once a year and cross-cutting events involving several forums are organised. The Mobility Forum is currently composed of 4 working groups:

- road safety and active modes,
- smart and connected mobility,
- sustainable mobility planning,
- "Barrier-free City for All" working group which meets either during the Mobility Forum or on other occasions.

Within the framework of these forums, the challenges of transport policy at European level are presented, as well as Eurocities' actions on this subject, and the innovative actions implemented in the major European cities, notably through ongoing European projects.

The City of Toulouse was Vice-President of the Mobility Forum (end 2018 - end 2020) for two years. It has become President of the Forum between 2021-2022. The city of Madrid is the vice-president. The ambition of the Toulouse presidency has been to raise the voice of the partner cities to enable transformations, ambitions but also expectations and needs in terms of regulations and budgets. The challenges of mobility and European interconnections are immense. Cities are an integral part of the solutions, as close as possible to the realities, territorial levers and freedoms.

Among the priority objectives:

- The circulation and interconnections of people and goods (road, river and rail networks, public transport and urban hubs, soft modes and pedestrians).
- The recovery plans and their interactions with the deployment of structural projects such as the metro, the railway, the cable car, etc.
- The evolution and interaction of means, techniques, uses and behaviours, particularly in relation to environmental policies, digital technology and resilience.
- The sharing of spaces and synergies between actors.

This presidency is part of Toulouse's ambition to promote innovative mobility that is accessible to as many people as possible. As the European capital of air and space mobility, Toulouse wishes to invest in Mobility in the broadest sense.

In South Holland three cities are active members of the Eurocities Network: The Hague, Rotterdam and Dordrecht:

- Rotterdam: is the second largest city in the Netherlands with more than 600,000 inhabitants. The Port of Rotterdam is the largest port in Europe,

stretching for 42 km along the Maas river into the North Sea. The port services 128,000 freight and cargo ships per year and offers direct and indirect employment to over half a million people in the Netherlands in total. The port, with its ships, ports and industry offer countless opportunities for use of drones and advanced air mobility solutions. Rotterdam The Hague Airport (IATA: RTM) is located 6 km north of the city centre. There are direct flights to/from cities in Germany, Italy, France, Spain, and the United Kingdom. Commercial airlines that operate to the airport include Transavia, Lufthansa, British Airways, and Turkish Airlines. The airport is owned by Schiphol Group and offers test and development means for aircraft and airport innovations.

- The Hague: is home to 500,000 inhabitants, when including its suburban municipalities the area contains over 800,000 inhabitants, making it the third-largest urban area in the Netherlands, after Amsterdam and Rotterdam. As the international city of peace and justice, The Hague also has a long-standing shared history and a strong connection with Europe. It is home to 31 European organisations, like Eurojust and Europol. The municipality of The Hague strongly believes in the potential of cities and regions in shaping the future of Europe. It supports the concept of multilevel governance, according to which all key stakeholders in the EU, including city governments, are involved to jointly tackle pressing matters and deliver concrete outputs for the benefit of citizens in the EU. The Hague is providing a perfect platform to successfully launch EU and cross-border projects. Regarding aerospace, The Hague is home to a strong aircraft, drone and satellite parts manufacturing cluster at Technology Park Ypenburg.
- Dordrecht: located in the West of the Netherlands, Dordrecht is home to nearly 120,000 inhabitants. Dordrecht is the bustling center of the Smart Delta Drechtsteden, the industrial engine of the Rotterdam region and is closely associated with university cities such as Delft and Leiden. The Drechtsteden, with a total of almost 300,000 inhabitants, together form a recognizable urban waterfront area, containing industry-leading companies and institutions with their own character and the maritime manufacturing industry as a common denominator. GKN Fokker Aerostructures is located in the Drechtsteden and is Netherlands largest manufacturer of aircraft parts employing around 1200 fte.

In Emilia-Romagna two cities are actively involved in the Eurocities Networks:

- Bologna: with its strategic location, Bologna has been a primary crossroad of goods and people since Roman times. Today, thanks to its expanding infrastructures, it's the centre of a transport and business network of vital importance to Italy and Europe. It is the major hub in the country for highways and rails. Innovation in mobility, including air and space mobility, is one of the major trends of interest for the development of the city and of the metropolitan area around it.
- Cesena: is a vibrant city surrounded by a fantastic landscape. The city is ideally located between the Adriatic coastal towns of Rimini, Pesaro and Cesenatico and the charming villages, mountains, rivers and waterfalls of the Casentinesi

Forests natural park. In the province of Forlì-Cesena the Aeronautic and Space Pole of Forlì is located, with a concentration of academies and schools, together with an airport, laboratories and companies, where air and space mobility is also studied and developed.

Out of the 16 Spanish cities which are active members of the Eurocities Network, three are in the Madrid Community:

- Alcobendas: is a city located in northern Madrid, with 117,000 inhabitants. Thanks to its great public transport system, the city is less than 15 minutes away from Madrid's financial district and Downtown, Adolfo Suárez Madrid-Barajas international airport and IFEMA convention centre. Moreover, the city currently hosts the headquarters of 554 multinational corporations, being the third Spanish city by turnover, just behind Madrid and Barcelona. Determined to become a smart city, Alcobendas has launched a Digital Innovation Hub, called Intelligent Urban Lab, with the support of local institutions, companies, universities and start-ups. It is turning the city into a true urban lab in which mobility issues can be tackled through testing and experimentation so that innovative solutions may be developed within Alcobendas and escalated to other urban areas. Thus, the city is usually renowned as the Spanish Silicon Valley. More than 30,000 students attend the three universities located within the area, including the Autonomous University of Madrid (the second best university in Spain).
- Fuenlabrada: is located within the metropolitan area of Madrid, seventeen kilometers southwest of the capital. Its population is 194,514 inhabitants, which makes it the fourth most populous city in Madrid and the thirty-second largest in the country. Its economy is centered on industry and the service sector. The city is home to a campus of the Rey Juan Carlos University, the second public university in the Community of Madrid in number of students enrolled.
- Madrid: the Spanish capital is one of the most populous in the European Union, a cosmopolitan city where people of over 180 nationalities live together. As the Spanish capital, Madrid is home to embassies and international organisations, major companies and financial institutions. It ranks first in Spain for the creation of new companies and is one of Europe's most attractive cities for businesses, investors and employment. An innovative and dynamic city, Madrid's forward-looking entrepreneurial ecosystem is experiencing exponential growth and has positioned itself as one of the tech hubs with the greatest potential in Europe. The city is a favourite spot for entrepreneurs from around the globe seeking to launch a start-up. The city boasts a wide range of educational centres and universities, including some of the world's top business schools. Madrid is one of the cities that attracts the most university talent in Europe and Erasmus students rank it as their favourite city destination, citing its enviable geographical location, its excellent connectivity, its parks and green areas, its streets full of culture and history, and its lively nightlife – in short, a vibrant city full of life.

In Apulia Region, Bari city is actively involved in the Eurocities Networks. Bari is an Italian municipality with a population of 315,820, the capital of the region of Apulia and the metropolitan area of the same name with a population of around 1,200,000. Bari is the most populous Italian and European municipality overlooking the Adriatic Sea. The city also has a solid commercial and entrepreneurial tradition and has always been a focal point for trade and political-cultural contacts with the Middle East. Its port is the largest Italian passenger port on the Adriatic. The Fiera del Levante, one of Italy's leading trade fairs, has been held in Bari since 1930. Industry has always been a driving force, developing in the food, chemical, petrochemical, textile, wood and, above all, mechanical sectors. Companies such as Magneti Marelli, Nuovo Pignone, Bosch and Getrag are active in the mechanical industry: Bari is home to Italy's most important German industrial district. At the end of the 1980s, the Elasis Centre developed the famous common-rail system for Fiat, which was later sold to Bosch. The industrial area has gradually moved out of the city and is now located between the municipalities of Bari and Modugno, with branches towards Palo and Bitonto. The beginning saturation of the area has also favoured the growth of Molfetta's industrial sector in the last decade.

2.16 Alliance For Zero Emission Aviation

Several stakeholders from Occitanie (Occitanie Region, Aerospace Valley, Safran) are signatories of the Alliance for Zero Emission Aviation (AZEA - https://defence-industry-space.ec.europa.eu/eu-aeronautics-industry/alliance-zero-emission-aviation_en), which is part of the EU industrial strategy. This industrial alliance aims to prepare the aviation ecosystem for the introduction of hydrogen and electricity-powered aircraft to contribute to the goal of carbon neutrality by 2050. It brings together a wide range of stakeholders from the public and private sectors of industry, aviation, transport, energy, non-governmental organisations and civil society, of all sizes, with the participation of small businesses particularly encouraged. The aim of the AZEA is to prepare the market for the arrival of zero-emission aviation services by identifying the priorities and challenges of the technical developments of this new technology, proposing practical solutions and stimulating investment and connections between the different stakeholders. The Alliance aims to create a strong ecosystem around zero-emission aviation, connecting stakeholders from different sectors and developing opportunities for linkages, funding and synergies with European programmes and initiatives.

The Alliance's activities are focused on three main tasks:

- Analysis and planning: Identifying the challenges of bringing hydrogen-powered aircraft to market and creating a roadmap for hydrogen and electric-powered aircraft
- Investment and synergies: developing and strengthening collaborations and partnerships between Alliance members, contributing to the development of new funding opportunities and coordinating efforts with European initiatives.

- Recommendations and awareness raising: Identify policy, regulatory and standardisation needs and promote zero-emission aviation to the general public.

From the E-R region, the Guglielmo Marconi airport joined the alliance AZEA in 2022. This was fully in line with the commitments of the civil aviation sector and of Bologna's airport main goal of neutralising its CO_2 emissions by 2030. The airport is working on this also by adhering to the international Airport Carbon Accreditation programme, and confirming this commitment by signing the Toulouse Declaration. The path undertaken by G. Marconi airport has so far led it to reach Level 3 - Airport Carbon Accreditation (ACA) optimisation.

In addition to international organizations and industries, there are other Spanish entities located in Madrid which are members of AZEA: Aciturri, Aernnova, CESA (Compañía Española de Sistemas Aeronáuticos), IBEROJET, INTA (Instituto Nacional de Tecnica Aeroespacial), ITP Aero.

South Holland is represented in AZEA by the following members: TU Delft, To70, Stichting AeroDelft, Maeve Aerospace, and Netherlands Airport Consultants (NACO).

2.17 European Consortium for Training in Aerospace

The European Consortium for Advanced Training in Aerospace (ECATA - https://ecata.org/) is a joint initiative among leading aerospace universities and industries in Europe, organising a yearly course on management of multinational aerospace projects for 20 highly qualified young engineers. Universities from three of the regions in AD-ASTRA participate in ECATA: UPM (Madrid), ISAE-Supaero (Occinania) and TUDelft (South Holland). In Figure 10 there are reported all ECATA Academic Institutions while in Figure 11 there are reported the ECATA Companies.

Figure 10. ECATA Academic Institutions.

Figure 11. ECATA Companies.

2.18 UIC2 - Urban Air Mobility Initiative City Communities

The Urban Air Mobility Initiative Cities Community (UIC2 - https://civitas.eu/urban-air-mobility) aims to facilitate urban mobility's sustainable and safe transition to the vertical dimension. It was established in October 2017 as part of the EU Smart Cities Marketplace. In September 2022, we celebrated the 5th anniversary of UIC2

by transitioning to the EU's CIVITAS initiative. This move created the CIVITAS Urban Air Mobility Thematic Cluster under the CIVITAS Demand and Urban Space Management Thematic Area.

UIC2 is a community that prioritises the needs of citizens and regions in the emerging sector of urban air mobility. The aim is to foster cross-sectoral collaboration to shape the future of UAM services and to focus on making the voice of European urban and regional communities heard in this field.

While DTA is a knowledge partner of this community, there are city members involved in the UIC2 initiative from Apulia, Madrid, Occitania and South Holland (Figure 12).

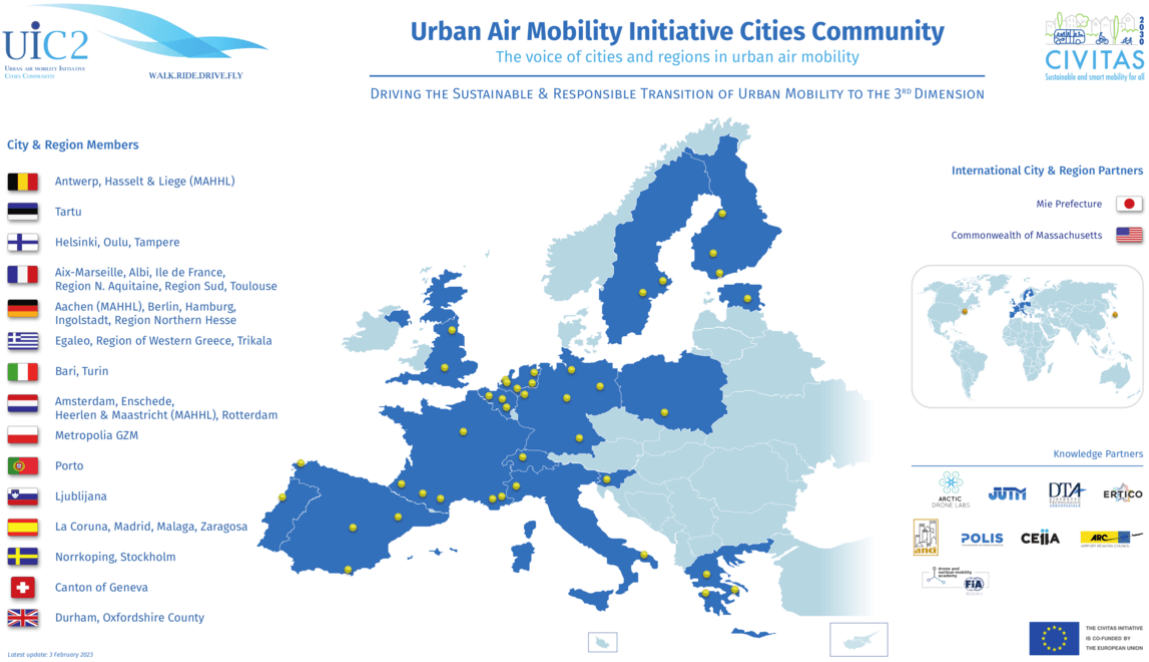

Figure 12. Urban Air Mobility Initiative Cities Community map.

3 Case studies

3.1 Emilia-Romagna

3.1.1 ELCA network

European Lightweight Cluster Alliance (ELCA - https://elcanetwork.eu/) is a collaborative initiative that aims to accelerate the adoption of lightweight materials in strategic industries. Mobility is the primary focus of the alliance, but applications in other lightweighting-related sectors are also targeted; including energy, health care, aeronautic, defence and space, construction. The alliance is creating a unique inclusive business framework for exploring lightweight-driven market opportunities. The main players from established industries and research institutions can collaborate and facilitate activities to put the lightweight technologies into practice.

The alliance is very active in bringing together the partners in international projects in R&D, in Technology Transfer and in Innovation, addressing the challenges and needs of industry.

Clust-er MECH, the mechatronics and motoristics cluster of the E-R region, participates actively in ELCA. This clust-er is part of the regional Clust-ERs network, which together with the Technopoles and the High Technology Network laboratories, are one of the key players in the regional innovation ecosystem coordinated by ART-ER.

3.1.2 Vanguard Initiative

The Vanguard Initiative (https://www.s3vanguardinitiative.eu/) is a unique alliance that gathers 38 of the most advanced industrial regions in Europe (among those also E-R and South Holland), focused on stimulating industrial innovation and building European value-chains based on complementarities in regional smart specialisation strategies.

By connecting innovation ecosystems and sharing knowledge and facilities across its member regions, the Vanguard Initiative facilitates interregional collaboration, stimulates interregional innovation investments, strengthens open innovation, and speeds up the introduction and market-uptake of new products and innovations in Europe.

ART-ER is very active in this initiative, representing the region E-R in the whole Network and specifically in all the eight pilot projects that are developed within the network: Bio-Economy; Efficient and Sustainable Manufacturing (ESM); High performance production through 3D-printing; advanced manufacturing for energy related applications in harsh environments; New Nano-Enabled products pilot; Artificial Intelligence; Smart Health/ Personalized Medicine; Hydrogen (H_2). In particular ART-ER is co-leading two of these pilots and involved many actors from the region (universities, research centres and companies) in the projects.

None of the pilots are directly related to the Aerospace domain, but most of those can have an impact on it, in particular with the recent opening to commercial space flight

and the new space economy. In particular the pilot on 3D printing can have many points of contact with aerospace applications (i.e. in-orbit manufacturing, prototyping, etc.), but also ESM, H_2 or AI.

3.2 Occitania

3.2.1 EIT Urban Mobility

Toulouse Métropole has been a core partner of the EIT Urban Mobility (UM - https://www.eiturbanmobility.eu/) since 2021. EIT UM is the entity/network dedicated to urban mobility of the European Institute of Innovation and Technology; its excellence comes from the partners. As Europe's leading innovation community for urban mobility, EIT UM brings together key players from the entire mobility value chain. The community comprises more than 300 organisations in 33 European countries (among those also Italy as a country and Comune di Modena; AESS - Modena Energy and Sustainable Development Agency; Arco Technologies and Hipert as organizations from the E-R region).

For its first year as a core partner of the EIT Urban Mobility and for its first participation in the response to the calls for projects launched by this European body in March 2021, Toulouse Metropole has seen 4 of its 8 submitted mobility projects selected and therefore eligible for European co-financing (including 2 as Coordinator) which are:

- Urban Air Mobility (UAM) Plazza Accelerator: a start-up accelerator dedicated to UAM. Partners: Toulouse Métropole, Aerospace Valley (FR), Carnet (ES) and Ferrovial (ES).
- 4I4U: a project to engage students from Toulouse and Barcelona (aged 15 to 23) in the mobility of the future via a co-creation process supervised by cities, industrialists and academic actors. Partners: Toulouse Métropole, Campus des Métiers et des Qualifications d'excellence - Mobilité et Transport Intelligent de Toulouse(FR), Université Polytechnique de Catalogne UPC (ES), Carnet (ES), City of Barcelona (ES), IMI (ES).
- FlexCURB: implementation of 2 digital solutions for dynamic curb space management by studying parking management, urban vehicle access regulations and freight management. Partners: Automotive Technology Center of Galicia (ES), Toulouse Métropole, Urban radar (FR), Polis, Eurométropole de Strasbourg (FR), University of Ghent (BE), Fit Consulting Srl (BE), City of Louvain (BE), Carnet (ES).
- RAISE-UB: a solution for the transformation of railway stations into multimodal and multiservice hubs. Partners: Polytechnic of Milan (IT), Toulouse Métropole as an observer, City of Milan (IT), City of Madrid (ES), Ferrovial (ES), AMAT (Agency for Mobility, Environment and Territorial Planning of Milan), CI3, Polytechnic Foundation of Milan (IT).

Currently, all projects have been completed except for the UAM Plazza Accelerator, which will continue until 2024. The UAM Plazza Accelerator project aims to create in

Toulouse the first European acceleration programme dedicated to start-ups evolving in the various fields related to urban air mobility (UAM).

The objective is to support at least 10 start-ups per year from all over Europe. This new acceleration programme will be developed in three phases:

- Phase 1 (2022): setting up the accelerator An acceleration programme dedicated to UAM will be defined, launched and hosted from the B612 (Toulouse), based in particular on the feedback from the DISTRICT scheme run by Aerospace Valley. The selected start-ups will benefit from mentoring sessions from expert coaches in order to define their business plan, their product development strategy, their investment needs and their go-to-market strategy. Startups will also be able to test their MVP in living labs. At the end of the first acceleration session, a demo day will be organised where startups will have the opportunity to present themselves to investors, including the EIT Urban Mobility.
- Phase 2 (2023) - "Digital Acceleration": In addition to phase 1, a digital coaching solution will be developed to facilitate the acceleration programme for start-ups located remotely outside the physical sessions at B612. In addition, these developments should allow third party companies and investors to join the programme in order to coach and/or invest in the supported start-ups. Through the "CHOOSE YOUR START-UP" module, companies will have the opportunity to sponsor the paid acceleration activity for any start-up of their choice.
- Phase 3 (2024) - "All in one": In addition to phase 1 and phase 2, a multi-modality test bed will be proposed with the support of Toulouse Metropole, so that companies can test and validate their systems, but also the level of acceptability from users/citizens, through a "living lab" functionality. This work should also facilitate collaboration with the regulatory authorities.

3.2.2 Gazelle Accelerator

The Gazelle Accelerator project (https://www.eitmanufacturing.eu/news-events/activities/accelerate-and-grade-up-existing-technology-based-companies-smes-and-start-ups-to-create-european-gazelles-2/), coordinated by Aérospace Valley, aims to support existing technology-based companies, SMEs, start-ups and scale-ups by accelerating their international business, innovation and financial capabilities in Industry 4.0.

The sixth edition of the project in 2022 aimed to promote the activities of companies developing solutions to the technical challenges and specific use cases previously identified by key European industry players, including Airbus. Following this identification, a call for proposals was launched, after which 17 companies, including 14 French ones, were selected to receive tailored support for a period of 5 months, including two companies from the Toulouse area / Occitanie region.

The support offered to the winners aims to foster their development by facilitating their access to the market and to financing through meetings with European companies and investors, to assist them in their innovation projects by helping them

to join consortia and develop collaborations with other companies, thus helping them to internationalise.

The aim of the Gazelle Accelerator project is to create and strengthen connections between innovative SMEs, start-ups and scaleups and European investors and industry. Since its launch, the Accelerator has supported 97 companies and made more than 120 connections with industrials and investors across Europe.

3.2.3 European Clean Aviation Regional Ecosystem

The European Clean Aviation Regional Ecosystem (ECARE - https://ecare-project.eu/) project aims to facilitate the emergence of synergies between regional/local funding and the European level around aviation. It is part of the first wave of Horizon Europe Clean Aviation Partnership calls for proposals.

The call aims to fund the establishment of a platform that will facilitate interaction between national and regional actors (including clusters), support and coordinate national and regional activities with the Clean Aviation Partnership. The idea of the consortium is to use this proposal to identify specific actions to increase the involvement of SMEs and other stakeholders in the Clean Aviation Program. The total budget of the call is estimated at €720,000, with a funding rate of 100%.

The project is led by the Aerospace Valley cluster in Toulouse, which has formed a consortium with three other partners, Hamburg Aviation, DAC Cluster and EASN-TIS (as mentioned above). Other partners such as aviation clusters or regional partners can be included in the project.

During the 24-month project, regional and national support programs in France, Germany and Italy will be recorded in a map and an inventory of support measures will be made. Recommendations will also be formulated in the form of a roadmap to create synergies between available funds and to finance low-carbon aviation innovation. To highlight the results of the mapping and create a space for sharing and exchange, a digital platform with a forum area will be established. Finally, the project should also lead to the creation of a community and a network.

The Occitania region has participated in the project by becoming a member of the ECARE stakeholder group. This allows it to participate in the advisory and recommendation activities of the group.

The project is of great interest to the region, as it will increase the financial resources available for actions in the field of synergies between sectoral funding and structural funds, and improve the visibility of the Occitania region at European level on these issues. But it will also better support the operationality of the synergy actions agreed in the cooperation agreement between the Clean Aviation Partnership and the Occitania Region.

Finally, the participation of the Region will reinforce its support to the territorial ecosystem, especially in favour of SMEs, and to support the access of regional actors to the calls of the Clean Aviation Partnership.

The project has a pilot character and aims to involve the regions. Moreover, it aims to create connections between European aviation clusters by setting up exchange networks to exploit synergies and better link the Structural Funds and the Clean Aviation Program.

3.2.4 UNIVERSEH

The University of Toulouse is coordinating the European Space University for Earth and Humanity (UNIVERSEH - https://universeh.eu/) project, the first European university to bring together five universities from all over Europe in the field of space. UNIVERSEH is a European university that is part of the European University Initiative. This initiative, suggested by President Macron during his speech at the Sorbonne in 2017, is integrated into the Erasmus + program.

The goal of the European Universities is to raise a new generation of Europeans who are proficient in several foreign languages and aware of current societal challenges to enable an increase in European competencies. The European College projects are designed to enable participating students to spend more time abroad during their studies, to master two languages in addition to their mother tongue, and to create a European identity based on a common feeling.

The European University project is funded with €5,000,000 over three years. As could be seen in Figure 13, this European university involves the Lulea University of Technology (Sweden), the University of Luxemburg (Luxembourg), the AGH University of Sciences and Technology (Poland) and Heinrich Heine University (Germany).

Space is a key issue for these universities and for the EU. It is a key factor for European autonomy. It is a topic that combines numerous aspects: scientific, economic, social, cultural... It is also anchored in the European priorities for climate protection and should help to make the space sector more sustainable.

The objectives of UNIVERSEH are to make the EU a world leader in the space sector, to develop an innovative university offer to educate students by adapting them to future needs. It also aims to promote European values and identity and provide a more inclusive education.

This project will enable numerous links between European universities and their students, leading to the exchange and sharing of knowledge in the field of space.

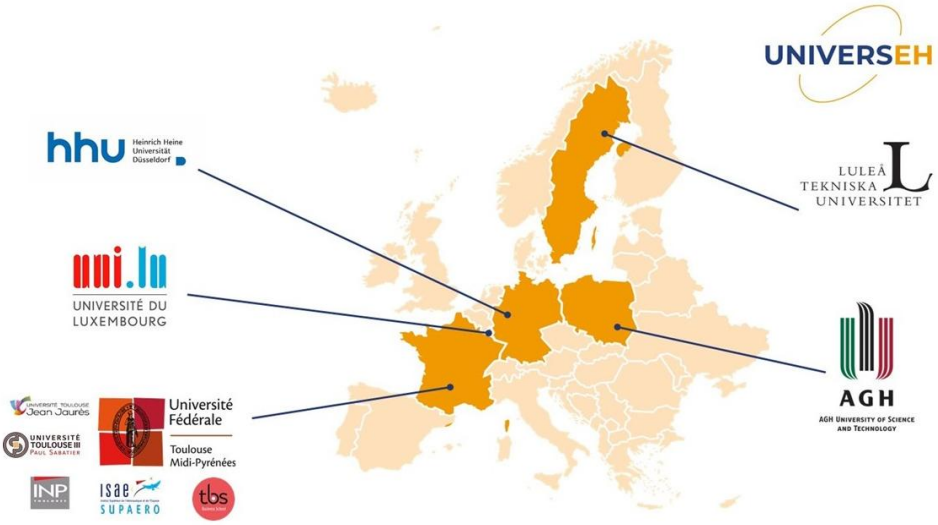

Figure 13. Map of UNIVERSEH consortium partners.

3.3 Madrid

3.3.1 NANOSTAR

The NANOSTAR Project is a collaborative platform which aims to provide relevant training in the development of nanosatellite space technologies through student challenges. The main goal of the project is to provide students with the experience of a real space engineering process including all stages from conception and specification, to design, assembly, integration, testing and documentation. In other words, the whole process is through a network that combines high-level engineering careers and entrepreneurial ventures in the area of nanosatellites.

NANOSTAR is funded by the Interreg Sudoe Programme through the European Regional Development Fund (ERDF). The project lasted for 30 months, from 2019 to 2021. The consortium is composed of 7 universities and 2 aerospace clusters, plus 3 ESA Business Incubation Centres as partners; all of them located in France, Spain and Portugal.

Within the NANOSTAR programme, UPM has developed some of the main work packages, which include tasks such as the development of a methodology for the cooperative design, construction, integration and testing of nanosatellites using and adapting the ECSS standard.

NANOSTAR facilitates the training of students with a high level of skills in space engineering and project engineering, so that they will be the future key players in the field of nanosatellites. All of it in a context of cooperation among different locations and disciplines.

3.3.2 GALILEO Information Centre

The GALILEO Information Centre Chile (GIC - https://galileognss.eu/tag/galileo-information-centre-gic/) is the information centre on satellite navigation technologies and programs of the European Satellite Navigation Systems (EGNSS) that provides support to Argentina, Bolivia, Chile, Colombia and Ecuador.
The objectives of the centre are:

- Promote activities related to European satellite navigation systems.
- Monitor local and regional initiatives that use satellite navigation technologies.
- Provide support to users in South America in the development of new applications through cooperation with the European industry.

The GIC was developed by a consortium participated by Universidad Politécnica de Madrid (UPM) in a project funded by the European Union.

The Galileo Information Centres, funded by the European Commission (EC) and the DG Defence Industry and Space (DG-DEFIS), are promoting the introduction of the European GNSS (EGNSS) programmes, Galileo and EGNOS, in Latin America. The Centres monitor local and regional satellite navigation initiatives, identifying potential markets and stakeholders, and providing support to users in developing new applications through cooperation between Latin American and European industry.

Additionally, the Centres are responsible for disseminating information in different languages about EGNSS and supporting the user community to enhance local awareness and understanding of the European GNSS services. Galileo Information Centres in Chile (serving Argentina, Bolivia, Ecuador and Colombia) and Brazil (serving the Portuguese-speaking community), have started providing services in summer 2020, while the Centre in Mexico (covering Mexico, Central America and the Caribbean) is expected to open in the coming months.

Recently inaugurated, the GIC in Chile has already started its activities training the user community about Galileo Systems and Services and the opportunities the EGNSS can bring to Latin America.

3.3.3 EELISA

The European Engineering Learning Innovation and Science Alliance (EELISA - https://eelisa.eu/) brings together nine higher education institutions located in seven European countries and aims to define and implement a common model of a European engineer. It is one of the 44 European Universities financed by the European Commission under the Erasmus+ program

The EELISA alliance (Figure 14), coordinated by Universidad Politécnica de Madrid, offers a European engineering model that, expanding its scope from a traditional technological core, also fully responds to the challenges of contemporary society.

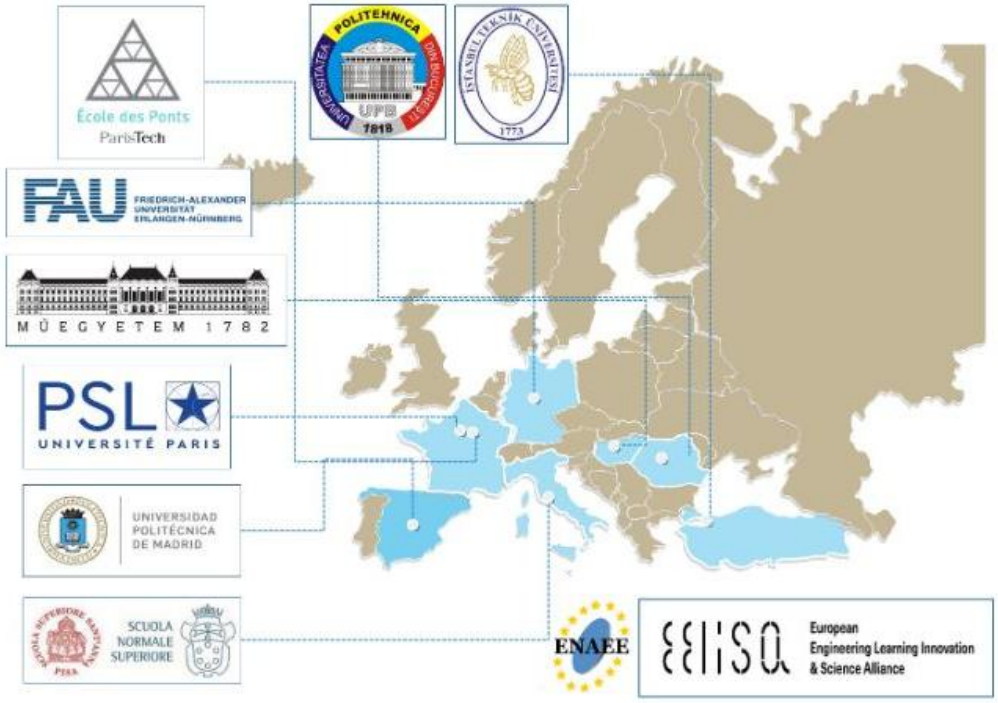

Figure 14. EELISA alliance map of participants.

The commitment and impact on society is recognized through the EELISA Credential that students obtain by participating in the EELISA Communities, linked to the UN

Sustainable Development Goals. With EELISA, UPM actively supports the proposal of the European Commission to make a European Education Area a reality in 2025 and thus take advantage of knowledge and turn it into the basis of the recovery and prosperity of Europe, based on the principles of inclusion, mobility and innovation, and reinforcing a growth strategy, based on sustainability, and using the ecological and digital transitions as engines of transformation. In addition to educational matters, EELISA is also working in the field of research, innovation and entrepreneurship through its associated projects: EELISA InnoCORE and EELISA Unfolds.

3.4 Apulia

3.4.1 ASSURED-UAM

The Acceptance Safety and Sustainability Recommendations for Efficient Deployment of Urban Traffic Mobility (ASSURED-UAM, https://assured-uam.eu/) project (which started in January 2021 and ended in April 2023) aimed to find solutions to ensure the seamless integration of unmanned aircraft platforms with Air Traffic Management (ATM) and cities while maintaining the acceptability, safety and sustainability of UAM. UAM is commonly understood as air transport within or between urban areas, enabling door-to-door or near-door travel for people or goods in densely populated urban areas. UAM undoubtedly has such potential. However, considerable preparatory work is necessary to make the most of it, covering many areas and complexities related to critical infrastructures and interfaces.

The emergence of new technologies in remotely piloted and autonomous aircraft, let generated visions of a large-scale presence of air mobility in areas till now considered hardly available for air transport - such as densely populated urban areas. It will add a new dimension to mobility and significantly improve urban transport services. In addition, the development of vertical transport is seen as a remedy for many transport-related challenges and an enabler for achieving strategic goals, such as those contained in the EC or ACARE documents.

During the time of its development, ASSURED-UAM has achieved the following high-level objectives:

- Viewing vertical urban transport as a practical and economically efficient mode of transport is crucial, seeing it as an additional dimension to our sustainable and integrated transport systems. With this in mind, ASSURED-UAM has developed realistic and robust scenarios for advancing urban and peri-urban air mobility.
- Organisational and policy definition support has been provided to authorities, policymakers and urban industry organisations to facilitate the complex implementation process of vertical transport modes and their integration with the horizontal dimensions of urban and peri-urban mobility systems.
- Aviation best practices, standards, recommendations and organisational solutions have been integrated and promoted in urban/municipal administrative and legislative structures. These efforts aim to enable the deployment of urban air mobility services soon.

- It has proven to be a strong ally in achieving the European Green Deal's goal of carbon-neutral urban transport by 2050.
- It has proposed the integration of surface transport modes into the urban air traffic management system, for example, by considering the SESAR X-TEAM D2D and VUTURA projects.

3.4.2 SPACEWAVE

To achieve a successful European industrial renaissance, clusters can serve as a crucial support system for SMEs looking to expand internationally. Earth observation (EO) technologies offer immense benefits to emerging industries such as Blue Growth, as they are highly accessible, practical and affordable tools for monitoring, studying and managing marine resources.
Four clusters, namely Aerospace Valley (AV), Pole Mer Méditerannée (PMM-TVT), Marine South East Limited (MSE) and DTA, have combined their expertise in EO and Blue Growth to form the basis of a European Strategic Cluster Partnership (ESCP) known as SpaceWave (https://clustercollaboration.eu/community-news/spacewave-alliance-launched-accelerate-use-earth-observation-blue-economy-growth).
The primary objective of SpaceWave was to support European SMEs in their international expansion plans, thereby promoting the global deployment of EO technologies in the Blue Growth sector and stimulating economic growth. To achieve this goal, SpaceWave has implemented three key activities:

- Conducting an international market analysis of downstream EO technologies for Blue Growth
- Identifying European and international stakeholders and analysing value chains
- Defining a common internationalisation strategy to unlock Europe's full potential in downstream EO for Blue Growth.

3.5 South Holland

3.4.1 Copernicus Masters Competition

The Copernicus Masters (https://copernicus-masters.com/) is the global innovation competition to foster the user uptake of Copernicus applications. It was launched by Anwendungszentrum Oberpfaffenhofen GmbH (AZO) in 2011 on behalf of the ESA and with world-class partners coming from industry and governmental institutions alike. The success reached by previous winners has demonstrated the Copernicus Masters' ability to boost the development of businesses in the downstream sector of EO data. Many domains of our society, from infrastructures to agriculture, ecosystem preservation and green energies, benefit from it. With a prize pool of EUR 531,000 in 2022, the Copernicus Masters awards innovators showcasing the benefit of Copernicus services in their solutions.

Alongside, until 2021, AZO also organised the Galileo Masters Competition, this competition was initiated by ESA in 2002 and is now fully replaced by the Copernicus Masters Competition. The competition awards innovators fostering new solutions and concepts that showcase the benefits of the European Copernicus services to our everyday life.

Participants can be regions or countries: South Holland works with the Netherlands Space Office to address the competition nationally. Italy is represented by the Italian Space Agency.

4 Conclusions

In Deliverable 1.1, the relevant stakeholders (public authorities, industry, RTOs, universities, investors, etc.) and their innovation and technical capabilities, as well as any already existing innovation programmes and policies, were identified in each region. The already established inter- and intra-regional connections, and possibly any relevant international connection, were also identified. This activity is a work in progress that will be continuously updated along the development of the project, due to the dynamic asset of each ecosystem, changing and growing in any moment, and to the increasing knowledge that each partner is gathering on each ecosystem.

In this Deliverable 1.2, the connections and networks are clearly singled out and detailed for each partner region. The common interregional connections are listed and specified and for each region also the specific connections that do not involve at present other regions of the partnership are identified and detailed. The latter are called *case studies*, in order to underline the fact that they may represent a reference for the whole partnership as best practice to take into account for the development of the joint action plan.

After Deliverable 1.1 proved the richness and variety of the innovative ecosystem of the five regions that participate in the project, the inventory of connections now shows that most of the partners belong to multiple networks. The list of already established inter- and intra-regional connections, and international connections is rich. This shows that the five regions are already well developed as aerospace hubs, even if all in a different way and with specific characteristics. Indeed, as all segments and subsegments of the aerospace sector are well represented in each of the ecosystems, the connections are multiple already, be they international connections implying several of the partners or simple case studies implying only one partner.

Commonalities and common orientations among the 5 ecosystems involved will be further analysed during the development of the project, being a valuable basis for the co-creation workshops to come. However the results of Deliverable 1.2 already show that the five regions that are partners of the AD-ASTRA project are well aware of the need to collaborate by connecting to others. As was written earlier on, «diversity generates wealth». Thus, elaborating further on this concept: “collaboration also makes strength”. Collaborating makes more efficient, working together leads to better work, mutual choices bring about better alignment. In today’s complex geopolitical context, it is all the more important to look in the same direction in order to make Europe a centre of excellence. Connecting is also a means to seek better funding, which in itself is essential to innovation.

Like for D1.1, the results of this second inventory prove that the AD-ASTRA consortium can provide valuable inputs to the extension of the connections and links among the five participant regions, and others to come. As all the strong players of the aerospace European ecosystem, such as ESA or multinational companies like Airbus or Thales are present in at least three of the five regions, it seems coherent to connect all the systems, therefore contributing to consolidating the leadership of the European aerospace industry.

This activity and this inventory are clearly a first step in the common understanding of the five ecosystems. Further improvement of these inventories will be managed during the project, in particular during and after the co-creation events. In this way the five ecosystems will be even studied and known in more detail and they can be used as best practices to draw a joint action plan that will help each of them to be improved and to grow up.