

## EREA contribution to the EC consultation with special focus on Aviation Research beyond H2020

### Executive Summary and Key Messages

EREA, the *Association of European Research Establishments in Aeronautics*, is a strong supporter of European research, which has proven its efficiency since the first dedicated European Framework Programmes (FPs) 30 years ago. EREA has been widely involved in the European FPs since FP3 in aviation, and in the security field of activities since the creation of this programme in FP7. EREA is committed to the development of the European Research Area and of a flourishing European innovation eco-system, in particular in the Aviation domain.

This paper reflects the common position of the EREA Research Establishments and their recommendations for an impactful aviation research programme in the next Framework Programme, taking into account the “*LAB-FAB-APP*” report of the High Level Group chaired by Pascal Lamy.

EREA wishes to highlight the following Key Messages:

*In order to prepare tomorrow’s technologies and innovations that will address societal and market needs of the 21<sup>st</sup> century and to allow disruptive science to emerge:*

- *It is essential to have a dedicated aviation Research and Innovation (R&I) Programme in FP9, paying particular attention to the following:*
  - *A budget dedicated to aviation in the field of Research and Innovation is crucial. Funding envelope should follow the recommendation of the Lamy report to double the budget of the post-2020 EU research and innovation programme.*
  - *It is of utmost importance that this European aviation programme addresses the entire Research and Innovation chain (all TRLs), in a strong and coordinated manner,*
    - *with a budget - via grants - dedicated to research and innovation in aviation up to TRL 6,*
    - *with financial instruments only for TRL > 6 .*
  - *In FP9 it is crucial to foster collaborative research, which generates true EU added value, with better balance between top-down and bottom-up approaches, hence with an increased budget for the medium and long-term lower-TRL collaborative research.*
- *With regard to the instrument to ensure long-term vision and stability of aviation research in FP9:*
  - *The Future Sky Joint Research Initiative - proposed by EREA - is the best way to ensure implementation of the mid- and long-term research strategy as outlined in Flightpath 2050 and laid down in the ACARE SRIA and to prepare the future of aviation in the next but one generation of the Air Transport System (ATS) in Europe.*
  - *To ensure a strong R&I eco-system FP9 should definitively support also applied research, test infrastructures and education:*
    - *There is an essential need to support, develop and maintain test infrastructures for new products and disruptive solutions.*
    - *Education is crucial to get the workforce best suited for the development of new knowledge and innovation.*
  - *The preferred option for the set-up of aviation research in FP9 is the integration into a future Aviation PPP, based on Article 187 of the TFEU (Joint Undertaking), with specific processes, rules, governance and budgets for bottom-up as well as top-down approaches to be defined. EREA is ready and willing to be closely involved in the preparation of the boundary conditions (rules, set-up...) of the PPP.*
  - *EREA fully supports the mission-oriented approach to address global challenges in order to show as a type of lighthouse project the benefit for European funded research for the citizen. An aviation related mission like “European aviation goes more electric” or “urban air mobility” would complement aviation related actions in one pillar e.g. Clean Sky and SESAR.*

\*\*\*\*\*

## Introduction and motivation – Significance of Sustainable Development Goals and Societal and economic impact of publicly funded Aviation Research

Aviation is one of the flourishing sectors of the European industry and contributes substantially to the European economic welfare. It is essential to be ready to meet future major economical and societal challenges in a more and more competing environment. Hence the entire sector must improve its performance in order to maintain its global leadership and meet the needs of citizens. Top level objectives of European aviation sector are addressed in the *Flightpath 2050* vision document, accepted by all stakeholders under the leadership of the European Commission.

On the basis of Flightpath 2050 and recent technological and societal developments the *Advisory Council for Aviation Research and Innovation in Europe* (ACARE) has updated<sup>1</sup> its *Strategic Research and Innovation Agenda* (SRIA), in order to provide guidance for future European, national, regional public and private R&I programs and to achieve the *COP21* goals and the *2030 Agenda for Sustainable Development* subscribed by Governments, businesses and civil society. Aviation research has to follow and support the *Aviation Strategy for Europe* and other *European policies* (European Energy Union, Single European Sky, Aviation Security Policy, as well as industrial policies, etc) and take into account the long cycles for aviation. The European Framework Programmes for Research and Innovation with its related joint undertakings Clean Sky and SESAR are the main instruments to implement the SRIA on European level, complementary to national and regional programs and activities.

Research and development are the basis of European competitiveness. Hence EREA fully supports the first recommendation of the “*LAB-FAB-APP: Investing in the European future we want*” report to prioritise research and innovation in EU and double the budget of the post-2020 EU research and innovation programme.

Furthermore with regard to the recommendation of the Lamy report to better align EU and national R&I investment EREA strongly encourages a harmonisation between FP9 and national & regional public & private programs in order to maximise future impact of EU R&I programmes. FP9 should concretely enable synergies between FP9 and ESIF as already addressed within the current Clean Sky JU.

The following paper provides EREA’s contribution towards the implementation of ACARE SRIA for aviation R&I within the upcoming EU Framework Programme (FP9).

***In order to allow disruptive science to emerge and to prepare tomorrow’s technologies and innovations that will address societal and market needs of the 21<sup>st</sup> century:***

- ***It is essential to have a dedicated aviation Research and Innovation (R&I) Programme in FP9,***
  - ***complying with the COP21 goals and 2030 Agenda for Sustainable development, following and supporting European policies and taking into account EU declarations,***
  - ***with a specific budget dedicated to the aviation sector in the field of Research and Innovation and with an amount in line with the recommendations outlined in the “LAB-FAB-APP” report.***
- ***As recommended by the Lamy HLG***
  - ***EREA fully supports the first recommendation of the Lamy report to double the budget of the post-2020 EU research and innovation programme;***
  - ***EREA strongly encourages the harmonization between FP9 and national & regional public & private programs in order to maximise future impact of EU R&I programmes and create critical mass around societal and competitiveness priorities.***

<sup>1</sup> ACARE on behalf of its aviation stakeholders throughout Europe launched the updated SRIA to guide the future direction of public and private research towards the achievement of the “Flightpath 2050” Vision on the 21<sup>st</sup> of June 2017 at Le Bourget, Paris Air Show.

## Future Sky: a long term research plan for aviation

Education, research, technology and innovation are essential catalysts for a competitive and sustainable future and efforts have to be pursued to remain effective. Aviation operates on long development cycles for exploitation of technology and related innovation both because of the complexity of the systems to integrate and because of the absolutely necessary safety requirements and certification processes. This specificity leads to the need for a long term research plan to initiate research on new promising technologies in time.

This vision is included in **Future Sky: a Joint Research Initiative (JRI)** proposed by EREA in which development and integration of aviation technologies, with a focus on the next but one generation of Air Transport System (ATS), are taken to the European level. The already started Future Sky JRI makes easier the alignment of national institutional research for aviation and is setting up joint research programmes open to all aviation stakeholders; this approach should be continued in FP9. EREA believes institutional cooperation of European Research Establishments (REs) is the best guarantee to ensure technological development to the benefit of European society and industry, beyond the current SESAR and Clean Sky timescales. Future Sky's overall goal is the full airside mobility, with resilience against any impacts, e.g. from disruptive events like extreme weather, in line with the goals laid down by Flightpath 2050 and focusing on the major identified key areas for aviation research listed in the ACARE SRIA for medium and long term. Industry and universities are explicitly invited to join Future Sky for R&I activities to achieve the European challenges of Air Transport; the EREA REs are enriching the critical mass around priorities by aligning their institutional research programmes. Four research themes have been already launched within the Future Sky JRI (Figure 1) (Safety, Quiet Air Transport, Energy and Air transport Integration). In addition to these EREA believes that efforts should also be oriented towards the area "Security for Aviation", which is an increasingly pressing issue and a key preoccupation for travellers; within this area an important topic, in line with ACARE SRIA update, is the cyber security in civil aviation as adopted in a dedicated declaration by ICAO.



Figure 1: Future Sky Joint Research Initiative (JRI)

Besides the crucial need of a specific **aviation** R&I programme at European level with an appropriate funding it is of utmost importance to develop and maintain **test infrastructures** for industrial applications at EU level, including physical and virtual test capabilities that the aviation sector needs for developing new technologies and as means of compliance with respect to safety regulation. Innovations can only be brought to the market if Europe has the facilities to test, validate and certify them. Many of these facilities need continuous support to be maintained and updated, and it is difficult to do this only at national level. Therefore, action at a European level is not only warranted, it is crucial.

Finally, EREA welcomes the idea outlined in the Lamy report that the next Framework Programme should benefit from an increased attention on **education**. This will ensure the development of a strong **R&I eco-system** having the necessary skills to generate and foster new knowledge, to push further the progress of European research and to develop new entrepreneurship. Such an **eco-system** including research and education leads to high-skilled jobs and innovation at European level for the benefits of the society. EREA fully supports the notion of "LAB-FAB-APP" report that innovation and entrepreneurship should have an important role in education. Furthermore, the role of education is essential for improving the awareness of new scientific results, new technology and disruptive products in the society and increasing the involvement and acceptance of citizens.

*With regard to the instrument to ensure long-term vision and stability of aviation research in FP9:*

- *The Future Sky Joint Research Initiative - proposed by EREA - is a key approach to ensure implementation of the mid- and long-term research strategy as outlined in Flightpath 2050 and laid down in the ACARE SRIA and to prepare the future of aviation in the next but one generation of the Air Transport System (ATS) in Europe.*
- *To ensure a strong R&I eco-system FP9 should support applied research, test infrastructures and education:*
  - *There is an essential need to support, develop and maintain test infrastructures for new products and innovative solutions.*
  - *Education is crucial to get the workforce best suited for the development of new knowledge and innovation.*

## Overall structure and Budget of FP9

An EU Framework Programme for Research and Innovation should support the **entire Research and Innovation process**, starting with fundamental research (ERC), technology development (small collaborative Research projects), technology verification (medium sized collaborative Research projects) via system demonstration (JTI) before product development.

The three-pillar structure of Horizon 2020 should be maintained and fine-tuned. The proposal by the Lamy HLG to focus more on the complementarity of the pillars and a **healthy balance between bottom-up and top-down calls** is fully supported by EREA. **Appropriate governance structures** should ensure the seamless flow of knowledge through the innovation chain across the pillars, thanks to good connections between DGs at European Commission level.

As advocated by the Lamy HLG, innovation should be promoted throughout FP9. However, one should realize that sectors have different innovation cycles. In aviation, the cycle is substantially longer than in other sectors.

EREA fully supports the recommendation of the HLG to **double the budget** of the post-2020 EU civil Research and Innovation programme. EREA strongly believes that reaching the target of **3% of GDP investment in R&I** is especially important in a sector that faces fierce global competition. This includes a strong commitment from the private sector and harmonisation of national investments.

In order for Europe to keep its competitive advantage as well as for the discovery and realisation of new ground-breaking technologies, EU funding is mandatory. For supporting and keeping one of the most flourishing EU industries and because of the long cycles characterizing research in aviation, the investment in Research and Innovation is crucial and requires the necessary support from public funding through **Grants** up to TRL 6 (dashed line on Figure 2). To ensure a proper flow through the innovation chain, a certain degree of continuity is required. EREA therefore fully supports multi-annual programming. At the same time, certain flexibility is needed to address emerging issues at hand. However, clear and rigid rules of participation are needed for FP9 to become the trusted, impactful programme it should be. FP9 should earmark a **larger portion of the funding for Collaborative Research** on TRL levels 1 to 4-5, which will keep the invaluable innovation and human capital source for one of Europe’s most strategic sectors vibrant and bring in new ideas for the technological base of the European Industry.

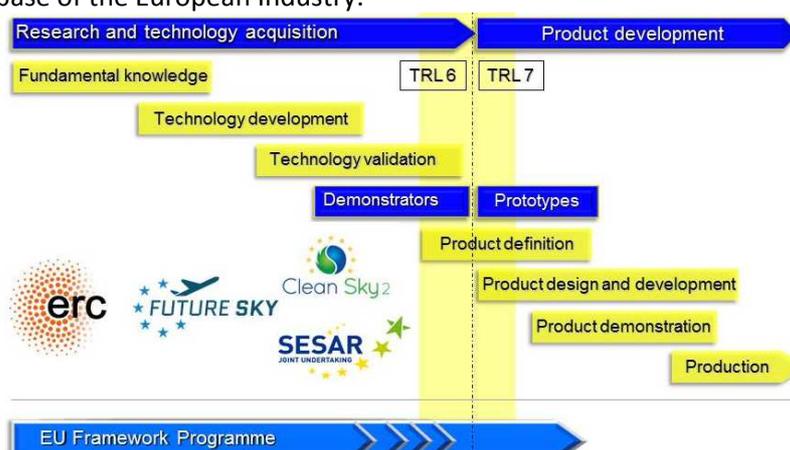


Figure 2: Innovation process needs appropriate funding

Apart from this general set-up, the added value of an EU Framework Programme compared to national efforts is that it funds and fosters cross-border cooperation involving all stakeholders (from universities, REs and industry including SMEs) in various European-wide configurations<sup>2</sup>. Furthermore, the EU Framework Programme enables to implement large scale projects that each individual European nation could not carry out on its own. This EU supported cooperation is the basis for the continuous realisation and maintenance of the *European Research Area* (ERA). In order to avoid silo structures between the research and innovation stakeholders, the successful **collaborative research instruments** need to be maintained and strengthened. This will continue to foster strong cooperation between European universities, research organisations, SMEs and industry, ensuring effective knowledge and technology transfer between stakeholders, which is essential for all sectors including aviation.

***In order to prepare tomorrow's technologies and innovations and to allow disruptive science to emerge:***

- ***EREA fully supports the recommendation of the HLG to double the budget of the post-2020 EU Research and Innovation programme. EREA strongly believes that reaching the target of 3% of GDP investment in R&I is especially important in a sector that faces fierce global competition.***
- ***It is of utmost importance that the European aviation programme in FP9 addresses the entire Research and Innovation chain (all TRLs), in a strong and coordinated manner,***
  - ***with a budget - via grants - dedicated to the aviation sector in the field of research and innovation up to TRL 6,***
  - ***with Financial Instruments only for TRL > 6.***
- ***In FP9 it is crucial to foster collaborative research, which is the added value of an EU Framework Programme, with a more balanced situation between top-down and bottom-up approaches, hence with an increased budget for the medium and long-term lower-TRL collaborative research.***

## Aviation in FP9

EREA favours an approach where each transport mode has its own programme, particularly above a certain TRL level, even if a cross-cutting approach might be used for some lower TRL research projects as well as for inter-modality. Having a **dedicated programme for aviation research** will better guarantee the flow of technology from low to high TRL than generic programmes. Aeronautics and ATM research should keep a high visibility in FP9.

Up to now aviation research was handled in different programmes. Whereas the bottom-up low to medium TRL research was tackled in the regular collaborative research programme, the mainstream of Clean Sky activity was to integrate technologies into high maturity, full-scale and representative demonstrators. The needed research activities to implement the Single European Sky was handled by SESAR combining exploratory research, industrial research and demonstration with different processes within the SESAR Joint Undertaking.

For the future Framework Programme, considering the fact that lower TRLs research cannot be handled like higher TRLs, EREA recommends the following option for the **future of collaborative research**:

- **Integration of future aviation collaborative research into a future Public-Private Partnership (PPP) using an open neutral process guided by the EC with rules, governance and budgets for bottom-up and top-down approaches to be defined.**
  - Within the Work Programme of an Aviation PPP (Figure 3) there should be room for:
    - A programme aimed at large (flying) demonstrators,
    - One aimed at applied research projects (integrated projects not limited to demonstrators) (including EREA Future Sky projects),
    - And one programme on upstream research (including EREA Future Sky contributions).

<sup>2</sup>Examples of success stories underlining the added value of previous FPs-funded research projects whose results were used as inputs for Clean Sky:

- Reduction of Aircraft and Rotorcraft Noise Emission by half through the VITAL programme (improvement / optimization of flight operations and ATM / ATC integration);
- Noise emission abatement technologies specific to Aircraft and Rotorcraft thanks to SILENCER and FRIENDCOPTER (Each of these integration projects was more or less a direct outcome of several (more than 20 each) basic research projects funded in the '90s);
- *Success Stories on Aviation - 15 years of Research and Innovation*, <http://www.acare4europe.com/documents/acare-success-stories-0>.

- This option would bring together the full Aviation Research scope into a PPP umbrella (agency, JU...), from the upstream research up to demonstrators, for a more consistent, seamless and flexible technology roadmap to implement the ACARE SRIA action lines.
- Compared to the current Clean Sky 2 JTI and in order to take into account the bottom-up approach in the full aeronautics research scope, **an adapted and specific governance** should be implemented in the future aviation PPP concept, **with an industry-led approach on the one hand and a bottom-up research-led one on the other hand**. Furthermore, the Aviation PPP could be based on open calls for proposals for the whole Work Programme to increase the openness of the aviation PPP while keeping industry fully involved.
- In addition EREA fully supports the **mission-oriented approach to address global challenges** as outlined in the Lamy report, in order to show as a type of lighthouse project the benefit for European funded research for the citizen.
  - EREA strongly supports the notion of “**moon shots**” missions, as an effective driver for disruptive ideas. In the aerospace sector it is important to invest in incremental improvements of current technology, but we should not be afraid to dream big. Disruptive innovations in aerospace have had huge spill-over effects in the past; Europe should continue on this path.
  - Missions could also raise the interest and ambitions of young researchers to work on challenging and new topics.

Clearly defined missions help focus resources where they yield the highest return, and results that are more recognizable to the public. Independently of these missions FP9 should also include other types of funding for further specific topics to mature, where a funding at EU level is also of clear European added value.

From an EREA point of view an aviation related mission like “European aviation goes more electric” or “urban air mobility” could complement aviation related actions in one pillar e.g. Clean Sky and SESAR.

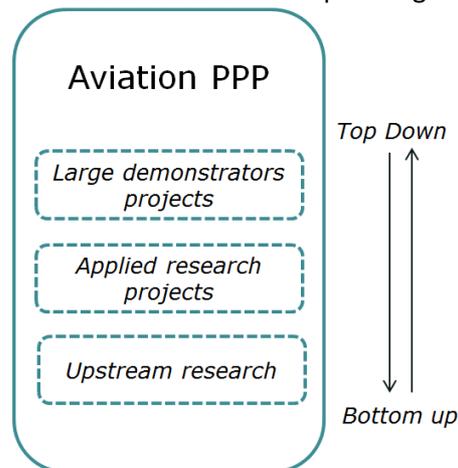


Figure 3: All aviation Collaborative Research under an aviation PPP

**With regard to the instrument to ensure long-term vision and stability of Aviation research in FP9:**

- **EREA fully supports the mission-oriented approach to address global challenges in order to show as a type of lighthouse project the benefit for European funded research for the citizen. An aviation related mission like electric aircraft or urban air mobility could complement aviation related actions.**
- **The preferred option for the set-up of aviation research in FP9 is the integration into a future Aviation Public-Private Partnership (PPP), based on Article 187 (Joint Undertaking) of the TFEU<sup>3</sup>, with specific processes, rules, governance and budgets for bottom-up and top-down approaches to be defined. EREA is ready and willing to be closely involved in the preparation of the boundary conditions (rules, set-up...) of the PPP.**
- **EREA recommends the next R&I framework programme provides a broad portfolio of bottom-up calls throughout FP9, in order to reach out all ideas and relevant stakeholders in the research community.**
- **In order to maximise effectiveness and synergies, EC Directorates should coordinate the overall work programmes of the different pillars and ensure cross monitoring of ERC, EIC, and global challenges/mission activities.**

<sup>3</sup> TFEU: Treaty on the Functioning of the European Union

## Implementing the next Framework Programme

EREA advocates for a Framework Programme based on excellence, simple for researchers, and with a strong impact on European society's needs.

**Excellence** should remain the main criterion in the evaluation of project proposals. That's why there is a need to continue the enforcement of a transparent, objective, reliable evaluation process with a high quality selection of experts.

For organising calls for proposals a balanced approach between available funding and scope of the call has to be implemented, in order to ensure acceptable **success rates**. In fact, that means that Work Programmes need to be formulated in a much more **focused** way than in H2020 with **more descriptive topics** and more explicit expected **impact**. This focused formulation of the Work Programme would allow a coherent implementation of European Research and Innovation **strategies based on ACARE's SRIA**. The updated ACARE SRIA takes into account the challenging and changing environment (external factors and boundary conditions), but also takes stock of progress in research and prepares us for a **mission-oriented FP9**. While preparing FP9, strengths should be kept (e.g. PPPs/JUs, collaborative research), but the set-up should be adapted to cover all aspects of the innovation chain, infrastructures and the role of education.

FP9 should improve and concretely enable **synergies between FP9 and European Structural and Investment Funds (ESIF)** as already addressed within the current Clean Sky JU. The (regional) local eco-system would help Europe to gain larger critical mass and more global impact.

As outlined in the updated ACARE SRIA, future implementation needs to address aviation specific actions (like in an aviation PPP, see above) and cross-cutting issues, which need to be addressed in other parts of FP9. From an EREA point of view the proper tackling of aviation related work in other research sectors like ICT, NMBP and the envisaged Defence programme needs to be ensured and properly organised. In particular in the future *European Defence Research Programme* (EDRP), starting from 2021, synergies could be considered for specific areas such as critical and emerging technologies (i.e. drones). It should be ensured that new topics will not replace the traditional aviation research funding.

### *The implementation of the SRIA in the future FP9 should:*

- *keep excellence as the main criterion in the evaluation of project proposals;*
- *continue the approach of more precisely outlined WP topics (including more explicitly defined impacts);*
- *better align programming and funding rules of different EU-instruments to allow for better coherence and synergies;*
- *support the entire Research and Innovation chain with a limited number of appropriate instruments (e.g. ERC, aviation PPP). Instruments to support Innovation like EIC using financial instruments should be set up only in addition to the current support schemes.*

\*\*\*\*\*

EREA Registered in the EU Transparency-Register under No. 010397411668-54

### Contact for EREA, the Association of European Research Establishments in Aeronautics

Ms. Anne-Laure Delot  
EREA Secretary  
c/o ONERA, International Affairs Directorate  
Chemin de la Hunière  
BP 80100  
91123 Palaiseau cedex, FRANCE  
Email: [anne-laure.delot@onera.fr](mailto:anne-laure.delot@onera.fr)  
Phone: +33 1 80 38 67 48  
Fax: +33 1 80 38 68 86