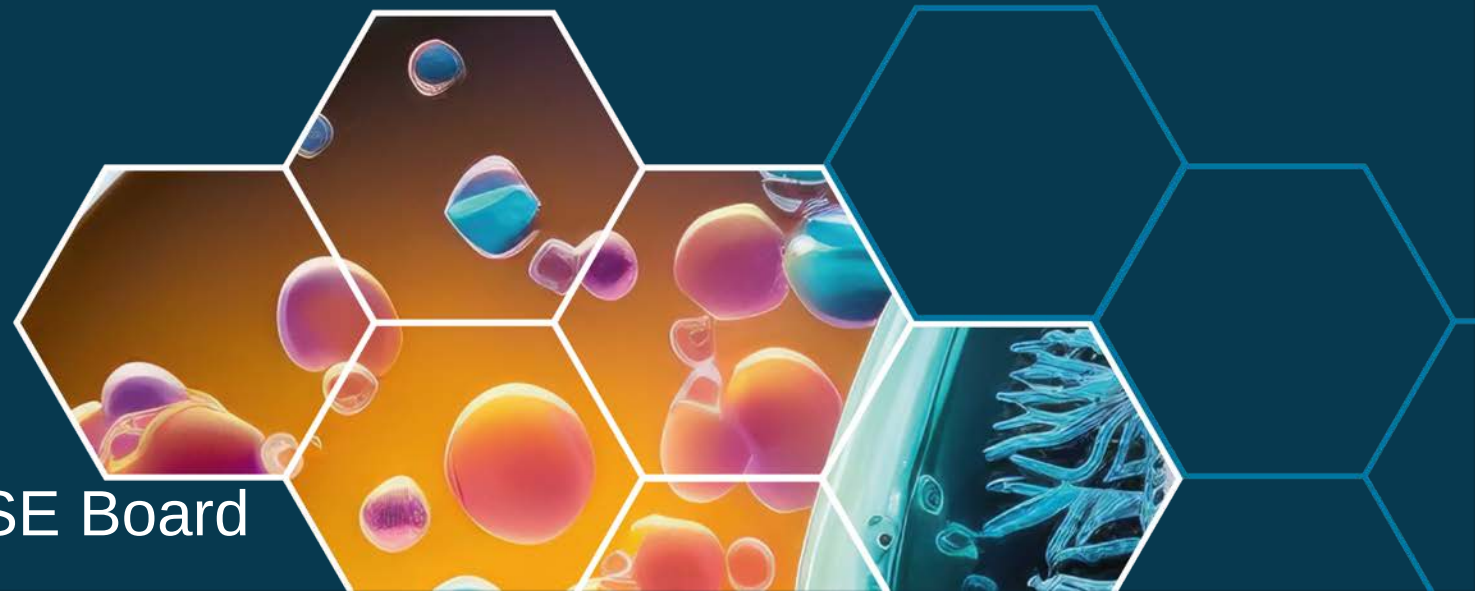
Scientific Advice Mechanism
to the European Commission

7 June 2024

Presentation to the Euro-CASE Board

SAPEA Evidence Review Report on the Impact of AI in Science in the EU



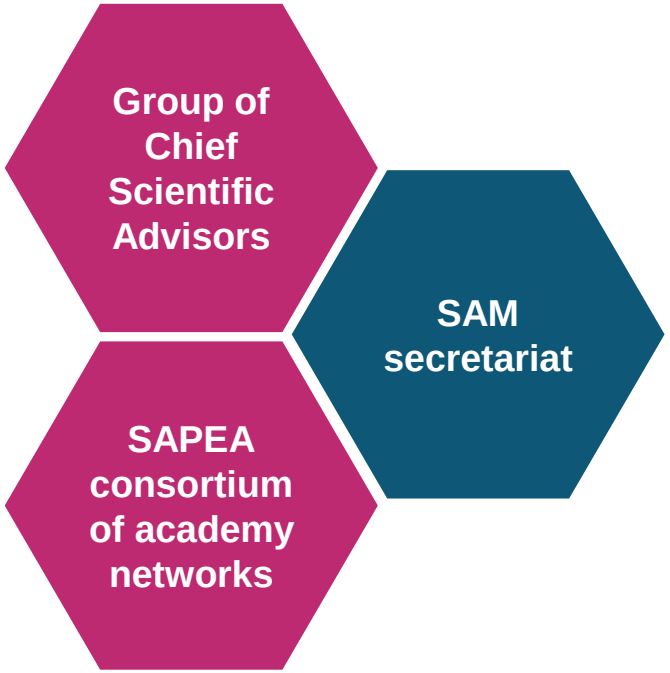
Prof. Anna Fabijańska
Lodz University of Technology
Alternate member of the Euro-CASE Board

About the SAM

The SAM provides independent scientific evidence and policy recommendations to the European institutions by request of the College of Commissioners.

The three parts of the SAM

Scientific community



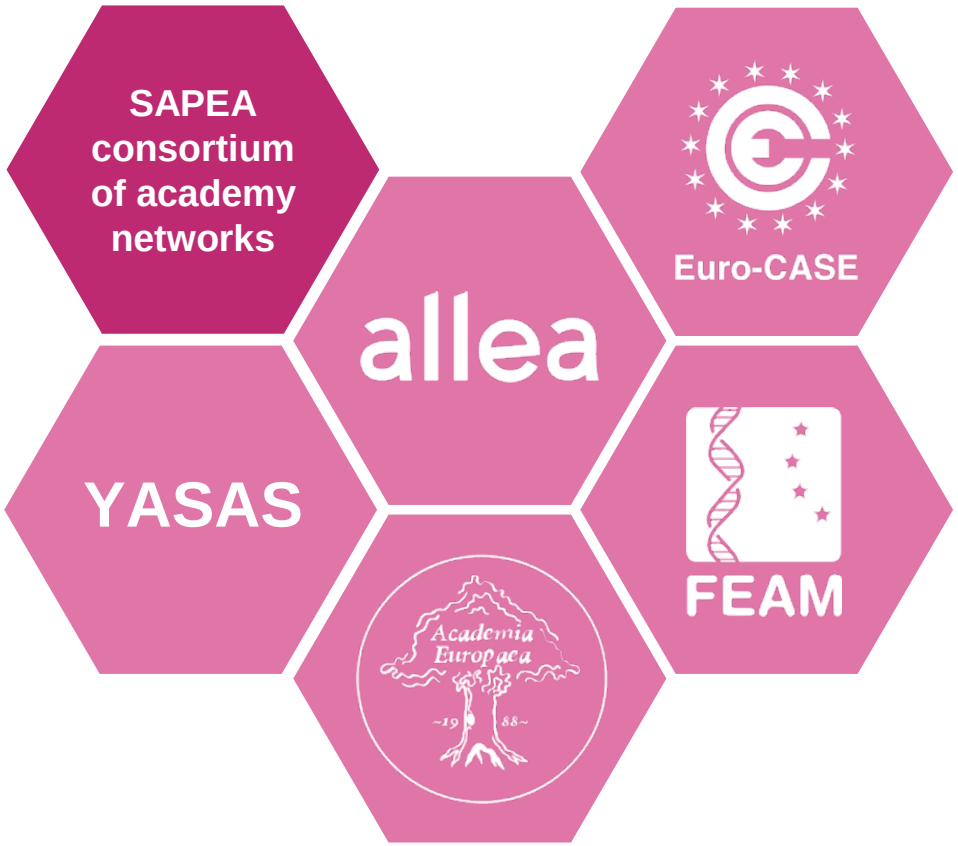
European Commission

About the Advisors

- **Seven highly qualified scientists**
- Backgrounds in various disciplines, both social and natural sciences

- **Make policy recommendations** in response to requests for advice
- Recommendations based on publicly available scientific evidence

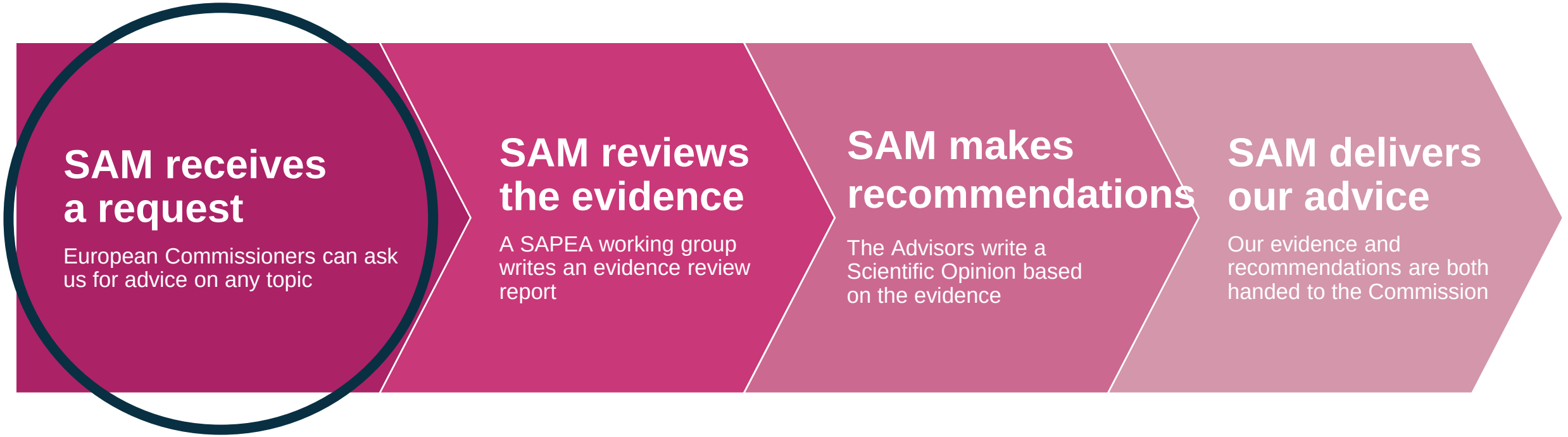
About SAPEA



- **Brings together around 110 academies from across Europe**
- Offers outstanding expertise from natural sciences, engineering and technology, medical, health, agricultural and social sciences, and the humanities

- **Provides independent evidence reviews on request**
- Informs the Advisors' policy recommendations

How we work (simple version)



The request and its motivation

The EU still has no **dedicated and systemic policy** to facilitate the uptake of AI in science.

There is a need for a policy that can connect and complement the different AI initiatives that can impact the uptake of AI in science and for new, better targeted policies on its application.

(Scoping paper: Successful and timely uptake of Artificial Intelligence in science in the EU, July 2023)

The question

How can the European Commission **accelerate a responsible uptake of AI in science** (including providing access to high quality AI, respecting European Values) in order to boost the EU's innovation and prosperity, strengthen EU's position in science and ultimately contribute to solving Europe's societal challenges?

(Margrethe Vestager, Executive Vice-President for A Europe fit for the Digital Age, July 2023)

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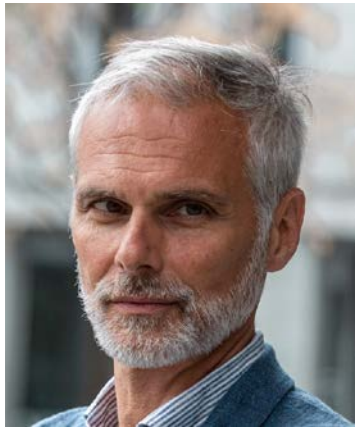
How we work (simple version)

The Working Group

CO-CHAIRS

Anna Fabijańska (Poland)



Andrea Emilio Rizzoli (Switzerland)

WORKING GROUP

Arlindo Oliveira (Portugal)

Paul Groth (The Netherlands)

Patrícia Martinková (Czechia)

Karen Yeung (UK)

Evidence-gathering process

Literature reviews

Rapid review of the literature in all key areas:

- Impact of AI on the scientific process
- Impact of AI on researchers and their work
- Policy design for AI in science

Detailed search strategies available in the ERR

Peer review

4 experts with broad knowledge of the topic

Evidence gathering workshops

- 35 experts in the relevant areas of sciences.
- From diversity of countries across Europe (and beyond).
- 3 workshop reports also published on the website.

Foresight workshop

(separate activity)
Workshop report published on the website

Evidence Review Report structure

- Chapter 1: Introduction
- Chapter 2: Landscape of AI research & innovation
- Chapter 3: Opportunities and benefits of AI in science
- Chapter 4: Challenges and risks of AI in science
- Chapter 5: Impact on scientists and researchers work environments, careers, skills and education
- Chapter 6: Evidence-based policy options

Key landscape elements

- AI research is characterised by a **strong leadership of AI research activities and infrastructure development by industry**. This has implications for the practice of research itself.
- AI research and research in AI require large amounts of infrastructure. The largest **AI infrastructures are located outside Europe**.
- Across the globe, the **regulatory landscape around AI is highly dynamic**. In Europe, the EU AI Act aims to become the most comprehensive AI legislation in the world.
- AI research and the use of AI in research are highly impacted by the **strong economic and geopolitical interests in AI**.

Main opportunities for AI in science

- AI is **increasingly used throughout areas of research** and throughout the research process.
- The applications and uptake of AI in research are **however unevenly distributed across scientific domains**. Many examples highlight the potential to support the research process, esp. in domains relying on large amounts of data.
- We are **missing comprehensive evaluation studies** about the impact of AI on the science system as a whole.
- Potential opportunities for **AI uptake in qualitative and theoretical development research**, in the humanities and social sciences, may develop. No systematic evidence of those opportunities is currently available.

Main challenges and risks for AI in science

- **Lack of transparency**: State-of-the-art AI models and systems lack transparency, commercially-created opacity, AI Big Tech companies dominate the AI innovation frontier through secrecy to profit from AI scientific knowledge.
- **Biases, low quality data**: poor AI model performance (low input data quality, failure to update the model, etc.), social-cultural bias reflected in datasets and in the AI systems outputs, new forms of 'machine bias' stemming.
- **Misinformation**: AI tools not yet able to perform peer reviews or assessment of research, they add to the strain of the publication system (automated misinformation).
- **Inequalities within research**: Popular and lucrative sciences benefit from more funding, inequalities between industry and public research.
- **Lack of knowledge and guidelines**: Researchers lack guidelines and knowledge on the ethical and legal requirements, need better training in transdisciplinary approaches
- **Potential harmful uses**: research on AI has shown its potential to lead to manipulation and misinformation at scale, bio-weapon development, cybersecurity, fraud, hacking, deepfake, and military AI applications.

Impacts on people

- **Research careers and jobs will be impacted by AI**, current evidence shows that additional digital skills and AI literacy will be required for most researchers. These additional requirements may add onto the already high-pressure academic environments.
- **Different skills will be required for users and developers of AI**, with the common need to understand the underlying ethical and governance requirements of the technology. Education and training in AI are being built into university curricula and increasingly in demand. As they develop, there are risks that inequalities might leave some groups behind in the process of digitalisation.
- **Public-private partnerships** could benefit the landscape of AI education and literacy, but in the current landscape, these partnerships can also be harmful to recognition of the knowledge provided by the academics.
- AI systems and tools have the potential to **enhance rather than replace humans**, and in particular researchers, through human-machine collaborations fostering upskilling and creativity.

Policy options

- Research & development of **best practices, guidelines and protocols**
  - Epistemic integrity, validity, and open publication
  - Conform with basic principles of research integrity
  - In accordance legal rights and interests (such as copyright and IP)
  - Allow for the development of discipline-specific norms
- **Researcher education and training in AI**
- **Publicly-funded, transparent guidelines and metrics** for academic publishing
- Coordinated EU effort - **State-of-the art facility for AI in academic research in Europe** (computational power, infrastructure, quality data repository, developing standards and trainings)
- **EU 'AI safety' institute** (monitor vulnerabilities and misuse for AI, international exchange, policy proposals to mitigate threats, negotiate limits to military uses)

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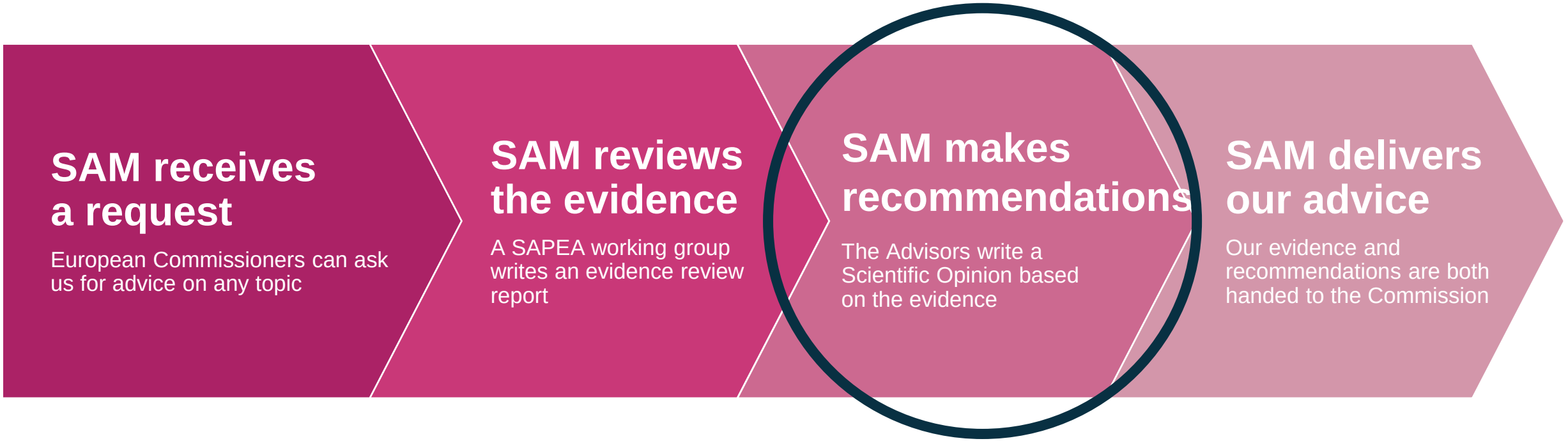


Recommendations

Four sets of main recommendations

1. The Group of Chief Scientific Advisors recommends that the European Commission develops and deploys **policy frameworks** that evolve with AI developments for AI in research and innovation to **adapt to the fast-paced and highly dynamic developments** in the field of AI.
2. **Improve quality standards of AI syste**ms (i.e. data, computing, codes) and provide fair access for researchers working on and with AI research.
3. **Protect and invest in research infrastructures** and in AI as they play a key role in ensuring the EU's competitiveness in all scientific disciplines.
4. **Ensure AI is driven by people** (individuals and communities) living in an open society. Protect researchers, individuals and communities from being driven by AI to generate profit or be controlled by entities ignoring EU core values and principles.

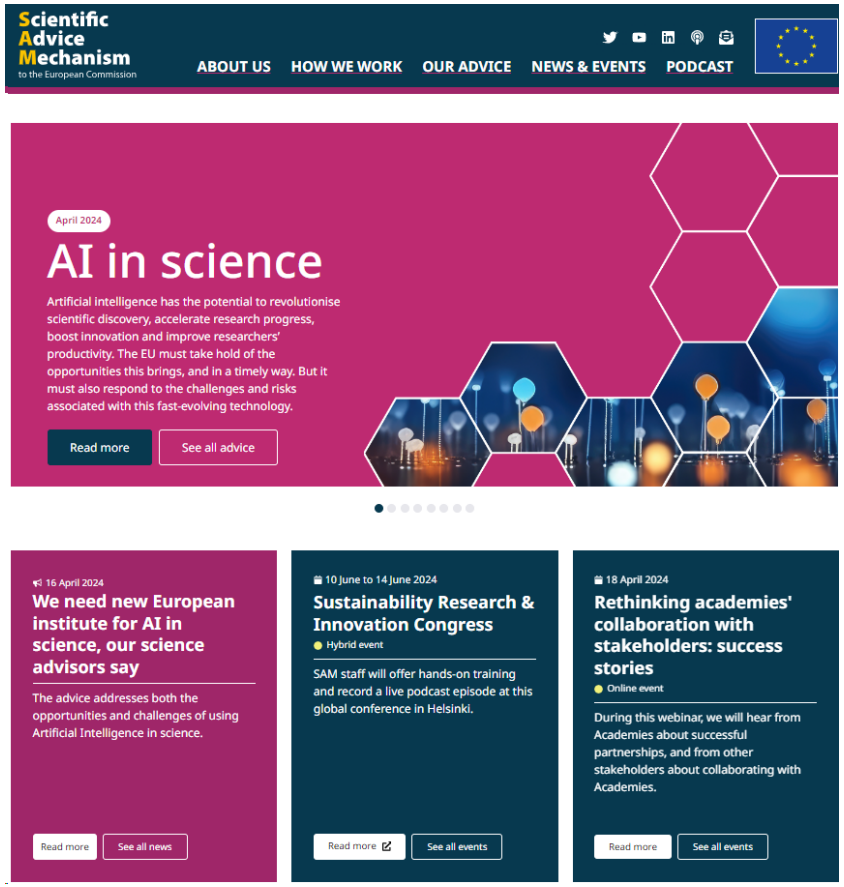
How we work (simple version)

Handover to the European Commission

Official Handover on **15 April 2024** to Commisionner for Research and Innovation and European Vice President for ‘A Europe fit for a Digital Age’

“Science advisors to the European Commission have called for the EU to set up a “state-of-the-art” publicly funded institute for academic research into artificial intelligence, to accelerate use of AI across all fields of research.”

More information



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