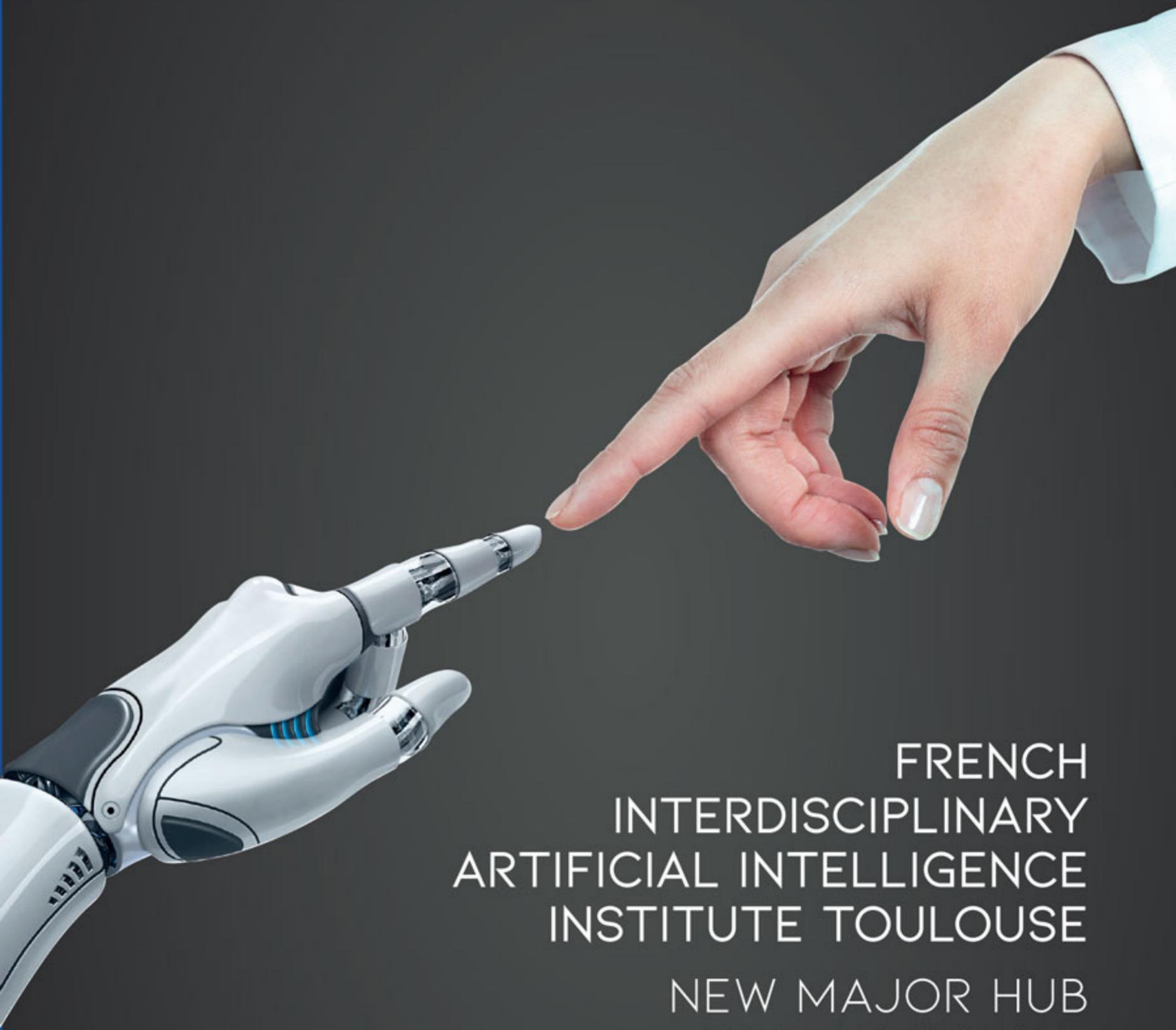


ANITI

ARTIFICIAL & NATURAL INTELLIGENCE
TOULOUSE INSTITUTE



FRENCH
INTERDISCIPLINARY
ARTIFICIAL INTELLIGENCE
INSTITUTE TOULOUSE

NEW MAJOR HUB
FOR ARTIFICIAL
INTELLIGENCE



Université
Fédérale

Toulouse
Midi-Pyrénées

SCIENTIFIC PROJECT

The scientific project is structured around three integrative programs (IPs), which will develop innovative solutions to address challenges raised by our application domains using theoretical advances in core AI scientific areas.



► **IP A: Acceptability, Fair representative data for AI**

This IP addresses various facets of the acceptability of systems integrating AI algorithms from social, economical, legal or ethical points of view. This includes issues about data that can affect AI algorithms. We will propose new ways of handling data to address data bottlenecks and data biases that can hamper AI systems.

► **IP B: Certifiable AI toward autonomous critical Systems**

This IP will develop new methods, models and tools based on hybrid AI, to support the design and validation of critical autonomous systems for which strong guarantees are required, (e.g., by certification authorities in aeronautics). This program will strengthen and implement the momentum initiated by the IRT-Saint Exupéry on this topic.

► **IP C: Assistants for design, decision, and optimized Industry processes**

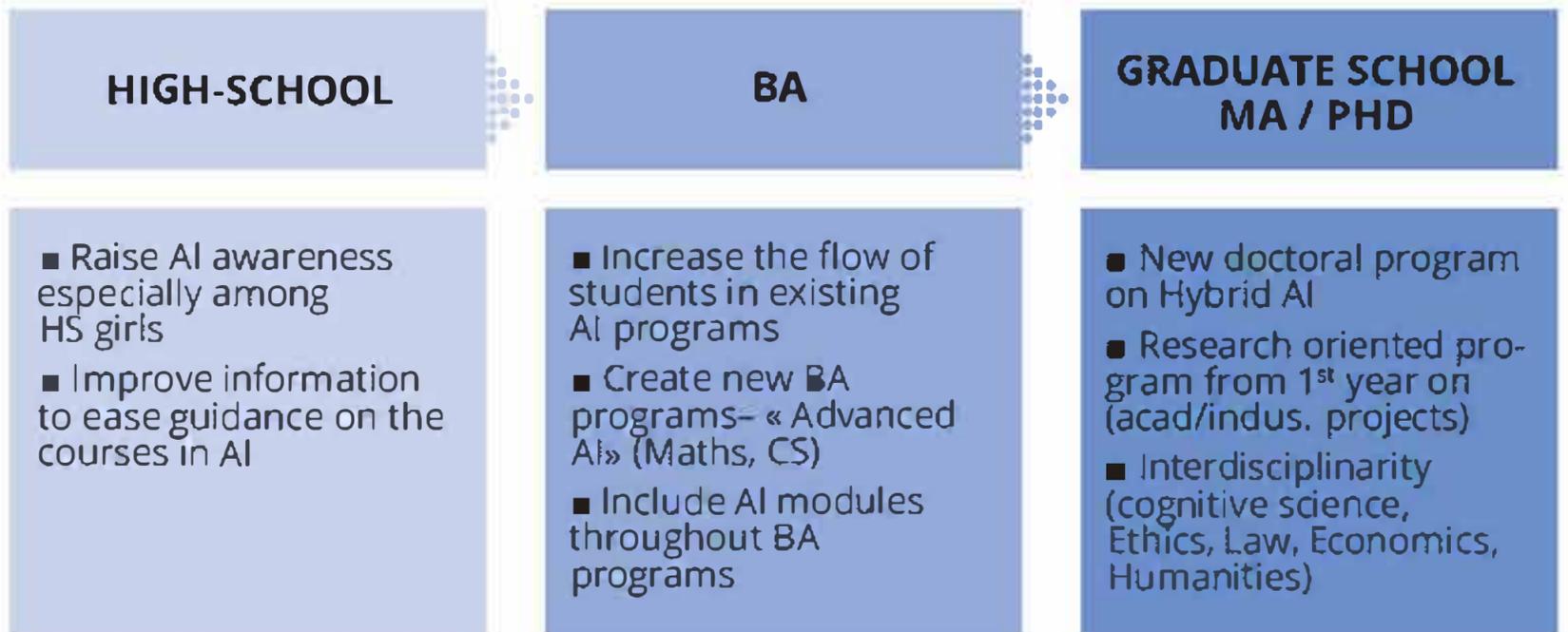
This IP will develop new AI methods to aid human decisions. This program will design advanced AI assistants to increase the performance of design, decision and industrial production related activities. This will lead to the design of cognitive assistants with advanced dialogue and interaction skills, the monitoring of complex systems in order to model their behaviour, predict their evolution, and anticipate corrective actions, and the design of autonomous mobile robots with the ability to interact with humans, cognitively and physically, to perform complex tasks in a collaborative manner.

In total, the project aims to fund more than thirty research chairs, of which about ten will be headed by researchers from international laboratories and universities (e.g. MIT or Brown University in the United States). The project will also promote international mobility and collaboration with an extensive visiting scholar's program to attract outstanding students and the best experts to address the challenges of hybrid AI in the targeted applications.

EDUCATION AND TRAINING PROJECT

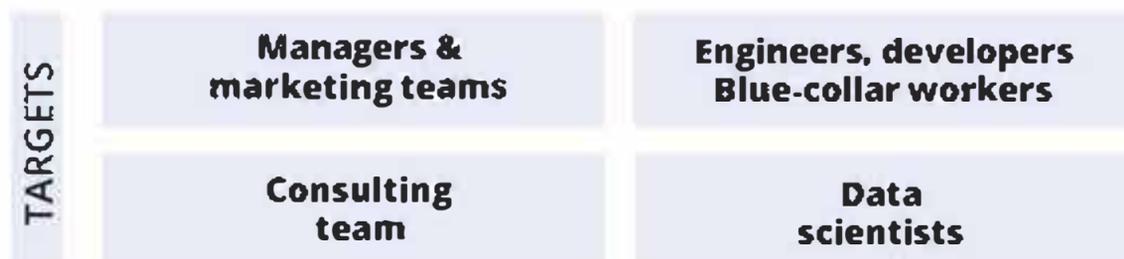
Lean on a wide range of high-level training courses thanks to the higher education institutions of the University of Toulouse, ANITI is aiming at becoming a world leader in hybrid AI education and doubling the number of students trained in AI by 2023.

► Formal education



► Continuing education

The project will also address the lack and urgent need in industry for AI qualified personnel, by developing apprenticeship programs and devoting significant effort to continuing education. A single portal entry for continuing education for the Toulouse site will be offered, with programs tailored to different levels and different needs.



► AI scientific culture dissemination

Several actions to disseminate AI scientific culture will be planned, drawing on local strengths.



ECONOMIC DEVELOPMENT PROJECT

ANITI aims to support the rapid dissemination of new technological possibilities to ANITI partners and the acceleration of 100 SMEs, including the creation of startups.

ANITI will provide its private partners with scientific support and opportunities for technology transfer through:

- The Partners' club, for the development of synergies between research centers and companies, disseminating knowledge and informations exchange ;
- The Innovation & Business Committee will evaluate the business development opportunities all along the project. The IBC brings together the SATT Toulouse Tech Transfer, representatives of IPs and ANITI founding strategic partners, clusters, financial partners, both public and private incubators and local authorities (Metropole, Region).



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Interested to join the Partners' club, contact:

aniti@aerospace-valley.com

+50 PARTNERS



24 CHAIRS

The 24 chairs are grouped into three integrative programs that provide three distinct sets of themes and challenges that ANITI will address. Each chair is a small team consisting of a PI associated researchers, post-doctoral fellows and Ph.D. students.



INTEGRATIVE PROGRAM A: ACCEPTABILITY, FAIR REPRESENTATIVE DATA FOR AI

Moral AI

Principal investigator: Jean-François Bonnefon

Law, Accountability and Social Trust in AI

Principal investigator: Céline Castets-Renard

The effects of AI on competition in the marketplace

Principal investigator: Bruno Jullien

Empowering Data-driven AI by Argumentation and Persuasion

Principal investigator: Leila Amgoud

Developing AI to Improve Global Governance

Principal investigator: César Hidalgo

Fair & Robust Methods in Machine Learning

Principal investigator: Jean-Michel Loubès

Heterogeneous data fusion-based inference

Principal investigator: Nicolas Dobigeon

AI for physical models with geometric tools

Principal investigator: Fabrice Gamboa



INTEGRATIVE PROGRAM B: CERTIFIABLE AI TOWARD AUTONOMOUS CRITICAL SYSTEMS

Efficient algorithms and Data Assimilation for computationally efficient constrained advanced learning

Principal investigator: Serge Gratton

Deep Learner Explanation & Verification

Principal investigator: Joao Marques Silva

Optimization for ML and the Christoffel function for data analysis

Principal investigator: Jean-Bernard Lasserre

Pushing the frontier of nonconvex optimization to more general settings and understanding why it works

Principal investigator: Marc Teboulle

Fair & Robust Methods in Machine Learning

Principal investigator: Jean-Michel Loubès

Large scale optimization for AI

Principal investigator: Jérôme Bolte

New certification approaches of critical AI based systems

Principal investigator: Claire Pagetti

Game Theory and Artificial Intelligence

Principal investigator: Jérôme Renault

AI for Air Traffic Management and Large Scale Urban Mobility

Principal investigator: Daniel Delahaye



INTEGRATIVE PROGRAM C: ASSISTANT FOR DESIGN, DECISION, AND OPTIMIZED INDUSTRY PROCESSES

Reverse-engineering the brain

Principal investigator: Thomas Serre

Deep learning with semantic, cognitive and biological constraints

Principal investigator: Rufin van Rullen

Synergistic transformations in model based and data based diagnosis

Principal investigator: Louise Travé-Massuyes

Neuro-adaptive Technology based Mixed-initiative to enhance Man-Machine Teams

Principal investigator: Frédéric Dehais

Motion Generation for Complex Robots

Principal investigator: Nicolas Mansard

Cognitive and Interactive Robotics

Principal investigator: Rachid Alami

Knowledge compilation techniques for reducing complexity of algorithms for solving problems with uncertainty and preferences

Principal investigator: Hélène Fargier

Design using intuition and logic

Principal investigator: Thomas Schiex

ANITI PRESENTATION

The ambition of the Artificial and Natural Intelligence Toulouse Institute (ANITI) is to develop a new generation of artificial intelligence called hybrid AI, combining data-driven machine learning techniques with symbolic and formal methods for expressing properties and constraints and carrying out logical reasoning. This approach will provide better guarantees in terms of reliability, robustness and the ability to explain and interpret the results of the algorithms used, while ensuring social acceptability and economic viability. Such guarantees are required by many applications targeted by the project, such as autonomous vehicles of the future.



2 strategic application sectors targeted
> *mobility and transportation*
> *robotics/cobotics for the industry of the future*
200+ researchers
3 integrative programs
24 research chairs
50 partners
Including some thirty companies



**UNIVERSITÉ FÉDÉRALE
TOULOUSE MIDI-PYRÉNÉES**

100,000+ students
Universities in **10** cities
31 universities, schools & research entities
1,000+ training courses: BA/M/PhDs
145 research laboratories and entities
5th largest concentration in France
of ERC researchers



**TARGET BUDGET
OVER FOUR YEARS**

80 M€ (academia, industry, PIA3
investment programme, institutions)
Including:
24 M€ from the Occitanie region
4 M€ from Toulouse Métropole



TOULOUSE AND ITS REGION

2nd largest concentration of researchers in France
with **6,800** public sector researchers
2nd largest creator of startups in France
(INSEE, 2018)

ANITI is coordinated by the University of Toulouse: Université fédérale Toulouse Midi-Pyrénées within the framework of France's « Investing for the Future – PIA3 » program, with the support of the Occitanie Region, the Toulouse Metropole, and the SATT Toulouse Tech Transfer.

ANITI has been selected to be one of four institutes spearheading research on AI in France. ANITI, along with the other 3AI institutes, will start operations for a renewable 4-year period as part of the French national strategy for Artificial Intelligence, the Programme Investissements d'Avenir under the Plan Villani. These institutes will collaborate and operate as a network with the goal of making France a world leader in artificial intelligence.

CONTACTS



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