The Research Framework Programmes of Europe
- Opportunities for Trans-national Research in Aviation

Dietrich Knoerzer
DG RTD-H.3 Aviation
Bretigny, 14 May 2014
• The European Union
• The Challenges for Aviation
• Aviation in the 7th Framework Programme
• Horizon 2020 – Opportunities for Aviation
The European Union

European Commission proposes

Annual Budget (~112 billions €) (e. g. Horizon 2020)

European Parliament is consulted, co-decides

Council of the European Union decides

Court of Auditors advises

Committee of the Regions advises

Treaties

Amendments

President J. M. Barroso

Co-decision procedure

785 representatives elected directly by citizens

European Economic and Social Committee - European Investment Bank - European Central Bank - European Ombudsman - European Data Protection Supervisor - ...
The Research Framework Programme of the EU

States Contributing to FP7
7th EU Research Framework Programme

- 28 EU Member States
- FP7 Associated States
  - Iceland
  - Norway
  - Switzerland
  - Turkey
  - Albania
  - Israel
  - Macedonia
  - Montenegro
  - Serbia

Total FP7 Budget (2007 - 2013) above 50 billion €
Air Travel Development
(only Passengers)

Air traffic has doubled every 15 years.

Source: ICAO, Airbus

Air traffic will double in the next 15 years.

20-year world annual traffic growth 4.7%

World annual RPK (trillion)

Source: ICAO, Airbus
The Fuel Efficiency of Aircraft Has Dramatically Improved

Global fleet fuel consumption 2009 (Source DLR)

Lufthansa fleet fuel consumption 2009 (Source LH)

Future Aircraft

Source: IPCC/ DLR
Development of Civil Aircraft Noise Emission

- **Side-line noise level for Aircraft engine configurations**
- **Normed on constant thrust**

**Jet Engines**

**Bypass-Jet Engines**
Key Goals

- 50% cut in CO2 emissions per passenger/km
- 80% cut in NOx emissions
- Halving perceived aircraft noise
- Five-fold reduction in accidents
- ATS capable of handling 16 mio. flights a year
- 99% of all flights within 15 min. of timetable

How is the 50% CO2 Reduction Achieved?

Airframe 20-25%

Engines 15-20%

Operations 5-10%
Aeronautics Research in Framework Programmes

**Average budget per year, M€**
*(Overall FP, M€)*

- **FP4:** 1994 - 1998
  - 49 (245)

- **FP5:** 1998 - 2002
  - 140 (700)

- **FP6:** 2002 - 2006
  - 180 (900)

- **FP7:** 2007 - 2013
  - 137 (960)
   - **Collaborative Research**
     - **FP7:** plus 350 M€ contribution to SESAR

**Years**

- Since 1990 more than 400 RTD projects funded with 3 billion €
- 30% of EU public funding in civil aeronautics RTD
- Project size 2 - 8 million € with typically 5 - 15 partners
- Large technology integration projects with total budget more than 100 million € with up to 60 partners
Examples of FP7 Projects in Aeronautics Technologies

Carbon fibre profile manufacturing - Composite fuselage modelling - Adaptive manufacturing - Manufacturing of complex titanium sheets

Reducing drag - Reducing NOx - Reducing CO2 - Reducing Noise - Towards 2050?

Personal helicopter - Pulsar guided aircraft - Plasma controlled flow - Brussels-Tokyo in 3 hours
Clean Sky

Joint Technology Initiative **Clean Sky** 2008, 7 years, 1600 M€, EC: 800 M€

- SMART Wing Aircraft
- Regional Air Transport
- Green Engines
- Eco-Design
- Technology Evaluator
- ATS Model
- Simulator Platform AC, ATM, AP (flight segment)

More info: www.cleansky.eu
Trajectory Optimisation Objectives
**TBS** replaces current **distance separations** with **time intervals** in order to adapt to **weather conditions**.

**SESAR validation exercises**

- **More landings** (+5 per hour) in strong wind conditions
- **Reduced holding times** by up to 10 minutes

*Source: SESAR JU*
Example: Wake Vortex Research

**FP7 Projects:**

WakeNet-3 Europe - Coordination Action

UFO – Ultra-fast wind sensors for wake-vortex hazards mitigation

GREEN-WAKE – Demonstration of LIDAR-based wake vortex detection incorporating an atmospheric hazard map

**SESAR Projects:**

P6.8.1 “Flexible and Dynamic Use of Wake Vortex Separations”

P12.2.2 “Runway Wake Vortex Detection, Prediction and Decision Support Tools”

P15.4.9a “Weather sensing technologies specifications”

The information flow between the projects has to be ensured
Europe's Vision for 2050 'Flightpath 2050'

**Vision 2050:**
- Responding to society’s needs
- Securing global leadership for Europe

**Five Objectives of the Strategic Research & Innovation Agenda - SRIA**
- Meeting Societal and Market Needs
- Maintaining and Extending Industrial Leadership
- Protecting the Environment and the Energy Supply
- Ensuring Safety and Security
- Prioritising Research, Testing Capabilities & Education

[www.acare4europe.org](http://www.acare4europe.org)
The EU Framework Programme for Research and Innovation

'Horizon 2020'
(2014 – 2020)

Three Priorities

1. Excellent Science  31.7 % (of Budget)
2. Industrial Leadership  22.1 %
3. Societal Challenges  38.5 %

Budget:  70.2 billion Euro (Compromise July 2013)
‘Horizon 2020’ Objectives & Structure

**Europe 2020 Priorities**

**Tackling Societal Challenges**
- Health, demographic change & wellbeing
- Food security and the bio-based economy
- Secure, clean and efficient energy
- **Smart, green and integrated transport**
- Climate action & Resource Efficiency including Raw Materials
- Inclusive, innovative and secure societies

**Industrial Leadership & Competitive Frameworks**
- Leadership in enabling and industrial technologies (ICT, nano, materials, bio, manufacturing, space)
- Access to risk finance
- Innovation in SMEs

**Excellent Science Base**
- European Research Council
- Future and Emerging Technologies
- Marie Curie actions on skills, training and career development
- Research infrastructures

**Supporting the objectives:**
- European Institute for Innovation & Technology
- Joint Research Centre

**Shared objectives and principles**
Common rules, toolkit of funding schemes

**International Cooperation**

**European Research Area**

**Dissemination & knowledge transfer**

Simplified access
"Smart, Green and Integrated Transport"

(provisional budget of about € 6 billion)

Focus on research that require trans-European cooperation to address today's most pressing transport challenges,

**Aviation:**

- Making the European Aviation sector more competitive
- Decreasing its environmental impact
- Continuing to enhance the already very high levels of safety
- Contributing to seamless mobility when using air transport
Aviation research and innovation in Horizon 2020

- Alternative fuels
- Security
- FCH 2 Fuel cells
- Clean Sky 2
- SESAR
- ATM
- Long term research
- Greening and competitiveness
- SME support
- ICT
- Materials
- ERC
- Basic research
- Research infrastructures
- Access to financing
- RSFF
Aviation Topics 2014/2015

In line with the Strategic Research and Innovation Agenda (SRIA) of ACARE

- Competitiveness of European aviation through cost efficiency and innovation
- Enhancing resource efficiency of aviation
- Seamless and customer oriented air mobility
- Coordinated research and innovation actions targeting the highest levels of safety for European aviation
- Breakthrough innovation for European aviation
- Improving skills and knowledge base in European aviation
- Support to European aviation research and innovation policy
- International cooperation in aeronautics
JTI 'Clean Sky' is part of the Innovation Investment Package

Clean Sky 2 Programme Overview

~ 1.8 billion € EU-funding

Vehicle IADPs
- Fast Rotorcraft
  - Agusta Westland
  - Eurocopter
- Large Passenger Aircraft
  - Airbus
- Regional Aircraft
  - Alenia Aermacchi

Large Systems ITDs
- Airframe ITD
  - Dassault – EADS-CASA – Saab
- Engines ITD
  - Safran – Rolls-Royce – MTU
- Systems ITD
  - Thales – Liebherr

Building on Clean Sky, going further into integration at full aircraft level
And developing new technology streams for the next generations of aircraft
Extension of SESAR Joint Undertaking

The High Level SESAR Programme Research and Innovation 2020 addressing remaining part of the European ATM Master Plan

**Exploratory Research**
- Air Vehicle Operations & Technology
- ATM Operations & technology
- Airport Operations & Technology
- System Architecture
- ICT for Information Mgmt., Uncertainty & Optimisation
- Safety
- Security
- Role of the Human in Automation and Ops. Change
- Environment & Weather for Aviation
- Enabling Change: Economics, Legal, Policy & Regulation

**Applied Research, Pre-Industrial Development, Validation**
- AIRPORT: Airport Terminal, Surface & Tower Systems
- ATM: Airspace, Traffic Management & Systems
- AIRCRAFT: Air Vehicle Operations, Mission Management & Integration
- INFRASTRUCTURE: ICNS, Training & Simulation Systems
  - Priority Business Needs – ATM Key Features & Enablers
  - Operations, Technical Interoperability & Performance
  - Remotely Piloted Air Systems (RPAS) Integration
  - System(s) Architecture
  - Safety & Security Management
  - Societal Challenges
  - Regulation & Standardisation Planning
  - European ATM Master Plan Maintenance
  - Preparation for Deployment

**Large Scale Demonstrations**
- Airspace Users
- Air Navigation Service Providers
- Supply Industries
- Airports
- National Authorities
- Staff Associations
- ESA

*Source: SESAR JU*
Where are we with Aviation?

- Europe’s Vision for Aviation and the SRIA of ACARE address the challenge of future needs.
- Europe’s new Framework Programme ‘Horizon 2020’ offers an opportunity and a multi-national platform for the needed technologies.
- Most budget goes to Clean Sky 2 (1,8 billion €) and SESAR Extension (600 million €); little budget for the 'classical' RTD activities.
- Council is expected to approve the Joint Undertakings (SESAR Extention, Clean Sky 2, etc.) in May 2014.
- First Call closed in March and Commission expects to launch the second Call in July 2014 (limited budget).
The EU Framework Programme for Research and Innovation 2014 - 2020

Thank you for your attention!