TRANSDISCIPLINARY RESEARCH POLICY FOR PREPARING THE FUTURE?

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ONERA at a glance

- Public sector entity established in 1946
- Under the supervision of the Ministry of Defence
- 1,900 people at eight sites (13% PhD)
- Budget ~225 million €
- 51% of contract work
- Largest fleet of wind tunnels in Europe
What are we talking about?

Academics

Industry

Where new disruptive ideas with high potential application emerge

Where no specific public funding exists (except ERC)

Public funding

Bilateral partnership

Multilateral partnership

Public funding

REs, RTOs

TRL Scale

Acare – EREA - ESRE
Some (personal) considerations

- The gap between fundamental knowledge and industrial research is bridged by Research Establishments (REs) or Research and Technology Organizations (RTOs).

- **But** time is harder for technically based innovation (compared with services based innovation) because of longer development time cycles and stronger investments (skills, manpower and technical means).

- The key is to fill the TRL2-TRL 4 segment and develop knowledges and elementary bricks to build new concepts of planes (including propulsion, materials, control, systems).

- Taking a look on the past successes, we can see that a lot of them have been grounded on international exchanges and cooperations on risky projects.

- We have the responsibility to build a more favorable environment!

- For the young people (and also for those who are young since little longer).
4 steps for the revival of TRL 2→ 4 transdisciplinary research in REs

- To develop a clear vision of the future and future needs
- To try to obtain funding at least for the networking and the physical links between partner’s teams
- To try to organize the research program as a cross process of bottom up propositions and top down calls
- To share the vision and the roadmaps with partners in order to build (risky) common research projects
The 12 challenges of the ONERA Scientific Strategic Plan (2015-2025)
The structure of in-house research projects at ONERA

- Federative Research Projects
  - 4 years projects, multidisciplinary research
- Federative Research Actions or networks
  - 3 years transverse disciplinary actions or networks
- Research Projects
  - 3 years monodisciplinary projects
- Exploratory Research Actions
- International Exploratory Research Actions (new)
- Fully hired PhDs
- One year Post-Docs

- In-kind contribution to collaborative projects (public)
- In-kind contribution to programs of common interest with industry
- PhDs with industry

- Self-elaborated projects granted by State Agencies
Development of the instrumentation in large industrial wind-tunnels

BOS-3D for instantaneous density field measurement

PIV-3D for time-resolved dynamic fields

BOS-3D Jet studies in the wind-tunnel S1 ONERA Modane

F. Nicolas, A. Plyer, et al. (Fluvisu & MOTAR 2017)

Q = 2.5 kg/s – M = 0

Q = 1 kg/s – M = 0.4

PIV Particle Image Velocimetry  BOS Background Oriented Schlieren
The 2016 ONERA-TSAGI Price for young researcher’s 2 years projects

Topology Optimization Methods for Searching of Advanced MetaMaterials and Pro-Composite Layouts

Main objective of TOPSAMPI

- Revisit aircraft structures design from global layout to material by combining the two aspects: matter and material

With

- topology optimization and parametric/shape optimization
- composite and extreme materials/structures
- additive manufacturing

Print of an auxetic material
Negative Poisson’s ratio

Bettebghor et al. ONERA, TSAGI
As a conclusion … for discussion

By asking some questions

How do new ideas emerge?

How can we support this emergence?

What are the means we can use for passing from the crude idea to preliminary results that can be the starting point of funded projects?