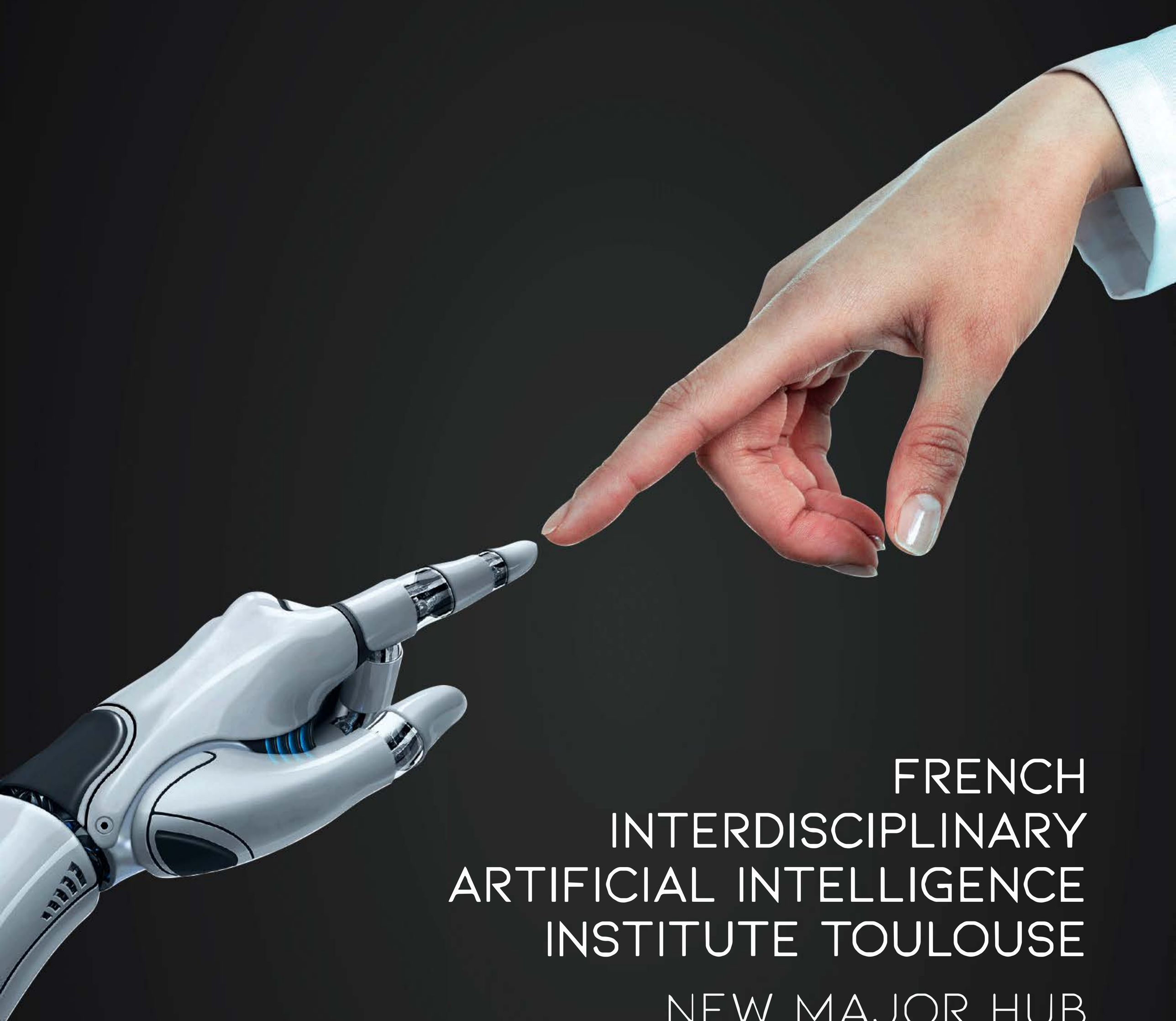
ANITI

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.

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IPA: 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.

IPB: 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.

IPC: 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

The ambition is to become a world leader in hybrid AI education and to double the number of students trained in AI by 2023.

HIGH-SCHOOL	BA	GRADUATE SCHOOL MA / PHD
■ New doctoral program on Hybrid AI ■ Research oriented program from 1st year on (acad/indus. projects) ■ Interdisciplinarity (cognitive science, Ethics, Law, Economics, humanities)	■ Increase the flow of students in existing AI programs ■ Create new BA programs– « Advanced AI» (Maths, CS) ■ Include AI modules throughout BA programs	■ Raise AI awareness especially among HS girls

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.

TARGETS		
	Managers & marketing teams	**Engineers, Developers**
	Consulting team	**Data scientists**

AI scientific culture dissemination

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

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ECONOMIC DEVELOPMENT PROJECT

Rapid dissemination of new technological possibilities to ANITI partners via IPs

Start-up creation

- Via ANITI's Innovation and Business Committee
- Up to 1 M€/year dedicated by Toulouse Tech Transfer (early stage funding)
- Pre-incubation and incubation management in liaison with innovation clusters (e.r., Aerospace Valley) public and private incubators.

To become a partner and member of the Institute, contact:
aniti@aerospace-valley.com

+50 PARTNERS

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.

ANITI

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

TARGET BUDGET OVER FOUR YEARS

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

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

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 this autumn for a renewable 4-year period as part of the French national strategy for Artificial Intelligence, the Programme Investissements d'avenir1 under the Plan Villani 2. 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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www.univ-toulouse.fr/ANITI

22 CHAIRS

An international jury reviewed the ANITI proposal and validated the following 21 chairs. Each chair is a small team consisting of a PI associated researchers, post doctoral fellows and Ph.D. students. The chairs are grouped into three integrative programs that provide three distinct sets of themes and challenges that ANITI will address.

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

AI and Competition
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

Data-driven approximate Bayesian computation for fusion-based inference from heterogeneous (remote sensing) data
Principal investigator: Nicolas Dobigeon

AI for physical models with geometric tools
Principal investigator: Francis 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

Large scale optimization for AI
Principal investigator: Jérôme Bolte

New certification approaches of critical AI based systems
Principal investigator: Claire Pagetti

Game Theory, Convergence for Generalized Adversarial Nets and other ML architectures
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

Human Robot Interactions for cobot-industry applications
Principal investigator: Rachid Alami

Knowledge compilation
Principal investigator: Hélène Fargier

Design using intuition and logic
Principal investigator: Thomas Schiex