ICT Solutions for Brilliant Minds

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A European Strategy for AI in science
CSC – IT Center for Science Ltd.

CSC welcomes the Commission's initiative to develop a comprehensive AI in Science strategy for the EU. The combination of artificial intelligence, data, and powerful computing resources is transforming the traditional paradigms of scientific research, and the EU's commitment to step up the use of AI in science is not only timely but essential for strengthening Europe's research capacity, driving innovation and competitiveness, and reducing strategic dependencies.

AI can expand researchers' productivity and creativity by processing vast amounts of data, uncovering patterns, and generating predictive models at an unprecedented pace. This acceleration of research is extremely powerful and has positioned AI as a catalyst for groundbreaking scientific advances. Using large-scale AI models for scientific research is practically impossible without access to supercomputing resources and well-managed data, and it is essential to continue pooling resources within the EuroHPC framework for world-class European AI-enabling infrastructures – including supercomputers, AI factories, data platforms, open European web index, and high-speed research networks – and their development as a mutually reinforcing ecosystem. Equally important is promoting their interlinkage and connection to the scientific community, to provide researchers with the best possible tools to accelerate research. The upcoming strategy and the European AI research body must recognise and drive this goal through a distributed yet coordinated approach. This must also be reflected in closer synergies and coherence among relevant policy initiatives and funding programs across the EU.

European large language models are absolutely necessary, but AI is a lot more than generative or general-purpose models. Researchers must have access to a versatile AI toolbox when AI is needed. Therefore, investments in developing different kinds of AI, machine and deep learning, and other predictive approaches should be supported with the strategy. For example, AI-powered simulations can be a valuable tool in many disciplines.

Empowering researchers with the right skills and expertise is critical to advancing AI-driven science. It enables, for example, deeper collaboration between AI and domain scientists to co-create new models and tools, while also ensuring researchers are equipped to recognise AI's limitations and address ethical, privacy, and security implications. Promotion of projects where AI or ML specialists work together with domain-specific scientists could yield valuable learning experiences and lead to fresh outcomes and pertinent feedback. Besides, understanding what the model does and what it means for a given discipline will not become obsolete even though AI will

automatise processes. In addition to AI-specific skills, it is critical to create understanding about technology as a horizontal skillset that is needed in all domains, and the AI in Science Strategy should be in line with the Union of Skills Strategy to ensure an integrated approach to competence development.

Alongside access to computing, the ability to develop scientifically relevant AI models relies fundamentally on the available data. Successful application of AI/ML for different uses requires models to be reliable and well-assessed, and high-quality open data is needed to train the models. Therefore, a strategy for AI in science cannot be isolated from building Europe's sovereignty in data. Europe must better utilize its own data assets, ensuring their ownership and security, as a key part of technological sovereignty and reducing dependencies. The value from European data must benefit Europe, while contributing to broader global progress in research and innovation. The European data spaces and the open science cloud EOSC, together with the AI factories' data labs, can channel high-quality data that is FAIR and compliant with EU norms also for scientific purposes. The funding instruments but also the regulatory environment have to look after this, e.g. through building access to data and sustaining upkeep of AI models and training data. Legal support for research teams, guidance for clear and permissive interpretations of the AI Act, and when personal data is used, of the GDPR, would help to avoid fragmentation and slowdown of AI activities in the field of research, development and innovation. The AI Act has exemptions for scientific research, but it may not always be clearcut, particularly in applied or close-to-market research, where science ends.

Harnessing the full potential of AI requires coordinated efforts, spanning research, the public sector and the full spectrum of industry. Given the deep interconnections between AI application in science and research and its adoption in industry and public sector, the AI in Science strategy must be closely aligned with the parallel Apply AI strategy - including joint incentives to foster public-private partnerships. Without such coherence, there is a risk of fragmentation that could slow both scientific progress and industrial competitiveness.

Finally, AI must be used in science sustainably in a broad sense. While using AI to boost research in fields like climate, ecology or health can increase its positive handprint, the negative environmental footprint of training and running the models can become large and has to be mitigated by aligning the strategy with EU efforts on green computing and data centers. Research done with AI must be as open as possible, transparent, ethical, and scientifically sound, and consider aspects like data quality, biases, and verifiability. Responsible AI in line with European values adds to the legitimacy and increased uptake of this transformative technology in science.

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