



Making Europe a leader in AI: in conversation with Venki Ramakrishnan, Antoine Petit and Martin Stratmann

Summary note of an international interactive online event, held on 7 October 2020

The international interactive online event, *Making Europe a leader in AI: in conversation with Venki Ramakrishnan, Antoine Petit and Martin Stratman*, was organised by the Royal Society, the Centre National de la Recherche Scientifique (CNRS) and the Max Planck Society, demonstrating scientific ties between the UK and the rest of Europe on Artificial Intelligence¹, a global scientific priority. This event outlined the opportunities for European collaboration in the field of AI and explored the potential for Europe to be an attractive and leading research destination. A video of the event is available on the Royal Society's website². This note aims to provide a summary of the key points of discussion.

Opening remarks by the President of the Royal Society

Venki Ramakrishnan (Chair), the President of the Royal Society, gave an introductory speech setting out the context for the event, noting that the dominant players in the development of AI and digital technologies are the US and China, and Europe is often thought to play a minor role. However, Europe has a legacy of digital innovation, including the development of the World Wide Web, communication tools such as Skype, the LINUX operating system, as well as hardware products supporting AI, such as computer chips from Arm, which was recently bought by Nvidia for \$40bn. This innovative legacy continues today in cutting-edge European start-ups, with Demis Hassabis FRS's DeepMind being a prominent recent example.

Europe has also shown leadership when it comes to the governance and regulation of data and AI technologies. While data is global, the General Data Protection Regulation (GDPR) has demonstrated the ability to regulate data use at the European level. The development of Privacy Enhancing Technologies (PETs) has helped to use data more safely to train AI, and is an example technology area encouraged by data protection regulation³. Governance is not just about regulation, and commissions across Europe have been set up to scrutinise the ethics of data use and AI. Recommendations from the Royal Society and British Academy review on *Data management and use: Governance in the 21st Century*⁴ have been mirrored in the UK government's Centre for Data Ethics and Innovation.

Europe is capable of producing cutting edge innovation in AI and has played a leading role in shaping public debates and policy. A major challenge is now for Europe to ensure it develops technology at scale.

Key issues posed for discussion were where Europe has displayed leadership on the use of data and AI so far, and where challenges remain. Venki Ramakrishnan concluded by noting the context of Covid-19 and Brexit, and the risks these posed to collaborative working, and asked what needs to be done to ensure European countries can work together to make Europe a leading destination for AI.

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1. Royal Society. 2017. Machine learning: the power and promise of computers that learn by example. See: <https://royalsociety.org/~/media/policy/projects/machine-learning/publications/machine-learning-report.pdf> (accessed 29 January 2021).
 2. See: <https://royalsociety.org/science-events-and-lectures/2020/10/making-europe-a-leader-in-ai/> (accessed 16 February 2021).
 3. Royal Society. 2019. Protecting privacy in practice: the current use, development and limits of privacy enhancing technologies in data analysis. See: <https://royalsociety.org/~/media/policy/projects/privacy-enhancing-technologies/privacy-enhancing-technologies-report.pdf> (accessed 13 January 2021).
 4. British Academy and Royal Society. 2017. Data management and use: Governance in the 21st Century. See: <https://royalsociety.org/~/media/policy/projects/data-governance/data-management-governance.pdf> (accessed 13 January 2021).

Opening remarks by the Chairman and Chief Executive Officer of the Centre National de la Recherche Scientifique

Antoine Petit, the Chairman and Chief Executive Officer of the Centre National de la Recherche Scientifique (CNRS) began by comparing competition in AI research to a race in which the US and Google, Apple, Facebook, Amazon and Microsoft (GAFAM) were already ahead, and poised to extend their lead. He framed his talk in terms of the five 'ingredients' Europe needed to be more competitive.

The first is data. This presents a challenge that needs to be met at a European level, as each country is too small to amass sufficient data individually to compete with the likes of America and GAFAM. Ensuring data can be shared, across countries, and between businesses, will be key.

The second ingredient is computing power, with Europe currently well-placed in this regard.

The third ingredient is human intelligence. Petit noted the need to improve the education in AI of people at all levels. PhDs and postdocs are essential for research, but graduate students and undergraduates are also needed to ensure that enough people enter industry understanding how AI can best be used. It is a European-wide challenge to retain talent, given global competition. Canada should be looked to as an example, where their Board of AI encompasses approximately 60 Chairs, half of whom come from overseas. The European Research Council (ERC) could be used to achieve a similar purpose in Europe. An area of European strength can be found in the number of researchers it has with dual competencies in AI and another field, such as chemistry or particle physics. This has allowed for the development of new applications and techniques for AI.

The fourth ingredient is ensuring a positive relationship between the private sector and academia. This is a challenge in Europe due to the lack of big players. Europe produces good startups, but these frequently get bought up with American or Asian capital. Major European investors are currently not willing enough to gamble on AI, and this needs to be rectified: AI represents a revolution rather than an evolution. Links with academia need to be fostered. The Canadian Chairs in AI frequently hold dual

appointments with large American tech companies. While there may be drawbacks, this facilitates knowledge sharing between the private and academic sectors.

Finally, the fifth ingredient is acceptability to society. This encompasses issues such as fairness, explainability⁵, and ethics. Expertise will need to be drawn from across the humanities in order to address these issues. A key question will be, what determines how and why people need to have a decision explained? Ethical considerations in Europe are different to those in other parts of the world, but are relatively consistent across the continent⁶. AI ethics is a domain where Europe could take leadership.

Opening remarks by the President of the Max Planck Society

Martin Stratmann, the President of the Max Planck Society, began by noting a number of general challenges in the scientific landscape, before focusing his attention on AI specifically.

There are a number of stressors on European industry at present. These include climate change, Covid-19, and the impact of Brexit. Science is the underlying foundation of knowledge: it is essential to good decision making and societal wellbeing, and has to be used in responding to these challenges.

Europe has strengths in publication, in international infrastructure (such as the European Laboratory for Particle Physics, better known as CERN), in intergovernmental agencies (such as the European Molecular Biology Laboratory, EMBL) and in international mobility⁷. Much has been achieved, but pressing issues remain, including insufficient innovation budgets within European framework programmes, a scientific performance gap across Europe, and a lack of unity in the face of global competition.

AI is a business that depends on rapid scalability. Data is essential for AI. For these reasons, Europe will have to ensure collaboration between countries, and provide a safe data space for science and industry, in order to compete on a global stage.

5. Royal Society. 2019. Explainable AI. See: <https://royalsociety.org/-/media/policy/projects/explainable-ai/AI-and-interpretability-policy-briefing.pdf> (accessed 13 January 2021).

6. ALLEA and Royal Society. 2019. Flourishing in a data-enabled society. See: <https://royalsociety.org/-/media/policy/Publications/2019/28-06-19-flourishing-in-data-enabled-society.pdf> (accessed 29 January 2021).

7. Leopoldina and Royal Society. 2019. European collaboration in machine learning and AI. See: <https://royalsociety.org/-/media/policy/Publications/2019/03-04-19-european-collaboration-machine-learning-ai-discussions.pdf> (accessed 29 January 2021).

An area of significant opportunity for Europe is in the development of new types of industry which fuse AI with existing areas of strength, such as robotics, catalyst development, health, and chemical production. This will require a strong research community.

While there are centres of excellence in many European countries – especially France, the UK and Germany – Europe is lagging behind on AI and must develop novel strategies to develop this industry in order to compete. This requires a four-pronged approach.

First, it requires the ability to attract good people. In this context, the ERC is very important and needs more financial resources rather than less.

Second, Europe needs excellent theoretical training in maths and computer science. Interestingly, Eastern Europe has a very strong record here, a long tradition of doing mathematics at the highest level.

Third, networks must be developed between top institutions in parallel to the EU framework programmes. These should focus on excellence, and not regional funding, which is a legitimate but separate concern. We should look to success stories, such as EMBL. The European Lab for Learning & Intelligent Systems (ELLIS) initiative should be promoted through intergovernmental treaties, and transformed to be a modern equivalent to EMBL focusing on basic science.

Lastly, for Europe to be a leader on AI, Martin Stratmann recommended that Europe develop dedicated computer structures. Mid-term, quantum computing is of real interest, and could be a game changer when it comes to AI.

On reflection it was noted that one of the great strengths of China in the area is its access to data. Europe needs to develop means of managing data and developing institutions and infrastructure on a continent-wide level in order to compete.

Comments by AI experts

Marta Kwiatkowska, Professor of Computing Systems at University of Oxford, highlighted some of the problems there have been with algorithmic decision making, on which AI depends. These include security risks, privacy leaks, and concerns about unfairness. She asked how the sharing of data across borders can be achieved in a way acceptable to the public, and whether GDPR offered an advantage in this.

The panel noted the benefits regulation could offer, such as allowing the breakup of monopolies, while accepting that too much regulation can be burdensome and stifle innovation. The importance of trust was highlighted, with the Danish health data centre noted as a particularly successful example, where the public trusted their government with a huge centralised medical database. The German National Science Data Structure, and Gaia-x were offered as other successful example of trust and data-sharing in public research and industry respectively.

Stéphane Mallat, Professor at the Collège de France, stressed the continuing importance of fundamental research to the development of AI, especially in mathematics. He suggested the major challenge was in how to retain talented researchers not just physically in Europe, but also employed at European companies or institutions, when American and Asian competitors could offer high pay, an environment populated with leading researchers, and excellent access to computing power.

Nuria Oliver, Co-Founder and Vice President of ELLIS, reflected on how ELLIS had sought to address these challenges. She highlighted three pillars being used to support European technological sovereignty in modern AI. These were:

1. Identifying and investing in excellent researchers as ELLIS fellows and scholars, participating in ELLIS Research programs and/or ELLIS units.
2. Attracting and inspiring more PhD students in modern AI.
3. Creating a network of ELLIS units prepared to contribute to ELLIS, all performing excellent research on modern AI while ensuring economic and social impact.

The first 30 ELLIS units have launched on September 15th, with 4 in the UK (at UCL, Edinburgh, Oxford, and Cambridge). Each ELLIS unit has made a 5-year commitment to devote at least €1.5 million of their own funding per year to carry out excellent research in modern AI and contribute to achieving the ELLIS mission and vision.

More is needed and ELLIS has issued a call to action to ensure that Europe is a producer, not just a consumer, of AI. This will allow the development of AI more in line with European values. Nuria Oliver asked how governments and intergovernmental bodies can be encouraged to help realise this vision, given the urgency of the situation.

Questions from the audience

Questions submitted from the audience focused on what could be done to improve technical education in relation to AI and contribute to a just transition as old jobs are lost and new ones created.

Responding to the questions, Martin Stratmann reiterated that ELLIS should be adopted on an intergovernmental basis, on the model of EMBL. This would allow for more competitive salaries. However, competition on pay with industry is not new, and other inducements to public research should be considered, such as the Max Planck Society's offer of lifelong independent research. On jobs, this question is important, and requires a separate initiative running in parallel to what is developed for basic research.

Antoine Petit stressed the importance in AI being adopted at all levels, from scientists to policymakers to industry to society. A model is needed to allow collaboration among European companies in order to produce AI that reflects European values. EMBL is an interesting model to consider.

Conclusion

The Chair concluded by noting that these are important questions with no easy solutions. A balance is required between regulation and operability. The opportunity of using AI to scale up existing areas of strength, such as manufacturing or pharma, merits further attention. But the scale needed to compete globally can only be achieved by integrating the multiple national and continent-wide initiatives. While leadership in regulation is important, ultimately it is not enough and the most useful products will be the most successful. Ensuring European-wide collaboration and interoperability will be essential.