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AREANA
AVIATION RESEARCH ECOSYSTEM ADVANCED NOVEL APPROACH

D1.12. – Potential Synergies between EU, National & Regional R&I Aviation Programs

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Abstract

The deliverable "Potential Synergies between EU, National & Regional (ENR) R&I Aviation Programs" aims to identify synergies within the framework of aviation research in Europe, based upon an analysis of performed European projects and national and regional funding programs. The synergy potentials thus developed form the basis for the further steps of the AREANA project towards the successful implementation of the solutions developed.

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1. Executive Summary

The task of this deliverable is to compile EU funded collaborative research aviation projects and other main national and regional R&I aviation programmes. Based on this compilation, the main synergy potentials in the field of aviation research in Europe were identified as a basis for further work in Work Package 1 of the AREANA project.

1.1 EU funded Projects

An analysis of four European funding programs managed by CINEA (the European Climate, Infrastructure and Environment Executive Agency) was carried out for the period 2014 to 2023. A total of 374 projects related to aviation were identified, with the largest share coming from the Horizon 2020 program respectively its successor program Horizon Europe with a total of 199 projects and the CEF (Connecting Europe Facility) program with a total of 159 projects. In addition, 20 projects from the last funding call of the Clean Aviation Joint Undertaking (CAJU) were analyzed.

A special focus was then placed on those aviation projects with a direct connection to aircraft technology, as in this area a good comparison with national and regional funding programs can be made and representative synergy potential can thus be worked out. Seven European projects that have already dealt with the optimization of European aviation research in the past were also taken into account.

1.2 Main National and Regional Programs

The main funding programs at national and regional level were compiled. This included programs that are exclusively aviation-related, programs in which aviation is explicitly mentioned as a funding option, and programs in which the specific funding content is open, but in which aviation topics were also funded in practice. The aim was to cover at least 80% of the actual funding for each European country with relevant aviation research funding.

In total, 40 funding programs were identified (32 national, 8 regional).

1.3 Resulting Synergy Potential

By comparing the European funded projects with the national and regional funding programmes, 5 key synergy potentials were identified:

1. Strategy alignment

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2. Communication transparency
3. Process harmonization
4. Joint calls and other forms of cooperation
5. Joint use of research infrastructure

The determination of synergy potential forms the basis for the transition from the "analysis phase" to the "solution phase" of the AREANA project's work package 1 "Synergies". In this phase, clearly defined and practically implementable solutions are developed to realize the identified synergy potential.

A key element in the development of the solutions is the continuous involvement of all stakeholders. For this purpose, a flyer was created to present the synergy potential and the further steps in the project in a clear and structured summary.

2. Synergy potential of Aviation Research & Innovation in Europe

Using synergies in European aviation research enhances innovation, reduces costs, and accelerates technological advancements by pooling resources and expertise. Collaborative efforts promote standardization, improve safety, and foster environmental sustainability. They also bolster Europe's global competitiveness, drive economic growth, and create high-skilled jobs. By addressing complex challenges collectively, these synergies facilitate comprehensive solutions and ensure knowledge sharing across the continent. Furthermore, joint projects supported by EU initiatives strengthen political and strategic ties between European countries and "friendly" nations outside of Europe, fostering unity and shared purpose in advancing the aviation industry.

This deliverable will explore potential synergies by compiling EU funded research aviation projects (mainly managed by CINEA) and other main National and Regional R&I aviation programs.

To define the task in more detail, the scope of "aviation research" should be described as a first step: Basically, aviation research includes all research that has to do with aviation in the broadest sense. These are in particular the large areas of general aircraft technology, airports, air traffic management and fuels.

The aircraft technology area is complex due to the many different categories of aircraft (commercial aircraft, helicopters, general aviation, UAV…) but also the technologies used (structure, engines, systems…). The solutions to be developed by AREANA should be of general use and thus largely independent of specific technologies.

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One example here is the planned improved cooperation between national and regional research programs with the European research funding Clean Aviation Joint Undertaking. In parallel, a corresponding cooperation with SESAR (Single European Sky ATM Research, a partnership within the framework of the European ATM) is also being examined.

As part of the analysis phase to determine synergy potential in aviation research in Europe, projects from various European funding programs that are currently ongoing or have been completed in recent years were evaluated.

In a second step, key national and regional funding programs were analyzed. The challenges of the existing system were then identified in order to finally develop a system of complementary synergy potential in a final step.

2.1 European Aviation R&I Projects

Regardless of the comparison of different funding programs at European, national and regional level, looking at funding projects also opens up new perspectives for developing solution approaches to exploit synergies in the field of aviation research.

For this purpose, projects from four funding programs managed by CINEA - Horizon Europe, Connecting Europe Facility, Innovation Fund and Life Program - were first examined.

In addition, projects from the largest “green aviation” European research program, the Clean Aviation Joint Undertaking were evaluated.

2.1.1 Relevant European Research Programs managed by CINEA

The following list provides a brief overview of the funding programs managed by CINEA with (a possible) aviation connection.

- Horizon Europe/Horizon 2020: supports research and innovation projects addressing global challenges, including sustainable aviation technologies, emissions reduction, and air traffic management improvements.
- Connecting Europe Facility (CEF): funds projects enhancing transport infrastructure, including airport operations and connectivity, to support a more integrated and sustainable European transport network.
- LIFE (French: L’Instrument Financier pour l’Environnement) Program: provides funding for environmental and climate action projects, including initiatives aimed at reducing the environmental impact of aviation through sustainable practices and technologies.

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- European Innovation Fund (EIF): focuses on funding large-scale projects demonstrating innovative low-carbon technologies, including those in aviation, to reduce greenhouse gas emissions.

It should be noted that the allocation of projects to the aviation sector is not always clear-cut: In addition to projects with a clear aviation connection (e.g. the development of a new aircraft engine), there are also projects that are independent of industry (e.g. the development of high-performance batteries that may be used for road-transport but are also needed in the field of electric flight). The third group consists of research projects that specifically address solutions for other sectors, but which are related to, or dependent on, technologies or research results from the aviation sector (e.g. airborne wind power generation).

2.1.2 Projects from Relevant European Research Programs managed by CINEA

In order to obtain an overview of the main aviation projects from the programs funded by CINEA, a total of 374 projects from the 4 programs mentioned under point 2.1.1 were examined in more detail for the entire period of the last 10 years (2014-2023).

The Horizon Europe/Horizon 2020 and LIFE programs were further divided into the sub-programs "Horizon Transport", "Horizon Energy" and "Horizon Climate" respectively "Life Climate", "Life Environment" and "LIFE Horizontal".

- Horizon Europe / Horizon 2020 Projects:

Overall, the Horizon program is the central European research program for aircraft technology. Over the last 10 years, 141 projects in this area have been identified in the "Horizon Transport" area. The entire spectrum of aviation technology was covered: a quick keyword analysis revealed, for example, 52 projects from the wing area, 28 from the engine area, 20 hydrogen projects, 18 projects related to UAS and UAM and 15 projects with aerodynamic content. Also worth mentioning are 12 projects related to airports or intermodal transport solutions, as well as a total of 8 projects (including AREANA) that are connected to improving the research landscape.

The "Horizon Energy" call has mainly funded the SAF/Biofuels area (33 projects). In the Horizon Climate area, there was another project from the Climate Impact/Regulation area.

- Connecting Europe Facility (CEF) Projects: Funds projects enhancing transport infrastructure, including airport operations and connectivity, to support a more integrated and sustainable European transport network.

In addition to the Horizon projects, the CEF program is the second major program for aviation funding. A total of 159 projects related to aviation were found here, 128 of which were directly related to airports or intermodal topics, the other 31 being connected to the area of air traffic management. However, it should be noted that the CEF program primarily serves to expand infrastructure. The research area is represented with a smaller share in the area of digitalization, but overall plays a rather subordinate role.

- LIFE Projects und Innovation Fund Projects:

The number of aviation-related projects in the two remaining programs (Life and EIF) is significantly smaller, with 10 and 6 projects respectively in the last 10 years. The "LIFE horizontal" sub-program is worth mentioning here: a total of 5 projects in the area of climate policy, including the pricing of carbon dioxide, were funded.

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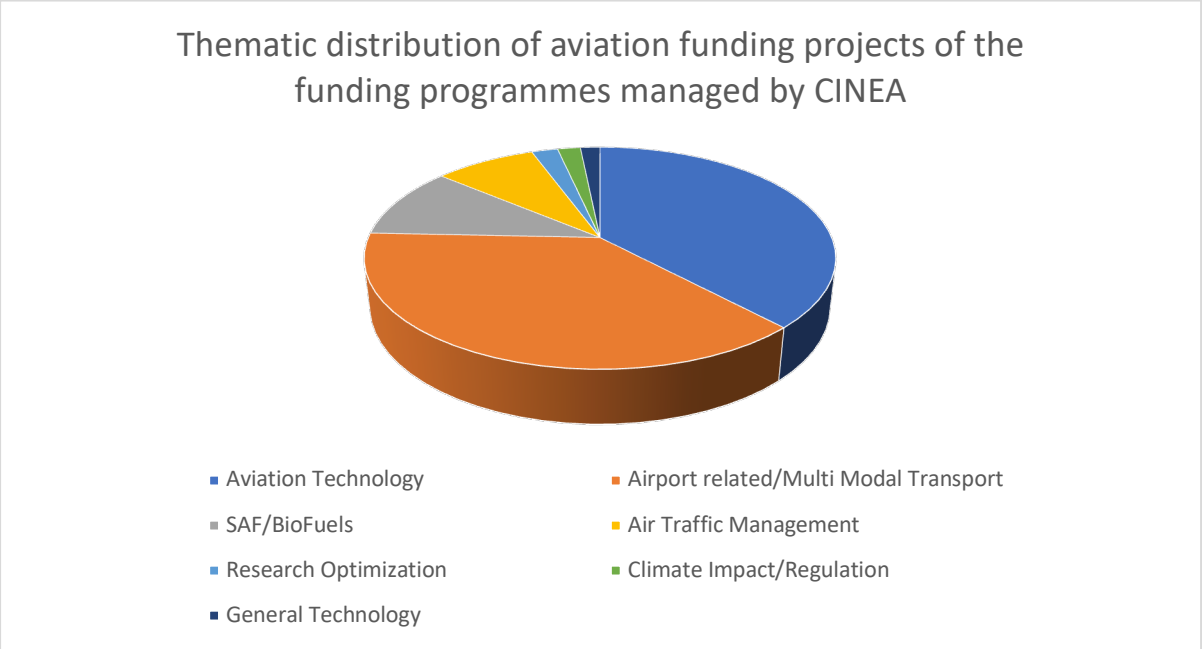

2.1.3 Relevant Research Programs not managed by CINEA

Beyond the programs managed by CINEA, there are several other European funding opportunities for aviation research. Some important examples include the following funding opportunities:

- Clean Aviation Joint Undertaking: The successor to Clean Sky, this program focuses on accelerating the development of climate-neutral aviation technologies, fostering innovation in sustainable aircraft design and operation.
- SESAR Joint Undertaking: The Single European Sky ATM Research program aims to modernize and harmonize air traffic management across Europe, enhancing safety, efficiency, and environmental sustainability.
- European Investment Bank (EIB) Loans: Offers financial products and advisory services to support aviation projects that enhance connectivity, efficiency, and sustainability.
- European Structural and Investment Funds (ESIF): Comprising five funds including the ERDF (European Regional Development Fund), these funds aim to invest in job creation and a sustainable European economy, which can encompass aviation infrastructure and innovation projects.

While the last two points are general funding programs that can also support aviation topics, the first two points represent two essential and comprehensive programs that are dedicated to specific subject areas.

The aim of the Clean Aviation Joint Undertaking is to address the challenges of climate-neutral aviation in order to ensure compliance with the Paris Agreement and the European Green Deal. The SESAR project aims to establish a uniform solution in the field of air traffic management for European airspace in order to increase the efficiency of aviation while reducing the climate impact and costs.

2.1.4 Projects from the Clean Aviation Joint Undertaking

In order to obtain a more detailed view of the funding of European aviation technology research at project level, the 1st Call of the Clean Aviation Joint Undertaking was selected from the programs not managed by CINEA.

As of June 24, 2024, a total of 20 projects have been assigned to this call in the EU database system "CORDIS" (see Annex A). With the exception of the ECARE project which, as a coordination and support action (CSA), is connecting the Clean Aviation program to regional funding, all other 19 “technical” projects are projects for the concrete implementation of the three Clean Aviation project lines:

- Hydrogen-Powered Aircraft (HPA)
- Hybrid-electric powered Regional Aircraft (HER)
- Short/short-medium range Aircraft (SMR)

In accordance with the clearly defined objectives of CAJU, all projects serve the goal of making short- and medium-haul air traffic as climate-friendly as possible in order to make a significant contribution to achieving the climate goals of the Paris Agreement and the European "Green Deal". All projects therefore come from the field of alternative propulsion technologies (hydrogen) or the general improvement of aircraft efficiencies, such as improving the aerodynamic quality of the aircraft.

2.2 Main National and Regional R&I Aviation Programs

The main existing national and regional funding programs will now be examined more closely. It should be noted that this is a qualitative recording of the main programs, which cannot claim to be 100% accurate for various reasons:

The classification of a program as an "aviation research program" is not clear. As has already been observed with the European programs, there are both purely aviation-related programs (such as Clean Aviation) and mixed programs such as Horizon Europe, which have dedicated aviation components but also components that have little or no aviation connection. Finally, there are also programs that have an overall aviation-independent objective, but within which some aviation projects can still be funded. Especially in the area of projects that were only partially aviation-related

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or completely open, there were generally no freely available data sets that would allow an estimate of the aviation share of the overall program with reasonable effort.
Furthermore, research programs are always subject to budgetary fluctuations within the framework of the respective political objectives. When querying existing programs, the responsible ministries were generally unable to say whether the current programs would be continued in the coming years at the same level and with the same objectives, or whether they would be continued at all. The naming of specific budgets and/or contents of future programs was therefore generally refused.
Based on these restrictions, as part of the AREANA project, the participants recorded the aviation-specific national and regional funding programs for their respective nations. If the respective national research funding was not represented by these programs at around 80%, general research funding programs in which aviation-specific projects had been funded in the past were also considered. In general, projects with an average annual aviation-related funding volume of less than €1 million in total were not considered.
To complete the data, European nations with significant aviation programs that were not directly involved in AREANA were also queried.
The overall overview resulted in a list of 40 selected programs (see Annex B).
In order to make a practical assessment of the coverage of the technical topics of the individual funding programs, a detailed study of the parallel ECARE project was used. In a separate analysis, 47 national (see Annex C) and 21 regional funding calls (see Annex D) were examined in detail with regard to the coverage of topics in the area of aircraft technology using a self-developed taxonomy.

Although the ECARE study is limited to the three nations participating in ECARE - France, Italy and Germany - it offers a sufficiently broad data base to provide a basis for developing synergy potential in comparison with the European research projects. Already in June 2024 a first work-related exchange between ECARE and AREANA took place on this matter to gain understanding and incorporate first lessons learned.

2.3 Challenges of Aviation R&I in Europe

The evaluation of the European funding projects as well as the national and regional funding programs as a whole reveals a complexity that indicates fundamental competitive disadvantages, especially in comparison with larger, monolithic competitors such as the USA or China:

- The large number of different funding programs at all levels entails the risk of insufficiently coordinated research strategies by the various funding bodies.

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- Overall, it is hardly possible for the research community to adequately grasp the overall situation, i.e. to have the right funding instruments for their respective research projects at all times, but also to keep an eye on all possible research partners.
- The fact that research funding is largely carried out nationally or regionally makes effective cooperation across national borders more challenging. This means that especially for participants from countries without a well-developed aviation industry and therefore generally limited funding opportunities, participation in European aviation research is not easily possible.
- At the same time, the fragmentation of the European funding landscape is also associated with a multitude of different processes, administrative requirements and forms, which mean additional administrative work for the funding recipient if he or she wishes to use the entire range of European research funding.
- Finally, significant parts of the necessary research infrastructure are also nationally owned, so that access is not equally available to all members of the research community.

2.4 The AREANA "Synergy Chain"

Based on the evaluation of European aviation research projects carried out under point 2.1 and the list of important national and regional R&I programs in the field of aviation presented under point 2.2, the following resulting synergy potentials have been identified:

- **Strategy alignment**

The analysis of the funding projects carried out under Horizon 2020 and Horizon Europe showed a total of 8 projects (including AREANA) that deal with different aspects of European research cooperation in aviation. It is therefore clear that the need for better cooperation between the various funding bodies has already been recognized at the European level.

Currently, the "PULSAR" project is tasked with the design of (parts of) the European research strategy. The plan here is to create a "road map" for the area of aircraft noise and emissions in European aviation R&I with focus on CAJU-related environmental targets and how to reach those.

Between 2017 and 2020, two further projects were carried out, ICARe and PARE, which dealt with the gaps in European research that existed at the time from different perspectives.

And finally, there is also the ECARE project, which is intended to promote the connection of regional calls in particular to the Clean Aviation program, which consequently requires closer coordination of the respective funding strategies.

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In addition to the above-mentioned individual project experiences from previous specific individual projects, the need for a strategic adjustment is also supported by the analyses of the content overlaps between the individual national and regional funding calls carried out in the ECARE project.

The analysis shows that the 47 funding calls evaluated have large overlaps in relation to the 24 different taxonomy areas: on average, each area is covered by 2/3 of the calls (64%), even the area with the low quota is addressed by almost every second call (47%). When analyzing the regional calls, the overlap is even significantly greater with an average value of 79% and a minimum value of 57%.

It can therefore be assumed that when designing the joint strategy, particular consideration must be given to the multiple funding of similar or identical research areas. Even if the funding bodies generally took the view that parallel developments should not be generally ruled out, it is nevertheless obvious, given the high level of overlap, that there is significant potential in individual sub-areas through better coordinated research programs.

The aim of AREANA is to establish such an efficient and sustainable process for a coordinated funding strategy in the field of aviation in Europe.

- **Communication transparency**

In the complex world of aviation R&I funding in Europe, the question of communication or information transparency needs to be addressed. Given the sheer number of funding programs and research participants, a uniform IT platform that provides all the information required for successful, cross-border participation in aviation research in Europe could generate considerable synergy potential. The development of a specialized platform for this as part of the ECARE project has already laid the foundation for such a solution. The aim of AREANA is to continue to support the solution developed by ECARE after the end of the ECARE project in order to identify any remaining obstacles to long-term successful operation and to develop solutions for mitigating them.

- **Process harmonization**

On the basis of a harmonized strategy and the most comprehensive possible transparency regarding the goals, funding opportunities and competencies of the research participants within the European research ecosystem, the question still arises as to the requirements for improved cooperation.

In order to answer this question, the first step is to analyze the existing obstacles such as legal requirements and other mandatory expectations by the funding bodies. In the context of the AREANA project, an extensive survey was carried out for this purpose, which was documented in the AREANA Deliverable 1.10 "ENR Survey Evaluation".

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One important element of this topic, the handling of intellectual property in connection with the fundamentally desired "open science" was also already addressed in the Horizon 2020 project "OSCAR" (Open ScienCe Aeronautic & Air Transport Research).

The aim of the AREANA project is now to develop blueprints for effective joint cooperation across borders, based on the project's own findings from the survey and the preliminary work of the OSCAR project on IP rights.

- **Joint calls and other forms of cooperation**

The high thematic overlap of the funding calls evaluated in the ECARE project already hints at the fundamental potential of joint calls within the various subject areas, without the respective funding bodies having to deviate from their own funding priorities. Accordingly, both the PARE project and ICARe are calling for more intensive international cooperation, explicitly also with selected partners outside of Europe. The Horizon 2020 project AERO-UA already examined these possibilities between 2016 and 2019 specifically with regard to cooperation with Ukraine.

The consideration of the various possibilities for multinational cooperation at all levels (European, national, regional) is therefore a key focus of the synergy work in the AREANA project.

The various possible forms of implementation are described in more detail in the AREANA Deliverable 1.1 "Option List".

Overall, AREANA relies on a range of different cooperation models in order to meet the requirements and expectations of as broad a range of stakeholders as possible. The aim is to adapt the national funding under national administration - to strengthen a joint European aviation research innovation and deployment ecosystem.

- **Joint use of research infrastructure**

The final synergy potential remains the shared use of research infrastructure, which in many cases makes international cooperation possible or worthwhile in the first place.

In this area, AREANA can build on the Horizon 2020 project "Ringo", which was completed in 2020.

It will be the task of AREANA to enable the best possible use of the existing critical research infrastructure in the European sense.

AREANA aims to orchestrate processes for investment, deployment and sharing of research and technology infrastructures.

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3. Conclusions

3.1 What needs to be done

The five most important synergy potentials, developed in the AREANA analysis phase and presented in section 2.4, form the framework of the measures that AREANA aims to implement.

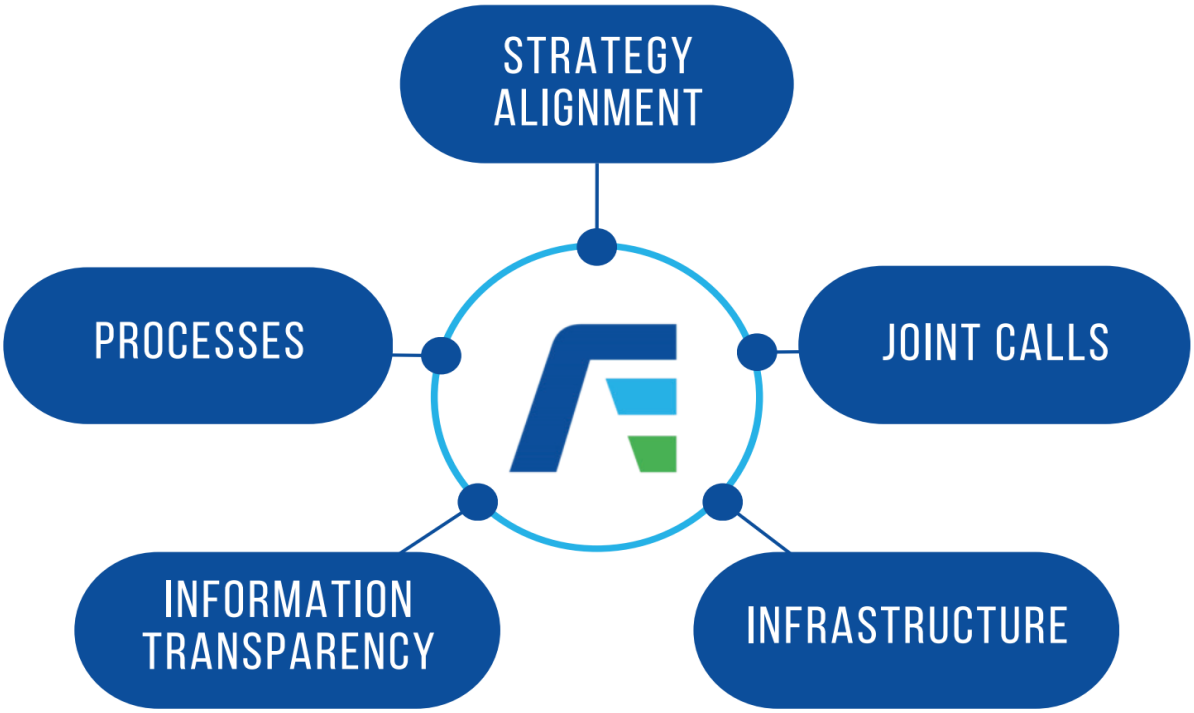

Figure 1: AREANA framework of measures formed by synergy potentials

- Strategy alignment: We need to align our strategies to know what we and our partners across Europe are doing and to find new ways to do it even better together.
- Information transparency: We need to have information transparency to find our best cooperation options: topics, partners and funding programs.
- Processes: We need to be creative in administration, finding the smartest possible processes which allow us to concentrate on our core work: research and innovation.
- Joint calls: We need joint tenders or other appropriate forms of cooperation that enable us to bring together our complementary skills in an optimal way.
- Infrastructure: We must work together openly and fairly to use existing infrastructure and make new investments where required.

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3.2 How it shall be implemented

Defining what we need to do is just the first step. In parallel the AREANA team developed the AREANA principles for Synergy design:

- Funding agencies' expectations and requirements have to be taken into account.
- Real added-value solutions for all stakeholders in the European research & innovation landscape shall be created.
- Easy to use solutions, reducing bureaucratic effort have to be developed.
- Develop appropriate processes and clear responsibilities – to sustain synergies beyond the end of the project.
- Be open to members from EU and beyond, willing to play a fair part in European aviation research.
- Consider to enhance existing approaches, but also to try completely new paths.

These principles are intended to serve as basic guidelines for the further course of the project. In this process, the 5 AREANA synergies must be translated into practical solutions. This can only be done in constant exchange with the two most important stakeholder groups: the funding providers and the funding recipients.

As an initial impetus for the continued dialogue, the AREANA synergies and principles were compiled in a flyer and presented at the ILA 2024 (see Annex E).

In the solution development phase, 4 tasks inside AREANA work package 1 will deal with the further development of the options for practical solutions, while two further tasks will be dedicated to the intensive involvement of the countries that are not directly represented in the project team. This is intended to ensure that the project goals remain rooted in the entire research ecosystem and that sufficient support can be guaranteed to support the ideas, even after the project has been completed (December 31, 2025).

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4. Glossary

AREANA	AVIATION RESEARCH ECOSYSTEM ADVANCED NOVEL APPROACH
ATM	Air Traffic Management
CAJU	Clean Aviation joint Undertaking
CEF	Connecting Europe Facility
CINEA	The European Climate, Infrastructure and Environment Executive Agency
CIRA	Italian Aerospace Research Center
CORDIS	Community Research and Development Information Service
DLR	German Aerospace Center
ECARE	European Clean Aviation Regional Ecosystem
EIB	European Investment Bank
EIF	European Investment Fund
ENR	European, national, regional
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Fund
EU	European Union
HE/HEU	Horizon Europe
HER	Hybrid-electric powered Regional Aircraft
HPA	Hydrogen-Powered Aircraft (HPA)
ILA	International Aviation Exhibition (Berlin)
LKR	Light Metal Competence Center Ranshofen (Austria)
R&I	Research and Innovation
SESAR	Single European Sky ATM Research Program
SMR	Short/short-medium range Aircraft
VZLU	Czech Aerospace Research Centre

5. References

[1.] AREANA - "Option List", Deliverable 1.1, v02, June 2024

[2] AREANA - "ENR Survey Evaluation", Deliverable 1.10, v0.05, June 2024.

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6. Annexes

A. Clean Aviation Joint Undertaking Projects 1. Call

Project acronym	Title	Grant-Agreement ID	Teaser
HyPoTraDe	Hydrogen Fuel Cell Electric Power Train Demonstration	101101998	HyPoTraDe aims to design, assemble, and ground-test a set of 500-kW modular fuel cell-battery hybrid-electric DEP powertrain architectures, including cryo-enabled thermal management with ??? > 0.12, emulating operation in a relevant environment (FL > 150). The ground...
UP Wing	Ultra Performance Wing	101101974	The Ultra Performance Wing project will validate, down select, mature and demonstrate key technologies and provide the architectural integration of “ultra-performance wing” concepts for targeted ultra-efficient Short
TheMa4HERA	Thermal Management for the Hybrid Electric Regional Aircraft	101102008	The TheMa4HERA project takes on the huge challenge of on-board thermal management that comes with the introduction of hybrid electric power and propulsion systems in Regional and Short and Medium Range aircraft. This will be achieved through development, design and testing at...
HYDEA	HYdrogen DEmonstrator for Aviation	101102019	The HYDEA project, which stands for “HYdrogen DEmonstrator for Aviation”, proposes a strong and time-effective technology maturation plan to develop an H2 propulsion system to secure an Entry Into Service of a zero-CO2 low-emission aircraft by 2035, consistently with the...
H2ELIOS	HydrogEn Lightweight & Innovative tank for zerO-emisSion aircraft	101102003	To enable a technologically and economically feasible H2-powered aviation, new integral LH2 tank solutions are required that could serve as part of the airframe main structure and capable of withstanding its respective loads. The H2ELIOS project will develop an innovative and...
fLHYing tank	flight demonstration of a Liquid HYdrogen load-bearing tank in an unmanned cargo platform	101101946	The fLHYing tank project aims to flight-test a 1,000-liter flight-load-bearing vacuum-insulated composite LH2 tank in the Pipistrel Nuuva V300 cargo UAV. This project proposal is disruptive in several perspectives: (i) definition of requirements, design, manufacturing and...
ECARE	European Clean Aviation Regional Ecosystems	101101970	To reach Europe climate neutrality by 2050 as ambitioned by the Green Deal strategy, it is necessary to drastically reduce emissions from aviation. Clean Aviation Joint Undertaking has set out a very ambitious innovation programme to achieve this goal but it is also necessary...
FASTER-H2	Fuselage, Rear Fuselage and Empennage with Cabin and Cargo Architecture Solution validation and Technologies for H2 integration	101101978	The FASTER-H2 project will validate, down select, mature and demonstrate key technologies and provide the architectural integration of an ultra-efficient and hydrogen enabled integrated airframe for targeted ultra-efficient Short
CONCERTO	Construction Of Novel CERTification methOds and means of compliance for disruptive technologies	101101999	"Clean Aviation’s ambition to go over decisive impactful steps in demonstrated disruptive aircraft performance compatible with 2035 EIS will only be possible if the future regulatory framework is not an impediment to innovation. Certification shall still improve safety while...
HE-ART	Hybrid Electric propulsion system for regional AiRcrafT	101102013	Air travel is an important supplement to other means of regional transportation and in some regions the only viable solution. However, the regional transport market is highly competitive, and air travel must demonstrate that it can compete with hi-speed trains, cars or...
CAVENDISH	Consortium for the AdVent of aero-Engine Demonstration and aircraft Integration Strategy with Hydrogen	101102000	In line with the European Green Deal target of reaching carbon neutrality in the aviation industry by 2050, breakthrough technologies related to direct (100% hydrogen) combustion systems will be researched, prototyped and integrated onto a modern donor aeroengine for ground...
AMBER	InnovAtive DeMonstrator for hyBrid-Electric Regional Application	101102020	Climate change poses an unprecedented challenge on today’s society. Numerous studies highlight the urgent need to decarbonize global industry and to drastically reduce pollutant emissions across all sectors, including aviation. Although, the global environmental impact of...
OFELIA	Open Fan for Environmental Low Impact of Aviation	101102011	Reducing SMR aircraft environmental impact is a priority of the Clean Aviation SRIA, which objective is to have technologies ready for the future generation of SMR aircraft. The engine is key in this effort and the Open Fan engine architecture is the most promising solution in...
HERWINGT	Hybrid Electric Regional Wing Integration Novel Green Technologies - HERWINGT	101102010	Development of key technologies to address a new wing design for a HER aircraft maturing up to TRL5: manufacturing, assembly, structural concepts and processes, concept studies, configuration and architecture trade offs for a full wing component are part of the activity. As a...
HECATE	Hybrid ElectriC regional Aircraft distribution TEchnologies	101101961	Aviation needs to meet the ambitious targets of the European Green Deal. This means a step change is needed towards hybrid electric regional aircraft to significantly reduce the fuel burn. This can only be accomplished with power distribution networks that can safely handle...
HERA	Hybrid-Electric Regional Architecture	101102007	HERA will identify and trade-off the concept of a regional aircraft, its key architectures, develop required aircraft-level technologies and integrate the required enablers in order to meet the -50% technology-based GHG emission set in SRIA for a Hybrid-Electric Regional...
HEAVEN	Hydrogen Engine Architecture Virtually Engineered Novelly	101102004	Climate-neutral aviation will require the use of alternative fuels such as Green Hydrogen and Sustainable Aviation Fuel (SAF) combined with the power density of an ultra-efficient gas turbine engine for the Short and Medium Range (SMR) aircraft market which corresponds to...
NEWBORN	NExt generation high poWer fuel cells for airBORNe applications	101101967	NEWBORN focuses on realistic and commercially viable project outcomes significantly exceeding the Call topic Expected Outcomes. This is the only path to bring a real impact, well beyond paperwork and test rigs. With this in mind, the project applies the steppingstone principle...
SWITCH	Sustainable Water-Injecting Turbofan Comprising Hybrid-electrics	101102006	SWITCH aims to answer the challenge of climate-neutral short-medium range air transport by developing a revolutionary sustainable gas turbine propulsion system – the hybrid Water-Enhanced Turbofan (hybrid WET). It boosts WET technology with hybridization (Electrical Aircraft...
SMR ACAP	SMR aircraft architecture and technology integration project	101101955	"The SMR Aircraft Architecture and Technology Project (SMR ACAP) shall be the central place to assess and integrate all technologies at aircraft level, from across the projects in the SMR pillar. Establishing the link to projects with relevant technologies in the other Clean...

B. List of Funding Programs (National and Regional)

Main National and Regional Aviation Research and Innovation Funding Programs						
Country of programme	Funding size	Level of funding				Name of the programme
		Europe	National	Regional	Justification	
Austria	Medium		x		National budget	KIRAS
Austria	Medium		x		National budget	National Aviation Research Funding Programme (Take Off)
Austria	Medium		x		National budget	Basic/General Programmes
Czech Republic	Medium		x		National budget	Doprava 2030 (Transport 2030)
France	Very large		x		50% national public funding	CORAC
France	Very large		x	x	National and Regional budget	France 2030 regionalisé
France	Very large		x		National budget	France 2030 (BPIfrance)
France	Medium		x		National budget	France 2030 (ADEME)
France	Very large		x		National budget	AID (Agency for Defence Innovation)
Germany	Very large		x		National budget	Federal Aviation Research Programme (LuFo Klima)
Germany	Small		x		National budget	LuRaFo (Luft- und Raumfahrt Forschungsprogramm) EFRE cofinanced
Germany	Medium			x	Regional budget	BayLu
Germany	Medium			x	Regional budget	GATE - Grren Aviation Technologies
Italy	Medium	x	x		EU and National budget	ISM4Italy: Infrastruttura di innovazione per la mobilità sostenibile in Itali
Italy	Medium		x		National budget	PNRR Centro Nazionale Mobilità Sostenibile MOST
Italy	Small		x		National budget	PRORA AVIATION- Green, SAFE and Secure + Defence a) Greening – Clean Aviation – Electric and Hybrid Vehicles b) Single European Sky - ATM-UTM-High Air Operation
Italy	Medium		x		National budget	PRORA Greening – Clean Aviation – Electric and Hybrid Vehicles
Netherlands	Medium		x		National budget	Aviation in Transition (In Dutch: Luchtvaart in Transitie)
Netherlands	Medium		x		National budget	TopSector High-tech (TSH)-Aircraft Manufacturing Industry Fund (in Dutch: TopSector High-tech Vliegtuigmaakindustrie)
Poland	Small			x	Regional budget	Regional Innovation Strategy for Podkarpackie Voivodeship; Area of activity (smart specialization): aviation and space
Poland	Small			x	Regional budget	Regional Innovation Strategy of the Mazowieckie Voivodeship; Area of activity (smart specialization): Intelligent systems in industry and infrastructure; Priority Research Direction: Solutions ensuring low emission in aviation
Portugal	Small		x		National budget	Portugal 2030
Spain	Medium		x		Regional budget	Misiones Aero
Spain	Very large		x		National budget	Aerospace R&D projects **(Loans only!)**
Spain	Small			x	Regional budget	Civil UAV Initiative
Spain	Small	x		x	Regional and EU budget	Hazitek
Spain	Small			x	Regional budget	Elkartek
Sweden	Small		x		National budget	Innovair
Sweden	Small		x		National budget	NFFP, The National Aeronautical Research Program
Sweden	Small		x		National budget	Part of the Swedish Transport Administration's R&I activities
Sweden	Small		x		National budget	The Swedish Energy Agency
Sweden	Small		x		National budget	Vinnova's (Sweden's innovation agency) sustainable mobility area
Switzerland	Medium		x		National budget	Spezialfinanzierung Luftverkehr
UK	Very large		x		National budget	The ATI Programme
Romania	Medium		x		National budget	Core Programs for research and Development-NUCLEU
Romania	Small		x		National budget	The national plan for research, development and innovation-PNCDI IV - Challenges - Change
Romania	Small		x		National budget	The national plan for research, development and innovation-PNCDI IV - Demonstration experimental project
Romania	Small		x		National budget	The national plan for research, development and innovation-PNCDI IV - Transfer project to the economic operator
Romania	Medium		x		National budget	The national plan for research, development and innovation-PNCDI IV - Centers of Excellence (CoEx)
Romania	Small		x		National budget	The national plan for research, development and innovation-PNCDI IV - Partnerships and European missions

Very Large > 100 Mio €, Large > 50 Mio €; Medium > 10 Mio €; Small <= 10 Mio €

C. National Calls technology Coverage (evaluated by ECARE)

		Taxonomy concerned (1: main - 0: secondary)																						
Name of the call	Funding body	A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H1	H2	H3	H4	I	J	K	L	M	N	O	P
ADI - Aide pour le développement de l'innovation	BPI France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
AAC Programme French Tech 2030	BPI France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Laboratoires communs organismes de recherche publics PME, ETI - LabCom 2023	ANR	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
I-DEMO 2	BPI France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
I-DEMO Europe	BPI France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
DECARB IND	ADEME				●					●			●						●	●					
Appel à projets national "Recyclage des plastiques"	ADEME			●						●										●					
Solutions innovantes pour l'amélioration de la recyclabilité, du recyclage et de la réincorporation des matériaux (RRR)	ADEME			●										●						●	●				
Études d'écoconception	ADEME	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Investissements d'écoconception	ADEME	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Projets R&D + i	ADEME	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Diag Decarbon'Action	BPI France / ADEME	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Subvention Innovation	BPI France	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LuFo VI- 1: Ökoeffizientes Fliegen und disruptive Technologien	Federal Ministry for Economic Affairs and Climate Action - Germany							●	●	●	●	●	●										●		
LuFo VI- 1: KMU	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LuFo VI- 1: Technologie	Federal Ministry for Economic Affairs and Climate Action - Germany			●	●	●	●			●										●	●				
LuFo VI- 1: Intelligente Prozesstechnologien für Entwicklung, Fertigung, Betrieb und Instandhaltung	Federal Ministry for Economic Affairs and Climate Action - Germany																		●		●				
LuFo VI- 1: (Hybrid-)elektrisches bemanntes Fliegen	Federal Ministry for Economic Affairs and Climate Action - Germany													●											
LuFo VI- 1: Demonstration	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●			●
LuFo VI-2: Disruptive Technologien und innovative Systeme (ökoeffizientes Fliegen)	Federal Ministry for Economic Affairs and Climate Action - Germany							●	●	●	●	●	●										●		
LuFo VI-2: KMU	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LuFo VI-2: Basistechnologien	Federal Ministry for Economic Affairs and Climate Action - Germany			●	●	●	●			●										●	●				
LuFo VI-2: Digitalisierung, Industrie 4.0 und KI	Federal Ministry for Economic Affairs and Climate Action - Germany																		●		●				
LuFo VI-2: Wasserstofftechnologien und (hybrid-)elektrisches Fliegen (Zero Emission Aircraft)	Federal Ministry for Economic Affairs and Climate Action - Germany											●	●												
LuFo VI-2: Technologiedemonstration	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
LuFo VI- 3: Disruptive Technologien	Federal Ministry for Economic Affairs and Climate Action - Germany				●	●	●	●	●	●	●	●	●										●		
LuFo VI- 3: KMU	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
LuFo VI- 3: Basistechnologien	Federal Ministry for Economic Affairs and Climate Action - Germany			●	●	●	●			●										●	●				
LuFo VI- 3: Digitalisierung und künstliche Intelligenz	Federal Ministry for Economic Affairs and Climate Action - Germany																		●		●				
LuFo VI- 3: Wasserstofftechnologien und (hybrid-) elektrisches Fliegen (Zero Emission Aircraft)	Federal Ministry for Economic Affairs and Climate Action - Germany											●	●												
LuFo VI- 3: Technologiedemonstration	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●		●	●	●
KMU-innovativ: Ressourceneffizienz und Klimaschutz	Federal Ministry of Education and Research - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
FuE-Einzelprojekte (ZIM)	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
FuE-Kooperationsprojekte (ZIM)	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Internationale FuE-Projekte (ZIM)	Federal Ministry for Economic Affairs and Climate Action - Germany	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Aerospace Call 2019	Ministry of Industry and Economic Development - Italy	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Public call for expressions of interest for the candidacy of project ideas to be admitted to a negotiation procedure aimed at financing redevelopment and refunctionalisation interventions of sites for the creation of innovation ecosystems in the South	Agenzia per la Coesione Territoriale				●			●	●								●				●				●
Negotiated procedure for the assignment of services for research and development projects on disciplinary issues relating to "Innovative Space Technologies"	Agenzia Spaziale Italiana		●	●	●	●	●	●	●				●			●	●		●	●	●		●		●
PRIN (Research projects of relevant national interest)	Ministry of University and Research - Italy	●	●	●			●					●	●		●	●		●	●			●		●	●
PNRR (National Recovery and Resilience Plan). Agreements for innovation - First counter	Ministry of Industry and Economic Development - Italy			●	●	●	●	●	●				●	●		●	●		●	●	●		●	●	●
PNRM (National Military Research Plan) 2023	Ministry of Defence - Italy	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
POR R&I 2014-2020 - Public call for the provision of funds under the fund of funds of the National Operational Program for research and innovation	Ministry of University and Research - Italy	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
PNRR (National Recovery and Resilience Plan). Agreements for innovation - Second counter	Ministry of Industry and Economic Development - Italy			●	●	●	●	●	●				●	●		●	●		●	●	●		●	●	●
Highly specialized competence centres	Ministry of Industry and Economic Development - Italy				●				●	●	●			●						●	●				●
IPCEI Hydrogen 2 (H2 Industry)	Ministry of Industry and Economic Development - Italy		●									●	●										●		
PNRR (National Recovery and Resilience Plan). Strengthening and thematic and territorial extension of technology transfer centres	Ministry of Industry and Economic Development - Italy	●	●	●	●					●	●	●				●			●						●
Support for innovative SMEs	Ministry of Industry and Economic Development - Italy	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	
% of calls covering Taxonomy Item:		55	60	72	74	66	68	66	68	72	62	68	74	62	53	62	60	53	70	72	77	47	66	55	64

D. Regional Calls technology Coverage (evaluated by ECARE)

Name of the call	Funding body	Region	Taxonomy concerned (1: main - 0: secondary)																								
			A1	A2	A3	B	C1	C2	D	E	F	G1	G2	G3	H1	H2	H3	H4	I	J	K	L	M	N	O	P
DEMONSTRATEUR Nouvelle Aquitaine	Region Nouvelle Aquitaine	Nouvelle Aquitaine	1			1				1	1			1		1	1				1					
"Contrat d'innovation" - Occitanie	Region Occitanie	Occitanie	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Contrat 3S	Region Occitanie	Occitanie	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Contrat Entreprise d'Avenir	Region Occitanie	Occitanie	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
IDEMO REGIONALISE	Region Occitanie / BPI France	Occitanie and other regions	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Innovation, Amorçage, Investissement Start-up	Region Nouvelle Aquitaine	Nouvelle Aquitaine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Soutien aux projets innovants - Région Nouvelle-Aquitaine	Region Nouvelle Aquitaine	Nouvelle Aquitaine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
PTI - Prestation Tremplin Innovation - Région Nouvelle-Aquitaine	Region Nouvelle Aquitaine	Nouvelle Aquitaine	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
GATE – Green Aviation Technologies	Behörde für Wirtschaft und Innovation (Authority for Economy and Innovation) Hamburg	Hamburg				1				1	1	1	1	1	1	1	1	1			1					
POR Campania FESR 2014-2020. Innovation and technology transfer: support to companies in carrying out feasibility studies (Phase 1) and projects (Phase 2) consistent with RIS3	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POR Campania FESR 2014-2020. Contributions in favor of Micro and SMEs for the implementation of innovation processes	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POR Campania FESR 2014 – 2020. R&D Projects for Enabling Systems and Technologies for the Aerospace Industry	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Call: expressions of interest for research and development services for the fight against Covid-19	Campania Region	Campania		1					1	1							1	1		1	1	1				
Campania StartUp 2020, Call for the support of innovative companies	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POR Campania FESR 2014-2020. Public Call for the selection of the supply chain technological platform for sustainable and safe mobility	Campania Region	Campania		1	1		1		1	1	1	1		1			1	1		1	1	1		1		
POR CAMPANIA FESR 2014-2020. CAMPANIA REGIONAL GROWTH FUND	Campania Region	Campania	1	1	1	1	1	1	1	1				1	1	1	1	1		1	1	1		1	1	
POR CAMPANIA FESR 2014/2020. Public call for the selection of Research and Development Projects for Enabling Systems and Technologies for the Aerospace Industry	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POR CAMPANIA FESR 2014/2020. Public tender for "high-tech districts, aggregations and public-private laboratories" for the strengthening of the scientific and technological potential of the Campania Region. Training activities for researchers and/or research technicians	Campania Region	Campania			1	1					1															
POR CAMPANIA FESR 2014/2020. Public call for tenders to support Micro and SMEs in Campania in carrying out experimental development, technology transfer and industrialization projects	Campania Region	Campania	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Campania Startup 2023 - POR Campania FESR 2021-2027 - Call for Pre-information	Campania Region	Campania		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
POR FESR Campania 2021-2027. [001-030,075]	Campania Region	Campania		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
% of calls covering Taxonomy Item:			71	86	86	90	81	67	86	76	81	71	71	90	76	67	90	86	62	86	95	90	57	81	67	71

E. AREANA "Synergy" Flyer

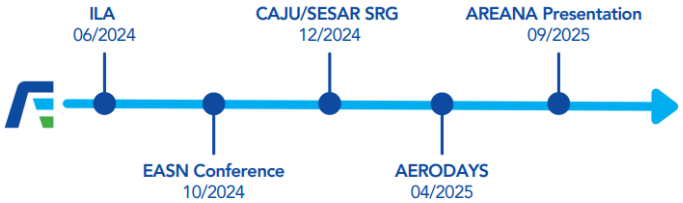
Funded by the European Union

Europe is a leader in aviation. Challenges and new opportunities are emerging (e.g., green & digital transformation, global competition, supply/value-chain bottlenecks).

Solutions rely on research, innovation and deployment investments. From idea inception to market implementation. At EU, national, regional and local level. Encompassing all actors in the aviation ecosystem and other sectors - on the civil domain and beyond.

AREANA aims at synergies of European programmes and actors. Notably from research, where all starts.

TIMELINE AREANA – STAKEHOLDER INVOLVEMENT OPPORTUNITIES



AREANA PRINCIPLES FOR SYNERGIES DESIGN

1. Funding agencies' expectations and requirements taken into account.
2. Real added-value solutions for all stakeholders in the European research & innovation landscape.
3. Easy to use solutions, reducing bureaucratic effort.
4. Appropriate processes and clear responsibilities – to sustain synergies beyond the end of the project.
5. Open to members from EU and beyond, willing to play a fair part in European aviation research.
6. Open to enhance existing approaches, but also to completely new paths.

OUR MISSION

Create an actionable roadmap towards effective and sustained European aviation research & innovation

SYNERGY CHAIN

SMART STRATEGY ALIGNMENT

WHAT?
Focus on key areas, agreeing on the issues to be addressed, further detailed in roadmaps for a complementary funding landscape.

WHY?
Insufficient funding/investment coordination between European, national, and regional strategies leads to inefficient funding allocation.

HOW?
Establish an effective and sustainable process for a coordinated European funding strategy for aviation.

COMMUNICATION TRANSPARENCY

WHAT?
A method to provide every European stakeholder in aviation R&I with an easy and comprehensive access to all necessary information.

WHY?
The large number of funding programs within Europe requires greater transparency in order to efficiently match competences and needs.

HOW?
Development of an IT tool, operated by an appropriate EU public R&I entity trusted by all parties, to ensure continuous update of high-quality relevant data.

PROCESS HARMONISATION

WHAT?
Special processes that meet EU / national / regional requirements while enabling effective joint international efforts.

WHY?
Existing programmes differ greatly in their processes, which leads to complicated and suboptimal cooperation.

HOW?
Development of blueprints for effective joint cooperation processes across borders.

JOINT CALLS

WHAT?
Bi- or multinational calls that allow targeted transnational research, innovation and deployment cooperation between complementary co-funding programs.

WHY?
National and regional funding programs restrict free choice of optimal partners across borders.

HOW?
Adapt national use of national funding under national administrations - to strengthen a joint European Aviation Research, Innovation & Deployment Ecosystem.

JOINT USE OF INFRASTRUCTURE

WHAT?
Update existing catalogues (e.g., EU RINGO, AirTN,…) and optimize the sharing of research & technology infrastructure.

WHY?
Due to high investment costs, the use, upgrade and set-up of research & technology infrastructure in aviation at large requires a higher degree of integration.

HOW?
Orchestrate processes for investment, deployment & sharing of research and technology infrastructures, and sustain a one-stop-shop with an EU public R&I entity trusted by all parties.