Opinion of the European Economic and Social Committee on 'Proposal for a Council Regulation on establishing the European High Performance Computing Joint Undertaking'

(COM(2020) 569 final — 2020/260 NLE)

(2021/C 123/02)

Rapporteur: **Louise GRABO**

Referral	Council of the European Union, 26.10.2020
Legal basis	Article 187 and the first paragraph of Article 188 of the Treaty on the Functioning of the European Union.
Section responsible	Single Market, Production and Consumption
Adopted in section	11.12.2020
Adopted at plenary	27.1.2021
Plenary session No	557
Outcome of vote (for/against/abstentions)	240/0/5

1. **Conclusions and recommendations**

1.1. The EESC confirms the validity of this strategic initiative and the added value of a EuroHPC (High Performance Computing) Joint Undertaking (JU) as a tangible step in keeping with the European Union cloud strategy as well as being an integral part of a wider EU strategy (including amongst other things cybersecurity, the Digital Single Market, the European Gigabit Society, Open Science, EU4Health and Resc-EU).

1.2. The EESC considers that the EU's existing investments deployed in recent years and even after the outbreak of the COVID-19 pandemic for the acquisition and operation of world-class supercomputing machines are still not at an optimal level compared to those of its competitors (the US, China and others). Additional resources and investments are called for, including on the part of the EU Member States, particularly those that are less advanced and/or involved in the field. It is vital for these resources to be combined with coherent EU research and innovation programmes and the next 2021-2027 MFF, including the Recovery and Resilience Facility, if the EU is to compete in HPC applications at global level.

1.3. The EESC endorses the industrial approach, within a renewed EU industrial and embedded SME strategy, for developing the next generation of low-power microchips in Europe, making the EU less dependent on imports and securing access to top-quality HPC technology and know-how.

1.4. The EESC calls on the Commission to redouble its efforts to draw up a 'multiannual roadmap' that can guarantee EU civil society ownership and contribute in a practical way to the respective levels of JU governance in strategic sectors (health prevention early warning systems, preparedness, pilot programmes on training for disaster risk mitigation and cybersecurity). To this end, beyond the existing HPC competence centres and Digital Innovation Hubs, it is urgent to integrate the added value and multiplier role of a permanent Civil Society Dialogue within existing JU Advisory Groups. The EESC, owing to its very nature, would be the ideal partner for holding an open EuroHPC JU Annual EU Dialogue Forum accompanied by educational awareness campaigns with the active involvement of scientific and knowledge networks, social and economic partners, civil society organisations and the media.

1.5. The EESC deems it necessary to collect EU civil society feedback to better monitor, explain and promote by the EU institutions and Member States the short- and medium-term added value of the EuroHPC JU and the sectoral advantages and opportunities it presents as a legal and strategic instrument. The EuroHPC JU should not only benefit scientific/research communities but should also guarantee greater 'ownership' and involvement on the part of interested intermediaries such as public institutions, EU social partners and civil society organisations, industrial and small and medium-sized enterprises (SMEs) representative organisations and value chain actors in software applications development, providing access to infrastructure, of particular importance for smaller countries, and enhancing in-kind contributions to the HPC JU.

1.6. The EESC welcomes the fact that two of the Commission's partners in the contractual public-private partnership (cPPP) could become the first private members, which is key for participation from the very beginning of the JU by EU industries. This is particularly the case as regards micro-enterprises and SMEs offering competitive solutions/adaptability, but that risk being excluded or penalised by public procurement if they are not appropriately covered through a specific legal chapter and/or existing consortium forms. The EESC underlines the importance of modernising the setting of specific public procurement procedures and of awarding criteria to facilitate the involvement of existing or new 'SME clusters' in this specific EU Regulation on a Joint Undertaking ([1]) covering classic HPC supercomputers and software applications, but also the procurement of quantum computers/simulators.

1.7. The EESC welcomes the possibility of including more partners but would also insist that for any new partners, in particular those from outside the EU, the requirement of reciprocity be fulfilled.

1.8. The EU should make the most of the opportunity presented by the development of EuroHPC JU technology to develop the relevant European industrial sectors so that they can cover the entire production chain (design, manufacturing, implementation and application).

1.9. The EU should establish as a mid-term goal achieving the capability to plan and produce HPC using European technology.

2. **General comments**

2.1. On 10 March 2020 the European Commission adopted the communication *A New Industrial Strategy for Europe*, setting out an ambitious industrial strategy for Europe to lead the twin transitions towards climate neutrality and digital leadership. In its communication the Commission underlines the need to strengthen the development of key enabling technologies that are strategically important for Europe's industrial future, including High Performance Computers and quantum technologies. In a subsequent communication dated 27 May 2020, entitled *Europe's moment: Repair and Prepare for the Next Generation* ([2]), HPC applications were identified as a strategic digital capacity that will be a priority for sources of investment in Europe's recovery, such as the Recovery and Resilience Facility, InvestEU and the Strategic Investment Facility.

2.2. EuroHPC JU applications, using what are known as 'supercomputers' with extremely high computational power, are able to solve hugely complex and demanding problems. Today they represent a key factor for global leadership in scientific, industrial, biological risk and (cyber)terrorism risk strategies, and are thus essential for national security, defence and geo-political challenges and more in general for the digital and green transformation of our society. EuroHPC JU applications also underpin the data economy, enabling key technologies such as artificial intelligence (AI), data analytics and cybersecurity to exploit the enormous potential of big data.

2.3. Furthermore, HPC is also becoming a tool of growing importance at global level for supporting public decision-making by simulating scenarios and supporting global and regional common preparedness response and knowledge networks related to natural risk events (e.g. tsunamis, floods, fire, earthquakes, etc.) as well as anthropogenic ones (e.g. industrial risks). In this framework, EuroHPC JU systems could deploy and increase their added value when multiple risks occur simultaneously, with a significant negative impact on societies.

2.4. EuroHPC JU is involving several industrial sectors in order to innovate and scale up to higher-value products and services to be placed on the internal and global markets, opening up to new industrial applications in combination with other advanced digital technologies.

2.5. HPC applications and infrastructures are essential in nearly every field of research, from fundamental physics to biomedicine, in order to achieve deeper scientific understanding and breakthroughs.

([1]) Council Regulation (EU) 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (OJ L 252, 8.10.2018, p. 1).

([2]) *Europe's moment: Repair and Prepare for the Next Generation* — COM/2020/456 final.

2.6. HPC is being used in connection with the COVID-19 pandemic, often in combination with AI, to accelerate the discovery of new drugs, predict the spread of the virus, plan and distribute scarce medical resources, and anticipate the effectiveness of containment measures and post-epidemic scenarios.

2.7. HPC is also an essential tool for researchers and policy-makers to address major societal challenges, from climate change, migration, smart and green development and sustainable agriculture to personalised medicine and crisis management in the EU, together with neighbouring and third countries.

2.8. According to the Commission's Staff Working Document (SWD) ([3]) […], Europe has been, and still is, a world leader in HPC applications, but its supercomputing infrastructure is falling behind in the world ranking.

2.9. A widely accepted headline indicator of regional competitiveness in HPC is the number of systems in the 'top-10' and 'top-500' lists of world supercomputers in each world region.

2.10. The baseline, as defined in the EuroHPC JU IA and the EIB study ([4]), is the following: According to the EuroHPC JU IA, 'Problem No 1 (The EU does not have the best supercomputers in the world …). Today, none of the 10 leading supercomputers in the world is located in the EU. Collectively, the EU and the Member States are significantly under-investing in HPC technology supply and infrastructures when compared to the US, China or Japan'.

2.11. In the next few years, Europe's leading role in the data economy, its scientific excellence and its industrial competitiveness will increasingly depend on its ability to develop key HPC technologies, provide access to world-class supercomputing and data infrastructures and maintain its present excellence in HPC applications. To make this happen, a pan-European strategic approach is essential through Joint Undertakings (JUs).

2.12. The first EuroHPC JU was established in October 2018 as a legal and financial framework, pooling resources from the EU, 32 countries and two private members: the European Technology Platform for HPC (ETP4HPC) and the Big Data Value (BDVA) Association.

2.13. So far, the JU has used funds from the 2014-2020 Multiannual Financial Framework (MFF) for its strategic investments. After 20 months of operation, it has substantially increased overall investment in HPC at European level and has started to deliver on its mission to restore Europe's position as a leading HPC power. By the end of 2020, it will deploy a world-class supercomputing and data infrastructure accessible to public and private users all over Europe. Its investments are also supporting HPC Competence Centres throughout Europe, which ensure that HPC is widely available in the Union and provide specific services and resources for industrial innovation (including SMEs) and the development of HPC skills, research and innovation in critical HPC hardware and software technologies and applications. This will increase the EU's ability to produce innovative HPC technology.

2.14. The Council Regulation establishing the EuroHPC JU in 2018 ([5]) set a target of reaching the next supercomputing frontier, exascale performance. See preamble, Section 12: 'The Joint Undertaking should be set up and start operating at the latest by early 2019 to reach the target of equipping the Union with a pre-exascale infrastructure by 2020, and to develop the necessary technologies and applications for reaching exascale capabilities around 2023 to 2025'. This increase in computing power would also come from the deployment of quantum computers and from moving to post-exascale technologies.

2.15. The present proposed regulation is in essence a continuation of the existing initiative established under Council Regulation (EU) 2018/1488, introducing modifications to adapt the 2018 regulation to the next multiannual financial framework (MFF) programmes, but also to reflect the priorities of the Commission and to make it possible for the JU to use funding from the new MFF programmes for 2021-2027.

2.16. The European Commission Staff Working Document (SWD(2020) 179 final) analyses the development of key socio-economic and technological drivers and of user requirements affecting the future progress of HPC and data infrastructures, technologies and applications in the EU and worldwide, taking into account the EU's political priorities for 2020-2025.

([3]) *Equipping Europe for world-class High Performance Computing in the next decade* SWD/2020/179 final
([4]) *Equipping Europe for world-class High Performance Computing in the next decade* SWD/2020/179 final
([5]) Council Regulation (EU) 2018/1488.

2.17. HPC is used in more than 800 scientific, industrial and public sector applications that play a major role in boosting industry's innovation capability, advancing science and improving people's quality of life. Europe is today a leader in HPC applications in a wide range of areas such as personalised medicine, weather forecasting, the design of new aeroplanes, cars, materials, and drugs, and energy, engineering and manufacturing.

2.18. The governance and allocation of voting rights of the proposed JU remain identical to the ones defined in Council Regulation (EU) 2018/1488. The EuroHPC JU will continue to implement the HPC strategic roadmap as defined by the multiannual strategic research and innovation agendas developed by the EuroHPC JU Research and Innovation Advisory Group (RIAG) and the EuroHPC JU Infrastructure Advisory Group (INFRAG), complemented by the Strategic Research Agenda of the of the EuroHPC JU private members to establish the HPC ecosystem. The Union's financial contribution to the JU under the 2021-2027 MFF would be EUR [XXX], matched by at least an equal amount of total contributions from the participating states and private members of the EuroHPC JU. The JU will use these funds mainly to implement its activities under the five pillars described above.

2.19. The main expected outcomes for the proposed EuroHPC JU in the next decade would include:

— a federated, secure and hyper-connected EuroHPC JU and data infrastructure with mid-range supercomputers and at least two top class exascale and two top class post-exascale systems (at least one of each category built with European technology),

— hybrid computing infrastructures integrating advanced computing systems,

— quantum simulators and quantum computers in HPC infrastructures,

— secure cloud-based HPC and data infrastructure for European private users,

— HPC-powered capacities and services based on European public data spaces for scientists, industry and the public sector,

— next generation technology building blocks (hardware and software) and their integration into innovative HPC architectures for exascale and post-exascale systems,

— Centres of Excellence in HPC applications and industrialisation of HPC software, with novel algorithms, codes and tools optimised for future generations of supercomputers,

— large-scale industrial pilot test-beds and platforms for HPC and data applications and services in key industrial sectors,

— national HPC Competence Centres, ensuring wide coverage of HPC in the EU, with specific services and resources for industrial innovation (including SMEs),

— a significant increase in Europe's workforce in HPC skills and know-how,

— reinforced data storage, processing capacities and new services in areas of public interest across the Member States.

2.20. Main achievements by joint undertakings:

— The EuroHPC JU has substantially increased the level and quality of investments in HPC at European level in a single and coordinated effort with Member States.

— By the end of 2020 EuroHPC JU will provide the EU with the best world supercomputers.

— EuroHPC JU will provide a European source of key technologies.

— European HPC technology supply and market.

— The EuroHPC JU strategy and its impact on the HPC value chain.

3. **Market trends and main lessons learnt**

3.1. The Commission's Working Staff Document (WSD) presents the latest EuroHPC JU market figures and provides an overview of the main lessons learnt from the JU's activities so far.

3.2. Lessons learnt from the EuroHPC JU's governance and administration: the EuroHPC JU has already acquired solid working experience, with extensive discussions among stakeholders on the governance, administration and other operational aspects. Examples include:

— the 13 meetings of the EuroHPC JU Governing Board with the regular participation of delegates from the European Commission and the 32 participating states,

— the JU's advisory groups (RIAG and INFRAG) have already held numerous meetings and have been supported by the active involvement of the two private members (ETP4HPC and BDVA),

— the selection of the eight hosting sites and the launch of the procurement procedure for the eight EuroHPC JU supercomputers, and the launch of the JU's 2019 and 2020 calls.

3.3. There are 22 implementation aspects from which the main lessons learnt so far can be summarised as follows:

— simplification of the co-funding scheme,

— the combination of EU and national funds in the different EuroHPC JU activities needs to be simplified and optimised,

— recommendations include a single set of eligibility criteria for participation (instead of 32 different national eligibility criteria),

— implementation of central management of all financial contributions (except in duly justified cases), in line with Article 8(1)(c) of the proposed Regulation establishing Horizon Europe and flexibility in introducing different percentages of EU and national funding to fund participants in R&I activities,

— more flexibility in the contribution of private members and other private actors to the activities of the EuroHPC JU, notably by including novel forms of cooperation, for example co-funding specific HPC infrastructure for industrial use.

4. **Specific comments**

4.1. The majority of project partners are from research organisations (75 % of the total funding of the Future and Emerging Technologies projects), whose mainspring is not industrialisation of results achieved. Enhanced and sustained training efforts will also be a major factor in fully exploiting not only the next EuroHPC JU-funded pre-exascale and exascale supercomputers but also future computing generations. Moving from simulation-centric HPC to integrating HPC in a full continuum of IT infrastructure, from Edge to HPC, is a major challenge. This would require developing a strong relationship between the HPC community with other ecosystems such as big data, AI and the Internet of Things (IoT). Europe can be a worldwide leader here if the momentum created by Horizon 2020 continues.

Brussels, 27 January 2021.

The President
of the European Economic and Social Committee
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