

# Towards a European Strategic Aviation RDT&E Infrastructure

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- 14 September 2012 IEG Meeting 1
- 15-16 October 2012 IEG Meeting 2
- 8 November 2012 IEG Meeting 3
- 19 November 2012 IEG Meeting 4
- 10 December IEG 2012 Briefing of Tiit Jurimae, DG RTD
- 16 January Meeting of Folkers, Klenner and Abbink
- 22 January IEG Meeting 2013 IEG Meeting 5
- 25 February Briefing on the IEG Report at the ACARE-AirTN Workshop on Aviation Research Infrastructures in Europe

## 1. Introduction

2. Need for a European Strategic Aviation RDT&E Infrastructure
3. Establishment of selection criteria
4. Funding for a European Strategic RDT&E infrastructure
5. Conclusions and Recommendations

# Introduction (1)



- The availability of excellent Research, Development, and Test and Evaluation (RDT&E) infrastructure is an essential part of securing a decisive competitive edge for the European **Aviation** industry (**i.e. Aeronautics & Air Transport**), as well as of the aviation-related public research in Europe.
- The current large aviation RDT&E infrastructure in Europe has been built over many years and provides its capabilities Europe-wide and beyond, much of it for civil and military RDT&E.
- It has been a major contributor to the growth of the European aviation sector to its position today as **global leader**.
- Much of this major infrastructure is in national ownership, only the European Transonic Windtunnel (ETW) and the German/Dutch Windtunnel (DNW-LLF) are in multinational ownership.

- The major aviation RDT&E facilities/capabilities are extremely costly to run, to maintain and to upgrade to deal with the technological advances and challenges of the future.
- The large RDT&E infrastructure, of **strategic** importance for Europe, has to provide its **capabilities** Europe-wide and beyond in order to provide the necessary income for their operation
- In the US, Russia and increasingly China, major aviation RDT&E facilities/capabilities are supported on government level, as **strategic** means to increase the **competitiveness** of their aviation industry, resulting into a non-level playing field

## 1. Introduction

## **2. Need for a European Strategic Aviation RDT&E Infrastructure**

- Strategic importance of Aviation to Europe
- Excellent Aviation Research and Testing Infrastructure, vital to achieve EU goals
- US Government and NASA approach
- Non-level playing field

## 3. Establishment of selection criteria

## 4. Funding for a European Strategic RDT&E infrastructure

## 5. Conclusions and Recommendations

## 'Flightpath 2050'

- *“Aviation’s economic and societal contribution is substantial generating around € 220 billion and providing 4.5 million jobs”*
- *“Aviation is a catalyst for growth and skilled employment. As such, it is at the heart of the Europe 2020 strategy and its flagship initiatives, including Innovation Union, An Industrial policy for the globalisation era and resource Efficient Europe”*
- *“Strategic European aerospace test, simulation and development facilities are identified, maintained and continuously developed”*
- *“The ground and airborne validation and certification processes are integrated where appropriate”*



## Strategic Research and Innovation Agenda

### SRIA 5.5 Infrastructure

- *“R&D infrastructure is an indispensable tool to achieve a decisive and competitive edge”*
- *“Strategic aviation infrastructure is of the highest quality and efficiency, providing the basis for world-class research and competitive product development while supporting education“*
- *“It ranges from wind tunnels, engine test facilities, via iron & copper birds, structure facilities and e-infrastructures up to experimental aircraft and simulation capabilities for in-flight and airport operations”*

## US Strategic Aeronautics RDT&E Planning

- 2002 Final Report of the Commission on the Future of the US Aerospace Industry
- 2005 House of Representative Hearing on the Future of Aeronautics at NASA. 106 Congress: Hearing before the Subcommittee on Space and Aeronautics of the Committee of Science
- 2006 – 2011 bi-annual National Aeronautics R&D Plans and National Aeronautics RDT&E Infrastructure Plan from the Office of Science and Technology Policy (OSTP, White House Advisory)

- NASA established Aeronautics Test Program (ATP) as a two-pronged strategic initiative:
  - to retain and invest in NASA aeronautics test capabilities considered strategically important to the Agency and the Nation and
  - to establish a strong, high-level partnership to expand cooperation between NASA and DOD, facilitating the establishment of an integrated national strategy for the management of their respective facilities.
- The national view or coordinated approach is becoming more important
- For 2012-2016 NASA's ATP budget will be **300 MEuro**

- Not only US but also European strategic aviation RDT&E facilities/capabilities that are essential for societal and economic benefits are not usually viable as independent businesses.
- Most of them have been built-up with national government support, but today face shrinking levels of support, that are threatening both major maintenance and upgrades
- Funding of these facilities is still mostly national, except e.g.:
  - German Dutch Windtunnel DNW-LLF (DE, NL)
  - European Transonic Windtunnel ETW (DE, UK, NL, (F))

- A non-level playing field exists between USA, Russia (and increasingly China) and the present European aviation RDT&E infrastructure
- This non-level playing field disadvantages the growing number of new Member States that are entering the European aviation supply chain
- Researchers need access to the best aviation RDT&E facilities
- Through co-funding EU can play an essential role towards harmonizing and focusing towards a European Strategic Aviation R&T Infrastructure (as already envisaged in Horizon 2020)

1. Introduction
2. Need for a European Strategic Aviation RDT&E Infrastructure
- 3. Establishment of Selection Criteria**
  - **ACARE selection criteria**
  - **IEG selection criteria**
  - **”Strategic RDT&E capabilities”**
4. Funding for a European Strategic RDT&E infrastructure
5. Conclusions and Recommendations

The ACARE selection criteria consider strictly financial figures for investment and operating costs:

- **Strategic**  
> 100 million Euro investment, operating budget as high as 10 million Euro/year and less than 10 in Europe
- **Key**  
>10 million Euro investment, tariffs on full operating costs – unique character and less than 100 in Europe
- **Common**  
less than 10 million Euro investment, medium or small size capabilities, basic tools

IEG developed a more detailed set of criteria for the Strategic and Key facilities considering the research as well as the industrial development needs:

- **Size** (close to the ACARE criteria: investment and turnover)
- **State of the art**
- **User’s expectations/experience**
- **Meeting of all the needs** to time horizon **Flightpath 2050**
- **Accessibility**
- **Uniqueness** (only for “Strategic facilities”)



- IEG view: a strategic R&T infrastructure consists of **“Strategic RDT&E capabilities”**, i.e. one or more facilities (hardware/software), including related technologies and highly skilled personnel/operators
- IEG considered the following strategic RDT&E capabilities:
  - Aerodynamic and aero-acoustic testing capabilities ( wind tunnels)
  - Engine test capabilities
  - Air Traffic Management (ATM) capabilities
  - Large scale Demonstrator Aircraft
  - Production technology capabilities
  - Large scale computational simulation capabilities (E-infrastructure)

1. Introduction
2. Need for a European Strategic Aviation RDT&E Infrastructure
3. Establishment of selection criteria
- 4. Funding for a European Strategic RDT&E infrastructure**
  - Rationale and possibilities for EU co-funding**
    - Upgrading and maintaining of new strategic RDT&E capabilities**
    - Facilitating access to strategic RDT&E capabilities**
  - Co-funding by EU Member States**
  - Long term commitments by industry**
5. Conclusions and Recommendations

- **Upgrading and maintaining strategic RDT&E capabilities**
  - facility owners to apply to open call for bids
  - bids to be evaluated against IEG criteria
- **Facilitating access to strategic RDT&E facilities for excellent science as well as for research & testing**
  - researchers/organisations to apply for access support via a voucher scheme
  - applications to be evaluated against IEG (facility/capability) criteria as well as relevance of the proposed research (cf. ESWIRP)

Applying these own criteria, IEG concludes as follows with regard to the wind tunnels:

- Only 4 “core” wind tunnels are seen as “strategic and unique”:
  - ETW – European Transonic Windtunnel (Cologne)
  - DNW-LLF – German Dutch Windtunnel, large low-speed facility (NL)
  - ONERA S1 - Transonic Windtunnel (Modane)
  - ONERA F1 - pressurised low-speed windtunnel (Le Foucat)
- RUAG-LWTE has no unique capabilities over DNW-LLF
- ARA, ONERA S2 and DNW-HST have similar capabilities
- EU might support “strategic but **not** unique” (though “core” for industry) wind tunnels, however only in case of consolidation

- The European aero engine community benefits from a number of important RDT&E facilities in France, the UK, Germany and Spain. Examples are ONERA-BD2, INTA-full scale engine test bed, AneCom, ONERA-CEPRA19 and -RACE
- The IEG scope does not allow for a well-reviewed proposal for engine RDT&E facilities at this moment. It can only emphasize the strategic importance and need for support for new investments.
- The IEG recommends the establishment of a working group composed of Industry and Research Establishments to complete the AirTN list with Engine RDT&E infrastructures, and define a plan for the sustainable support of a European powerplant system RDT&E infrastructure.

- Increasing air traffic congestion does require intensive research in the field of ATM, already started within SESAR
- A strategic ATM R&T capability shall include:
  - Flight test aircraft
  - Flight simulators
  - ATM/Radar simulators
  - Tower simulators
- These facilities are available in the DLR-NLR AT-One configuration, where necessary combined with the Eurocontrol Experimental Center ESCAPE Facility

- The US has, in the past, very successfully fostered and secured step changes in aviation. A combined military & civil approach, accompanied by the NASA/DARPA X-plane programmes, has paved the way for revolutionary designs. This mainly led to superior military and space vehicles, but also had a significant spillover to the civil side.
- This capability is essential in order to get a next generation “step change” civil transport aircraft and that there is the need to support this at a European level.
- The IEG recommends the establishment of a working group composed of Industry, Research Establishments, national governments and the EU in order to develop a plan for a future “European X-Plane Programme”.

- National and regional governments together with REs and industry have launched important Production Technology Research Centres in several European countries (e.g. ZLP-Germany, HVM Catapult-UK, Composite Research Centre-France)
- On the medium/long term this infrastructure and capability is to be considered as a strategic RDT&E capability for Europe
- Although the set-up is taken care of on national or regional level, there is a need for a sustained European support, accompanied by a complementary synchronization



- Further improved simulation capabilities are considered to be essential for step changes in aircraft development. They are indispensable for future Multi-Disciplinary Optimisation (MDO) in order to boost aircraft performance
- National and regional governments together with REs and industry have launched Future Simulation Centres
- On the medium term this infrastructure and capability is to be considered as a strategic RDT&E capability for Europe
- Although the set-up is taken care of on national or regional level, there is a need for a sustained European support

- **'Excellent Science'**

*European Infrastructures (2.478 million Euro)*

- ESFRI focused on basic science and closed until 2015
- Try to get aviation infrastructures included later in ESFRI
- possibilities outside of ESFRI within Infrastructures budget?

- **'Industrial Leadership'**

- not a probable source

- **'Societal Challenges'**

*Smart, green and integrated transport (6.802 million Euro)*

- seems most feasible possibility!

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- A European Strategic Aviation RDT&E Infrastructure is **indispensable**
  - for the continued **competitiveness** of the European Aeronautics/Air Transport industry
  - for **excellent science/ RDT&E** purposes
- The European Strategic RDT&E facilities/capabilities are usually **not viable as independent businesses**
- A **Level Playing Field is needed** with respect to US, Russia and increasingly China. A European Strategic Aviation RDT&E infrastructure is essential to realize this
- EU, Member States and industry need **jointly to ensure an integrated approach to secure the continuity and quality** of this Strategic Aviation R&T Infrastructure
- The Commission proposal for **Horizon 2020 offers possibilities**

- Endorse the IEG criteria for “strategic” RDT&E facilities (as well as for “key” facilities)
- Facilitate access to strategic RDT&E facilities for excellent science as well as for research & testing through a voucher system
- Establish a gremium to develop application/assessment procedures:
  - for the qualification “strategic” or “key” i.a.w. IEG criteria
  - for EU co-funding for new or upgrades of strategic/ key RDT&E facilities
  - for strategic RDT&E facilities access vouchers

- Support the following European “strategic and unique” wind tunnels (qualified “core” by industry):
  - ETW,
  - DNW-LLF,
  - ONERA F1 and S1
- Support the European “strategic and not unique” wind tunnels (qualified “core” by industry) of which more than one exist (e.g. DNW-HST, ARA, ONERA S2) only if consolidation is achieved

Set up appropriate expert teams that can assess the mid to long term need for the following European strategic RDT&E capabilities:

- Propulsion
- Air Traffic Management
- Large scale demonstrator aircraft
- Production technology
- E-infrastructure
- Environmental research

- Establish new budget line for a European Strategic Aviation RDT&E Infrastructure
- IEG qualified judgement, based upon information received so far and expecting approx. 10 “strategic” facilities, results into the following recommendation:
  - **Upgrade of facilities:** 10 -15 million Euro/year
  - **“Access vouchers”:** 5 -10 million Euro/year