



Aeronautics & Air Transport Research in the 7th EU Framework Programme (FP7)



ACTIVITIES AND RESULTS SO FAR

EUROPEAN COMMISSION
DG Research Aeronautics



Activities and Results in EU FP7 Aeronautics Research

Contents

- ◆ 6 Activities
 - with Examples of projects
- ◆ Calls for Proposals in FP7 Aeronautics so far
- ◆ International cooperation

FP7 Aeronautics & Air Transport Research

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

FP7 Aeronautics - Activities

1. The Greening of Air Transport

Embraces both the **global** issue of **climate change** (CO₂, NO_x, soot, vapour, particulates) and **local** issues of **noise** and **air quality**

◆ Green Aircraft

Flight Physics,
Aero-structures,
Propulsion,
Systems and Equipment

◆ Eco - Production and Maintenance

◆ Green Air Transport Operations

Flight and Air Traffic Management, Airports

Goals 2020

-50% CO₂
-80% No_x
Per
passenger
-km

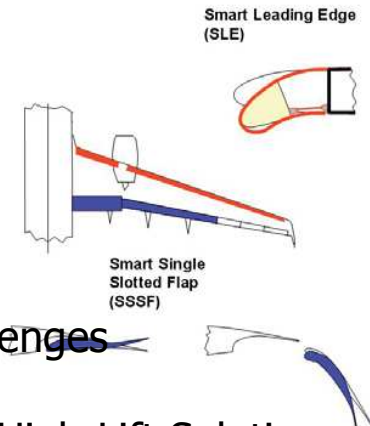
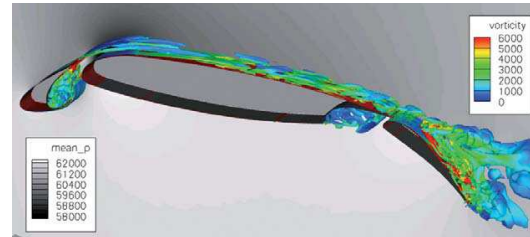
-50% noise
ie -10 dB

+recycling
--waste

ACARE SRA2
Ultra Green HLTC

FP7 Aeronautics - Examples

1. The Greening of Air Transport



ACFA 2020 Active **Control** of Flexible 2020 Aircraft

ATAAC Advanced **Turbulence Simulation** for Aerodynamic Application Challenges

WakeNet3-Europe European Coordination Action for Aircraft **Wake Turbulence**

DESIREH Design, Simulation and Flight Reynolds-Number Testing for Advanced High-Lift Solutions

SADE **Smart High Lift Devices** for Next-Generation Wings

DREAM valiDation of Radical Engine Architecture systeMs

ERICKA Engine Representative Internal Cooling Knowledge and Applications

FUTURE Flutter-Free Turbomachinery Blades

ELUBSYS Engine **LUBrication** SYStem technologies

KIAI Knowledge for **Ignition**, Acoustics and Instabilities

TECC-AE Technology Enhancements for Clean **Combustion**

ALFA-BIRD Alternative **Fuels** and Biofuels for Aircraft Development

GreenAir Generation of **Hydrogen by Kerosene Reforming** via Efficient and Low-Emission New Alternative, Innovative, Refined Technologies for Aircraft Application



FP7 Aeronautics - Examples

1. The Greening of Air Transport

OPENAIR Optimisation for Low Environmental **Noise** Impact Aircraft

TEENI Turboshaft Engine **Exhaust** Noise Identification

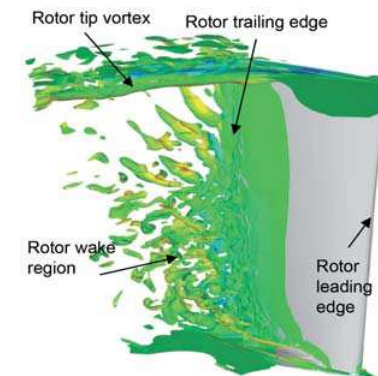
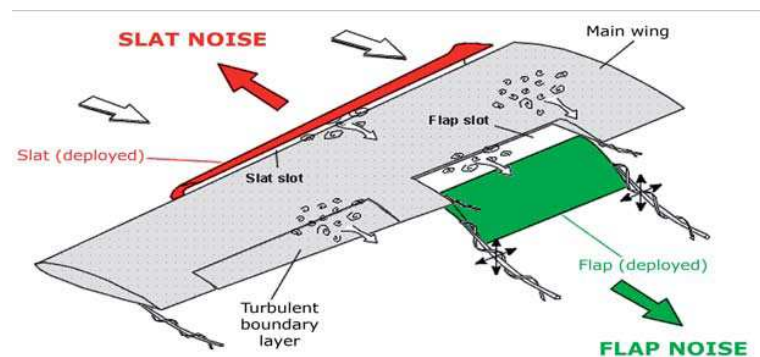
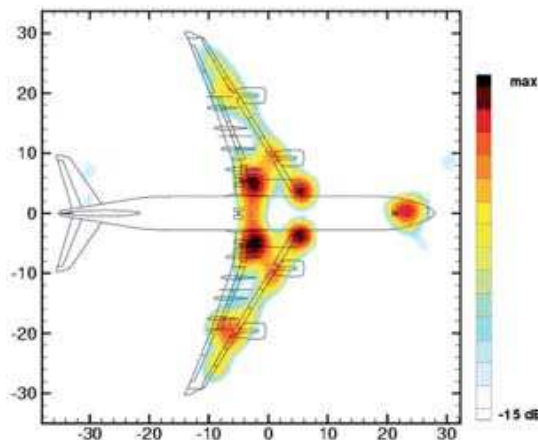
FLOCON Adaptive and Passive Flow Control for **Fan** Broadband Noise Reduction

VALIANT VALidation and Improvement of Airframe **Noise prediction Tools**

COSMA **Community Oriented** Solutions to Minimise aircraft noise Annoyance



24-bladed rotor



REACT4C Reducing Emissions from Aviation by Changing **Trajectories** for the Benefit of Climate

FP7 Aeronautics - Activities

2. Increasing Time Efficiency

Aims at significant **reduction of journey time** through maintaining flight time within **schedule** and minimising the time that passengers have to spend in **airports** in the travel-related process.

◆ Improved Aircraft Throughput

Systems and Equipment, Avionics,
Maintenance and Repair

◆ Time Efficient Operations

Air Traffic Management
(only SESAR!),
Airports



Goals 2020

x3 a/c
movements

99% flights
within 15
min schedule

Time in
airports:
15 min for
short-haul
30 min for
long-haul

ACARE SRA2
Highly Time Efficient HLTC



FP7 Aeronautics - Activities

2. Increasing Time Efficiency

ALICIA All Condition Operations and Innovative Cockpit Infrastructure



ASSET Aeronautic Study on Seamless Transport

TITAN Turnaround Integration in Trajectory and Network



FP7 Aeronautics - Activities

3. Safety & Customer Satisfaction

Aims at a significant reduction in **accident** rate and at a quantum leap in passengers **choice** and **schedule flexibility**

◆ **Aircraft Safety:** Aero-structures, Systems & Equipment, Avionics, Human Factors

◆ **Operational Safety:** Design systems and tools, Maintenance, ATM (only SESAR!), Airports, Human Factors

◆ **Passenger Friendly Cabin:** Design, Noise and Vibration, Systems & Equipment

◆ **Passenger Friendly Operations** Maintenance and Repair, Airports

Goals 2020

-80%
accident
rate

+
elimination
and
recovery of
human
errors

+ mitigation
of effects of
survivable
accidents

+
passenger
choice

FP7 Aeronautics - Examples

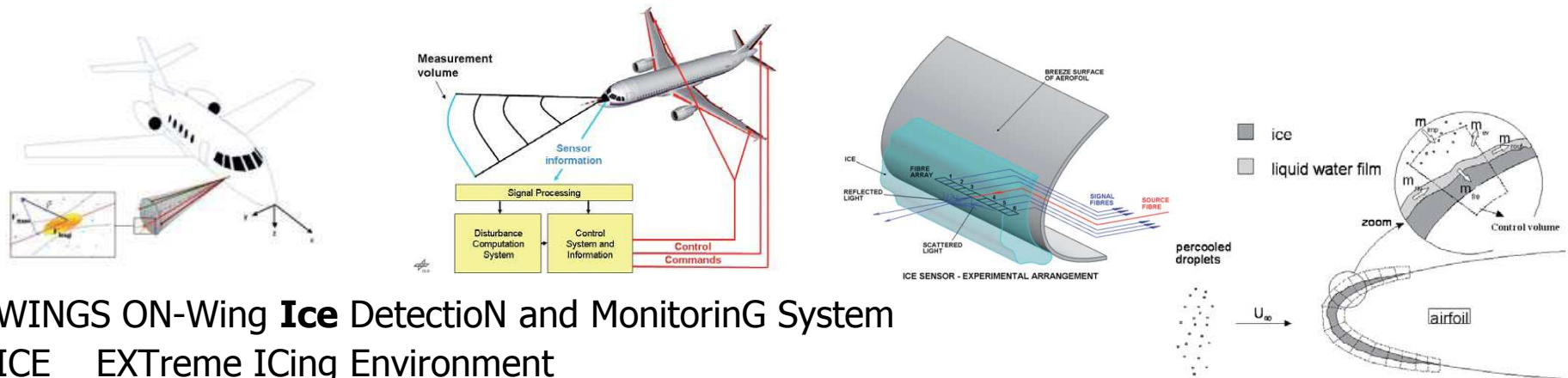
3. Safety & Customer Satisfaction

ADDSAFE Advanced **Fault Diagnosis** for Safer Flight **Guidance and Control**

DANIELA Demonstration of **Anemometry** InstrumEnt based on **LAser**

DELICAT DEmonstration of **LIdar**-based **Clear Air Turbulence detection**

GREEN-WAKE Demonstration of LIDAR-based **wake vortex detection** system incorporating an Atmospheric Hazard Map



ON-WINGS ON-Wing **Ice** Detection and Monitoring System

EXTICE EXTreme ICing Environment

LAYSA **Multifunctional Layers** for Safer Aircraft Composite Structures

IAPETUS Innovative **Repair** of Aerospace Structures with Curing Optimisation and Life-cycle Monitoring Abilities

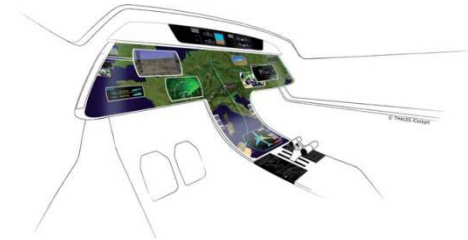
PICASSO Improved Reliability **Inspection** of Aeronautic Structure through Simulation Supported POD

TRIADE Development of Technology Building Blocks for **Structural Health-Monitoring** Sensing Devices in Aeronautics

FP7 Aeronautics - Examples

3. Safety & Customer Satisfaction

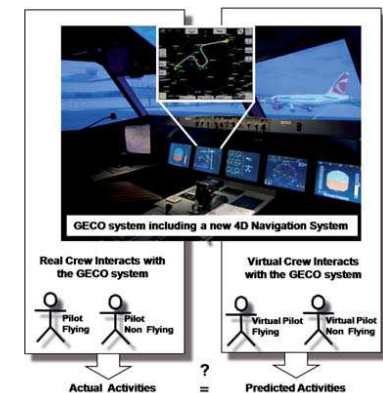
HUMAN	Model-Based Analysis of Human Errors During Aircraft Cockpit System Design
SUPRA	Simulation of UPset Recovery in Aviation
VISION	Immersive Interface Technologies for Life-Cycle Human- Oriented Activities in Interactive Aircraft-Related Virtual Products
MISSA	More Integrated System Safety Assessment
ODICIS	One Display for a Cockpit Interactive Solution



SCARLETT	SCAlable and Reconfi gurableLe Electronics plaTforms and Tools
SAFAR	Small Aircraft Future Avionics Architecture
HISVESTA	High Stability Vertical Separation Altimeter Instruments

AAS	Integrated Airport Apron Safety Fleet Management
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iSPACE	innovative Systems for Personalised Aircraft Cabin Environment
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FP7 Aeronautics - Activities

4. Improving Cost Efficiency

Embraces all the **cost** that arise in the **whole air system design** and **operation**

◆ Aircraft Development Cost:

Design Systems and Tools, Aero-structures, Systems & Equipment, Avionics, Production

◆ Aircraft Operational Cost

Flight Physics, Aero-structures, Propulsion, Systems, Avionics, Maintenance

◆ ATS Operational Cost:

Design Systems and Tools, ATM (only SESAR!), Airports, Human Factors

Goals 2020

- 50% aircraft development cost
- 50% time to market
- 50% aircraft operating costs
- travel charges



ACARE SRA2
Highly Cost Efficient HLTC

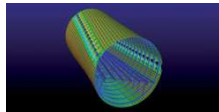


FP7 Aeronautics - Examples

4. Improving Cost Efficiency

CRESCENDO Collaborative and Robust Engineering using **Simulation** Capability Enabling Next **Design Optimisation**

FLEXA Advanced Flexible **Automation** Cell
 glFEM Generic Linking of **Finite Element** based Models
 FFAST Future Fast Aeroelastic **Simulation** Technologies
 ALEF Aerodynamic Load Estimation at Extremes of the Flight Envelope



MAAXIMUS More Affordable Aircraft through eXtended, Intergrated and Mature **nUmerical** Sizing
 IMac-Pro Industrialisation of Manufacturing Technologies for **Composite** Profiles for Aerospace Applications

INFUCOMP Simulation-Based Solutions Industrial Manufacture of **Large Infusion** Composite Parts

ADVITAC ADVance Integrated Composite **Tail Cone**

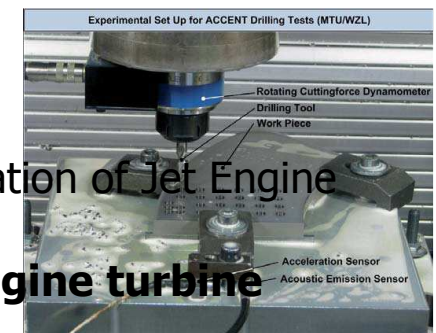
COALESCE2 Cost Efficient Advanced **Leading Edge** Structure

FANTOM Full-Field Advanced **Non-Destructive** Technique for Online Thermo-Mechanical Measurement on Aeronautical Structures

AISHA II Aircraft Integrated **Structural Health Assessment** II

ACCENT **Adaptive Control of Manufacturing** Processes for a New Generation of Jet Engine Components

ADMAP-GAS Unconventional (Advanced) Manufacturing Processes for **Gas-engine turbine** components



FP7 Aeronautics - Examples

4. Improving Cost Efficiency

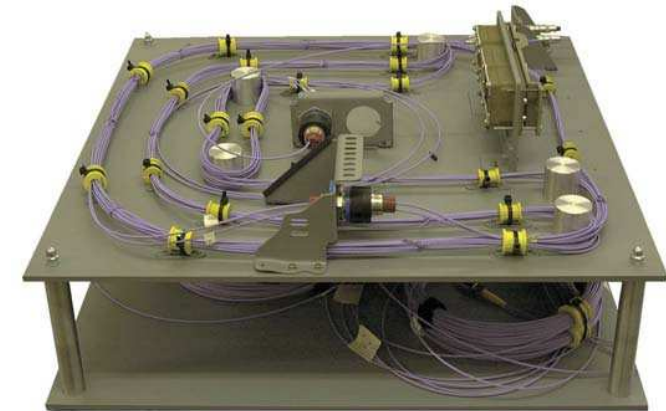
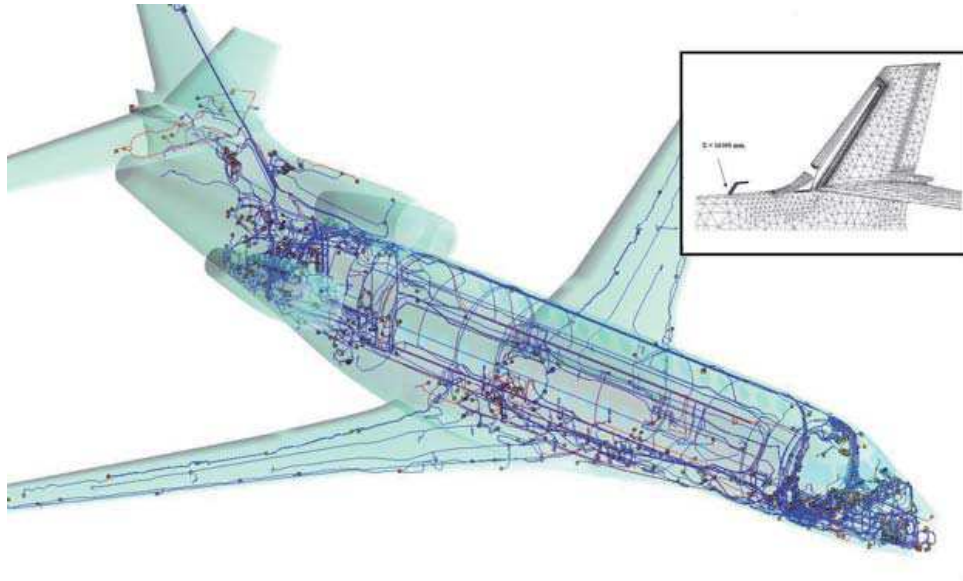
SANDRA Seamless Aeronautical **Networking** through integration of Data links, Radios and Antennas

CREAM Innovative Technological Platform for Compact and Reliable Electronic integrated in Actuators and Motors

TAUPE Transmission in Aircraft on Unique Path **wirEs**

DAPHNE Developing Aircraft **Photonic Networks**

HIRF SE HIRF Synthetic Environment research programme



FP7 Aeronautics - Activities

5. Protection of Aircraft & Passengers

Aims at making **impossible** that an **attacking** force of any kind succeeds in creating **injury, loss, damage or disruption** either on the travellers or on citizens.

◆ Aircraft Security

Aero-structures,
Systems and Equipment,
Avionics

◆ Operational Security

Airports, Human Factors,
Air Traffic Management (only SESAR!)



Goals

0% hostile
on-board or
external actions
against aircraft
or
against the air
transport system

ACARE SRA2
Ultra Secure HLTC

FP7 Aeronautics - Examples

5. Protection of Aircraft & Passengers

ATOM **Airport detection and Tracking** Of dangerous Materials by passive and active sensors arrays

BEMOSA **Behavioral** Modeling for Security in Airports



FLY-BAG Blastworthy **Textile-Based Luggage Containers** for Aviation Safety



FP7 Aeronautics - Activities

6. Pioneering Future Air Transport

Beyond 2020 horizon, to explore and pioneer the more **radical, revolutionary** technologies that might configure the **step changes** required in the air transport of the **second half of this century**.

Goals
Setting the foundations of new technology base & new paradigms

◆ Breakthroughs & Emerging Technologies

Lift, Propulsion,
Interior space, Life-cycle

◆ Step Changes in Air Transport Operation

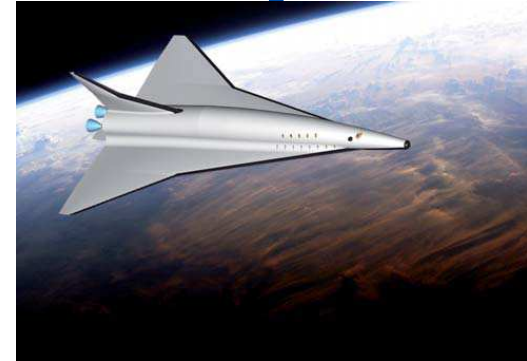
Novel Air Transport vehicles,
Guidance and control, Airports



FP7 Aeronautics - Examples

6. Pioneering Future Air Transport

FAST20XX Future **High-Altitude High-Speed** Transport 20XX

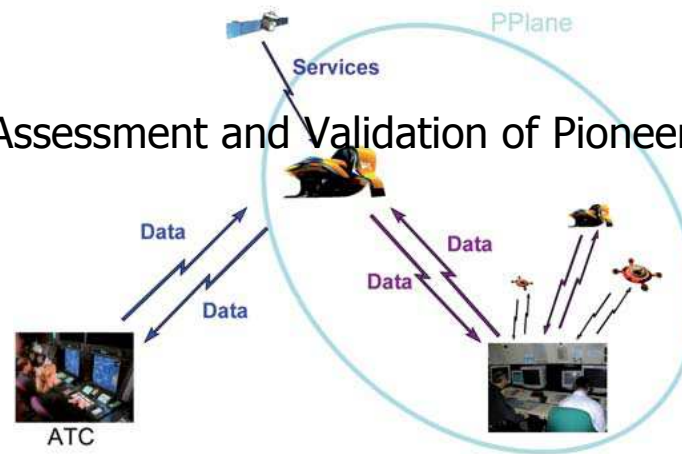


LAPCAT-II Long-term **Advanced Propulsion** Concepts and Technologies II



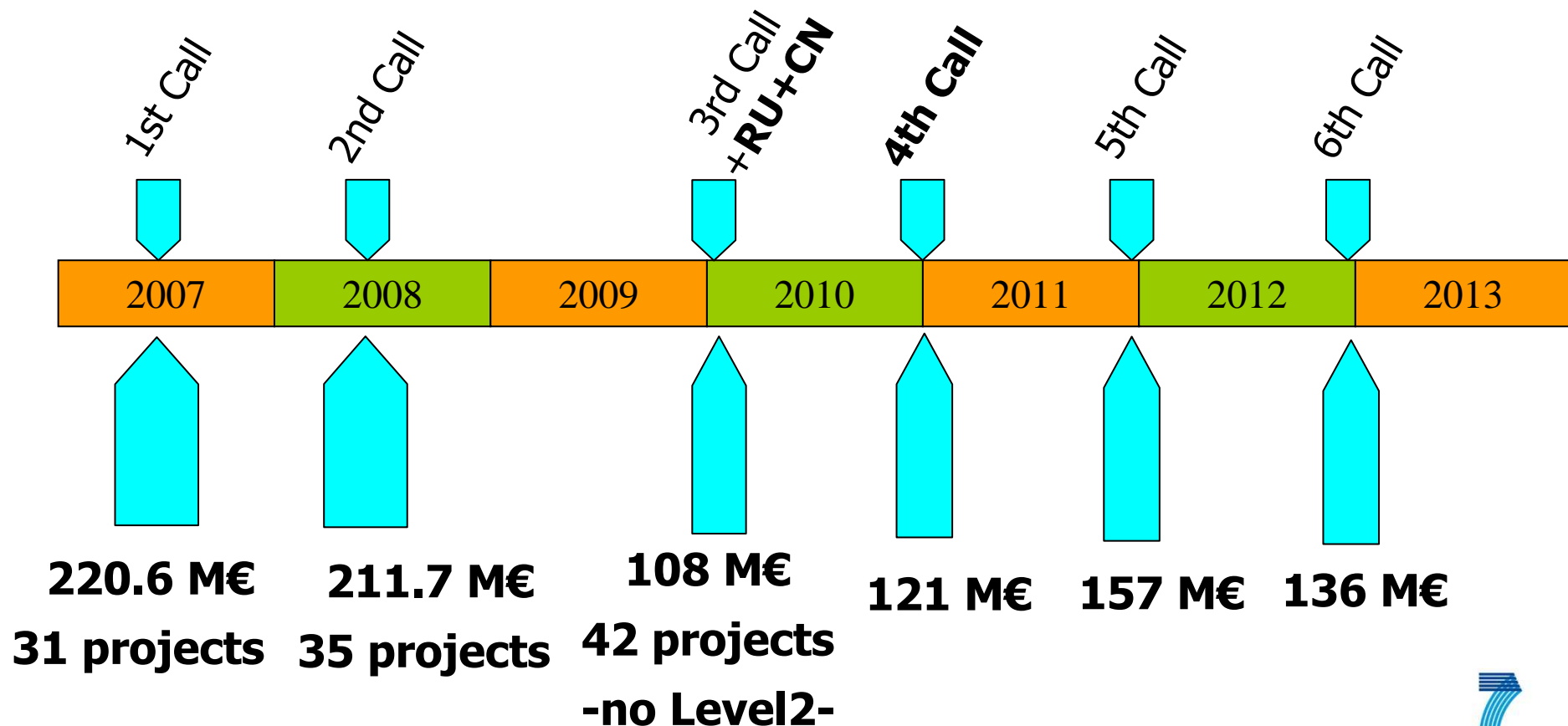
PLASMAERO Useful **Plasma** for **Aerodynamic** control

PPlane **Personal Plane:** Assessment and Validation of Pioneering Concepts for Personal Air Transport Systems



Indicative Roadmap Calls for Proposals

FP7 Aeronautics and Air Transport Collaborative Research & Support



Results 3rd Call – 2010 (Closed on 14 January 2010)

Scheme	n. Proposals Retained /Submitted	Funding M€	Examples
Level 1+CA	27/160	97.5/529	<ul style="list-style-type: none"> - CA X-NOISE - ATLLAS II - AircraftFire
SA	10/25	3.3/9	<ul style="list-style-type: none"> - AERODAYS2011 - CooperateUS
Level1 (Call Russia)	3/8	4/11 (EU only)	<ul style="list-style-type: none"> - Geodesic structures - Plasma anti Engine Noise - Flight data –Safety & Maint.
Level 1 (Call China)	2/4	3/6 (EU only)	<ul style="list-style-type: none"> - Ti Casting – Large Parts - Noise reduction methods

About 90% of grants negotiated and ready for issuing



EUROPEAN
COMMISSION

Community research



International Cooperation in Aeronautics Research

HOW to cooperate in FP7 ? – Evolution

< 2007 2008 (2009) **2010** 2011 2012 2013

...OPENING.....

..... **SUPPORT ACTIONS**

TWINNING.....

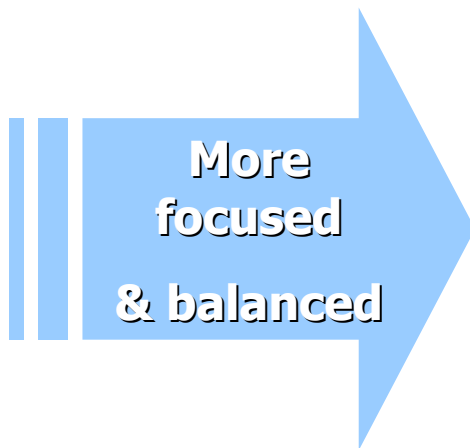
COORDINATED CALLS

- Co-participation = approx. 50/50
- Co-funding = each-side-pays-its-nationals
- Co-evaluation = peer review from both sides

RECIPROCITY

... ASSOCIATE TO FP7 ?

- "Gov2Gov" e.g. EU-RU WG on Civil Aero Research; e.g. EU-US (FAA) MoC – Annex I ATM;
- 3rd Countries experts as evaluators: <https://cordis.europa.eu/emmfp7/>



WHERE?: Progress of International Initiatives in FP7 Aeronautics, beyond the overall FP7 opening

