ASD High-Level Position on Aeronautics in the next Framework Programme (FP9)

1. CONTEXT

Aeronautics is a global business based on excellence, technology and high-level skills. With 160 Bn€ of revenues, over 550 000 direct employees\(^1\) and indirectly more than 1.5 million jobs, the European Aeronautics’ industry is a key contributor to European economic performance and competitiveness. This is the result of high levels of public-private investments in Research and Technology (R&T) made over the last decades by Member States and the European Union, together with industry.

Over the past 40 years, Europe has progressively become a world leader in civil aircraft manufacturing. However, the competitive technology and business landscape for air transport is changing rapidly and the European aviation ecosystem has to adapt swiftly and smartly to major game changers. These include the new environmental requirements agreed under COP21, the rising demand for all air transport, the reform of Air Traffic Management, the unprecedented level of public support in the US to its domestic Aeronautics industry, the emergence of new competitors such as China, and the technology challenges driven by digitalisation and electrification.

Europe’s Aeronautics industry is thus facing today probably one of its most challenging technological periods. Despite this increasingly demanding environment, Europe must remain a centre of excellence in Aeronautics for the great benefit of its citizens (job provider, environment protection, safe, secure and convenient mobility for all) and in the interest of Europe’s strategic autonomy. The Aeronautics industry must continue to pioneer. Even if the private sector invests massively in the development of new aircraft, public grants and public-private partnerships are key to foster innovation for sustainable transport.

2. CLEAN SKY & SESAR: ACHIEVEMENTS

The two major European Aviation Research Programmes, Clean Sky (greener and more efficient aviation technologies) and SESAR (Air Traffic Management R&T), act as catalysts for the whole innovation chain in Europe. Thanks to their long-term technology roadmap and financial commitment, the two aviation Joint Undertakings (JUs) have proven their efficiency and their added value for both public authorities and innovation chain, mostly in:

- Designing, developing, manufacturing and operating more competitive, safe and environmentally sustainable aircraft and Air Traffic Management (ATM) Systems;
- Creating a large and efficient science and technology community of academic research professionals and industries, from large companies to SMEs\(^2\), through all EU-28 countries;
- Delivering outstanding demonstrators with a real impact on the aircraft programmes and market.

\(^1\) 2016 ASD Facts & Figures – accessible at http://www.asd-europe.org/facts-figures
\(^2\) Around 250 SMEs have already been involved in the Clean Sky 1 programme
Success stories of Clean Sky 1 include, *inter alia*, the flight tests of the BLADE laminar wing (boasting a 50% wing friction reduction and up to 5% less CO₂ emissions) and **Counter-Rotating Open Rotor** (reducing fuel consumption and CO₂ emission by about 30%).

Success stories of SESAR are best evidenced by its impactful results: when deployed, the **63 delivered SESAR solutions** should offer a 34% increase in airspace capacity and a 30% decrease in flight time variance, meaning reduced delays on all EU flights and 95% of flights staying within their time plan, as well as a decrease of 2.3% of fuel burn and emissions per flight.

### 3. CLEAN SKY & SESAR: WAY FORWARD

#### i. The Future of Clean Sky

The Clean Sky 3 programme is an essential enabler to achieve ACARE Flightpath 2050 objectives through new concepts managing both disruptive technologies and continuous incremental innovations. The Clean Sky 3 programme will be based on a flexible roadmap going from upstream research to demonstrators, and organised through the following key research themes:

- **Optimised Energy Aircraft**
  - New aircraft and propulsion system configurations
  - Innovative materials
  - Smart structures
  - Advanced aerodynamics
  - Flight mechanics
  - More efficient propulsion options (including hybrid or full electric propulsion)

- **Enablers supporting the connected and autonomous Aircraft**
  - Cyber resilient connectivity
  - Enhanced passenger experience
  - Optimized crew operations
  - Safety focused and control architectures
  - Smart autonomy solutions for operations in urban environment

- **Aeronautics Industry 4.0**
  - Smart design, manufacturing and support
  - New 3D design and simulation tools
  - New Innovative manufacturing processes
  - Technologies for future health management capability
  - Virtual certification

These key goals would need to be pursued through the maturation of a series of cross-cutting technologies: artificial intelligence, augmented reality for engineering and passenger applications, advanced, intelligent manufacturing including 3D printing and Internet of Things (IoT) specific capability and Big Data analytics.

The mandate of Clean Sky should evolve to embrace the full Aeronautics research scope, from the upstream research to demonstrators, for a more consistent, seamless and flexible roadmap and a productive, well-organized, operational dialogue between the whole European research ecosystem (academia, research organizations and industry, from large companies to SMEs).

Moreover, the long term Clean Sky roadmap should be demonstration-driven to bring the adequate momentum to the full programme, and it should also be more agile to grow medium-sized projects that offer more capacity for **bottom-up innovative proposals** with disruptive technologies.

As a coordinating body, the Joint Undertaking should oversee **allocation of financial resources and high-level technical priorities**, and its governance be adapted to the new scope described above.
ii. **The Future of SESAR**

The modernization of Air Traffic Management (ATM) through SESAR 3 is a key enabler to improve the performance of the EU air transport system, and to increase safety, security and to maximise infrastructure capacity. As such, it is an important component of the EU Aviation Strategy.

The ambition of the future SESAR programme should be to further progress towards a Digital, Single European Sky, in order to safely accommodate the exponentially growing number of airspace users (airlines, rotorcraft, business aviation, unmanned aircraft, military users, etc.), and foster a smart, policy-driven transition to the digital era.

The future SESAR programme should maintain Europe’s leadership by embracing key technological trends:

- **Connectivity**
  To fully interconnect and integrate the ATM system, building on an intranet of services, irrespective of borders and physical location of infrastructure.

- **Automation**
  To decrease pilot and air traffic controller workload to focus on critical tasks and enable new mobility and new aeronautical concepts: e.g. ATM for drones (U-Space), single pilot, autonomous aircraft.

- **Virtualisation**
  To decouple physical infrastructures (e.g. control towers) from the service they provide, enabling greater flexibility and availability of resources.

- **Cybersecurity**
  To secure the ATM system and ensure complete confidence in the information exchanged in this fully interconnected system.

The reform of Air Traffic Management in Europe is crucial to cope with congested skies: Air Traffic Management infrastructure urgently needs an upgrade in light of the expected traffic growth and its impact on the environment (25 million flights annually in 2050 in the EU).

Air Traffic Management upgrade in a secure, safe and efficient way shall require a closer alignment between the SESAR JU programme and the SESAR deployment Manager activities (currently using the Connecting Europe Facility (CEF) funds) in order to optimise the industrialisation and deployment of innovative SESAR solutions. A more efficient transition from Research & Innovation (R&I) to industrialisation and deployment could be achieved by a revised organisation, reuniting both the R&D and the deployment parts under the same governance.
4. GENERAL RECOMMENDATIONS

There are numerous challenges that European Aeronautics have to face to maintain their leading edge in the medium and the long-term perspective:

- Decrease the carbon footprint despite the doubling of air traffic by 2050;
- Increase air traffic safety level despite a huge increase in air traffic and the insertion of drones;
- Maintain the security level, including in the cyber-space, in a context of high terrorism risks;
- Provide new services to passengers and increase their comfort through better connectivity and mobility;
- Provide citizens with highly qualified jobs sustained by a high level of competitiveness.

Achieving these ambitious goals will require a common roadmap and commitments from all stakeholders throughout Europe.

The current performance of Aeronautics is the result of continuous high levels of public-private investments in R&T undertaken by a wide scope of European stakeholders. ASD firmly believes that the next Framework Programme (FP9) should continue and strengthen the current virtuous circle developed within the previous FPs.

Slowing down or stopping the European long-term support strategy would endanger European companies, with respect to international competitors that benefit from substantial national continuous support. Any downturn in Aeronautics research programmes would lead to a rapid loss of competencies and would create a scientific and technological gap which would be almost impossible to catch up after several years of delayed investment.

To get the European aviation sector technologically ready to answer to any future air transport market demands and to maintain a leading international market position, it is essential to consider a dedicated budget for Aeronautics research in FP9, due to the specificities of the sector. These include long-term research cycles, billions of euro invested, high technological and commercial risks as well as very long term pay-back periods.

To achieve the required ambitious and innovative goals, a substantial increase in the financial long-term and continuous commitment from both industry and EU is therefore necessary, along with dedicated grant-based funding mechanisms, due to the specificities mentioned above.

Past and current EU-funded research programmes have demonstrated the appropriateness and effectiveness of the Public-Private Partnership (PPP) concept and Joint Technology Initiative (JTI) mechanism for aviation related topics. The PPP approach and the JTI mechanism, allowing to share the benefits of research across the member states and thereby to spread the key societal benefits, should be kept and consolidated in FP9.

In view of upcoming discussions around the next EU Research and Innovation Framework Programme, ASD calls on EU decision-makers to support a higher budget for aeronautics research in FP9. Such support is vital to ensure the worldwide competitiveness of the sector and its strong contribution to the EU’s trade export, as well as the creation of highly-skilled jobs.

****

[Signature on file], Jan Pie, ASD Secretary General, 24 January 2018