



EU Strategy on AI

The Health & Care research case

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"...Ethics and competitiveness go hand in hand. Businesses cannot be run sustainably without trust, and there can be no trust without ethics. And when there is no trust, there is no buy-in of the technology, or enjoyment of the benefits that it can bring. Europe needs to lead the way in promoting responsible competitiveness, distinguishing itself from others by building a trademark of trustworthiness. Only by doing so, can we expect to be able to lead by example in this rapidly evolving environment..."

Mr. Pekka Ala-Pietilä, Chairman of the AI HLEG, February 2019 (extract from article originally published in German in the "Frankfurter Allgemeine Zeitung")

EU strategy for AI

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A STRATEGY FOR EUROPE TO LEAD THE WAY

**Boost
technological
and industrial
capacity & AI
uptake**

**Prepare for
socio-
economic
changes**

**Ensure an
appropriate
ethical & legal
framework**

AI FOR GOOD AND FOR ALL

EU strengths



Excellent research centres



World-leading position in robotics



Strong business-to-business domain



Strong industrial and services sectors: automotive, healthcare, agrifood



Industrial data

Maximising benefits from AI



Economic impact



Contribution to societal challenges



Healthcare



Energy
efficiency



Road safety



Cybersecurity

...

EU investments in AI

Combined Public and Private investment 2018-2020: €20bn

Combined Public and Private investment after 2020: €20bn with €1bn p.a. through Horizon Europe and the Digital Europe Programme



**R&D and
excellence
centers**



**AI-on-
demand
platform**



**Digital
Innovation
Hubs**



**Industrial
data
platforms**

European Commission

Over the duration of H2020 (2014-2020): around €2,6bn on AI related areas (robotics, big data, health, transport, FETs)

EC Communication on AI – April 2018

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Coordinated approach to make the most of the opportunities offered by AI and to address the new challenges that it brings. **The EU can lead the way in developing and using AI for good and for all**, building on its values and its strengths.

EU can capitalise on:

- **world-class researchers, labs and startups** (the latter with support from the *European Innovation Council* and the *European Fund for Strategic Investments* as well)
- the **Digital Single Market**. Common rules, for example on data protection and the free flow of data in the EU, cybersecurity and connectivity
- **Wealth of industrial, research and public sector data**

<https://ec.europa.eu/digital-single-market/en/artificial-intelligence>

Artificial Intelligence for Europe {SWD(2018) 137 final}
<https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe>

<https://ec.europa.eu/digital-single-market/en/news/communication-artificial-intelligence-europe>

Coordinated Plan on the Development and Use of AI Made in Europe



10 April 2018

25 European countries signed a Declaration of cooperation on Artificial Intelligence

28 Member States, Norway and Switzerland

Signatories agreed to work together on the most important issues raised by Artificial Intelligence, from ensuring Europe's competitiveness in the research and deployment of AI, to dealing with social, economic, ethical and legal questions!

7 December 2018: Coordinated plan on AI published

On 10 April 2018:

Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, UK, Norway

Other countries have joined the initiative since it was launched:

- **Romania in May 2018**
- **Greece in May 2018**
- **Cyprus in May 2018**
- **Croatia in July 2018**

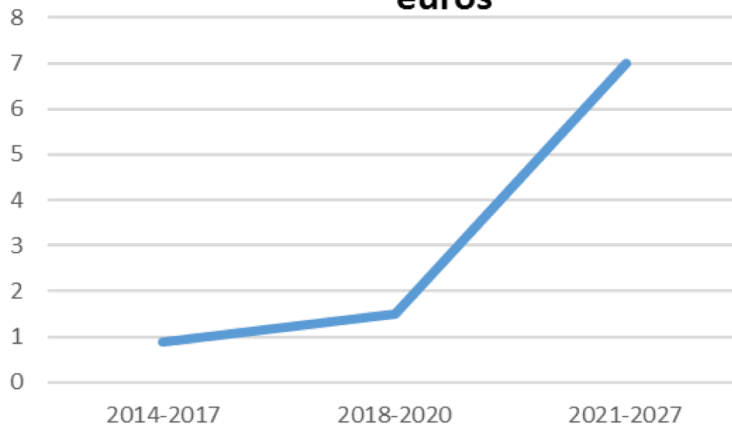


Coordinated Plan on the Development and Use of AI Made in Europe

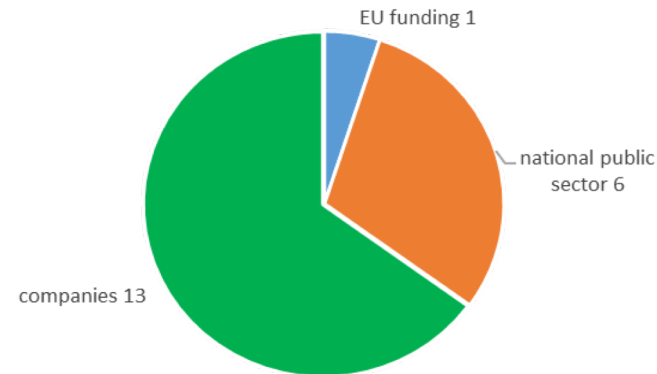
- **National AI strategies:** By mid-2019 all Member States should have their own strategies in place outlining investment levels and implementation measures, which will feed into discussions at EU-level
- **A new European AI public-private partnership:** A new research and innovation partnership on AI will be set up, to foster collaboration between academia and industry in Europe and to define a common strategic research agenda on AI
- **A new AI scale-up fund:** The Commission will support startups and innovators in AI and blockchain in their early stages as well as for companies in their scale-up phase
- **Developing and connecting world-leading centres for AI:** European AI excellence centres will be developed and connected, world-reference testing facilities will be established in areas such as connected mobility, and the uptake of AI across the economy will be encouraged through Digital Innovation Hubs (€66 million for robotics hubs are announced today). A European Innovation Council pilot initiative will also be launched to support next generation AI technologies

EU investments in AI – Coordinated Plan

**EU funding for AI, in billion
euros**



European Investment in AI: target 20 bn by 2025



- Common strategic research and innovation agenda
- Resources for start-ups and innovators
- European Innovation Council pilot

EU CHALLENGES

Staying at the forefront in S&T

Access to Data

Inclusive: AI available/Usable for All

Evolution of the Labour landscape & Skill gaps

Acceptance/Ethical issues

Safety/Liability issues

Scattered Effort vs. Fierce International competition



Addressing AI Legal & Ethics Issues

High Level Group of Experts

- EC appoints **52 experts on AI**, comprising representatives from academia, civil society, as well as industry
- General objective: **support the implementation of the European strategy on AI**. This includes the elaboration of recommendations on future AI-related policy development and on ethical, legal and societal issues related to AI, including socio-economic challenges

<https://ec.europa.eu/digital-single-market/en/high-level-expert-group-artificial-intelligence>

European AI Alliance

- Multi-stakeholder platform which will **complement and support the work of the AI High Level Expert Group** in particular in preparing draft AI ethics guidelines
- **Full mobilisation of a diverse set of participants**, including businesses, consumer organisations, trade unions, and other representatives of civil society bodies
- **Encourages broad participation in the policy-making process** of the European Commission [on AI].
- **First Annual AI Alliance Conference in 2019**. Membership of the Alliance will grant privileged access to this event

<https://ec.europa.eu/digital-single-market/en/european-ai-alliance>

AI Ethics and regulatory framework

Ethics Guidelines for Trustworthy Artificial Intelligence (AI) prepared by the High-Level Expert Group on Artificial Intelligence (AI HLEG) and published on April 9, 2019

- I. Respecting Fundamental Rights, Principles and Values - Ethical Purpose
- II. Realising Trustworthy AI
 - 1. Requirements of Trustworthy AI
 - 2. Technical and Non-Technical Methods to achieve Trustworthy AI
- III. Assessing Trustworthy AI

Based on fundamental rights and ethical principles, the Guidelines list **seven key requirements** that **AI systems** should meet in order to be **trustworthy**:

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

Participate in the piloting phase of the AI Ethics Guidelines:

<https://ec.europa.eu/futurium/en/register-piloting-process>

AI in Health & Care (HC) (examples)

From wellness to diagnostics to operational techs

- Robot-assisted surgery
- Virtual nursing assistants
- Clinical Trial participation
- Automated Image Diagnosis
- Connected Machines
- Smart implantable devices
- Prostheses
- Companion robots
- Algorithms for more accurate and earlier diagnoses
- Radiology



- Make patient data available as a basis for the use of AI in health research taking into account the legitimate interests of patients and confidentiality of their data
- Personalised medicine
- Time and cost gains
- Better diagnoses/treatments

AI in HC Research - Challenges (examples)

Ethics

- Data – algorithms – bias
- Use of technology - good or evil
- Physicians and algorithms
- Data (patient health, diagnostics and outcomes) - “collective knowledge”
- Machine-learning-based clinical guidance – a third-party “actor” - confidentiality concerns
- Privacy, transparency
- Users' emotions/misuse of AI
- Employment – socio-economic impact
- Socio-economic inequalities (access to AI H&C techs for all?)

Legal

- Data protection
- Technical safety and failure – liability
- Certification of users' skills
- Ownership of data
- Lack of legal approval process for the wider use of certain AI techs

Technology

- Interoperability with other soft/hardware
- Lack of sufficient high quality data to train AI tools
- Insufficient maturity of the products available on the market



H2020 Societal Challenge 1 Work Programme 2018-2020 – possible "entry doors" for AI

- SCI-DTH-03-2018:** Adaptive smart working and living environments supporting active and healthy ageing
- SCI-DTH-01-2019:** Big data and Artificial Intelligence for monitoring health status and quality of life after the cancer treatment
- SCI-DTH-05-2019:** Large scale implementation of digital innovation for health and care in an ageing society
- SCI-DTH-11-2019:** Large Scale pilots of personalised & outcome based integrated care
- DT-TDS-01-2019:** Smart and healthy living at home

- <http://ec.europa.eu/programmes/horizon2020/sc-1-health-demographic-change-and-wellbeing-work-programme-2016-2017-preparation>

• http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-health_en.pdf

Ultimate goals of AI use in H & C

- **EFFICIENCY**
- **SAFETY**
- **SERVING THE PATIENT, HC PROFESSIONAL AND HC SYSTEMS**