

AI research & innovation ecosystem mapping

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June 18, 2024
AI4Europe event



About the ecosystem mapping



- **Aim:** provide overview of organisations working on AI-related topics, and the application areas in which they are active
- **Scope:** 9 Networks of Excellence
- **Goal:** Develop a prototype
- **Method:** Use survey to collect data, agree AI categories and application areas



Data collected



1. Organisation details (name, url, contact, type of org, type of activity, FTE, NoE membership)
1. Research topics activity levels per high-level topic
2. Research subtopics
1. Application area activity levels
2. Application area subtopics

Research topics process



1. Subtopics synthesis (AAAI-23 and community-driven topics) into final structure
2. Start with the 12 research areas and 12 application areas of CLAIRE and combine with the AAAI-23 conference topics.
3. Changes at the top level were made only if it is justified (e.g. a more representative title). At the subtopics level, the NoEs were able to add as many topics as they want.
4. Maintain a maximum of 12 high level categories to keep it comprehensive
5. The high-level topics are alphabetically sorted, not implying any primacy.
6. Check with Working Committee



Research topics & application areas

The ecosystem map requires a structured list of topics. The NoEs agreed to combine our initial structure the AAI-23 keywords and topics provided by the NoEs, performing several reviews. Each topic has several subtopics (the amount of subtopics is shown after each topic). The topics are alphabetically sorted.

Research topics	
AI Hardware & High-Performance Computing	4
Computer Vision & Audition	36
Ethical, Legal, Social Aspects	34
Human- Machine Interaction & Cognition	32
Knowledge Representation & Management	17
Machine Learning	60
Multi-Agent Systems & Agent-Based Modelling	10
Planning, Routing & Scheduling	15
Reasoning	31
Robotics	19
Search & Optimisation	26
Speech & Natural Language Processing	27



Application areas	
Agriculture & fisheries	9
Economy & financial markets/services	9
Environment, energy & sustainability	18
Health & wellbeing	12
ICT infrastructure	4
Industry	11
Learning & education	10
Media, communication, web & entertainment	16
Mobility & transportation	18
Public sector & citizen services	6
Safety & Security	8
Scientific research, design & engineering	6

Data collected



NoE	# responses	# organisations
AI4Media	32	32
dAIEDGE	20	35
ELIAS	14	32
ELISE	32	33
ELSA	17	27
ENFIELD	33	35
euROBIN	30	31
HumanE-AI-Net	45	54
TAILOR	46	55
Total	269	334
Total (no dupl.)	228	

Survey open since oct 2023

Mapping of the EU AI Landscape around the Networks of Excellence

This survey is part of a **joint effort** of the AI research & innovation community and the European Commission.

Its aim is to **provide an initial mapping of the EU AI research landscape** around the European Networks of AI Excellence centres (NoEs):

- **AI4Media** - A European Excellence Centre for Media, Society and Democracy (<https://www.ai4media.eu>);
- **TAILOR** - Foundations of Trustworthy AI - Integrating Reasoning, Learning and Optimization (<https://tailor-network.eu>);
- **Humane-AI-Net** - HumanE AI Network (<https://www.humane-ai.eu/>);
- **ELISE** - European Learning and Intelligent Systems Excellence (<https://www.elise-ai.eu>);
- **euROBIN** - European ROBotics and AI Network (<https://eu robin-project.eu>);
- **ELSA** - European Lighthouse on Secure and Safe AI (<https://elsa-ai.eu>)

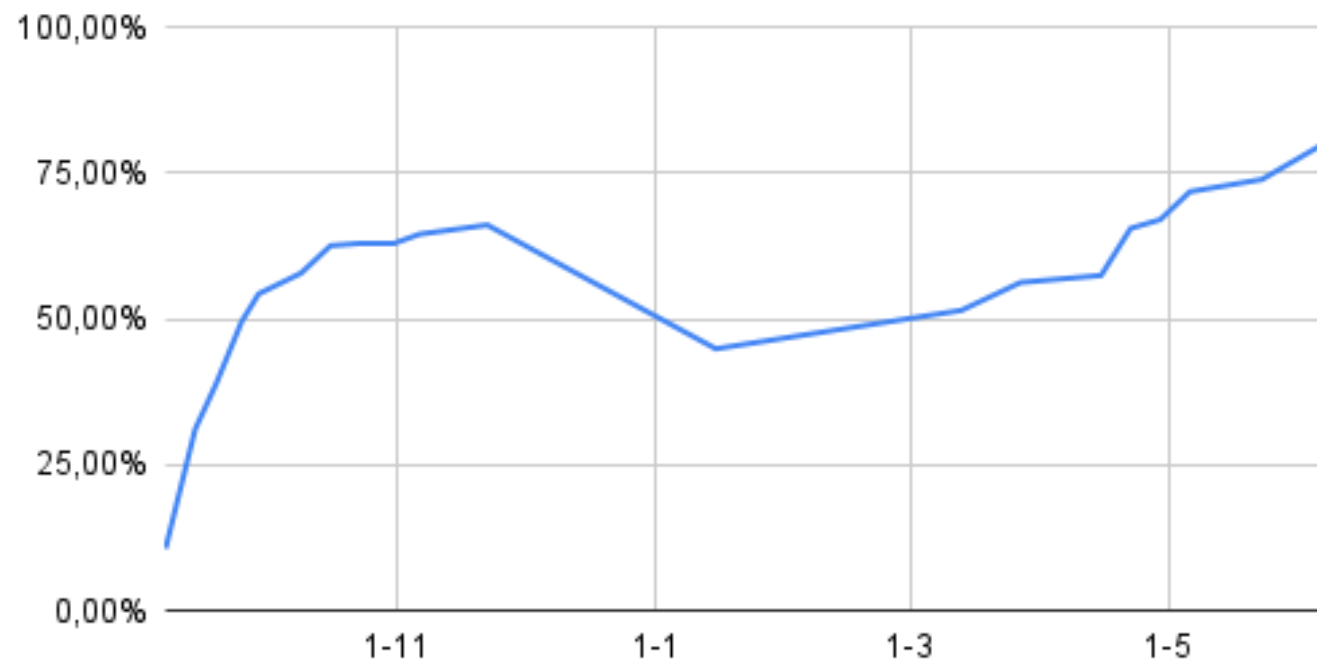
Three new Networks of Excellence emerged during the data collection phase, and organisations in these networks can fill in this survey as well:

- **dAIEDGE** - A network of excellence for distributed, trustworthy, efficient and scalable AI at the Edge (<https://daiedge.eu/>)
- **ELIAS** - European Lighthouse of AI for Sustainability (<https://elias-ai.eu/>)
- **ENFIELD** - European Lighthouse to Manifest Trustworthy and Green AI (<https://www.enfield-project.eu>)

The survey has been created in close consultation with a representative from each NoE together with input from the EC, and is facilitated by the **VISION** CSA (Value and Impact through Synergy, Interaction and coOperation of Networks of AI Excellence Centres).



Average response rate (%)

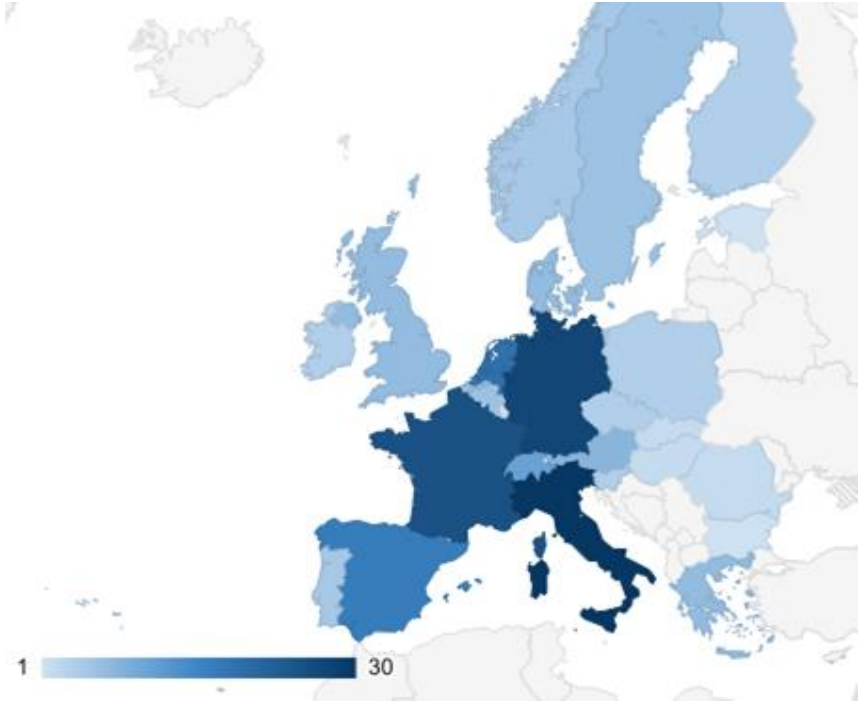
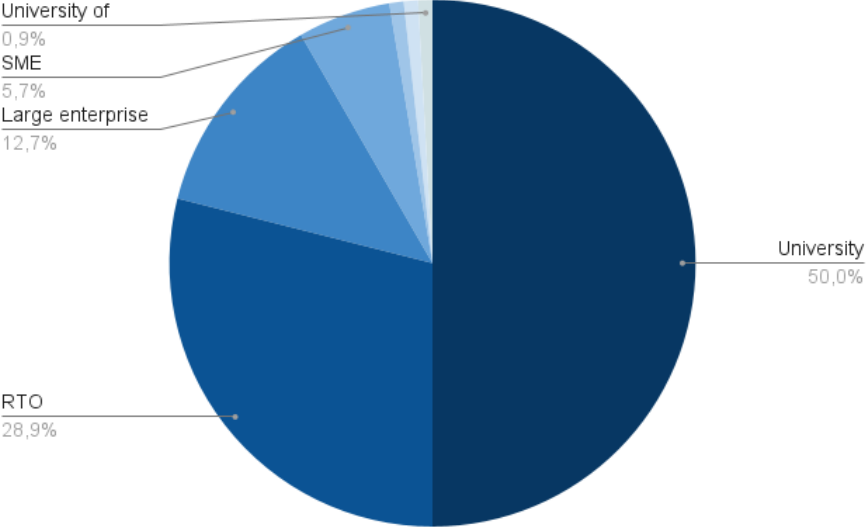


Response rate (juni 2024): 80,5%

Data collected



Organisation types



How to use the tool

eu-ai-ecosystem.tnods.nl



Value



Shared language

- List of AI research topics & application areas
- Find suitable categories
- Search organizations by topic

Detailed reporting on organizations


- Positioning their expertise
- Branding

High-level overview

- Map of European AI R&D excellence
- Visualizing NoEs
- Lab to market
- Research topics x application areas
- Reporting on AI research (sub)topic

Shared language



 **EUROPEAN AI RESEARCH AND INNOVATION ECOSYSTEM** [Map](#) [Statistics](#) [Topics and applications](#)

Click topic or area to see sub-topics and sub-areas. Click on sub-topic or sub-area to filter organizations.

RESEARCH TOPICS

Search

- AI Hardware & High-Performance Computing
- Computer Vision and Audition
- Ethical, Legal, Social Aspects
- Human-Machine Interaction and Cognition
- Knowledge Representation and Management
- Machine Learning
- Multi-Agent Systems and Agent-Based Modelling
- Planning, Routing and Scheduling
- Reasoning
 - Action, Change, and Causality
 - Argumentation
 - Association analysis**
 - Cooperative reasoning
 - Automated Reasoning and Theorem Proving
 - Bayesian Networks
 - Belief Change
 - Case-Based Reasoning
 - Causality and causal inference
 - Common-Sense Reasoning
 - Computational Complexity of Reasoning
 - Correlation analysis
 - Decision/Utility Theory
 - Diagnosis and Abductive Reasoning
 - Fuzzy logic
 - Fuzzy rule-based systems
 - Geometric, Spatial, and Temporal Reasoning
 - Graphical Model
 - Natural intelligence
 - Nonmonotonic Reasoning
 - Preferences
 - Probabilistic Programming
 - Qualitative Reasoning
 - Reasoning with Beliefs
 - Relational Probabilistic Models
 - Semantic networks
 - Sequential Decision Making
 - Similarity-based learning
 - Stochastic Models & Probabilistic Inference
 - Stochastic Optimization
 - Visual reasoning

APPLICATION AREAS

Search

- Agriculture & fisheries
- Economy & financial markets/services
- Environment, energy & sustainability
- Health & wellbeing
- ICT Infrastructure
- Industry
- Learning and education
- Media, communication, web and entertainment
- Mobility & transportation
- Public sector & citizen services
- Safety & Security
- Scientific research, design & engineering

Results for Association analysis

Select map view to see results on map

ISL Bristol - University of Bristol
Intelligent Systems Laboratory - Faculty of Engineering

UNIFI - University of Pisa
KDD Lab - Knowledge Discovery and Data Mining Laboratory (<https://kdd.isi.cnr.it/>)

KNOW - Know-Center

Searching by topic



Search organizations on keyword, research topic, and/or application area.

Deep Neural Architectures



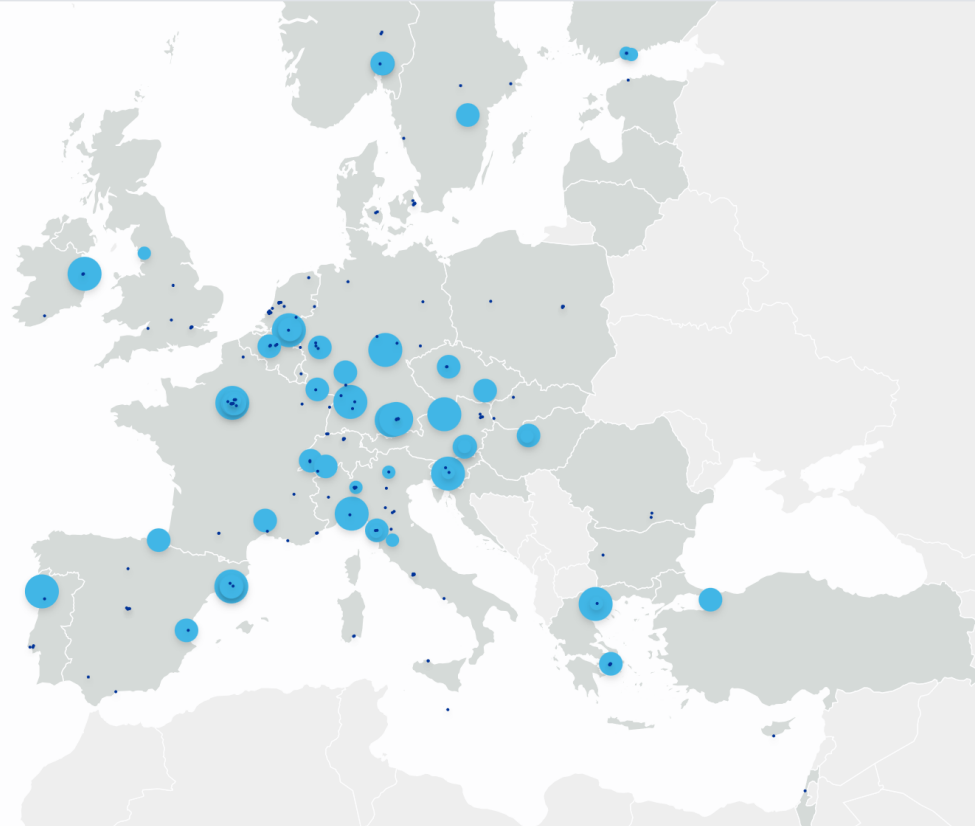
Deep Neural Architectures x

→ RESEARCH TOPICS

↓ APPLICATION AREAS

- Scientific research, design & engineering
- Health & wellbeing
- Industry
- Environment, energy & sustainability
- Mobility & transportation
- Safety & security
- Learning & education
- Media, communication, web & entertainment
- ICT infrastructure
- Public Sector & Citizen Services
- Economy & financial markets/services
- Agriculture & fisheries

→ TYPE OF ACTIVITY



• No match ● Low relevance ● High relevance

Search results:

CERTH - Centre for Research & Technology Hellas

Visual Analytics Lab (VALab)

LDO - Leonardo

Leonardo LABS

CEA - French Alternative Energies and Atomic Energy Commission

Laboratoire d'Intégration de Systèmes et des technologies (LIST) Institute

Bosch - Robert Bosch GmbH

Bosch Center for AI

Insight - Insight SFI Research Centre for Data Analytics

JKU - Johannes Kepler University Linz

Institute for Machine Learning

BSC - Barcelona Supercomputing Center

High-Performance Artificial Intelligence

JSI - Jožef Stefan Institute

Department of Automatics, Biocybernetics, and Robotics

Fraunhofer IDMT - Fraunhofer Gesellschaft

Fraunhofer Institute for Digital Media Technology (IDMT) - Media Distribution & Security,

Audiovisual Systems and Semantic Music Technology Groups

DLR - German Aerospace Center

Institute of Robotics and Mechatronics

INESC TEC - Institute for Systems and Computer Engineering, Technology and

Science

TU/e - Eindhoven University of Technology

Information Systems group

VW - Volkswagen AG

Machine Learning Research Lab

TU/e - Eindhoven University of Technology

UNIPI - University of Pisa

Department of Computer Science

JRS - Joanneum Research

"Intelligent Vision Applications" research group, DIGITAL Institute

TU Darmstadt - Technical University of Darmstadt

Artificial Intelligence and Machine Learning lab

CUNI - Charles University

Institute of Formal and Applied Linguistics

BUT - Brno University of Technology

CVC - Computer Vision Center (Autonomous University of Barcelona)

EPFL - Swiss Federal Institute of Technology in Lausanne

Detailed reporting on AI R&D organizations

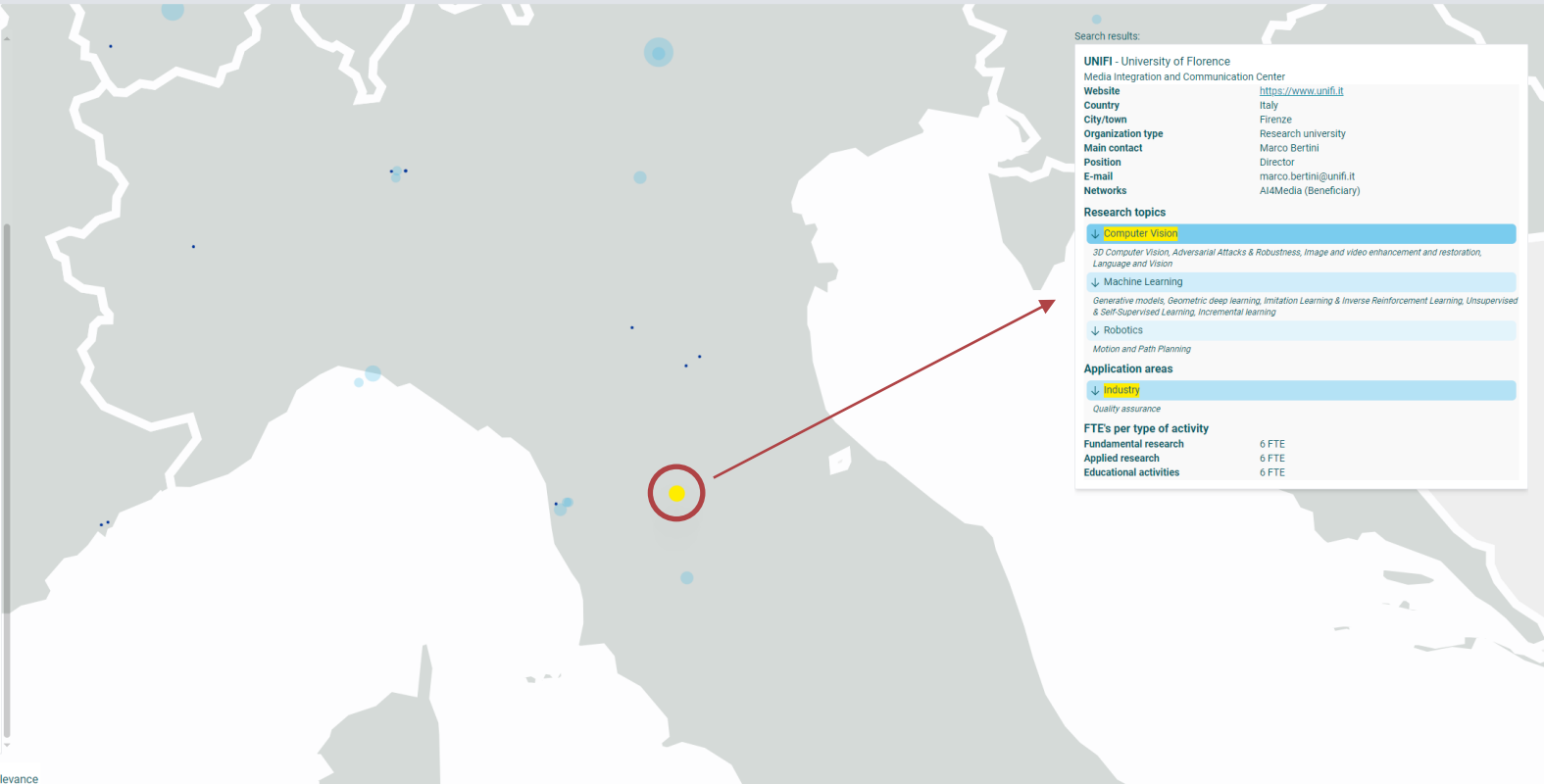


EUROPEAN AI RESEARCH AND INNOVATION ECOSYSTEM [Map](#) [Statistics](#) [Topics and applications](#)



- Multi-Agent Systems & Agent-based Modeling
- Search & Optimisation
- Knowledge Representation
- Planning, Routing & Scheduling
- Reasoning
- Cognition Modeling & Cognitive Systems
- Knowledge Management
- AI Hardware & High-Performance Computing
- Computer Audition
- APPLICATION AREAS**
- Scientific research, design & engineering
- Health & wellbeing
- Industry
- Environment, energy & sustainability
- Mobility & transportation
- Safety & security
- Learning & education
- Media, communication, web & entertainment
- ICT infrastructure
- Public Sector & Citizen Services
- Economy & financial markets/services
- Agriculture & fisheries
- TYPE OF ACTIVITY**
- Applied research
- Fundamental research
- Educational activities
- Product/solution development
- Consultancy
- Other

• No match ● Low relevance ● High relevance



Search results:

UNIFI - University of Florence

Media Integration and Communication Center
Website <https://www.unifi.it>
Country Italy
City/town Firenze
Organization type Research university
Main contact Marco Bertini
Position Director
E-mail marco.bertini@unifi.it
Networks AI4Media (Beneficiary)

Research topics

Computer Vision

3D Computer Vision, Adversarial Attacks & Robustness, Image and video enhancement and restoration, Language and Vision

Machine Learning

Generative models, Geometric deep learning, Imitation Learning & Inverse Reinforcement Learning, Unsupervised & Self-Supervised Learning, Incremental learning

Robotics

Motion and Path Planning

Application areas

Industry

Quality assurance

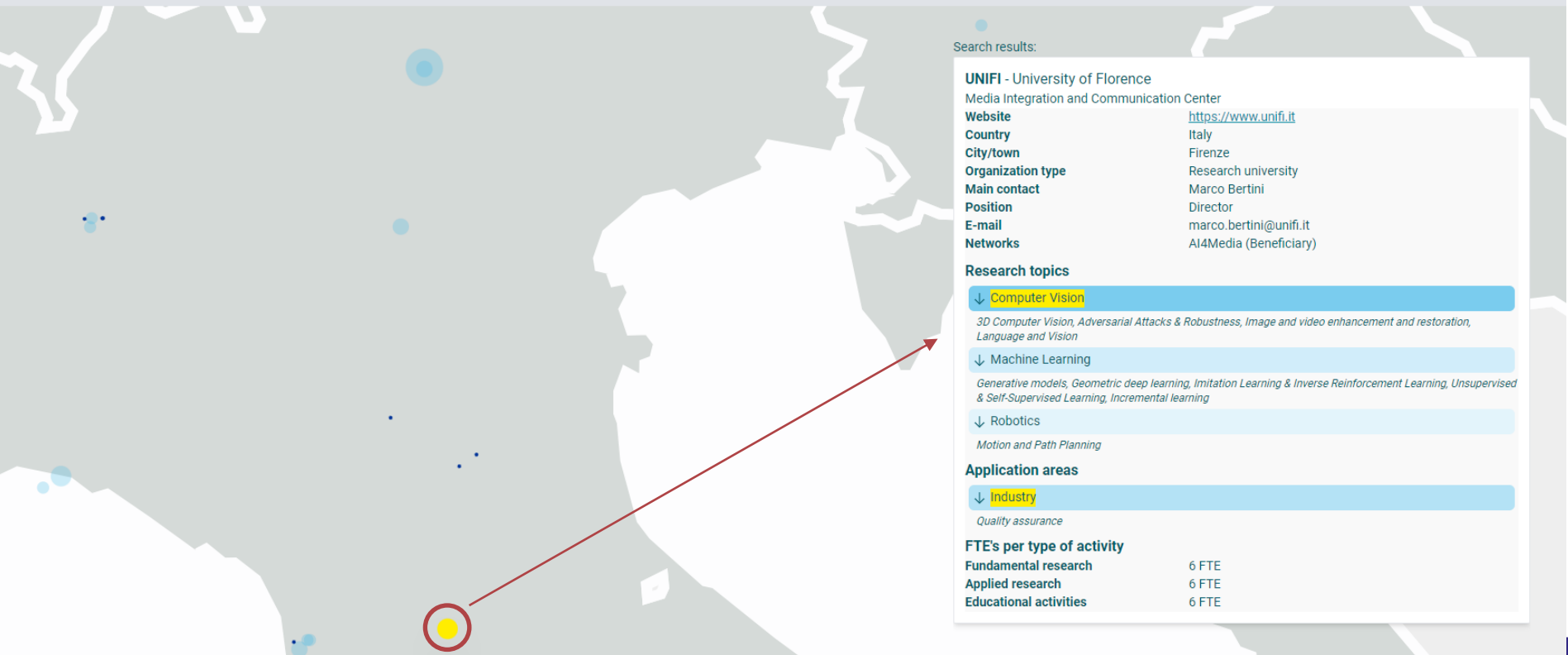
FTEs per type of activity

Fundamental research	6 FTE
Applied research	6 FTE
Educational activities	6 FTE

Detailed reporting on AI R&D organizations



and applications



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Country Italy

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Robotics

Motion and Path Planning

Application areas

Industry

Quality assurance

FTE's per type of activity

Fundamental research 6 FTE

Applied research 6 FTE

Educational activities 6 FTE

Overview: Visualizing AI R&D excellence



Search organizations on keyword, research topic, and/or application area.

Enter keyword

→ RESEARCH TOPICS

• Computer Vision

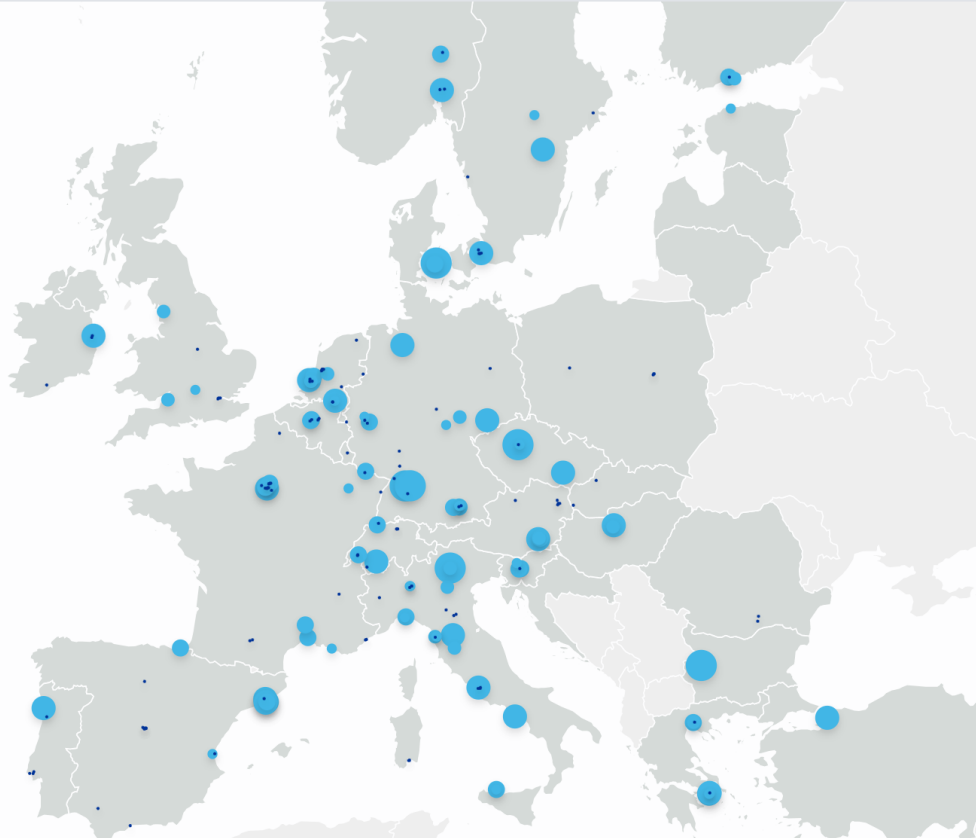
→ APPLICATION AREAS

• Industry

→ TYPE OF ACTIVITY

• Applied research

• Educational activities



• No match • Low relevance • High relevance

Search results:

IMG - Imagga Technologies

CIIRC CTU - Czech Technical University
Czech Institute of Informatics, Robotics, and Cybernetics

Bosch - Robert Bosch GmbH
Bosch Center for AI

FBK - Bruno Kessler Foundation
Marketing Strategy & Business Development

DTI - Danish Technological Institute

Fraunhofer IPA - Fraunhofer Gesellschaft
Institute for Manufacturing Engineering and Automation (IPA) - Robot Technologies and Services

TNO - Netherlands Organisation of Applied Scientific Research
ICT, Strategy & Policy (ISP), Appl AI program

TU/e - Eindhoven University of Technology

BUT - Brno University of Technology

CVC - Computer Vision Center (Autonomous University of Barcelona)

BSC - Barcelona Supercomputing Center
High-Performance Artificial Intelligence

TU Graz - Graz University of Technology

NKUA - National and Kapodistrian University of Athens
Department of Informatics and Telecommunications

Insight - Insight SFI Research Centre for Data Analytics

UCPH - University of Copenhagen
Department of Computer Science

TÜBİTAK - Scientific and Technological Research Council of Türkiye
BILGEM

LIU - Linköping University

ELTE - Eötvös Loránd University
Department of Artificial Intelligence

UNIFI - University of Florence
Media Integration and Communication Center

BSC - Barcelona Supercomputing Center
High-Performance Artificial Intelligence

UniNa - University of Naples Federico II
CREATE Consortium - PRISMA Lab

HES-SO - University of Applied Sciences and Arts of Western Switzerland
Institute of Informatics

INESC TEC - Institute for Systems and Computer Engineering, Technology and

Overview: Visualizing NoE expertise



EUROPEAN AI RESEARCH AND INNOVATION ECOSYSTEM [Map](#) [Statistics](#) [Topics and applications](#)



Search organizations on keyword, research topic, and/or application area.

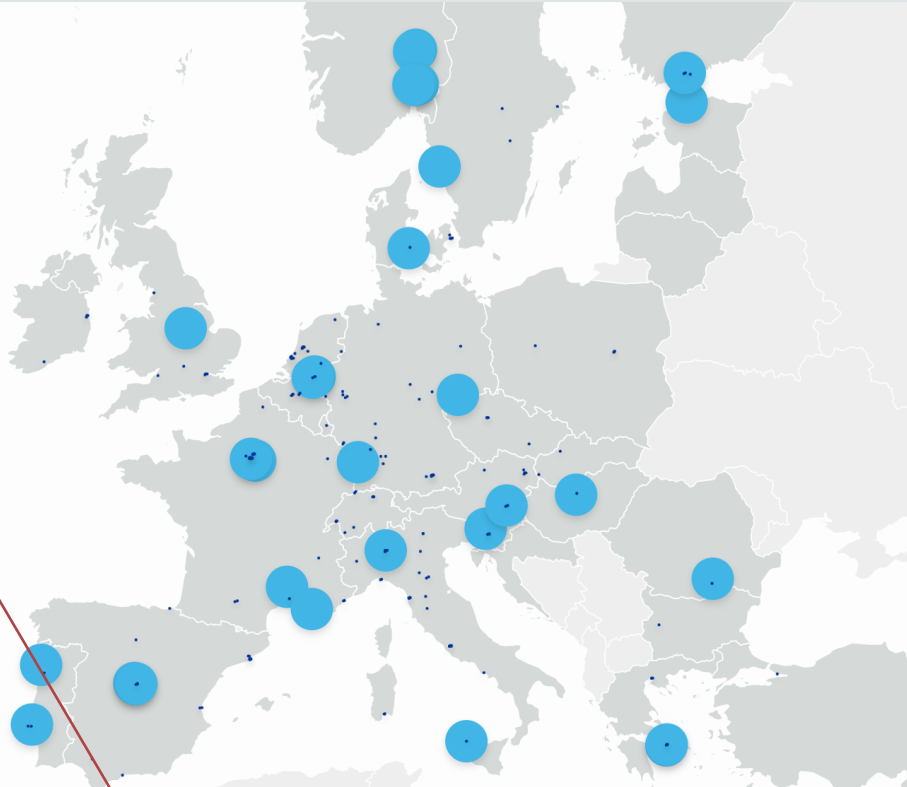
Enter keyword

RESEARCH TOPICS

- Machine Learning
- Computer Vision
- Human-Machine Interaction
- Ethical, Legal, Social Aspects
- Speech & Natural Language Processing
- Robotics
- Multi-Agent Systems & Agent-based Modeling
- Search & Optimisation
- Knowledge Representation
- Planning, Routing & Scheduling
- Reasoning
- Cognition Modeling & Cognitive Systems
- Knowledge Management
- AI Hardware & High-Performance Computing
- Computer Audition

APPLICATION AREAS

TYPE OF ACTIVITY



Search results:

- ECOE** - ERATOSTHENES Centre of Excellence
Department of Big Earth Data Analytics
- TU/e** - Eindhoven University of Technology
Information Systems Group
- DTI** - Danish Technological Institute
Robot Technology Center
- TalTech** - Tallinn University of Technology
Department of Computer Systems - Centre for Intelligent Systems
- UCM** - Universidad Complutense de Madrid
Instituto Complutense de Análisis Económico
- NTNU** - Norwegian University of Science and Technology
Dept. of Information Security and Communication Technology - Critical Infrastructure Security and Resilience (CISAR) Research Group
- NTNU** - Norwegian University of Science and Technology
Department of Information Security and Communication Technology
- CHALMERS** - Chalmers University of Technology
Geoscience and Remote Sensing
- IMT-BS** - Institut Mines-Télécom Business School
Department of Economics and Finance (DEFI)
- NEW** - EDP Centre New Energy Technologies
Digital Energy area
- INESC TEC** - Institute for Systems and Computer Engineering, Technology and Science
- SINTEF** - SINTEF - Foundation for Scientific and Industrial Research
Trustworthy Green IoT Software Group
- Iskraemeco
Innovation Department
- MAG** - Maggiori Group
Greek branch
- UPB** - Politehnica University of Bucharest
- TUC** - Chemnitz University of Technology
Faculty of Computer Science
- BAS** - Boeing Aerospace Spain
Airspace and Operational Efficiency
- ICCS** - Institute of Communication and Computer Systems
Computer Networks Laboratory (CNL)
- IMT** - Institut Mines-Télécom
- BME** - Budapest University of Technology and Economics
Department of Telecommunications and Media Informatics

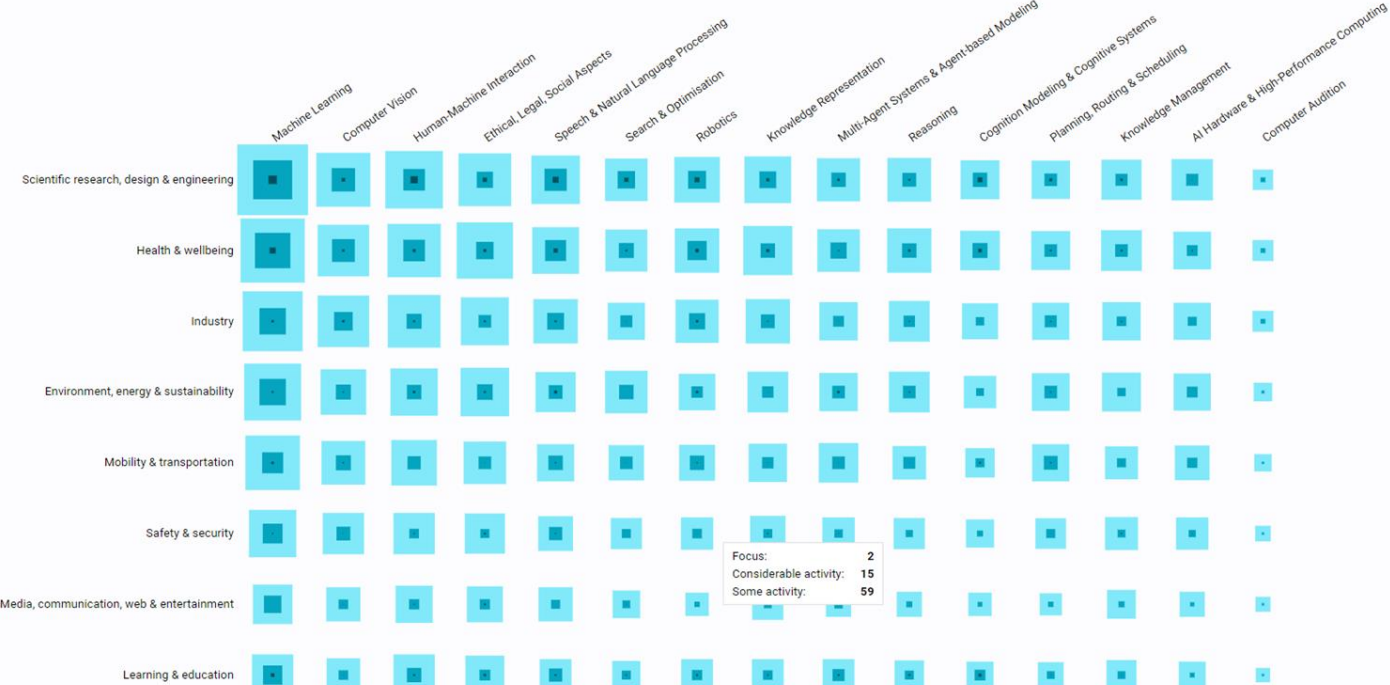
European AI Networks of Excellence (click on a logo to filter by network)



Overview: Research in application areas



Click on cell to search for organizations



Overview: Lab to market



 **EUROPEAN AI RESEARCH AND INNOVATION ECOSYSTEM** Map [Statistics](#) Topics and applications

Show Research topics and Type of activity *Click on cell to show corresponding organizations*

	Applied research	Fundamental research	Educational activities	Product/solution development	Consultancy	Other
Machine Learning	■	■	■	■	■	■
Computer Vision	■	■	■	■	■	■
Human-Machine Interaction	■	■	■	■	■	■
Ethical, Legal, Social Aspects	■	■	■	■	■	■
Speech & Natural Language Processing	■	■	■	■	■	■
Robotics	■	■	■	■	■	■



ADRA joint
topic group

Joining forces



Combining similar efforts, so we don't end up with several concurrent mappings
Organised in a dedicated joint topic group of Adra

Initiating organisations:

- TNO (VISION, NoE Ecosystem Mapping)
- UTwente (Adra-e cartography)
- UCC (AI-on-demand platform, European R&D mappings)
- ...



Adra joint topic group (JTG) on Ecosystem Mapping & Information Repository



Mission

Maximize the effectiveness of the AI, Data and Robotics (ADR) community

by supporting the development and maintenance of an ecosystem mapping and information services that are of **value to the ADR research & innovation community.**

The AI, Data and Robotics Association (Adra)



On May 21, 2021, [BDVA](#), [CLAIRE](#), [ELLIS](#), [EurAI](#) and [euRobotics](#) founded **Adra (AI, Data and Robotics Association, asbl)** joining forces and integrating a wide range of stakeholders into the activities of the Partnership. Adra is the private side of the AI, Data and Robotics Partnership in Horizon Europe.

Similar initiatives



- Adra-e cartography (UTwente)
- RODIN information repositories (TNO, euRobotics)
- BOWI DIH heatmap (TNO)
- DIHs catalogue (TNO)
- ELLIS lab catalogue (ELISE)
- TAILOR mapping of AI topics for SRIR v2 (TNO)
- [AI Navigator](#) (Insight Centre, UCC)

Strategic impact of the JTG



Maximize the effectiveness of the AI, Data and Robotics (ADR) community

1

Coordinated ADR R&I info mapping

A rigorous organization around the information provisioning of the ADR research and innovation ecosystem

- Responsible body
- Open, democratic decision-making

2

Valuable services to ADR community

Development of a set of valuable services to support the effectiveness of the ADR community

- Mapping
- Benchmarking
- Finding funding
- Matchmaking
- Showcasing
- Emergence radar

3

Focused channel with EC

A focused channel for discussion with the EC on information provisioning for ADR research and innovation

- Excellence
- Visibility
- Representation

4

A shared language

A categorization of ADR research topics and application areas that reflect European values.

- Research topics
- Application areas
- By the ADR community
- For the ADR community

JTG functions

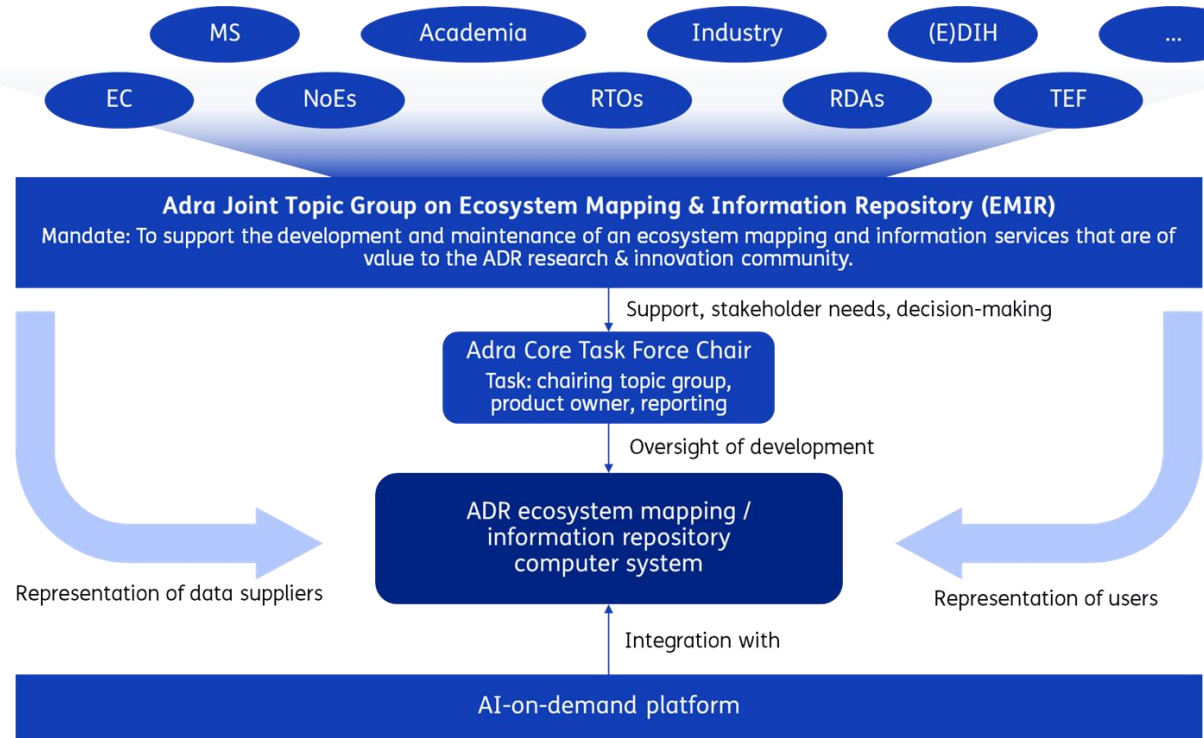


1. Democratic, diverse, and open forum

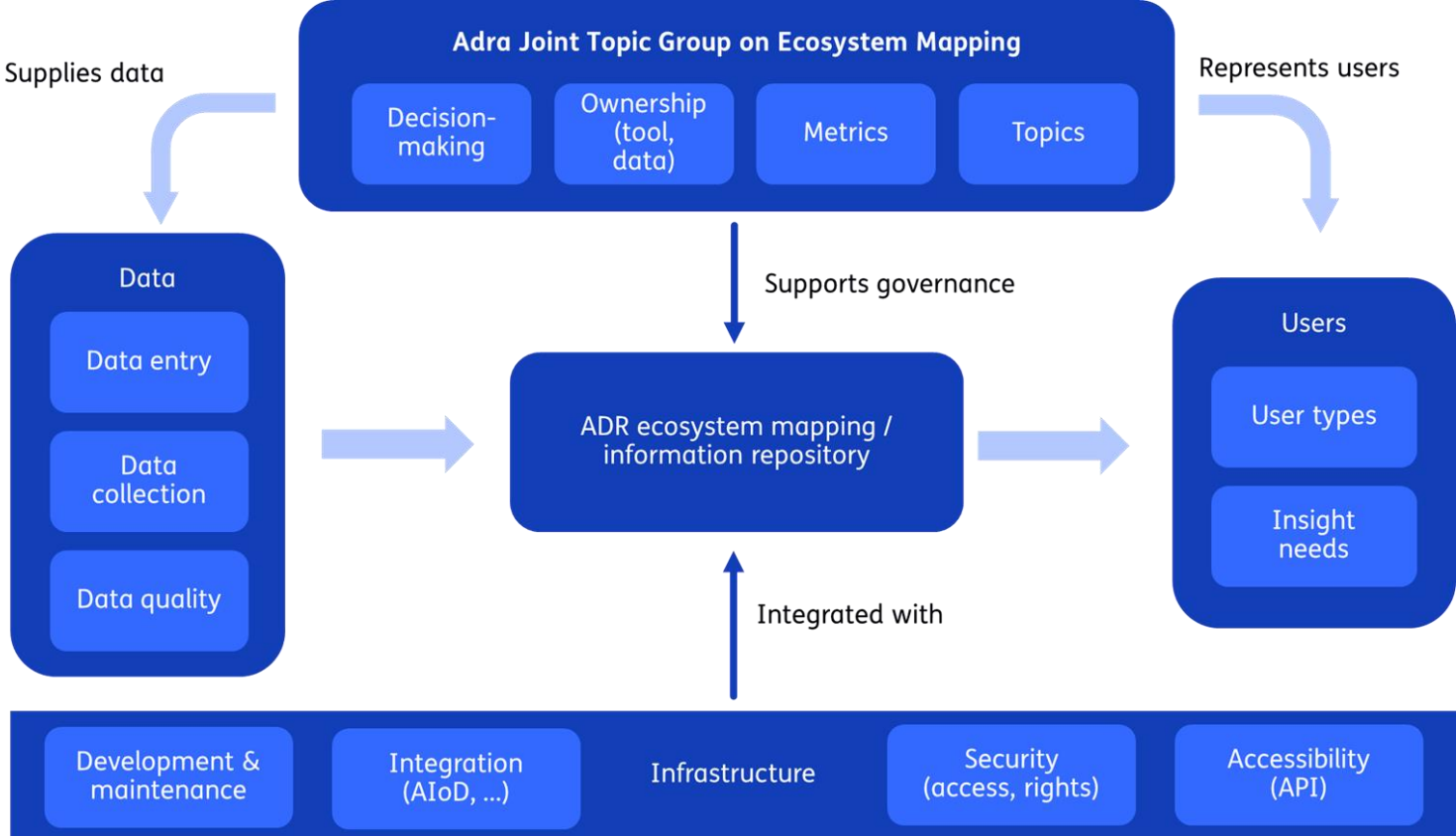
1. Growing coalition of stakeholders

1. Representation

1. Oversight



Governance



JTG main activities year one



01	Governance	<ul style="list-style-type: none">• Establish an organizational governance• Invite more stakeholders to join
02	Extend categorization	<ul style="list-style-type: none">• Extend the categorization of research topics and application areas for a wider scope of research, innovation and applications in the ADR community
03	Extend scope	<ul style="list-style-type: none">• Extend the scope of the mapping to organizations in the AI, Data & Robotics community, but that were not included in the initial NoE-based mapping
04	Architecture	<ul style="list-style-type: none">• Establish architectural principles (e.g. open source, machine-readability, transparency) for the minimum viable product (MVP)• Establish requirements for the MVP
05	Business case	<ul style="list-style-type: none">• Establish a business case for the mapping• Value proposition and earning model• Funding requirements
06	Funding & development	<ul style="list-style-type: none">• Organise funding• Commission and oversee the development and maintenance of the MVP

United in Diversity



*Make Europe a research powerhouse
in human-centred, trustworthy AI!*

www.vision4ai.eu

info@vision4ai.eu



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952070.

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