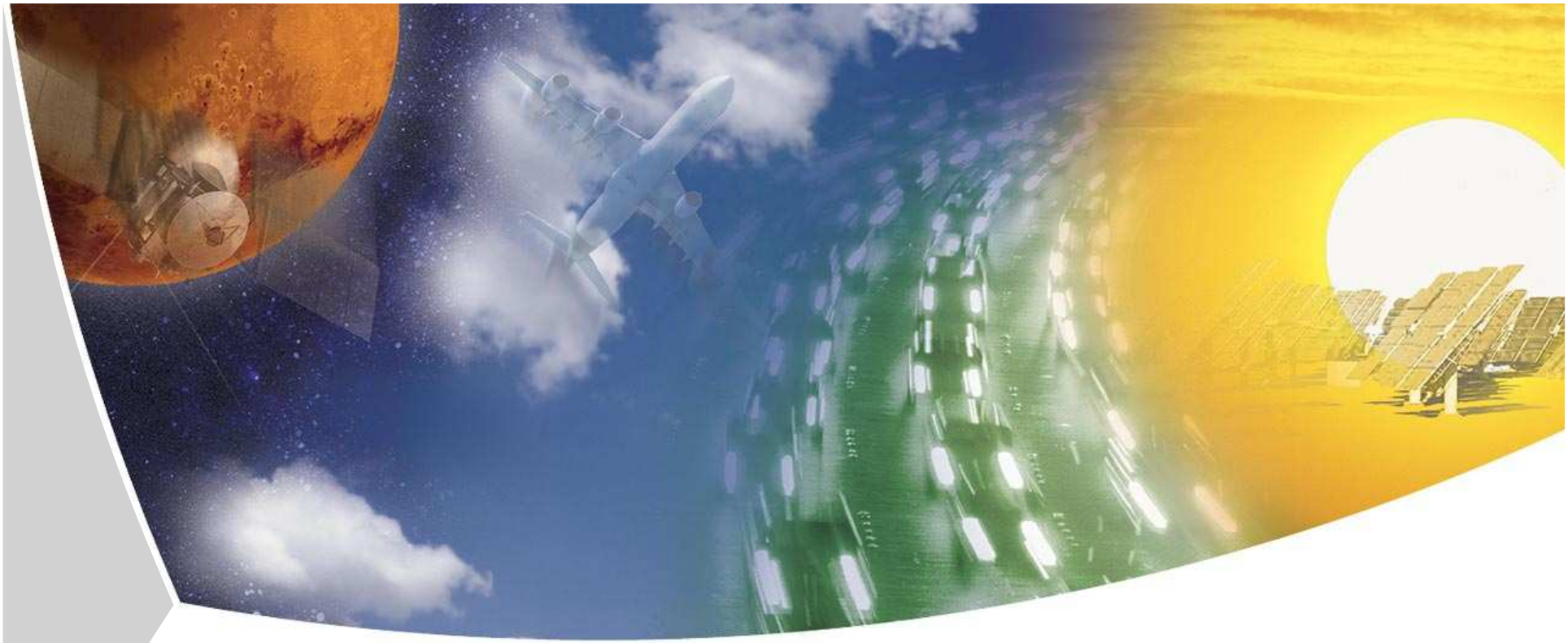


DLR - German Aerospace Center

DLR Research Projects,
a contribution to the Vision 2020

Deutsches Zentrum
für Luft- und Raumfahrt e.V.
in der Helmholtz-Gemeinschaft

Historical roots

100 JAHRE
Luft- und Raumfahrtforschung
in Deutschland

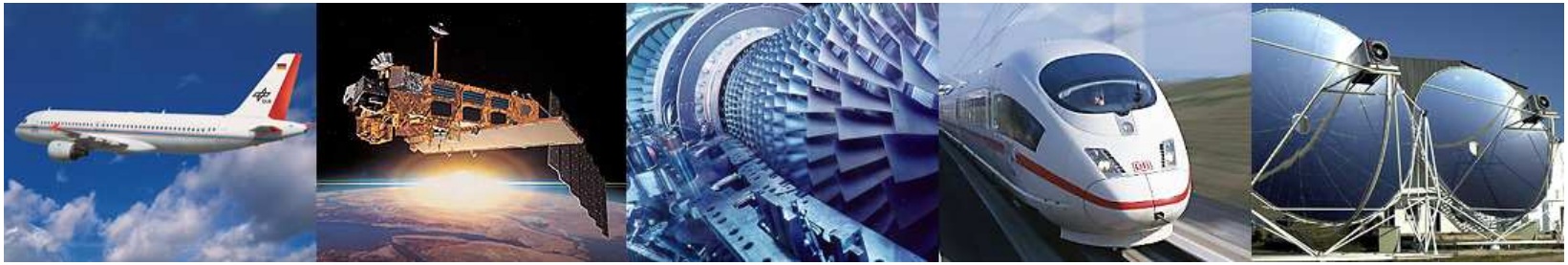
1907 – founding of the „Modellversuchsanstalt der Motorluftschiff-Studiengesellschaft“ - Research Facility for the „Airship development society“, later the „Aerodynamische Versuchsanstalt Göttingen“ AVA

1989 – transformation of the DFVLR in Deutsche Forschungsanstalt für Luft- und Raumfahrt (DLR)
Founding of the German Space Agency „Deutsche Agentur für Raumfahrtangelegenheiten“ DARA

1997 integration of the DARA into the DLR with all their political functions.
Since 1997 DLR means „German Aerospace Centre“

DLR

German Aerospace Center



Research Institution

Space Agency

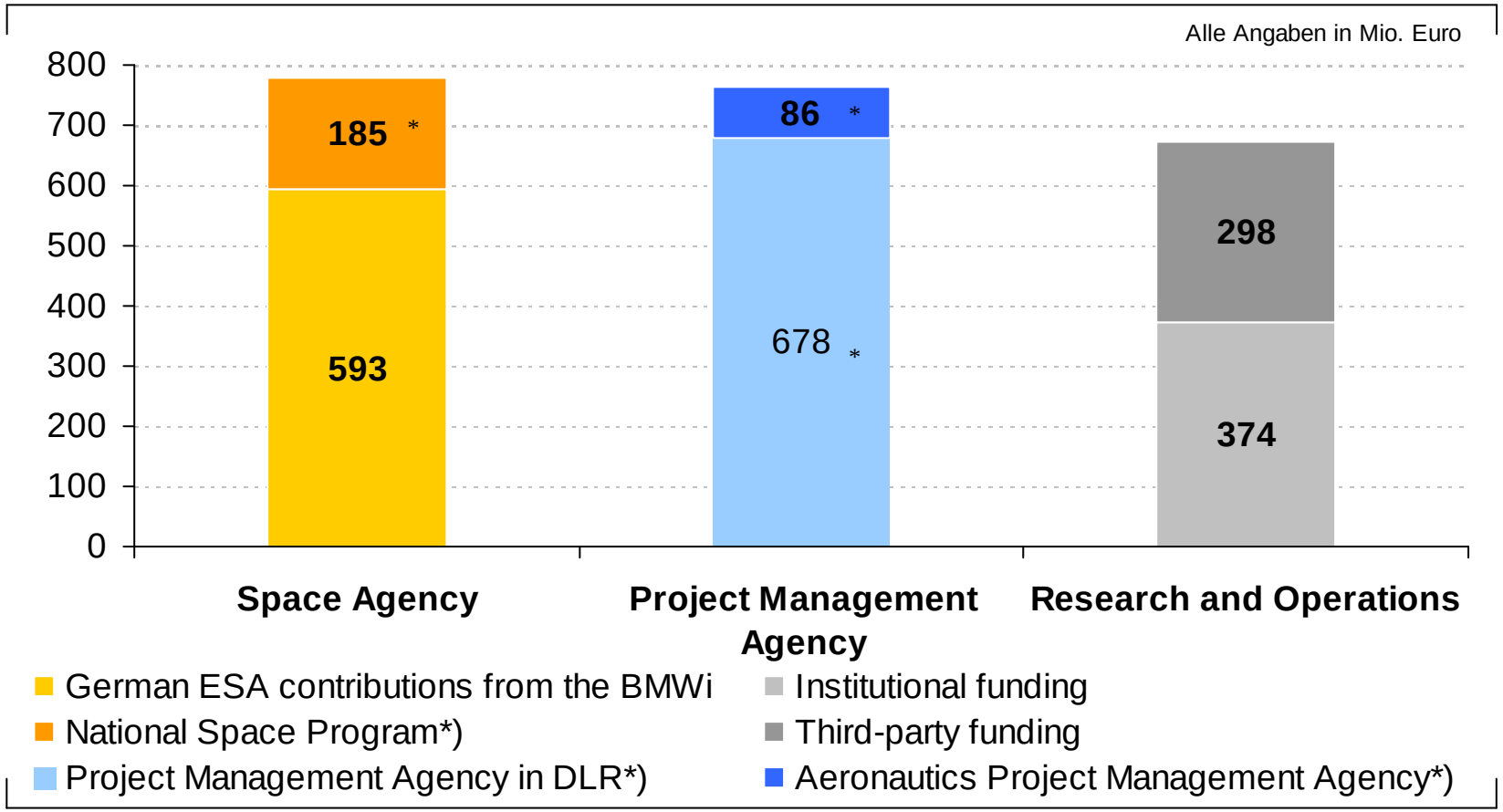
Project Management Agency

Key areas

- ✓ **Aeronautics**
- ✓ Space
- ✓ Space Agency
- ✓ Transport
- ✓ Energy
- ✓ Security

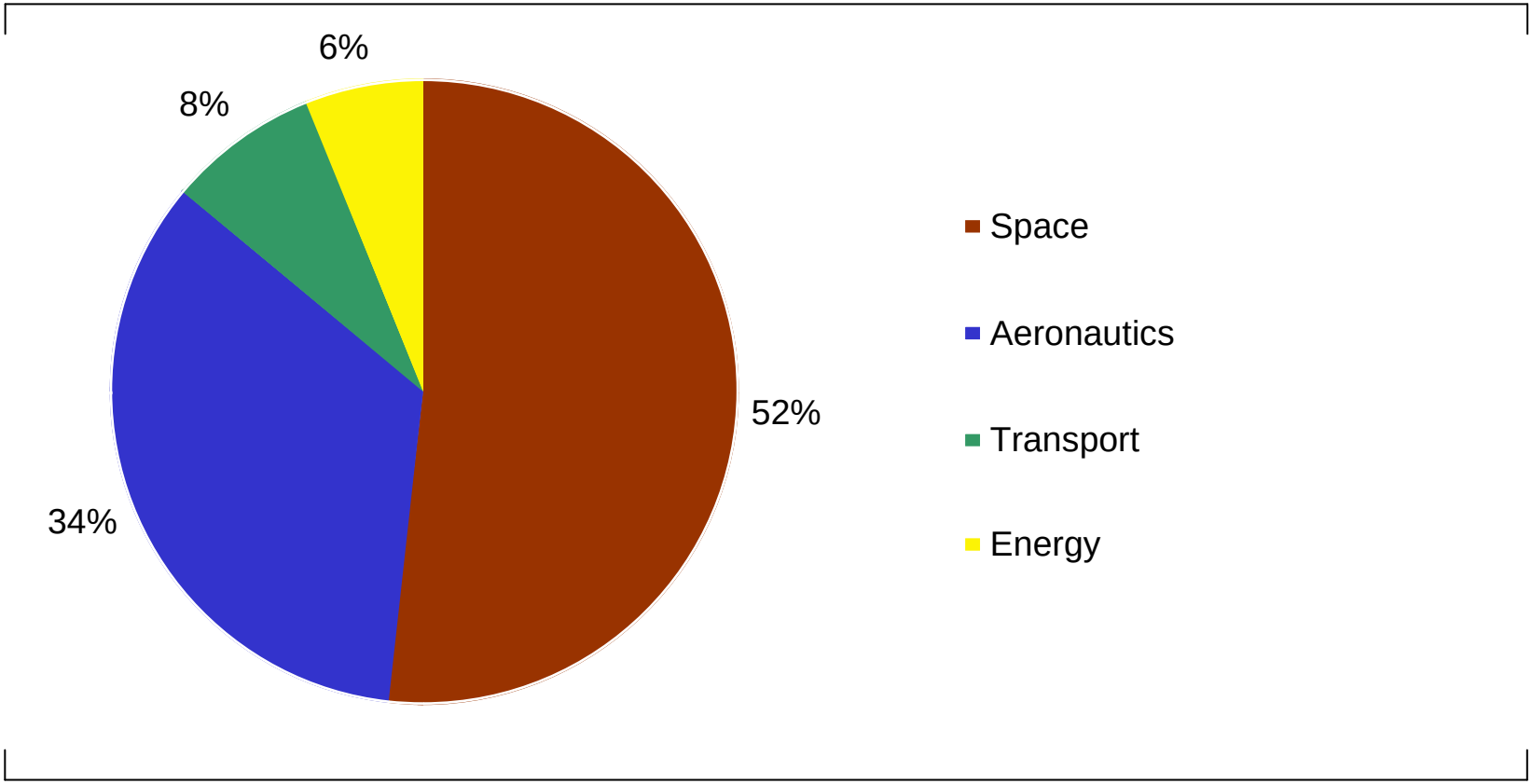
Financing of DLR and research funding 2010

2.114 Mio.€



*) without management budget

Percentage of overall income from research and operations



Sites and employees

6.200 employees working
in 29 research institutes and
scientific and technical facilities

- ■ at 9 sites
- ● in 6 field offices

(7 field offices of the Project Management Agency)

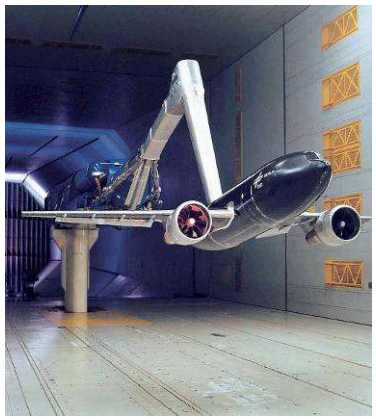
Offices in Brussels,
Paris and Washington.

DLR participates in the:

- ♦ European Transsonic Wind Tunnel (ETW)
- ◆ German-Dutch Wind Tunnels (DNW)

Large-scale facilities

- ✓ **Research aircraft and helicopter fleet,**
- ✓ **Windtunnels,**
- ✓ **Engine** (rocket and **aircraft**) **test rigs**,
- ✓ Solar furnace, solar fields,
- ✓ Autoclaves,
- ✓ Traffic tower.
- ✓ German Space Operations Center (GSOC),
- ✓ German Remote Sensing Data Center (DFD).



Aircraft Research and Test Platforms

Flight Mechanics / Control

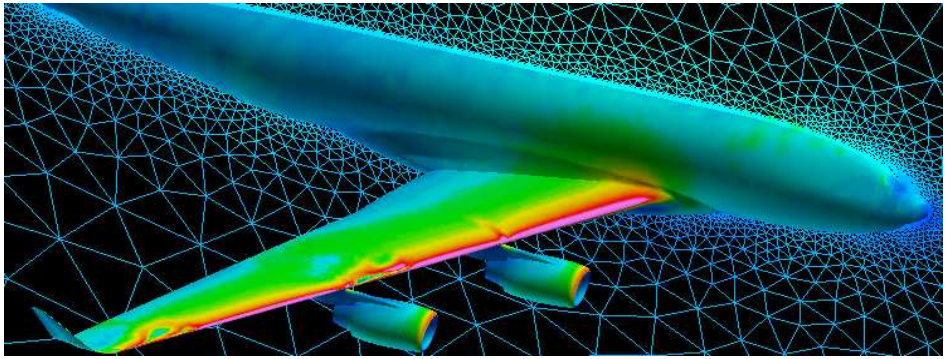
Flight Guidance

Aerodynamics

Atmosphere / Environment

Aeronautics

Leading Partner for
Research in National Aeronautical Industry

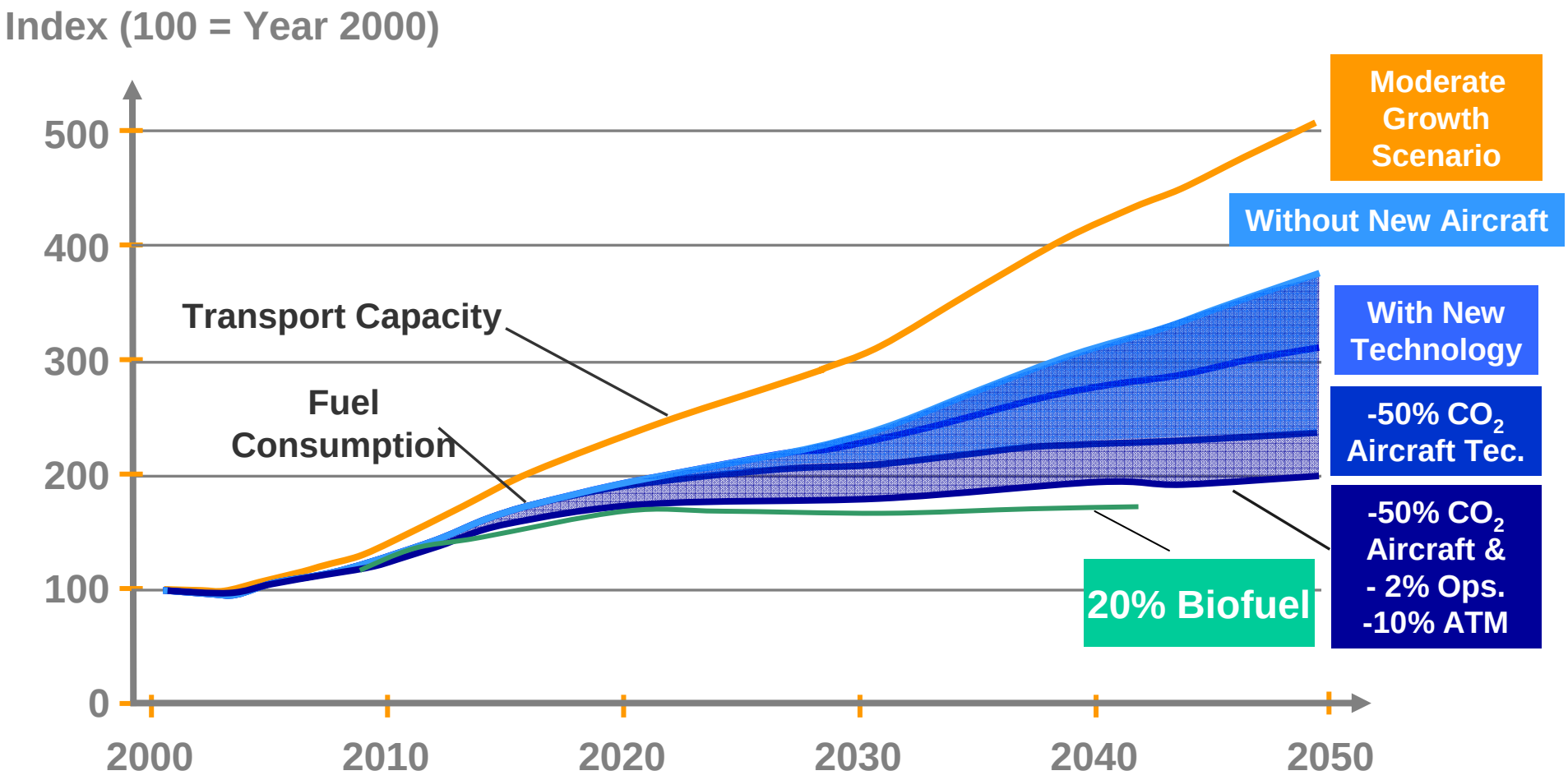


- Air Transport System Concepts and Assessment
- Energy and Cost Efficient Aircraft
- Efficient and low Emission Aero Engines
- Safe and Efficient Air Transport System
- The Future Helicopter

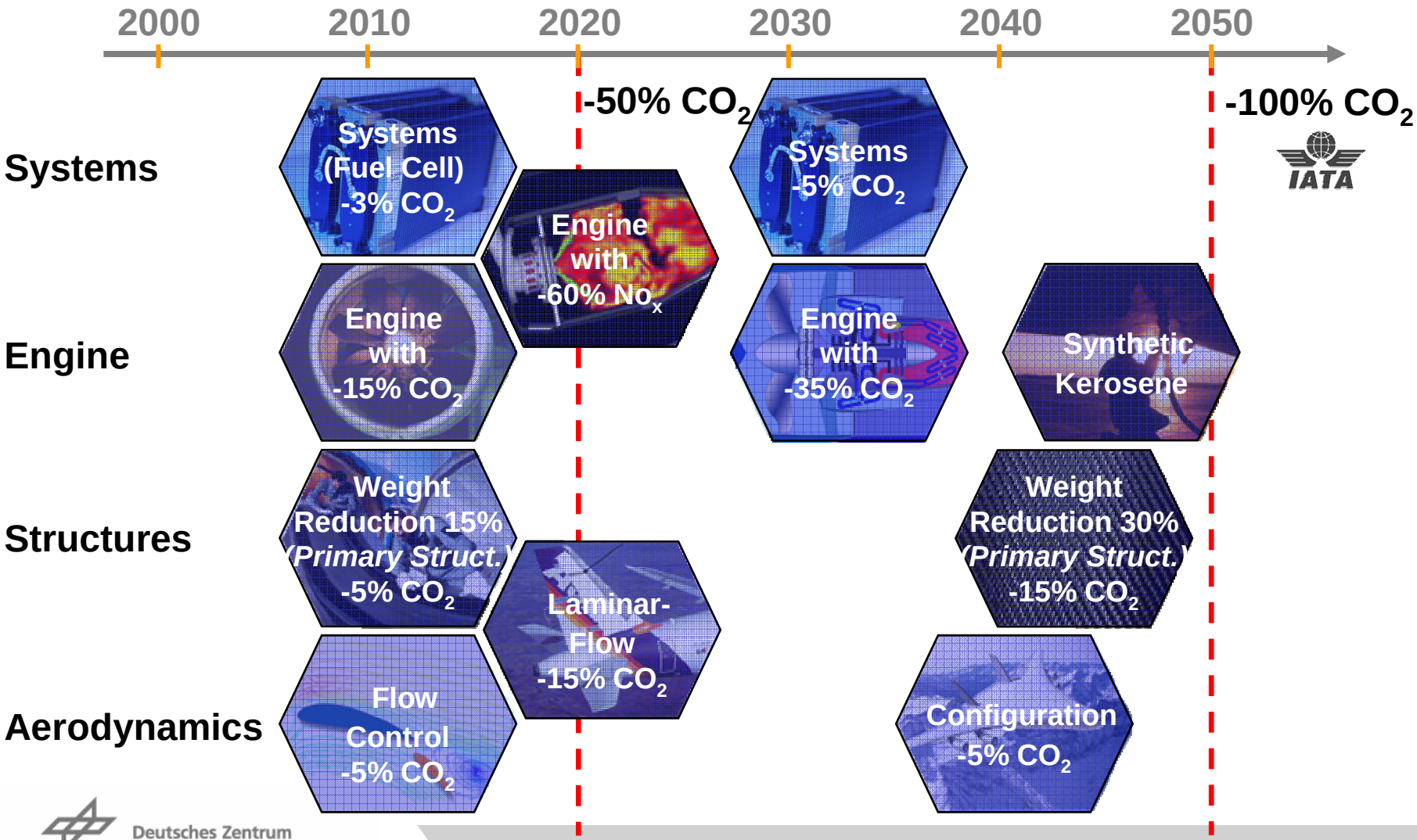
VISION 2020: Challenges and Associated Goals

- **Quality and Affordability**
  - *Reduced passenger airfares*
  - *Increased passenger choice*
  - *Modernized freight operations*
  - *Reduced time to market by 50%*
- **The environment**
  - *Reduction of CO2 by 50%*
  - *Reduction of NOx by 80%*
  - *Reduction of external noise by 50%*
  - *Substantial progress towards 'Green MMD'*
- **Safety**
  - *Reduction of accident rate by 80%*
  - *Drastic reduction in human error and the consequences*
- **The Efficiency of the Air Transport System**
  - *3X capacity increase*
  - *99% of flights within 15 min of schedule*
  - *Less than 15' min waiting time in the airport for short distance flights*
- **Security**
  - *Airborne – terrorism prevention*
  - *Airport – prevention of unauthorized access (persons or products)*
  - *Air navigation - safe control of hijacked aircraft*

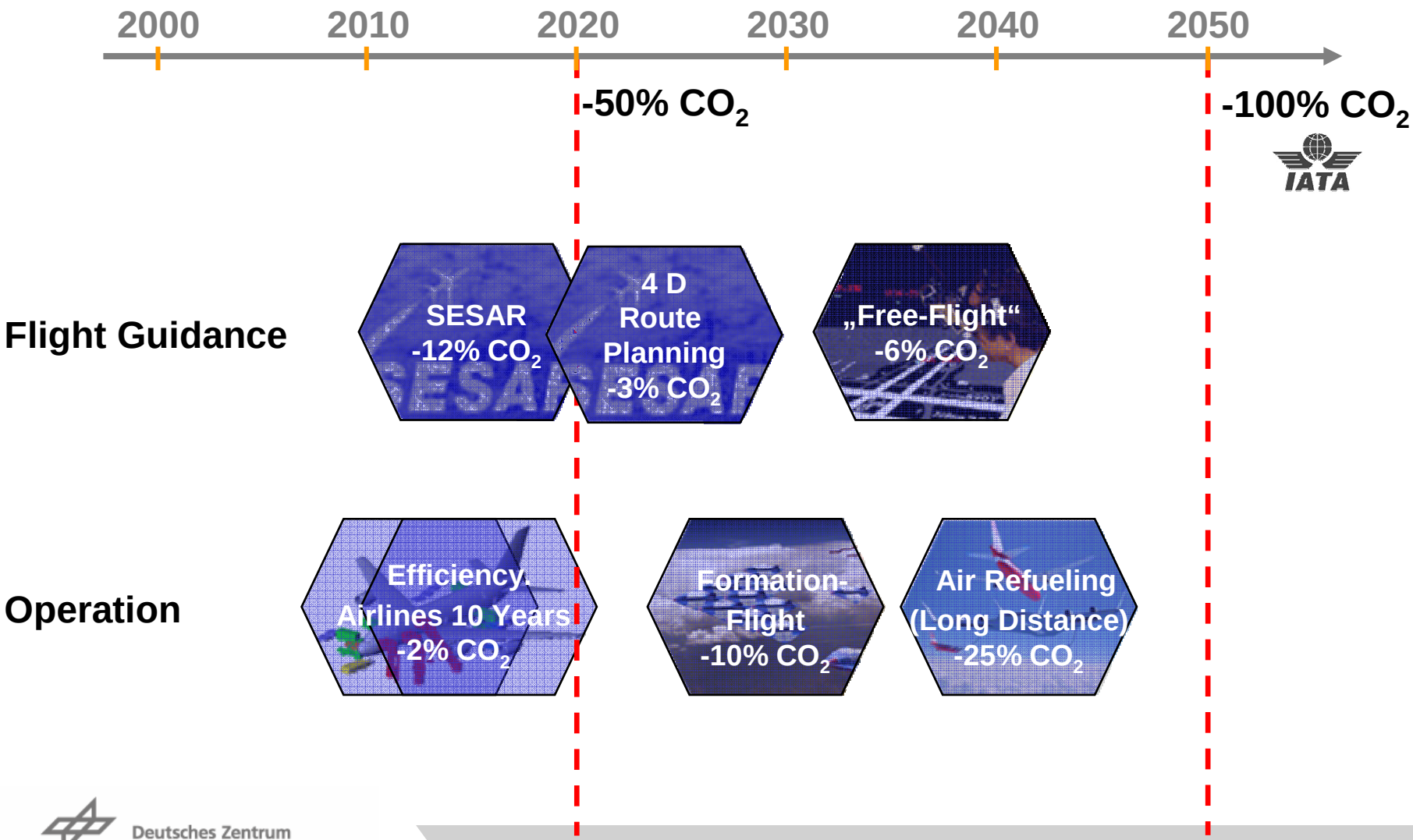
Technology Impact – Extrapolation 2000 - 2050



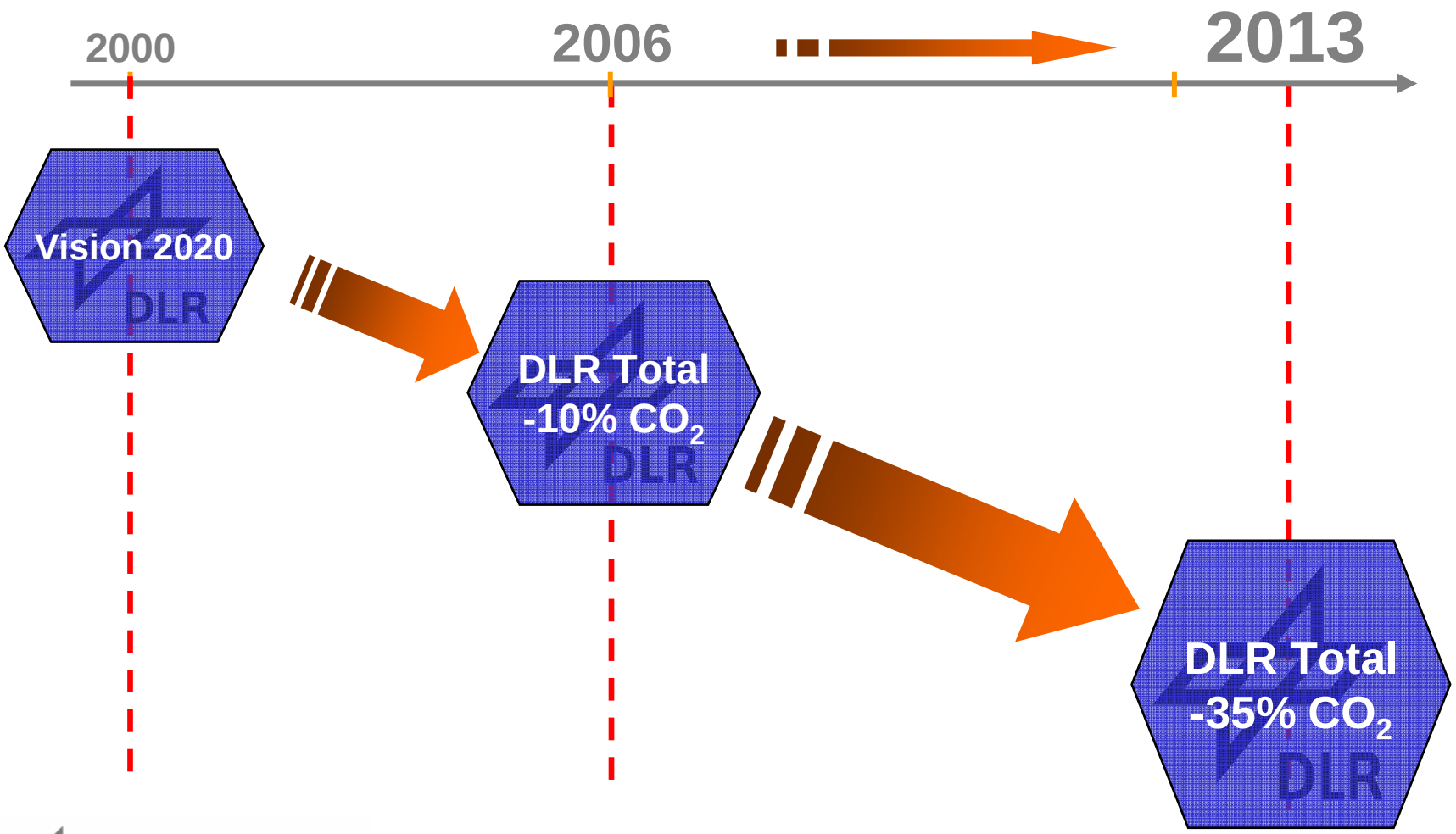
Aircraft Specific Technology



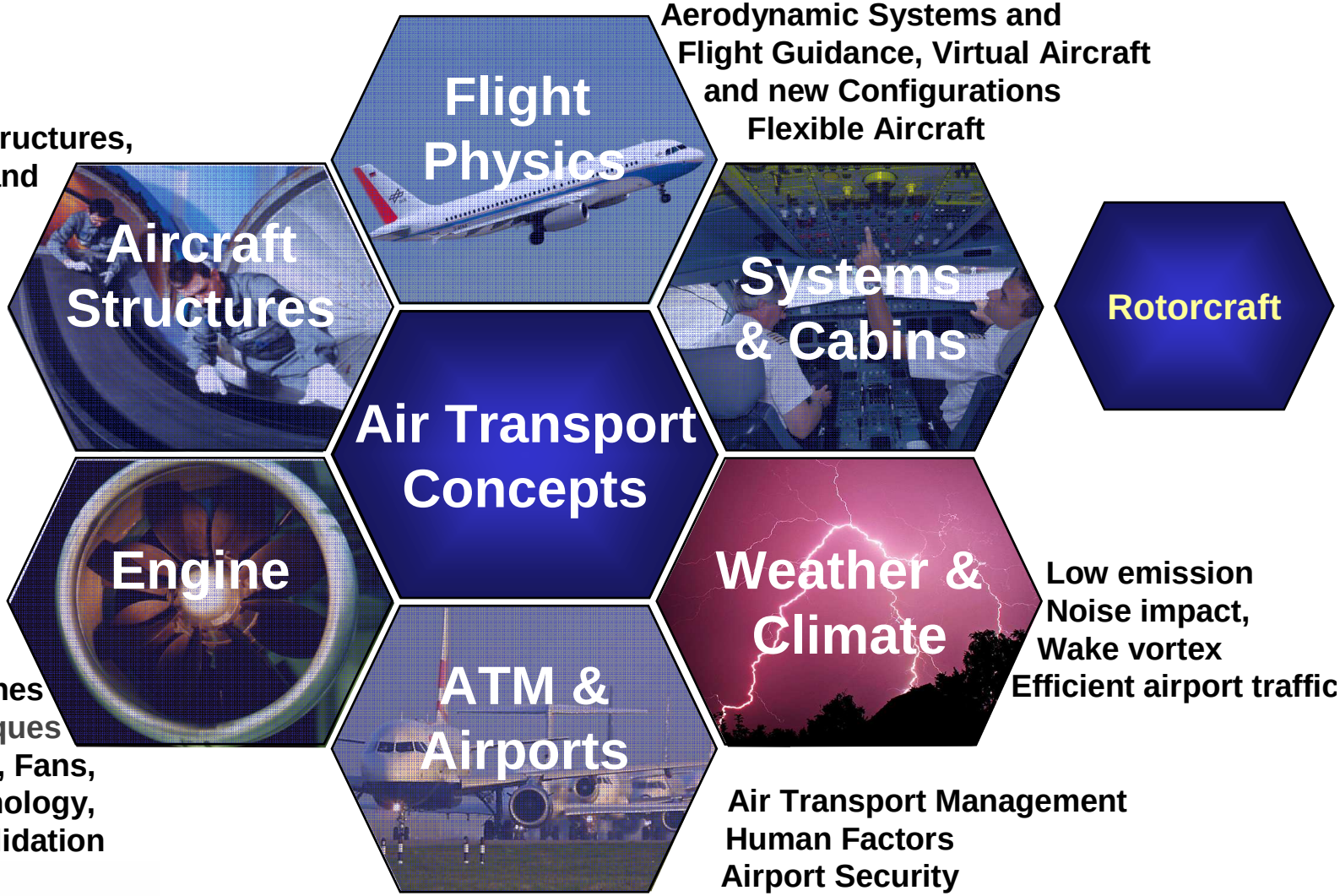
Operation Related Technology



DLR Contribution to Vision 2020



Main Areas of Aeronautics Research at the DLR



Test Infrastructures

Material Testing

Tower Simulator

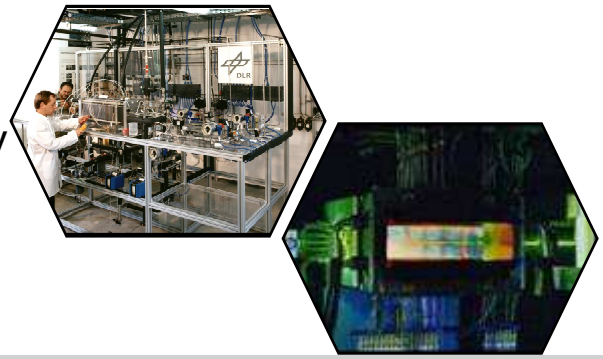
Ground Vibration Testing

Rotor Test Stand

Cockpit Simulator

Test Activities

- Basic Research
- Materials Characterization
- System Identification
- Validation of Numerical Tools
- Process Simulation
- Component Testing
- Industrial System Tests



Fuel Cell Laboratory

Experimental Combustor

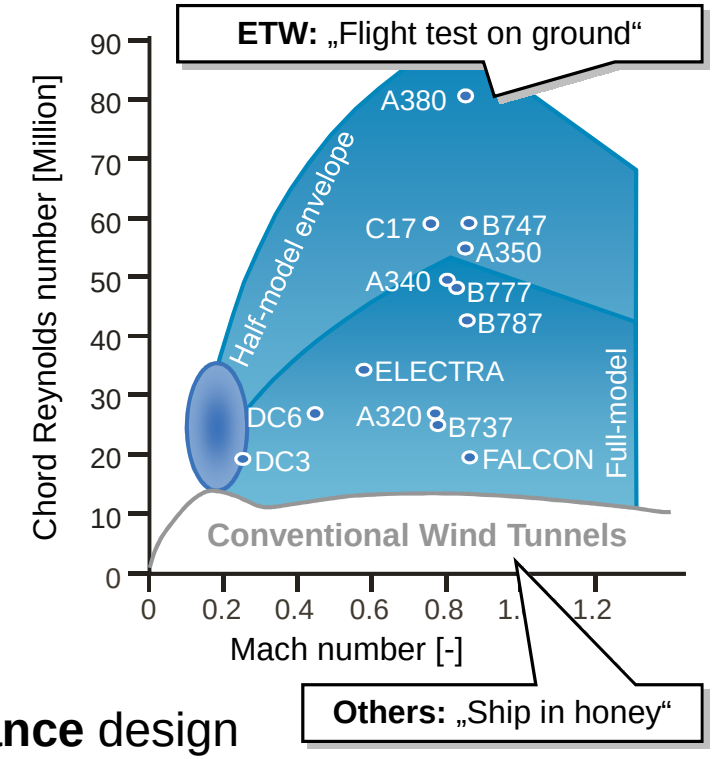
European Transonic Windtunnel ETW

European Transonic Windtunnel

High-lift & high-speed “flight-alike” testing

ETW’s time-cost-quality benefits:

- Full-scale Flight Reynolds Number
- Independent Variation of Reynolds Number and Structural Loads
- Productivity and Costs Efficiency
- Security and Client Confidentiality



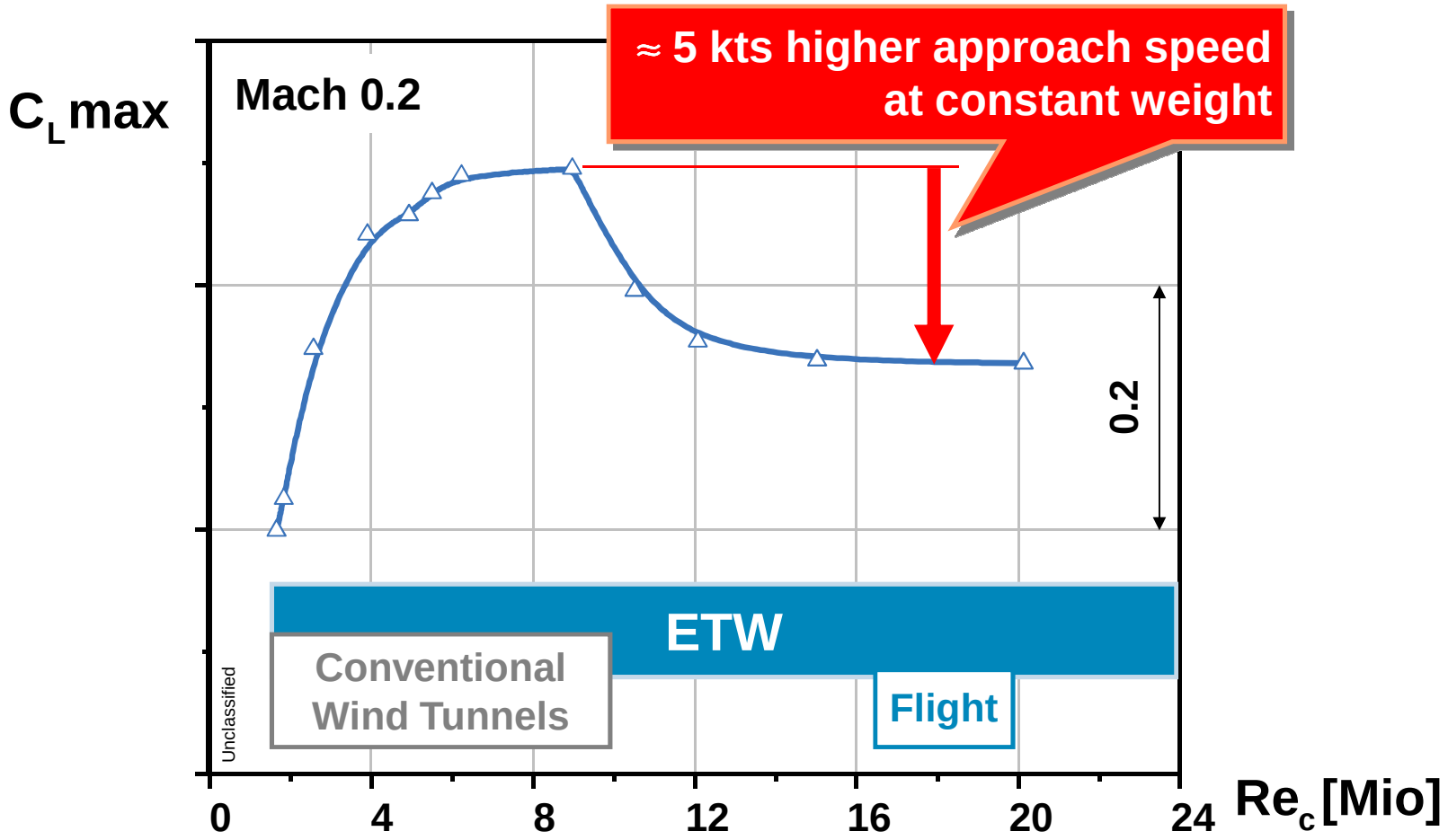
“Flight-alike” testing more accurate than 99%

- Validation of **cutting-edge aircraft-performance** design
- Early confidence in **meeting the design requirements**
- **Valuable risk mitigation**

EUROPEAN TRANSONIC WINDTUNNEL

European Transonic Windtunnel

High-lift testing example



EUROPEAN TRANSONIC WINDTUNNEL

German-Dutch Wind Tunnels

DNW:
Deutsch- Niederländische Windkanäle

Common operation of 10 wind tunnels in Germany and the Netherlands

DNW Wind Tunnel

European Cooperation

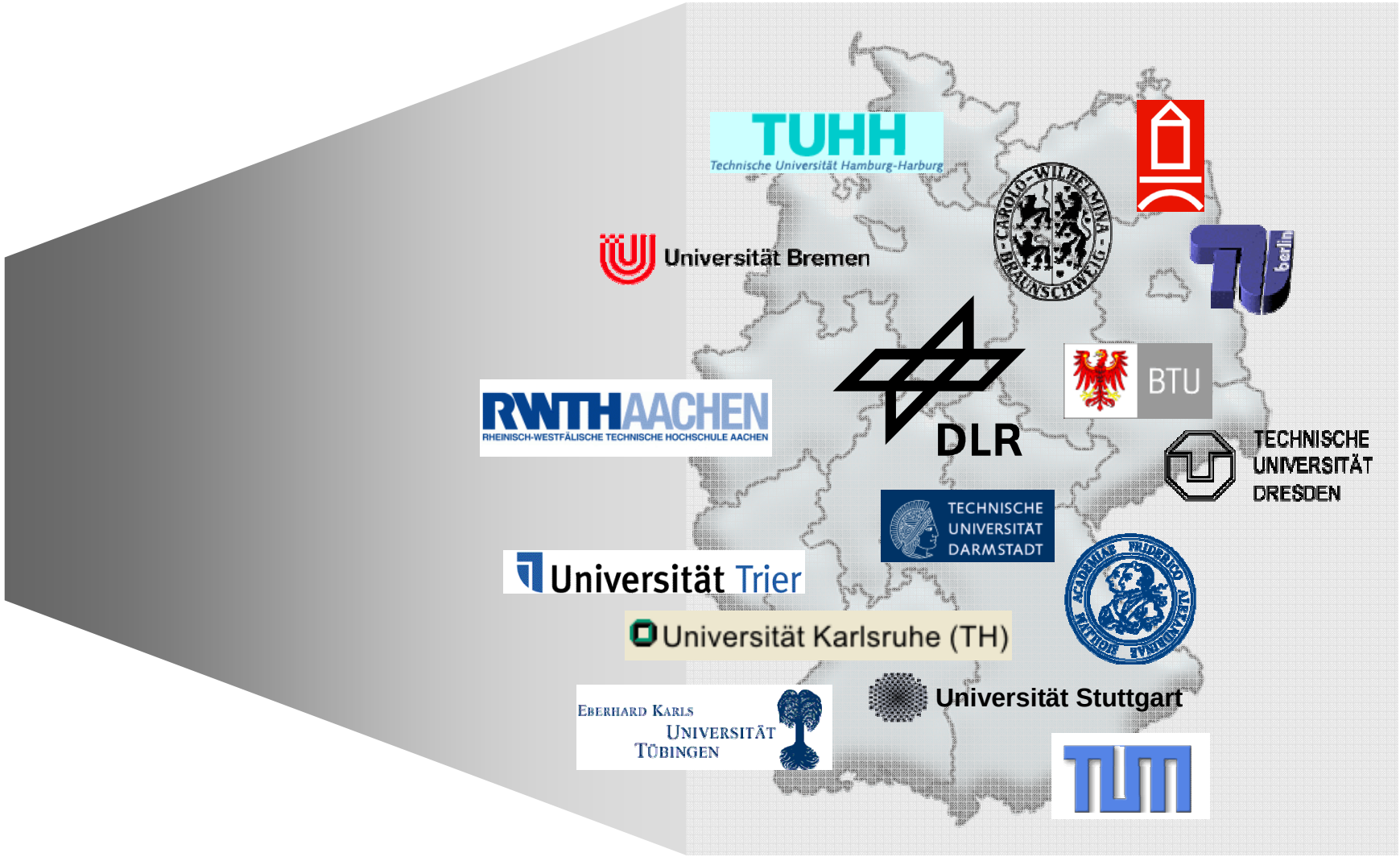
- **EREA** Membership

- Close Collaboration with **ONERA** on
  - Fixed wing A/C Research
  - Rotorcraft Research

- Close Collaboration with **NLR** on ATM: **AT-One**

- Joint Operation of Windtunnels with **NLR**: **DNW**
  (extended to **ATA** with **ONERA**)
  ETW (assisted by NLR, ONERA, DTI, DLR)

Universities



Contact in DLR

www.dlr.de

International cooperation

Scharenberg Rainer

+49 2203 601-4738

+49 2203 601-3907

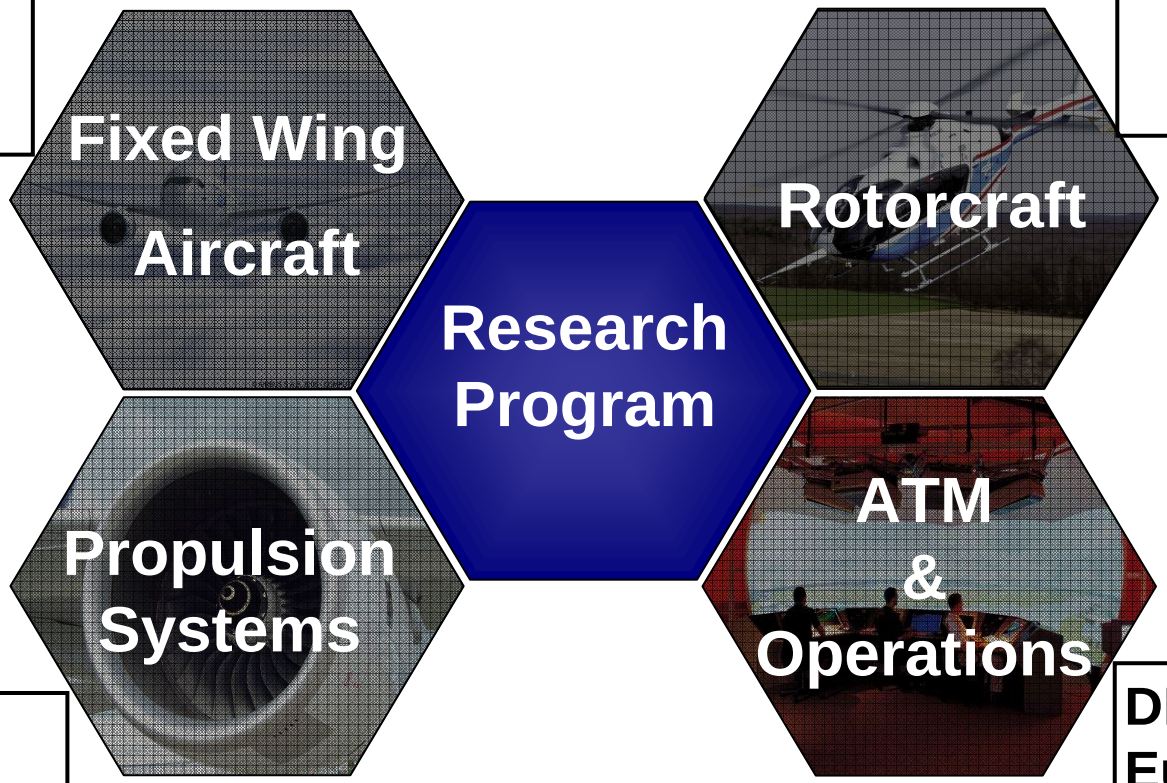
Rainer.Scharenberg@dlr.de

End of Presentation

Main Industrial Partners

Research Partners and Customers !

Airbus
Liebherr
Diehl
EADS MAS
Grob



Eurocopter
Liebherr
SKF

MTU
Rolls Royce

DFS
Eurocontrol
Diehl
Lufthansa
Airports