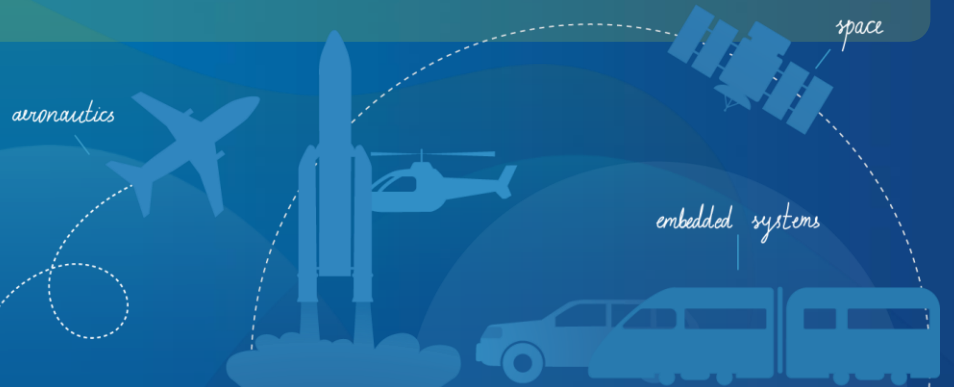
IRT SAINT EXUPÉRY

Accelerating science, technology research & transfer to industry



FRENCH INSTITUTES OF TECHNOLOGY

IRT SAINT EXUPÉRY: VALUE FOR INNOVATION

AERONAUTICS, SPACE
& EMBEDDED SYSTEMS

2014 – 2018 « Track Record »

>110 TRANSFERRED TECHNOLOGICAL RESULTS

23 TRANSFERRED SOFTWARES

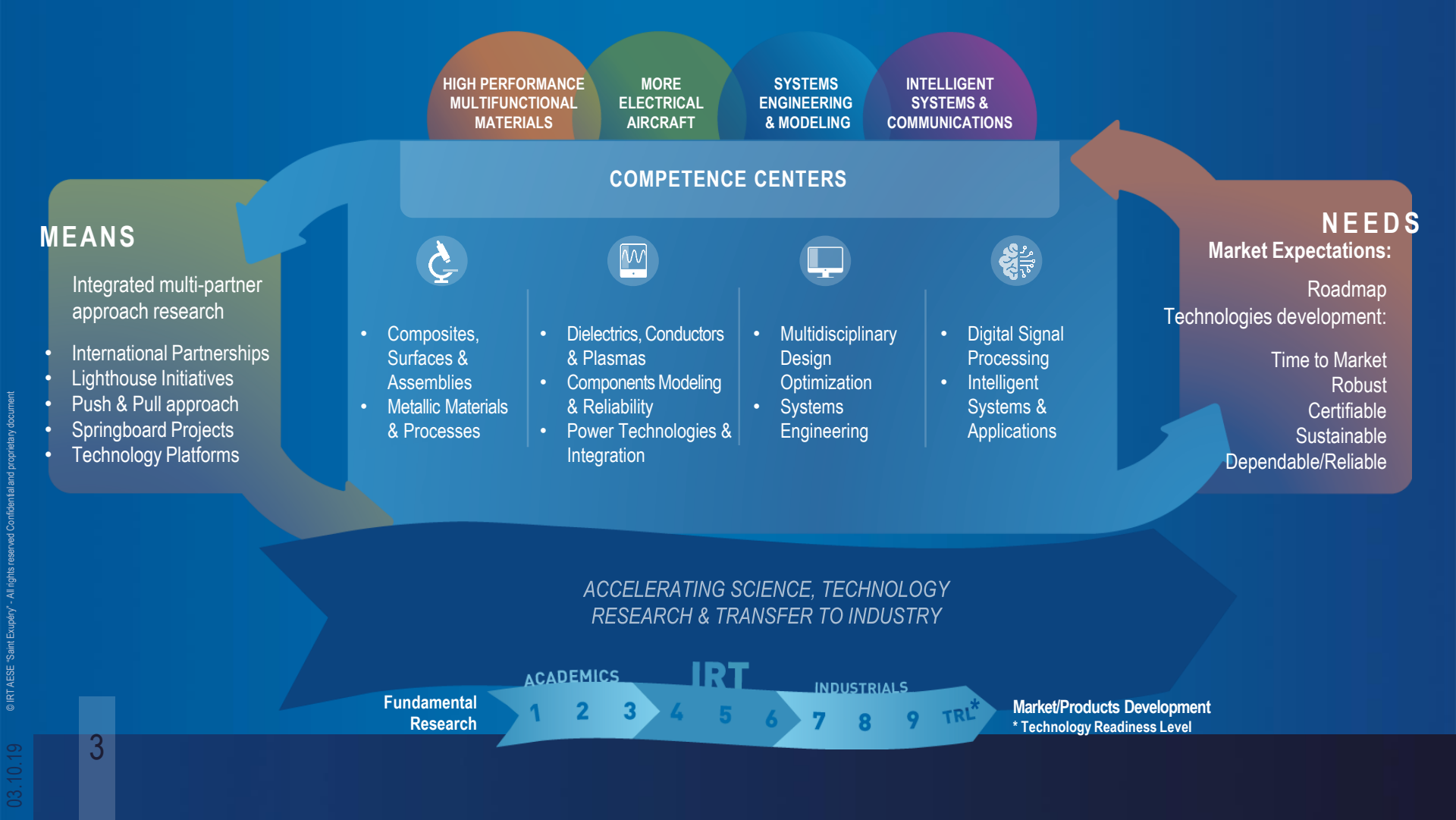
15 PATENTS

6 TRL GATES

13 INNOVATIVE EQUIPMENT

352 PUBLICATIONS & COMMUNICATIONS

60 2018 PhD STUDENTS & POST-DOCs



KEY FIGURES (12/2018)

2013 2014 2015 2016 2017 2018 2019 2025+

START-UP — RAMP-UP — CRUISE MODE

RESEARCH @IRT

33 On going Projects

€332M Cumulative Budget (2014-2023)

172 Publications

180 Communications

294 Conferences

11 Platforms

51 Equipment

125 Patents & Technology Transfers

PEOPLE

42 PhD Students

18 Post-Docs

37 Experts

17 Technical Referents

+ 90 PhD & Post-Docs Advisors

153 IRT Secondments

167 IRT Contract Employees

MEMBERS & PARTNERS

103 Industrial Members

including

57 SMEs

20 Mid-Caps Companies

53 Academic Members

including

30 Laboratories

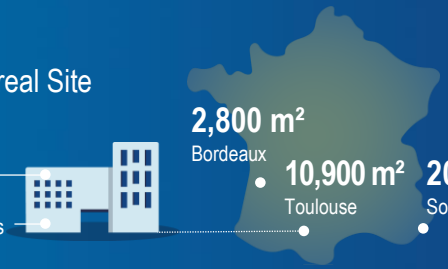
23 Public Institutions

FACILITIES

1 Montreal Site

4,000 m2 Offices

6,900 m2 Technical Surfaces



2,800 m² Bordeaux

10,900 m² Toulouse

200 m² Sophia Antipolis

MEMBERS & PARTNERS

FOUNDING MEMBERS

Public Institutions

Laboratories

Private Research

Industrials

20 Mid-Caps Companies

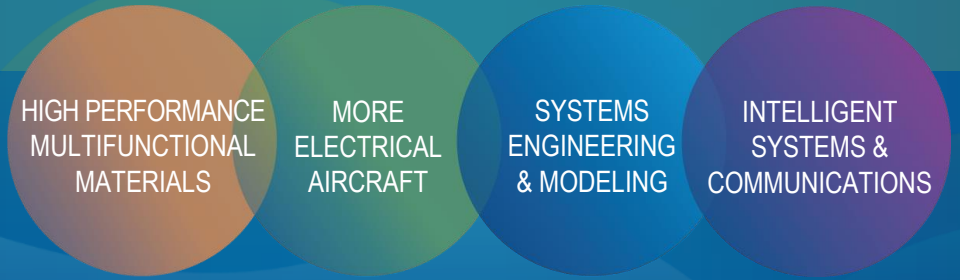
SMEs

Networks and Clusters

PARTNERSHIPS

NATIONAL & LOCAL AUTHORITIES MEMBERS

OUR TECHNOLOGY RESEARCH



FRENCH INSTITUTES OF TECHNOLOGY

HIGH PERFORMANCE MULTIFUNTIONAL MATERIALS

STÉPHANE
MAHDI

OUR GOAL

Boost the development of innovative material solutions
Support the technology transfer to industry
"On-Demand" Materials
- optimized elaboration & transformation for production
- multifunctionality
- special / efficient processes & automation
- environmental compliance
- design / sizing requirements
- simulation & virtual testing

CHALLENGES & NEEDS

Strong aeronautical, spatial & vehicle needs for incremental & disruptive products

Define aero-structure costs, Ensure the product robustness and drive the production means & ramp-up

Optimized Materials

Efficient Processes
Reliability – Robustness
Dialogue Tests – Simulations

Performance – Cost – Process Robustness
Effect of Defects – Ageing – Durability
Digital Materials & Manufacturing

HIGH PERFORMANCE MULTIFUNTIONAL MATERIALS

POSITIONING

ELABORATION & TRANSFORMATION [MULTIFUNCTIONALITY, COST, PERFORMANCE]	**Understand**: Key characteristics, Process parameters **To accelerate the development of new material solutions**	**KEY FOR OPTIMIZED DESIGN & PRODUCTION**
PROCESSING & AGEING - DURABILITY [PROPERTIES, EFFECT OF DEFECTS, LONG-TERM EFFECTS]	**Develop**: Environmental compliance, relations constituent-structure-process **To create understanding regarding special processes & innovative technologies**	**KEY FOR END TO END CONTROL, FROM THE SUPPLY-CHAIN TO IN-SERVICE ROBUSTNESS**
APPLICATIONS & INDUSTRIALISATION [AUTOMATISATION SCALE-UP, SIMULATIONS]	**Define:** Process Robustness, Digital Manufacturing, Virtual Materials **To contribute to the transition to automatization & digitalization**	**KEY FOR NEW STRUCTURES TRADE-OFFS & PRODUCT DEVELOPMENT OPTIMIZATION**

THROUGH 2 COMPETENCE CENTERS

Composites, Surfaces & Assemblies

Metallic Materials & Processes

MORE ELECTRICAL AIRCRAFT DOMAIN

RÉGINE
SUTRA -ORUS

OUR GOAL

To optimize More Electrical Aircraft solutions

To prepare Hybrid/Electric propulsion

To take benefit of all possible convergences between various industry sectors

CHALLENGES & NEEDS

Integration, multi-physics optimization

High voltage technologies, installation and storage

Electrical network quality, stability and security

Wide band gap integration, dielectrics, ageing, COTS, digital densification

Cost , Weight,
Efficiency, Power Density
Reliability

MORE ELECTRICAL AIRCRAFT DOMAIN

ADDED VALUE

TO DELIVER:	TO ALLOW OUR PARTNERS:
Technology demonstrators, multi-physics models, design tools, differentiating test means, databases	To increase the power density of every component of the electromechanical chain & to get a global optimization (losses reduction, 3D integration, interaction analysis, cooling solutions, etc.)
Voltage impact assessment, test procedures, scientific analysis, simulation tools, differentiating test means, databases, design guidelines, standards proposal, new electrical materials	To install secured high voltage solutions in embedded platforms by managing impacts: Weight, safety, etc.
Test procedures, test results, reliability/ageing/failure modes/EMC models, health monitoring solutions, design guides	To decrease the cost by mastering the use of COTS components To predict of the reliability and the robustness of the various elements

THROUGH 3 COMPETENCE CENTERS

- Dielectrics, Conductors & Plasmas
- Component Modeling & Reliability
- Power Technologies & Integration

SYSTEMS ENGINEERING & MODELING DOMAIN

MARIE-HÉLÈNE
DEREDEMPT

OUR GOAL

Make critical systems safer & cheaper
Increase system performance & autonomy
Ease design to manufacturing efficiency
Reduce development & operation costs
Optimize systems design
Allow disruptive solutions for new services
Boost digitalization process

CHALLENGES & NEEDS

Disruptive Technologies for Embedded Systems

Digital continuity for E2E product lifecycle in Extended Enterprise

Architecture optimization in multidisciplinary context

Safe
Smart
Connected
Autonomous
User-oriented

SYSTEMS ENGINEERING & MODELING DOMAIN

POSITIONING

COLLABORATIVE MBSE METHODOLOGY INCLUDING EXTENDED ENTREPRISE	Model-based System Engineering, MBSA/MBSE deployment capabilities, system design integration, product design to manufacturing	**DIGITAL CONTINUITY TO EASE PRODUCT LIFE CYCLE AND COLLABORATION**
HIGH PERFORMANCE PROCESSING & ARCHITECTURES	COTS-based systems, optimized parallel design , virtual platform for early V&V, cyber security, safety, qualification and certification, embedded IA certification , autonomy	**SAFETY CRITICAL & HIGH PERFORMANCE EMBEDDED SYSTEMS**
MULTI DISCIPLINARY OPTIMIZATION	Multi-disciplinary design optimization methodologies, automated trade-off, extended MDO/MBSE, uncertainties and multi level fidelity	**DIGITAL CONTINUITY TO EASE DESIGN IN A PARAMTETRIC MULTIPHYSICS ENVIRONMENT**

Multidisciplinary Design Optimization

Systems Engineering

THROUGH 2 COMPETENCE CENTERS

INTELLIGENT SYSTEMS & COMMUNICATIONS DOMAIN

LIONEL
CORDESSES

OUR GOAL

Prepare next generation communications

Adapt Artificial Intelligence (AI) to new applications and domains

Invent dependable AI for critical systems

Grow with the relevant ecosystem

CHALLENGES & NEEDS

Detect new needs
beyond the current hype
from under the radar

Build disruptive solutions
when nothing else works
with clear added value

Be a valuable partner for our Members
Be part of their roadmap
Be their daring explorer

Safe
Adaptive
Resilient
Dependable
Self-inventing

INTELLIGENT SYSTEMS & COMMUNICATIONS DOMAIN

POSITIONING

REALTIME DIGITAL SIGNAL PROCESSING	Efficient signal processing for high throughput optical and digital data transfer. Optimized software and hardware for embedded image processing	**OPTICAL AND RADIO COMMUNICATIONS, EMBEDDED SYSTEMS**
INTELLIGENT SYSTEMS & APPLICATIONS	IA algorithms for innovative and reliable applications in Aerospace, environment and transports	**ABOVE-HUMAN PERFORMANCE AND SYSTEM AUTONOMY**
DEPENDABLE & EXPLAINABLE ARTIFICIAL INTELLIGENCE	Robust unbiased learning, methods & tools, algorithms, qualification data sets	**CRITICAL PROCESSES, PRODUCTS & SERVICES**

Digital Signal Processing
Intelligent Systems & Applications
DEpendable Explainable Learning

THROUGH 2 COMPETENCE CENTERS & 1 PROGRAM

THANK YOU FOR YOUR ATTENTION

FRENCH INSTITUTES OF TECHNOLOGY

ANNEXES

FRENCH INSTITUTES OF TECHNOLOGY