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European Research in Aeronautics

Preparing the Future



AWIATOR Project A340 Flight Test (Nov. 2006)

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Content

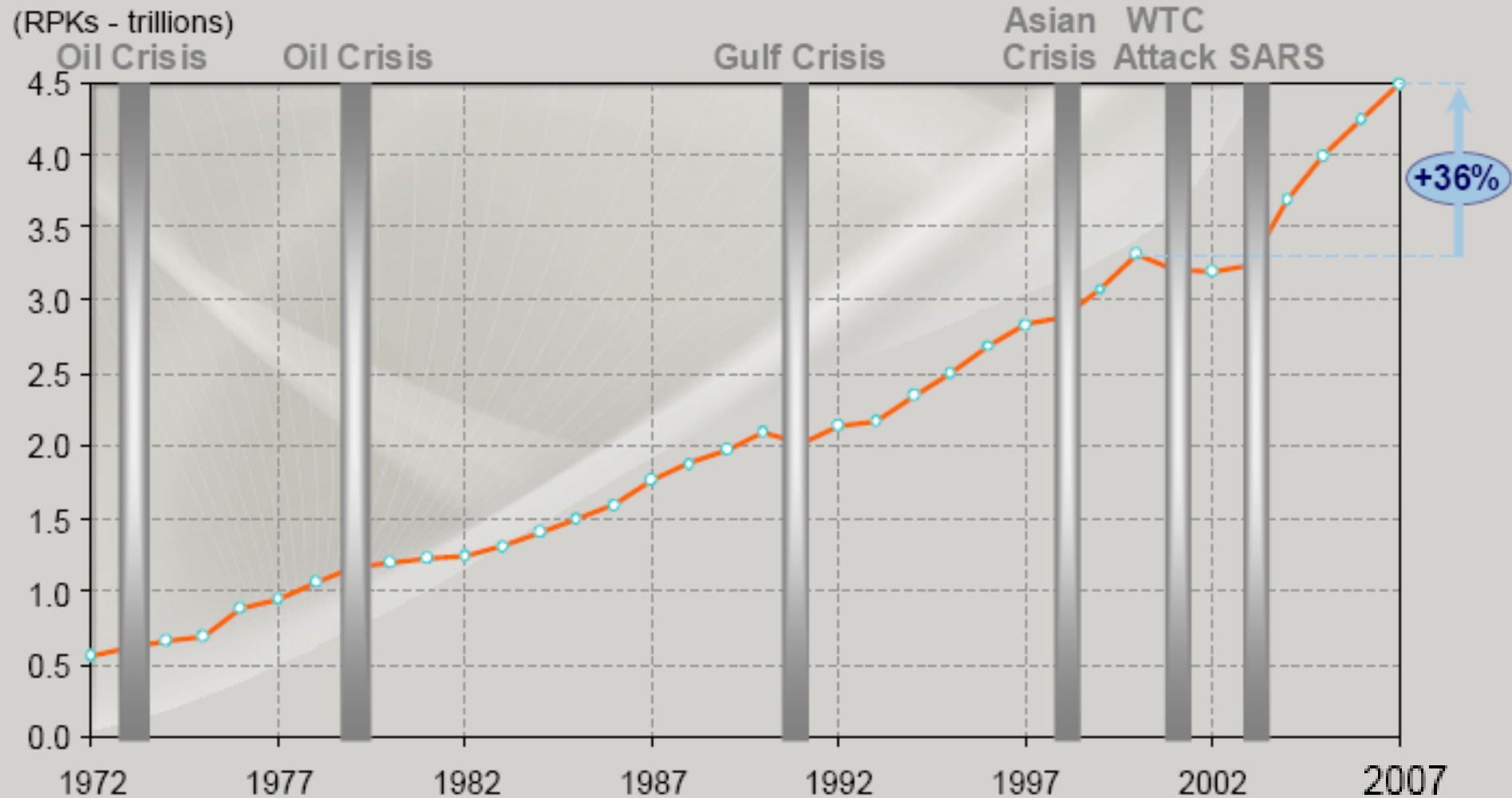
- **Challenges to Aeronautics**
- **Aeronautics and Air Transport in FP7**
- **Lessons learnt from 1st and 2nd Call for Proposals**
- **Overview of JTI “Clean Sky” and JU “SESAR”**
- **Examples of EU Research Activities**
- **Towards Future of Aeronautics Research**
 - The industry point of view



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Development of World Air Transport



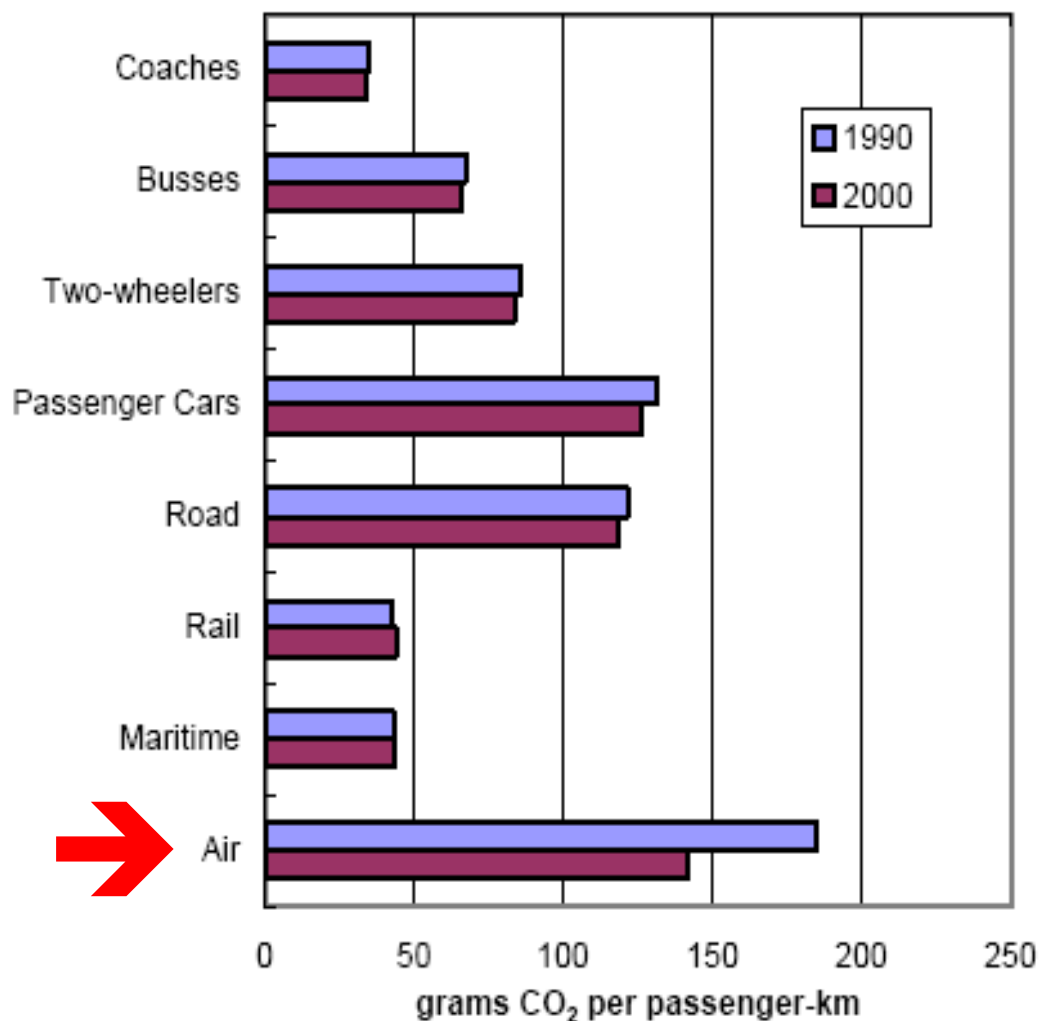


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Comparison of Transport Modes

CO₂ emission per passenger-km (seat-miles)



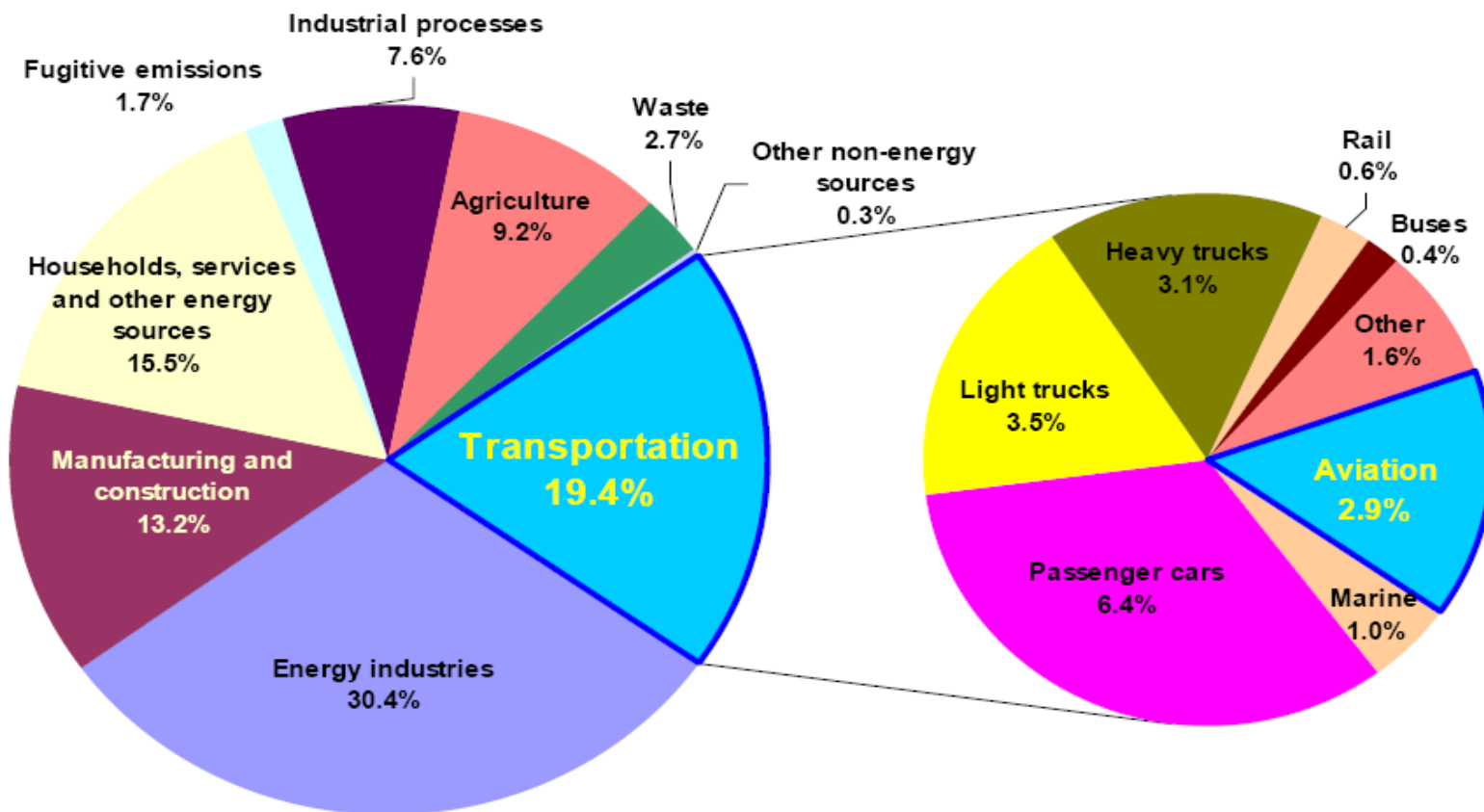
Source: EEA 2006



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Emissions of Greenhouse Gases (GHG) in Europe (2006)



Data source: EEA, reference year 2006



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A Joint Strategic Approach for Aeronautics Research in Europe:

The Advisory Council for Aeronautics Research in Europe (ACARE)

- **represents the Technology Platform (TP) for Aeronautics and Air Transport**
- **involves all Stakeholders (EU Member States, Commission, Eurocontrol, industry, research, airlines, airports, etc.)**
- **prepares Strategic Research Agendas (SRA) as the baseline for Europe's research activities**



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EUROPEAN AERONAUTICS!
A VISION FOR 2020



2000
European Aeronautics:
A Vision for 2020

2002
Strategic Research Agenda
Six Challenges for Aeronautics

2004
2nd Issue of the Strategic Research
Agenda
Six High Level Target Concepts

2008 Addendum to
Strategic Research Agenda

Society's needs

Global leadership



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European Focus

- R&D aligned to the
- Strategic Research Agenda SRA and SRA2 developed by
 - **ACARE the Advisory Council for Aeronautics Research in Europe**

ACARE

October 2002 : The Strategic Research Agenda (SRA) : 5 Challenges

Quality and
Affordability

Environment

Safety

Air Transport
System
Efficiency

Security

October 2004 : The SRA 2 : Target Concepts

Very Low
Cost ATS

Ultra Green
ATS

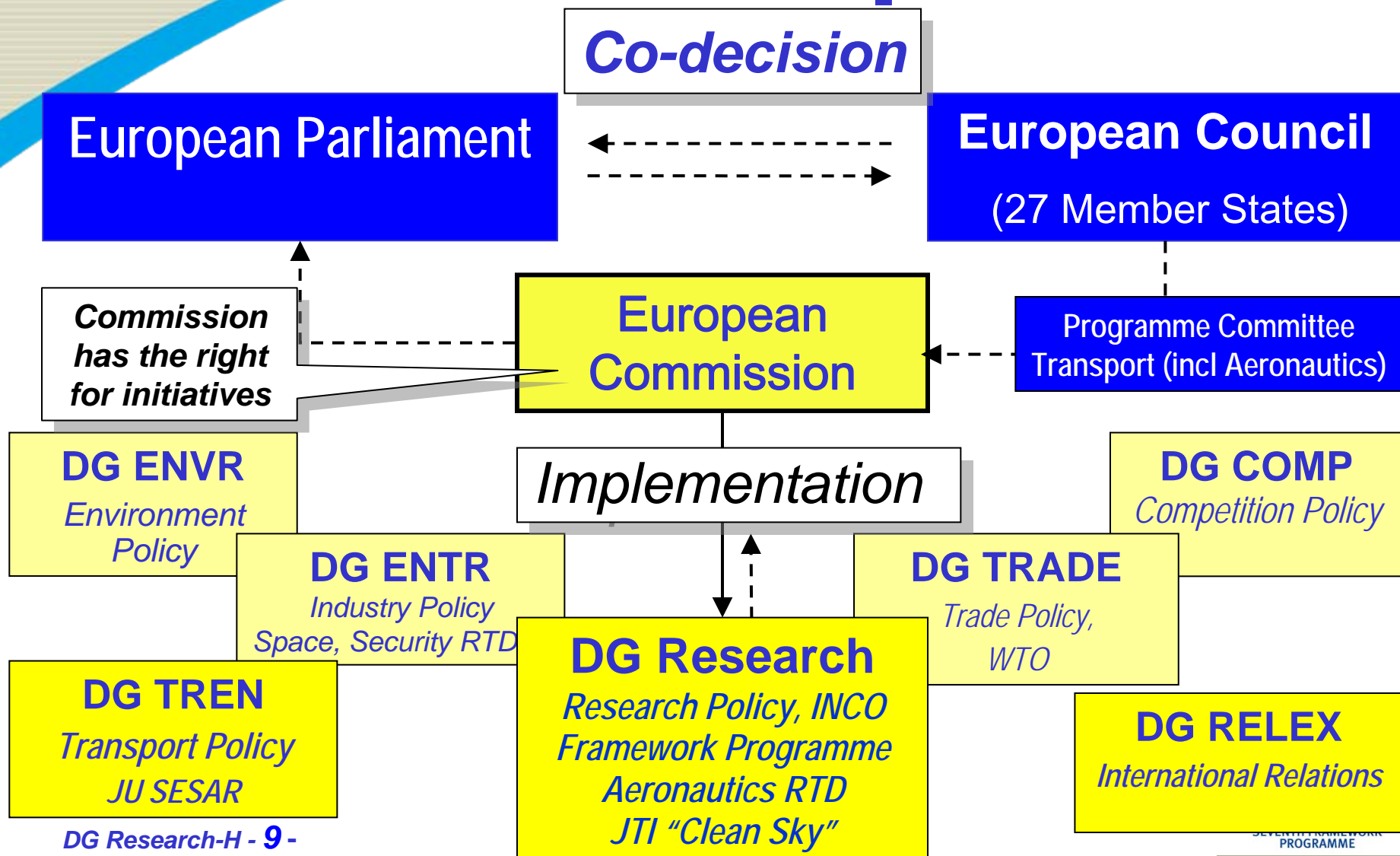
Highly
Customer
oriented ATS

Highly time-
efficient ATS

Ultra Secure
ATS

22nd Century

Aeronautics RTD in the European Union





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States Contributing to FP7

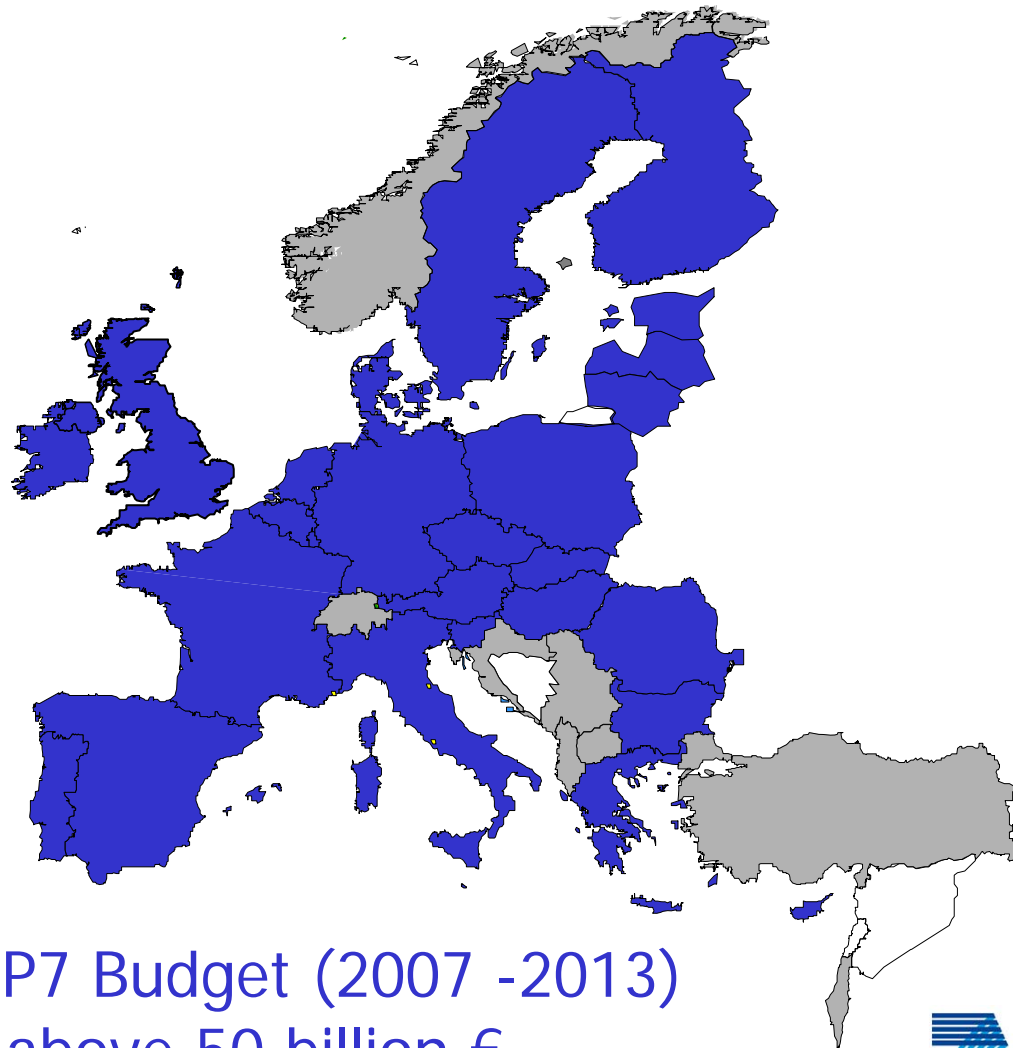
7th EU Research Framework Programme



■ 27 EU Member States

■ FP7 Associated States

- Iceland
- Norway
- Switzerland
- Croatia
- Turkey
- Albania
- Israel
- Macedonia
- Montenegro
- Serbia
- Others to join



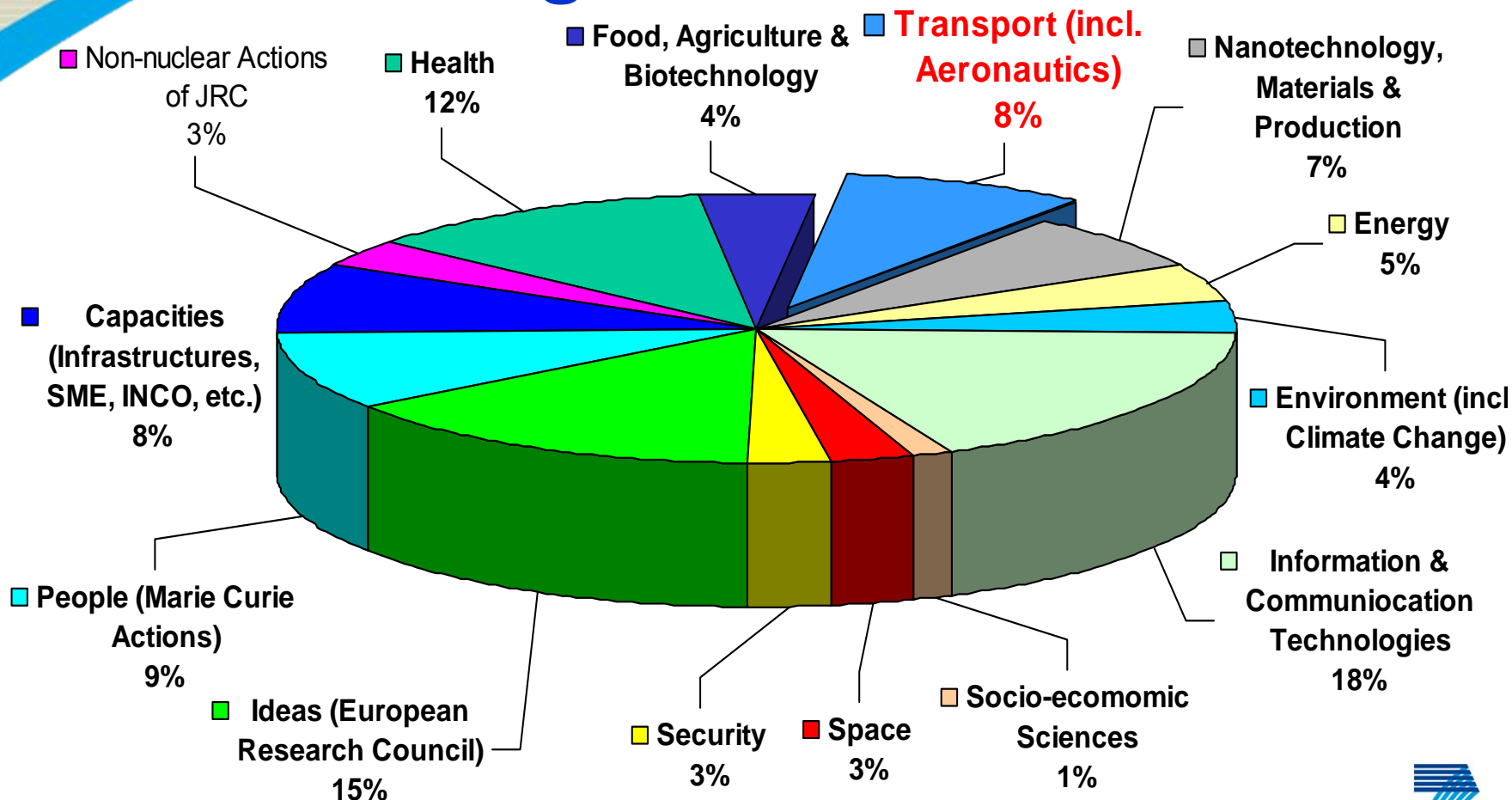
Total FP7 Budget (2007 -2013)
above 50 billion €



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7th Research Framework Programme Budget Breakdown



Budget 2007 - 2013: 50.521 million Euro (+ nuclear JRC and EURATOM)

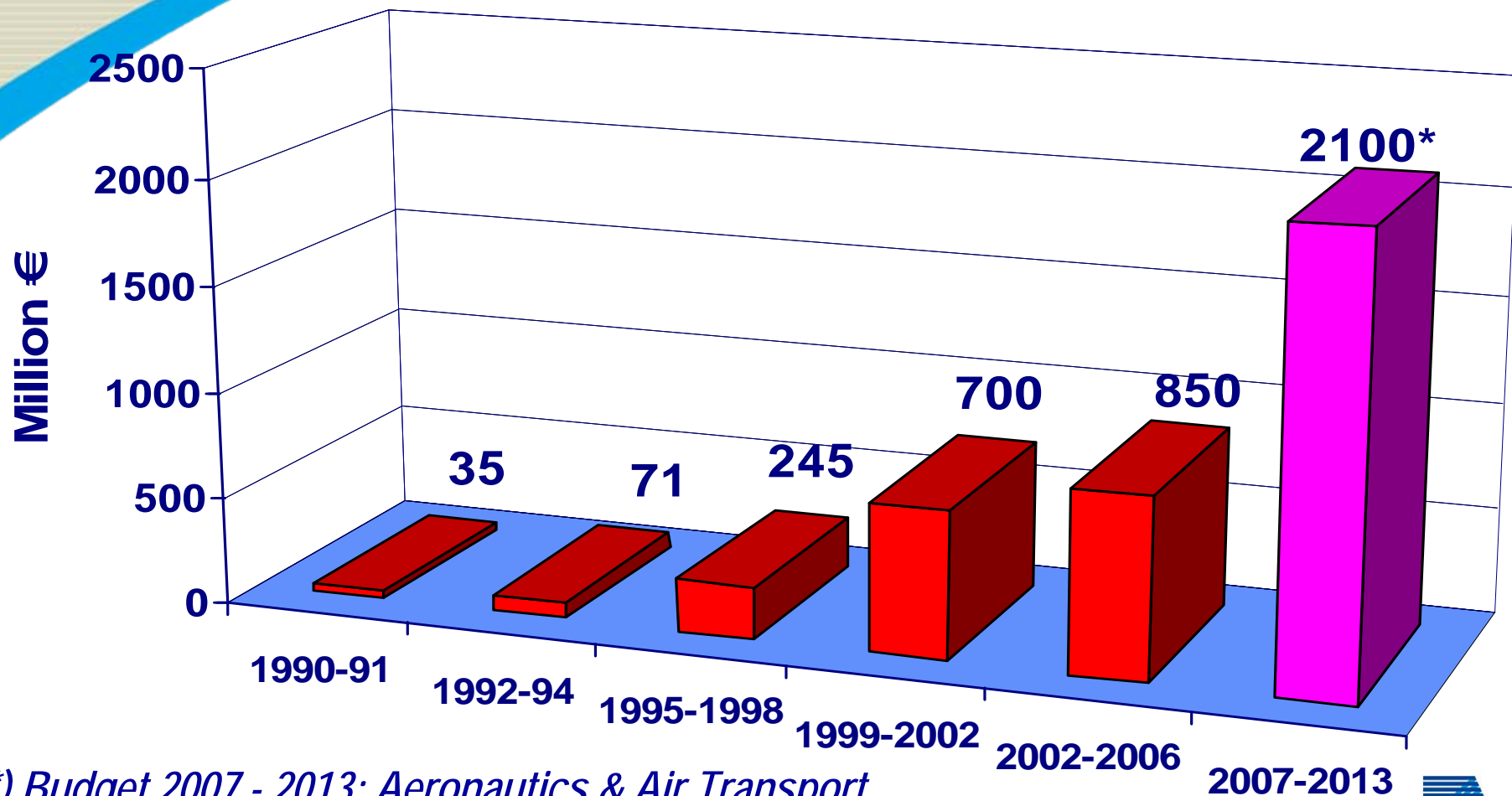
DG Research-H - 11 -



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R&TD Funding for Specific Aeronautics Research on EU Level *in million Euro*



*) Budget 2007 - 2013: Aeronautics & Air Transport
(Collaborative Research + JTI) and SESAR (350 mio €)



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Key Points

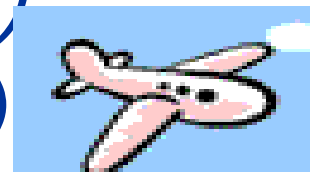
- **European Commission funding for pre-competitive research and technology development activities**
- **Multi-national project teams involving Industrials, SMEs, Universities, Research Institutes, etc.**
- **100% funding for consortium management activities**
 - limited to about 4% of project value
- **50% funding for research and technology development activities**
- **75% for Research institutes, Universities and SMEs**
- **Duration typically**
 - 3 years for level 1 and
 - 5 years for level 2 ,
 - but can be shorter or longer



The “Transport” Theme

(Tentative Budget Breakdown)

- Aeronautics & Air Transport *(2.100 mio €)*
 - Collaborative Research (L1 & L2)
 - JTI “Clean Sky”(800 mio €)
 - Support to SESAR (350 mio €)
- Surface Transport *(1.108 mio €)*
 - Road (including urban)
 - Rail (including urban)
 - Waterborne (maritime & inland)
- Support to the European Navigation Satellite System (Galileo) *(518 mio €)*





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7th Framework Programme

Aeronautics & Air Transport

(2007 – 2013)

Activities

1. The **greening** of air transport
2. Increasing **time** efficiency
3. Ensuring **customer** satisfaction and safety
4. Improving **cost** efficiency
5. **Protection** of the aircraft and passengers
6. **Pioneering** the air transport of the future





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Research / Technology and Product Development in Aeronautics

Research and technology acquisition

Product development

Fundamental knowledge

Technology development

Technology validation

Demonstrators

Prototypes

Product definition

Product design and development

Product demonstration

Production

EU Framework Programme

Level 1

Collaborative
Research

Level 2

F.P.7 Concept: Level 3 Joint Technology Initiative

EUREKA

-10

-5

0

years

+5



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7th Framework Programme **Aeronautics & Air Transport** *(2007 – 2013)*

Success Rate by Instrument of the Call 2007 and the Call 2008

- **Level1:** Call 2007: 26 out of 167 proposals
Call 2008: 28 out of 223 proposals
- **Level 2:** Call 2007: 4 out of 5 proposals
Call 2008: 4 out of 6 proposals
- **CSA:** Call 2007: 6 out of 20 proposals
Call 2008: 11 out of 24 proposals



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Aeronautics and Air Transport Summary 1st and 2nd Call FP7 *Level 1 Funding*

<i>Greening</i>	<i>44.0 M€</i>	<i>(21%)*</i>
<i>Time Efficiency</i>	<i>7.2 M€</i>	<i>(3%)**</i>
<i>Customer Satisfaction & Safety</i>	<i>30.8 M€</i>	<i>(14%)</i>
<i>Cost Efficiency</i>	<i>104.5 M€</i>	<i>(49%)</i>
<i>Security</i>	<i>9.2 M€</i>	<i>(4%***)</i>
<i>Pioneering</i>	<i>19.6 M€</i>	<i>(9%)</i>
<i>TOTAL</i>	<i>215.3 M€</i>	<i>(100%)</i>

* The “Clean Sky” JTI will be a major contributor to Greening

** The “SESAR” JU covers an important part of activities for
Time Efficiency

*** The Security Programme in FP7 also covers work of interest
to Aeronautics and Air Transport



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7th Framework Programme **Aeronautics & Air Transport** *(2007 – 2013)*

Conclusions on 2nd Call (2008)

- **Good overall response, good quality of proposals**
- **Re-submissions improved**
- **Work programme reasonably covered**
- **Stable SME participation – possibly near ceiling?**
- **International cooperation improving and evident**
- **Breakthrough technologies showing innovation**
- **Good balance between industrial competitiveness and public good**
- **Interface “Clean Sky” and “SESAR”**



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JTI "Clean Sky"

Integrated Technology Demonstrators (ITD)

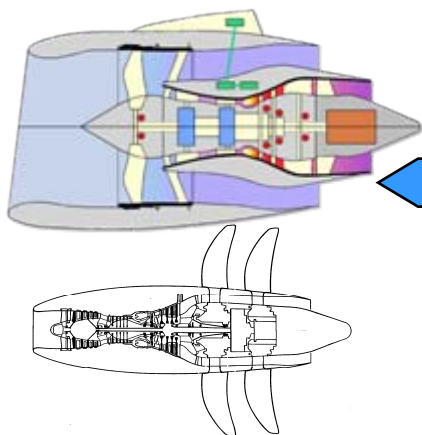


SMART Wing Aircraft

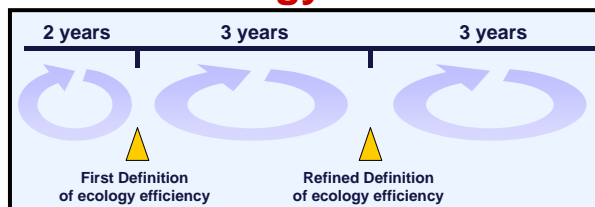


Regional Air Transport

Green Engines



Technology Evaluator

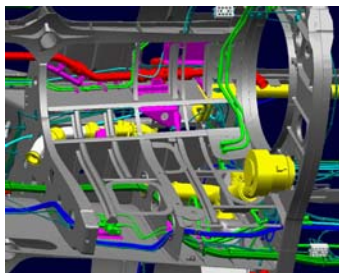


Simulator Platform AC, ATM, AP (flight segment)

ATS Model



Green Rotorcraft



Eco-Design



Systems for Green Operation

Linked to "SESAR" Joint Undertaking










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JTI "Clean Sky" – Targets

Technology Evaluator

ITD	Smart Fixed Wing Aircraft	Green Regional	Green Rotorcraft	Sustainable & Green Engines	Systems for Green Operations	Eco Design
Activities	Active Wing New Aircraft Configurations	Advanced Aerodynamics (Low Drag & Noise) Low Weight Structures	New Powerplants Innovative Blades & Rotors New Aircraft Configurations	Advanced LP & HP System Technology New Engine Concepts (i.e. Open Rotor)	Mission & Trajectory Management Aircraft Energy Management	Whole Life Cycle Environmental Impact Analysis
Targets	CO ₂ ~12 to 20% Noise ~10dB	CO ₂ ~10 to 20% Noise ~10dB	CO ₂ ~26 to 40% NO _x ~53 to 65% Noise ~10dB	CO ₂ ~15 to 20% NO _x ~15 to 40% Noise ~15dB	CO ₂ ~10 to 15% Noise ~17dB	CO ₂ ~10% Noise ~10dB

Products	Widebody 2020	Narrowbody 2015	Regional 2020	Corporate 2020	Rotorcraft 2020
					
	CO ₂ -30% NO _x -30% Noise -20dB	CO ₂ -20% NO _x -20% Noise -15dB	CO ₂ -40% NO _x -40% Noise -20dB	CO ₂ -30% NO _x -30% Noise -10dB	CO ₂ -30% NO _x -60% Noise -10dB



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JTI “Clean Sky” Call for Proposals (CfP)

Proposed steps of selection process

Call for Proposal Process and Competitive Selection

- **Proposals will be selected according to open and transparent competitive procedures**
- **Open criteria agreed by the Governing Board**
- **The selection will be done with the assistance of independent experts**
- **Call for Proposals will contain clear details of the assessment criteria that will be defined to select the best proposals having regard to all relevant factors.**
- **Calls published under: www.cleansky.eu**



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Development of the Single European Sky (SES) Policy

- **Policy preparation launched in 1999, 2000 (High Level Group)**
- **2004: Framework legislation adopted**
- **2005/2006: SESAR Definition phase started (TEN financed)**
- **2007: SESAR Joint Undertaking set up**
- **2008: Update of the SES framework, ATM Masterplan, PPP**
- **2008: SESAR Development & Validation phase starts (PPP EC – Eurocontrol - industry)**

Source: DG TREN - 06/2008



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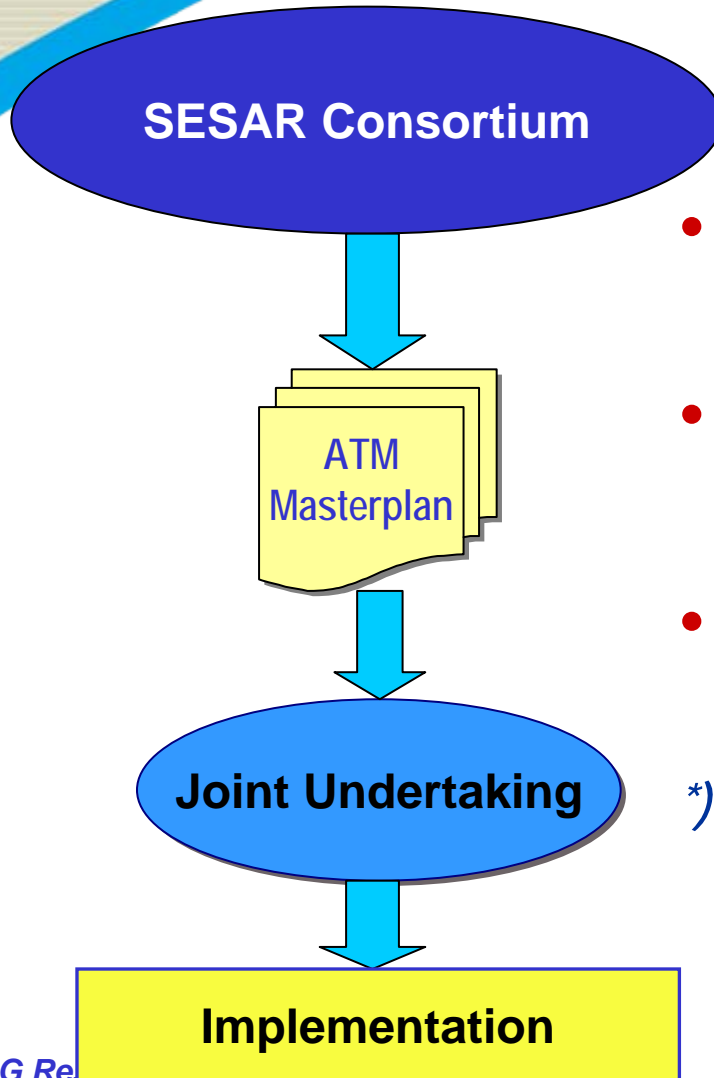
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SESAR* Organisation

The three phases of SESAR:

- **Definition Phase (2005 - 2007),**
delivering the European ATM Master Plan
- **Development Phase (2007 - 2013)**
to develop the new systems
- **Implementation Phase (2014 -)**
deploy the new technologies

*) *SESAR = Single European Sky ATM Research*





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Single European Sky ATM Research SESAR

The Goals of SESAR

Enabling EU skies to handle 3
times more traffic

Improving safety by a factor of 10

Reducing the environmental
impact per flight by 10%

Cutting ATM costs by 50%

Joint Undertaking

**European
Commission**

EUROCONTROL

Industry

=

Public – Private
Partnership

700M€

700M€

700M€

2 Funding members

3rd funding member

Created by the European Union Council Reg No 219/2007

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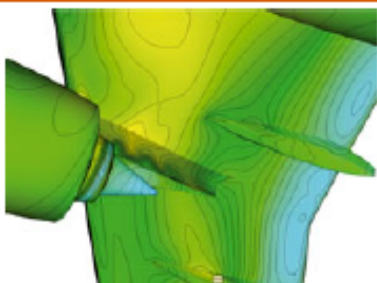
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Technology Needs for Ambitious Goals

ACARE's ambitious goals:

50% cut in CO₂ emissions > Vision 2020

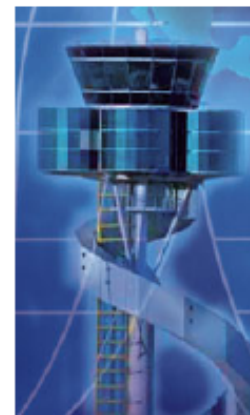
Aircraft manufacturers 20-25%



Engine manufacturers 15-20%



Operations 5-10%
Air Traffic Management



A Clean Sky

Source: Airbus Global Market Forecast 2007 - 2026





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WakeNet 3 – Europe

Coordination Action for Wake Vortex Research in Europe

Co-ordination of EU research activities

- ATC-Wake, FAR-Wake, CREDOS, national research

International co-operation with

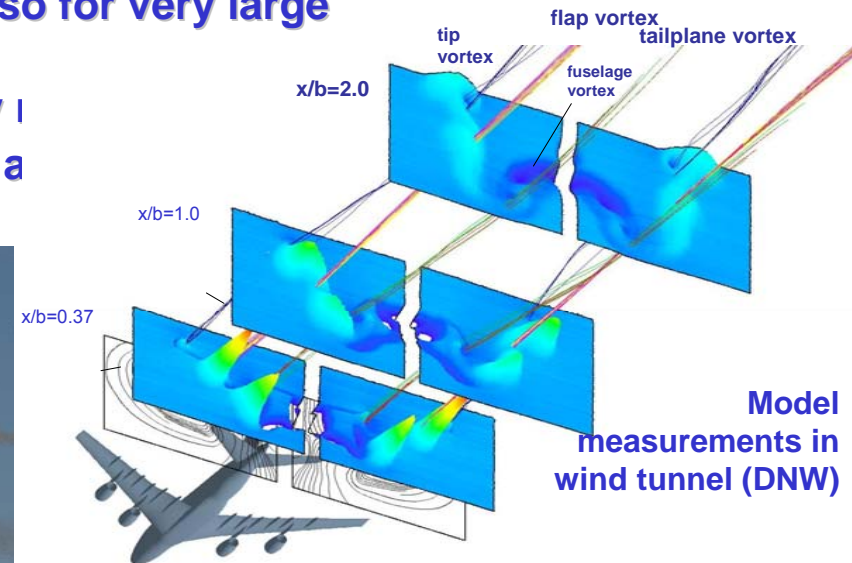
- Wakenet USA, Russia

Co-ordination objectives:

- Assure present ICAO safe separation distances to remain valid also for very large transport aircraft
- Increase airport capacity by 1
- Explore means to minimise a



AWIATOR Project A340 Flight Test



Model
measurements in
wind tunnel (DNW)

Source: Klaus Huenecke, Airbus D



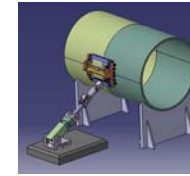
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Synergy from EU Projects

3rd Generation

High-fidelity simulation for
fast production of
integrated composite
airframes



FP7: MAAXIMUS

'As-built'
Component Level
Simulation-based design

2nd Generation

"Composite-oriented
design"



FP6: ALCAS

Sub-Component Level
Design Manufacturing Testing
(CWB / LG, Keel-beam, Large cut-out,
PAX door surround)
Composite sizing criteria

1st Generation

"Black metal CRFP
parts design"



FP5: TANGO

Design, manufacturing, test and
mechanical evaluation of composite
technologies at **component level**
No Virtual Development

Source: Airbus-F

2000

2004

2008

2012

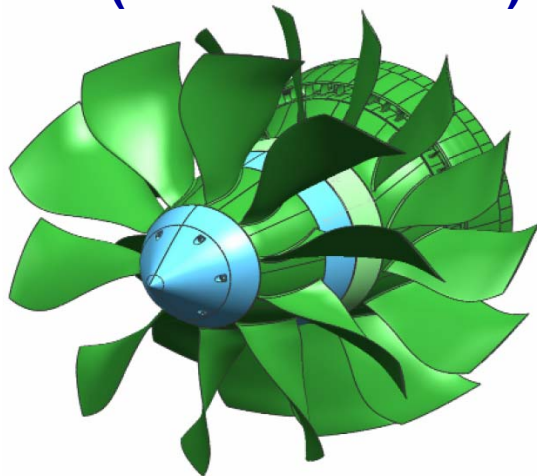


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VITAL

(90 M€ Total Cost)

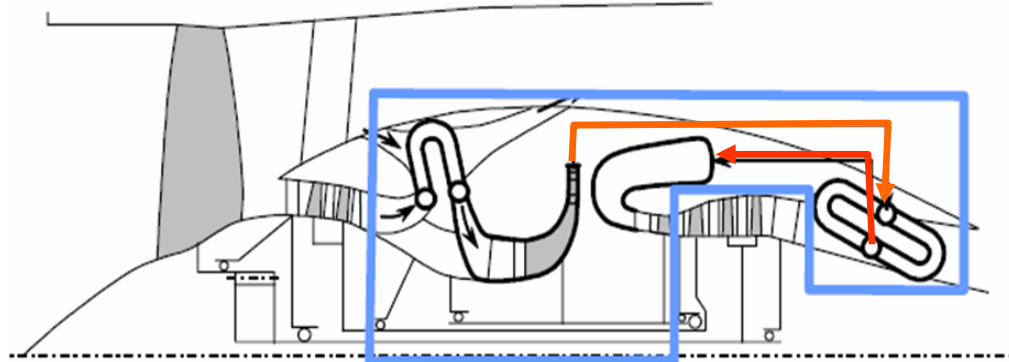


SNECMA property

Aero-Engines

NEWAC

(75 M€ Total Cost)

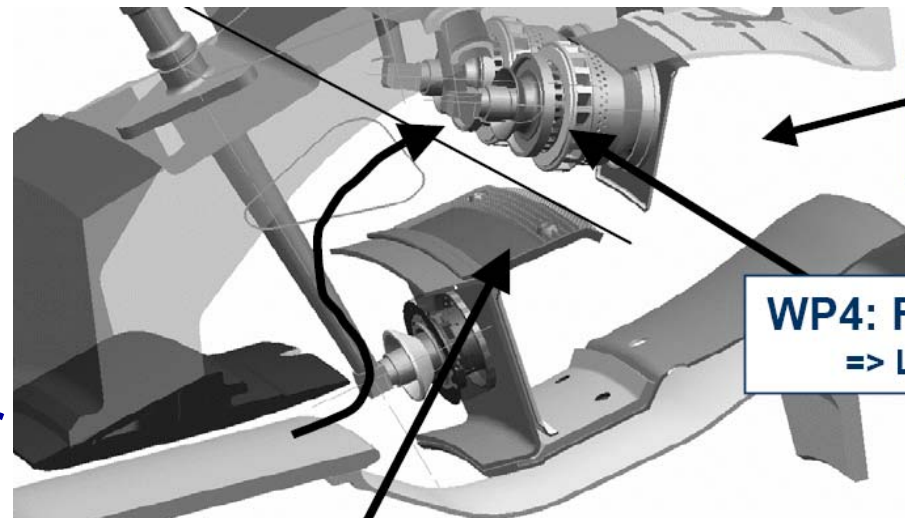


New engine architectures for

- Higher Propulsive Efficiency (less CO₂)
- Less Noise
- Better Thermodynamic Cycle Efficiency (less CO₂)

Clean (Lean) Combustors for

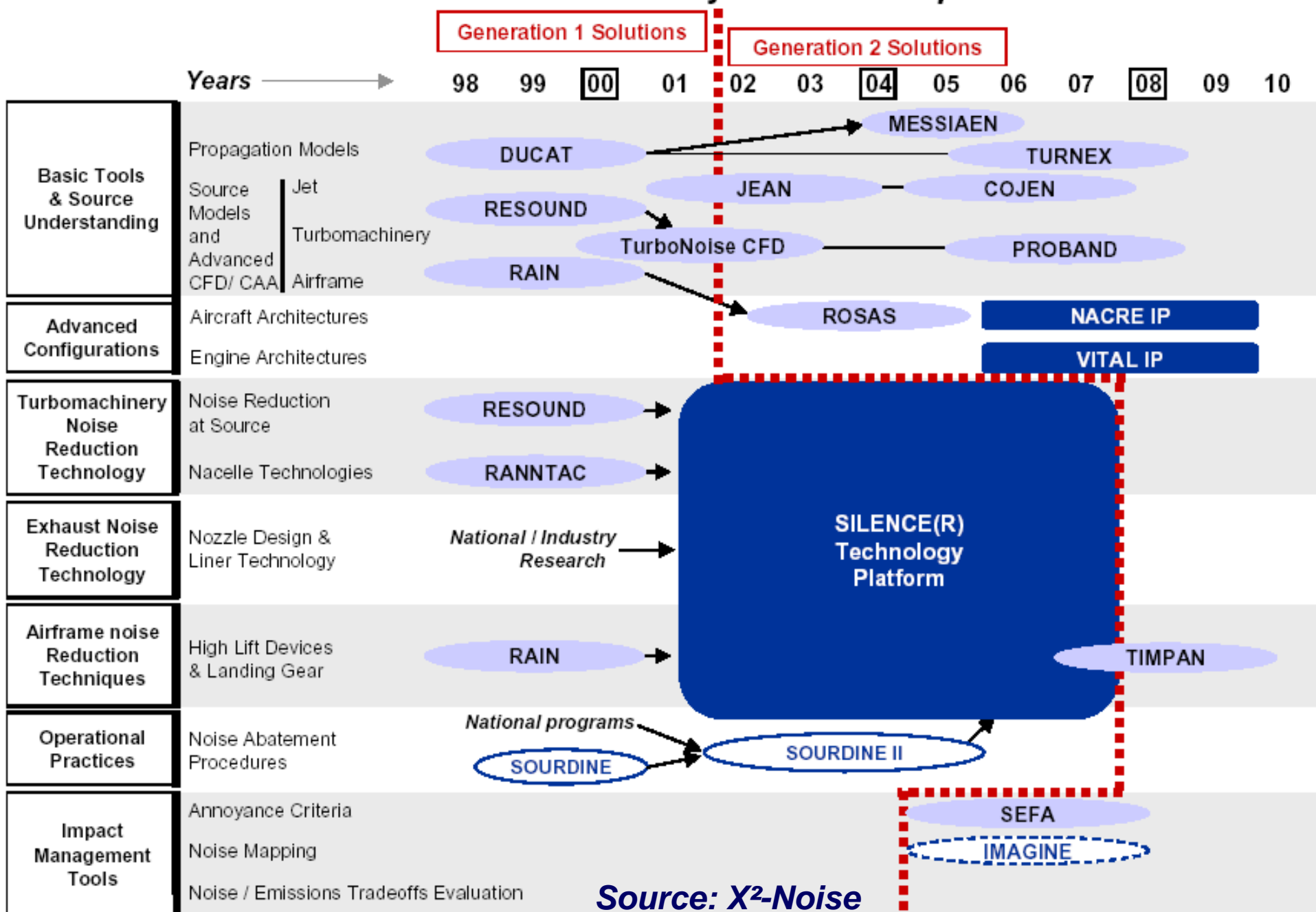
- Less NO_x Emissions
- Less particles, soot, etc.



LOPOCOTEP

(7.1 M€ Total Cost)

Aircraft Noise Projects Roadmap





FP7 - Aeronautics and Air Transport (2007 – 2013)

Proposed Way Forward

- **Future Annual Calls**
 - 2010 Call 114 M€ (estimated)
 - 2011 Call 132 M€ (estimated) **To be decided when which**
 - 2012 Call 163 M€ (estimated) **instruments will be used**
 - 2013 Call 144 M€ (estimated)
- **Max. funding to Level 1 projects proposed limit of 5.0 M€**
- **WP for Level 1 in 2010 Call:**
 - Open to all topic areas in **Greening, Cost Efficiency and Pioneering**
 - Focusing **Time Efficiency and Customer Satisfaction and Safety** to only topic areas not covered in the first two Calls
- **Max. funding to Level2 projects proposed limit of 40 M€**



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Subjects for Focussed Research Collaborative Projects (Level 1 or CP-FP) and Support Actions (coordinating, CSA-CA)

- **Flight Physics**
- **Aero-structures**
- **Propulsion**
- **Systems & Equipment**
- **Avionics**
- **Design Systems and tools**
- **Production**
- **Maintenance**
- **Air Traffic management**
- **Airports**
- **Human Factors**



These subjects are likely to remain for all the duration of FP7



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FP7 - Aeronautics and Air Transport *(2007 – 2013)*

Future Calls

WP2010 will focus on the Specific Programme activities of greater strategic importance

- ***The Greening of Air Transport***
- ***Improving Cost efficiency***
- ***Pioneering the Air Transport of the Future***

Some topics also be on **Safety, Time Efficiency and Security**

Complementarity and synergy with the Joint Technology Initiatives:

Clean Sky, SESAR and Fuel Cell & Hydrogen JTI

particularly in the selection of topics for "The Greening of Air Transportation"



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FP7 - Aeronautics and Air Transport ***(2007 – 2013)***

Implementation of the Call 2010 ***Tentative Planning***

- Inputs of the Stakeholders until Oct. 2008
- Commission internal consultation from Nov. 2008
- Consultation with Advisory Group, PC Transport Spring 2009
- Adaption of the Call July 2009
- Publication of the Call 30th July 2009
- Closing of the 3rd Call 14th January 2010



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The European Aeronautics industry network for R&T **IMG4**

- ASD-IMG4 coordinates industry's position with regard to the EU R+TD Framework Programmes.
- ASD-IMG4 represents, through the Industry Management Groups (IMG), the European Aeronautics Industry.

**IMG4 comprises representation
from four groupings :**

Euromart IMG

Agusta-Westland
Alenia Aerospazio
Airbus SP
Airbus G
Airbus F
Airbus UK (A)
Dassault-Aviation
Eurocopter
SAAB AB
S.A.B.C.A.
GKN-Westland

Engine IMG

SNECMA
Rolls-Royce
MTU Aero Engines
RRD
Turbomeca
ITP
AVIO
Volvo Aero
Techspace Aero
Alstom
PBS Velká Bíteš
WSK Rzeszow

Equipment IMG

Galileo Avionica
BAE systems avionics
Diehl Aerospace
Hellenic Aerospace Ind.
AG Liebherr-Aerospace
Barco
Messier-Dowty Ltd
Messier-Bugatti
GE Aviation
Goodrich
Thales Avionics
Thales AES
ZF Luftfahrttechnik GmbH

Qinetiql
Cesa
Dräger AG
Netherland
Sagem (A)
Selex Comms
Nord-micro
Skysoft
Saab Tech
ISQ
Jihostroj
Meggitt

ATM - IMG

AMS
Thales Air Defence
Thales Avionics
Bae Systems
Galiléo Avionica
Thales Alenial Space
Noesis (Danotec)
Selex Communication
Helenic Aerospace Industry
Dassault Aviation
Eurocopter
GE Aviation

Airbus
Avitech
Indra
Raytheon



Equipment Industry Manufacturing Group - EqIMG

- The EqIMG was formed 17 years ago as an open forum for the European equipment industry
- To provide a technical interface between the European equipment industry and the European Commission in order to prepare and to define suitable programmes and subjects for research in the field of aeronautical equipment.
- Currently 26 participants from 11 Member States representing major companies, trade organisations and AeroSME.



EqlMG - How it works

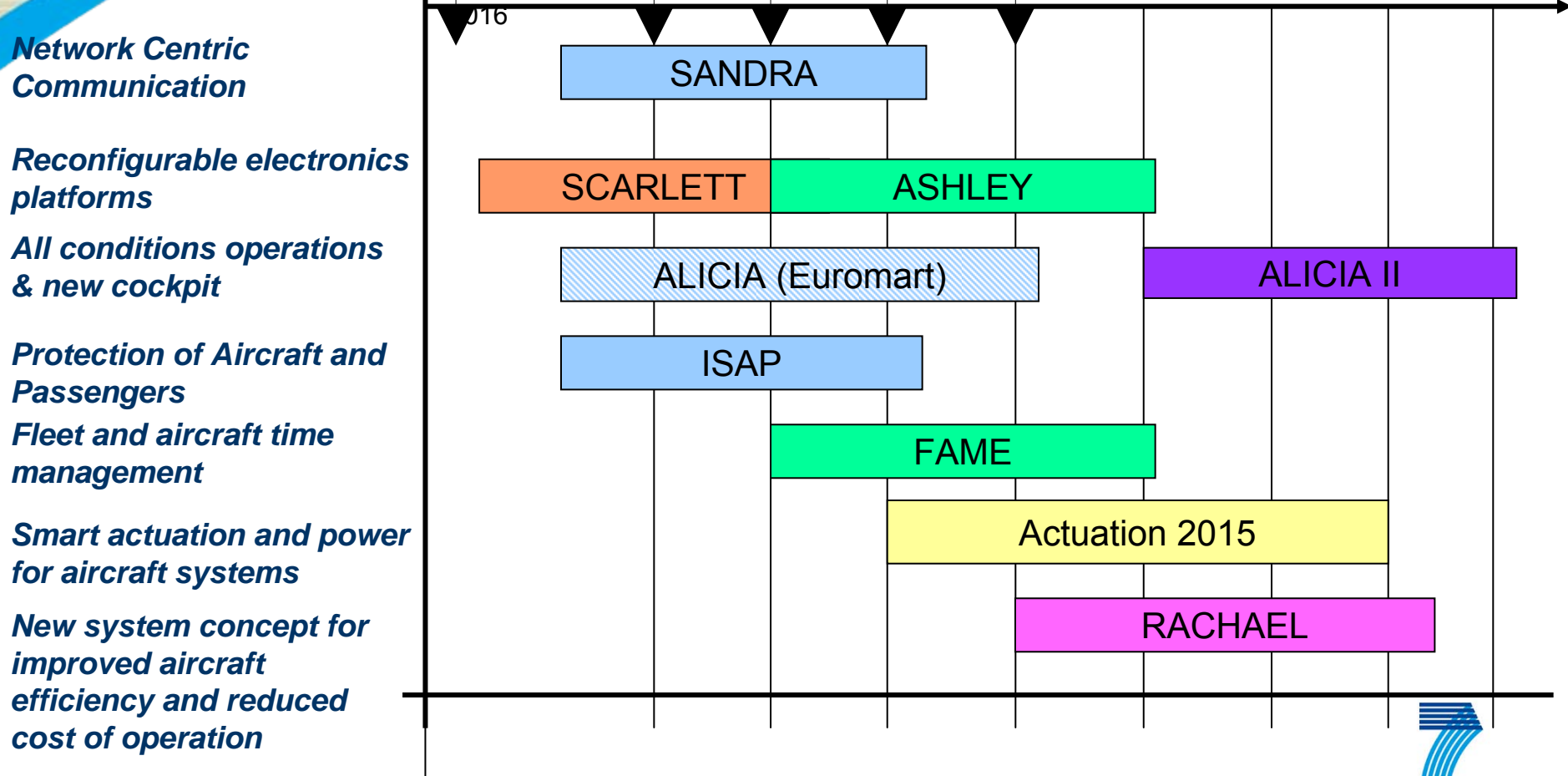
- One meeting every month the most often in Brussels
- EqlMG collects all research ideas from Equipment sector
- EqlMG co-ordinates the proposals from the equipment sector
- Decisions are taken on the basis of consensus
- EqlMG co-ordinates its activity with the other groups (airframe, engines, ATM, research centres, universities)



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Current roadmap for EqIMG L2 projects





Current European Commission view of future topics

- Cost Efficiency and Greening are the 'most demanded' WP areas the level of intensity seems correct and should continue in next calls
- Customer Satisfaction and Safety could see a reduction, while ensuring that gaps in covering some topics are addressed
- Time efficiency and security could be reduced to focus only the topics not yet covered, considering that RTD in both areas are addressed in other initiatives (SESAR and Security Programme)
- Stronger focus on Pioneering merit attention in view of the large number of WP topics not yet covered



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IMG4 Response

- **IMG4 is in the process of developing a revised strategy**
 - Developing a list of Level 1 topics for Call 3
 - Reviewing existing list of level 2 projects in the light of the
 - ◆ Reduced funding
 - ◆ Changing European Commission requirements



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Thank you for your attention !

