



ELLIS

April 9, 2021



European Laboratory for Learning and Intelligent Systems

European Laboratory for Learning and Intelligent Systems



ELLIS Mission

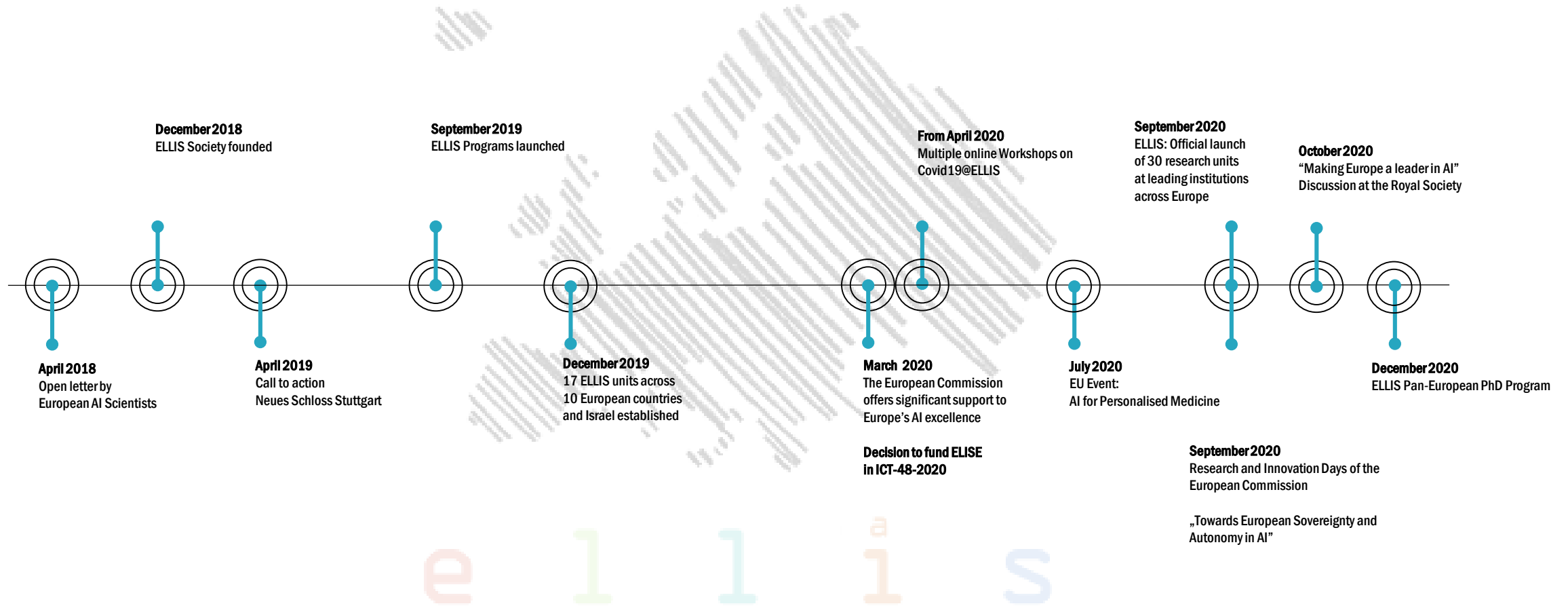
The mission of ELLIS is to benefit Europe in two ways:

- 1. We want the best basic research to be performed in Europe, to enable Europe to shape how machine learning and modern AI change the world.**
- 2. We want to have economic impact and create jobs in Europe, and believe this is achieved by outstanding and free basic research.**

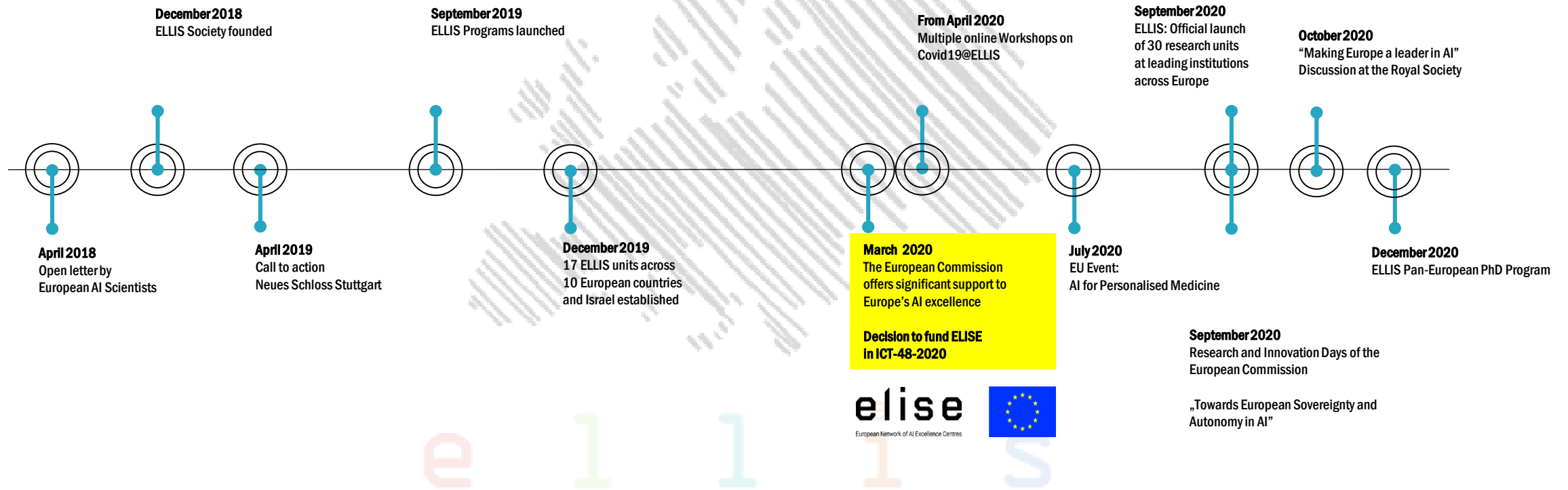
The logo for ELLIS, consisting of the lowercase letters 'e', 'l', 'l', 'i', 's' in a light, sans-serif font. The letters are colored: 'e' is light red, the first 'l' is light green, the second 'l' is light blue, 'i' is light orange, and 's' is light blue. The logo is positioned at the bottom center of the slide.

e l l i s

ELLIS Milestones



ELLIS Milestones



ELLIS Letter

Initiative to establish a European Lab for Learning & Intelligent Systems

We are at a crossroads where

(1) **machine learning is at the heart of a technological and societal artificial intelligence revolution** involving multiple sister disciplines,¹ with large implications for the future competitiveness of Europe,

(2) **Europe is not keeping up**: most of the top labs, as well as the top places to do a PhD, are located in North America; moreover, AI investments in China and North America are significantly larger than in Europe, and

(3) **the distinction between academic research and industrial labs is vanishing**, with a significant part of the basic research now being done in industry (with substantial research freedom, and higher salaries), rapid commercialization of results, and academic institutions worldwide struggling to retain their best scientists (with negative implications not only for research but also for the education of future talent). This further weakens Europe since all of the companies doing top research in this field are controlled from the US (or China) – many European companies whose future business crucially depends on AI are not perceived as competitive.

There are still a few machine learning & perception research hotspots in Europe that play in the international top league. Virtually all of the top people in those places are continuously being pursued for recruitment by US companies. Even if we only wanted to *retain* these centers, we would need to increase our investments in line with what other countries are doing. To *strengthen* our position, we need to build on what is strong in Europe, think big and have the courage to try new models.² We believe our best bet is for the outstanding centers in Europe to join forces.

European strength currently lies in its academic culture and well-educated students. E.g., Cambridge and Zurich have top university departments in the field, Tübingen has top Max Planck departments, and in France, we have a mixture of both between the Paris universities (e.g., Ecole normale supérieure) and CNRS/INRIA. Large US players have started research labs in those places, such as Amazon (Cambridge, Tübingen), Apple (Cambridge), Facebook (Paris), Google/Deepmind (Zürich, Paris, London), Microsoft (Cambridge), Qualcomm (Amsterdam). While a major motivation for these labs is the competition for local talent, the labs also strongly contribute to the local ecosystems by rendering them more attractive for

¹ We use the term machine learning to include areas of AI that are strongly influenced and driven by machine learning, such as much of computer vision, natural language and speech understanding, and parts of robotics.

² European governments are beginning to realize this, as shown by the recent establishment of the Alan Turing Institute as well as the new French AI strategy (https://www.wired.com/story/emmanuel-macron-talks-to-wired-about-frances-ai-strategy/?mbid=email_onsiteshare). Countries like Canada and Japan are taking action to address the challenge of retaining top AI researchers; and Canada's Vector Institute is an exciting model of what can be done.

students and researchers, and breeding a generation of high-level professionals, some of who subsequently form startups.

Proposal

We should found a **European Lab for Learning & Intelligent Systems** (working title; abbreviated as “ELLIS”), involving the very best European academics while working together closely with basic researchers from industry.

The mission of ELLIS is to benefit Europe in two ways:

1. we want the best basic research to be performed in Europe, to enable Europe to shape how machine learning and modern AI change the world, and
2. we want to have economic impact and create jobs in Europe, and believe this is achieved by outstanding and free basic research, independent of industry interests.

This is how to make ELLIS competitive:

- **outstanding facilities** and computing infrastructure

- it is a **inter-governmental organization** (like EMBL, the European Molecular Laboratory Lab). France and Germany may be (the) initial partner countries, the Netherlands would be an excellent addition, but ELLIS is not limited to the EU; in particular, there are outstanding centers of excellence in Switzerland, the UK, and Israel, and we would benefit from including them.

- ELLIS comprises **labs in the partner countries** at the top academic sites for machine learning & perception research. This allows jump-starting ELLIS by means of (short or long term) co-affiliation and/or secondment of outstanding academics. Excellent researchers across each country may be connected via fellowships, and the links to local research institutions are vital for ELLIS to thrive.

- it runs **programs for visiting researchers (both from academia and industry)**, as well as **workshops and summer schools** for students, academics, and industrial participants. **Mobility** is facilitated by housing, childcare, and (international) schools at each site.

- it aims at building a **European PhD and MSc program** in cooperation with degree-granting universities. Student education includes time spent in at least two partner sites, and industry research internships are encouraged.

- ELLIS researchers can **split their time between ELLIS and local university or industry research labs** (creating an incentive for industry to co-locate). Collaboration with industry is encouraged and structured using transparent and simple IP rules that ensure that public funding is used in a way that benefits the public. Joint research involving industry and public funding is openly publishable.

ELLIS Society founded

MONTREAL, DECEMBER 4, 2018



Implementation



ELLIS Fellow Programs

ELLIS PhD & Postdoc
Program

ELLIS Sites

Implementation



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ELLIS Fellow Programs



ELLIS PhD & Postdoc
Program



ELLIS Sites

ELLIS Fellow Programs

Geometric Deep Learning



Robust Machine Learning



Interactive Learning and
Interventional Representations



Machine Learning and Computer Vision



Robot Learning: Closing the Reality Gap!



Human-centric Machine Learning



Th., Alg. and Comp. of Modern Learning Systems



Quantum and Physics based Machine Learning



Natural Intelligence



ELLIS Health



Machine Learning in Earth and Climate Sciences



Natural Language Processing



Symbolic Machine Learning



ELLIS Workshops



Global Perspectives on Responsible AI
An Interdisciplinary Research Symposium – 25/26 Jun



Stream Finished

ELLIS Workshop on
Geometric and Relational Deep Learning
Thomas Kipf

Playbacks	Peak concurrents	New subscribers
2.3K	292	27
Duration	Total watch time	Avg. watch time
6:28:13	58 days	35:33

ELLIS against COVID Workshops



ELLIS against Covid-19 on April 1st
ELLIS Against COVID19

Playbacks	Peak concurrents	New subscribers
6.3K	1.3K	211
Duration	Total watch time	Avg. watch time
3:10:21	154 days	34:51



Sepp Hochreiter
(Johannes Kepler University Linz)



Günter Klambauer
(Johannes Kepler University Linz)



Lena Maier-Hein
(German Cancer Research Center)



Gunnar Rätsch
(ETH Zürich)



Guido Sanguinetti
(University of Edinburgh)



Bernhard Schölkopf
(Max Planck Institute for Intelligent Systems)



Oliver Stegle
(German Cancer Research Center (DKFZ) & EMBL Heidelberg)



Mihaela van der Schaar
(University of Cambridge, The Alan Turing Institute & University of California)



Max Welling
(University of Amsterdam)

Implementation



e l l i s



ELLIS Fellow Programs



ELLIS PhD & Postdoc
Program



ELLIS Sites

The PhD & Postdoc Program



attract & support excellent young researchers in ML



metaprogram on top of existing graduate programs



European collaboration



focus on excellence



joint supervision within the ELLIS network



aiming to become the #1 brand in ML

Program set up

joint supervision within the ELLIS network

1 ELLIS fellow/scholar

+

1 ELLIS fellow/scholar/member

collaboration & exchange

academic track

- research stay at a top academic institution abroad (min. 6 months)

industry track

- research at a European industrial lab (min. 6 months)

- min. 50% at the academic partner

ellis.eu/phd-postdoc

Recruiting



central application

- 1x year in December
- open PhD positions with ELLIS fellows/scholars
- single point of entry for students
- matching process



nomination by advisors

- PhD students & postdoc already working with an ELLIS fellow/scholar
- throughout the year



PhD and postdoc Program Update

1,339
applicants

50
nominations

2020

first pan-European central recruiting round (annual intake) + nominations on a rolling basis



results

75
PhDs &
postdocs

85
advisors



605k
mobility fund

- 53 institutions across 14 countries
- focus on **excellence** in research
- **collaboration** is key: joint supervision by ELLIS fellows and members + mandatory **international exchange** or intensive local collaboration with **industry** (Qualcomm, Bosch, VW, Valeo.ai, DeepMind, Siemens, Amazon etc.)

Implementation



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ELLIS Fellow Programs



ELLIS PhD & Postdoc
Program



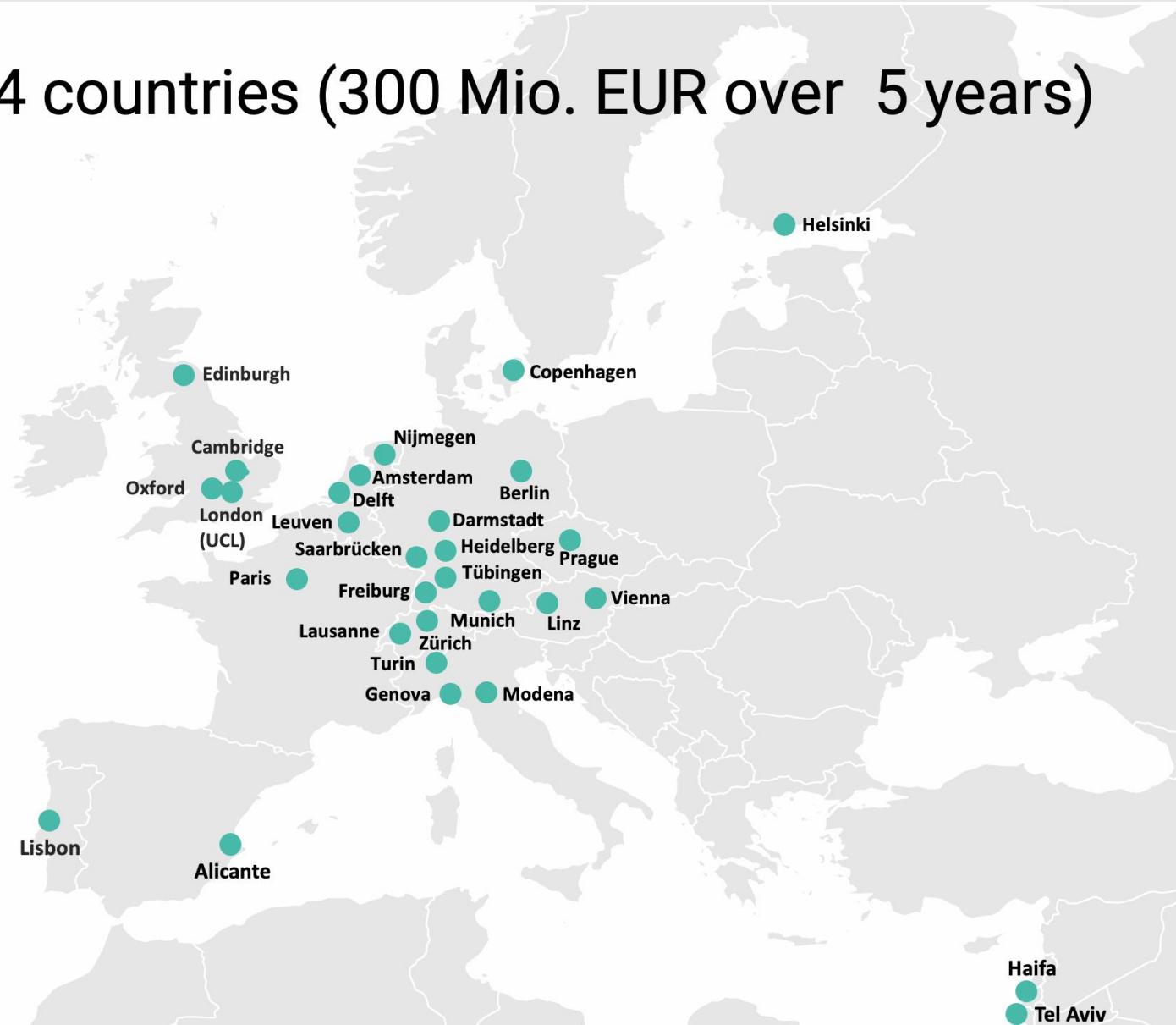
ELLIS Sites

ELLIS Units

- Nucleus of scientific excellence within their local ecosystems
- Active scientific contributors and collaborators within the ELLIS network
- Scientific and strategic leadership within their local ecosystems and at the national level
- Create new agile and enabling working environments that are internationally attractive for top talent
- Pursue a strategy to improve critical mass of excellent people, diversity, low teaching obligations, permeability to industry (support of start-ups and part-time employments), internationally competitive salaries
- Build ELLIS institutes

ELLIS Units

30 ELLIS-Units in 14 countries (300 Mio. EUR over 5 years)



Official launch of ELLIS units

Declaration

ELLIS (**European Laboratory for Learning and Intelligent Systems**, <https://ellis.eu>) is a European AI network of excellence. It focuses on fundamental science, technical innovation and societal impact. Modern Artificial Intelligence technologies are based on *machine learning*. Like human intelligence, learning machines do not have to be explicitly programmed, but can learn from experience. Many fundamental ideas in this field were developed in Europe or by European researchers. However, Europe is now facing challenges when it comes to attracting and retaining the best talent. ELLIS is a grassroots initiative that addresses these challenges with a *three-pillar strategy* to maintain and foster *European technological sovereignty* in this competitive field.

The three pillars focus on *fellows*, *students* and *sites*. The aim is to invest in existing talent, foster new talent, and build a network of outstanding European innovation ecosystems.

The **first pillar** is the establishment of a broad range of [Fellow Programs](#),¹ dedicated to topics ranging from basic research in theory and algorithms to applications in health and climate sciences and human-centric elements of AI.

The **second pillar** attracts, inspires, nurtures and connects the best PhD students in Europe through the **ELLIS PhD program**.

The **third pillar** consists in the creation of a network of ELLIS sites located at the leading existing institutions or created from scratch, performing modern AI research across Europe. An **ELLIS Unit** invests at least 1.5 Mio EUR per year, for at least five years, and requires a commitment to excellence through international peer review as well as a contribution of at least 300k EUR annually towards network activities, such as hosting exchange faculty and students, leading research programs and organizing workshops.²

Call to Action

Invest in Excellent Research

Highly innovative ecosystems emerge at outstanding academic institutions that serve as talent magnets and incubators of innovation. In modern AI, industrial innovation and cutting-edge academic research go hand in hand. New research institutions both private (DeepMind, Google Brain, Facebook AI Research, Open AI) and public (Vector Institute, MILA) play this dual role by offering agile environments and outstanding research conditions. The ELLIS initiative's long-term goal is to establish a pan-European Artificial Intelligence laboratory inspired by models such as the European Molecular Biology Laboratory (EMBL) (<https://ellis.eu/en/letter>). It will comprise *ELLIS Units and Institutes* that attract outstanding scientists and provide them with the means to generate scientific, economic, and societal innovation.

Support ELLIS Units

The now established set of *ELLIS Units* within existing institutions integrates local AI ecosystems into a European network, joining forces in the competition for talent, scientific innovation, and economic impact. The units were selected for excellence by a competitive process, and we ask countries and regions to support their units and contribute towards their annual budget. This should include a component of unrestricted funds of at least 300k Euro per year and unit, to facilitate the implementation of the envisioned European network initiatives.

Work towards ELLIS Institutes

The legal and financial basis for outstanding European AI calls for the strong commitment of national governments as well as intergovernmental coordination. ELLIS Institutes should offer highly attractive conditions for top talent, unprecedented agility and an optimal infrastructure to incubate spin-offs such as start-ups, new academic research groups, or social enterprises. An ELLIS Institute will require significant resources (building costs as well as an annual budget increasing to EUR 30-40 million). We encourage all European countries to consider setting up ELLIS Institutes. Countries, federal states / regions, and private donors are invited to join this process.

Top departments in Computer Science

CSRankings: Computer Science Rankings

CSRankings is a metrics-based ranking of top computer science institutions around the world. [Click on a triangle](#) (▶) to expand areas or institutions. [Click on a name](#) to go to a faculty member's home page. [Click on a pie](#) (the 🥧 after a name or institution) to see their publication profile as a pie chart. [Click on a Google Scholar icon](#) (🔍) to see their publications, and [click on the DBLP logo](#) (🌟) to go to a DBLP entry.

[Applying to grad school? Read this first.](#)

Rank institutions in by publications from to

All Areas [\[off | on\]](#)

AI [\[off | on\]](#)

- ▶ Artificial intelligence
- ▶ Computer vision
- ▶ Machine learning & data mining
- ▶ Natural language processing
- ▶ The Web & information retrieval

Systems [\[off | on\]](#)

- ▶ Computer architecture
- ▶ Computer networks
- ▶ Computer security
- ▶ Databases
- ▶ Design automation
- ▶ Embedded & real-time systems
- ▶ High-performance computing
- ▶ Mobile computing
- ▶ Measurement & perf. analysis
- ▶ Operating systems
- ▶ Programming languages
- ▶ Software engineering

Theory [\[off | on\]](#)

- ▶ Algorithms & complexity
- ▶ Cryptography
- ▶ Logic & verification

Interdisciplinary Areas [\[off | on\]](#)

- ▶ Comp. bio & bioinformatics

#	Institution	Count	Faculty
1	▶ Technion 🥧	26.0	47
2	▶ ETH Zurich 🥧	16.2	26
3	▶ Max Planck Society 🥧	15.0	13
4	▶ University of Edinburgh 🥧	14.9	33
5	▶ University of Amsterdam 🥧	13.6	16
6	▶ EPFL 🥧	13.1	30
7	▶ Hebrew University of Jerusalem 🥧	11.6	27
8	▶ University of Oxford 🥧	11.3	28
9	▶ TU Darmstadt 🥧	9.1	8
10	▶ University College London 🥧	8.6	24
11	▶ Sapienza University of Rome 🥧	8.1	21
12	▶ Imperial College London 🥧	7.5	23
12	▶ Tel Aviv University 🥧	7.5	21
14	▶ University of Copenhagen 🥧	7.1	20
15	▶ Ben-Gurion University of the Negev 🥧	7.0	15
16	▶ Bar-Ilan University 🥧	6.8	13
17	▶ University of Cambridge 🥧	6.4	15
18	▶ TU Munich 🥧	5.5	16
18	▶ Universidade de Lisboa 🥧	5.5	29
20	▶ Cardiff University 🥧	5.1	17
20	▶ TU Delft 🥧	5.1	19

Quotes

"the ELLIS program shows how Europe is coming together to create an ecosystem that will allow us not only to match what is happening elsewhere in the world, but also to do better."


Margrethe Vestager, Executive VP of the European Commission

"Artificial Intelligence is at the cutting edge of basic research, yet it also has the potential of changing the world for the better. Europe will only be able to shape this development if we invest in outstanding research in this field"

Martin Stratmann, President of the Max Planck Society

"It is essential for British science to build strategic relationships with our leading European colleagues, and with AI being a key pillar of our UK industrial strategy, this is exactly the kind of initiative we welcome."

Sir Venki Ramakrishnan, President of the Royal Society



"Europe must build an AI at the service of the greatest number, based on its common values, particularly in terms of ethics and respect for privacy. To do so, its existing outstanding communities must develop cooperations through this kind of initiatives of excellence, while encouraging indispensable international relations."

Antoine Petit, President and CEO, CNRS

"I am convinced that ELLIS offers an incredible opportunity not only to make our economies more dynamic and competitive but also to develop an ethical AI system. I want to thank all those who have worked hard to make ELLIS become a reality. We all know however, that the real work begins now. So, let's do this together."

Joël Mesot, President of ETH



Thank you



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