German Aerospace Center (DLR)

H2020 AREO-UA Project
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Nicolas PETER
Head International Relations

Knowledge for Tomorrow
DLR
German Aerospace Center

- Research Institution
  - Aeronautics
  - Space
  - Energy
  - Transport
  - Security & Defence

- Space Administration

- Project Management Agency
Locations and employees

~ 8,200 Employees

33 institutes & facilities spread (6 new) over 16 sites across Germany (4 new)

3 Field stations in O'Higgins (Antarctica), Inuvik (Canada) & Almeria (Spain)

5 Liaison Offices in Berlin, Brussels, Paris, Tokyo and Washington D.C
6 New DLR Research Institutes

+ 3 New Institutes for Aeronautics Research
  in Augsburg (Bavaria), Dresden (Saxony) and Hamburg
  Emphasis on Digitalization in Aeronautics Research „Virtual Aircraft“

+ 1 New Institute for Space Research
  in Jena (Thuringia)
  Focus on Big- & Smart-Data

+ 1 New Institute for Energy Research
  in Oldenburg (Lower Saxony)
  Focus on System Aspects of the Transformation of the Energy System

+ 1 New Institute for Safety & Security Research
  in Bremerhaven (Bremen)
  Emphasis on Safety of Critical, Maritime Infrastructures

DLR 39 Research Institutes
20 Sites & Locations across Germany
Structure

Senate

Executive Board

Space Administration
Research & Development
Project Management Agency
# Executive Board

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<th>Name</th>
<th>Responsibilities</th>
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<tr>
<td>Prof. Dr. Pascale Ehrenfreund Chair</td>
<td>Overall strategy and development, External relations, Corporate Communication, ESA Council</td>
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<tr>
<td>Klaus Hamacher Vice Chair</td>
<td>Human Resources, Finance, Corporate Organisation, Quality Assurance and Infrastructure, Technology Marketing, Information technology, Project Management Agency</td>
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<tr>
<td>Dr. Gerd Gruppe</td>
<td>Space Administration, National/ESA programme</td>
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<tr>
<td>Prof. Dr. Hansjörg Dittus</td>
<td>Space Research and Technology: research, programs, projects, technology transfer</td>
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<tr>
<td>Prof. Rolf Henke</td>
<td>Aeronautics: research, programs, projects, technology transfer, Approved Design Organisation</td>
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<tr>
<td>Prof. Karsten Lemmer</td>
<td>Transport and Energy: research, programmes, projects, technology transfer</td>
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Participation in the Helmholtz Association
Main characteristics of the DLR general strategy

- **Excellent science**
- **Partner to industry**
- **Contributions to overcoming social challenges**
Programme Management Research & Development

Programme Directorates
- Aeronautics
- Space Research and Technology
- Energy
- Transport

Institutes and Facilities
Know-how, Research facilities

Service and resource agreements
Projects Programmes

Resources
Financing of DLR and research funding 2017 (planned)

- **Space Administration**
  - German ESA contributions BMWi/BMVBS: €308 million
  - National Space Program incl. management: €864 million

- **Project Management Agency**
  - Institutional funding R&D: €160 million
  - Third-party funding R&D: €1,186 million

- **Research and Operations**
  - DLR Project Management Agency incl. management: €470 million
  - Aeronautics Project Management Agency incl. management: €463 million

All figures in million euro; therefore, the rounding differences without settlement of cross-financing.
Aeronautics

Knowledge for Tomorrow
DLR Aeronautics

- Optimise the performance and environmental compatibility of the entire aircraft system
- Expand the range of helicopters to all weather conditions
- Increase efficiency and environmentally-friendly aircraft engines
- Develop safe, environmentally-friendly and efficient air traffic (flight control, flight operations)
Goals and Strategies of Aeronautics

Primary goals
• Further development of civilian transport systems from the perspectives of efficiency/economy, safety and environmental compatibility
• Technological contributions towards assuring the capability profile of the German armed forces

Fundamental strategic components
• Orientation with the European research agenda for civil aviation
• Research into the complete air transport system and all its major components
• Carrying out specific defence-related research work, making greatest possible use of synergies with civilian themes
• Strategic cooperation with the most important German and European partners from research and industry
System capability in research

Air transport systems

Components and technologies

Vehicles

Aviation
Key Concepts

The Short-Range Aircraft
The Long-Range Aircraft
The Unmanned Freighter
The SAR Helicopter 2030
The Efficient Air Transport
The Virtual Product
Resources in Aeronautics 2016 (planned) Total resources € 228 million

- Institutional funding, civilian (HGF) 134 million
- Institutional funding, defence (BMVg) (approx. 30 % space and transport) 66 million
- Third-party funding 28 million

All values in € million
Sites Involved in Aeronautics

Augsburg
Braunschweig
Goettingen
Hamburg
Cologne
Oberpfaffenhofen
Stade
Stuttgart
Lampoldshausen
Facilities – Aeronautics

• Research aircraft
• Cockpit simulators
• Tower simulator
• Compressor, combustion chamber and turbine test beds
• Autoclaves
• Material and structural test facilities
• Ground vibration test facility
• Wind tunnels*

* Predominantly under the auspices of German-Dutch Wind Tunnels (DNW)
Missions:
- **Efficiency increase**
  (resource consumption and direct operating costs)
- **Minimisation of environmental impacts**
  (emissions and noise)
- **Acceleration of product developments**
Organisation

Institute of Propulsion Technology
Reinhard Mönig

Components

- **Engine**
  Andreas Döpelheuer

- **Fan and Compressor**
  Eberhard Nicke

- **Combustor**
  Christoph Hassa

- **Turbine**
  Frank Kocian

- **Combustor Testing**
  Christian Fleing

Technologies

- **Numerical Methods**
  Edmund Kügeler

- **Engine Acoustics**
  Lars Enghardt

- **Measurement Technology**
  Christian Willert

- **Combustor Simulation**
  Francesca di Mare
Fan and Compressor

- Design of efficient and silent fans and of highly loaded, multi-stage axial-flow compressors
- Design and experimental investigation of high-performance centrifugal compressors
- Experimental investigation of compressor cascades, new fan designs, multi-stage axial-flow compressors (4-stage rig) and advanced centrifugal compressors
Global networks
International cooperation is key for DLR and a core element for most of its endeavours.

DLR cooperates with all types of actors: space and research agencies, universities, companies, etc.

DLR cooperates with European partners bilaterally and in the context of ESA and EU programmes.

DLR cooperates also with all major actors worldwide.
DLR International Partners

We cooperate with over 400 Partner-Organisations in more than 60 countries
National and International Networking

Customers and partners: Governments and ministries, agencies and organisations, industry and commerce, science and research

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<tr>
<td>Germany</td>
<td>HELMHOLTZ ASSOCIATION</td>
<td>Federal Ministry of Education and Research</td>
<td>Federal Ministry for Economic Affairs and Energy</td>
<td>Federal Ministry of Defence</td>
<td>Deutsches Zentrum für Luft- und Raumfahrt</td>
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<td>SIEMENS</td>
<td>DIEHL</td>
<td>OHB</td>
<td>AIRBUS</td>
<td>LIEBHERR</td>
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[Image of various flags indicating countries and logos of partner organisations]
Our strengths

DLR provides:

Unique synergies of 5 research areas, space administration and project management agency

Innovative research from basic research to product development

Reliable partner for politics, industry and society
Thank you for your attention

Дякую за увагу