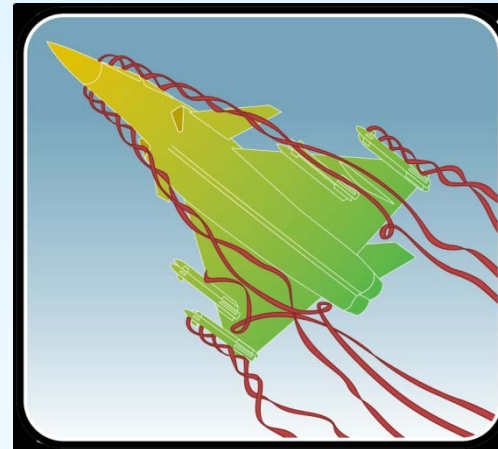


The Group of Responsables Aerodynamics (GoR AD) High-level plan on future GoR research



50 years of cooperation

1973

2023

1. First steps for Computational Fluid Dynamics with limited computer power
 2. There were several independent European national aeronautics companies in very strong competition
 3. No cooperative European funded projects to speak of
 4. No sharing of databases
- GARTEUR to foster cooperation among different companies and nations for the development of knowledge on aerodynamics and CFD

1. CFD is 'mature' and available with comfortable CPU
2. Competition among European countries is still in place, but, several national aeronautics industries disappeared and one large multi-national company emerged
3. Cooperative funded projects are now well developed and therefore most of the companies prefer to participate to EU funded projects than to GARTEUR projects
4. Several new areas of cooperation are available (NATO, EREA...)

→ **What place for GARTEUR today?**

GARTEUR

2023
1973



CLEAN AVIATION



- high TRL
- competition for budget & activities
- extra-large partnership
- intermediate TRL
- proposal success unclear
- potentially large partnership



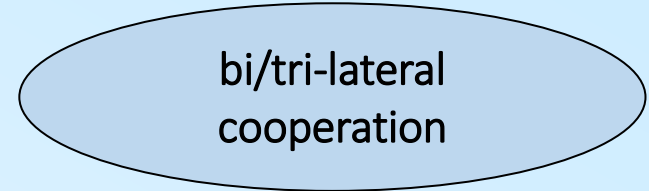
- research establishment political club
- provides directions
- no technical / research activities
- Future Sky?



- active groups & excellent lectures
- military focus
- no funding



- limited long-lasting partnership
 - high level of group effect
 - research + industry
 - military & civil
 - no show off: detailed technical exchanges
- think tank
 - prior to EU project
 - low TRL
- no budget
 - focused research
 - data sharing
 - limited paperwork
 - difficulty to contribute sometimes



- extra-small partnership
- low budget



unique cooperative and agile framework to tackle well contoured low TRL activities



Perspectives

1. Open issues for CFD
 - a. Conditions where strong separation are present (i.e. stall conditions, control surfaces, high lift...)
 - b. Some more CPU would help
 - More accurate simulation (LES, DNS...), optimization
 - c. Toward virtual certification
 - d. Our industrial problems are coupled (flexible aircraft, reactive flows, cooling systems...)!
 - Experimental validation required
 - e. Quantum computing?
2. New challenges are born
 - a. Rupture is needed for environmental impact (hydrogen / electric aircraft...)... with safety and certification in mind
 - b. Nose to tail simulation (external + internal)
 - c. Opportunity: Data science (analysis of flows + machine learning)
3. Cooperation dynamics: recover from COVID