Future Sky
Preparing for the future of aviation

Paul Eijssen
EREA Secretary
EREA in numbers

> 5.000
Employees in aeronautics

~ € 0,5 Bln
Annual spend on research in aeronautics
Breakdown of EREA revenues

- On average about 20% of EREA work is used to build up new knowledge (Low TRLs 0-3)
- Technology development counts on average 70% of EREA’s work (TRLs 4-6), e.g. Collaborative Projects
- On average about 10% is dedicated to direct support to industrial innovation (services, High TRLs) e.g. Industrial Contracts
The role of EREA

Development & Integration of technologies

Transfer to industry

Production & commercialisation

Research

Universities

Industrial partners, Spin-offs, Start-ups
Example of technology transfer
Eurocopter BlueEdge® Low Noise Blade
The role of EREA
Applied Research and Research Infrastructures Provider

FP 2050 Goals

- „Next generation wide & narrow body aircraft“
- „Quiet short take-off & landing“
- „Night operations by quiet aircraft“

Requirements

- New TLAR (noise, intermodality, …)
- New methods (design-to-noise, source noise design)
- Massive flow control
- Mission adaption capabilities
- ATM design for 24/7 (incl. intermodality)

Infrastructures

- Classic Aeronautics Infrastructure for aircraft design
  - HPC for CFD, CAA, CSM
  - Wind tunnels
  - Engine test beds
  - Structure test rigs, Iron Bird
- Aviation Infrastructure & Periphery
  - Labs for Noise Perceiption, Standardisation
  - Simulators for new ATM/ATS
  - Materials, Life Cycle, VR => Virtual Certification
Challenges

- 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 and Education
Looking back to the future
Convergence of concepts
Looking back to the future

THF, Berlin-Tempelhof 1923

FRA, Frankfurt Airport 2006
Persistent growth of air traffic

Asia-Pacific airlines to lead in world traffic by 2031

World Traffic by airline domicile (RPK billions)

- **Asia-Pacific**
  - 2011 traffic: 28%
  - 2012-2031 traffic: 32%
  - 20-year growth: 5.4%

- **Europe**
  - 2011 traffic: 27%
  - 2012-2031 traffic: 24%
  - 20-year growth: 4.1%

- **North America**
  - 2011 traffic: 27%
  - 2012-2031 traffic: 20%
  - 20-year growth: 3.3%

- **Middle East**
  - 2011 traffic: 7%
  - 2012-2031 traffic: 11%
  - 20-year growth: 7.3%

- **Latin America**
  - 2011 traffic: 5%
  - 2012-2031 traffic: 6%
  - 20-year growth: 5.9%

- **CIS**
  - 2011 traffic: 3%
  - 2012-2031 traffic: 4%
  - 20-year growth: 5.4%

- **Africa**
  - 2011 traffic: 3%
  - 2012-2031 traffic: 3%
  - 20-year growth: 5.0%

Source: Airbus

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Only little room for further growth

Cumulative monthly slots at FRA per hour

Capacity figure

Number of Slots

Time [h]

05:00 - 06:00
06:00 - 07:00
07:00 - 08:00
08:00 - 09:00
09:00 - 10:00
10:00 - 11:00
11:00 - 12:00
12:00 - 13:00
13:00 - 14:00
14:00 - 15:00
15:00 - 16:00
16:00 - 17:00
17:00 - 18:00
18:00 - 19:00
19:00 - 20:00
20:00 - 21:00
21:00 - 22:00
22:00 - 23:00
23:00 - 00:00

januar  februar  marz  april  mai  juni  juli  august  september  oktober  november  dezember
24/7 Air transport
Not with today’s vehicles!

- Noise
- Wake Vortex / ATM
- Emissions / Climate Impact
- Ground Processes / Turnaround
Challenges linked to Aviation Growth

- Data Manipulation
- Vehicle Safety
- Trajectory Noise
- System Security
- Source Noise
- Turnaround
- Configuration Noise
- Atmosphere Models
- Noise Perception
- Congestion
- Multi-Scale Simulation
- Recyclability
- Product Life Cycle
- Sustainable ATS
- UAV, Cargo UAV
- Wake Vortex, Separation
- Resilient ATM
- More/All Electric Aircraft
- Classic: Payload, Range, Speed
How to get there?

+ national aerospace strategies
How to get there?
Let’s condense what a Future Sky should be
How to get there?
Let’s define a common long-term goal

24/7 air transport combines the most far-reaching goals of Flightpath 2050. Striving for a substantial increase in performance, safety, competitiveness, and acceptance.

24/7 air transport is a synonym for maximum mobility and maximum modal embedment with minimum impact on the environment.
How to get there?
By looking further ahead together
How to get there?
By Opening Up New Perspectives in Joint Research

ATS Generation

N+1
Joint Undertaking

N+2
Joint Research Initiative

SESAR
Clean Sky 2

FUTURE SKY
Future Sky
Twenty-Four Seven Enablers

TSE 1
Safety

TSE 2
Quiet Air Transport

TSE 3
Air Transport Integration

TSE 4
Energy

Four Programmes
to cover all aspects of “24/7”
TSE 1 Safety

- Resilient vehicles, resilient ATS
- Permanent risk monitoring
- Safety of new entrants in ATS
- Human Performance Envelope

Future Sky
Twenty-Four Seven Enablers

TSE 2 Quiet Air Transport
TSE 3 Air Transport Integration
TSE 4 Energy
Future Sky
Twenty-Four Seven Enablers

TSE 2 Quiet Air Transport
- Virtual noise assessment
- Fresh low-noise technologies
- Tailored aircraft configurations
- Noise impact metrics
Future Sky
Twenty-Four Seven Enablers

TSE 3 Air Transport Integration
- Design 24/7 aircraft
- Design 24/7 air transport system
- Efficient ground processes
- Seamless intermodal embedment
- Assess regulatory framework
Future Sky
Twenty-Four Seven Enablers

TSE 1
Safety

TSE 2
Quiet Air Transport

TSE 3
Air Transport Integration

TSE 4 Energy
- Assess future engines & fuels
- Design on-board energy systems
- Design Eco-efficient infrastructure
- Eco-efficient design, manufacturing & LCM
Funding & Participants

Institutional/National Research Programmes

Co-funding Horizon 2020
Future Sky Safety
Where are we now?
Focus, scope & funding

• Two main activities:
  1. Research coordination
  2. Research into specific safety topics

• One program, 7 year roadmap, two calls
• 34 partners – research, industry & academia
• Overall budget (part 1 & part 2) : 40M€ budget (25 M€ EU)
• Addressing the priorities of the ACARE Strategic Research Agenda and EASA’s European Aviation Safety Plan
Future Sky Safety
Nine technical projects

Theme 1 - New protections against today’s accidents
P3 Specific solutions for runway excursion accidents
P8 Advanced flight envelope protection

Theme 2 - Strengthening the capability to manage risk
P4 Total system risk assessment
P9 Getting ahead of the curve; emergence detection and big data

Theme 3 - Building ultra-resilient systems and operators
P5 Resolving the organizational accident
P6 Human Performance Envelope
P10 More resilient crew – flight deck automation cooperation

Theme 4 - Building ultra-resilient vehicles
P11 Reducing the effect of environmental hazards
P7 Mitigating the risk of fire, smoke & fumes
Future Sky Safety
Some interesting results already

- Currently performing an inventarisation of all safety research activities at EREA members
  - Some interesting insights already
- Currently putting in place a research coordination exchange mechanism
- In 2016 EREA starts common research projects that will be fully funded by its members
- Still in 2015 a call for PhDs will be launched
  - Future Sky coordinates and cofunds PhDs working at EREA Members
  - Results will be shared