Future Sky
Proposal for a Joint Research Initiative in Aviation
EREA in numbers

5.135

Employees in aeronautics

€ 447.000.000

Spend on research in aeronautics
Breakdown of EREA revenues by clients 2011

- Grant: 46%
- Governmental Projects: 15%
- EU Aerospace Industry: 12%
- Non EU Aerospace Industry: 2%
- National Space Agencies: 1%
- ESA: 2%
- Non Aerospace Industry: 1%
- Other: 16%
- EU, Europ.Commission, Eurocontrol: 4%
The position of Research Establishments
Transfer basic knowledge into industrial applications by further developing and integrating technologies.
The need for Research Establishments to co-operate

Transfer basic knowledge into industrial applications by further developing and integrating technologies

- Research establishments play this role at the national level

- At European level to play a similar role REs have to co-operate with European aviation industry

- There is the need of an European programme combining the forces of the research establishments, such as Clean Sky combines the efforts of industrial stakeholders.

- EREA believes that co-operation of European research establishments for R&TD programmes is the best guarantee to ensure technological development to the benefit of European society and industry, beyond the current SESAR and Clean Sky timescales.

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Future Sky

Boundary conditions

2050 and beyond
Joint Research Programmes
Long term perspective of SRIA

Flightpath 2050
Serving society’s needs and maintaining global leadership for Europe

ACARE
Strategic Research and Innovation Agenda (SRIA)

Societal & Market Needs
Industrial Leadership
Environment & Energy
Safety & Security
Research, Infrastructures & Education

EREAT Future Sky Joint Research Initiative

Joint Research Programme 1
Joint Research Programme 2
Joint Research Programme 3
Joint Research Programme 4
EREA Research infrastructures
Future Sky goals

Vision
Definition of technologies and systems, processes of Flightpath 2050

Knowledge
Develop the knowledge for the next ATS generation including complex testing and validation capabilities
Contribute to the education of future engineers

Attraction
Make aviation fascinating for the public and attracting the young generation

Competitiveness
Analyse and prepare the scientific technological ground for future ATS beyond Clean Sky and SESAR
Future Sky goals
24/7 Air Transport System

• The overall goal of Future Sky will be “24/7”

• This concept describes the full mobility with special focus on ATS, 24 hours a day, 7 days a week, resilient against any impacts e.g. from disruptive events like extreme weather, in line with FlightPath 2050

  – Under “24/7”, new environmental friendly vehicles will be needed, so quiet that they are allowed to operate during night at airports

  – Totally new elements will be needed too, such as large UAV for air cargo

  – “24/7” will also address aviation operational issues, including ATM

  – “24/7” will address also intermodal aspects, both specific for aviation and with respect to worldwide day-and-night operations
Programmatic outline
Enablers and Support Projects for 24/7 ATS

TSE 1 Safety
TSE 2 Vehicle
TSE 3 System
TSE 4 Energy

Research Infrastructures

SP = Support Project
TSE = 24/7 Enablers
TSE 1 on Safety

- **Theme 1 – Towards 10^{-7}**
  - Breakthrough research to address a current main accident category and a current main common causal factor of accidents in commercial air transport with the purpose of enabling a direct, specific, and significant risk reduction in the medium term.

- **Theme 2 – Strengthening the capability to manage risk**
  - Processes and technologies to enable the aviation system actors to achieve near-total control over the safety risk in the air transport system.

- **Theme 3 – Building ultra-resilient systems and operators**
  - Improvement of Systems and the Human Operator with the specific aim to improve safety performance under unanticipated circumstances.

- **Theme 4 – Building ultra-resilient vehicles**
  - Reducing the effect of external hazards on vehicle integrity as well as reducing the number of fatalities in case of accidents.

Start in 2014 / 2015
TSE 2 on the vehicle

- The quiet operating air transport vehicles
  - Serviceable from smaller airfields
  - Make use of ultra-quiet engines
  - Use flow control e.g. for maximum lift on short runways
- Could serve as a baseline for the next short range aircraft
- Also include the impact of air vehicles by addressing the whole product life cycle
- Address the Flightpath 2050 goals on industrial leadership and competitiveness
TSE 3 on the system

- Special focus on the insertion of UAVs in the civil ATS
  - Probably for air cargo as a start.
- Prepare a toolset for different UAS, including night operations e.g. by electrical UAS, etc., in order to provide the vision of a complete 24/7 ATS
- Enable European industry to serve the world market with appropriate products and service
TSE 4 on energy

• Address the energy system on-board and on-ground
• Innovative propulsion research
• Development of different energy sources:
  – Batteries
  – Fuel cells
  – Enhanced turbines driving electrical engines, etc.
• Look at the complete balance
  – Needs on ground, i.e. at the airport
  – Energy supply
• Use of alternative fuels
  – Including also production processes, certification, etc.
• The outcome of this TSE can be used
  – To develop specific technologies
  – Set European standards worldwide
  – Calculate overall costs

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Support projects
Spin-in

• **SP 1 – Ground interfaces**
  – Adressing the 4 hour door-to-door goals from Flightpath 2050
  – Fast loading/unloading
  – Turnaround time at the airport,
  – Adaptations in ground and the air part of airport processes
  – Provide ideas, solutions and simulations on the aviation side, including the interface to the other modes. (aiming to a total transport model)

• **SP 2 – The value of speed**
  – Supersonic transport
  – Knowledge gained from supersonic research can be transferred into high-tech projects in aerodynamics, propulsion, material technique, light weight structures etc.
Support projects
Spin-off

• **SP 3 – Special transport**
  - Whereas the first two support projects provide input to the TSE, this support project will use the outputs of the TSE as spin-offs to provide toolsets for improved special missions like:
    - Search and Rescue SAR
    - Off-shore missions
    - Rigging of power poles
    - Pipeline inspections, etc.
Organisational set-up

• Future Sky aims at further aligning the institutional research programmes of the national research establishments gathered in EREA.

• By further joining research efforts at a European scale results in aviation research should be achieved that would not have been achieved by individual effort.

• REs are committed to involve third parties in the research activities of Future Sky, so that a proper technology transfer between basic knowledge to industrial application can be ensured.
Funding mechanism

Institutional research programmes

Eurpean co-funding Horizon 2020
Involving universities and industry

• In the Future Sky Advisory Board
  – University representatives
    • Bring and share fundamental existing knowledge in order to build well addressed and well-structured TSE
  – Industrial representatives
    • Share long term visions and needs in order to better address the scientific steps and tools to be developed in Future Sky

• In the TSE
  – Parties interested and committed to the long term objectives of the programme can express their interest in teaming up and forming a consortium
Role of the European Commission

• Involved in set-up and operation of Future Sky
• Representative from DG RTD and DG MOVE in Advisory Body
• A project officer from the European Commission will be taken on-board in all the co-funded activities
• TSE based on Commission’s work programme
• Commission evaluates the quality of the proposed TSE
• Outcomes of Future Sky could be input for next work programmes