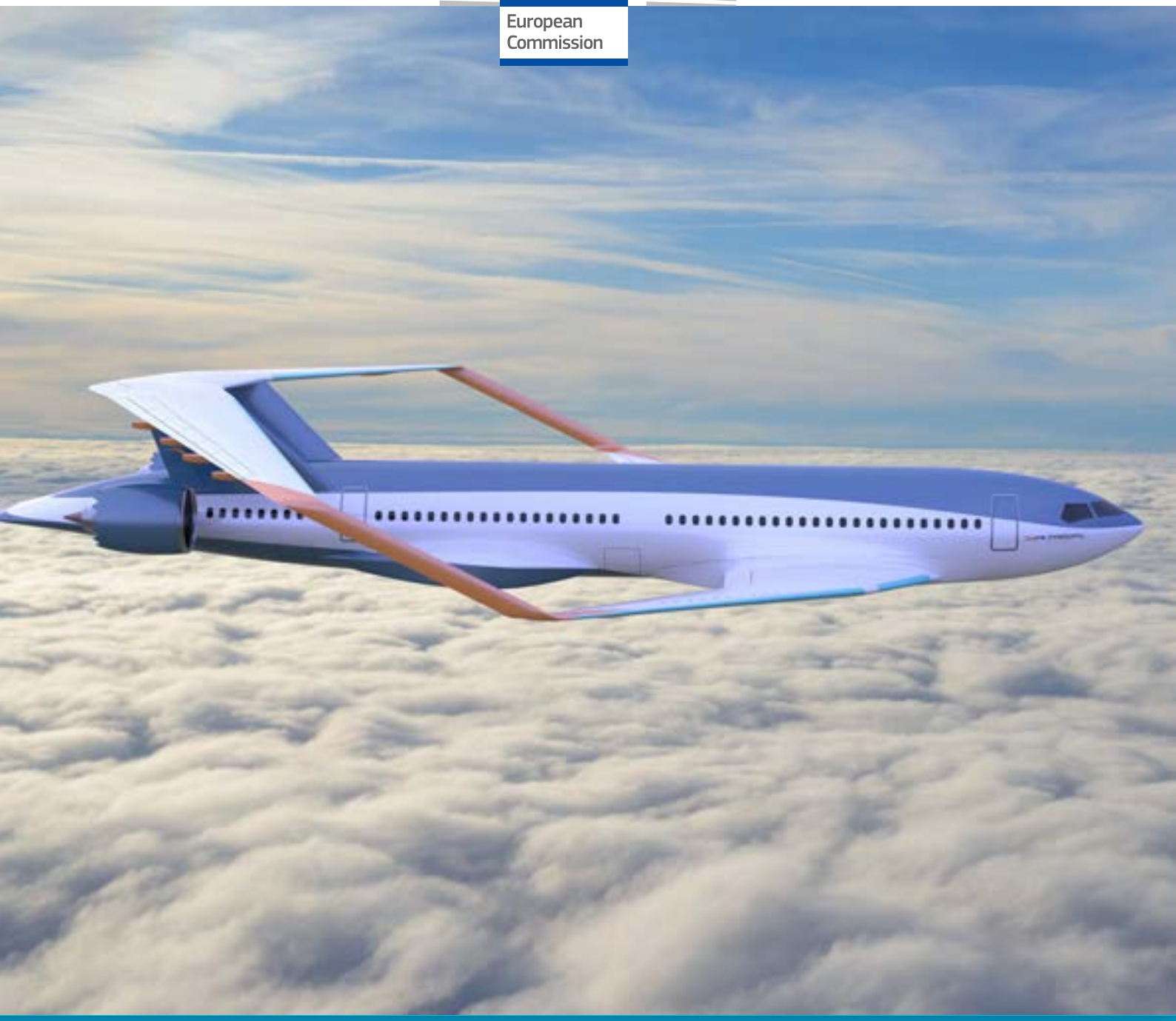
European Commission



HORIZON 2020 COLLABORATIVE AVIATION RESEARCH

Project contributions to the Flightpath 2050 goals

Innovation and Networks Executive Agency

TABLE OF CONTENTS

JEAN-ERIC PAQUET
Director-General for DG Research & Innovation

FOREWORD

I am delighted to introduce this brochure of the latest aviation research projects funded by the EU's Horizon 2020 framework research programme and managed by the European Union's Innovation and Networks Executive Agency (INEA).

By developing technologies that could make aviation more environmentally friendly, safer, and improve travellers' experience, the projects featured here are making an important contribution to the EU's sustainability and transport policy goals. With the Paris Agreement, weekly school climate strikes, and increasingly urgent warnings from scientists, I am sure that I do not need to remind you of the importance of reducing the risks of climate change. That is why the EU has made action on climate change one of its priorities. In the Directorate-General for Research and Innovation, we fund research in many fields that contribute to this priority via competitive calls for proposals.

Naturally, in aviation, safety must always remain paramount. Improving safety, as well as environmental protection and inter-modality, provides clear benefits to aeroplane passengers - but it also boosts the global competitiveness of the EU's aviation industry. This often leads also to job creation. Research in this field is not only producing excellent results, it is also strengthening the European aviation research community and fostering cooperation. This cooperation reaches beyond EU borders; some projects include partners from further afield, helping to tackle challenges that call for global action.

Just like excellent research, the management of the research framework programme is a successful team effort, not only involving the European Commission. We are pleased to work with our colleagues in INEA, as well as those in the Clean Sky 2 Joint Undertaking public-private partnership, the European Union Aviation Safety Agency (EASA), and the Single European Sky Air traffic management Research (SESAR) Joint Undertaking, who also manage EU-funded aviation research.

It is an exciting time for aviation. All indicators point towards significant and sustained growth in the sector, and the future of the European aviation industry looks particularly bright.

I am convinced that the research and innovation efforts demonstrated in these ambitious Horizon 2020 aviation projects, managed by INEA, will play a substantial role in maintaining this future success. Thanks to all involved for their efforts.

Aviation is one of Europe's main industries of excellence. It contributes to maintaining close to 5 million jobs and represents over 2% of European GDP. The continuous growth in the demand for air transport worldwide – forecast at nearly 5% every year until 2030 – will further increase the sector's economic and social impact. However, it also calls for measures to mitigate its environmental footprint, in terms of gas emissions and noise pollution, as well as to ensure a safe and seamless travel.

The European Union's Innovation and Networks Executive Agency (INEA) has been addressing these challenges through a growing number of collaborative research projects in aviation supported by the H2020 programme. Over the past 5 years, INEA has undertaken a key-role in the wider landscape of aviation research and innovation funded by the EU.

INEA's implementation of H2020 makes an important contribution towards achieving the EU's strategic goals in aviation, in its vision 'Flightpath 2050'. The Agency supports R&I aviation projects that are not only improving already existing solutions but also, and more importantly, developing disruptive, game-changing technologies that could further accelerate the achievement of EU goals.

INEA is supporting a €325 million portfolio of nearly 70 research projects in aviation, which will increase further by 2021. More than 400 partners from across the EU - and sometimes beyond - participate in these projects. Thriving R&I activities involve industries, SMEs, research centres, academia, public bodies, authorities and operators. R&I is a key promoter of European environmental sustainability and competitiveness in the global economy.

This brochure aims to present the contribution of INEA managed projects to EU policy priorities. It includes examples focused on decarbonising and increasing the sustainability of aviation, enhancing and maintaining the EU's global leadership and competitiveness of the EU aviation industry, further increasing safety, and developing a more integrated air-transport system for a seamless and faster travel experience. The brochure will showcase key-results and the impact of completed projects, as well as highlight the objectives of those still on-going, thus demonstrating the effective contribution that the Agency makes to supporting aviation R&I in Europe.

I hope that you will enjoy your reading and appreciate the relevance of our work.

DIRK BECKERS
Director of the Innovation and Networks Executive Agency

IMPACT AREAS OF **INEA'S PROJECTS**

Since 2014, INEA manages aviation research and innovation projects funded by the Horizon 2020 'Smart, green and integrated transport' Societal Challenge. The projects have been selected via competitive calls for proposals, which are designed to identify the best projects contributing to the achievement of the Flightpath 2050 goals. They are all efforts of collaborative research and innovation by multi-partners consortia.

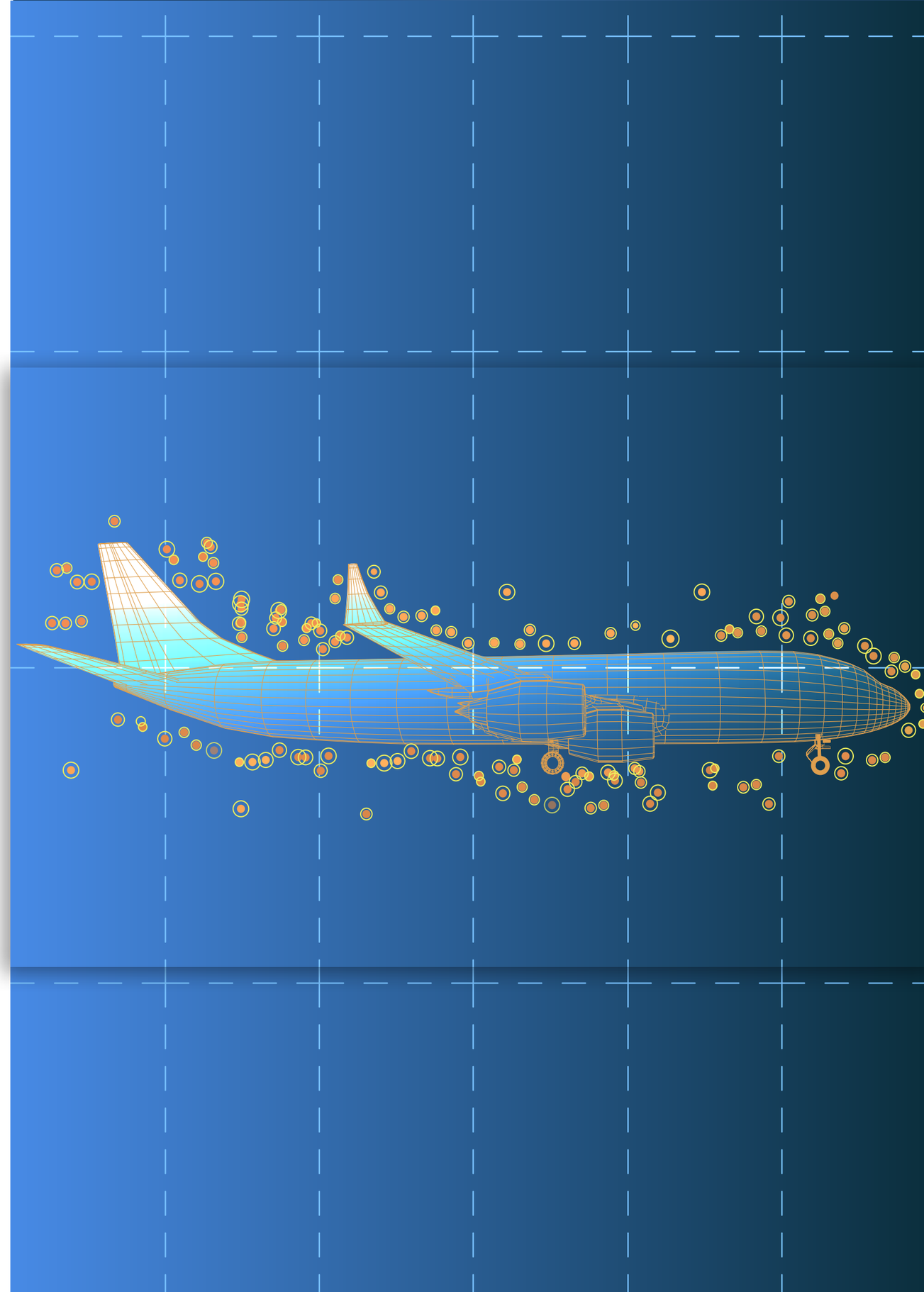
This brochure will showcase Horizon 2020 funded projects managed by INEA that have reached a conclusion, delivering promising results for the aviation research community, as well as some examples of running projects that are currently investigating novel technologies and systems. It will highlight their contribution classifying them according to one[1] of the following EU policy priorities in aviation research.

- Low environmental impact (low emission of CO_2, NOx, particulates and noise) [page 6]
- Global leadership and competitiveness [page 16];
- Safety [page 24];
- Aviation as part of a multi-modal transport system [page 32] .

Several of the presented projects include efforts for International Cooperation with non EU-countries with the aim to leverage resources, mitigate risks and effectively address global challenges, such as air transport decarbonisation. These efforts are strengthening the role of the EU as a Global Actor [page 36]

World-class Research Infrastructure plays a key role in our projects as they offer testing and validation capabilities required not only to sensibly advance aircraft technology developments, but also to assess disruptive game-changing configurations.

An increasing number of projects focusing on safety and certification issues have been monitored by the European Aviation Safety Agency with the aim to further accelerate technology development and safe deployment, as certification is the gateway from research to market.



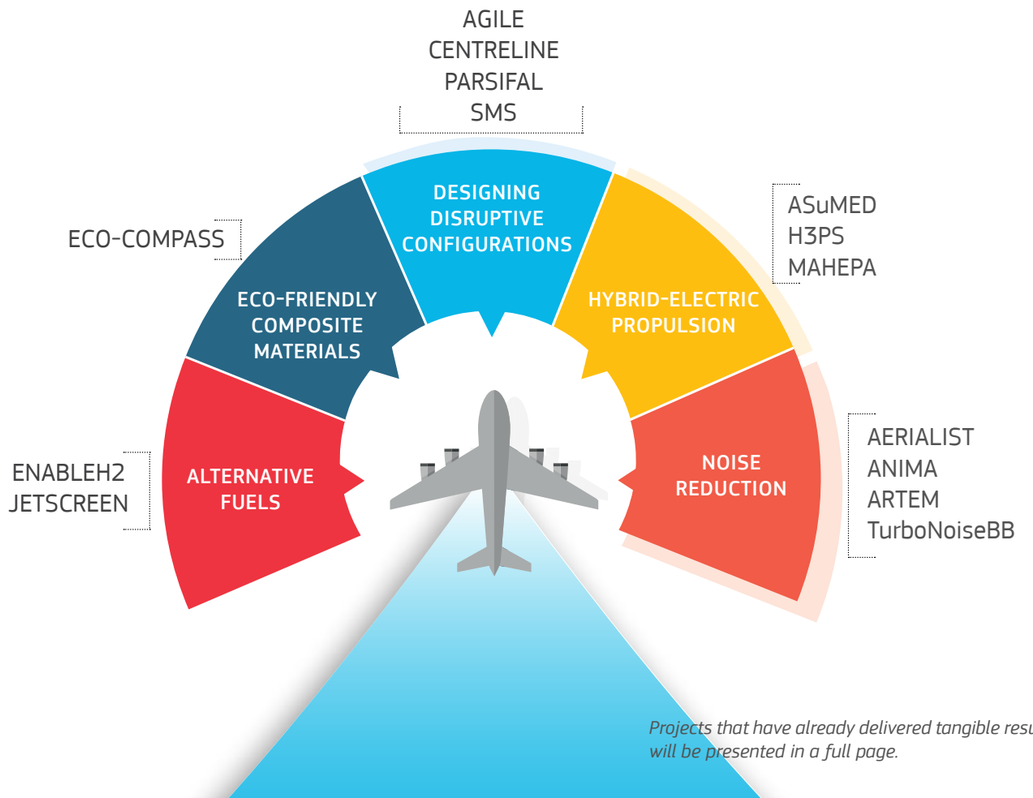
1 Projects may however contribute to more than one priority.

Low environmental impact (low emissions of CO_2, NOx, particulates and noise)

Reducing its environmental impact is, and will continue to be, a key driver for aviation. According to the Flightpath 2050 vision, there is the need in aviation to accelerate efforts to increase resource efficiency, and at the same time to reduce noise and gas emissions. Compared to the capabilities of typical aircraft from the year 2000, the technologies and procedures available by 2050 should allow a 75% reduction in CO_2 emissions per passenger kilometre and a 90% reduction in NOx emissions, while the perceived noise emission should be reduced by 65%.

Disruptive changes in aircraft configurations and operations (including alternative energy sources) will be crucial to achieving the environmental goals by 2050.

Future developments in aircraft design, airframe configuration, propulsion systems (including all electric and hybrid-electric) and alternative fuels are needed, as well materials and processes resulting in low-emissions.



Projects that have already delivered tangible results will be presented in a full page.

Agile

RESULTS

Aircraft 3rd Generation Multidisciplinary Design Optimisation for Innovative Collaboration of Heterogeneous Team of Experts

The project has achieved and demonstrated that a 40% reduction in the time needed to solve the aircraft multidisciplinary design problem is possible, and therefore leads to significant cost savings and better products. The AGILE methodology and the implemented innovative solutions have reached TRL4 in all the proposed design and optimisation technologies.

AGILE has developed a revolutionary methodology streamlining the collaborative design of aircraft via a fully automated, multidisciplinary and cross-organisational approach which exploits the latest IT and supercomputing technologies. The methodology has been implemented in AGILE's Open Access framework which collects the AGILE technologies and is currently used by a broad spectrum of organisations, also from non-aviation sectors - such as naval engineering and building architecture.

AGILE has also contributed to achieving the EU environmental goals set in Flightpath 2050 by demonstrating the application of AGILE technologies for designing seven future disruptive aircraft configurations with low environmental impact in terms of noise and gas emissions.

The competitive supply chain enabled by the AGILE technologies will support the aviation industry to rapidly introduce innovative products, reduce development costs and provide a more affordable air-transport system for citizens.

The project has already been recognised by its peers and received the International Council for Aeronautical Sciences (ICAS) Award for Innovation in Aeronautics 2018. The ICAS Award is given "for outstanding and innovative contributions to the development of advanced aeronautical systems". AGILE's scientific and technological impact in aeronautics has not only been praised by the EU industry, but also by NASA and Boeing.

AGILE is a Research and Innovation Action 'Open to the World' bringing together international partners from the EU, Russia and Canada.

Photos © AGILE

01/06/2015 — 30/11/2018

GRANT AGREEMENT NUMBER
636202

COORDINATOR
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV

EU FUNDING
€7.1 million

WEBSITE
https://www.agile-project.eu/

Eco-compass

RESULTS

Ecological and Multifunctional Composites for Application in Aircraft Interior and Secondary Structures

ECO-COMPASS developed and assessed multifunctional and ecological improved composites from bio-sourced and recycled materials for application in aircraft secondary structures and interior. The project helped mature ecologically improved composites and addressed environmental challenges such as material sustainability and waste treatment in the aviation industry with possible applications in automotive, rail and maritime transport.

Natural fibres flax and ramie were used for different types of reinforcements like fabric and nonwoven. Honeycomb sandwich cores with wood fibres substituting a part of the aramid fibres were successfully tested. Substitution of bisphenol-A based epoxy resins in secondary structures by partly bio-based epoxy resins was investigated with promising results. Material protection technologies were studied to reduce environmental influence and improve fire resistance. Modelling and simulation (Figure 1) of chosen eco-composites optimised the use of materials while the Life Cycle Assessment aimed to investigate the ecological advantages compared to synthetic state-of-the-art materials.

ECO-COMPASS investigated different approaches, concepts and technologies. In terms of eco-reinforcements, the project reached generally TRL 3-4. An example is the hybrid combination of flax fibres with recycled carbon fibres in a hybrid nonwoven with TRL 3 (Figure 2). Partly rosin-based epoxy resins and the Green Honeycomb sandwich core have achieved a TRL 4. Generic demonstrator parts for interior and secondary structure were manufactured (Figure 3).

ECO-COMPASS has contributed to achieving the EU environmental goals set in Flightpath 2050 by demonstrating that some aircraft components can include new, eco-efficient and competitive materials. In 2018, ECO-COMPASS was featured in Euronews' Futuris programme, which is broadcast in 158 countries and 12 languages.

The project reinforced the cooperation between European and Chinese participants to improve the ecological balance of materials currently used in aviation. It enabled a unique leverage of resources and allowed mitigation of risks in the eco-composites development and production. Two open access special issues in scientific journals have been published by the consortium.

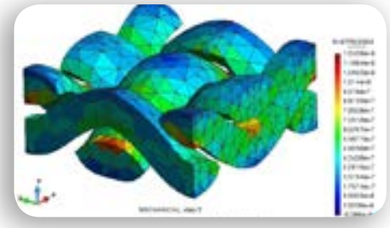


Figure 1

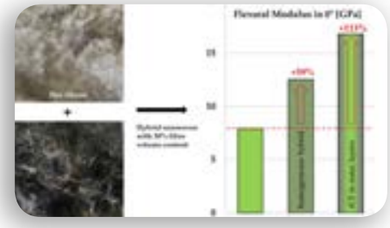


Figure 2

Figure 3

Photos © ECO-COMPASS

01/04/2016 — 30/06/2019

GRANT AGREEMENT NUMBER
690638

COORDINATOR
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV

EU FUNDING
€1.9 million

WEBSITE
www.eco-compass.eu/

ENABLEH2

ENABLING CRYOGENIC HYDROGEN BASED CO_2 FREE AIR TRANSPORT (ENABLEH2)

ENABLEH2 is revitalising the enthusiasm for liquid hydrogen (LH2) for civil aviation. With the ambitious long-term environmental and sustainability targets for civil aviation in mind, the project will demonstrate that switching to LH2 is feasible and must be a complement to the research and development (R&D) of advanced airframes, propulsion systems and air transport operations.
For a long time, LH2 has been considered a feasible fuel for a sustainable aviation. Yet, its use is still subject to scepticism. ENABLEH2 is tackling key challenges of this type of fuel such as safety, infrastructure development, economic sustainability and community acceptance.
Moreover, the project is also maturing two key enabling technologies, H2 micromix combustion and fuel system heat management, that may allow to achieve zero mission-level CO_2 and ultra-low NOx emissions. The technologies will be evaluated for competing aircraft scenarios. These scenarios will feature, amongst other, distributed turbo-electric propulsion systems, boundary layer ingestion via mission energy efficiency, life cycle CO_2 and economic studies for various fuel prices and emissions taxation.

01/09/2018 — 31/08/2021

769241
CRANFIELD UNIVERSITY
€4 million
https://www.enableh2.eu/

JETSCREEN

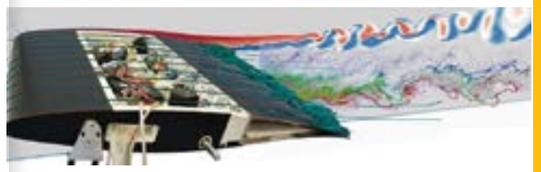
JET FUEL SCREENING AND OPTIMISATION

The JETSCREEN project develops an optimisation platform enabling the integration of distributed design tools and experimental based validations to assess the risks and benefits of alternative fuels. The proposed platform will contribute to optimise alternative fuels in terms of achieving the maximal energy density and lowest pollutant emissions. The project aims to provide fuel producers, aircraft manufacturers, and engine and fuel system OEMs with knowledge-based tools that will:
• analyse and streamline the approval process for alternative aviation fuel
• assess the compatibility of fuel composition and properties with respect to the fuel system and the combustion system
• quantify the added value of alternative fuels
• optimise fuel formulation in order to attain the full environmental potential of synthetic and conventional fuels
The proposed research methodology will particularly focus on the so-called extreme fuels, with targeted experiments and modelling investigations, especially during the development phase of the platform. The project will finally carry out quantitative and qualitative assessments of the impact of fuel on physical sub-processes, on the fuel system or the engine.

01/06/2017 — 31/05/2020

723525
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
€7.5 million
https://www.jetscreen-h2020.eu/

Grant Agreement Number · EU contribution · Coordinator · Website



© SMS

01/05/2017 — 30/04/2020

723402
INSTITUT NATIONAL POLYTECHNIQUE DE TOULOUSE
€4 million
http://www.smartwing.org/SMS/

SMS

SMART MORPHING AND SENSING

The SMS project is a multi-disciplinary project which develops smart aircraft lifting components of which the shape can be optimised with respect to aerodynamic performance (high lift & low drag) by means of intelligent electro-active actuators. The project will rely on a new generation of fiber optic based sensors, allowing distributed pressure measurements and in-situ real-time optimisation of the aerodynamic characteristics of the lifting component. The proposed solution will allow the reduction of flow separation and flow instabilities which are the source of aircraft structural vibrations and aerodynamic noise.
The project combines the following methods:
• Advanced integrated aeroelastic design using High-Fidelity Computational Fluid Dynamics-Structural Mechanics (CFDSM);
• Advanced distributed sensing using a new generation of high-fidelity fiber optic sensors;
• Advanced experimental techniques to provide data and high-fidelity simulations for the iterative feedback of the controller design. These experimental techniques will also be used as a basis for the validation of the novel actuation and sensing systems via wind tunnel tests at subsonic (take-off and landing) and transonic (cruise) speeds.
• Controller design by appropriate Flight Control Commands (FCC), to actuate the electro-active material properties in order to enable a real-time in-situ optimisation of the final prototypes in reduced scale and large scale.

© CENTRELINE

01/06/2017 — 31/05/2020

723242
BAUHAUS LUFTFAHRT EV
€3.7 million
https://www.centreline.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

CENTRELINE

CONCEPT VALIDATION STUDY FOR FUSELAGE WAKE-FILLING PROPULSION INTEGRATION

The CENTRELINE project demonstrates the proof of concept for a ground-breaking approach to synergistic propulsion-airframe integration, the so-called propulsive fuselage concept.
The concept features an electrically driven propulsor, which is located in the back of the fuselage. This design mitigates the drag effects that are caused by the airflow around the fuselage. Furthermore, this helps to distribute the thrust over main components of the airframe, which is believed to be a promising concept to increase efficiency and safety.
Based on the results of the EU funded project DisPURSAL (GA no. 323013), CENTRELINE aims at maturing the technology by building scaled-down models that will be tested in a wind tunnel. The project's researchers will also perform high-fidelity numerical simulations and apply integrated design optimisation techniques. The research and innovation action targets CO_2 reductions of 11% against an advanced conventional reference aircraft for the year 2035.

DESIGNING DISRUPTIVE CONFIGURATIONS

PARSIFAL

PRANDTLPLANE ARCHITECTURE FOR THE SUSTAINABLE IMPROVEMENT OF FUTURE AIRPLANES

The PARSIFAL project aims to pave the way for the improvement of future aviation, through the introduction of an innovative box-wing aircraft, called "PrandtlPlane".
The project's main objective is to demonstrate how the payload capacity of present aircraft like the Airbus 320 or Boeing 737 can be raised to the capacity of larger airplanes like A330/B767 by adopting the "PrandtlPlane" configuration, hence contributing to cut emissions per unit weight of transport (passenger or unit weight of freight).
In addition, PARSIFAL is investigating the introduction of PrandtlPlanes in different aircraft categories, ranging from regional turboprop aircraft (ATR-42 and ATR-72 class) to ultra-large airliners.
The advantages of this breakthrough innovation are well quantified from the standpoint of manufacturers, airlines and airport managers, under the guidance of an Advisory Board composed of European industry representatives.

© PARSIFAL

01/05/2017 — 30/04/2020

723149
UNIVERSITA DI PISA
€3 million
https://parsifalproject.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

© ARTEM

01/12/2017 — 31/11/2021

769350
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
€7.5 million
https://www.dlr.de/at/desktopdefault.aspx/tabid-12784/22395_read-51555/

ARTEM

AIRCRAFT NOISE REDUCTION TECHNOLOGIES AND RELATED ENVIRONMENTAL IMPACT

The ARTEM project develops novel technologies to reduce aviation noise emissions. It paves the way for maintaining and increasing the mobility in Europe in the future, while providing relief to communities that are highly affected by aircraft noise - such as those neighbouring airports.
This project aims to investigate the fundamental physical mechanisms generating aviation noise, and to contribute to the technological development of unique devices capable of reducing aircraft engine and airframe noise.
The interaction effects of all components (engines, high-lift-devices, airframe, and landing gear) are investigated for both current and future (2035-2050) aircraft configurations.
The most promising noise reduction technologies are undergoing a selection process. The innovations selected will be assessed by the aircraft industry within the CleanSky programme with respect to their near-term application potential.
For advanced future aircraft configurations (2035 -2050), the project will also develop targeted auralisations - procedures to model and simulate the human experience in the presence of aircraft noise. This approach will allow to have a comprehensive estimate of the noise generated by the aircraft of the future.

01/09/2016 — 29/02/2020

690714
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
€6.7 million
https://www.dlr.de/turbonoisebb

TurboNoiseBB

VALIDATION OF IMPROVED TURBOMACHINERY NOISE PREDICTION MODELS AND DEVELOPMENT OF NOVEL DESIGN METHODS FOR FAN STAGES WITH REDUCED BROADBAND NOISE

The TurboNoiseBB project develops concepts and technologies to reduce aeroengine noise, such as fan broadband noise (BBN), at source. The project will enable a major technical leap based on an improved understanding of the broadband noise source mechanisms and validated broadband noise prediction methods.
In particular, TurboNoiseBB will contribute to major improvements in the noise emission of turbofan engines entering into service after 2025. The project will deliver three validated generation noise reduction concepts and associated tradeoff parameters to pave the way for the demonstration.

NOISE REDUCTION

AERIALIST

ADVANCED AICRAFT-NOISE-ALLEVIATION DEVICES USING METAMATERIALS

The objective of the AERIALIST project is to uncover the potential of acoustic metamaterials in aeronautical applications.
AERIALIST aims to design innovative and unconventional noise mitigation devices, thereby contributing to the noise reduction targets envisaged in Flightpath 2050.
The ability of acoustic metamaterials to direct and control sound waves will be used to reduce noise propagation from nacelle intakes and to enhance shielding effects.
AERIALIST represents the first international research initiative entirely focused on the development and validation of a general theory for the modelling of acoustic metamaterials in the aeroacoustic context.
The AERIALIST research and innovation action aims at extending the fundamental theory of metamaterials taking into account the effect of aerodynamic flow. Tailored numerical methods will be developed and applied to the design of sample devices. These devices will be manufactured and validated in wind-tunnel experiments.

01/06/2017 — 31/05/2020

723367
UNIVERSITA DEGLI STUDI ROMA TRE
€2.4 million
https://www.aerialist-project.eu/

ANIMA

AVIATION NOISE IMPACT MANAGEMENT THROUGH NOVEL APPROACHES

ANIMA develops a holistic approach for managing and mitigating aviation noise impact. It will help reinforce Europe's leadership in aviation and the aircraft industry in the long-run. In a context of growing air traffic, it will also ensure an improved quality of life in European communities neighbouring airports.
The project takes into account the annoyance that noise generates, stemming from non-acoustical factors - such as attitudinal, health or sociological effects, which are largely undocumented. The project looks into these factors by actively involving communities neighbouring airports, who are directly impacted by the noise issue, as well as airports, local authorities, aviation industry, airlines and regulatory entities, among others.
ANIMA will result in a unique set of noise-management-and-mitigation best practices for the aviation noise stakeholders. It will also provide local authorities, land-use planners and airports with an innovative and user-friendly noise management toolset facilitating decision making. This will include annoyance simulations and trade-offs with current and future aircraft.
By ensuring and reinforcing coordination at both national and international level, the project will also deliver a strategic roadmap for the EU Aviation Noise research.

© ANIMA

01/10/2017 — 30/09/2021

769627
OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES
€7.5 million
https://anima-project.eu/

© MAHEPA

01/05/2017 — 30/04/2021

723368
PIPISTREL VERTICAL SOLUTIONS DOO PODJETJE ZA NAPREDNE LETALSKE RESITVE
€9 million
http://mahepa.eu

MAHEPA

MODULAR APPROACH TO HYBRID ELECTRIC PROPULSION ARCHITECTURE

The MAHEPA project is developing two new hybrid electric powertrains to enable cleaner, quieter and more efficient aircraft propulsion.
By adopting a modular approach to propulsion system component design, two variants of a serial hybrid-electric powertrain will be tested in flight for the first time. The first variant uses a fuel-driven generator to charge the batteries and power the electric motor, while the second relies on fuel cells to produce power enabling zero-emission flight. Data from flight tests will be used to model future operating scenarios of hybrid electric aviation paving the way towards greener aircraft.
The project is developing key technology and roadmap for market implementation of future hybrid-electric airplanes. After successfully completing ground demonstrations of a hybrid powertrain in the HYPSTAIR (FP7 605305) project, MAHEPA will deliver new, optimised propulsion components with increased reliability suitable for in-flight testing and future commercial deployment in small aircraft.
The first flights of two four-seat airplanes equipped with MAHEPA hybrid electric powertrains are scheduled for 2020.

© Airbus

01/05/2017 — 30/04/2020

723119
OSWALD ELEKTROMOTOREN GMBH
€4 million
http://asumed.oswald.de/

ASuMED

ADVANCED SUPERCONDUCTING MOTOR EXPERIMENTAL DEMONSTRATOR

The ASuMED project is building the first fully superconducting motor prototype achieving the power densities and efficiencies needed for hybrid-electric distributed propulsion (HEDP) of future large civil aircraft. HEDP offers a route to achieve the reductions in fuel burn and emission targeted by Flightpath 2050, namely a reduction in CO_2 by 75%, NOx and particulates by 90% and noise by 65% compared to 2000.
The ASuMED prototype will outperform state-of-the-art e-motors with normal conductive technologies. The project work focuses on the development of an innovative motor topology, a superconducting stator and rotor, a magnetisation system, as well as a light and highly efficient cryostat for the motor. In addition, novel numerical modelling methods and a new airborne cryogenic cooling system design are developed. Further, a highly dynamic, fail-safe and robust control of superconducting machines is realised by a modular inverter topology. Final tests evaluate the technology´s benefits and allow its integration into designs for future aircraft.

Grant Agreement Number
Coordinator
EU contribution
Website

HYBRID-ELECTRIC PROPULSION

H3PS

H3PS – HIGH POWER HIGH SCALABILITY AIRCRAFT HYBRID POWERTRAIN

The H3PS project is developing the first parallel hybrid powertrain for General Aviation, 4 seat aircraft. The totally new system aims to pioneer solutions in reducing the environmental impact of air travel.
H3PS will power the Tecnam P2010 aircraft, but will also be suitable for an entire market segment which still employs leaded fuel and piston engines whose basic technology, although reliable, is over 60 years old. The goal will be a marketable solution to bring new and old General Aviation aircraft in the hybrid vehicles arena. The project aims to provide an immediate way to leave behind leaded fuels at the same time that superior performances and comparable installation weights are offered and fuel savings and greener operations are allowed. The project is managed by three top European GA players: TECNAM (coordinator) for airframe and system integration, BRP-ROTAX for design and integration of combustion engine and e-motor, SIEMENS for e-motor and power storage. Bringing in the sky a parallel hybrid will show its benefits and its high scalability level for up to 11 seats airplanes.

© H3PS

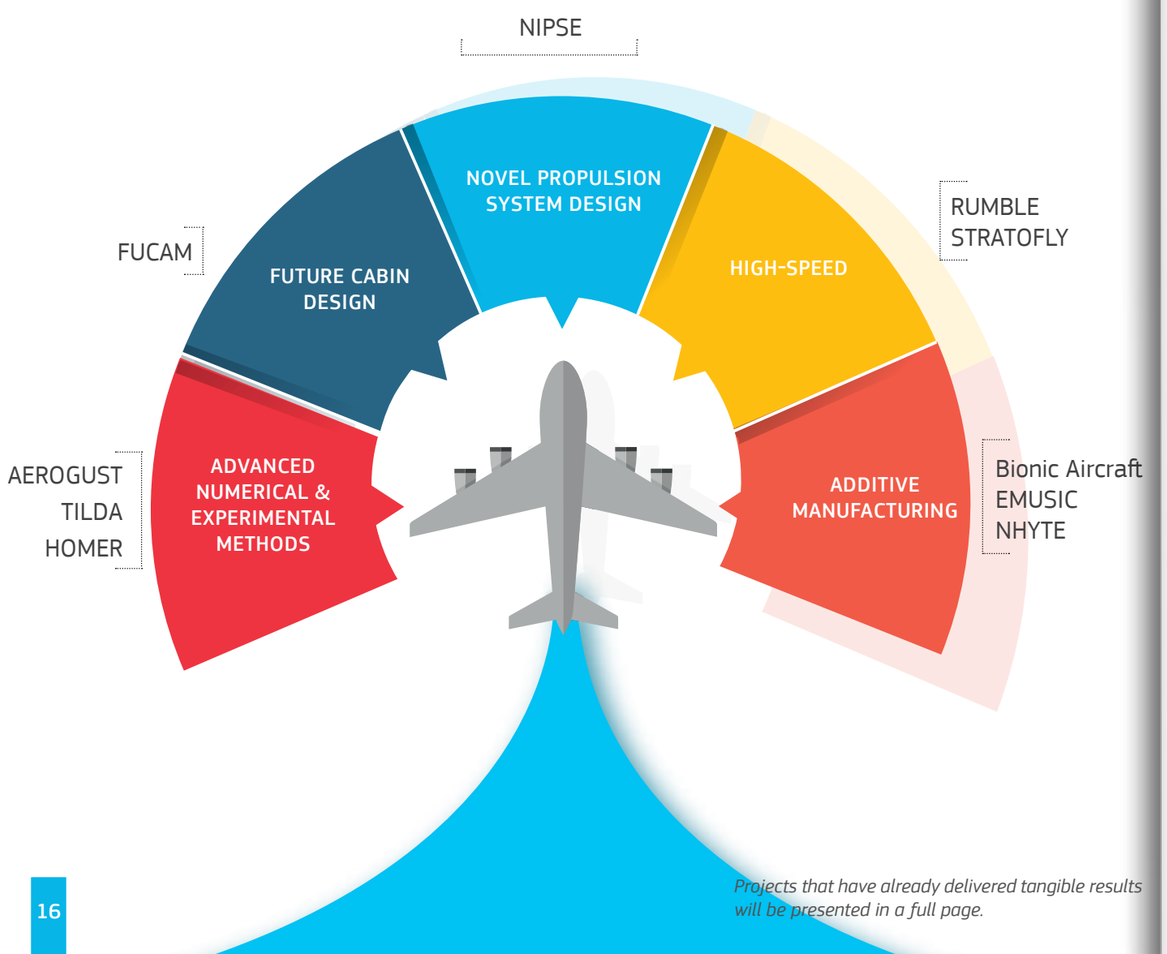
01/05/2018 — 30/04/2021

769392
COSTRUZIONI AERONAUTICHE TECNAM SPA
€4 million
https://www.h3ps.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

Global leadership and competitiveness

Delivering the best products and services worldwide is, and will continue to be, a key objective for the European aviation industry. According to the Flightpath 2050 vision, there is the need in aviation to continue developing tools for achieving highly integrated/streamlined system design, manufacturing, standardisation and certification, while ensuring the successful management of complex supply chains to reduce the development timescales and costs.

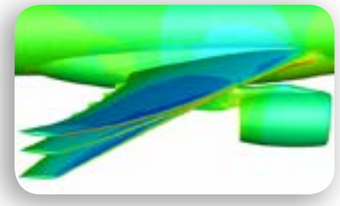


Projects that have already delivered tangible results will be presented in a full page.

AEROGUST

RESULTS

Aeroelastic Gust Modelling



Photos © AEROGUST

01/05/2015 — 31/07/2018

The project investigated and developed improved methodologies and simulation methods for gusts (turbulence) and loads evaluation on aircraft and wind turbines. These technologies allow innovative aircraft design changes and will reduce aircraft development costs and time to market.

The project has demonstrated new CFD methods, which make use of existing technology and do not require increased resources to model gusts. Reduced Order Models developed in AEROGUST provide reductions in computational cost to the order of 1/100 of the full order time. These developments facilitate the introduction of higher fidelity methods within industry for gust loads and allow the certification authorities to reconsider gust profile definitions.

Ultimately, the AEROGUST project will contribute to the Flightpath 2050 goal of maintaining and extending European industrial leadership by developing efficient capabilities for gust simulation that move beyond the current state of the art. These methods can be used earlier in the design of an aircraft and can also allow the investigation of the gust response of more flexible or innovative aircraft that may be needed to protect the environment and energy supply.

The project has been recognised internationally with Boeing noting it as ‘one of the three most promising research projects in Europe’. A special session was given to the project at the AIAA Aviation Conference 2018.

The AEROGUST project is a Research and Innovation project bringing together international partners from the EU and South Africa in both the Aerospace and Wind Turbine communities. The partners come from Academia, Research Organisation, SMEs and European Industry.

GRANT AGREEMENT NUMBER
636053

COORDINATOR
UNIVERSITY OF BRISTOL

EU FUNDING
€ 4.2 million

WEBSITE
https://www.aerogust.eu/

EMUSIC

RESULTS

Efficient Manufacturing for Aerospace Components USing Additive Manufacturing, Net Shape HIP and Investment Casting

© EMUSIC

The EMUSIC project developed more efficient manufacturing processes to produce a range of aerospace components to their final shape in one step. These use up to 95% of alloy feedstock instead of the current 10% to produce components that are equivalent to or better than the conventional ones, at a lower cost.

All but two of these processes are additive manufacturing methods in which components are built up layer by layer. They allow building complex shapes directly from powder or wire by melting them locally by laser or an electron beam. The other two processes are compressing powder at high pressure and temperature and investment casting first used by the Egyptians thousands of years ago. All of these technologies aim to manufacture components to “near net shape” so that they require minimal machining or surface treatment, thus significantly reducing manufacturing costs.

The project has delivered six different components (a guide groove, an outer casing, a gimbal, compressor casing, a T900 frame connector, a hub) and processing technologies.

EMUSIC has contributed to strengthening the global leadership and competitiveness of the EU industry, which is one of the Flightpath 2050 goals, by demonstrating more efficient manufacturing processes for aircraft components.

In addition, the project reinforced the cooperation between European and Chinese participants as it built on an effective joint effort between aircraft manufacturers, universities, research laboratories from Europe and China. This cooperation ensured the required experimental facilities, modelling expertise and equipment to assess the mechanical properties of the proposed components.

01/04/2016 — 31/03/2019

GRANT AGREEMENT NUMBER
690725

COORDINATOR
THE UNIVERSITY OF BIRMINGHAM

EU FUNDING
€1.8 million

WEBSITE
http://www.birmingham.ac.uk/generic/emusic

NIPSE

RESULTS

Novel Integrated Powerplant System Equipment

Photos © NIPSE

New Engine architectures require novel solutions for Integrated Systems and Equipment to prevent excessive fuel burn. By reviewing novel integration and equipment solutions, the NIPSE project set out an ambitious goal to help fuel burn reduction. It also aimed to achieve a reduction in development time, volume and weight without impacting maintenance time.

The project developed novel heat exchanger solutions, innovative cowl opening systems, new fire and temperature detection systems, and an optimisation solution to speed integration solutions. In addition, the examination of potential of future electrical architecture opportunities, composite and electrical interconnectivities, allowed new concepts and approaches to be examined.

The project reduced weights of the affected technologies by 24% and reduced development time by over 45%. The combination of these advances enabled a projected 0.31% reduction in fuel burn of the Integrated Powerplant System. A number of individual technologies were developed, ranging from TRL2 to TRL5 achievements by the end of the programme.

Through addressing volume reduction, the project has enabled the positioning of equipment within the Integrated Powerplant System to be improved significantly. This enables a smaller nacelle to be developed for the same engine fan size, thus resulting in a contribution to fuel burn reduction.

By enabling a faster integration development time, more optimisation can be undertaken, leading to further improvements. In addition, development of improved heat exchanger technology allows the Integrated Powerplant System to be more efficient in operation, further contributing to fuel burn reduction.

The project was undertaken by leading European companies, thus developing Industrial Competitiveness within Europe, another key element of the Flightpath 2050 goals.

The project shared the results at the recent ILA 2018 event in Berlin, showcasing the technological gains to many International visitors of the air show.

01/06/2015 — 31/05/2018

GRANT AGREEMENT NUMBER
636218

COORDINATOR
SAFRAN NACELLES

EU FUNDING
€ 6.2 million

WEBSITE
www.nipse.eu/

TILDA

RESULTS

Towards Industrial LES/DNS in Aeronautics – Paving the Way for Future Accurate CFD

© TILDA

The TILDA project's main objective was to apply high-fidelity simulation methods for resolving all flow features relevant to aerodynamic design, utilising urrent (and future) computer power and architecture adequately.

This objective implies supporting industry with both accurate and innovative approaches based on high-order methods applied to advanced direct simulation of turbulence (LES/DNS) methodologies, and offering unprecedented accuracy on fully unstructured grids.

The TILDA project provided a significant enhancement of high-order methods for LES and DNS approaches and offered an improved physical knowledge and understanding contributing to an enhanced reliability of these CFD methods – up to the borders of the flight envelopes.

Besides a considerable improvement in high-order methods for unstructured meshes - including curved mesh generation itself and in-situ postprocessing, the major quantitative target was to reach wall-clock times of about 35 hours on 5,000 GPUs (or 13 million CUDA cores) using 22.5 billion degrees-of-freedom for 3 flow passes over a 5-blade cascade application.

By successfully reaching the goals, including the quantitative achievements, and the provision of accurate CFD approaches to industry, the TILDA project is directly supporting the Flightpath 2050 directives to maintain global leadership by providing the best products and associated services in aeronautics and air transport.

The TILDA project incorporated one Partner from Russia, TsAGI, and paved the way to the new HiFi-TURB project with partners from the US (Boeing, NASA), aiming at improved turbulence models for separated flows, based on the methodologies developed within TILDA. This demonstrates both the importance of the TILDA objectives and the worldwide interest in accurate CFD predictions for application in industrial design environments.

01/05/2015 — 31/12/2018

GRANT AGREEMENT NUMBER
635962

COORDINATOR
NUMERICAL MECHANICS APPLICATIONS INTERNATIONAL SA

EU FUNDING
€ 2.7 million

WEBSITE
http://www.dlr.de/as/tilda

HOMER

HOLISTIC OPTICAL METROLOGY FOR AERO-ELASTIC RESEARCH

The development of breakthrough designs using flexible light-weight structures and more thrust efficient propulsion techniques is, and will be, a major challenge of the European aeronautical industry in the next decades.
The HOMER project is contributing to address this challenge by developing advanced three-dimensional (3D) optical metrology techniques for breakthrough research in aerodynamics and aero-elasticity to be used in wind tunnels tests.
The proposed metrology will contribute to advance the understanding on unsteady 3D flow features around air-vehicles and wings, as well as the related load distributions and induced dynamical forces around and within the exposed structures. The development of cleaner and more efficient aircraft concepts is expensive and is hampered by the limitations of design tools such as Computational Fluid Dynamics and Computational Structural Mechanics. The experimental methods proposed in HOMER will be key for developing future novel aircraft designs with improved energy efficiency and environmental performances. In particular the proposed 3D optical metrology will enable engineers to simultaneously measure the unsteady 3D aerodynamic behavior and the corresponding unsteady aerodynamic loads in a non-intrusive way.

01/09/2018 — 31/08/2021

769237
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
€4.9 million
https://www.dlr.de/as/en/desktopdefault.aspx/tabid-183/251_read-52406/

Fucam

FUTURE CABIN FOR THE ASIAN MARKET

FUCAM is a three-year EU-Japan collaborative project gathering the expertise of eight research and industrial partners from seven European countries and from Japan.
It aims to develop a conceptual cabin interior design dedicated to the Asian markets for 2025 onwards.
The Asia Pacific region is the fastest growing air transport market in terms of aircraft deliveries and seat capacity growth. The market represents a very large potential and a unique opportunity for the EU aeronautics sector to contribute to developing the future airplane cabin. Within the FUCAM project the conceptual designs of aircraft seating and cabin interior are expected to better meet the Asian requirements and habits regarding travel behaviour and lifestyle, which differ from those of the Europeans in terms of comfort and enjoyment of the in-flight experience. FUCAM will also establish a panorama of the innovative cabin technologies emerging in Europe and Japan. It will then compose a cabin concept satisfying the collected requirements, while incorporating the most promising enabling technologies. Other aspects, such as efficient cabin installation, power and data distribution, communications and electro-magnetic radiation, will be addressed through identifying airlines' requirements.

01/02/2016 — 31/01/2019

690674
AIRBUS DEFENCE AND SPACE GMBH
€1.8 million
www.fucam-project.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

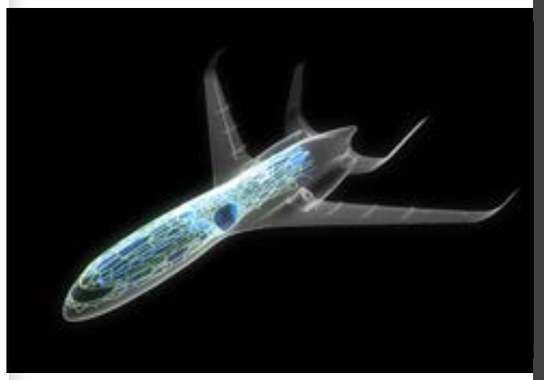
Nhyte

NEW HYBRID THERMOPLASTIC COMPOSITE AEROSTRUCTURES MANUFACTURED BY OUT OF AUTOCLAVE CONTINUOUS AUTOMATED TECHNOLOGIES

The NHYTE project is developing concepts and methodologies enabling the realisation of innovative and green integrated aero-structures made by a recyclable hybrid thermoplastic composite material with multifunctional capabilities.
This hybrid material will be fabricated by an innovative machine implementing continuous automated production processes: typical aero-structure (part of wing and fuselage) will be produced by a robotic machine using new process such as Automated Fibre Placement (AFP), continuous forming and will be assembled by induction welding, in a similar way as it is done in the automotive industry.

01/05/2017 — 30/04/2020

723309
NOVOTECH AEROSPACE ADVANCED TECHNOLOGY SRL
€5.3 million
https://www.nhyte-h2020.eu/



© Bionic Aircraft

Bionic Aircraft

INCREASING RESOURCE EFFICIENCY OF AVIATION THROUGH IMPLEMENTATION OF ALM TECHNOLOGY AND BIONIC DESIGN IN ALL STAGES OF AN AIRCRAFT LIFE CYCLE

The BIONIC AIRCRAFT project develops new technologies, methodologies and concepts for the aircraft's additive manufacturing (AM). In particular, the project is working on new design concepts and materials that can boost the weight saving potential of AM, as well as new concepts for quality control, repair, recycling and spare parts logistics.
The project is expected to significantly develop the AM sector and enhance its application in civil aircrafts. This will help reduce the aircraft's weight by up to one ton in the medium term and develop completely new types of aircrafts with weight saving potential of 30% in the long term. This will lead to an important reduction of emissions. Due to the resource efficiency of AM technologies and new possibilities for spare parts logistics, the environmental impact will be further reduced.

01/09/2016 — 31/08/2019

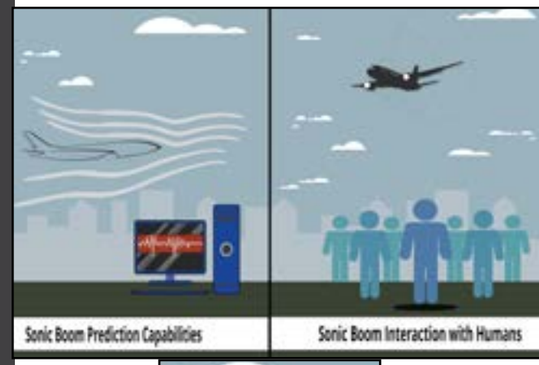
690689
FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.
€6.4 million
https://bionic-aircraft.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

RUMBLE

REGULATION AND NORM FOR LOW SONIC BOOM LEVELS

Nearly 15 years after the last commercial supersonic flight, one of the main obstacles remaining on the path towards sustainable supersonic flights is the issue of noise.
The RUMBLE project is focusing on the production of the scientific evidence requested by national, European and international regulation authorities to determine the acceptable level of overland sonic booms and the appropriate ways to comply with it. The project will develop and assess sonic boom prediction tools, study the human response and validate its findings by wind-tunnel experiments and flight tests. It will also pave the way for a future low boom flying demonstrator. The project will associate the leading organisations in supersonic aviation in Europe and Russia, combining scientific excellence, world-class research infrastructures and industrial leadership bearing the heritage from Concorde and Tu-144, with strong involvement in the regulatory bodies.
RUMBLE will provide the necessary data and procedure for a future internationally-agreed standard on low-sonic-boom supersonic flights overland. This will help protect European citizens' quality of life and guarantee that no unacceptable situation is created by supersonic commercial flights.



Photos
© RUMBLE

01/11/2017 — 31/10/2020

769896
AIRBUS SAS
€5 million
https://rumble-project.eu/

STRATOFLY

STRATOSPHERIC FLYING OPPORTUNITIES FOR HIGH-SPEED PROPULSION CONCEPTS

STRATOFLY investigates the feasibility analysis of high-speed passenger stratospheric flight with respect to key technological, societal and economical aspects. The goal of STRATOFLY is to refine the design of a hypersonic vehicle able to fly at about 10,000 Km/h (Mach 8) above 30 km of altitude. The project will focus on the integration of innovative propulsion systems, unconventional structural configurations and systems for the thermal and energy management of the vehicle.
Taking into account sustainability, the project will investigate strategies to reduce gas and noise emissions, while at the same time ensuring the required safety levels for passengers. The project aims at drastically increasing the efficiency of the thermodynamic cycle (>15%) by exploiting fuels cryogenically stored in the tanks. This efficiency gain will be quantified in terms of reduction of fuel consumption, emissions (75% to 100% reduction in CO_2 emissions per passenger kilometer, 90% reduction in NOx emissions) and noise.
The target of STRATOFLY is to build up on a legacy of past projects and reach TRL 6 the proposed by 2035.

© STRATOFLY

01/06/2018 — 30/11/2020

769246
POLITECNICO DI TORINO
€4 million
https://www.h2020-stratofly.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

Safety

Safety is at the core of European air-transport policy. According to the Flightpath 2050 vision, the number of accidents should be further reduced, taking into account the increasing air traffic where manned and unmanned air-vehicles will operate in the same airspace.

The weather and other hazards from the environment should be efficiently evaluated and the risks properly mitigated. Efforts should be focused on developing a holistic approach to aviation safety, thanks to the support of new safety management, safety assurance and certification techniques.

Projects that have already delivered tangible results will be presented in a full page.

Future Sky Safety

RESULTS

Photos © Future Sky Safety

With its Flightpath 2050 Vision, the European Commission aims to achieve the highest level of safety in air transportation ever – both for passengers and for freight. The Future Sky Safety (FSS) project contributes by bringing together 35 European partners to develop new tools and new approaches to aeronautics safety.

As a result of the coordination by EREA, a range of new, cooperative safety projects materialised in FSS. For example, a project on runway excursions developed algorithms and monitoring techniques for reducing the risk of runway veer-offs. Following three successful flight tests, these tools can be used by both airlines and flight data monitoring software developers. Likewise, thanks to a pan-European safety culture survey of 7239 European pilots and their perceptions on the safety culture in European aviation, FSS-developed guidance on advancing the safety management of organisations, which was adopted by the European Aviation Safety Agency. Another important result is the development of the Human Performance Envelope (HPE), a new concept for cockpit operations and design. Through flight simulations, researchers have shown how the HPE approach can contribute to safeguarding human performance in flight upset conditions. In another project, researchers tested the fire resistance of advanced composite materials in an aircraft. This work has demonstrated the potential of geo-polymers for improving cabin air quality through continuous air quality sensing.

FSS is improving cabin safety, reducing the risk of accidents, achieving near-total control over safety risks and enhancing safety performance under unexpected circumstances. FSS expects further impact in terms of future changes to regulations, standards and guidance material for aviation safety, in particular for the braking performance of aircraft on contaminated runways, safety management of service providers, and the use of advanced composites in aircraft. Research is mainly positioned at Technological Readiness Levels (TRL) ranging from TRL3 (experimental proof of concept) to TRL5 (technology validated in industrially relevant environment).

Future Sky Safety was invited and recognised by members of the Employment and Transport committees of the European Parliament to learn about the study and its findings. The project contributes to Open Science policy through the realisation of more than 30 Open Access publications, which will be made available through OpenAire.

FSS cooperates with non-EU countries through direct involvement of its research partners TsAGI (Russia), CSEM (Switzerland), Embraer (Portugal, Brasil) and receives advice from ICAO and FAA (United States).

01/01/2015 — 30/06/2019

GRANT AGREEMENT NUMBER
640597

COORDINATOR
STICHTING NATIONAAL LUCHT- EN RUIMTEVAARTLABORATORIUM

EU FUNDING
€ 14.9 million

WEBSITE
https://www.futuresky-safety.eu/

PHOBIC2ICE

RESULTS

Super-IcePhobic Surfaces to Prevent Ice Formation on Aircraft

Phobi2ICE is a European-Canadian project founded by the European Commission, Canadian NSERC and CARIC organisations.

By applying an innovative approach to simulation and modelling, the PHOBIC2ICE project has enabled the design and fabrication of icephobic surfaces with improved functionalities. Several types of polymeric, metallic and hybrid coatings using different deposition methods were developed and tested. The project has also collected fundamental knowledge of phenomena associated with icephobicity issues.

Coatings have been successfully developed based on different anti-icing strategies, and shown an ice accretion decreasing in the 15-20% range, respect to the uncoated aluminum reference. A new flight test configuration has been developed, which allows the testing of 8 different samples/specimens at the same time. TLR 4 so far is achieved.

The technology developed by PHOBIC2ICE aims to decrease the power consumption needed for preventing hazardous icing, hence reducing the carbon footprint of commercial aircraft with respect to the competitors. Results will increase productivity time. They will drive the research in the development of new products (reducing the time-to-market) and possibly reduce complexity in the conventional ice protection systems.

Phobic2Ice was awarded the Best Low TRL innovation project at the CARIC forum in Vancouver in August 2017. The project was also featured in Euronews' Futuris programme.

Collaboration between European and Canadian partners within the project resulted in studies of investigated surfaces using unique equipment. Experience and the broadening of the testing capabilities of each side have been significant.

01/02/2016 — 30/04/2019

GRANT AGREEMENT NUMBER
690819

COORDINATOR
FUNDACJA PARTNERSTWA TECHNOLOGICZNEGO TECHNOLOGY PARTNERS

EU FUNDING
€1.8 million

WEBSITE
www.phobic2ice.com/

ANTI-ICING

© SENS4ICE

01/01/2019 — 31/12/2022

824253
DEUTSCHES ZENTRUM FUER LUFT- UND RAUMFAHRT EV
€6.6 million
www.sens4ice-project.eu

SENS4ICE

SENSORS AND CERTIFIABLE HYBRID ARCHITECTURES FOR SAFER AVIATION IN ICING ENVIRONMENT

The SENS4ICE project is developing sensors and certifiable hybrid architectures for reliable detection and discrimination of icing conditions.
Modern airplanes are well equipped to cope with the most common icing conditions. However, some conditions containing Supercooled Large Droplets (SLD) have been the cause of severe accidents over the last three decades. Consequently, authorities addressed these safety concerns by issuing new certification rules to ensure that future airplanes remain controllable in these conditions and can exit safely upon detection.
SENS4ICE is introducing a novel approach to cope with the complex problem of ice detection through the hybridisation of different detection techniques. In the proposed hybrid system, the direct sensing of atmospheric conditions and/or ice accretion on the airframe is combined with an indirect detection of ice accretion on the airframe by monitoring the change of aircraft's characteristics.
SENS4ICE will develop, test, validate and mature the different detection principles in close cooperation with regulators to develop acceptable means of compliance.
SENS4ICE builds on a global consortium including aircraft manufacturers, equipment suppliers and research/ academia from Europe, Brazil, Russia and USA.

01/01/2019 — 31/12/2022

824310
AIRBUS OPERATIONS SAS
€12 million

ICE GENESIS

CREATING THE NEXT GENERATION OF 3D SIMULATION MEANS FOR ICING

In view of developing future safe air-vehicle and safe propulsive systems architecture, new methodologies to characterise ice accretion and its effects are crucial. Changes in certification regulations for icing conditions, such as for Supercooled Large Droplets (SDL), will require manufacturers to certify their products against more stringent requirements. In addition, snow still remains a challenge for turbine engines and Aircraft Power Units.
The ICE GENESIS project will provide the European aeronautical industry with a new generation of validated icing engineering tools based on numerical simulation and test capabilities.
Thanks to the novel three-dimensional analyses, the proposed tools will allow to fully addressing icing conditions, which is required for developing safe and efficient design and certification of future aircraft and rotorcraft.
Overall, ICE GENESIS will contribute to increasing flight safety, reducing certification costs and increasing operability. This challenge is addressed by a global consortium including aircraft and engine manufacturers, equipment suppliers and research/academia from Europe, Russia, Japan and Canada.

© MUSIC-haic

MUSIC-haic

3D MULTIDISCIPLINARY TOOLS FOR THE SIMULATION OF IN-FLIGHT ICING DUE TO HIGH ALTITUDE ICE CRYSTALS

Ice crystal icing (ICI) is a safety concern that has become paramount for the aeronautic industry. MUSIC-haic is developing advanced icing numerical tools that could be used both as design tools to anticipate and reduce ICI hazards, and as accepted means of compliance during the certification process. The MUSIC-haic research will provide a better physical understanding of mixed phase and ice crystal accretion phenomena, a set of improved and better validated models for all the underlying elementary physical processes, as well as 3D multiphysics mature simulation tools (TRL5-6) able to simulate ICI in real conditions and to support pre-design, design and certification of engines and aircraft. The need for the European aeronautics industry to use numerical simulation tools able to accurately predict ICI is urgent, especially regarding the development of the new generation engines. ICI is indeed extremely difficult to address through ground-testing and currently non-addressable with numerical tools. MUSIC-haic is a follow-on project to the HAIC FP7 EU project, which initiated the development of appropriate numerical tools. MUSIC-haic gathers a consortium of 13 organisations from Europe and Russia. To fulfil its mission, MUSIC-haic also builds on a strong cooperation with major North-American teams.

01/09/2018 — 31/08/2022

767560

OFFICE NATIONAL D'ETUDES ET DE RECHERCHES AEROSPATIALES

€4.8 million

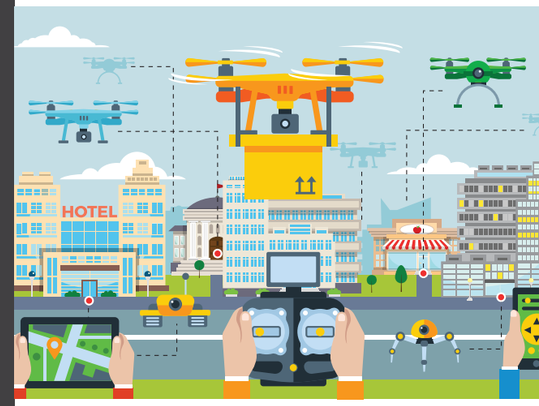
www.music-haic.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

MoNIfly

MOBILE-NETWORK INFRASTRUCTURE FOR COOPERATIVE SURVEILLANCE OF LOW FLYING DRONES

The MoNIfly project is developing the first mobile network infrastructure to communicate and enforce flight restriction zones to drones.
The project is developing a mobile network communications device, which will be integrated into drones. With that, bidirectional communications between a server and individual drones is established and used to communicate position data from the drone to the server, as well as position data of restriction zones from the server to the individual drones. In drone operations today, no positional data of the drone is known to anyone except the individual user. This poses a threat to low altitude drone flights as separation among drones and other aircraft cannot be guaranteed. In order to ensure separation, MoNIfly uses the position data of low-flying aircraft to create safety-zones around these aircraft, prompting drone operators to leave that airspace.
MoNIfly also introduces a novel concept to contribute to safe low altitude operation of the expected increasing amount of commercially and privately used drones.



01/06/2017 — 31/05/2020

723509

TECHNISCHE UNIVERSITAET BRAUNSCHWEIG

€2 million

http://www.monifly.eu/

AW-DRONES

CONTRIBUTING TO AIRWORTHINESS STANDARDS FOR MASS-MARKET DRONES

The AW-Drones project will contribute to the safe use of mass market drones by supporting the on-going EU regulatory process for the definition of rules, technical standards and procedures. In particular, the project will develop an open repository containing structured information about technical rules, procedures and standards for drones worldwide. It will also hold a set of validation workshops with experts and external stakeholders, and develop a well-reasoned set of technical standards covering, among tothers, the analysis of standards required to support both the Specific Operations Risk Assessment (SORA) methodology and the development of U-Space in Europe.

The main expected impacts are to support the on-going EU regulatory process for technical rules, standards and procedures for civilian drones; to enable safe, environmentally sound and reliable operations in Europe; to generate additional leverage for Europe in the international negotiations for global rules and standards; to increase the acceptance of EU standards; and to offer better opportunities for European drone designers, manufacturers and operators in accessing global markets.

01/01/2019 — 31/12/2021

824292

DEEP BLUE SRL

€2.6 million

http://www.aw-drones.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

01/10/2016 — 30/09/2019

723986
ZENTRALANSTALT FUR METEOROLOGIE UND GEODYNAMIK
€7.4 million
www.eunadics.eu/

EUNADICS-AV

EUROPEAN NATURAL AIRBORNE DISASTER INFORMATION AND COORDINATION SYSTEM FOR AVIATION

Aviation is one of the most critical infrastructures of the 21st century. Even comparably short interruptions, for instance, due to natural hazards, can cause damage worth billions.
The EUNADICS-AV project addresses airborne hazards with an extremely high impact (environmental emergency scenarios), including volcano eruptions, nuclear accidents and other scenarios where aerosols and certain trace gases are injected into the atmosphere.
Before the 1990s, insufficient monitoring as well as limited data analysis capabilities made it difficult to react to and to prepare for this type of rare, high-impact events. Nowadays there are many data available during crisis situations, and the data analysis technology has improved significantly. However, there is still a major gap in the Europe-wide availability of real time hazard measurement and monitoring information for airborne hazards describing “what, where, how much” in three dimensions, combined with a near-real-time European data analysis and assimilation system.
The main objective of EUNADICS-AV is to close this gap and allow all stakeholders in the aviation system obtain fast, coherent and consistent information. This would allow a seamless response on a European scale, including ATM, ATC, airline flight dispatching and individual flight planning.

01/10/2016 — 30/09/2019

724100
FUNDACION INSTITUTO DE INVESTIGACION INNAXIS
€5.6 million
http://innaxis.org/safeclouds

Grant Agreement Number
Coordinator
EU contribution
Website

SafeClouds.eu

DATA-DRIVEN RESEARCH ADDRESSING AVIATION SAFETY INTELLIGENCE

Currently, each aviation stakeholder owns different isolated datasets, which are rarely shared.
The SafeClouds project will develop a novel data mining approach for aviation safety and design innovative representations of the results in order to effectively transfer the gained data to such users as airlines and air navigation service providers by pooling various datasets. The proposed safety knowledge algorithms and representations will allow identifying and mitigating aviation risks, as well as building a unified vision for the future of safety analytics in Europe.
The project is supported by EASA and powered by a full spectrum of aviation stakeholders - airlines, airports, ANSPs, Eurocontrol, research organisations, safety agencies.

SARAH

INCREASED SAFETY AND ROBUST CERTIFICATION FOR DITCHING OF AIRCRAFTS AND HELICOPTERS

The SARAH project is establishing novel holistic, simulation-based approaches to the analysis of aircraft ditching that will support a performance-based regulation and certification for next generation aircraft and helicopters, as well as enhance the safe air transport and foster the trustworthiness of aviation services.
Aircrafts and helicopters often travel above water and thus have to ensure safe landing in case of emergency. The motion of the aircraft and the water impact on its structure are therefore tested during the design phase.
Ditching has close links with crash simulation, but also distinctive features, such as hydrodynamic slamming loads on airborne vehicles and complex hydromechanics (partially at very large forward speeds), as well as the interaction of multi-phase fluid dynamics (involving air, water, and vapour phases) and structure mechanics.
Design for ditching involves more than the analysis of loads and subsequent strengthening of the structure. It often requires adjustments in handling of the vehicle during approach and the identification of favourable approach/flight-path conditions in line with the pilots flying capabilities to minimise the remaining kinetic energy of the vehicle to be transferred into the water.
There is a pressing need for more advanced studies to support the development of next-generation, generalised simulation-based ditching-analysis practices, and the SARAH project intends to fill this gap.
The project’s consortium involves experts from OEM industries, experienced suppliers of simulation technologies, established research institutions and representatives of the certification authorities.

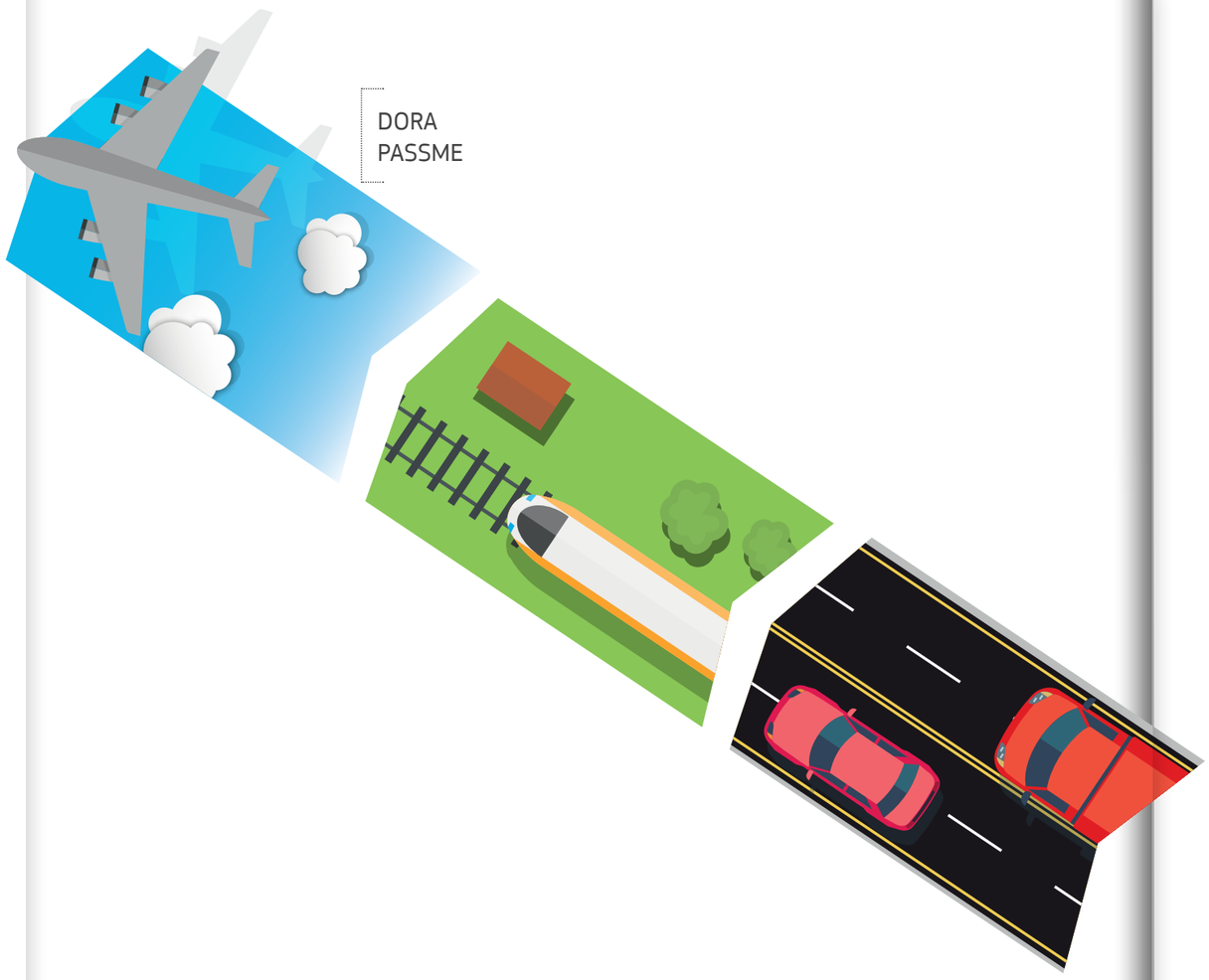
01/10/2016 — 30/09/2019

724139
IBK-INNOVATION GMBH & CO. KG
€6.6 million
www.sarah-project.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

Aviation as part of a multi-modal transport system

Passenger experience is of ultimate importance. According to the Flightpath 2050 vision, passengers should enjoy smooth and fast door-to-door travels where air transport is at the core of a seamless and integrated intermodal transport system. They should also be able to make informed mobility choices and have affordable access to all transport modes. Continuous, secure and robust high-speed communications should be available to ensure access to added-value applications.



DORA

RESULTS

Door to Door Information for Airports and Airlines

© DORA

The DORA project finished in September 2018 and achieved its overall goal to optimise and reduce the total travel time of air passengers.

To do this, the DORA project designed a seamless and integrated information system that helps to plan an air trip and optimises the travel time from the point of origin to the airplane and then again from the arrival airport to the final destination of the journey, independently of possible land traffic disruptions or congestions at airports.

DORA designed a smart phone application providing a single point of visualisation of the overall trip. By doing this, it relieves travelers from the need to collect information manually from different and heterogeneous sources. The app also provides mobile, seamless, and time optimised route recommendations for travels to/ from airports and within airport buildings, leading the passengers through terminals to the right check-inn counters, security checkpoints, departure gates, etc.

The entire DORA integrated system has been implemented in regions of Berlin and Palma de Mallorca, including airports in both cities, and successfully tested by real air passengers traveling between these two cities. They provided feedback on usability and impact of the DORA approach. Around 1,000 users experienced features of the DORA integrated system by using the DORA smart phone app. The achieved travel time saving is around 30 minutes in average. For an air travel of five hours for instance, the achieved time saving represents 10% of the overall travel time. For shorter air journeys, e.g. three hours, it represents 17%, etc.

Thanks to its results, the DORA project has helped achieve one of the main goals for Europe defined in the Flightpath 2050 vision document, ensuring quick, comfortable and simple access to the airports by considering intermodal connections. It contributed to the defined goal that 90% of air travelers within Europe are able to complete their journey, door-to-door, within 4 hours.

The established overall DORA framework has a high exploitation potential, but to really take off , it is crucial to reach a critical mass of customers, users, solution providers, etc. who work together and are ready to compete with large players world-wide. For this purpose, a DORA FORUM has been established to work out the potential synergies and create a larger community around DORA and other similar mobility frameworks.

01/06/2015 — 30/09/2018

GRANT AGREEMENT NUMBER
635885

COORDINATOR
EURESCOM-EUROPEAN INSTITUTE FOR RESEARCH AND STRATEGIC STUDIES IN TELECOMMUNICATIONS GMBH

EU FUNDING
€4.7 million

WEBSITE
https://dora-project.eu/

PASSME

Photos © PASSME

Personalised Airport Systems for Seamless Mobility and Experience

All travel, including by air, involves a lot of modalities, unwanted waiting time, stress and confusion for passengers. The PASSME project has reduced overall door-to-door travel time of passengers by 60 minutes. It has also provided passengers with continuous access to timely information in order to help them make informed decisions, and has improved the quality of experience for at least 70 % of the passengers.

PASSME created four main breakthroughs:

1. **Passenger Demand Forecasting System**
Enabling informed decissions for airport operations to serve passengers faster and better.
2. **Luggage free travel**
It created a passenger independant luggage sytem that transports luggage from one destination to another. This enables a passenger to travel without luggage.
3. **Redesigned passenger centric airport and aircraft interiors**
PASSME created airport and aircraft interior parts that reduce unwanted waiting time and increase the passenger experience
4. **Personalised device and smartphone application**
Through the personlised app, passengers are continuously informed on their direction (way finding) and stress level in order to reduce travel time and increase their experience

PASSME has contributed to the Flightpath 2050 goal of reducing the average travel time within Europe and to an improved traveling experience.

The PASSME consortium consisted of 12 partners form 9 EU countries, 3 universities, 3 knowledge institutes and 6 companies (airports, airline, design agency, communication agency and chair manufacturer).

All results of PASSME are available for public use.

01/06/2015 — 31/05/2018

GRANT AGREEMENT NUMBER
636308

COORDINATOR
TECHNISCHE UNIVERSITEIT DELFT

EU FUNDING
€4.6 million

WEBSITE
https://passme.eu/

World-class research infrastructures

Research infrastructures, such as wind tunnels or high-performance computers, are key enablers to innovate effectively towards a greener, safer and more competitive aviation, in line with the Flightpath 2050 goals. They are key-tools to investigate, test, simulate, validate novel technologies or novel aircraft configurations, such as those developed by the projects illustrated in the previous pages.

Research Infrastructures (RIs) are therefore the leverage to bring innovation into the market (also by accelerating the certification process), facilitate the competitiveness of European enterprises and encourage economic growth and job creation.

For the EU it is imperative to ensure that the required infrastructure for research activities in avation is available both to the necessary extent and in the required timeframe.

As a support to strategic planning for 2021-2027, the EU currently funds the H2020 RINGO project which is producing a cohesive and coordinated identification and assessment of the needs, gaps and overlaps for strategic RI in Europe dedicated to aviation.

The project will also analyse potential sustainable business models and funding schemes for the maintenance and improvement of existing infrastructures, as well as for the development of new ones which are necessary to maintaining the leadership and excellence of future EU aviation research.

RINGO

Photos © RINGO

01/03/2017 — 29/02/2020

724102
DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV
€1,957,545
http://www.ringo-project.eu/

Grant Agreement Number
Coordinator
EU contribution
Website

OPEN TO THE **WORLD**

Air transport allows passengers and goods to travel worldwide. With its inherent global dimension, aviation faces global challenges such as CO_2 and air pollution emissions, safety and security, noise emissions, and standardisation of many services, products and procedures that will benefit more from global solutions.

Supporting aviation R&I at the international level is of key-importance for the EU to enhance the competitiveness of world leading European industries by promoting the development and trade of novel technologies. In particular where the applicable regulatory regime is international and can thus result in barriers to the market introduction of innovative solutions coming from EU actors.

With most of future air-transport growth occurring outside Europe, access to knowledge and to new markets is strategic.

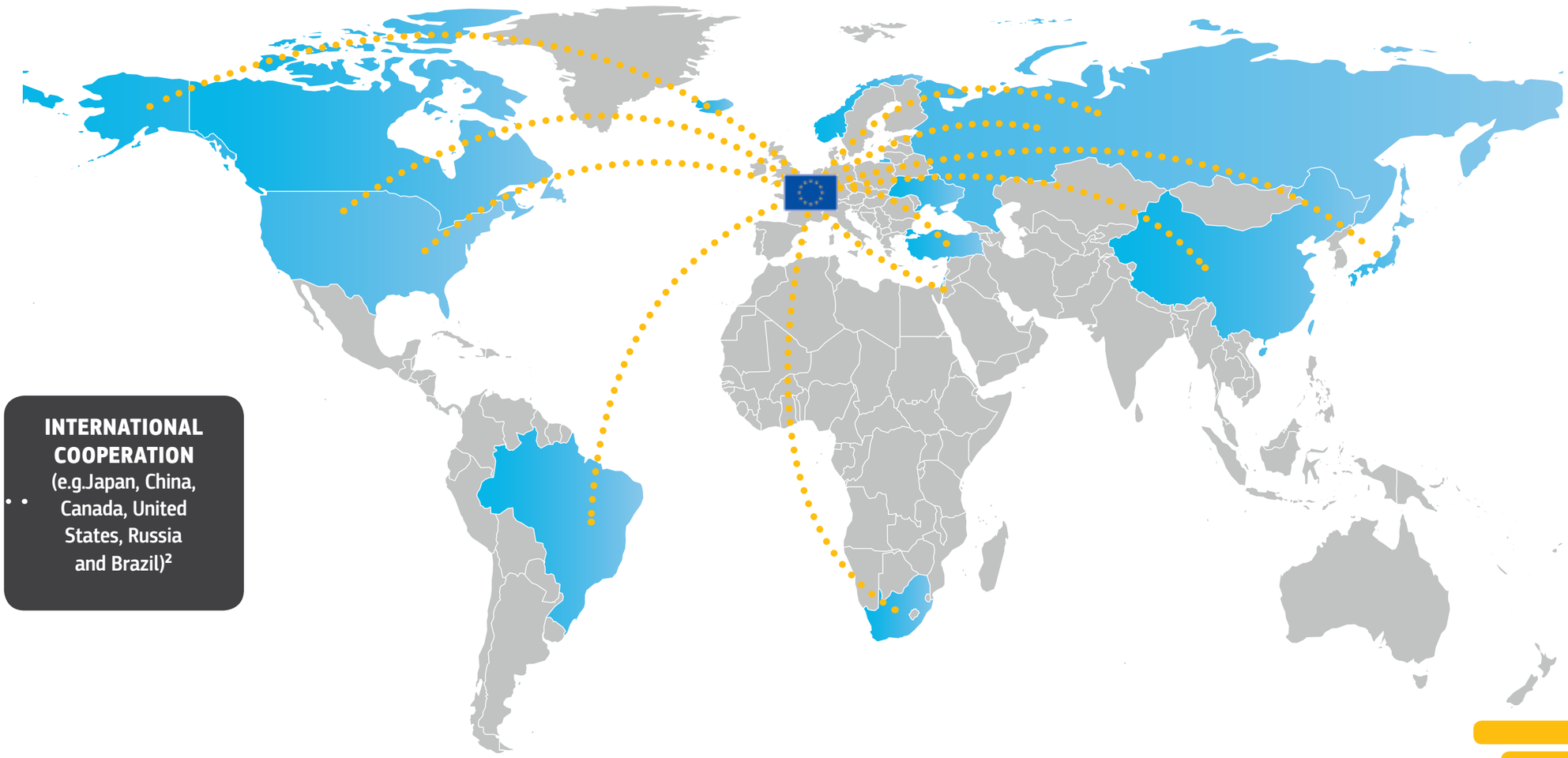
Current state of play

37 PROJECTS WITH NON-EU COUNTRIES

13 NON EU COUNTRIES

ASSOCIATED COUNTRIES[1] TO H2020

INTERNATIONAL COOPERATION (e.g.Japan, China, Canada, United States, Russia and Brazil)[2]



[1] Contributing to the funding of the Horizon 2020 programme.
[2] These countries do not receive EU contribution but fund projects themselves.

WHERE **INEA STANDS**

INEA in brief

INEA is an Executive Agency established by the European Commission to implement parts of EU funding programmes for transport, energy and telecommunications. The Agency's mission is to provide its stakeholders with expertise and high-level programme management, whilst promoting synergies among programmes, in order to benefit economic growth and EU citizens. INEA supports EU aviation activities together with the European Commission's Directorates-General for Mobility & Transport (DG MOVE) and Research & Innovation (DG RTD), as well as with the Clean Sky Joint Undertaking (JU) and the SESAR JU. The Agency's key role is to turn aviation policy set by the European Commission into R&I and infrastructure projects.

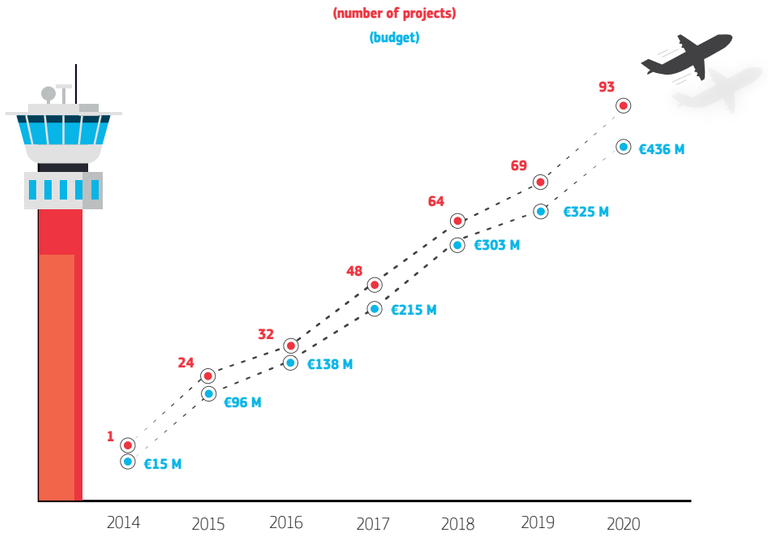
Horizon 2020

Since January 2014, INEA is the gateway to funding under the Horizon 2020 Societal Challenges 'Smart, green and integrated transport' and 'Secure, Clean and Efficient Energy' with a total budget of €5.3 billion (€2.3 billion for transport and €3 billion for energy) to be granted by end 2020. With an expected budget of over €50 million in 2020, INEA's total contribution to the EU's aviation research projects will be more than €400 million by the end of 2020.

Connecting Europe Facility (CEF)

INEA implements most of the CEF budget, in total €28.3 billion (€23.2 billion for transport, €4.6 billion for energy, and €0.5 billion for telecommunications). Under the CEF Transport programme, INEA's increasing aviation portfolio focuses on improving Air Traffic Management (ATM), as well as developing seamless and safe air mobility across Europe. Actions related to ATM and Single European Sky ATM Research (SESAR), are implemented by a wide range of aviation stakeholders. So far 68 Actions linked to ATM have been funded under the CEF Programme for a total amount of €1.6 billion.

H2020 Aviation projects supported by INEA



INEA is part of the EU Aviation R&I family

FURTHER
FUNDING OPPORTUNITIES

Aviation is one of the pillars of the EU economy and a rapidly growing sector. While it keeps developing – notably thanks to important research and innovation investments – many key challenges are still to be addressed.

This is why the EU offers a range of instruments and funding opportunities for projects working in the field of aviation.

INEA manages a project portfolio of collaborative aviation research that is currently worth €325 million. The agency will also handle several new aviation topics under the Mobility for Growth calls in 2020, which should make available no less than an additional €53 million by the end of 2020.

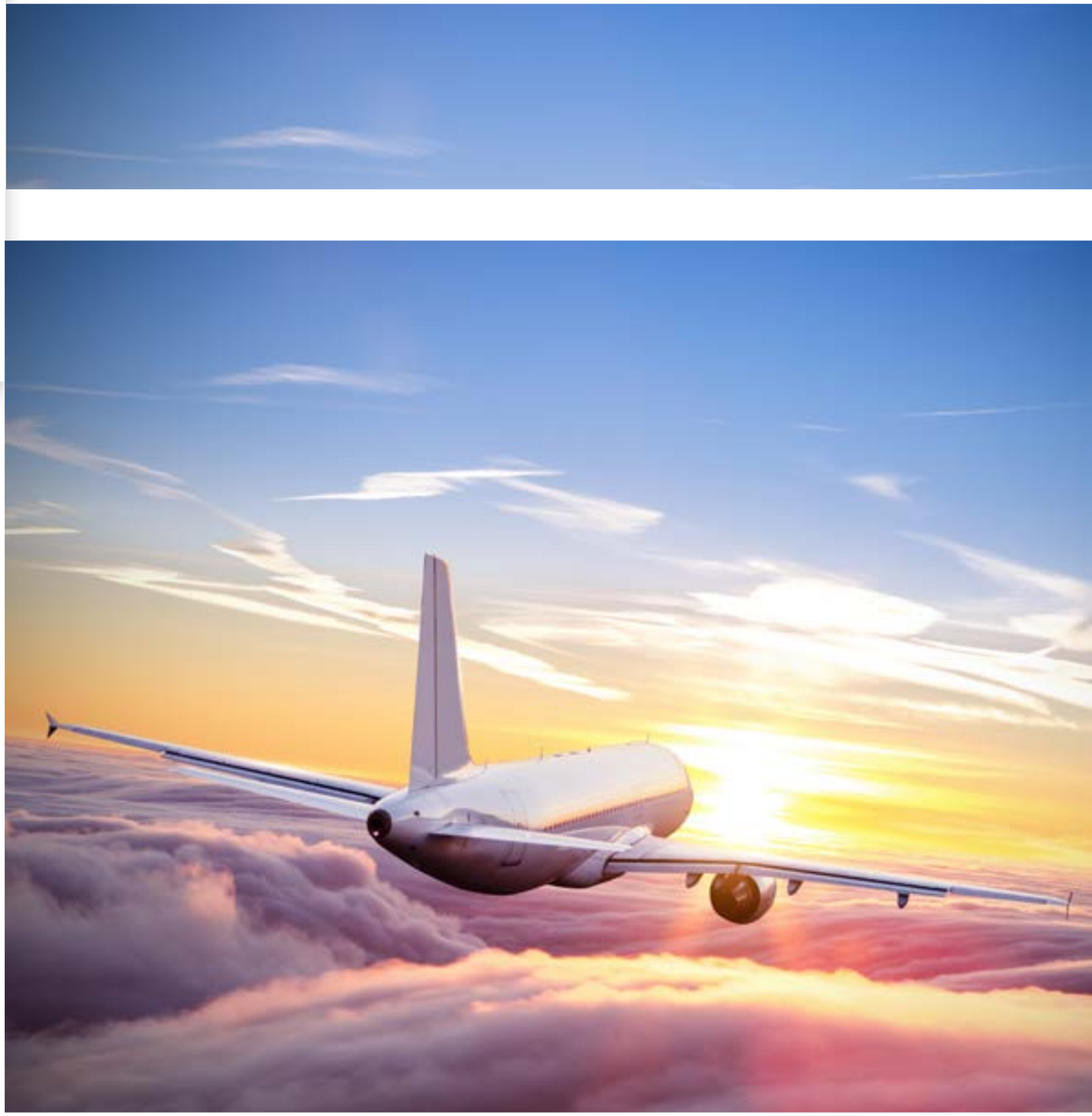
Discover additional funding opportunities offered by the EU for research and innovation in the aviation sector and managed by:

- Single European Sky ATM Research Joint Undertaking (SESAR JU) https://www.sesarju.eu/
- Clean Sky Joint Undertaking https://www.cleansky.eu/
- European Aviation Safety Agency (EASA) https://www.easa.europa.eu/
- European Global Navigation Satellite Systems Agency (GSA) https://www.gsa.europa.eu/
- European Research Council (ERC) https://erc.europa.eu/
- Executive Agency for SMEs (EASME) https://ec.europa.eu/easme/
- Marie Skłodowska-Curie Actions http://ec.europa.eu/research/mariecurieactions/

BECOME AN EXPERT EVALUATOR

The European Commission is regularly looking for external evaluators of project proposals.

If you fit the expert profile rather than that of an applicant, and would like to be considered as a proposal evaluator, sign up in the Funding & tender opportunities portal: https://ec.europa.eu/info/funding-tenders/opportunities/portal/



INEA

INNOVATION AND NETWORKS EXECUTIVE AGENCY

EUROPEAN COMMISSION
W910
B-1049 BRUSSELS
inea@ec.europa.eu
@INEA_EU
INEA
https://ec.europa.eu/inea/

TO DOWNLOAD AN
ELECTRONIC VERSION
OF THIS BROCHURE
PLEASE SCAN THIS CODE

Scan me

European Commission

Innovation and Networks Executive Agency

PDF:EF-02-20-003-EN-N - ISBN:978-92-9208-067-9 - DOI:10.2840/407559