

Digital Single Market

POOLING RESOURCES TO BUILD WORLD-CLASS EUROPEAN SUPERCOMPUTERS



WHY IS IT IMPORTANT TO JOIN FORCES AT EU LEVEL AND CO-INVEST IN WORLD-CLASS SUPERCOMPUTING INFRASTRUCTURES



In Europe, an analysis of 143 supercomputing projects showed that each €1 invested in **supercomputing for businesses** generated **around €870 in revenues and €69 in profits**.



Currently, **EU industry provides about 5% of supercomputing resources worldwide, but consumes one third of them**.



In June 2012, the EU had 4 machines in the global top 10 supercomputers. Today **the fastest system in the EU ranks 13 on the global list** – about 10 times slower than the world's fastest machine.¹



Compared to its competitors in the USA, China and Japan, **Europe is underinvesting in supercomputing**, with an annual **funding gap of €500-750 million**.²

HOW DOES EUROPE PLAN TO BECOME A WORLD LEADER IN SUPERCOMPUTING?

The **European High Performance Computing Joint Undertaking (EuroHPC JU)**

is a **legal and funding instrument** focused on:



A pan-European supercomputing infrastructure

Buying and deploying in the EU two supercomputers that will be among the top 5 in the world and at least two others that would today rank in the global top 25. These machines will be made available throughout Europe to public and private users, for use in more than 800 scientific and industrial application fields.



Research and innovation

Supporting the development of a European supercomputing ecosystem, stimulating a technology supply industry, preparing innovative applications to exploit the available computational power, and making supercomputing technologies available to more users, in particular small and medium-sized enterprises.

2018  2026

Established in November 2018, the Joint Undertaking will be operational until 2026.



The Joint Undertaking will be composed of public members (representatives of the EU and of participating European countries) and private members (representatives from supercomputing and big data stakeholders, including academia and industry).



The Joint Undertaking will have a budget of around €1 billion, of which 50% will come from the EU and 50% from the participating countries. Private entities will provide additional resources, of an estimated value of about €400 million.



The Joint Undertaking will provide financial support (public procurement, and research and innovation grants) following open and competitive calls.

WHAT IS SUPERCOMPUTING, ALSO KNOWN AS HIGH-PERFORMANCE COMPUTING (HPC)?



HPC involves thousands of processors working in parallel to analyse billions of pieces of data in real time, performing calculations thousands of times faster than a normal computer.



The next step in high-performance computing is exascale performance: machines able to perform 10^{18} (a billion billion) operations per second, a technology which is expected to be reached by top global players by 2021.

HPC BENEFITS

Citizens



Addressing major challenges faced by modern society (e.g. healthcare, public service efficiency, cybersecurity, safer and greener transport).

Researchers and scientists



Underpinning innovation in almost all scientific disciplines, and providing deeper insights into highly complex unexplored systems (e.g. astrophysics and deep space research).

Business and industry



Helping manufacturers and small and medium-sized enterprises be more innovative and save money, time and resources.

HPC CAPABILITIES CAN BE USED TO SOLVE SCIENTIFIC, INDUSTRIAL AND SOCIETAL CHALLENGES.



Health

- Development of personalised and precision medicine to make treatments more effective.
- Saving money and time in the development of new drugs, from the initial concept to the final phase of reaching the market.
- HPC can help save lives and hundreds of millions of euros, thanks to early detection of diseases and quicker diagnoses.



Climate change and weather forecasting

- 33% of the world's GDP is affected by the weather, and weather variations in Europe have an economic impact of around €400 billion annually.
- Severe weather resulted in high costs for Europe between 1970 and 2012:
 - 150,000 lives lost
 - €270 billion in economic damage
- Using HPC technology, climate scientists can predict the size and paths of storms and floods more accurately.
- This means that people can be alerted and evacuated with more notice, saving lives.



Industry

- Reducing development time, minimising costs, optimising decision processes and producing higher quality goods and services.
- For example, HPC has helped the car industry save more than €40 billion by:
 - reducing new vehicle development cycles from 60 months to 24 months.



Cybersecurity

- Estimates suggest cyber-crime damage costs will reach more than \$6 trillion annually by 2021, up from more than \$3 trillion in 2015.
- Combined with artificial intelligence, HPC helps to detect:
 - strange systems behaviour,
 - insider threats and electronic fraud,
 - very early cyberattack patterns (making responses possible within hours instead of days, even before a cyberattack happens).



Energy

- For example, HPC provides critical tools for:
 - designing renewable energy parks
 - designing high-performance photovoltaic materials,
 - optimising turbines for electricity production.
- HPC expenditure in the energy sector is projected to grow by 5% in the next few years.

¹ <https://www.top500.org/list/2018/06/>

² Study SMART 2014/0021 for the European Commission "High-Performance Computing in the EU: Progress on the Implementation of the European HPC Strategy"; IDC 2015, <https://ec.europa.eu/digital-single-market/en/news/study-high-performance-computing-eu-progress-implementation-european-hpc-strategy-final-report>