

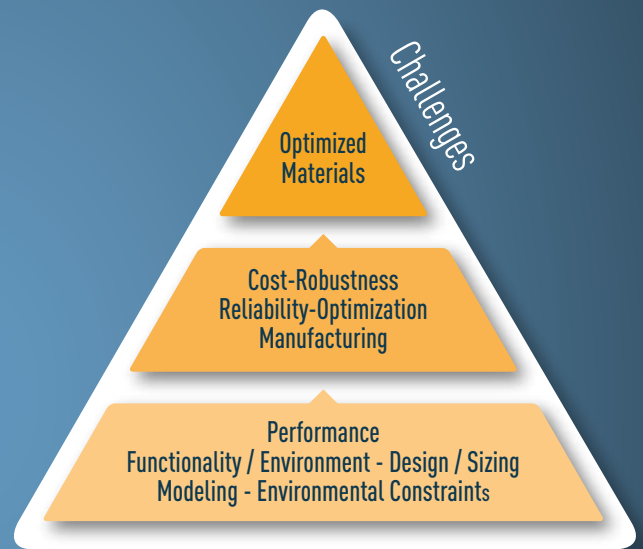
# Key Technological Domain

## High Performance Multifonctionnal Materials

### ★ ★ Market and needs

Materials represent up to 40% of a structural part cost and define production means. Demand on the Aeronautic and spatial materials market will be multiplied by 3 within the next 10 years.

Materials are a key lever of innovation through our elementary compositions and changes of production means.



### ★ ★ Technological axes

Transverse axis **INNOVATIVE ASSEMBLIES** (without classic Mechanical fixations)

- Critical parameters identification of innovative assembly processes.
- Improvement of the understanding of assembly processes.

#### ORGANIC MATRIX COMPOSITES

- Integration of new chemistries and functionalities
- Surfaces protection & Surfaces functionalities

#### METALLIC MATERIALS & SURFACES TREATMENTS

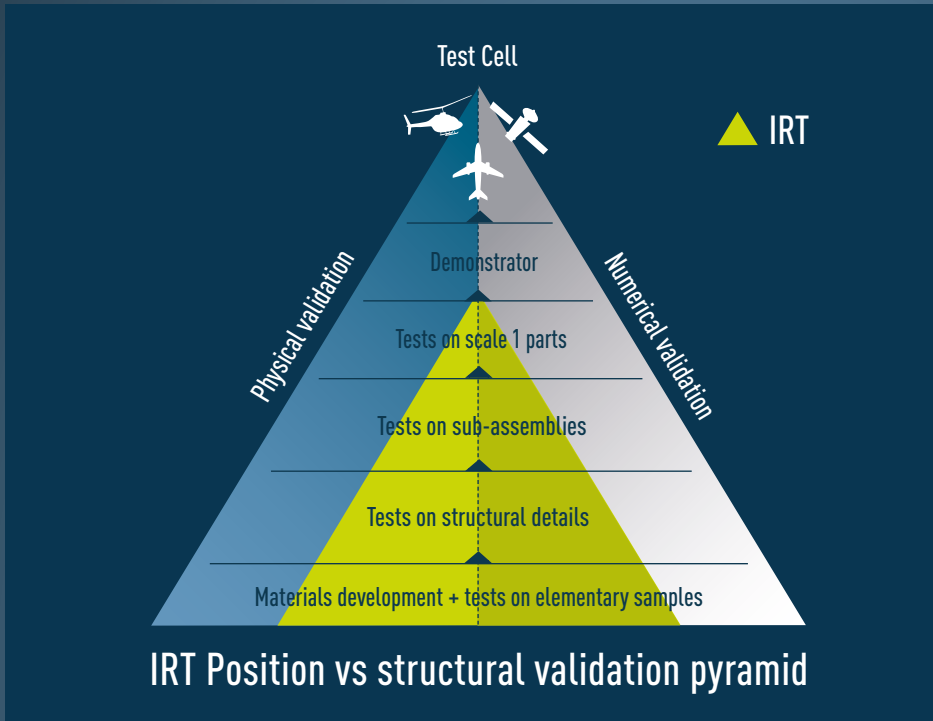
- New Titanium alloys with high performances
- Reinforced Metallic Materials
- Surfaces protection & Surfaces functionalities
- Understanding of new processes from a materials point of view (ex ALM)

#### CERAMIC MATRIX COMPOSITES

- Very High Temperature (→500°C)
- Materials and Industrial Processes

Transverse axis with **MORE ELECTRICAL AIRCRAFT DOMAIN**  
Materials for electronics

MORE ELECTRICAL AIRCRAFT DOMAIN



Projects in progress

**COMPINNOVTP**

Elaboration of multifunctional thermoplastics composite materials for aeronautic and space applications.

**COMPINNOVTD**

Elaboration of multifunctional thermoset composite materials for aeronautic and space.

**SURFINNOV**

Development of corrosion protection solutions for light alloys, improvement of tribological properties of the titanium. Elaboration of multifunctional coating materials, and lead time reduction decoration paints. Understanding and modelling of coating' ageing.

**METALTECHNICS**

Optimization of Ti alloys. Development of metallic matrix composite for space application. Investigation on mechanical performance for ALM parts (powder, defects, post-treatment, process). Characterization of alloy above 100°C.

**NANO**

Development of solder paste for integration of electronic components.

**INNOVATIVE ASSEMBLIES**

Determine critical parameters of assembly technologies in order to enhance their robustness, from design to final part, to ensure their performances and master their costs.

**OXIDE BASED CMC**

Development of processes to synthesize oxide based materials offering an alternative with a high durability to Titan based alloys and Nickel based alloys, in the temperature range of 500°C to 800°C, for civil aircraft applications.

**Sic MI CMC**

Develop Sic based CMC materials at market price for high-temperature applications on civil aircraft parts.

**Compétences**

- Architects (overall view from molecular aspects to final use and recycling of parts) / Polymer chemistry expert / Textile expert (sizing, impregnation) / Materials engineers / Process engineers / Mechanical, physics and chemical test engineers / Bonding expert / Welding expert / Assembly expert / Lightning strike phenomenon expert / Rapid dynamic mechanics engineer / Modelling experts / Material properties modelling / High Velocity dynamic modelling / Metallurgist expert / Surface treatment expert / Metal processes engineers (ALM, welding, machining, ...) / Chemical Formulation of surface treatment engineer / Oxidation/corrosion analysis experts / Chemical expert / Ceramic expert.

**Technology Platforms**

- Elaborate and characterize organic matrix composites.
- Surface protection and functionalization technologies.
- Elaborate and analyse ceramic matrix composites.
- Impact of manufacturing process on properties of metallic materials.
- Understanding of innovative assembly.

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