Artificial And Natural Intelligence Toulouse Institute

A center of excellence in Trustworthy

Serge Gratton (Scientific Director) – Romaric Redon (Director of operations)

November 24th, 2024

ANITI

La France constitue des pôles d'excellence en formation sur l'IA

RÉPARTITION DES IA CLUSTERS DE FRANCE 2030

FRANCE 2030

- ÎLE-DE-FRANCE
- RENNES — Université de Rennes **20 M€**
- LORRAINE/STRASBOURG — Université de Lorraine **30 M€**
- Institut Polytechnique de Paris **70 M€**
- Université Paris Saclay **20 M€**
- Sorbonne Université **35 M€**
- GRENOBLE — Université Grenoble Alpes **70 M€**
- Université Paris Sciences et Lettres **75 M€**
- TOULOUSE
- NICE
- Université de Toulouse **20 M€**
- Université Côte d'Azur **20 M€**

Public –Private Partners
20 Academics
40 Industrials

90 M€ prev. budget
20M€ ANR
10M€ Regional (target)
20M€ Academic
30 M€ Industrial(target)
10 M€ Other

300 Team members
120 Researchers
120 PhDs
50 seconded Engineers

19 Research Chairs
8 integrative Programs
20 AI education Programs
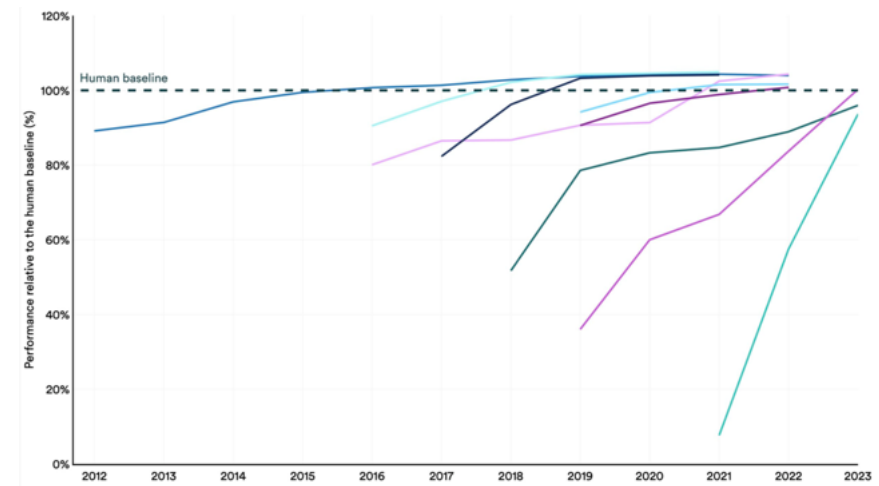**1** Master International

A Research Program Focused on Efficient AND Trustworthy AI

ANITI

- 2023: Year of Generative AI - Exceptional performance measured

- Visual recognition, medical diagnosis, text manipulation

- BUT compromised with facts and truth: trust issues.

  - 20% factual errors for the best systems !

  - Will never be perfect and make different errors than humans !

- What about their usages in Critical systems impacting people's safety ?

Legend:
- Image classification (ImageNet Top-5)
- Visual commonsense reasoning (VCR)
- Natural language inference (aNLI)
- Medium-level reading comprehension (SQuAD 2.0)
- Multitask language understanding (MMLU)
- Visual reasoning (VQA)
- English language understanding (SuperGLUE)
- Basic-level reading comprehension (SQuAD 1.1)
- Competition-level mathematics (MATH)

AI HAS SURPASSED HUMAN PERFORMANCE ON SEVERAL BENCHMARKS, INCLUDING SOME IN IMAGE CLASSIFICATION, VISUAL REASONING, AND ENGLISH UNDERSTANDING.
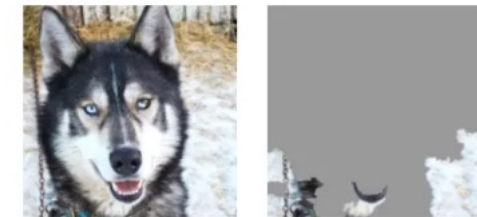THE AI £INDEX REPORT 2024 (STANFORD)

ANITI : Essential role in producing efficient and trustworthy AI methods, that meet regulation and standardization challenge

ANITI   Research on Efficient and Trustworthy AI

TRUSTWORTHY AI

FONDAMENTALS

ML architectures
Multi-modal Learning
Optimization for ML

ATTRIBUTES

Robustness
Fairness
Explainability
Acceptability
Frugality
Embeddability

INTEGRATION

Computer Vision
Time Series analysis
Natural Language P.
Hybrid modelling
Decision making
GenAI

| Transport | Industry 4.0 | Environment |

Explainability

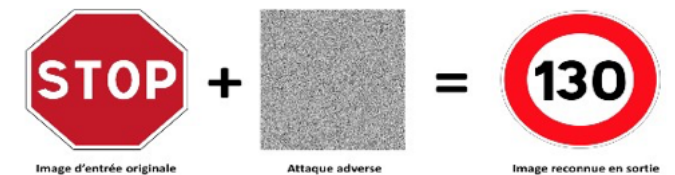
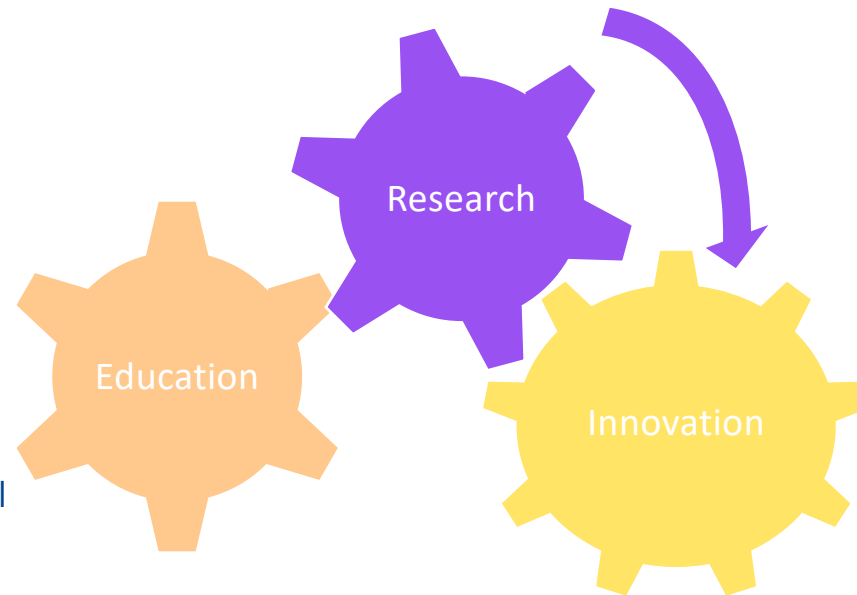(a) Husky classified as wolf   (b) Explanation

Robustness

Image d'entrée originale   Attaque adverse   Image reconnue en sortie

ANITI Global strategy

- 19 research chairs
- Mono-PI, Synergy, Industrial

Research

Education

Innovation

- AI "mention" for Toulouse
- 1 International Master
- 12 tracks on TAI and GenAI
- 450 students expert in AI every year
- In complement of EFELIA

8 collaborative programs:
- Collaboration academia/industry
- Funding opportunities: Regional, ANR, Europe, multilateral

ANITI

19 Excellence chairs – 37 PIs by research themes

Selection by an international jury of **14 experts** in 3 steps :
- Review by 2 experts of Chair proposals in Mai 2023
- Synchronization and ranking July 2023
- Final selection in April 2024

Mono-PI Chairs

Optimization

Sensitivity, Random matrices

Frugal reinforcement learning

Physics informed deep learning

Robotics and reinforcement learning

Anomalies

Argumentation in LLMs

Acceptable AI

Synergy Chairs

Bias, legals aspects, algorithmic implications

Cobots: robotics, language, vision, neurosciences

Meteorology, filtering and knowledge representation
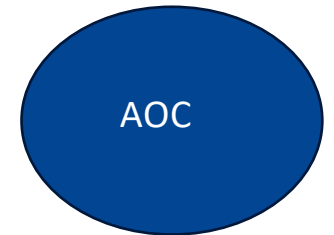
Industrial Chairs

Robustness

Certification

Planification / optimization

Energy networks

Remote sensing

Continental and coastal waters

AOC

ANITI

DEEL
Certifiable AI for critical embedded systems

- Explainability
- Theoretical guaranties
- Reinforcement learning with guaranties
- Quantized aware training
- Industrial modelling
- Out of distribution and anomaly detection
- Bias and fairness

FOR
Trustworthy AI/GenAI for critical processes

- Multimodality and the GW Architecture
- Reasoning and hallucinations
- Audit of LLMs and Bias Metrics
- Explainability
- Data (low resource learning)

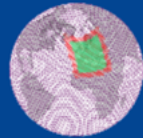**AI4SAVE**
AI for Simulation and Virtual Sensors

- Performance of the new surrogate models (performance and accuracy)
- Reliability (guarantees of approximation, respect for physical constraints)
- Low amount of data (high-fidelity simulation and empirical measurements)

ANITI

5 integrative programs to come

IndustryXAI
- Adaptive cobots with natural interaction
- Trustworthy AI Planning optimisation, Supply chain optimisation
- PHM and anomaly detection

AI4ENV
- Earth observation – Earth Digital twin
- AI for climate modelling and forecast
- Decision making to face climate change

AI4Decarbo
- AI4ATM sustainable trajectories CO_2/Non-CO_2
- Digital twin for more electric vehicles
- Robust optimisation for power systems

AI4Health
- Improve quality of care (diagnosis, …)
- Better patient management (Planning , …)
- Design of new treatment tailored to each individuals

ADoptAI
- Social acceptance
- legal aspects
- Neuroergonimic approaches to improve Human Interaction

TRANSFERT AND INNOVATION

Mature Open source software

- Trustworthy AI
- AI & Robotics
- Decision making

Contribution to a sovereign AI ecosystem

- Confiance.ai program: major challenge in securing AI systems
- P16 INRIA acceleration strategy: sovereign AI ecosystem

Transfer to large groups
- Collaboration on certification standards
- Integration of trustworthy AI methods for certifying AI-based systems
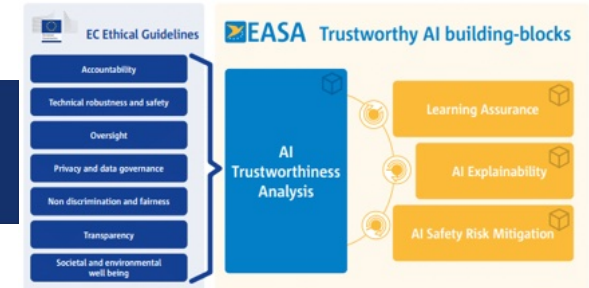- Methods and tools integrated by our Industrial partners

Transfer to SMEs and startup creation
- Collaboration with digital clusters D113, Numeum, La Mêlée, EDIH OccitanIA   #OccitanieisAI
- Deeptech startup creation with UT Innovation, Toulouse site university innovation hub labeled under France 2030

Training new AI talents with our partners

- 25 CIFRE PhDs
- 50 seconded engineers
- Continued education

AI ACT

EC Ethical Guidelines / EASA Trustworthy AI building-blocks

cen CENELEC   ED-324 / ARP6983 SAE INTERNATIONAL

Quality Improvement

Predictive maintenance

Process mining & predicted flow

ANITI

The program

Inscriptions
- ~235, 25 Novembre – FULL
- ~160, 26 Novembre

Posters
- Zone pgm integratif (10 posters)
- Chaires - 50 posters
- 20 stand entreprises
- Plateformes
  - LOGIN
  - PADOCC
  - NEOCAMPUS
- CST- mixité

LUNDI 25 NOVEMBRE

13 h 30 - 14 h 00	**ACCUEIL CAFÉ**
14 h 00 - 14 h 30	**PRÉSENTATION IA CLUSTER** Mot d'ouverture de Michael Toplis, président de l'Université de Toulouse, suivi de la présentation de l'IA Cluster par Serge Gratton directeur scientifique de ANITI et Romaric Redon, directeur opérationnel de ANITI
14 h 30 - 16 h 30	**SESSION AI GENERATIVE, LANGAGE ET ROBOTIQUE** Talk invité par Ellie Pavlick (visio) - Organisateurs : Nicholas Asher et Chloé Braud
16 h 30 - 17 h 00	**PAUSE CAFÉ**
17 h 00 - 19 h 00	**POSTER SESSION NO. 1 & CORNERS INDUSTRIELS**
19 h 00 - 21 h 00	**SOCIAL EVENT ANITI - APÉRO DÎNATOIRE**

MARDI 26 NOVEMBRE

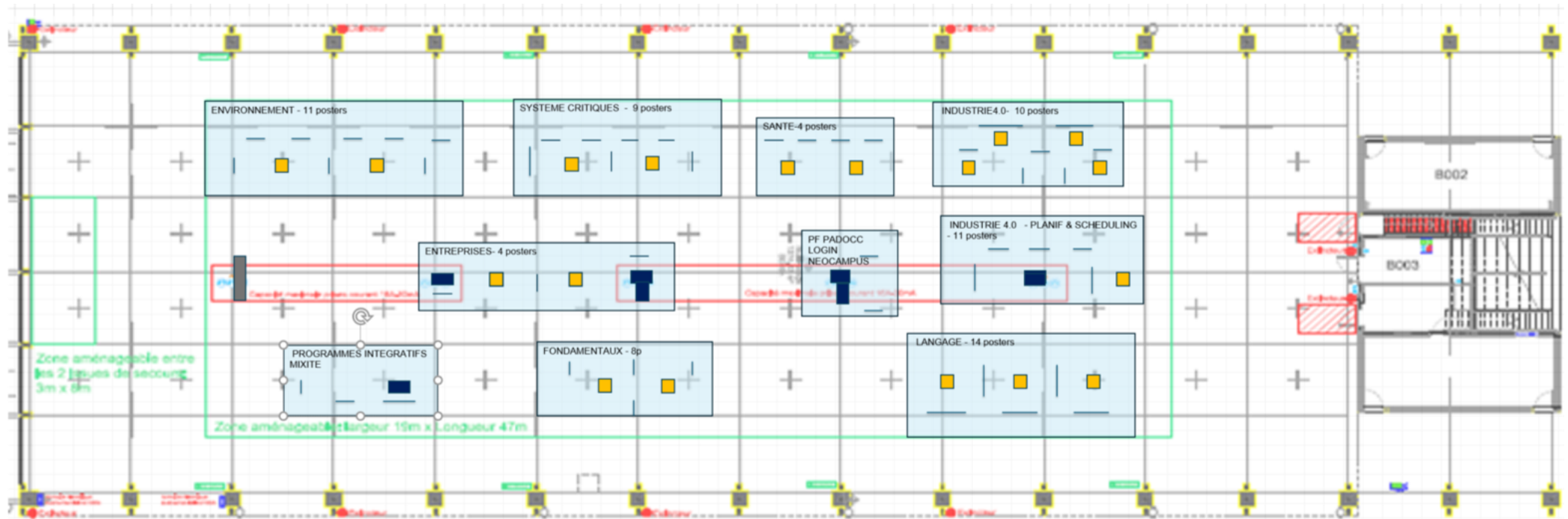|	
9 h 15 - 10 h 00	**ACCUEIL CAFÉ**
10 h 00 - 10 h 30	**HIGHLIGHTS ANITI 2019-2023**
10 h 30 - 12 h 30	**SESSION ENVIRONNEMENT** Animateurs : Laure Raynaud, Nicolas Dobigeon et Mathieu Fauvel
12 h 30 - 14 h00	**PAUSE DÉJEUNER**
14 h 00 - 16 h 00	**SESSION FONDEMENTS DE L'IA** Animateurs : Mathieu Serrurier et François Bachoc
16 h 00 - 16 h 30	**PAUSE CAFÉ**
16 h 30 - 18 h 00	**SESSION POSTER NO. 2 & CORNERS INDUSTRIELS**

Session Poster