EuroHPC JOINT UNDERTAKING

DECISION OF THE GOVERNING BOARD OF THE EuroHPC JOINT UNDERTAKING No 01/2020

Adopting the amended Joint Undertaking's Work Plan for the year 2020

THE GOVERNING BOARD OF THE EuroHPC JOINT UNDERTAKING,

Having regard to Council Regulation (EU) 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (hereinafter "Regulation")[1],

Having regard to the Statutes the European High Performance Computing Joint Undertaking annexed to the Regulation (thereinafter "Statutes") and in particular to Articles 1(o), 7 (4) (b), 7 (5) (b) and 18 of thereof,

Having regard to the Governing Board Decision No 38/2019 of 10 December 2019 adopting the EuroHPC Joint Undertaking Work Plan for the year 2020,

WHEREAS

(1) The annual Work Plan of the EuroHPC Joint Undertaking for the year 2020, adopted by the Governing Board by its Decision No 38/2019 of 10 December 2019, and amended by the Governing Board by its Decision No 39/2019 of 21 December 2019 needs to be amended in order to include the detailed description of the topic addressing quantum simulation to be launched under the research and innovation activities and in order to update the expenditure estimates.

(2) The Executive Director of the EuroHPC Joint Undertaking submitted the amended draft work plan to the Governing Board.

(3) In the interest of legal certainty and clarity, an amended annual Work Plan of the EuroHPC Joint Undertaking for the year 2020 should be adopted by the Governing Board,

[1] OJ L 252, 08.10.2018, p. 1-34

HAS ADOPTED THIS DECISION:

Article 1

The annual Work Plan of the EuroHPC Joint Undertaking for the year 2020 adopted by the Governing Board by its Decision No 39/2019 of 21 December 2019, is replaced with the amended Annual Work Plan for the year 2020 set out in the Annex to this Decision.

Article 2

The Executive Director shall make the amended Annual Work Plan 2020 publicly available on the website of the EuroHPC Joint Undertaking.

Article 3

This Decision shall enter into force on the date of its adoption.

Done at Luxembourg, on [*date*].

For the Governing Board

Herbert Zeisel

The Chair

Annex: Amended European High Performance Computing Joint Undertaking Annual Work Plan 2020

WORK PLAN and BUDGET

ANNEX to GB decision no 01/2020.

EuroHPC JOINT UNDERTAKING (JU)

2020
ANNUAL WORK PLAN and BUDGET

NOTICE

Please be aware that following the entry into force of the EU-UK Withdrawal Agreement[2] on 1 February 2020 and in particular Articles 127(6), 137 and 138, the references to natural or legal persons residing or established in a Member State of the European Union are to be understood as including natural or legal persons residing or established in the United Kingdom. UK residents and entities are therefore eligible to participate under this call.

In accordance with the Statutes of the EuroHPC JU annexed to Council Regulation (EU) 2018/1488 and with the Financial Rules of the EuroHPC JU.

The annual work plan will be made publicly available after its adoption by the Governing Board.

[2] Agreement on the withdrawal of the United Kingdom of Great Britain and Northern Ireland from the European Union and the European Atomic Energy Community

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Chapter 1 INTRODUCTION

The EuroHPC Joint Undertaking (hereinafter "EuroHPC JU"), established by the Council Regulation (EU) 2018/1488[3] (hereinafter "Regulation"), will contribute to the ambition of value creation in the Union with the overall mission to develop, deploy, extend and maintain in the Union an integrated world class supercomputing and data infrastructure and to develop and support a highly competitive and innovative High Performance Computing (HPC) ecosystem. In particular, the overall objectives of the Join Undertaking can be summarised as follows (Article 3 of the Regulation):

- to provide the research and scientific community, as well as the industry including SMEs, and the public sector from the Union or countries associated to Horizon 2020 with the best available and competitive High Performance Computing and data infrastructure and to support the development of its technologies and its applications across a wide range of fields;
- to provide a framework for the acquisition of an integrated, demand-oriented and user-driven world-class petascale and pre-exascale supercomputing and data infrastructure in the Union;
- to provide Union-level coordination and adequate financial resources to support the development and acquisition of such infrastructure, which will be accessible to users from the public and private sector primarily for research and innovation purposes;
- to support an ambitious research and innovation agenda to develop and maintain in the Union a world-class High Performance Computing ecosystem, exascale and beyond, covering all scientific and industrial value chain segments, including low-power processor and middleware technologies, algorithms and code design, applications and systems, services and engineering, interconnections, know-how and skills, for the next generation supercomputing era;
- to promote the uptake and systematic use of research and innovation results generated in the Union by users from science, industry, including SMEs, and the public sector.

The support for a sustainable exascale HPC ecosystem in Europe requires action on the technology supply to develop extreme scale, power-efficient and highly resilient HPC and data technologies. Therefore, the EuroHPC Workplan 2019 addressed extreme scale computing technologies (hardware, software, methods and algorithms for key applications), HPC and data centric environments and application platforms, and industrial software codes for extreme scale computing environments and applications. This was complemented with a call for proposals aiming at widening HPC skills and use, notably the through the creation, networking and support to the operation of national HPC Competence Centres, and an action to foster the innovation potential of SMEs.

In 2020 the actions will address the next building blocks for the development of the exascale HPC ecosystem, i.e. the development of a European low power processor and the integration of the processor and other technologies in pilots.

The development of the European low power processor will be pursued launching the second phase of the European Processor Initiative (EPI). The core objective of the European Processor Initiative (EPI) is the development of a European processor which should be ready for integration in the exascale supercomputers to be acquired by the EuroHPC JU in 2022/23. This presupposes different generations of microprocessors, of growing maturity and market-readiness, accompanied by large-scale demonstrators where they are integrated into prototype

[3] OJ L 252, 8.10.2018, p. 1-34.

systems to assess the progress towards the capability of delivering exascale supercomputers. The EPI is therefore structured in different phases, mapping the development of the different generations of microprocessors and the large-scale demonstrators. EPI Phase 2 is expected to further advance the low-power microprocessor designs and bring them closer to an operational device. The architecture and the platforms would evolve and should be integrated in extreme-scale demonstrators to test the technology readiness of the underlying concept, scalability to exascale and compatibility with the applications.

On the other hand, it is necessary to demonstrate in operational environments the successful integration of HPC technology building blocks, covering the full value chain (e.g. microprocessor, software, applications, interconnects …) developed in previous R&I actions into world-class exascale-class pilot systems. This requires a strong co-design approach driven by ambitious applications involving technology suppliers, system integrators, supercomputing infrastructure providers and user communities. The pilots are vehicles to optimise and synergise the effectiveness of the entire European HPC strategy through the integration of R&D outcomes into fully integrated HPC system pilots. The primary focus of pilots should be of establishing proof-points for the readiness, usability and scalability potential of the successful technologies developed in previous European actions, national actions of EuroHPC Participating States or private European actions, when deployed in conjunction with market technologies.

Chapter 2 ANNUAL WORK PLAN YEAR 2020

2.1. Operations

In 2020 the EuroHPC JU will only implement indirect actions to implement a research and innovation program. There are no new actions foreseen for the acquisition and development of a world-class supercomputing infrastructure. The priorities for indirect actions to be launched in the 2020 period were based on the Strategic Research and Innovation Agenda (SRA) adopted by the Research and Innovation Advisory Group (RIAG) of the EuroHPC Joint Undertaking[4].

The priorities address the development of European supercomputing technology including the second generation of European low power microprocessor technology developed in the European Processor Initiative (EPI), and the integration with a co-design approach of technology building blocks (developed in EPI and other previous European R&I actions) in advanced pilot systems aiming at exascale performance in operational environments. In particular, the following actions are foreseen:

In 2020, the EuroHPC JU intends to launch three Calls for proposals:

- H2020-JTI-EuroHPC-2020-01 – *Advanced pilots towards the European exascale supercomputers* for Research and Innovation Actions (EuroHPC-RIA)
- H2020-JTI-EuroHPC-2020-02 – *Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2)* for Research and Innovation Actions (EuroHPC-RIA)
- H2020-JTI-EuroHPC-2020-03 – *Training and Education on High Performance Computing* for Coordination and Support Actions (EuroHPC-RIA)

The **estimated EU expenditure for these calls is EUR 85 M€.** The EU contribution is based on the budget foreseen for 2020 in the general Union budget.

2.1.1. Call H2020-JTI-EuroHPC-2020-01

[4] https://eurohpc-ju.europa.eu/documents/EuroHPC_RIAG_Strategic_Agenda_2019.pdf

The support for a sustainable extreme-scale HPC ecosystem in Europe requires mastering the R&D process with a co-design approach and a holistic view on the technology supply, hardware, software stack and applications. The overall goal is to demonstrate the successful integration of European technologies in future European exascale and extreme performance computing capabilities addressing scientific, industrial or societal challenges.

Proposals are invited against the following topics:

EuroHPC-2020-01-a: Advanced pilots towards the European supercomputers

The EuroHPC JU will continue in 2020 the efforts to complete the European supply value chain with a Call for the integration of European technological building blocks into advanced pilot supercomputing systems aiming at exascale performance with a co-design approach. This is a necessary step to refine and customise the integrated hardware and software architectures to fit the needs of key relevant applications and to determine the necessary technical trade-offs in system design. Pilot systems should demonstrate a reliable proof of concept of EU technologies, notably proving the capability of scaling up and of providing energy-efficient solutions to realise the future European exascale supercomputers.

Specific Challenge: To demonstrate in pre-operational environments the successful integration of European technology building blocks developed for example in the European Processor Initiative (EPI) and in previously funded EU R&I actions into fully integrated pilot supercomputing systems commensurate with exascale performance objectives along with other European IP such as software tools and application libraries, interconnects, rack design, cooling systems, advanced fabric management, etc... The goal of these pilot supercomputing systems will be to produce a prototype system which can be used in a pre-operational environment, able to execute jobs and run software components designed as part of the pilot programme.

Two such pilot supercomputing systems will be supported whose work will be closely inter-coordinated. They will have to demonstrate how the challenges of power efficiency, usability, resiliency and scalability can be met, by considering in particular a strong co-design approach driven by ambitious application requirements. The involved stakeholders should include technology component suppliers, system integrators, supercomputing infrastructure providers and user communities.

Scope: Proposals are expected to address the European research, technology building blocks integration, system co-design, validation and experimentation of advanced supercomputing pilot systems aiming at exascale performance, driven by a set of ambitious extreme data and HPC application and power-efficiency requirements.

The approaches should ensure that they contribute to the realisation of future exascale system architectures based on European low-power processing technologies, such as those developed for example in the EPI initiative. Each proposal should aim at realising one supercomputing pilot system. Pilot systems should maximise the integration of European hardware and software technologies, and foster, to the extent possible, the development of solutions based on European open hardware and open-source software.

Two complementary pilot supercomputing systems are expected to be supported, based on the European Processor Initiative (EPI) and/or other previously funded EU R&I actions:

- One leveraging the efforts on European low power general purpose processing technologies
- A complementary one leveraging the efforts on European open hardware solutions (e.g. an agnostic HPC system able to embed, cool and manage existing components

and future ones, such as accelerator technologies based on RISC-V or other components that can simulate the behaviour of future European components)

The proposals should address all the following points:

- Description of the supercomputing pilot system, with architectural features and measurable objectives that demonstrate the relevance and potential of the pilot system as a meaningful step towards the realisation of future operational European exascale systems. The description of the pilot should address amongst other: targeted number of computing elements, interconnects and network topologies for exascale, cooling, I/O, etc.
- Definition of clear and measurable intermediate and final targets to demonstrate the suitability of the pilot system, for example in terms of system performance, performance improvements for the selected applications, power budget and efficiency, scalability, resilience, etc. The proposal should clearly describe the approach to measure and verify each of these targets and should demonstrate that the pilot system would offer a clear approach towards overall reduced power consumption.
- Description of software issues, including software stack, software scaling and adaptation for heterogeneous systems, software reliability, optimisation, and inclusion of a set of software programming tools and environments, compiler technologies for basic instruction sets and for higher level support of applications at scale with various programming models, etc. Pilot systems should aim to offer a pluralism in European solutions and maximise their integration inside the software stack.
- The integration of different European cooling systems, including prototype systems for their further testing and development.
- Clear identification of the European technology hardware and building blocks and how they are integrated and leveraged in the pilot systems. In particular, proposals have to demonstrate how the pilot system aligns with the efforts of European low power processing technologies, by describing the mechanisms that will be used for that purpose.
- Identification of a set of ambitious and relevant applications for the system co-design, describing how and when application developers and users will be involved in the co-design process, and what measures will be taken to attract and motivate users and developers to adopt the technologies proposed in the pilot system, in view of maximising their use and acceptance.
- Clear timed description of the engineering approach for the pilot systems, indicating for example the timing to development and release of the proposed hardware and software solutions, evaluation, testing, and the validation and deployment of the pilot systems in close-to-operation environments. The approach should also describe the involvement of users and developers (with the eventual re-writing, porting, re-factoring etc. of codes) in a co-design approach.
- Description of the use of the pilot systems in the operational environment during the life of the project and once the project is completed, including targeted services, communities and applications, etc…
- Description of mechanisms for cooperation between the pilot systems that would be supported by the action: the successful proposals are expected to establish a close collaboration in order to ensure to the extent possible the convergence and compatibility of the different results and solutions developed in the pilot systems, e.g. hardware/software stacks, components, common or fully interoperable software environments, common or fully interoperable application development platforms, common architectural views, etc. These mechanisms will be formalised in a cooperation framework gathering the selected pilot systems.

Wherever appropriate, actions should seek synergies and co-financing from relevant national or regional research and innovation programmes.

The EuroHPC JU considers that proposals requesting a contribution from the JU of up to EUR 22 million for the first pilot above and up to 15 million for the second pilot above, matched by the Participating States with a similar amount, and a duration of between 3 and 4 years would allow this specific challenge to be addressed appropriately. Nevertheless this does not preclude submission and selection of proposals with another duration or requesting other amounts.

Considering the specific objectives of the calls for proposals and the fact that these calls concern areas of critical importance for the security of the Union and the Digital Single Market and may pose potential risk to ensuring European technological autonomy in line with Article 9(5) of the Rules for Participation[5], the EuroHPC JU may limit the participation of legal entities established in associated countries and legal entities established in the EU but controlled from third countries.

Expected Impact: Proposals should describe how the proposed work will contribute to the impacts listed below and include a baseline, targets and metrics to measure impact:

1. Contribution to the realisation of the EuroHPC JU's overall and specific objectives[6]
2. Strengthening scientific leadership as well as the competitiveness and innovation potential of the European industry through the further development and use of European technologies
3. Contributing to a sustainable exascale HPC supply ecosystem in Europe and ensuring European technological autonomy in this field
4. Leveraging the efforts on the European low power processing (in particular the European Processor Initiative) or in open hardware technologies and contributing to the realisation of future exascale system architectures based on such technologies
5. Maximising the use of European technologies in users and developers of relevant applications for European scientific and industrial leadership
6. Creation, promotion and exploitation potential of European IP
7. Maturity of solutions and potential for exploitation in future European exascale HPC components and systems

Type of Action: Research and Innovation Action

***EuroHPC-2020-01-b*: Pilot on quantum simulator**

State-of-the-art scientific computing, especially for large-scale applications, lies in the massively parallel heterogeneous architectures of HPC systems. Accelerators can maximize the parallelism of HPC systems for scientific computing. However, solving large scientific problems requires huge amounts of computing capacities and memory that current HPC systems cannot optimally address. One solution for performing computations with such a large amount of memory and processors would be the quantum simulator.

A quantum simulator is a highly controllable quantum device that allows one to obtain insights into properties of complex quantum systems or solve specific computational problems inaccessible to classical computers. It can efficiently complement the parallel architecture of current supercomputers and act as "accelerator", addressing applications

[5] https://ec.europa.eu/research/participants/data/ref/h2020/legal_basis/rules_participation/h2020-rules participation_en.pdf

[6] Council Regulation 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (EuroHPC) https://eurohpc-ju.europa.eu/documents/Regulation.pdf

related to complex simulation and optimisation problems, notably for materials development, drug discovery, transportation and other real-world problems of high importance to industry.

The objective of the pilot action will be to develop, deploy and coordinate at European level a European quantum simulation (QS) infrastructure of circa 100+ interacting quantum units that shall be accessible via the cloud on a non-commercial basis to public and private European users. European quantum simulation technologies are currently being developed by EU projects or by national projects [7]in the Member States. The action will cover the acquisition of one such quantum simulator and its maintenance costs, the development of the interconnection between the classical supercomputer and the quantum simulator and the development of the necessary cloud access and middleware for programming and running applications in the quantum simulator. The European quantum simulator should be hosted by a supercomputing center located in the Union and co-located with a EuroHPC or Tier-0 supercomputer that should be existing at the moment when the project would start or soon after.

The objective of opening up such early computing platforms (whether in the form of quantum simulators or first physical computing platforms) widely to European users is to help them familiarize with quantum technologies, test their capabilities/performances and develop their first quantum applications and algorithms. The aim is not only to train users in using quantum computing systems but, most importantly, to develop an early ecosystem of quantum programming facilities and application libraries.

The EuroHPC JU considers that proposals requesting a contribution from the JU of up to EUR 6 million, matched by the Participating States with a similar amount, and a duration of between 3 to 5 years would allow this specific challenge to be addressed appropriately. The costs include the acquisition of one quantum simulator and its maintenance and operation cost.

Expected Impact:

- Contribution to the realisation of the EuroHPC JU's overall and specific objectives[8];
- Contribution to the development of a first ecosystem of hybrid HPC and quantum programming facilities and applications;
- Contribution to the next generation of modular HPC systems;
- Providing Europe's scientists and engineers with first experimental facilities to familiarise themselves with quantum technologies and develop the use cases;

Type of Action: Research and Innovation Action

Call H2020-JTI-EuroHPC-2020-02

The European Processor Initiative (EPI) develops and implements the roadmap for European HPC chips and accelerators facilitating the development of exascale machines. The aim is to provide industry in Europe with a competitive edge in processor technology to be further exploited across a wide range of applications from engineering, science and bio-medical to automotive, manufacturing, finance and emerging big-data and smart objects fields.

Within the Framework Partnership Agreement in European low-power microprocessor technologies awarded in 2017[9], the first phase of EPI (EPI Phase 1) is funded by the Horizon

[7]

[8] Council Regulation 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (EuroHPC) https://eurohpc-ju.europa.eu/documents/Regulation.pdf

[9] The FPA (Ref: 800928) was first called for by European Union's Horizon 2020 programme in the 2017 calls (H2020-ICT-2017-2), under the topic ICT-42-2017 Framework Partnership Agreement in European low-power microprocessor technologies (Call ICT-42-2017).

2020 work programme 2018-2019 through a Specific Grant Agreement (SGA).[10] The purpose of this Call is to support the second phase of EPI (EPI Phase 2), which will be implemented by the EuroHPC JU in view of the transfer of High Performance Computing activities in 2019 and 2020 to the JU.

One Proposal will be invited against the following topic:

***EuroHPC-2020-02*: Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2)**

Specific Challenge: Within the Framework Partnership Agreement[11] in European low-power microprocessor technologies awarded in 2017, the selected consortium will be invited to submit a Research and Innovation Action proposal for the second phase of the design and development of European low-power processors and related technologies for extreme-scale, high-performance big-data, AI and emerging applications, in accordance with the research roadmap defined in the respective FPA.

Scope: In particular, the proposal will build on the results of the Phase 1 of the European Processor Initiative (EPI), and is expected to cover the following topics:

a) Development of the second generation of low-power general purpose processing system units. Generate the functional and non-functional requirements (using representative HPC and big-data benchmarks, emerging applications specifications (in the automotive sector for example), and targeting maximum energy-efficiency and reliability; design the architecture of the processing system units; verify, tape-out, validate, test and bring up the processing system units; develop the required firmware and system software leveraging, as much as possible, on open source efforts and solutions.

b) Development of the second generation of low-power processing system units for application acceleration. Generate their functional and non-functional requirements (using relevant representative HPC and big data benchmarks and emerging applications) and design their architecture to accelerate specific HPC and big data applications, including as edge and embedded automotive applications or other emerging applications. The applications must have high-volume potential. Processing units will be realised as standalone components, distributed collaborating systems or IP-blocks, and will include stand-alone open RISC V hardware approaches for accelerators with connectivity not limited to the EPI processing units, addressing a large number of application areas. Work in this topic is required to interface with topic a) in order to achieve maximum interoperability (including IP-block interfacing) and roadmap synchronisation.

c) Validation of the first generation of low-power processing system units developed in Phase 1 (and Phase 2). Finalize the required firmware and system software leveraging, as much as possible, on open source efforts and solutions; development and integration of the boards/blades and test benches to demonstrate the processing units and accelerators

[10] Two SGA-EPI calls in for implementing the EPI-FPA were envisaged:
In 2018, a first call (first EPI phase) of 80 million Euros that started in December 2018 with the signature of the first SGA contract under the EPI FPA.
This would be followed by a second call (second EPI phase) of 40 million Euros planned for the WP 2020. In the meantime, the EuroHPC JU was established in October 2018 and all the ICT-LEIT calls related to High Performance Computing (HPC) were transferred to the EuroHPC JU, including the budget of 40 million Euros that was foreseen for the EPI Phase 2 in LEIT-ICT WP 2020. As a result, in the H2020 Work Programme 2018-2020 *Topic ICT-14-2020: Co-designing Extreme Scale Demonstrators (EsD) in the Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2)* has been removed from the Work Programme in view of the transfer of High Performance Computing activities in 2019 and 2020 to the EuroHPC Joint Undertaking.

[11] FPA Framework Partnership Agreement in European low-power microprocessor technologies (Ref: 800928) for that purpose. The EuroHPC Joint Undertaking will become a co-signatory in this FPA.

developed in Phase 1 (and Phase 2) of EPI with the porting of representative sets of real-life kernels for the chosen application(s). This will address also the integration and interconnection of the EPI hardware ecosystem with other approaches.

d) Support for a hardware and software development platform common to different processor and accelerator types. This platform should be accessible by a wide range of interested parties. Support should also be directed towards maximising early on the uptake by users of processor and accelerator technology developed in Phases 1 and 2 of EPI for testing purposes.

The developed technologies will demonstrate the synergies between HPC at the exascale level and scalability to distributed collaborating systems in emerging computing applications, in the automotive sector for example. The designs should follow a modular approach that would allow a rapid scale-up or scale-down. Sustainability and economic viability of the developed solutions are key aspects.

Wherever appropriate in order to address specific technology needs and/or activities, the consortium should seek additional partners to join the FPA consortium, provided they respect the objectives of the project.

The EuroHPC JU considers that a proposal requesting a contribution from the JU of up to EUR 35 million, matched by the Participating States with a similar amount, and a duration of up to 3 years would allow this specific challenge to be addressed appropriately. Nevertheless this does not preclude submission and selection of a proposal with another duration or requesting other amounts.

Wherever appropriate, the proposal could seek synergies and co-financing from relevant national or regional research and innovation programmes, including structural funds addressing smart specialisation. Work combining different sources of financing should include a concrete financial plan detailing the use of these funding sources for the different parts of the activities.

Considering the specific objectives of the call for proposals and the fact that these calls concern areas of critical importance for the security of Union and the Digital Single Market and may pose potential risk to ensuring European technological autonomy in line with Article 9(5) of the Rules for Participation, the EuroHPC JU may limit the participation of legal entities established in associated countries and legal entities established in the EU but controlled from third countries.

Expected Impact: Proposals should describe how the proposed work will contribute to the impacts listed below and include a baseline, targets and metrics to measure impact.

8. Contribution to the realisation of the EuroHPC JU's overall and specific objectives[12]
9. Strengthening scientific leadership as well as the competitiveness and innovation potential of European industry, contributing to a sustainable exascale HPC supply ecosystem in Europe and ensuring European technological autonomy in this field
10. Provide European industry with a competitive edge in processor technology with potential for a wide range of applications from engineering, science and bio-medical to automotive, manufacturing, finance and emerging big-data and smart objects fields
11. Leveraging the efforts on the European low power processing technologies (in particular the European Processor Initiative) and contributing to the realisation of future exascale system architectures based on such technologies
12. Creation, promotion and exploitation potential of European IP

[12]Council Regulation 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (EuroHPC) https://eurohpc-ju.europa.eu/documents/Regulation.pdf

13. Maturity of solutions and potential for exploitation in future European exascale HPC systems

Type of Action: Specific Grant Agreement (SGA) – Research and Innovation Action

2.1.2. Call H2020-JTI-EuroHPC-2020-03

EuroHPC-2020-03 Training and Education on High Performance Computing

Specific Challenge: High Performance Computing (HPC) is a rapidly accelerating field of research and development with a strong potential for economic growth. While computer science and programming is included in all university curricula as well as school curricula in some European countries, this does not satisfy the needs for HPC awareness, an HPC-ready workforce, and modern education in HPC. This topic aims at creating a pan-European agenda for the development of modern HPC-related education serving the necessary key-actors to reach industrial target groups.

Scope: The action should propose a pilot programme that aims to develop a quality-controlled educational master programme for HPC and industrial applications of pan-European reach. It should be developed and launched in close cooperation with the relevant European industry players (supply and user industry), HPC Competence Centres, HPC Centres of Excellence and PRACE in order to provide a programme that addresses concrete industry needs in HPC. The action should also facilitate companies to host students of the HPC master programme for a period of 3 to 6 months. One outcome should be a network of the training programme pilots based on well-documented best practices, tools and reusable training material, and linked with the industrial target group(s). Another outcome should be a concrete set of lessons learned in launching a pan European educational activity in HPC inspired by such pilot programme, including a roadmap and concrete recommendations for achieving it.

The consortium should demonstrate a good mix of excellence in education research and in HPC technologies and applications, with solid links to the HPC supply and user industry in Europe. It should have a clear strategy on how to stimulate the cooperation between education stakeholders and the HPC industry in Europe.

The EuroHPC JU considers that proposals requesting a contribution from the JU of up to EUR 7 million, matched by the Participating States with a similar amount, and a duration of up to 3 years would allow this specific challenge to be addressed appropriately. Nevertheless this does not preclude submission and selection of proposals with another duration or requesting other amounts.

Expected Impact: Proposals should describe how the proposed work will contribute to the impacts listed below:

1. Contribution to the realisation of the EuroHPC overall and specific objectives[13]
2. Facilitate access to services and training offered at national level to interested HPC users from industry, academia or public sector
3. Improved coordination and increased availability of training activities on HPC
4. Establishment of high quality HPC training and education programmes across the Union addressing industry needs
5. Joint MSc students connected to industry and more broadly preparing a skilled young future workforce in HPC ready to be employed by the European industry

Type of Action: Coordination and Support Action

[13] Council Regulation 2018/1488 of 28 September 2018 establishing the European High Performance Computing Joint Undertaking (EuroHPC) https://eurohpc-ju.europa.eu/documents/Regulation.pdf

2.2. Call management rules

Conditions for the Call - H2020-JTI-EuroHPC-2020-01

Opening date(s), deadline(s), indicative budget(s):

Topics (Type of Action)	Budgets (EUR million)	Deadlines
	2020	
Opening: 16 April 2020		
EuroHPC-2020-01-a (RIA)	37.00	15 September 2020
EuroHPC-2020-01-b (RIA)	6.00	28 July 2020
Overall indicative budget	43.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

Eligibility and admissibility conditions: The conditions are described in General Annexes A, B and C of the Horizon 2020 Work Programme 2018-2020[14].

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the Horizon 2020 Work Programme 2018-2020.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the Horizon 2020 Work Programme 2018-2020.

The full evaluation procedure is described in the relevant guide published on the Funding & Tenders Portal.

Grant Conditions:

EuroHPC-2020-01-a and EuroHPC-2020-01-b	As an exception from General Annex D of the Horizon 2020 Work Programme 2018-2020, the funding rate for eligible costs in grants awarded by the JU for this topic will be 50% of the eligible costs.
EuroHPC-2020-01-a and EuroHPC-2020-01-b	Grants awarded under this topic will be complementary. The respective options of Article 2, Article 31.6 and Article 41.4 of the EuroHPC JU Model Grant Agreement will be applied.

[14] http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf

EuroHPC-2020-01-a and EuroHPC-2020-01-b	Participants are encouraged to include a security self-assessment identifying any security issues and detailing how those issues will be addressed in order to comply with the relevant national and Union laws. Where appropriate, the Joint Undertaking may carry out a security scrutiny for proposals raising security issues in accordance with General Annex J of the Horizon 2020 Work Programme 2018-2020. The security scrutiny may lead to security requirements that are set out in Annex 1 to the EuroHPC JU Model Grant Agreement. For grants awarded under this topic the JU may object to a transfer of ownership or the exclusive licensing of results to a third party established in a third country not associated to Horizon 2020. The respective option of Article 30.3 of the EuroHPC JU Model Grant Agreement will be applied. Additionally, the Work Plan foresees additional exploitation obligations, requiring that first exploitation of the results takes place in Europe using an option of Article 28 of the EuroHPC JU Model Grant Agreement as a default option.

Consortium agreement:

EuroHPC-2020-01-a and EuroHPC-2020-01-b	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

Conditions for the Call - H2020-JTI-EuroHPC-2020-02

Opening date(s), deadline(s), indicative budget(s):

Topics (Type of Action)	Budgets (EUR million)	Deadlines
	2020	
Opening: 21 July 2020		
EuroHPC-2020-02 (Specific Grant Agreement RIA)	35.00	12 January 2021
Overall indicative budget	35.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

Eligibility and admissibility conditions: The conditions are described in General Annexes A, B and C of the Horizon 2020 Work Programme 2018-2020[15].

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the Horizon 2020 Work Programme 2018-2020.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the Horizon 2020 Work Programme 2018-2020.

The full evaluation procedure is described in the relevant guide published on the Funding & Tenders Portal.

Grant Conditions:

EuroHPC-2020-02	As an exception from General Annex D of the Horizon 2020 Work Programme 2018-2020, the funding rate for eligible costs in grants awarded by the JU for this topic will be 50% of the eligible costs.
EuroHPC-2020-02	For grants awarded under this topic the JU may object to a transfer of ownership or the exclusive licensing of results to a third party established in a third country not associated to Horizon 2020. The respective option of Article 30.3 of the EuroHPC JU Model Grant Agreement will be applied. Additionally, the Work Plan foresees additional exploitation

[15] http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf.

	obligations, requiring that first exploitation of the results takes place in Europe using an option of Article 28 of the EuroHPC JU Model Grant Agreement as a default option.

Consortium agreement:

EuroHPC-2020-02	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

Conditions for the Call - H2020-JTI-EuroHPC-2020-03

Opening date(s), deadline(s), indicative budget(s):

Topics (Type of Action)	Budgets (EUR million)	Deadlines
	2020	
Opening: 21 July 2020		
EuroHPC-2020-03 (Specific Grant Agreement CSA)	7.00	12 January 2021
Overall indicative budget	7.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

Eligibility and admissibility conditions: The conditions are described in General Annexes A, B and C of the Horizon 2020 Work Programme 2018-2020[16].

Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the Horizon 2020 Work Programme 2018-2020.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the Horizon 2020 Work Programme 2018-2020.

The full evaluation procedure is described in the relevant guide published on the Funding & Tenders Portal.

Grant Conditions:

[16] http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf.

EuroHPC-2020-03	As an exception from General Annex D of the Horizon 2020 Work Programme 2018-2020, the funding rate for eligible costs in grants awarded by the JU for this topic will be 50% of the eligible costs.

Consortium agreement:

EuroHPC-2020-03	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.

2.3. Support to Operations

Communication and events

In 2020 the EuroHPC JU plans to take advantage of the following events with a significant impact to communicate the achievements of the EuroHPC JU or providing a platform to engage with the public at large:

1. *EuroHPC Summit week*

The EuroHPC Summit Week (EHPCSW) is the major HPC event that brings together relevant European supercomputing stakeholders and decision makers, allowing them to share the latest technological developments, define synergies, express their current and future needs, and participate in shaping the future of European supercomputing. EHPCSW is also a platform to present the latest developments of the EuroHPC Joint Undertaking, both from a political and from a technological point of view. The 2nd edition of the event will take place on 23 - 27 March 2020 in Porto, Portugal. The event is hosted by FCCN (Fundação para a Computação Científica Nacional) and co-organised by PRACE, EXDCI-2 and ETP4HPC, under the auspices of the EuroHPC JU. The conference is a great opportunity to network with all relevant European HPC stakeholders, from technology suppliers and HPC infrastructures to scientific and industrial HPC users in Europe.

2. *Inauguration of EuroHPC JU office*

The EuroHPC JU office space is made available by the Luxembourgish government. It will be located in the Drosbach building, already occupied by some Commission services, and in proximity of DG CNECT's offices in Luxembourg. The offices are expected to be refurbished in February 2020. The completion of the subsequent move of the EuroHPC staff from its temporary location provides a good opportunity to promote the Joint Undertaking.

3. *Inauguration of the Hosting Entities*

In the course of 2020 the procurement of the three pre-exascale and the five petascale supercomputers will be completed. The beginning of the installation of the supercomputers at the hosting sites and their entry into service mark significant milestones for the achievement of an essential objective of the Joint Undertaking.

IT and logistics

In 2019 the necessary contracts, SLAs and MoUs were signed to equip the future EuroHPC offices with all necessary equipment and infrastructure to be operational on its own and

independent from the Commission. Early 2020 the installation of the IT equipment, e.g. telephony, secure data network (sTESTA), video-conferencing facilities, IT equipment, etc… will be completed. Together with the completion of the refurbishment of the office building, the EuroHPC JU staff will then move into its new location.

JU Executive Team – HR matters

In 2019 the post for the Executive Director was published. The selection process is expected to be concluded early 2020. The appointment of the Executive Director is a necessary criterion to reach autonomy. Therefore, he/she should take office before the completion of the autonomy which is planned for the second half of May.

The staff establishment plan foresees the creation of five additional posts to be filled in 2020, complementing the 11 posts available in 2019. In consequence, by the end of 2020 the 16 posts (including the Executive Director) of the EuroHPC JU should be filled.

Administrative budget and finance

The main objective for Finance and Budget is to ensure a sound financial management of the Program Office resources.

This is mainly achieved though the alignment of planned activities with budgeted resources, the establishment of commitments for respecting legal obligations, the payment execution for the grants, procurement contracts, goods and services delivered and the monitoring of the budget execution.

In 2020 activities will focus on the following:

- Ensure efficient budget forecast and maintaining a high level of accuracy in budgetary forecasting. To this perspective the spending pace of the grants with the highest budget will be closely monitored and checked against the forecast that their consortia have provided.
- Prepare 2021 budget in liaison with DG CNECT and DG BUDG.
- Report on 2019 budget execution and financial management.
- Prepare reports containing key elements to budget execution and sound financial management (payment delays, budget execution).
- Ensure transactions are financially and procedurally correct, that they are in conformity with the contracts and respecting the Financial Regulations and other relevant rules in operations; timely handling of all types of transactions.

These activities will be monitored through targeted KPIs, such as budget execution and Time-To-Payment.

2.4. Governance

The Governance of the EuroHPC Joint Undertaking is made of the following bodies:

- The Governing Board, composed of representatives of the EU and Participating States. The Commission and each Participating State appoint one representative in the Governing Board. The Governing Board is responsible for strategic policy making and funding decisions related to the activities of the Joint Undertaking, in particular for all the public procurement activities and the research and innovation actions. The EU holds 50% of the voting rights through the Commission representative. The rest of the voting rights are distributed among the Participating States.

- The Industrial and Scientific Advisory Board consists of the Research and Innovation Advisory Group (RIAG) and the Infrastructure Advisory Group (INFRAG) which provide independent advice to the Governing Board on the strategic research and innovation agenda and on the acquisition and operation of the supercomputers owned by the Joint Undertaking.
    - RIAG: It is composed of no more than 12 members, where no more than six are appointed by the EuroHPC Private Members taking into account their commitments to the Joint Undertaking and no more than six are appointed by the Governing Board. This Advisory Group draws up and regularly updates the draft multiannual strategic research and innovation agenda. This draft multiannual strategic research and innovation agenda shall identify research and innovation priorities for the development and adoption of technologies and key competences for High-Performance Computing across different application areas in order to support the development of an integrated High-Performance Computing ecosystem in the EU, strengthen competitiveness and help create new markets and societal applications.
    - INFRAG: It is composed of no more than 12 members appointed by the Governing Board. This Advisory Group provides advice to the Governing Board for the acquisition and operation of the petascale and pre-exascale supercomputers, drawing up and regularly updating the draft multiannual strategic agenda for such acquisition.
- The Executive Director; chief executive responsible for day-to-day management of the Joint Undertaking.

Chapter 3 BUDGET YEAR 2020

3.1. Revenue

In accordance with the provisions of the legal framework applicable to the EuroHPC JU, the contributors to the budget of the JU are:

- The **European Union** covering administrative and operational costs.
- The **Participating States** shall make a contribution to the administrative and operational costs that will be commensurate to the Union's financial contribution set out in Article 4(1) of the JU Basic Act.
- The **Private Members** of the Joint Undertaking shall make or arrange for their constituent entities and affiliated entities to make contributions to the JU's administrative costs.

The Union budget will constitute a ceiling for the actual Union contribution, in accordance with Article 6 of Council Regulation (EU) 2018/1488. The Participating States' contributions are subject to the availability of the appropriations provided by Participating States.

3.2. Budget Revenue

Title 1: We do not expect any revenues from fees and charges in 2020, as the first EuroHPC supercomputers would become operational in mid-year and it is unlikely they would already provide commercial services in 2020. Also, as the projects funded by the EuroHPC JU will just have started it is unlikely that the EuroHPC JU will issue already recovery orders.

Title 2: The EuroHPC JU will receive the Union funding for its administrative and operational expenditure, as foreseen in the JU Regulation.

Title 3: Following the EEA Agreement[17], the financial contributions of EFTA States are added to the JU budget, proportionally to the EU budget. Being additional to the general EU budget, they are represented separately from the EU contributions. The EFTA rate is the same for administrative and operational budgets.

In 2019-2020, the JU will also receive the appropriations accruing from contributions from (non-European Economic Area) third parties to research and technological development. Nevertheless, they remain subject to availability of the EU budget.

Title 4. Following the JU Regulation, the Participating States will contribute to the JU operational budget in 2020 for the acquisition of the three precursor to exascale supercomputers, as well as the petascale supercomputer hosted by Portugal.

Table 1: Commitment Appropriations

REVENUE (EUR)	2019 (executed)	2020 (estimated)
1. REVENUE FROM FEES AND CHARGES		
2. EU CONTRIBUTION		
- of which Administrative[18] (Title 1 and Title 2)	636.670	3.101.192
- of which Operations[19] (Title 3)	193.143.257	271.709.283
3. THIRD COUNTRIES CONTRIBUTION		
- of which EEA/EFTA[20]	4.611.961	6.663.615
supplementing Title 1 & Title 2	*53.377*	*74.739*
supplementing Title 3	*4.558.584*	*6.588.584*
- of which non-EEA[21]	44.823.777	5.161.223
4. OTHER CONTRIBUTIONS		
- Participating States		222.930.000
contribution to the procurement of the 3 pre-exascale		*209.705.000*
PT contribution to procurement of petascale		*13.225.000*
- Private Members		
TOTAL REVENUE *(EU + 3rd Countries + Participating States contributions)*	**243.230.665**	**509.565.313**

Table 2: Payment Appropriations

REVENUE (EUR)	2019 (executed)	2020 (estimated)

[17] Protocol 32 on financial modalities for implementation of Article 82

[18] i.e. Staff expenditure, building, equipment and costs for running the EuroHPC JU office

[19] i.e. procurement of the supercomputers, R&I calls for proposals

[20] 2019 EFTA rate – 2.38%, 2020 EFTA rate – 2.41%.

[21] Appropriations accruing from contributions from (non-European Economic Area) third parties to research and technological development. Additional budget made available by the Commission to fund the third pre-exascale supercomputer

1. REVENUE FROM FEES AND CHARGES		
2. EU CONTRIBUTION		
- of which Administrative (Title 1 and Title 2)	323.183	3.101.192
- of which Operations (Title 3)	2.482.631	179.858.078[22]
3. THIRD COUNTRIES CONTRIBUTION		
- of which EEA/EFTA[23]	1.690.746	4.308.436
supplementing Title 1 & Title 2	*53.377*	*74.739*
supplementing Title 3	*1.637.369*	*4.233.697*
- of which non-EEA		15.000
4. OTHER CONTRIBUTIONS		
- Participating States		57.442.275[24]
- Private Members		
TOTAL REVENUE	**4.496.560**	**244.724.981**

[22] Pre-financing grants retained for funding from the 2019 calls for proposals, and pre-financing of the acquisition of the supercomputers – EU contribution

[23] 2019 EFTA rate – 2.38%, 2020 EFTA rate – 2.41%.

[24] Pre-financing of the acquisition of the supercomputers – Participating States's contribution

3.3. Budget Expenditure

Titles 1&2: 100% of the commitment appropriations will be paid in the running year. The EU funding share to these appropriations will be released according to the JU needs during the period of 2020–2023. It will sum up to 10.000.000 € – the amount foreseen in the Regulation establishing the EuroHPC JU.

Title 3: The operational expenditure will be used for grants and procurement of the EuroHPC supercomputers.

Table 3: Commitment Appropriations

COMMITMENTS	Commitment Appropriations (EUR)	
	2019 (executed)	2020 (estimated)
Title 1. Staff Expenditure	**77.830**	**1.460.000**
11 Salaries and Allowances	40.000	1.330.000
- of which establishment plan posts	*20.000*	*552.000*
- of which external personnel	*20.000*	*778.000*
12 Expenditure relating to recruitment	47.963	40.000
13 Mission and travel expenses		70.000
14 Socio-medical infrastructure and training		20.000
Title 2. Building, Equipment and Operating Costs	**612.217**	**1.715.931**
20 Buildings and associated costs		115.000
21 Information Technology	426.350	450.000
22 Movable property and associated costs		80.000
23 Current administrative expenditure	1.000	150.000
24 Postage and Telecommunications		10.000
25 Expenditure of formal and other meetings	33.670	350.000
26 Running costs in connection with operational activities		150.931
27 Information and Publishing	1.000	10.000
28 Expert contracts and meetings	150.197	400.000
Title 3. Operational Expenditure	**242.540.618**	**506.389.382**
30 Grants, HPC Operations, R&I Activities	202.521.074	85.000.000
31 HPC Infrastructure Activities	40.019.544	421.389.382
TOTAL	**243.230.665**	**509.565.313**

Table 4 Payment Appropriations

PAYMENTS	Payment Appropriations (EUR)	
	2019 (executed)	2020 (estimated)
Title 1. Staff Expenditure	54.992	1.460.000
Title 2. Building, Equipment and Operating Costs	321.568	1.715.931
Title 3. Operational Expenditure	4.120.000	241.549.050
TOTAL	**4.496.560**	**244.724.981**

3.4. Details on the use of financial resources

Title 1: Staff Expenditure

Chapter 11 – Salaries and Allowances

The Joint Undertaking will have to organise the recruitment of new staff and cover the salaries, social security and other related allowances of staff in place. This appropriation is to cover the remuneration cost of establishment plan posts (temporary staff) and external personnel (contract staff, Seconded National Experts, interim), in accordance with the Staff Regulations.

The estimation of the cost of human resources is based on the total average cost. Considering that the recruitment of the staff will be progressive over the year, 5 full-time equivalents are accounted for 100% of the year, an average of 6 months of full-time equivalents has been accounted for the 10 staff members to join the EuroHPC JU in 2020, i.e., 50% of the year.

It includes the cost for basic salaries, family allowances, expatriation and foreign residence allowances. It is also intended to cover the employers' social security contributions, insurance against sickness, accidents and occupational disease, unemployment insurance, birth and death allowances, annual travel costs from the place of employment to the place of origin, in accordance with the Staff Regulations of Officials of the European Union and the Conditions of Employment of Other Servants of the Union[25].

Chapter 12 – Expenditure relating to recruitment

This appropriation is to cover the expenditure arising from the search for suitable candidates (publishing vacancies) and subsequent administration costs of the recruitment of new staff members (installation, resettlement and daily subsistence allowances, removal and travel expenses).

Chapter 13 – Mission and travel expenses

As part of its duties, the staff of the Joint Undertaking will have to travel to various conferences, meetings and workshops related to the activities of the Joint Undertaking and to the actions funded. The mission appropriation is to cover travel expenses, daily subsistence

[25] Regulation (EEC, Euratom, ECSC) No 259/68 of the Council of 29 February 1968 laying down the Staff Regulations of Officials and the Conditions of Employment of Other Servants of the European Communities and instituting special measures temporarily applicable to officials of the Commission (OJ L 56, 4.3.1968, p. 1).

allowances and ancillary or exceptional expenditure incurred by statutory staff in the interest of the service.

Chapter 14 – Socio-medical infrastructure and Training

This appropriation is intended to cover the costs of the annual medical check-up of staff and associated analyses required, complementary health insurance and schooling allowances. Under this chapter, the cost for training of staff is also covered.

Title 2: Building, Equipment and Operating Costs

Chapter 20 – Buildings and associated costs

The JU has to ensure that the working conditions of its staff comply with the standards of the EU institutions. The office premises will be offered by the JU hosting country. This appropriation includes costs related to the infrastructure: insurance, water, electricity and heating, cleaning and maintenance, security and surveillance.

Chapter 21 – Information Technology

To allow its staff to perform its work, the Joint Undertaking is equipped with state-of-the-art office equipment and networking facilities, allowing to use the standard IT toolchain of the EU programmes and institutions. This appropriation is intended to cover the purchase of computing and other similar electronic office equipment and hardware as well as the installation, configuration and maintenance of this equipment. The procurement and maintenance of program packages and software licences necessary for the normal operation of the JU; the expenditure on services contracts for analysis, programming and technical assistance necessary for the JU, the cost of external services contracts to manage and maintain the data and systems, training and other support activities.

It covers the cost of SLAs with the Commission, necessary for the use of the ABAC accounting system (SLA with DG BUDG), as well as for the provision of IT equipment/services (SLA with, DIGIT, REA, RTD, CdT, HR and/or CNECT). It also includes costs specific to the secure data communication needs of the JU to access the ABAC accounting system.

Chapter 22 – Movable property and associated costs

This chapter includes the necessary resources to cover the costs of office organisation, archive spaces and meeting rooms.

Chapter 23 – Current administrative expenditure

This chapter includes costs of office supplies, stationery, badges, office material and other consumables necessary for the operation of the office as well as any costs incurred for any mandatory translations,)

Chapter 24 – Postage and Telecommunications

This chapter is to cover all correspondence, postage and telecommunication (fixed, mobile telephony and videoconference equipment/licencing) costs of the JU.

Chapter 25 – Expenditure of formal and other meetings

As part of the activities of the Joint Undertaking, some meetings (like Governing Board meetings and community workshops) are likely to require big rooms that are not available at the JU premises. These appropriations are to finance meetings that are taking place inside or outside of the JU premises.

Chapter 26 – Running costs in connection with operational activities

Auditing and legal assistance are key elements to ensure that the JU complies with the legal framework. This appropriation is covering all audit related expenditure: the possible costs for internal audit capability, external auditors and ex-post audits.

In addition, the communication policy of the Joint Undertaking is an important element to ensure public awareness and understanding of the programme. This appropriation is also covering the activities related to publishing, and in particular:
- Communication material for conferences, info days and workshops,
- Website development and consolidation,
- General public relations and publicity.

Chapter 27 – Information and Publishing

This appropriation is intended to cover costs of the communication policy of the Joint Undertaking, to ensure public awareness and understanding of the scopes. It is also covering the activities related to production and printing the Annual Activity and other Reports.

Chapter 28 – Expert contracts and meetings

This chapter includes the costs related to the evaluation, selection and review of projects, as well as the costs incurred for evaluators and reviewers.

Title 3: Operational Expenditure

The main purpose of the Joint Undertaking is the indirect implementation of EU budget in the field of High Performance Computing. Detailed description of the operational activities is presented in the Work Plan.

Chapter 30 – Grants, HPC Operations, R&I Activities

R&I Grants:

The calls for proposals published in 2019 by the EuroHPC JU foresee a maximum total Union funding of 95.000.000 €, while the 2020 calls for proposal foresee a maximum total Union funding of 85.000.000 €:

The appropriations will serve for the prefinancing of the R&I grants of the projects selected as a result of the 2019 EuroHPC calls for proposals H2020-JTI-EuroHPC-2019-1 ("*Towards Extreme Scale Technologies and Applications*") with a total maximum Union funding of 55.000.000 € and H2020-JTI-EuroHPC-2019-2 ("*Innovating and Widening the HPC use and skills base*"), with a total maximum Union funding of 40.000.000 €,. i.e. for the call topics EuroHPC-01-2019 *Extreme scale computing and data driven technologies*, EuroHPC-02-2019 *HPC and data centric environments and application platforms*, EuroHPC-03-2019 *Industrial software codes for extreme scale computing*, EuroHPC-04-2019 *HPC Competence Centres* and EuroHPC-05-2019 *Stimulating the innovation potential of SMEs*. The prefinancing rate is of 80%, resulting in a total amount of 76.000.000 €.

The appropriations will also serve for the prefinancing of the R&I grants of the projects selected as a result of the 2020 EuroHPC call for proposals H2020-JTI-EuroHPC-2020-01, i.e. for the call topic EuroHPC-01-2020 *Advanced pilots towards the European exascale supercomputers* with a total maximum Union funding of 40.000.000 €. The prefinancing rate is of 80%, resulting in a total amount of 16.000.000 €. As the closing date of the H2020-JTI-EuroHPC-2020-02, i.e. for the call topic EuroHPC-02-2020: Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2) is November 2020, no prefinancing is included in the 2020 budget estimates.

As the closing date of the first 2020 EuroHPC call for proposal is mid-2020, no prefinancing is included in the 2020 budget estimates.

Experimental exascale platform:

The appropriations will serve for the grant for the experimental exascale platform, which was selected at the 2019 EuroHPC Call for Expression of Interest for the *Selection of Hosting Entities for Precursor to Exascale Supercomputers*. This grant targets building up the competitive EU technology that could be integrated in the future exascale supercomputers. It will include the development of an advanced experimental platform towards exascale systems. The selected technology will have to be an open solution for hardware, which could achieve objectives established by the EuroHPC JU. The total maximum Union funding of the project is 5.150.000 €, which results in 2019 in a prefinancing of 4.120.000 €

Operating costs of preexascale supercomputers:

The appropriations will serve for the operating costs of preexascale supercomputers, mainly to cover the costs related to site preparation, installation and testing. In its Decision No 12/2019 the EuroHPC Governing board approved the Hosting Agreements, including the maximum Union funding of 102.250.000 € to cover the Union's share of the operating costs. The three grants were signed in 2019 with a duration between 6 and 7 years. The prefinancing rate included in the budget is of 30%, resulting in 2020 in a total amount of 30.675.000 €.

Chapter 31 – HPC Infrastructure Activities

This appropriation is related to the acquisition of the three precursor to exascale supercomputers and five petascale supercomputers.

Precursor to exascale supercomputers

As the EuroHPC JU will be the owner of the pre-exascale supercomputers it procures, the Participating States will transfer to the EuroHPC JU their share to match the prefinancing paid by the EuroHPC JU. The installation of the precursor to exascale supercomputers is planned to start mid-2020 and therefore the payment schedule is foreseen as follows.

- Supercomputer set-up (85% of total value) payments: prefinancing of 30% of set-up is planned in 2020, a delivery payment (20% of set-up) and an acceptance payments (50% of set-up) are planned for 2021 (assuming an installation in one phase).
- Supercomputer maintenance (15% of total value) will be paid in one single payment upfront, therefore it is also planned for 2021.

Contributor	Total amount (in EUR)	2020 payments (in EUR)	2021 payments (in EUR)
EU funds	206.205.000	52.582.275	153.622.725
Participating States	209.705.000	53.474.775	156.230.225
Total	***415.910.000***	***106.057.050***	***309.582.950***

Petascale supercomputers

Following the explicit request of Portugal, one petascale supercomputer will be procured by the Joint Undertaking. As the EuroHPC JU will become the owner of this supercomputer, the appropriation includes not only EU funding but the Participating State's share (13.225.000 €). The operating costs of this supercomputer will be covered by the Hosting Entity.

The installation of all five petascale supercomputers is planned to finish by the end of 2020. Taking into account the particularities of JU procurement rules, the BG and PT supercomputer prefinancings of 30% will be paid in 2020, the rest of payments are planned for 2021.

As other procurements are run by the Hosting Entities, the EU funds for supercomputers' acquisition costs are planned to be executed in 2020.

Contributor	2020 payments (in EUR)	2021 payments (in EUR)
EU funds – BG	1.227.000	2.863.000
EU funds – CZ	5.130.000	
EU funds – LU	10.500.000	
EU funds – PT	2.077.500	4.847.500
PS funds – PT	*3.967.500*	*9.257.500*
EU funds – SI	5.900.000	
Total	***28.802.000***	***16.968.000***

Chapter 4 STAFF ESTABLISHMENT PLAN

The Staff establishment plan gives an overview and forecast of annual staff positions for years 2019 and 2020.

I. General presentation of the staff policy followed by the JU

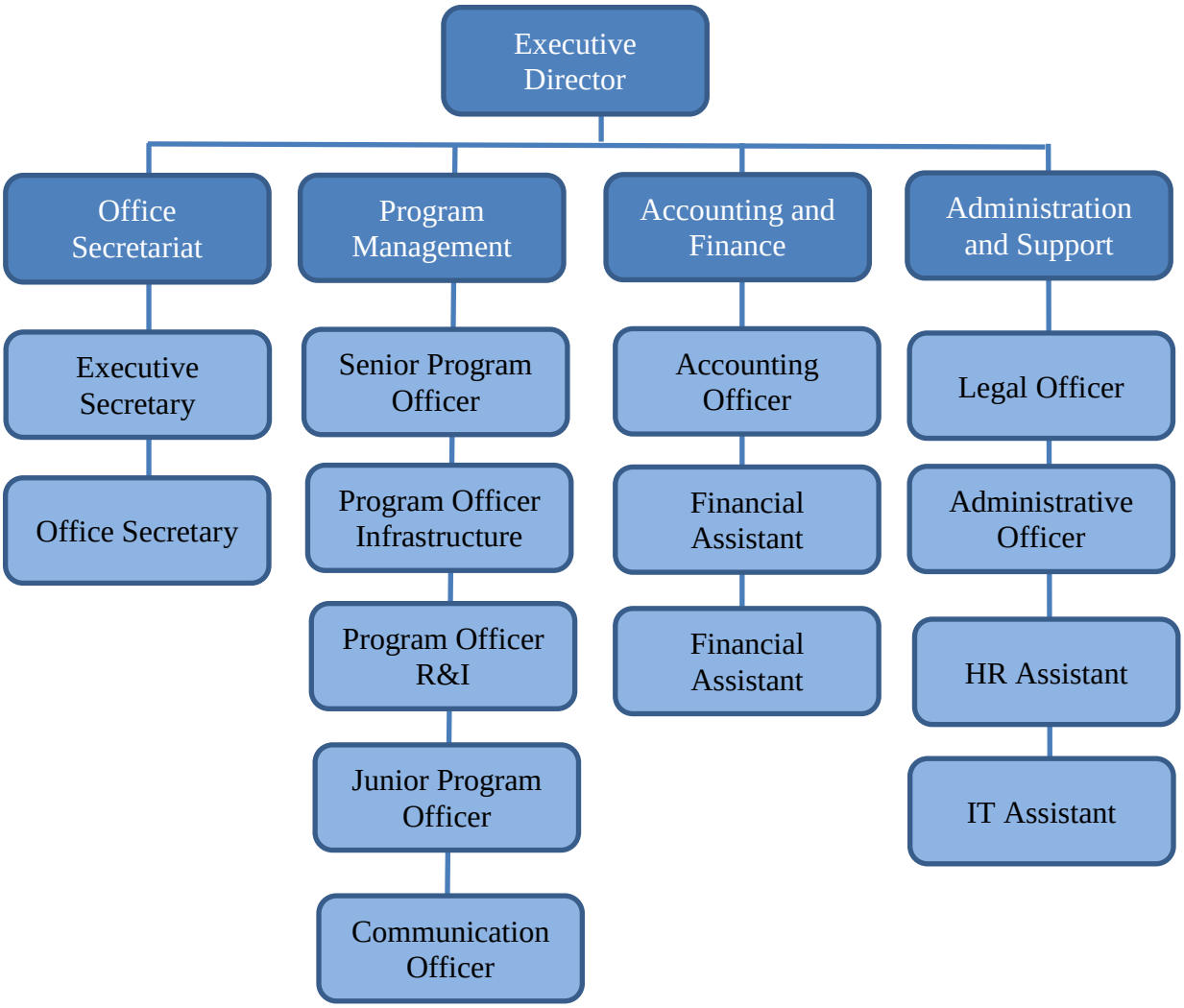
From a general point of view, the Staff of the JU shall consist of temporary staff (TA) and contract staff (CA) whose contracts will be governed by the Staff Regulations of officials and conditions of employment of other servants of the European Union.

The JU may also make use of seconded national experts and trainees, which selection and working conditions are subject to a decision of the Governing Board.

The staff policy followed by the EuroHPC JU shall consist of:

- a set of implementing rules giving effect to the Staff Regulations of officials and conditions of employment of other servants of the European Union, to be adopted by the Governing Board (after consulting the Staff Committee and with prior agreement of the Commission),
- a set of internal rules organising the day to day administration of the Office and responsibilities and tasks entrusted to staff, to be notified by the appointing authority.

II. Organisation chart 2020 of the EuroHPC JU



III. Staff expenditure justification for 2019 with estimates for 2020

	2019	2020 estimate
Establishment plan posts: TA-AD	4	4
Establishment plan posts: TA-AST		
Total establishment plan posts	**4**	**4**
Contract Agents	7	10
Seconded National Experts		1
Total Staff	**11**	**15**

Category and grade	2019		2020 estimate	
	Officials	TA	Officials	TA
AD 16				
AD 15				
AD 14				1
AD 13				
AD 12				
AD 11				
AD 10				1
AD 9				
AD 8		1		2
AD 7				
AD 6				
AD 5				
Total AD		1		4
Total AST/SC				
TOTAL		4		4

External Personnel – Contract Agents	2019	2020 estimate
Function Group IV	1	4
Function Group III		4
Function Group II		2
Function Group I		
Total Staff	**1**	**10**

Staff Costs	2019	2020 estimate
Temporary Staff	12.083	362.500
Contract Staff	18.650	431.900
Seconded National Experts		29.200
Total	**30.733**	**823.600**

Staff recruitments for 2019 (first year) are estimated to take place in September 2019, i.e. only a *pro-rata* calculation is taken into account for that year.

IV. Establishment plan for 2020

Executive Director (TA-AD14)

The Executive Director is the chief executive responsible for the day-to-day management of the EuroHPC Joint Undertaking providing leadership at the strategic and operational level ensuring the achievement of the Joint Undertaking's objectives. The Executive Director is its legal representative and he/she shall perform his/her tasks with independence and shall be accountable to the Governing Board

This position is presently vacant, occupied temporarily by the Head of Unit of DG CONNECT C2 in the capacity of Interim Executive Director.

Executive Secretary (CA-FGII)

The Executive Secretary provides the Secretariat of the Executive Director, planning the activities of the Executive Director's Office, provides administrative support in the relations with EuroHPC JU Bodies, and does the general coordination of the document management within the JU.

Office Secretary (CA-FGII)

The Office Assistant provides the Secretariat of the JU staff, supports the communication activities and ensures the logistics for the call for proposals evaluations, technical project reviews and internal meetings.

Senior Program Officer (TA-AD10)

The Senior Program Officer supports the Executive Director in all his work and decisions, upon request in his/her mission in respect of technical issues. This includes preparation of calls for proposals/tenders including their evaluation, expert assignment, grant agreement management, National points of contact and project coordinators. He/She also implements the functions of a Program Officer Infrastructure and/or Program Officer R&D.

Program Officer Infrastructure (TA-AD8)

The Program Officer organises and is involved in the evaluation of public tenders (publication, opening, selection of experts, logistics etc.), manages the selection process, monitors and reviews the execution of associated grant agreements, monitors the allocation of supercomputer access times and ensures compliance with the prevailing rules and regulations.

Program Officer R&D (TA-AD8)

The Junior Program Officer provides support to the implementation of the JUs program activities, such as evaluation of proposals for R&D grants, grant preparation, monitoring the technical execution of the grants, and provides any technical support to the Program Officers.

Junior Program Officer(SNE)

The Programme Officer organises and is involved in the evaluation of proposals (selection of experts, logistics etc.), manages the process of selection of projects, monitors and reviews the execution of grant agreements, carries out project reviews and ensures compliance with the prevailing rules and regulations. He/She also negotiates strategic, scientific, managerial and financial aspects of research contracts and amendments.

Accounting Officer (CA-FGIV)

The Accounting Officer monitors that the JU is complying with the applicable EU financial and accounting rules, is the interface with the EC Accountant (DG BUDG), provides advice and recommendations to improve the efficiency, effectiveness and financial management of the JU.

Financial Assistant (CA-FGIII)

The Financial Assistant verifies the financial and administrative compliance of the grants and contracts, performs the administrative quality checks on files for signature, monitors the operational and administrative expenditures, provides budget planning and reporting for operational and administrative expenditures.

Legal Officer (CA-FGIV)

The Legal Officer provides the Executive Director with all relevant legal advice and support for the smooth operation of the activities of the JU, monitors the implementation of contractual obligations of the JU, drafts the legal documents of the JU and is the JU's Data Protection Officer.

Administrative Officer (CA-FGIV)

The Administrative Officer maintains the Unit activity plans and ensures follow-up and respect of deadlines of the Unit activities, provides support to the activities of the Governing Board, contributes to administrative quality checks on files for signature, participates in the planning of logistics needs.

HR Assistant (CA – FGIII)

The HR Assistant manages HR personal files, assists in the implementation of the staff policy, manages SYSPER and is the contact point with PMO.

Communication Officer (CA – FGIV)

The Communication Officer is responsible for the JU's communication activities, including managing the JU website, developing and overseeing the execution of a communications activity plan implementing the Communications Strategy of the EuroHPC JU.

IT Assistant (CA – FGIII)

The IT Assistant is responsible for the management of IT and Telecommunication Systems, monitoring to correct operation of the systems, ensuring IT systems respond to business needs; ensuring the correct operation of the systems; ensuring information

security requirements; and representing the JU in internal and external meetings in relation with the ICT domain.