

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

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/>).

Countries like Canada and Japan are taking action to address the challenge of retaining top AI researchers; and Canada's Vector Institute (<https://vectorinstitute.ai>) is an exciting model of what can be done.

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 an **inter-governmental organization** (like EMBL, the European Molecular Biology Laboratory). 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. The participating degree-granting institutions will allow and encourage students in their MS and PhD programs to spend time in at least two ELLIS partner sites, with no additional tuition charge, and co-supervision from researchers at these sites. ELLIS will provide fellowships to support this program.
- 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 researchers can **found startups based on IP they generate**. ELLIS does not aim to optimize short-term licensing income, and rather aims at sustained economic

impact in Europe. To this end, it owns a modest share in those startups and claims no further rights as long as the startup is formed in a partner country, thus generating downstream impact (including jobs) in Europe. ELLIS supports startups in terms of (a) generous leave-of-absence rules, (b) temporary use of infrastructure, and (c) help with administration including legal/financial advice.

- ELLIS does not need a large headcount for personnel initially (since it strictly only recruits top notch academics), but it does need a **long term funding commitment** including a plan how the funding ramps up. Each local lab could aim to reach at least the scale of a major Max Planck institute, i.e., around 100 Mio EUR for infrastructure and an annual budget increasing to 30 Mio EUR during the first ten years.

- Existing funding structures are too slow: **ELLIS should start in 2018** and the core of such an initiative could be formed by at least France and Germany (e.g., CNRS/INRIA and Max Planck).³ There is interest among top researchers not only in those countries, but also in Switzerland, the UK, the Netherlands, and Israel. Institutional links between some of the sites already exist (joint centers and joint PhD programs).⁴

- In addition to researchers and faculty from the partner institutions, ELLIS will offer permanent employment to outstanding individuals early on and train them in both academic and non-academic skills. These researchers will receive an adjunct faculty position from one of the partner institutions. They will also be offered a complete career path within ELLIS, paralleling those found in tenure-track programs, from the equivalent of the rank of assistant professor to that of a full professor. This will be a major step towards avoiding brain drain to the US.

- ELLIS' unique characteristic is **outstanding academic quality** as measured for instance by publications in the leading competitive conferences of the field.⁵ It does not preclude other national and international activities that focus mainly on applied research and industry cooperation, but ELLIS' pure mission of **excellence in basic research** must not be compromised.

Challenges

- There is no shortage of funding for AI research, but **it is extremely hard to attract outstanding researchers**. However, it is the quality of the individual researchers that determines the strength of the overall lab, and only top people act as true talent magnets. US institutions and companies have recognized that money spent on those people pays off in multiple ways. In Europe, there are currently only few types of academic positions that allow us to attract such top people, e.g., Max Planck directorships or full professorships at ETH.

Our only chance to attract such people to ELLIS is to offer positions with outstanding academic freedom and visibility (in cooperation with Max Planck, ENS, CNRS,

³ Their recent activities of MPI-IS/Cyber Valley and PRAIRIE already plan to collaborate.

⁴ <http://learning-systems.org/>, http://mlg.eng.cam.ac.uk/?page_id=1458

⁵ The 2018 Report of the German Government's Commission of Experts for Research and Innovation (EFI) lists Tübingen/Stuttgart as the leading site in Germany in this respect, followed by Berlin/Potsdam. Similar arguments can be made for all other sites taking part in the present initiative.

INRIA, as well as participating top universities), with top packages.⁶

- Since the field holds great economical promise, there may be competition of different sites to be home to an ELLIS lab. The only criterion should be **academic excellence**.

Vision

- ELLIS will perform **fundamental research in modern AI**, attract top international industry research labs, and spawn **startups** that will become major players in the future. It will thus drive excellence in Europe's *research and use* of machine intelligence to foster economic development and improve the lives of people.

- ELLIS will be a **top employer in machine intelligence research**, on par with Berkeley, Stanford, CMU, and MIT. It will also be a world class venue to get trained in the field: in conjunction with universities, it will develop a highly attractive **European PhD program**, and it will strive to retain the best graduates within ELLIS to groom them into the next generation of senior scientists.

- Taken together, this means **that Europe will be able to play a major role in the scientific and societal revolution that is underway**. The first and second industrial revolution not only transformed technology but also led to fundamental societal changes. These changes were managed by European democracies and values. The current revolution may be equally significant. Europe should benefit from it and European values should help shape its impact.

The undersigned urge their governments to work towards the above goal.

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⁶ EMBL offers attractive packages that come with special conditions (<https://www.embl.de/jobs/work-at-embl/>), but the field of machine learning & perception is more competitive. Co-appointments with industry will help significantly.



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