

Quick Take

Update: Digital Europe Program Targets Deployment Path for AI, HPC, and Cybersecurity

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HYPERION RESEARCH OPINION

The European Commission (EC) has announced the Digital Europe Program, a new €7.5 billion effort designed to accelerate supercomputing, artificial intelligence, cybersecurity, and advanced digital skills, across the economy and society. Its overall goal is to help EU member states increase their capabilities in crucial areas of high-end computing and the relevant technologies to provide a foundation for driving Europe's 21st century economy.

Proposed funding for the seven-year program (2021-2027) is to be spread over the four aforementioned areas, but more than half of the money is intended to be allocated to the most critical areas of high-end computing today: supercomputing and artificial intelligence. The EU is playing catch-up in both realms, relative to the United States and China, and considering the expense of the infrastructure needed to expand HPC and AI capabilities, it is not surprising that the majority of the program's funding is targeting these areas.

The Digital Europe Program focuses on what is often regarded as the most neglected components of government-funded research, namely, its deployment and use. The European Union (EU) is well-positioned to execute on such a strategy since many of its member states are highly ranked in both R&D and manufacturing capability, as well as being home to a high concentration of high-tech companies. According to the 2021 Bloomberg Innovation Index, which used those three criteria (plus others) to quantify innovation capability across the globe, seven European countries ranked in the top 10: Switzerland (3rd), Germany (4th), Sweden (5th), Denmark (6th), Finland (8th), the Netherlands (9th), and Austria (10th).

The program's approach is to make these computing technologies readily available to end users throughout the EU, both by investing in infrastructure and by addressing the shortage of expertise in these domains. As such, the Digital Europe Program will complement the existing research-focused Horizon Europe initiative, which is designed to stimulate innovation in digital technologies and applications. The program will also support some of the connectivity aspects of the Connecting Europe Facility (CEF) effort, a funding instrument for developing networks and infrastructures in the sectors of transportation, telecommunications, and energy across Europe.

Focusing on technology deployment and use will help avoid redundancy with the myriad of other EC research-oriented efforts in the HPC, AI, and cybersecurity domains. That said, to derive the most benefit from this program will require close coordination with those efforts, as well as coordination with the relevant government agencies, academic institutions, and industry consortiums that have a primary stake in these technologies.

SITUATION OVERVIEW

The Digital Europe Program is part of a larger strategy by the EC to stimulate the region's information technology sector by drawing on the combined technical capabilities and economic strengths of the EU's member states. Not only does the commission want to make Europe more sovereign in its ability to develop these technologies, but the ultimate goal is to "fill the gap between the research of digital technologies and their deployment." That makes the Digital Europe Program a natural complement to the more R&D-focused and more wide-ranging Horizon Europe program.

As mentioned previously, the majority of the proposed €7.5 billion investment will be targeted to supercomputing and AI, with the specific breakdown and spending profile as follows:

- **Supercomputing (€2.2 billion):** Deploy early pre-exascale and exascale supercomputers (2021-2023), followed by post-exascale systems (2026-2027). This includes funding for a 2021 exascale supercomputer under the EuroHPC Joint Undertaking, and a number of petascale systems and upgrades to existing systems.
 - The funding will be used to broaden accessibility for these leading-edge systems, making them available to public institutions aimed at health, the environment, and security, as well as for commercial companies, including small and medium-sized enterprises. This entails providing services for European access to these resources and the federation of national and EU HPC initiatives into a common platform.
- **Artificial Intelligence (€2.1 billion):** Scale up the European AI platform to provide a single access point for AI software and hardware resources. Key domains include AI perception, interaction software, big data analytics, language processing, IoT, neuromorphic, robotics, and cybersecurity.
 - The AI component will also establish a common cloud-based European data space that will facilitate access to large datasets. As with supercomputing, accessibility will be open to both businesses and public institutions.
 - This funding is also intended to strengthen existing AI testing and experimentation in the areas of health, environment/climate, manufacturing, energy, and mobility. The testing capabilities will be implemented through large-scale Testing and Experimentation Facilities (TEF) for AI hardware, software, components, systems and solutions, and underlying computing resources.
- **Cybersecurity (€1.7 billion):** Strengthen cybersecurity coordination among member states using common tools and certification schemes, as well expand skills and capabilities of cybersecurity across the public and private sectors.
 - The funding will also go toward the provision of pan-European cybersecurity infrastructure (including optical communications and quantum communications infrastructure).
 - In particular, the effort initiates a European Cybersecurity Shield powered by a terrestrial- and satellite-based pan-European quantum communication infrastructure (EuroQCI). The EuroQCI will become the core infrastructure for ultra-high security communication in Europe.
- **Advanced Digital Skills (€580 million):** Support the design and deployment of specialized programs and traineeships (including upskilling programs) in areas such as big data and AI, cybersecurity, quantum computing, and HPC. This includes dedicated master's programs for artificial intelligence, advanced computing, and cybersecurity.

- **Ensure Wide Use of Digital Technologies (€1.1 billion):** Support deployments in areas of public interest such as health (complemented by the EU4Health program), Green Deal, smart communities, and the cultural sector. Encourage the uptake of advanced digital and related technologies by industry, especially small and medium-sized enterprises, as well by public institutions.
 - The initial focus will be to set up a network of 80 European Digital Innovation Hubs, which will offer access to technology testing, financing advice, market intelligence, and networking opportunities.

The program is also intended to support and encourage sustainable infrastructure, prioritizing energy efficiency, climate neutrality, repairability, and recycling.

FUTURE OUTLOOK

The Digital Europe Program looks to be a substantial effort to create a viable path from R&D to deployment across the three related technologies of HPC, AI, and cybersecurity. If the EU is to be competitive with the US and China in these areas, it will certainly need such a strategy and investment. Given that Europe has the technical capability and economic capacity to be a world-class player in these domains, the biggest challenge to the program will be one of execution and cooperation among the various member states.

Beyond the competitive drivers, the successful deployment of these technologies aims to strengthen the region both economically and socially. AI products and servers, in particular, are designed to reach into every sector of the economy during the program's lifespan, boosting productivity in key areas like healthcare, transportation, manufacturing, and financial services. At the same time, HPC (and to a more limited extent cybersecurity) will continue to be foundational technologies for AI, while also driving innovation in those same markets.

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