AI in Informatics Education and Professional Practice - Status in Italy

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Outline

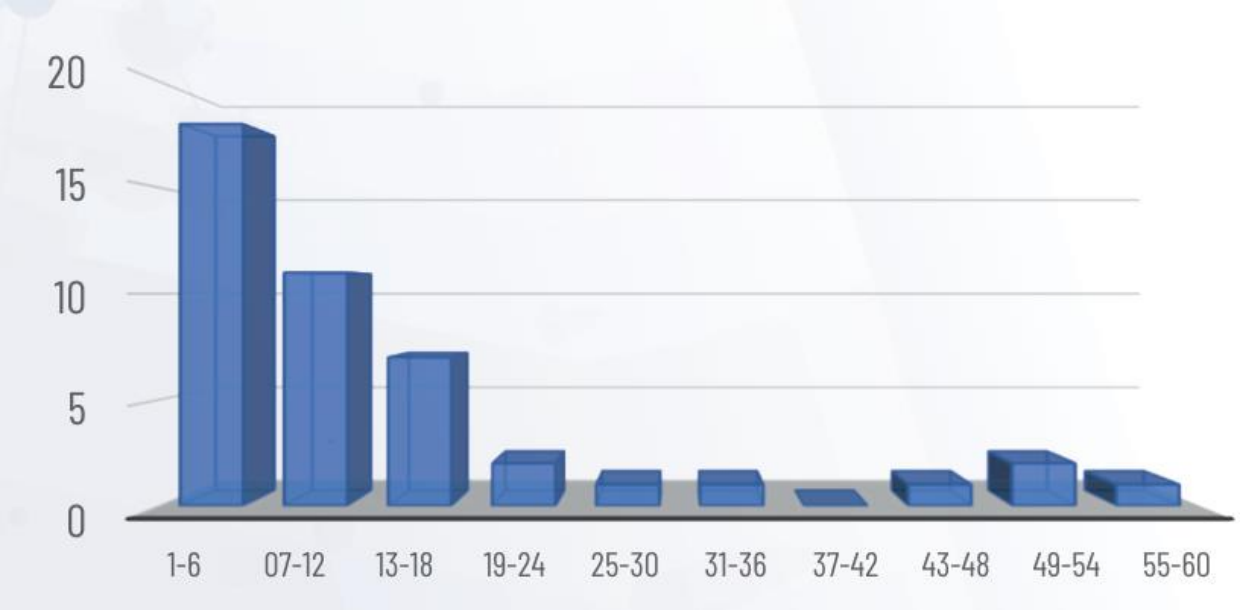
- Status of BSc and MSc programs in Italy dedicated to AI
- Initial certification activities
- Opportunities for the research community to interact with national government and legislative bodies

BSc and MSc Programs dedicated to AI in Italy

- The content derives from
  - a document (thanks to Rita Cucchiara) prepared by AIxIA (Italian association for AI, https://aixia.it)
  - public data available on https://universitaly.it

3y BSc programs on AI («Lauree triennali»)

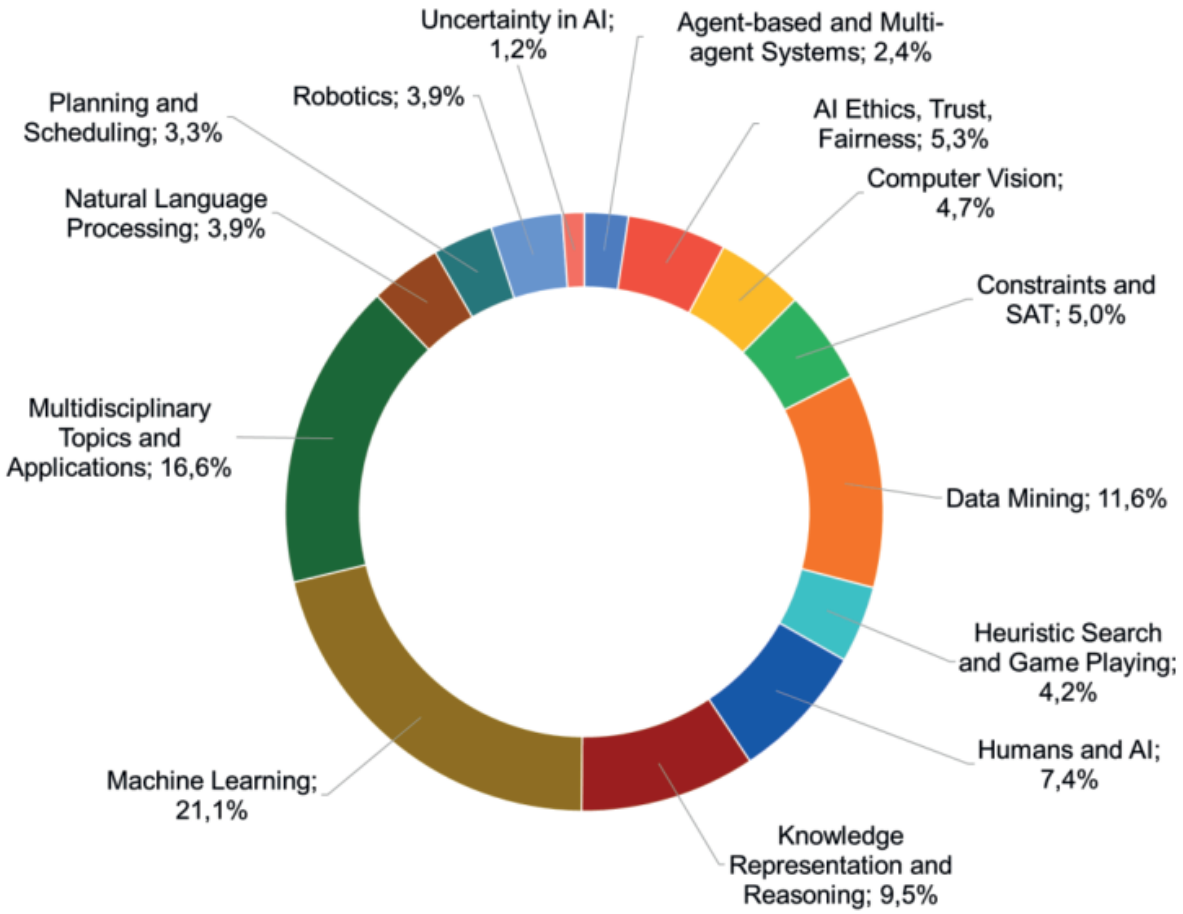
- Distribution of ECTS credits dedicated to AI (180 ECTS correspond to the full 3-year course)



My observation: not a strong focus on AI

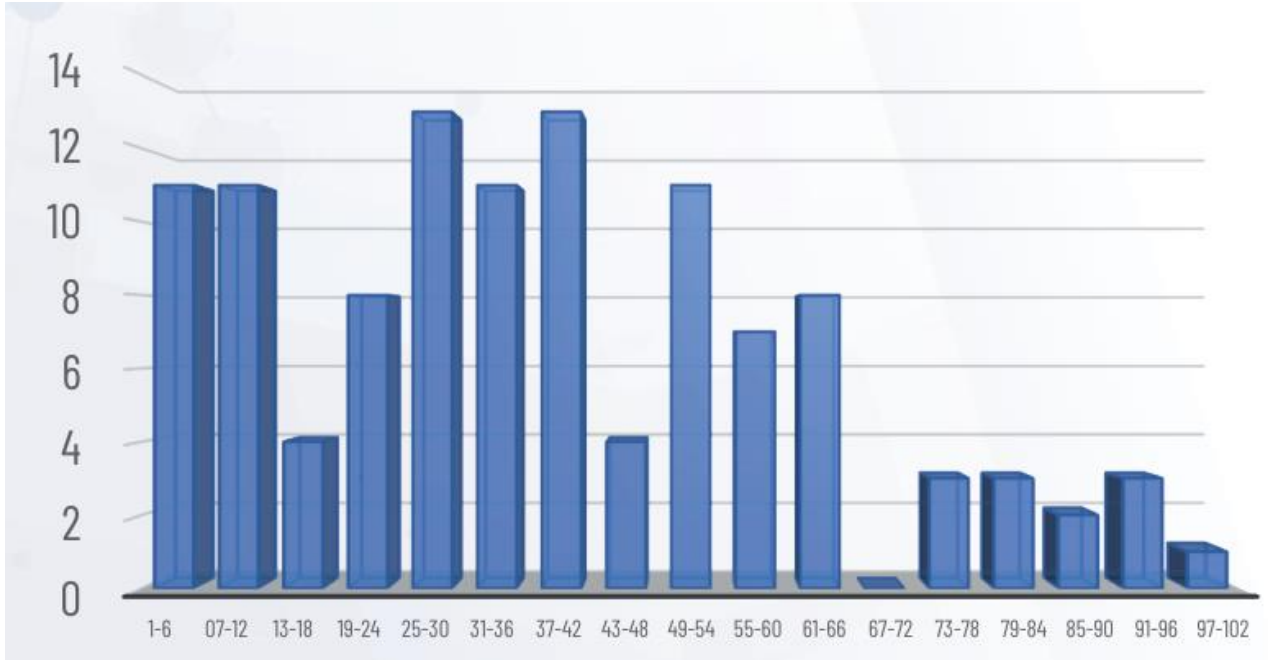
3y BSc programs on AI («Lauree triennali»)

- Topics covered



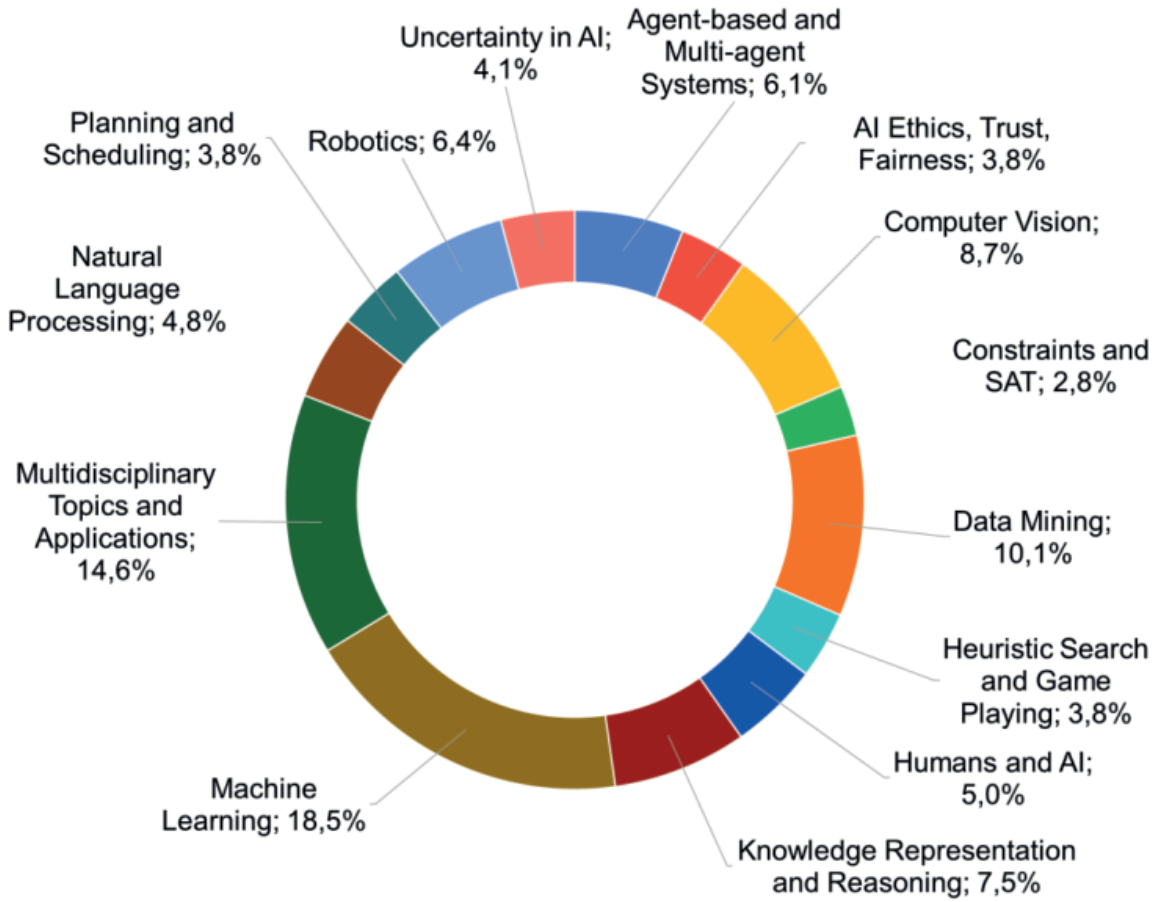
2y MSc programs on AI («Lauree magistrali»)

- Around half of the courses are *not* activated as a «Computer science» or «Engineering and computer science» program
- ECTS credits to AI (120 ECTS for the full 2-year program)
- Strong focus on AI (with a few exceptions)



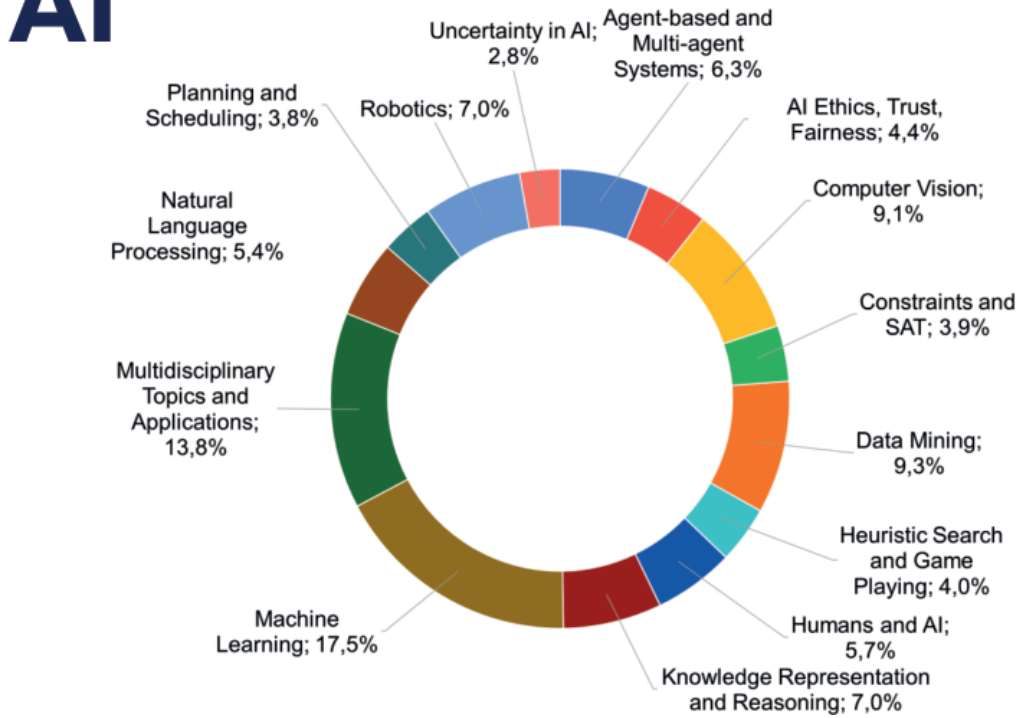
2y MSc programs on AI («Lauree magistrali»)

- Topics
  - Strong similarity with BSc



Focus on MSc courses with a strong AI focus

- MSc courses with at least 50 ECTS on AI
- 15 out of 38 still outside of CS/E&CS



BSc and MSc programs with AI in their title

- 11 BSc courses:
  - 6 CS
  - 3 Maths
  - 1 Management
  - 1 Philosophy
- 21 MSc courses:
  - 9 Eng&CS
  - 3 CS
  - 3 CS&Humanities
  - 2 joint CS/Eng&CS
  - 2 Data science
  - 1 Biotech
  - 1 Cognitive sciences

Initial certification activities

- The presentation originates from material provided by Carlo Sansone and Daniele Nardi (thanks!)

AI Act

First regulation on AI, aiming at a balance between technological innovation and respect of human rights

2021: first draft

2024: final approval

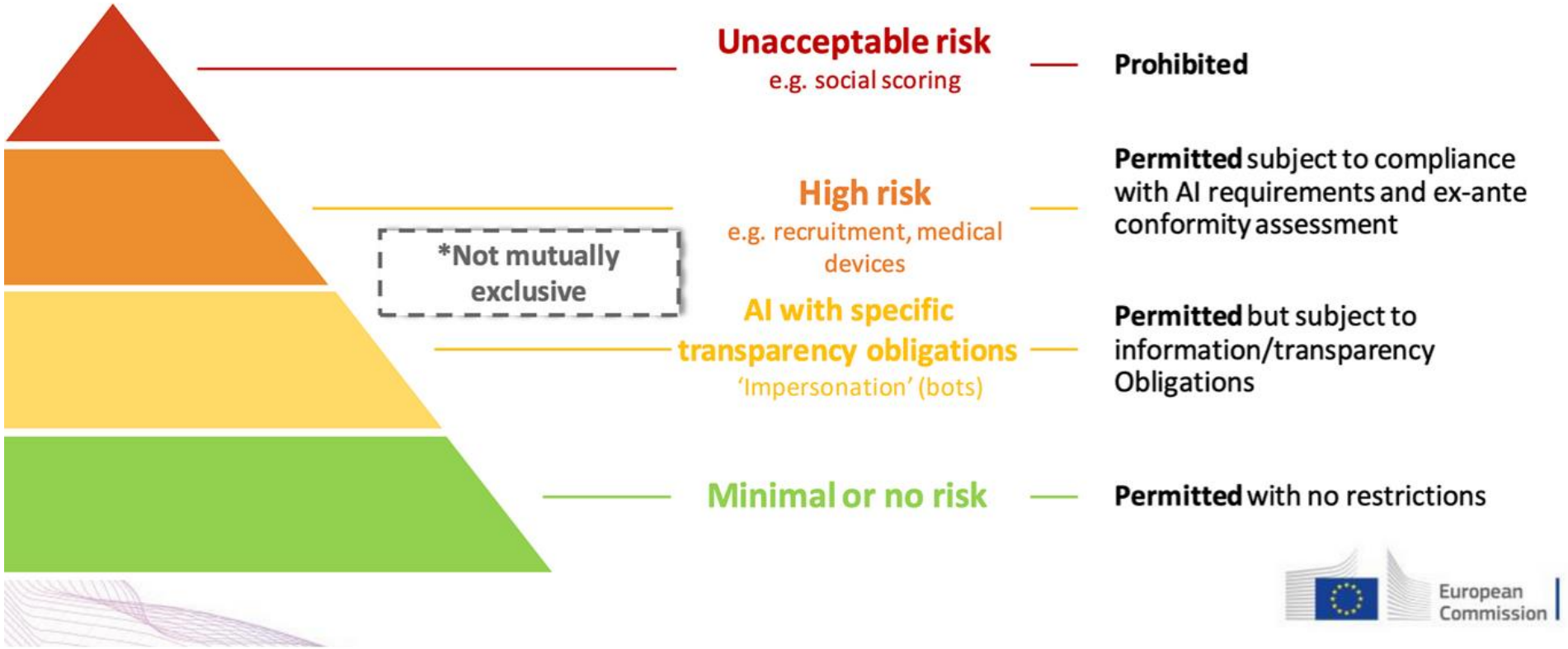
AI ACT guiding principles

- Human agency and oversight
- Technical Robustness and safety
- Privacy and data governance
- Transparency
- Diversity, non-discrimination and fairness
- Societal and environmental well-being
- Accountability

AI Act: focus

- "AI system“: an automated system designed to operate with varying levels of autonomy and that may exhibit adaptability after deployment and that, for explicit or implicit purposes, infers from the input it receives to generate outputs such as predictions, content, recommendations or decisions that can influence physical or virtual environments;

Risk-based approach



Compliance HRS

- Data Quality
- Human Oversight
- Transparency
- Documentation
- Accuracy
- Robustness
- Security

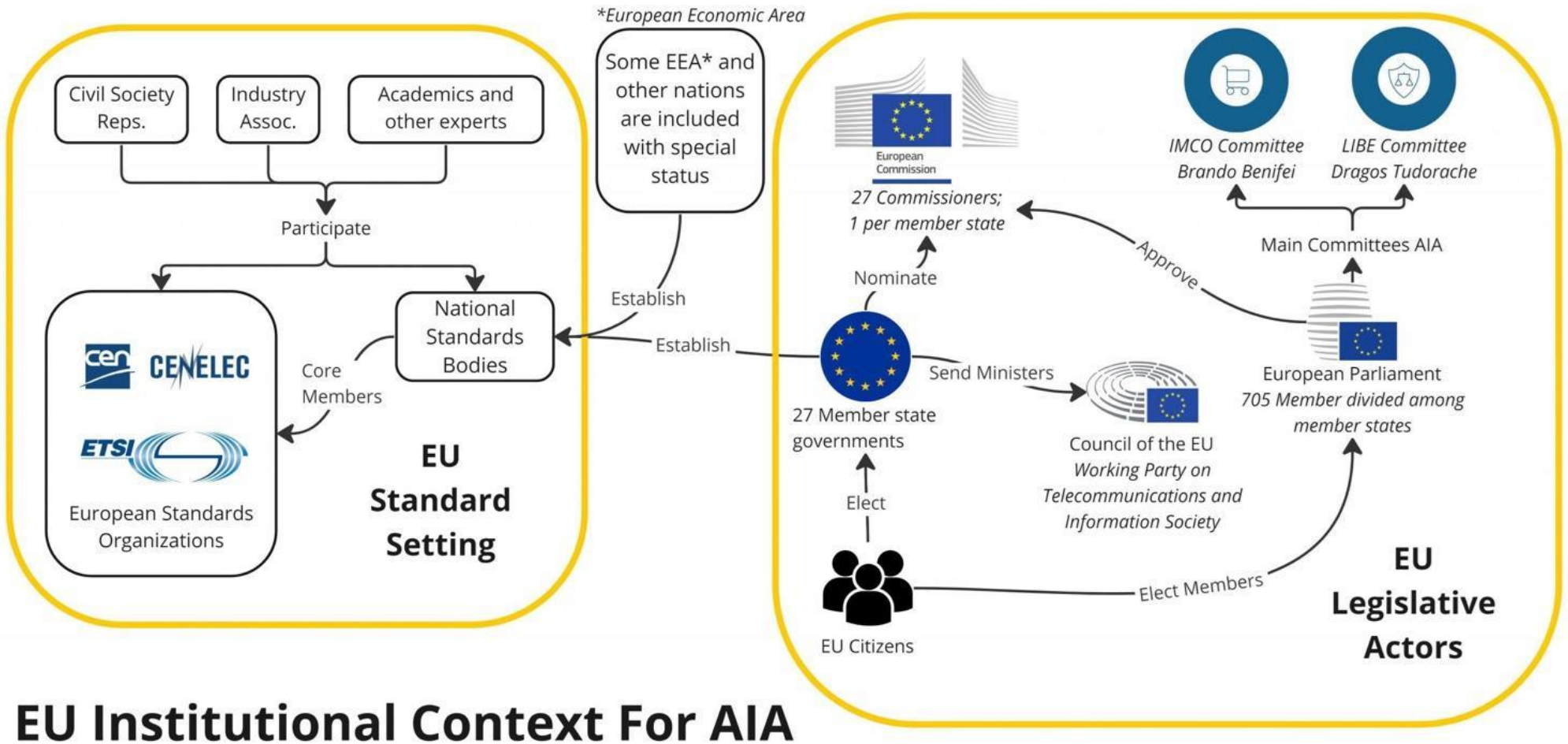
High-risk systems

The AI system is intended to be used as a safety component of a product, or is itself a product, covered by Union harmonisation legislation listed in Annex I;

Critical sectors: AI systems operating in sectors that are critical for safety and rights, including:

- **Health**: Medical diagnosis, healthcare devices.
- **Education**: Evaluation systems that influence access to education.
- **Employment**: Worker recruitment and performance monitoring systems.
- **Finance and Insurance**: Credit assessments, financial risk management, life and health insurance.
- **Critical infrastructure**: Systems that manage energy, transport, water and telecommunications.
- **Law enforcement**: Surveillance and detection of illicit behaviour.
- **Migration**: Border risk assessment and asylum claims.

AI Act path



EU Institutional Context For AIA

Accreditation

Notifying authorities

Notified bodies

Conformity:

- conformity assessment procedure provided for by the standard
- verification by a notified body

Special situations in which verification by a notified body is nevertheless required

Other initiatives in the world

Recommendations

- US (NIST guidelines- Risk-based)
- UK (light)

- OECD: Principles and guidelines

Regulations

- China

PoC (Proof of Concept)

Goal: to understand the effectiveness and application methods of some specific standards in view of a certification and accreditation scheme.

Two PoCs in the medical field:

- melanoma detection (Sapienza Univ. of Rome)
- stratification of patients with multiple sclerosis (Federico II Univ. of Naples)

A PoC on the governance of AI systems, in collaboration with INAIL (Italian Institute for Work Insurance and Safety)

PoC in the medical domain

Melanoma detection for portable devices

Multiple sclerosis patient stratification to support the specialist physician

Reference standard: ISO 24027:2021, “Bias in AI systems and AI aided decision making”.

Bias/prejudice:

- data
- cognitive
- algorithmic

Bias	Metodo di verifica	Azione intrapresa	Note	Giudizio di conformità
Automation				
Group Attribution				
Implicit				
Confirmation				
In-Group				
Out-Group homogeneity				
Societal				
Rule-Based				
Requirement				

Summary of the work on PoC in the medical domain

- In Melanoma Detection, data acquisition can create biases that must be controlled (BIAS on data)
- The use of standard approaches to the evaluation of the presence of bias on data is linked to the quality of the datasets, which favors interoperability in the long term
- The analysis of cognitive bias varies in relation to the end user, in relation to explainability
- The relationship between standards on AI and standards on medical devices is not yet sufficiently investigated and clarified

PoC with INAIL

Goal: to understand the complexity of implementing ISO 42001 within a public organization such as INAIL

Reference standard: ISO 42001, which ensures that policies, governance measures and training are established within the organization regarding AI systems

- The quality management system is a prerequisite for setting up effective governance measures and for training internal stakeholders
- The implementation of 42001 involves choosing which of the different components of an organization should take charge of which action

Result of the work on PoCs

It is just the start of a journey

- Interdisciplinary activity

Education of all stakeholders:

- citizens
- specialized operators
- public administrations
- service providers
- suppliers

Opportunities to increase the impact of the Computer Science academic community

3 committees in Italy dedicated to AI

- June'23: «Comitato di vigilanza sull'attività di documentazione» (Supervisory Committee on Documentation Activity) - Italian Parliament
  - Interviews with 8 experts (1 from GII) and a call for proposals
- October'23: «Comitato per studiare l'impatto dell'AI nell'editoria» (Committee to study the impact of AI on the publishing industry) – Department for Innovation
  - First chair: Giuliano Amato (former Italian Prime Minister), then resigned
  - 10 members, 2 from GII, 1 from GRIN
- November'23: «Comitato di Coordinamento per l'intelligenza artificiale» (Coordination Committee for AI), contributing to the preparation of the «National Strategy on the use of AI» - Prime minister office
  - Chair: Gianluigi Greco (GRIN)
  - 13 members, almost all academics, 2 from GII

Use of this opportunity

- The impact of AI is an important and complex problem
  - Technology experts are needed, but the answers provided by experts are not necessarily aligned with the expectations
  - In Italy, the research community in the IT field had until now limited options to influence policies
- Academia in the informatics domain traditionally pays limited attention to dissemination outside of the research community
  - Some attention should be paid to the ability to reach public opinion, supporting incentives to recognize this talent