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Minho Manifesto on European High-Performance Computing for Science and Innovation

A EuroHPC Petascale Coordination Network fostering research and innovation throughout Europe

This manifesto was prepared in the context of the high level round table on "High-Performance Computing for Science and Innovation", June 18, 2021, co-organised by the new five European HPC petascale systems in close collaboration with the Portuguese Presidency of the European Union Council and the European Commission

University of Minho, Guimarães, Portugal,

June 18, 2021

The undersigned call for a collective action throughout Europe towards a comprehensive research and innovation approach focused on High-Performance Computing (HPC) and covering the entire research and innovation continuum, from fundamental science to market-driven research and innovation. This requires specific actions to strengthen the emerging network of the new five European HPC petascale systems in terms of a well distributed and interconnected high-quality european infrastructure ensuring that science-driven and social innovations benefit European citizens throughout the entire European Union.

We consider that such a European-wide deployment of High-Performance Computing infrastructures has the potential to help achieving the twin digital and green transition in the coming decades, taking into consideration that:

- The pandemic with which we now live demonstrates the importance of knowledge to be able to ask more accurate and difficult questions and better understand the risks we face, as well as to evolve in this new geological era of the "Anthropocene". This requires the advanced processing of massive amounts of data, which can only be achieved through High-Performance Computing;
- New scientific knowledge on interactions to effectively support the challenges of the green and digital transitions that are seizing opportunities across all disciplinary areas. This will benefit from opening High-Performance Computing to research communities across the entire spectrum of disciplines;
- Innovation across our current institutional landscape and with diversified stakeholder groups, building the necessary economic and environmental resilience, but also addressing the social context and, above all, the inequalities that persist across our societies. This will gain from a European-wide deployment of well coordinated High-Performance Computing infrastructures;
- The advancement of observation and monitoring methods, which will help guide our common future, to better understand climate changes, and to act on ecological impacts, including the development of early warning and monitoring systems for a clean and

predictable future. It requires the creation of high precision digital models of the Earth to visualize, monitor and forecast natural and human activity on the planet aimed to support the sustainable development and adequately monitor and act on climate change and also to include Earth Observation, but equally other elements such as communication. Again, this can only be achieved through the processing and analyisis of massive amounts of data.

We acknowledge the enormous success of the Rome Declaration, signed on March 23, 2017, and the impact on the consequent mobilization of an effective European task force for the creation of the European initiative "EuroHPC- European High-Performance Computing", a European "Joint Undertaking", that assumed the commitment to participate in the joint European project to develop and deliver a world-class supercomputing infrastructure.

We recognise the important role that EuroHPC Join Undertaking (EuroHPC JU) is playing since 2018 to foster research and innovation throughout Europe and, in particular:

- We highlight both the scientific and societal impact of High-Performance Computing, connecting many scientific groups in recent years, with relevant results to the scientific community and our citizens;
- We consider this cooperation instrumental to respond to the challenges and ambitions stated in national and global strategies to ensure the sustainability of our common future;
- We recognise that the new five European HPC petascale systems are being installed aiming to be a world leading example of environmental sustainability in high performance computing (i.e., "green supercomputing"), uniquely combining the digital and green priorities established by the European Union.

It is under this context that we acknowledge the symbolic significance of a high level round table on "High-Performance Computing for Science and Innovation", taking place at the University of Minho on June 18, 2021, conveying an important message about our scientific cooperation and common achievements for the benefit of the European Community and people, so that they can trust science and its use for them and for building a sustainable future. In particular, we highlight the multiple sectorial perspectives discussed in the round table, combining a mission-oriented, demand-driven and problem-solving approach, which incorporates key stakeholders and covers diverse geographies, cultures and technology readiness levels.

The undersigned agree, in the context of the EuroHPC JU, to work towards the establishment of a network to coordinate:

- the interoperation of the new five European petascale systems as a distinctive pillar of the EuroHPC integrated exascale supercomputing infrastructure;

- the further development and promotion of environmentally sustainable high-performance computing infrastructures and operational practices, leading to a "European Green Supercomputing Network";
- the complementary availability of the new European petascale systems serving complex modelling and computational intelligence, both key to fundamental science and innovation breahthroughs across high impact areas, such as energy, climate, sustainable cities, cybersecurity, biomedical sciences, basic sciences and engineering, as well as social sciences and the humanities;
- the development of High-Performance Computing (HPC) and High-Performance Data Analysis (HPDA) test-beds and services, thereby scaling up and diversifying the new European petascale systems to better address the needs of scientific players, public administration and industrial users. This requires an inclusive and networked approach able to structure capacities and demand across Europe, with clear and fair access rules. In addition, it needs to be flexible, allowing customised solutions to answer to the needs of the individual stakeholders.
- public administration and society's mobilisation towards the use of bigdata enabled and computational intelligence-based applications aimed at promoting Europe's well-being, sustainability and resilience. This needs to be complemented by advanced, user-driven, citizen-based information systems, including massive data processing and the use of artificial intelligence;
- the role and contribution of the new European petascale systems to educating and training highly skilled scientists, developers, and users of HPC and HPDA systems;
- the promotion, exchange, and adoption of best practices to balance gender participation at all levels of operation, management, and exploitation of the new European petascale systems.

The undersigned invite the European Commission to participate in this endeavour and work with the signatories to best support it at the EU level.

Signed in the University of Minho, Portugal, on June 18, 2021, by:

Stoyan Markov, *Discoverer, Petascale Supercomputer Consortium, Bulgaria:* _____

Vit Vondrak, *Karolina, IT4Innovations National HPC Centre, Czech Republic:* _____

Pascal Bouvry, *MeluXina, LuxProvide, Luxembourg:* _____

Andrej Filipčič, *Vega, Institute of Information Science in Maribor, Slovenia:* _____

Rui Oliveira, *Deucalion, Minho Advanced Computing Center, Portugal:* _____

Paulo Quaresma, *Science and Technology Foundation, Portugal:* _____

Manuel Heitor, *Minister for Science, Technology and HIgher Education, Portugal:* _____

Simona Kustec, *Minister for Education, Research and Innovation, Slovenia:* _____

With the following testemonies:

Anders Jensen, *Executive Director, EuroHPC JU*

António Cunha, *President, North of Portugal Coordination Commission (CCDR Norte)*

A copy of the Minho Manifesto was handed at the end of the event to

Mariya Gabriel, *Commissioner for Innovation, Research, Culture, Education and Youth*