3IA

Institut interdisciplinaire d'intelligence artificielle (3IA) Côte d'Azur

UNIVERSITÉ CÔTE D'AZUR

cnrs dépasser les frontières

EURECOM Sophia Antipolis

Inria inventeurs du monde numérique

Inserm

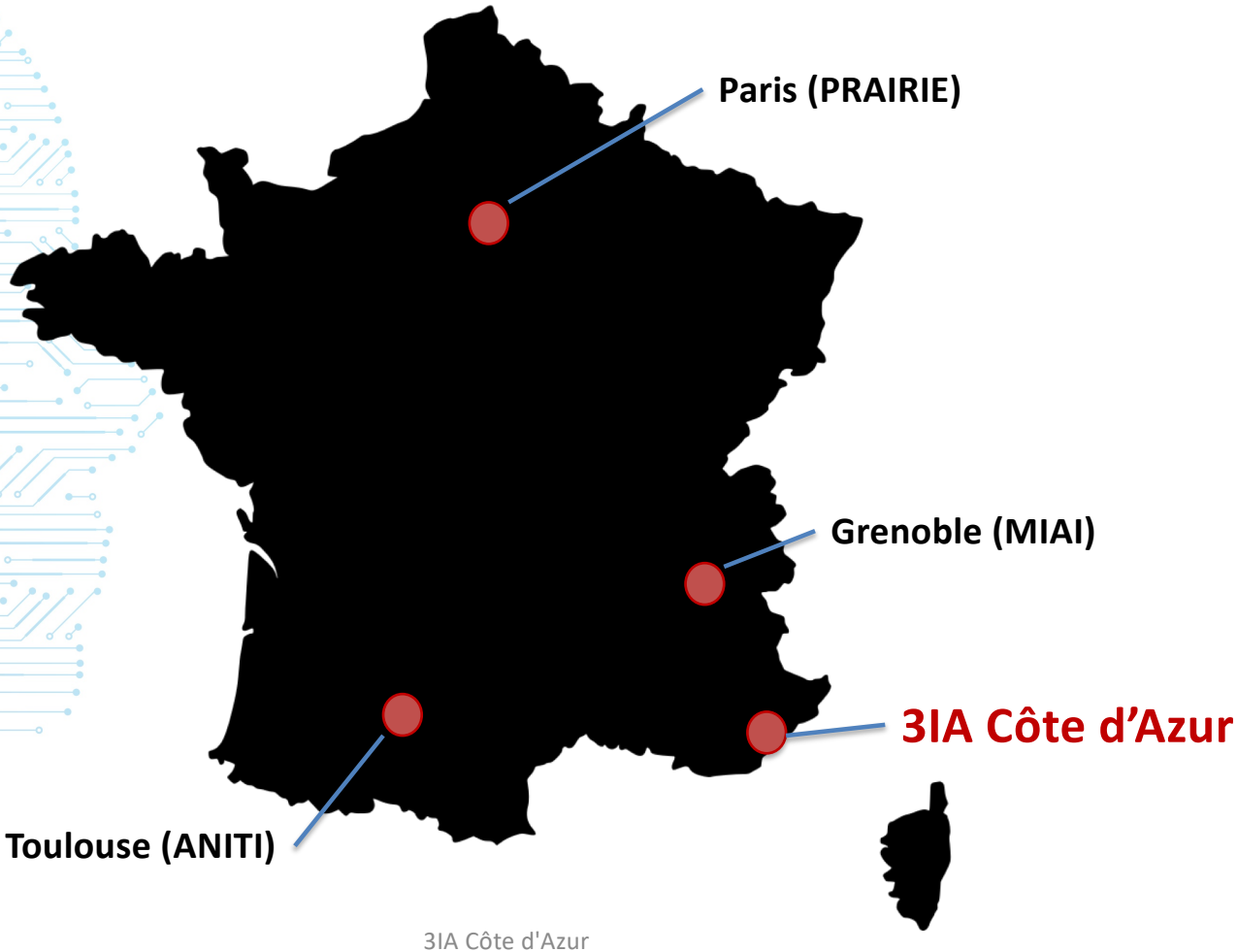
MINES ParisTech | PSL

skema BUSINESS SCHOOL

INITIATIVE D'EXCELLENCE

UCA J.E.D.I. UNIVERSITÉ CÔTE D'AZUR

One of the four interdisciplinary institutes of artificial intelligence (3IA) awarded the label in 2019



An exceptional site for academic research

Over the last few years

31
ERC laureates

6
CNRS medals

3
Inria awards

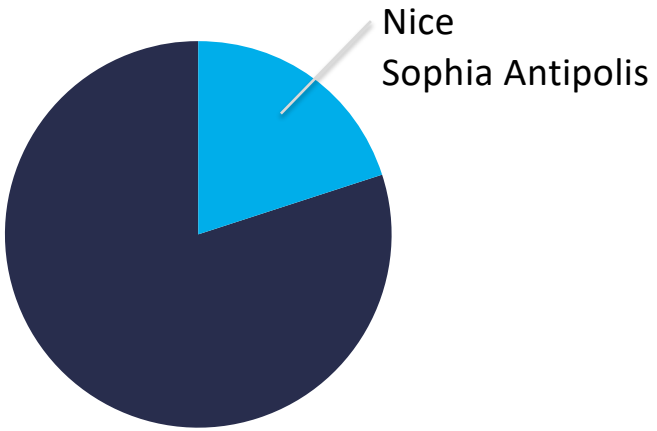
Strong research capacity in AI fields

Strong research capacity in AI fields

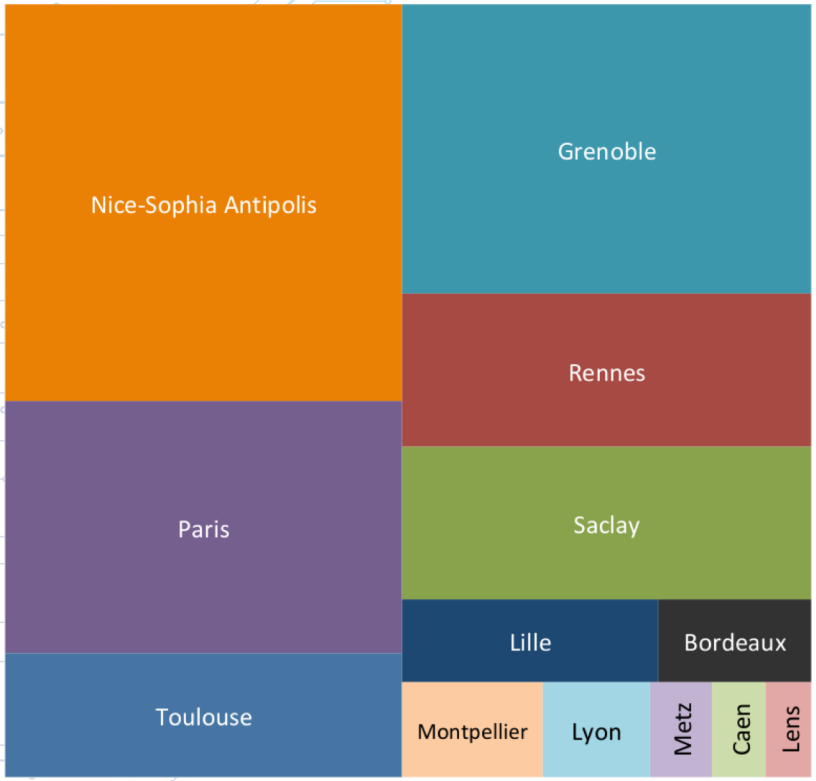
271
scientists in 28 research groups

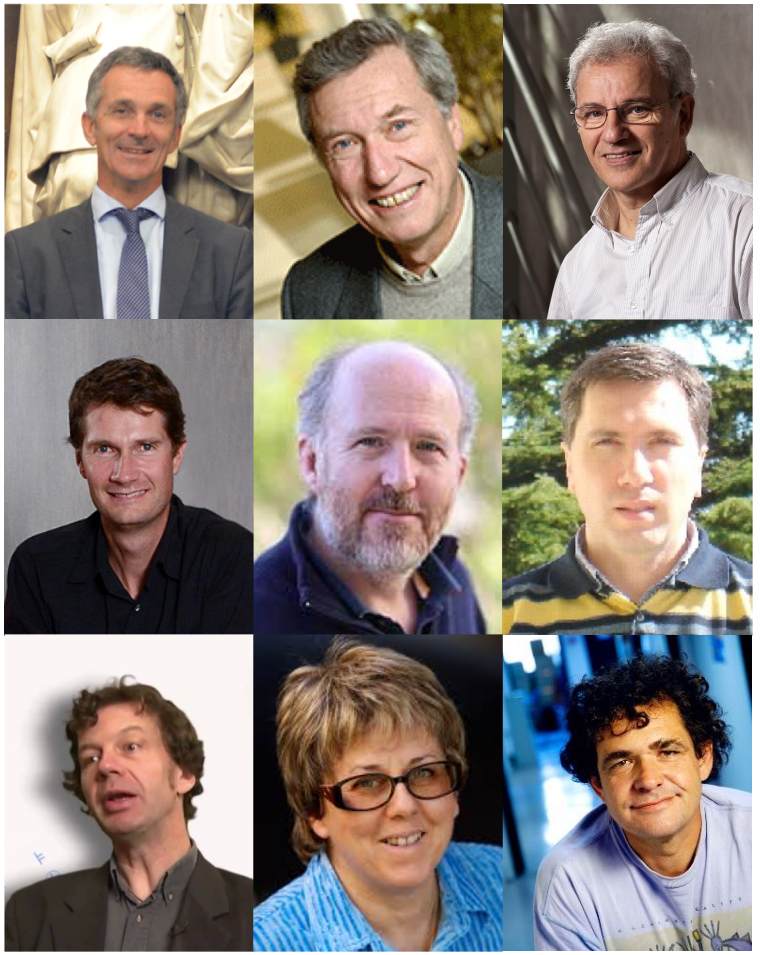
Weight of the French metropolises in the guide2research.com ranking

75 French scientists ranked including **20%** in Nice-Sophia Antipolis



An exceptional site for academic research





An exceptional site for innovation and private research

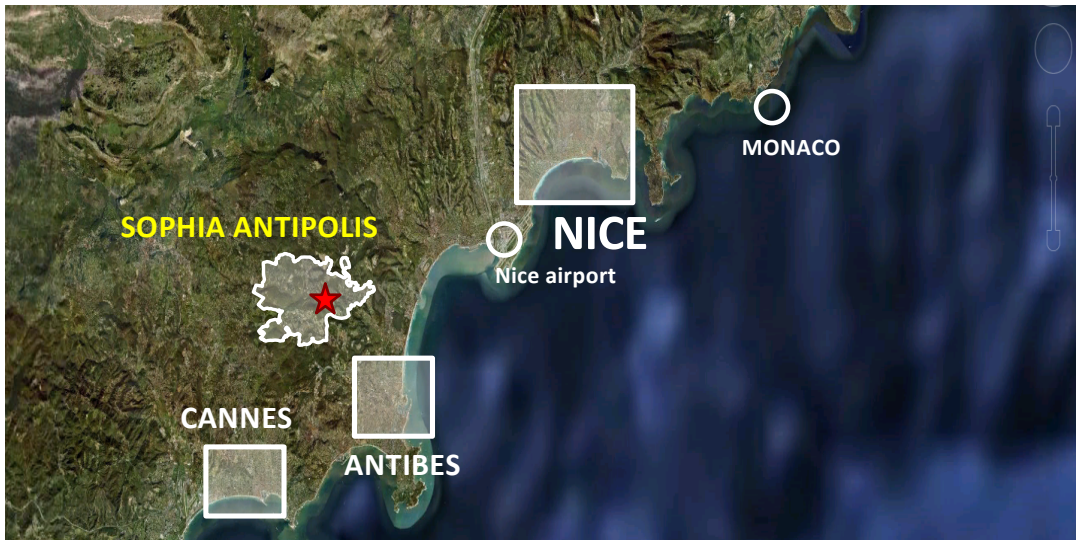
Sophia Antipolis: the largest technology park in Europe

2200+ companies

36000+ employees

4000 academic researchers

5500 students



Major tech actors

Research and development

- Network and Information Technologies
- Artificial Intelligence
- Health, Chemistry, Biotechs
- Smart territory, autonomous vehicles

50TH ANNIVERSARY SOPHIA ANTIPOLIS 2019

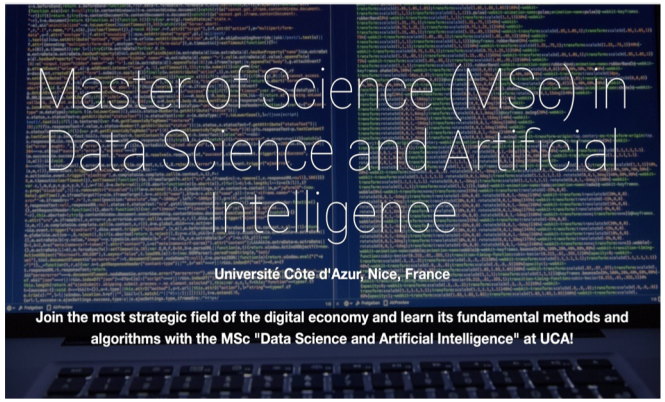
…since 50 years

A long term strategy on AI…

Launched in June 2017, renewed in 2018 and 2019

Charles Bouveyron: Université Côte d'Azur-Inria "Data Science" chair holder since sept. 2017

Amadeus-Université Côte d'Azur strategic partnership covering collaborative research and continuing education focused on AI in July 2017



Open in Sept. 2018

A long term strategy on AI… (continued)

Université Laval-Université Côte d'Azur partnership on the **Observatory on the societal impacts of AI** in 2018

Parternship extended to Alpes-Maritimes department and Sophia Antipolis conurbation in March 2019

Meeting in Montreal with a recent Turing Award

SOPHIA
TREMPLIN DE L'INTELLIGENCE ARTIFICIELLE
EDITION 2018
7•8•9 NOV - SOPHIA ANTIPOLIS

Vision

Real-world AI with applications to

Health

(medicine & biology)

Smart territories

A growing demand for versatile and interpretable AI

Axis 1: Core Elements of AI

Focus: develop "core AI" models and algorithms for real-world problems.

Statistical, machine and deep learning

- Unsupervised / self-supervised learning
- Learning with heterogeneous data
- Optimal transport and mean-field games
- Topological and geometrical data analysis

Knowledge representation and reasoning

- Combine machine learning with symbolic methods
- Web-based knowledge representation and processing
- Bridge unstructured, structured and semantic data
- Reason on complex heterogeneous dynamic networks

Constraint-aware AI

- Small data, active learning, approximate methods
- Distributed and federated AI / edge AI
- Online/real-time learning and decision
- Reasoning under and against uncertainty

Interpretable, explainable and trustable AI

- Traceable knowledge representation
- Ontology-based pruning and specialization
- Certified AI algorithms and data security
- Normalization and future legislation of AI

Axis 2: AI for Integrative Computational Medicine

Focus: AI for e-patient & e-medicine based on statistical, geometrical, biophysical, & semantic knowledge of anatomy, physiology & metabolism

Biophysics-based AI

- Learn biophysical parameters for quantitative diagnosis
- Predict evolution of pathologies & effect of therapies (digital twin)
- Data augmentation from biophysical simulation

Data-Driven AI

- Imaging and omics biomarkers (genetics, transcriptomics, proteomics, metabolomics) + lifestyle, behavior, etc. for patient selection
- Video Analytics & sensors for patient monitoring

Medical Data Management

- Medical Data Lab (Idex UCA)
- Health Data Hub, EDS APHP
- International databases
- Security, Privacy, GDPR
- With other 3IA institutes

Core AI issues: *large inverse problems, fat & heterogeneous data, topological & geometrical data analysis, supervised/unsupervised/mixed-supervised/federated learning, explainable and traceable results, etc.*

Axis 3: Computational Biology and Bio-Inspired AI

Focus: AI for the analysis of advanced biological data,
to 1) reveal complex biological processes and 2) inspire innovative computational processes

Computational Biology

- *Molecules:* mining conformational spaces of huge dimension to reveal biological functions
- *Networks:* combine single cell atlases and interaction networks (protein, metabolic, genetic, signaling…) to reveal molecular pathways
- *Cells/tissues:*3D+t super-resolution/multispectral microscopy to reveal differentiation/development complexity
- *Brain:* neuron-to-brain integration to model brain activity & Computational Neurosciences

Bio-inspired AI

- *Neuronal level:* spiking models to better understand neuronal dynamics
- *Cognition:* neuronal dynamics for the analysis of learning/perception/action sequences
- *Simulation/electronics:* brain models to provide new neuromorphic-biomimetic algorithms/architectures

Core AI issues: *Massive/high dim/heterogeneous data, complex dynamics networks, mean field theory, optimal transport, federated analysis, bridging unstructured and semantic data, unsupervised/self supervised/online/real-time learning, etc.*

Axis 4: AI for Smart and Secure Territories

Focus: AI to deliver personalized services and resources to a wide range of active actors on multi-scale territories

Examples: energy distribution systems, multimodal & shared mobility, autonomous connected vehicles, collaborative robots in live environments, global pollution control, etc.

Modeling & Prediction:

4D urban modeling, predict & exploit user behaviors and preferences, anticipate and manage possible disasters

Secure components:

Enforce security, reliability, privacy, resilience, trust, acceptability

Optimization

- Local & Global optimization of systems of systems, with active users
- Account for diversity, heterogeneity, uncertainty, dynamics, preferences, etc.

Core AI issues: *learning with heterogeneous/rare data & multiple objectives/preferences, real-time learning, reasoning on complex dynamic networks, security/quality of data, normalization and legislation of AI*


360&1
accenture
ACRI ST
Activeeon
SCALE BEYOND LIMITS
amadeus
ARM
ASTEK
Atos
BLUMANTA
DOCAPOSTE
DORIANE
Research Software & Consulting
epoc
MAKE YOUR EXPERIENCE REAL
GE Healthcare
IBM
IMRA
inHEART
mnemotix
MYCOPHYTO
MYDATAMODELS
NXP
Olea medical
orange
oticon MEDICAL
Pocket Confidant
Qwant
RENAULT
SAP
ThalesAlenia Space
THALES
Therapixel
ellcie healthy
Hewlett Packard Enterprise
kinaxia
LuxCarta
median
Symag
SYNCHRONEXT

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Côte d'Azur

- **Scientific excellence of the researchers**
- **In line with the Université Côte d'Azur dynamics**
  - University Research School and interdisciplinarity
  - International cooperation
  - Innovation coordination
- **Original education programme from high school to PhD**
- **Strong involvement of the companies**
- **Strong support of the local authorities**

Nice, Sophia Antipolis, Alpes-Maritimes, Région Sud

Main challenges : attractiveness and capacity to address the needs of the companies

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