

ONERA

THE FRENCH AEROSPACE LAB

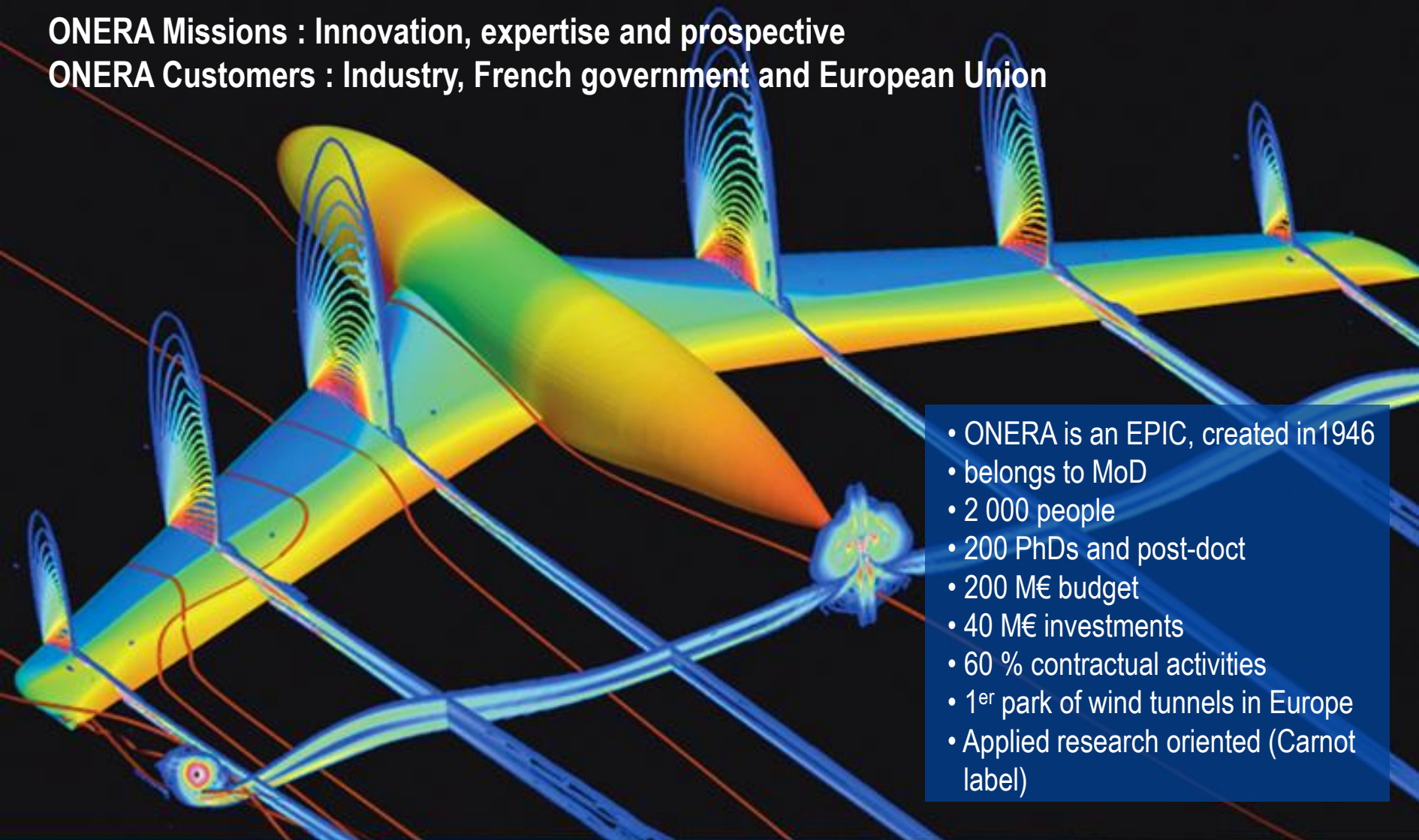
retour sur innovation

www.onera.fr

The French Aerospace Lab : an Applied Research Center

ONERA Missions : Innovation, expertise and prospective

ONERA Customers : Industry, French government and European Union

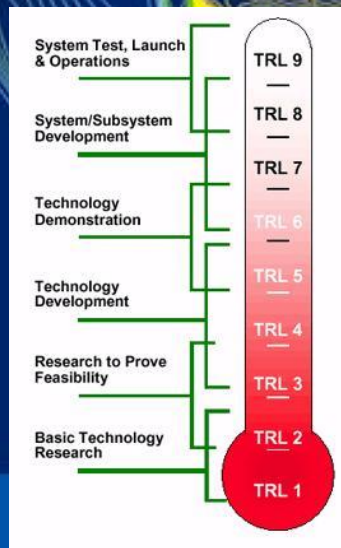


- ONERA is an EPIC, created in 1946
- belongs to MoD
- 2 000 people
- 200 PhDs and post-doct
- 200 M€ budget
- 40 M€ investments
- 60 % contractual activities
- 1^{er} park of wind tunnels in Europe
- Applied research oriented (Carnot label)

A Strategic Partner to Develop New Products for Aerospace Applications

ONERA prepares future
Hypersonic Aircraft

ONERA is an expert for the
government
Plasma Perch



ONERA proposes innovations
to the aerospace industry
Winglets

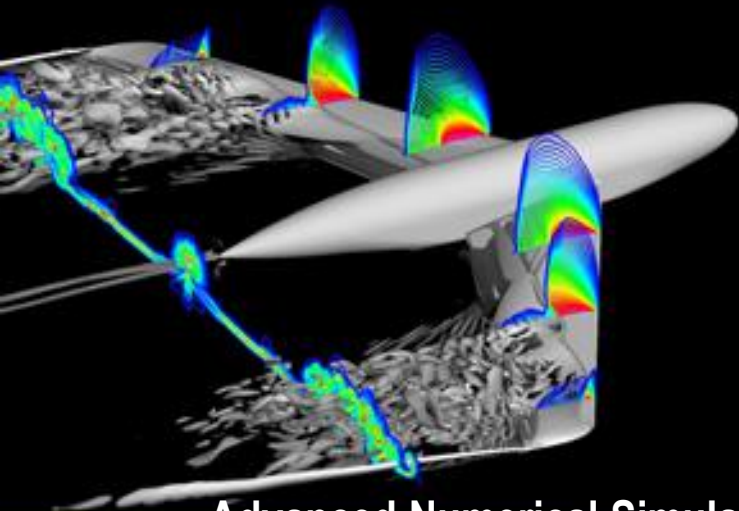
Applied Sciences : for Innovation in Aeronautics, Space and Defence



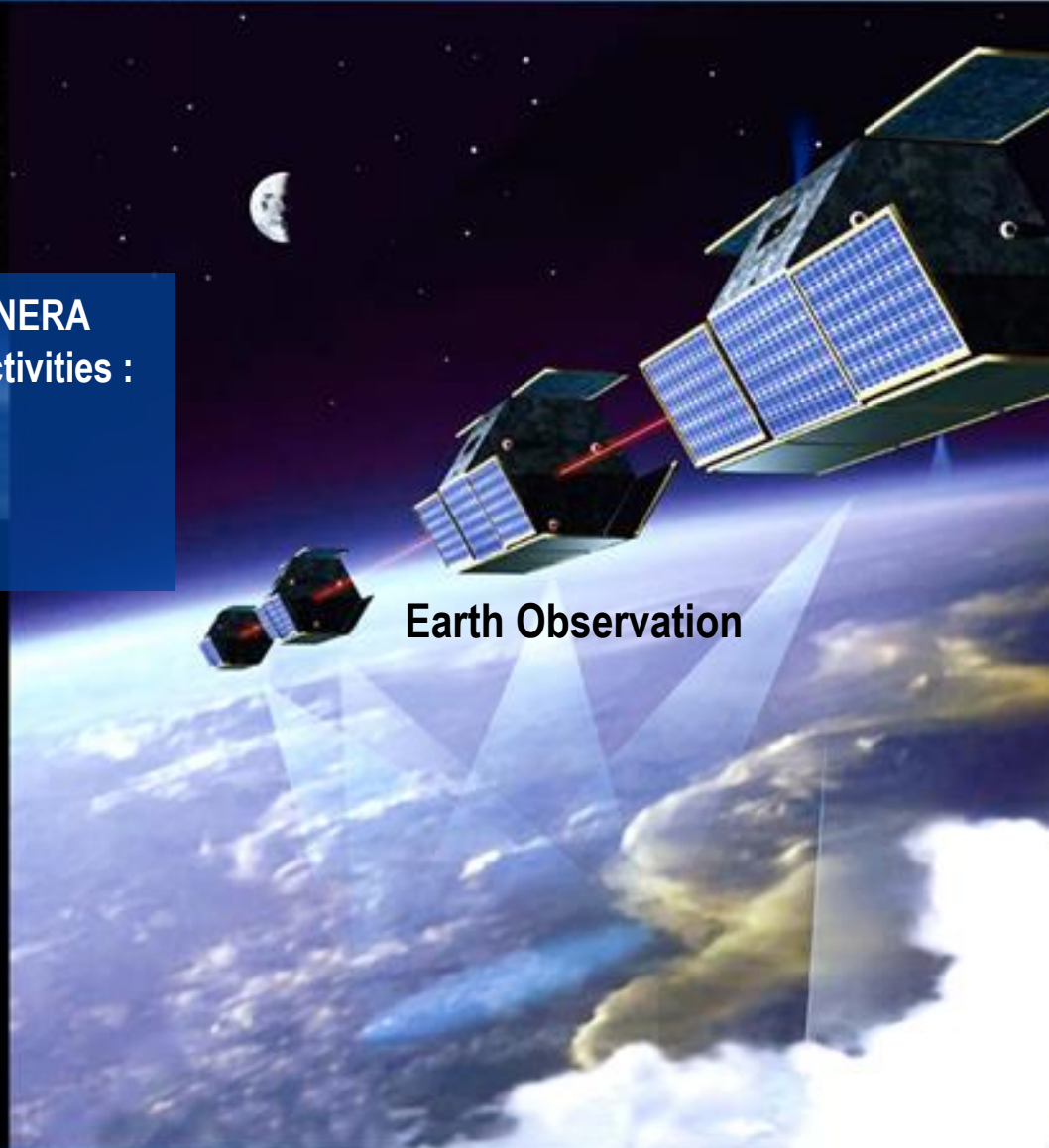
Stratospheric Aircraft

**A balanced ONERA
portfolio of activities :**

- 1/3 civil
- 1/3 defence
- 1/3 dual



Advanced Numerical Simulations



Earth Observation

Reasons for innovation (market) : technological lead and industrial success (EPICs)

Cellular Material
Crash Safety
Energy absorption ...

Wind Tunnels
Scale models (A400M)
Lift, drag & ...

Space Launcher booster
Turbulent flow
Thrust ...

Helicopter rotor
Aerodynamics
Noise ...

ONERA involved in R&D for

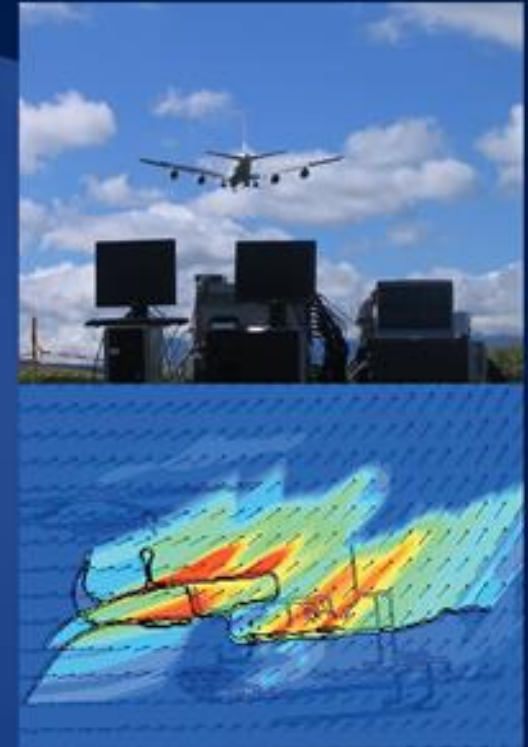
- Commercial aircraft (A350)
- Business jets (Falcon F7X)
- Aircraft engines (CFM56)
- Helicopters (Tigre)
- Spacecraft (Ariane 5)

Reasons for innovation (progress): knowledge ... and societal needs/ well-being!

ONERA concerned by present social and environmental stakes

- Sustainable growth
- Noise and emissions reduction
- Alternative fuel/power systems
- **Safety end security**

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Reasons for innovation (progress): knowledge ... and societal needs/ well-being !

Concerning Air Transport Management and SAFETY, ONERA works on

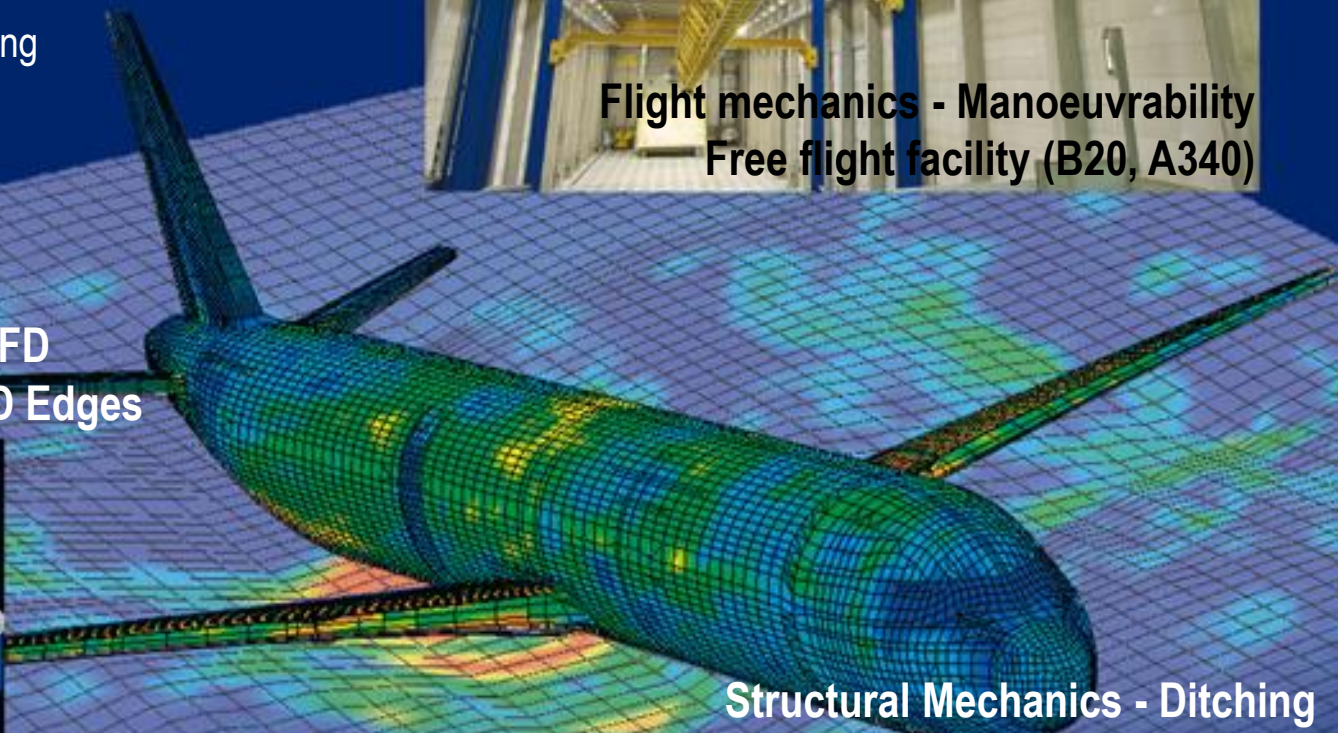
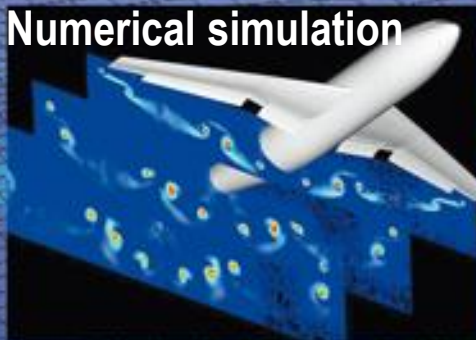
- Traffic & Infrastructures
- Wake vortices, flutter
- Environmental hazards (icing, lightning, etc)
- Crashworthiness, ditching

.....



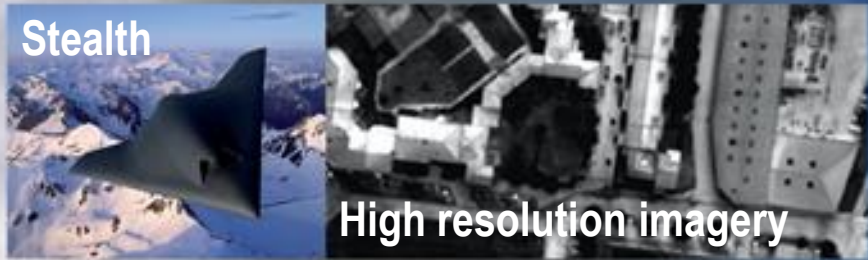
Flight mechanics - Manoeuvrability
Free flight facility (B20, A340)

Applied Mathematics – CFD
Vortices generation by 3D Edges
Numerical simulation



Structural Mechanics - Ditching
Pax survivability, fuselage integrity
Numerical simulation

Reasons for innovation (sovereignty): expertise, new concepts and products for Defence



ONERA develops/ products

- Over the horizon radars (Nostradamus)
- Space surveillance radars (Graves)
- High resolution infrared instruments

...

or participates to

- Enlarged air defence systems
- Unmanned vehicles

...

Graves Radar

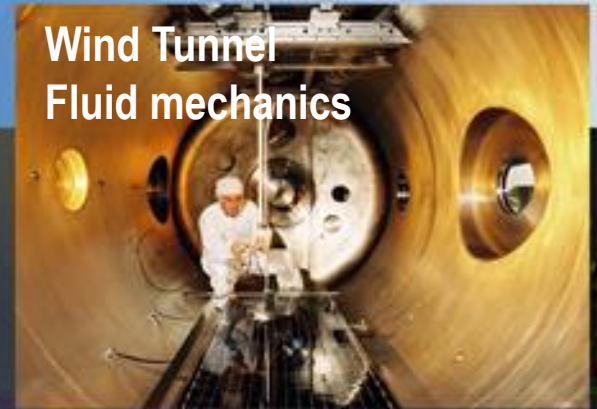
Unique Test Means and Devices in Europe ...

ONERA holds

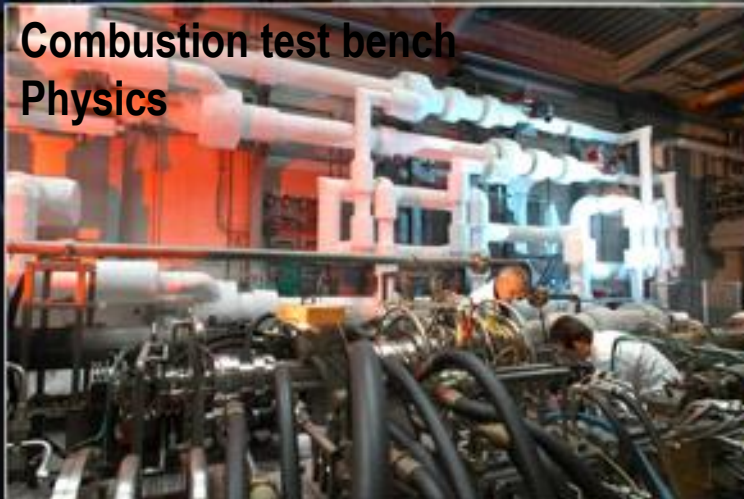
- 150 test benches and associated metrology
- Energetics, optics, physics, fluid mechanics
- Aeroelasticity, Propulsion,

...

Wind Tunnel
Fluid mechanics



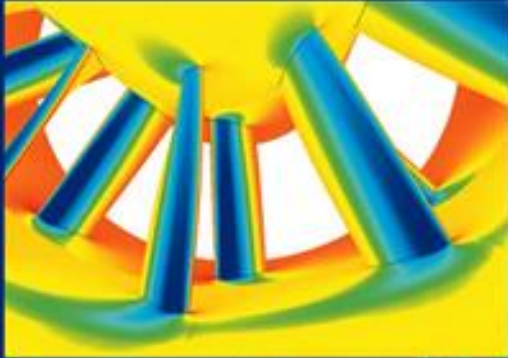
Combustion test bench
Physics



Laser imaging systems
Optics



Leading Competence Center for Wind Tunnels in Europe ...



CFD Code ElsA
Numerical simulation

ONERA holds

- Half of the european WTs
- All range of speeds, Mach 1 to 20
- Keys facilities for AIRBUS and DASSAULT AVIATION
- Iso 9001 accredited

And has got

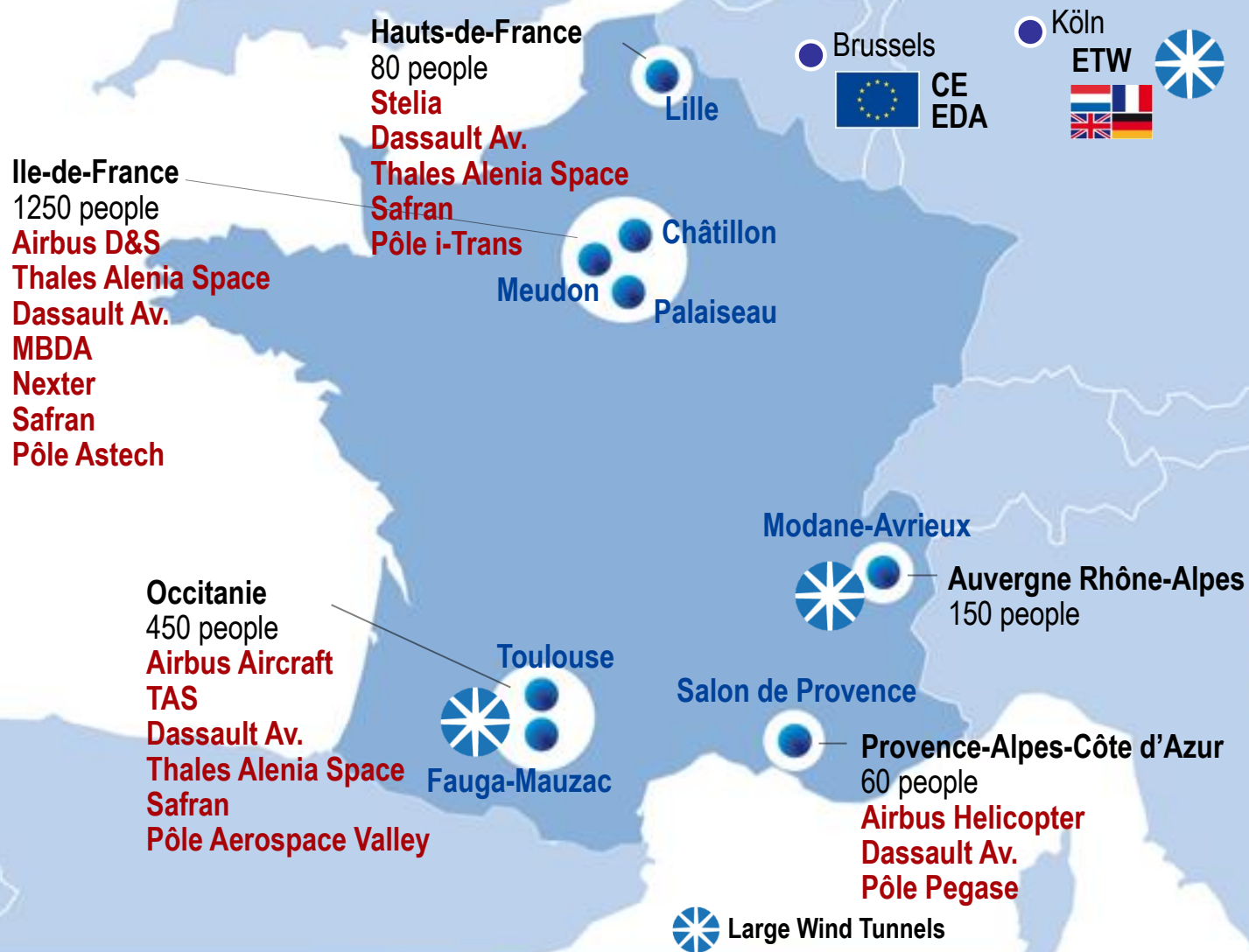
- More than 50 years of experience
- Customers around the World
- Experimental/theoretical synergy

Largest transonic Wind-Tunnel in the world



New composite blades

ONERA: close to its National Partners



ONERA Collaborates to Build up Future European Aerospace Research Force

ONERA belongs to EREA

- 4000 people
- 2000 engineers
- 400 M€ budget

ONERA French-German partnership (DLR)

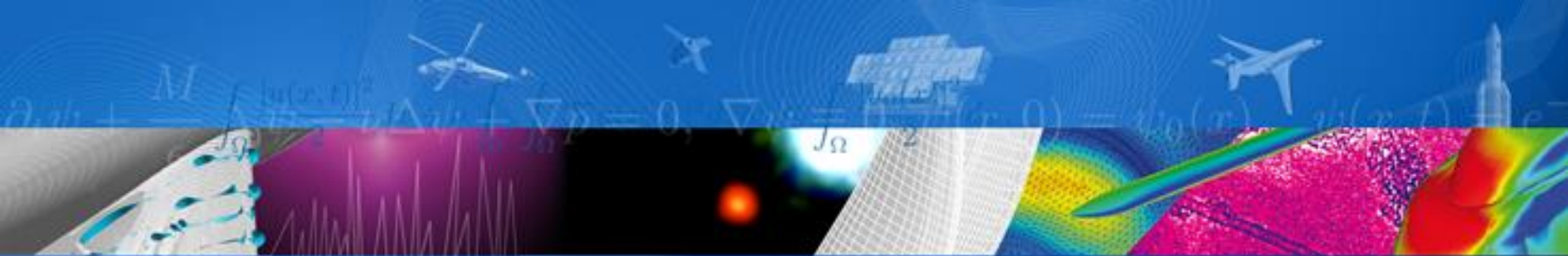
- integrated research programs (helicopters)
- collaborative research projects (A/C)

ONERA belongs to Aero Testing Alliance

ONERA participates to EC action programs

- 3rd to 7th PCRD , H2020 ...
- Joint Technical Initiatives (Clean Sky)
- Joint Research Initiatives (**Future Sky Safety**)
- Acore
- Era-Net





Thank you for your attention !

Any question ?

www.onera.fr



retour sur innovation

ONERA – General Presentation

- A public entity (EPIC)
- Created in 1946
- MOD umbrella
- ~ 2000 employees
- 233 M€ budget
- 53% contract-based business

Our missions :

- Orient and realize R&T in the aerospace domain
- Add R&T Value for national and European industry
- Realize and operate associated test means
- Provide high level services and expertise to the industry
- Foster Education through Research



ONERA – General Presentation

Strategic Long Term Partnerships

Multidomain Innovative R&T (TRL 1-6)

Leveraging Simulation with Experiences

Tailor made Solutions

Standard Industry Contracts

Dedicated IPR Agreements



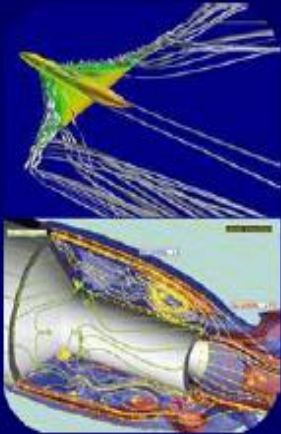
ONERA – General Presentation

Aircrafts:	Aerodynamics, aero elasticity, active control flight command, noise prediction, structures
Launchers:	Ariane 6, flight data collection
Engines:	new materials, engine noise, emissions
Space:	high sensitivity accelerometers, optics (VIS - IR- hyperspectral), radars (SSA)
Helicopters:	CFD Tools for Aerodynamics & Noise, New Blade Shapes, Low Noise Helicopter

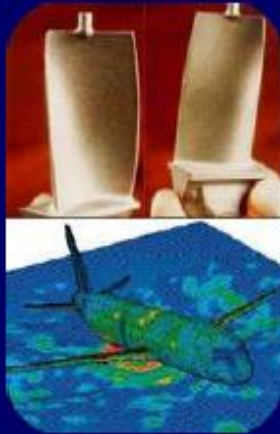


ONERA – General Presentation

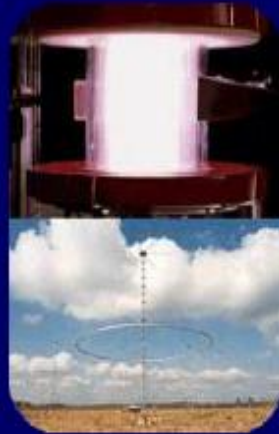
5 Scientific Domains



Fluid
Mechanics
& Energetics



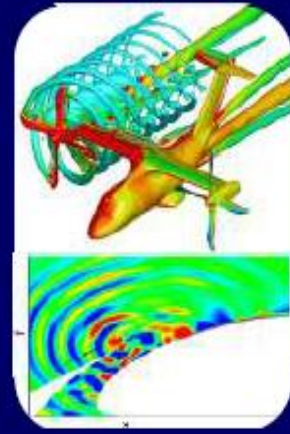
Materials
& Structures



Physics



Information
Processing
& Systems



Advanced
Numerical
Simulations

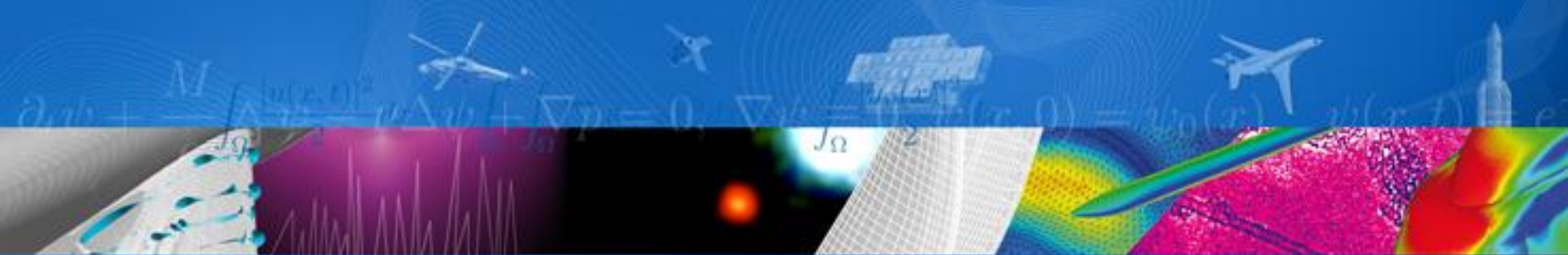


Wind Tunnels



Departments in ONERA Organisation

Nom	Sigle	Traduction
Aérodynamique, Aéroélasticité, Acoustique	DAAA	Aerodynamics Aeroelasticity Acoustics
Matériaux et structures	DMAS	Materials And Structures
Multi-Physique pour l'Energétique.	DMPE	Multi-Physic for Energetics
Electromagnétisme et Radar	DEMUR	Electromagnetism and Radar
Optique et Techniques Associées	DOTA	Optics and Associated Techniques
Physique, Instrumentation, Environnement, Espace	DPhIE	Physics Instrumentation Environment space
Traitement de l'Information et Systèmes	DTIS	Information Processing and Systems



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