EUROPEAN HIGH PERFORMANCE COMPUTING JOINT UNDERTAKING (EUROHPC JU)

ANNUAL ACTIVITY REPORT 2020

In accordance with Article 19 of the Statutes of the EuroHPC JU annexed to Council Regulation (EU) No 2018/1488 and with Article 23 of the Financial Rules of the EuroHPC JU.

The annual activity report will be made publicly available after its approval by the Governing Board.

Contents

FACTSHEET

Name	European High Performance Computing Joint Undertaking (EuroHPC JU)
Objectives	The mission of EuroHPC JU is to develop, deploy, extend and maintain an integrated world class supercomputing and data infrastructure in the Union and to develop and support a highly competitive and innovative High Performance Computing (HPC) ecosystem. The overall objectives of the JU can be summarised as follows: • to provide the research and scientific community, industry including SMEs, and the public sector from the Union or countries associated to Horizon 2020 with the best available and competitive HPC 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 HPC 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. • to interconnect and federate regional, national and European HPC supercomputers and other computing systems, data centres and associated software and applications in cooperation with PRACE and GÉANT.
Founding Legal Act	Council Regulation (EU) 2018/1488 of 28 September 2018 establishing the EuroHPC Joint Undertaking
Executive Director	Anders Dam Jensen – Executive Director
Governing Board	Chair on 31 December 2020: Dr. Herbert Zeisel Members: one representative of the EU and each Participating States. See Annex 3
Other bodies	The Industrial and Scientific Advisory Board consists of the Research and Innovation Advisory Group (RIAG) and the Infrastructure Advisory Group (INFRAG)
Staff	11 full-time employees (on-going staff recruitment) on 31 December 2020 including the Executive Director
2020 Budget	The budget revenue of the EuroHPC JU amounted to EUR 140.7 million in 2020. The majority of the budget came from EU contributions which amounted to EUR 124.2 million.

Budget implementation	Total commitment appropriations were EUR 509.1 million and total payment appropriations were EUR 181.5 million. Budget implementation was 96% in terms of commitments appropriations and 22% for payment appropriations. In line with the Joint Undertaking N+3 rule, unused appropriations will be reactivated in 2021.
Grants	In line with the priorities set in the 2019 Strategic Research and Innovation Agenda (SRA) adopted by the Research and Innovation Advisory Group (RIAG) of the EuroHPC JU, indirect actions with a budget of EUR 78 million were launched in 2020. In 2020: 19 grants were signed.
HPC infrastructure procurement	The EuroHPC JU Governing Board agreed to launch calls for eight supercomputers (3 precursor to exascale and 5 petascale). The Calls were launched in 2019 and evaluated throughout 2020. In 2020: Four contracts for petascale supercomputers were signed. Total value of these machines is EUR 74.1 million. The JU will provide 35% of the total funding to each of these supercomputers (EC/JU contribution is EUR 25.8 million). They are MeluXina (LU), Euro-IT4I/Karolina (CZ), VEGA (SI) and PetaSC/Discoverer (BG) Two contracts for precursor to exascale supercomputers were signed by the JU. The total value of these machines is EUR 264.5 million. They are LEONARDO (IT) and LUMI (FI). The JU will provide 50 % of total funding and the consortium will fund the other 50 %.
RIAG Strategic Research and Innovation Agenda	EuroHPC_RIAG_Strategic_Agenda_2019_0.pdf (europa.eu) no updates in 2020
INFRAG Multiannual Strategic Agenda	Multiannual Strategic Agenda (europa.eu) no updates in 2020
Call and Procurement implementation	Two calls were launched in 2020: **Call 1: H2020-JTI-EuroHPC-2020-01-a (deadline 15 September 2020), H2020-JTI-EuroHPC-2020-01-b (deadline 28 July 2020)** Number of proposals submitted: 6 proposals in Call H2020-JTI-EuroHPC-2020-01-a 3 proposals in H2020-JTI-EuroHPC-2020-01-b Number of eligible proposals: 3 proposals in Call H2020-JTI-EuroHPC-2020-01-a 2 proposals in H2020-JTI-EuroHPC-2020-01-b Number of proposals funded: 2 proposals in Call H2020-JTI-EuroHPC-2020-01-a, 1 proposal in H2020-JTI-EuroHPC-2020-01-b

	Call 2: H2020-JTI-EuroHPC-2020-02 (deadline 12 January 2021) Number of proposals submitted: 1 proposal in H2020-JTI-EuroHPC-2020-02 Number of eligible proposals: 1 proposal in H2020-JTI-EuroHPC-2020-02 The proposal is currently under evaluation.
Participation, including SMEs	Total number of participants in funded projects: 304 of which: % of SMEs: 14.8 % of private for profit/large companies: 13.8

EXECUTIVE SUMMARY

The EuroHPC Joint Undertaking was established on 28 September 2018 by Council regulation No 2018/1488, published in the Official Journal of the EU on 8 October 2018 and entered into force on 28 October 2018.

The Executive Director was appointed on 15 May 2020 and the Governing Board confirmed autonomy of the EuroHPC JU on 23 September 2020 when it confirmed that all autonomy criteria were met.

This is the first Annual Activity Report of the EuroHPC JU since its autonomy in September 2020.

1. Activities in 2019:

2019 was the first full year of operation of the EuroHPC JU under the stewardship of the European Commission. The EuroHPC JU was created at the end of 2018 and it became fully operational, but still part of the Commission, in 2019. It adopted and implemented its first work programme and established itself as a successful model of a public-private partnership involving the European Union, twenty-six Member States, and four associated countries from outside the EU.

In order to achieve autonomy from the European Commission, two activities were running in parallel:

a) administrative, legal and procedural approaches were defined, adopted and implemented:
   - governance;
   - rules of procedure;
   - administrative processes;
   - legal background documents;
   - model grant agreements and contracts.

b) the Workplan was developed. This sets out the actions required, with regards to the research and innovation pillar and the infrastructure pillar, namely:

   - publication and evaluation of calls;

   - launch of the procurement of the infrastructures.

At the end of 2019, the EuroHPC JU delivered two major objectives:

1. **Selection of HPC Hosting Entities**: Following a first call for expression of interest, three hosting entities were selected for the precursor to exascale supercomputers. The procurements were launched in November 2019, aiming at an entry into service of the supercomputers in late 2021.
   In addition, five hosting entities were selected for the petascale supercomputers. Because of the high interest from Member States to acquired HPCs, the initial plan to

acquire two precursor to exascale and two petascale supercomputers increased, compared to what was indicated in the Regulation establishing the EuroHPC JU.

The Calls to procure the petascale HPCs took place between January 2020 and May 2020. Procurements for the Luxemburgish, Slovenian, Czech and Bulgarian machines were organised nationally with EuroHPC JU observing the process. EuroHPC JU organised the procurement of the Portuguese machine.

2. **First Calls to build the HPC European Ecosystem:** The EuroHPC JU published in July 2019 two calls for proposals for a total Union funding of EUR 95 million, addressing the establishment of national HPC Competence Centres in the Participating States and their networking, a dedicated funding program for SME user of HPC, as well as R&I actions on HPC technology.

2. Activities in 2020:

Despite the challenges presented by the COVID-19 pandemic, the EuroHPC JU met most milestones required to achieve financial autonomy and to organise its move into its dedicated headquarters in the Drosbach building in Luxembourg.

3. Administration, Finance and Governance

The period after autonomy (September - December 2020) was pivotal to this new JU. The Executive Director and the Senior Programme Officer joined in September 2020 and with the new leadership in place, the JU Team then:

- organised the smooth onboarding of the new financial system (ABAC) with DG BUDG, which was critical in order to start signing HPC procurement contracts and paying staff salaries;
- built a brand new team in the COVID-19 context and completed recruitment processes for the roles of Finance Officer, a Legal Officer and a HR Officer;
- finalised the Hosting Agreement with the Luxembourg Government;
- launched the JU's website;
- took over the running of the JU's IT infrastructure, completed the IT migration away from the Commission, organised the IT inventory, identified IT procedures to be established, and provided the JU team with helpdesk support;
- prepared two Governing Board meetings and a number of Infrastructure Advisory Group (INFRAG) and Research and Innovation Advisory group (RIAG) meetings.

The European Court of Auditors and the Commission's Internal Audit Service (IAS) made their first visits in this period and briefed the JU for the upcoming audits/risk assessments in 2021.

The team also organised the procurement of the external Audit service provider and drafted the JU's first Annual Work Plan and Budget for 2021 (as an autonomous entity) which was adopted by the Governing in December 2020.

4. R&I:

In 2020, the JU launched two calls in line with the priorities set out in the 2019 Strategic Research and Innovation Agenda (SRA) adopted by the Research and Innovation Advisory Group (RIAG) of the EuroHPC JU, with a budget of EUR 78 million:

- H2020-JTI-EuroHPC-2020-01 – Advanced pilots towards the European exascale super computers 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)

Evaluation and grant preparation took place in 2020 and EuroHPC JU will finalise the execution of pre-financing payments for these calls in 2021.

5. Procurements:

The EuroHPC JU Governing Board agreed to launch calls for eight supercomputers (three precursor to exascale and five petascale). The Calls were launched in 2019 and evaluated throughout 2020.

Following the JU's autonomy in September 2020, the JU signed contracts for six High Performance Computers. The following four contracts for **petascale supercomputers** were signed:

- **MeluXina** (LU)

- **Euro-IT4I/Karolina** (CZ)

- **VEGA** (SI)

- **PetaSC/Discoverer** (BG)

With the EU's support, these Member States have now access to valuable computing resources and are able to grow their computing ecosytems nationally.

Two further contracts for **precursor to exascale supercomputers** were signed by the JU:

- **LEONARDO** (IT)

- **LUMI** (FI)

The total value of these two machines is EUR 264.5 million. This successful completion of the first step confirms that by pooling resources together, Europe can procure state of the art computing power.

6. Conclusion

The EuroHPC JU has already demonstrated that it is the right legal and financial instrument to address the shortcomings of the European HPC landscape and encourage Member States and EU funds to be pooled together to create European value for the Union as whole. Indeed, coordination of the HPC strategies of the Union and the Member States has already led to:

- Pooling of resources and investments;
- Availability within the Union of a world-class HPC infrastructure addressing user needs and demands;
- A structured and focused research and innovation agenda aligned with the overall ambition of creating a world-class HPC ecosystem;
- Increasing the public funding for R&I actions in the area of HPC.

The success of the EuroHPC Joint Undertaking was only possible thanks to the relentless efforts, dedication, and hard work of my very small and dynamic team in the Joint Undertaking, the members of the Governing Board, the members of the advisory groups, and the ongoing and helpful support of the Commission.
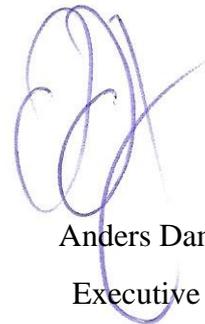
Anders Dam Jensen

Executive Director

1. IMPLEMENTATION OF THE ANNUAL WORK PLAN 2020

1.1. Preparatory and transition phase: January 2019 to September 2020

Up until the EuroHPC Joint Undertaking obtained the capacity to implement its own budget, the EuroHPC JU remained under the responsibility of the European Commission. All its initial financial and legal operations therefore were run by the Commission (Article 29 of the Council Regulation establishing the EuroHPC JU). This preparatory or transitory period included several tasks aiming at the establishment of the JU bodies (as listed in Article 4 of the EuroHPC JU Statutes, namely, the Governing Board, the Executive Director and the Industrial and Scientific Advisory Board), adoption of basic legal and administrative documents, procedures and budgets, start of the EuroHPC JU's activities, recruitment of its staff, and establishment of the EuroHPC JU office.

The preparatory phase ensured that the EuroHPC JU had the capacity to implement its own budget. Until then, payments to thirds parties (beneficiaries, suppliers, staff) were carried out by the Commission and administered following the provisions of the Financial Regulation (e.g. financing decisions, budgetary commitments, legal commitments).

From the moment the EuroHPC JU obtained the capacity to implement its own budget, the EuroHPC JU received contributions from the Commission. Direct payments from the Commission to third parties ceased. The JU's Authorising Officer was responsible for implementing the budget of the JU in conformity with the JU's Financial Rules and using the human and material resources at its disposal. The autonomy of the EuroHPC JU took effect on 23 September 2020 when all autonomy criteria were met.

The main potential risks associated with the initial actions regarding the establishment of the EuroHPC JU were overcome. These potential risks pertained to delays in the recruitment of the EuroHPC JU Executive Director, recruitment of the Accounting Officer, and in the setting-up of the dedicated Accrual-based Accounting System (ABAC). Since these conditions were part of the criteria to allow for the autonomy, their implementation could have impacted the date of autonomy of the EuroHPC JU. Following scrutiny from DG Communications Networks, Content and Technology, the criteria were met. The Executive Director was appointed on 15 May 2020, DG BUDG agreed to take the responsibility of the Accounting Officer for the EuroHPC JU, and a Service Level Agreement was signed between the EuroHPC JU and the relevant Commission service (DG BUDG), setting up a timetable for the implementation of ABAC.

1.2. Key objectives 2020 and associated risks

There were three main objectives for the EuroHPC JU in 2020:
- Achieving the EuroHPC JU's autonomy;
- Implementation of the 2020 research and innovation (R&I) calls;
- Implementation of the infrastructure activities.

1.3. Research & Innovation activities

The research and innovation (R&I) activities in 2020 were governed by the Strategic Agenda 2019 (SA2019), drafted by the EuroHPC JU Research and Innovation Advisory Group (RIAG). R&I actions addressing all pillars of the EuroHPC JU's R&I activities including technologies, applications, and training and skills were implemented by the EuroHPC JU.

The Governing Board agreed in 2019 to launch the following calls in 2020:

The first R&I actions (**H2020-JTI-EuroHPC-2019-1)** focused on the development of technologies and applications for the first European exascale systems. Grant agreements were signed with several consortia to develop hardware, software, algorithms, and to prepare applications for the next generation of supercomputers.

A second call (**H2020-JTI-EuroHPC-2019-2)** launched by the EuroHPC JU promoted significant pan-European initiatives at country level to broaden skills across the Union, address specific requirements for the adoption of HPC by local communities in 33 European countries, and provide support for Small and Medium-sized Enterprises (SMEs). With the launch of a pan-European network of national HPC Competence Centres, a major step towards a European HPC ecosystem was achieved.

The Governing Board then agreed to launch two further calls in 2020:

A call (**H2020-JTI-EuroHPC-2020-01)** on the first pilots for European supercomputers was launched in 2020. The subsequent evaluation of proposals was the first evaluation of the autonomous EuroHPC JU and was completed by the end of 2020. Most projects commence implementation in 2021.

Finally, a call (**H2020-JTI-EuroHPC-2020-02)** was launched within the Framework Partnership Agreement (FPA) in European low-power microprocessor technologies (Phase 2) which will close in 2021.

1.3.1. Calls for proposals

As indicated above, two calls in 2019 and two calls in 2020 were launched according to the respective Annual Work Plan (AWP). Activities related to all four calls were carried out by the EuroHPC JU during the reporting period. The foreseen EuroHPC JU contributions were EUR 95 million for the calls of the AWP2019 and EUR 78 million for the two calls of the AWP2020.

Call	Non-Profit	For-Profit
H2020-JTI-EuroHPC-2019-1		
EuroHPC-01-2019 (RIA)	50%	50%

EuroHPC-02-2019 (IA)	50%	35%
EuroHPC-03-2019 (IA)	50%	35%
H2020-JTI-EuroHPC-2019-2		
EuroHPC-04-2019		
CSA	100%	100%
RIA	50%	50%
EuroHPC-05-2019 (RIA)	100%	100%
H2020-JTI-EuroHPC-2020-01		
EuroHPC-2020-01-a (RIA)	50%	50%
EuroHPC-2020-01-b (RIA)	50%	50%
H2020-JTI-EuroHPC-2020-02 (SGA)	50%	50%

Table 1Funding rates for all calls evaluated or launched in 2020.

1.3.2. Summary of each call

➢ **Call H2020-JTI-EuroHPC-2019-1 (*Towards Extreme Scale Technologies and Applications*)**

The call *H2020-JTI-EuroHPC-2019-1* invited applications for a broad range of topics with the overarching goal of developing hardware and software for the next generation of European exascale HPC systems. Major challenges addressed in this call are technologies that efficiently exploit novel and increasingly heterogeneous system architectures and achieve high performance at low-power consumption. Proposals were expected to exhibit significant impact in science, industry, and society and align with existing and preceding Research and Development activities in Europe.

- The objective of the call topic *EuroHPC-01-2019* (Extreme scale computing and data driven technologies) was addressed in five sub-topics. Each subtopic focuses on a specific aspect of HPC technology, including application performance, data management[1], network and Input/Output (I/0) technology, mathematical methods and algorithms, and the development of a software stack. The proposals are expected to focus on evolving HPC architectures and address performance and efficiency on future

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[1] For a summary of all Calls, please go to annex 6

exascale systems. Moreover, proposals are requested to leverage ongoing efforts to develop energy efficient hardware in European low-power processing technologies and other European initiatives.

- The objective of the call topic *EuroHPC-02-2019* (HPC and data centric environments and application platforms) was on HPC solutions with relevance for the European industry and society i.e. the development of energy-efficient HPC software. In particular, the topic addresses software environments and application-oriented platforms to implement complex application workflows. The proposals are expected to demonstrate significant use cases and pilot systems.

- The objective of the call topic *EuroHPC-03-2019* (Industrial software codes for extreme scale computing environments and applications) was centred around the further development, adaptation, and optimization of HPC software for applications in the European industry. Proposals should exploit synergies with existing solutions and open-source projects where appropriate. Significant market impact should be achieved by the projects, creating substantial value in Europe.

The call was published with an indicative JU contribution of EUR 55 million on 25 July 2019 and closed on 14 January 2020.

➢ **Call H2020-JTI-EuroHPC-2019-2** *Innovating and Widening the HPC use and skills base*

This call addressed three different strategic initiatives.

- The objective of the call topic *EuroHPC-04-2019* was to set up and operate one HPC Competence Centre to support the development of the HPC ecosystem in a maximum number of countries participating in the EuroHPC JU. The HPC Competence Centre should provide leading-edge, innovative solutions taking into account national HPC requirements emanating from different users (industry, academia, public administrations) and develop the necessary expertise in collaboration with the national user community. National HPC Competence Centres should implement a flexible and modular approach in the services to be provided, taking into account the degree of maturity of the national HPC infrastructure.

- The Coordination and Support Action of topic *EuroHPC-4-2019* should provide support to the National Competence Centres. In particular, the action should establish a communication platform, facilitate dialogue among centres, promote the objectives of the HPC Competence Centres, and organize outreach events and workshops (on topics identified by the National Competence Centres). Proposals were expected to identify potential training solutions and tools available from the HPC Competence Centres network to support and assist National Competence Centres. Furthermore, the proposed action should implement a networking and coordination platform for national and European activities including mentoring and twinning schemes between National Competence Centres.

- Topic *EuroHPC-5-2019* addressed innovative European SMEs, focusing on the engineering and manufacturing sector. Its aim is to implement an open and competitive funding programme to unlock the innovation potential of European SMEs through support with world-class HPC knowledge and services, combining academic expertise and industrial research to develop market-ready products and business opportunities.

The call was published with an indicative EuroHPC JU contribution of EUR 40 million on 25 July 2019 and closed on 14 November 2019.

> **Call H2020-JTI-EuroHPC-2020-01 on** *Advanced pilots towards the European supercomputers and a Pilot on quantum simulator:*

The call for proposals invited applications for the implementation of pilot systems to (demonstrate the integration of European technology in HPC systems. The pilots support the development of hardware and software for the next generation of European exascale HPC systems. The central challenge of this call was the implementation of a prototype HPC system on the basis of technology developed in preceding R&I actions such as the European Processor Initiative. The two topics of the call covered the integration of different European technology building blocks including processors, accelerators and cooling systems, as well as the integration of a quantum simulator in an existing HPC system.

- Topic *EuroHPC-2020-01-a* focused on the implementation of advanced pilots towards the European supercomputers. The challenge defined by this topic is divided into two complementary pilot systems. One pilot is expected to specifically address the integration of European low-power processor technologies. A second and complementary system is expected focus on European open-hardware solutions, such as RISC-V and accelerator technology, which will be part of future European exascale systems. Proposals should demonstrate energy power efficiency, usability, resiliency and scalability of the prototype systems. The JU committed contributions of EUR 22 million and EUR 15 million for the two pilot systems, respectively.
- Topic *EuroHPC-2020-01-b* called for the development of a pilot on quantum simulator. Focus of action is the development of a first quantum computing simulator in the Union. Specifically, the proposed solutions should address the hybridization of quantum and classical HPC systems. A quantum simulator providing 100+ qubits should be installed at a hosting site of a European EuroHPC or Tier-0 supercomputer and a corresponding cloud-based platform for user access developed. The quantum simulator is expected to complement the co-located HPC system addressing challenges beyond the current scope of classical systems and support the development of new software for future quantum computers and applications. A JU contribution of up to EUR 6 million was available for this topic.

The call was published with an indicative EuroHPC JU contribution of EUR 43 million on 16 April 2020. Topic EuroHPC-2020-01-a closed on 15 September 2020. Topic *EuroHPC-2020-01-b* closed on 28 July 2020.

> **Call H2020-JTI-EuroHPC-2020-02 on Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2**) with a maximum JU contribution of EUR 35 million was launched in September 2020 and is currently under evaluation. The call invited the consortium of the Framework Partnership Agreement (FPA) in European low-power microprocessor technologies to submit a proposal for the second phase of the European Processor Initiative (EPI). The proposal should address

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. The scope of the call encompasses the development of the second generation of low-power general purpose processing system units, the development of the second generation of low-power processing system units for application acceleration, the validation of the first generation of low-power processing system units developed in Phase 1 (and Phase 2), and support for a hardware and software development platform common to different processor and accelerator types.

1.3.3. Progress against KPIs / Statistics

The final EuroHPC JU KPIs (Key Performance Indicator) are being defined by the Governing Board, and therefore there are only some general Horizon (H2020) KPIs to report 2020 (see Annex 3).

1.3.4. Evaluation procedures

The evaluation of proposals for all calls followed the rules set out in the Horizon 2020 (H2020) framework programme. The evaluation was made against the three standard H2020 evaluation criteria (excellence, impact and implementation).

The evaluation procedure was carried out with assistance of external experts, beginning with an initial individual evaluation, followed by a consensus group and concluding with the panel review. Each admissible and eligible proposal was evaluated by at least three external experts. The external experts were selected in a way to ensure a high level of skills, experience, and knowledge in the areas of the call (including project management, innovation, exploitation, dissemination, and communication). Special attention was given to achieve a well-balanced composition in terms of skills, experience, knowledge, geographical diversity, gender, and affiliation with organisations in the private and public sector. No redress request was filed during the reporting period.

Call	No of Proposals	TTI	TTS	TTG
H2020-JTI-EuroHPC-2019-1	38	182	159	341
H2020-JTI-EuroHPC-2019-2	3	117	143	260
H2020-JTI-EuroHPC-2020-01	5	152		
Total Average	**46**	**174**	**157**	**330**

Table 2 Number of submitted eligible proposals, average Time-to-Inform (TTI), Time-to-Sign (TTS) and Time-to-Grant (TTG, sum of TTI and TTS).

Table 2 shows the average Time-to-Inform (TTI), Time-to-Sign (TTS) and Time-to-Grant (TTG) for the submitted eligible proposals. The grant agreement preparation was mainly delayed due to the COVID-19 situation.

1.3.5. Participation and awarded grants

The calls for proposals attracted applications with participants from a large number of European countries. Among the successful consortia, 33 European countries are represented with at least one beneficiary. The participations of SMEs and LEs are lower than their representation among all unique beneficiaries. This indicates that some public institutions (Other), such as higher or secondary education establishments and research organisations, on average participate in more proposals compared to private companies. The statistical analysis further shows that the representation of beneficiaries in all submitted eligible and successful proposals are the same, emphasizing an unbiased evaluation process with respect to the different types of participating entities.

Entity	Participations	Beneficiaries	Successful Beneficiaries
SME	14%	20%	20%
LE	13%	17%	17%
Other	74%	63%	63%

Table 3 Participations and unique beneficiaries in all and successful (funded) proposals by type of entity. The category Other refers mostly to public bodies.

In total, 258 different legal entities participated as beneficiaries in the three calls evaluated in 2020. Most of the participating entities applied as a partner in one proposal (74%). Only very few beneficiaries participated in more than 10 proposals (2%). One beneficiary with an exceptionally high participation in 21 proposals was a partner in 46% of all submitted proposals. The very high participation frequency of few entities is also evident from the distribution of requested EU grants among the participants. While 209 beneficiaries requested a total EU grant for all participations up to EUR 1 million, 24% of the total requested EU funds can be attributed to four beneficiaries. Since the success rate was proportional to the participation rate, a similar distribution of requested and awarded grants is observed. This apparent imbalance can be explained by the critical role of some large European HPC centres and HPC vendors for the R&I activities in many consortia. In particular, the EuroHPC JU's initiatives on HPC adoption by local communities, training and skills as well as the procurement activities to equip a larger number of European HPC centres with state-of-the-art supercomputers are expected to mitigate the currently observed clustering of projects and resources in the future. Regarding beneficiaries among the Private Members of the EuroHPC JU, members of the ETP4HPC and BDVA, an increased success rate is observed. For example, for members of the ETP4HPC the success rate increased to 87.5% compared to 84% before the JU was established. The success rate of 78% for the members of the BDVA was found above the average success rate for all beneficiaries (67%).

Participations	No of Beneficiaries
1	191
2	26
3	13
4	7
5	5
6	5
7	4
9	1
10	1
12	1
13	2
14	1
21	1

Table 4 Total number of participations in all three evaluations of the reporting period and corresponding number of unique legal entities.

Grant Requested (M€)	No of Beneficiaries
0-1	209
1-2	26
2-3	10
3-4	6
4-5	3
8-9	1
10-11	1
11-12	1
16-17	1

Table 5 No of beneficiaries participating in the three evaluations in 2020 which requested an EU grant in the respective range.

Total Cost of Eligible Proposals

50%
34%
16%

Total Cost of Retained Proposals

57%
33%
10%

No of Eligible Proposals)

15%
39%
46%

No of Retained Proposals

19%
46%
35%
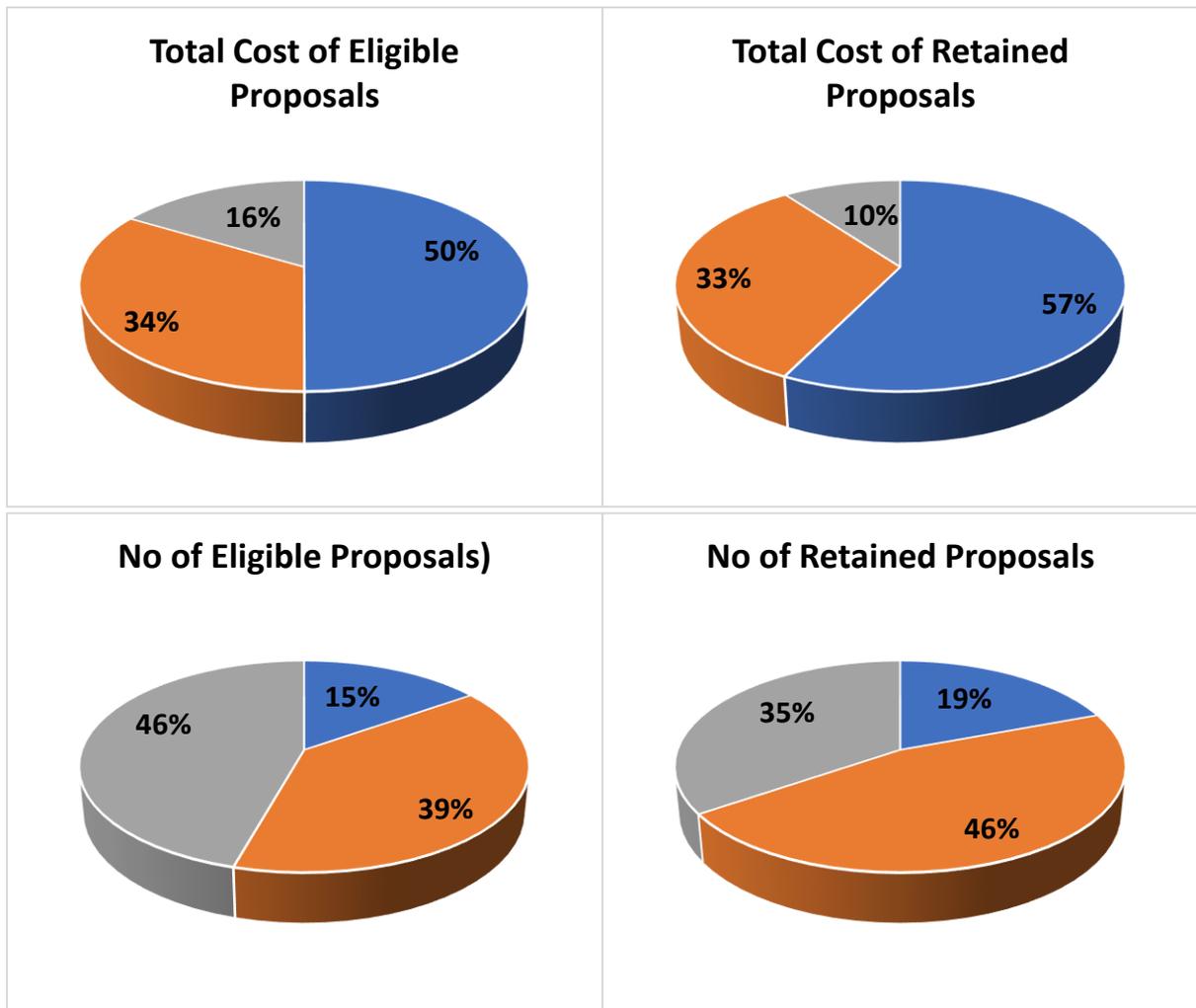
■ **Large (>10M€)** ■ **Medium (5-10M€)** ■ **Small (<5M€)**

Figure 1 Distribution of total cost and number of proposals for all eligible proposals (left) and retained proposals (right according to the classification in large, medium and small proposals.

The EuroHPC JU Governing Board has adopted (Decision 21/2020) the selection of 19 proposals for funding in the first instance.

Three proposals from call H2020-JTI-EuroHPC-2019-2 were selected for funding by EuroHPC JU Governing Board (Decisions 04/2020). Decision no 22/2020, the EuroHPC JU GB approved the ranked lists of proposals for first evaluation carried out by the autonomous JU for call H2020-JTI-EuroHPC-2020-01.

Call	No of Successful Proposals	Total Cost (Total)	Requested EU Funding (Total)	Requested EU funding (SME)	Requested EU funding (LE)
H2020-JTI-EuroHPC-2019-1	**20**	**€119,720,515**	**€55,942,816**	**€5,613,553**	**€9,311,923**
EuroHPC-01-2019	10	€65,951,496	€31,895,771	€2,965,274	€5,535,425
EuroHPC-02-2019	5	€30,823,691	€13,990,664	€1,064,797	€2,055,320
EuroHPC-03-2019	5	€22,945,329	€10,056,381	€1,583,482	€1,721,178
H2020-JTI-EuroHPC-2019-2	**3**	**€68,340,176**	**€39,941,028**	**€596,563**	**€1,240,625**
EuroHPC-04-2019	2	€58,341,701	€29,942,553		€1,240,625
EuroHPC-05-2019	1	€9,998,475	€9,998,475	€596,563	
H2020-JTI-EuroHPC-2020-01	**3**	**€84,486,804**	**€41,380,902**	**€4,148,251**	**€16,689,528**
EuroHPC-2020-01-a	2	€70,761,804	€35,380,902	€3,871,405	€15,979,981
EuroHPC-2020-01-b	1	€13,725,000	€6,000,000	€276,846	€709,547
Total	**26**	**€272,547,495**	**€137,264,746**	**€10,358,367**	**€27,242,075**

Table 6 No of retained proposals and corresponding financial information including breakdown in funds requested by SMEs and LEs.

Table 7 shows a detailed breakdown of funds for the different calls and topics. On average 11 partners from 6 different countries participate in a proposal. 8% of the awarded EU funds are designated to SMEs. Approximately 20% of the total available EU contributions were reserved for large enterprises (LEs). The most significant contributions to LEs are planned for the advanced pilots towards the European supercomputers in call H2020-JTI-EuroHPC-2020-01 and topic EuroHPC-2020-01-a.

As illustrated in Table 7, the three calls attracted submissions with broad participation from many European countries. The data demonstrate the broad participation of entities from both the public and private sector in Europe. With 20% SME participations and 17% participations of large enterprises, the actions contribute to a competitive and prosperous European economy in HPC.

Country	Beneficiaries	SME	LE
AT	6	3	1

BE	3		
BG	1		
CH	6	1	1
CY	2		
CZ	2		
DE	31	8	3
DK	1		
EE	1		
EL	9	4	2
ES	12	3	1
FI	1		
FR	29	6	12
HR	3		
HU	1		
IE	1		
IT	29	7	7
LT	1		
LU	2		
LV	1		
MK	1		
NL	3	1	1
NO	7		1
PL	2		
PT	3		
RO	1		
SE	3		

SI	2	1	
SK	2	1	
TR	3		
UK	3		1
Total	**172**	**35**	**30**

Table 7 Beneficiaries, SMEs and LEs participating in awarded grants of the three calls evaluated in 2020.

Table 8 provides an overview on the country-specific financial contributions of the JU for all funded proposals which were evaluated in 2020. The data reflect the participation statistics presented in Table 7.

Country	Total Cost (Total)	Requested EU Funding (Total)	Requested EU funding (SME)	Requested EU funding (LE)
AT	€3,595,530	€1,696,093	€268,649	€52,041
BE	€3,102,609	€1,613,492		
BG	€995,000	€497,500		
CH	€9,441,734	€4,402,536	€156,844	€156,625
CY	€2,249,550	€1,124,775		
CZ	€4,516,875	€2,258,438		
DE	€57,384,905	€33,163,711	€2,790,548	€312,725
DK	€2,030,625	€1,000,000		
EE	€2,000,000	€1,000,000		
EL	€13,620,420	€6,578,616	€749,094	€1,314,313
ES	€24,463,075	€12,344,777	€1,644,784	€50,897
FI	€1,993,099	€996,549		
FR	€66,464,871	€31,900,327	€1,754,450	€20,356,854
HR	€1,816,980	€908,490		
HU	€2,309,875	€1,000,000		

IE	€2,683,370	€1,341,685		
IT	€33,455,479	€15,365,177	€2,484,436	€4,071,372
LT	€285,000	€142,500		
LU	€2,350,000	€1,174,375		
LV	€1,000,000	€500,000		
MK	€1,825,490	€912,745		
NL	€1,471,250	€653,125	€192,500	€340,625
NO	€4,938,515	€2,469,258		€64,750
PL	€3,171,000	€1,483,600		
PT	€2,858,363	€1,429,181		
RO	€2,000,000	€1,000,000		
SE	€6,536,769	€3,268,384		
SI	€2,295,788	€1,206,438	€206,438	
SK	€1,419,450	€709,725	€110,625	
TR	€3,315,048	€1,644,836		
UK	€6,956,828	€3,478,414		€521,875
Total	**€272,547,495**	**€137,264,746**	**€10,358,367**	**€27,242,075**

Table 8 Breakdown of awarded grants by country as indicated by the participants. The figures are based on original data submitted with the proposals and may differ in the final grant agreement.

1.3.6. Portfolio analysis

The R&I actions initiated during the reporting period cover a wide range of topics, including technology, applications as well as training and skills. Dedicated actions to address European SMEs and prepare the development of the first exascale supercomputers based on European technology have been initiated. A more detailed overview of the individual activities is provided in the table below.

Call	Proposal	Objective	Coordinator nationality
H2020-JTI-EuroHPC-2019-1	ACROSS	High-Performance Computing, Big Data and Artificial Intelligence convergent platform, workflows and applications to aeronautics, climate and weather, and energy domains	IT
H2020-JTI-EuroHPC-2019-1	ADMIRE	create an active I/O stack that dynamically adjusts computation and storage requirements through intelligent global coordination, malleability of computation and I/O, and the scheduling of storage resources along all levels of the storage hierarchy	ES
H2020-JTI-EuroHPC-2019-1	DComEX	novel scalable library of AI-enhanced algorithms for the solution of large scale sparse linear system, application to cancer immunotherapy and composite materials	EL
H2020-JTI-EuroHPC-2019-1	DEEP-SEA	deliver a programming environment for future European exascale systems, adapting all levels of the software stack	DE
H2020-JTI-EuroHPC-2019-1	eFlows4HPC	workflows as a service for High-Performance Data Analytics, Machine Learning and High-Performance Computing, simulations for manufacturing (digital twins) and natural phenomena	ES
H2020-JTI-EuroHPC-2019-1	eProcessor	development of an open source out-of-order RISC-V processor, related	ES

		intellectual property building blocks and software	
H2020-JTI-EuroHPC-2019-1	exaFOAM	improvement of the OpenFOAM software for computational fluid dynamics across the entire process chain (pre-processing, simulation, I/O, postprocessing)	FR
H2020-JTI-EuroHPC-2019-1	HEROES	implementation of a software solution for HPC-platform selection, adapted to simulation tasks of scientific and industrial users, and its application using marketplace concepts	FR
H2020-JTI-EuroHPC-2019-1	IO-SEA	develop a data management and storage platform for exascale computing, based on hierarchical storage management and on-demand provisioning of storage services	FR
H2020-JTI-EuroHPC-2019-1	LIGATE	implement a computer-aided drug design solution for automated drug discovery	IT
H2020-JTI-EuroHPC-2019-1	MAELSTROM	develop a software environment to combine machine learning with established simulation techniques for weather and climate modelling	UK
H2020-JTI-EuroHPC-2019-1	MICROCARD	develop a production-ready simulation platform for cardiac electrophysiology for models with micrometer resolution	FR
H2020-JTI-EuroHPC-2019-1	NextSim	development of a numerical flow solver, adapted to new HPC architectures, for computational fluid dynamics applications in the aeronautical industry	ES
H2020-JTI-EuroHPC-2019-1	OPTIMA	optimize selected industrial applications and open-source libraries for HPC systems including field programmable gate arrays	EL

H2020-JTI-EuroHPC-2019-1	RED-SEA	develop the next generation of European exascale interconnects for modular supercomputer architectures	FR
H2020-JTI-EuroHPC-2019-1	REGALE	improve resource management at HPC centres by integrating and optimising components covering the entire process cycle	EL
H2020-JTI-EuroHPC-2019-1	SCALABLE	transfer of leading technology from public-domain research software to an industrial simulation software for computational fluid dynamics	FR
H2020-JTI-EuroHPC-2019-1	SPARCITY	maximising the performance and energy efficiency of sparse computations on emerging HPC systems	TR
H2020-JTI-EuroHPC-2019-1	TEXTAROSSA	advance innovative power and thermal management solutions, develop novel intellectual property for reconfigurable accelerators in heterogeneous HPC multi-node platforms	IT
H2020-JTI-EuroHPC-2019-1	TIME-X	advance parallel-in-time integration from an academic methodology into a widely available technology adapted to current and future exascale HPC architectures	BE
H2020-JTI-EuroHPC-2019-2	CASTIEL	combine the National Competence Centres for HPC created in the EuroCC project into a pan-European network	DE
H2020-JTI-EuroHPC-2019-2	EUROCC	create national competence centres for HPC to elevate the participating countries to a common high level in the fields of HPC, high-performance data analytics and artificial intelligence	DE
H2020-JTI-EuroHPC-2019-2	FF4EuroHPC	promote innovation using high-performance computing in small and medium-sized enterprises across Europe	DE

H2020-JTI-EuroHPC-2020-01	EUPEX	design, build, and validate the first prototype HPC system gathering European technology from different R&I activities including the European Processor Initiative and the Modular Supercomputing Architecture	FR
H2020-JTI-EuroHPC-2020-01	HPCQS	develop the programming platform and deploy a twin pilot system for a quantum simulator with 100+ qubits in each system, offer hybrid HPC/quantum simulator resources to users and application developers	DE
H2020-JTI-EuroHPC-2020-01	The European PILOT	demonstrate RISC-V based accelerators coupled to any general purpose processor and deliver a full software stack including middleware, runtimes, compilers, and tools for the emerging RISC-V ecosystem	ES

The portfolio analysis demonstrated that proposals selected for funding during the reporting period cover all R&I pillars of the JU. The comprehensive portfolio of activities include technologies and applications (H2020-JTI-EuroHPC-2019-1), coordination actions widen HPC use and skills across the Union (H2020-JTI-EuroHPC-2019-2) and the first pilot systems demonstrating European technology for future supercomputers (H2020-JTI-EuroHPC-202-01).

1.3.7. Experts

The widespread HPC expertise in Europe is not only reflected by the participation of 35 countries in the JU's R&I activities, but also in the contributions of experts from many European countries. The participation of leading experts from all European regions demonstrates the fair, transparent, and scientifically sound implementation of the selection and ranking of proposals. A total number of 37 experts participated in the three evaluations of calls during 2020. Experts with 23 different nationalities including IT, DE, RO, TR, CY, EL, UK, FR, PT, BG, ES, HR, BE, IE, SE, PL, AT, LV, LT, CH, DK, CZ, and SI contributed to the evaluations of 46 proposals submitted to three calls. With 43% female and 57% male experts an appropriate gender balance was achieved. On average, every evaluator assessed 5 proposals.

Call	Average No of Proposals per Evaluator	No of Female Experts	No of Male Experts
H2020-JTI-EuroHPC-2019-1	5.8	13	13
H2020-JTI-EuroHPC-2019-2	3.0	2	2
H2020-JTI-EuroHPC-2020-01	2.5	3	6

1.4. Call for tenders and procurements – HPC Infrastructure Activities

Procurement of supercomputers (2020)

The acquisition of the pre-exascale and petascale supercomputers took place in 2020. The calls for tender for the procurement (acquisition, installation and maintenance) of the precursors toexascale supercomputers opened on 28 November 2019. The procurements for the petascale were published at the beginning of 2020.

The EuroHPC JU Governing Board agreed to launch calls for eight supercomputers (3 precursors to exascale and 5 petascale). The Calls were launched in 2019 and evaluated throughout 2020. On behalf of the EuroHPC JU, the Commission organised the calls and procurement processes for the precursors to exascale and the Deucalion and Discoverer Petascales. The three other petascale procurements were organised nationally. Evaluations for all calls took place over the summer period in 2020 and were completed just before the autonomy of the EuroHPC JU.

Four contracts for petascale supercomputers have been signed since the JU's autonomy was granted. They were MeluXina (LU), Euro-IT4I/Karolina (CZ), VEGA (SI) and PetaSC/Discoverer (BG).

Two contracts for precursor to exascale supercomputers were also signed by the EuroHPC JU. They are LEONARDO (IT) and LUMI (FI). The JU will provide 50% of total funding and the consortium will fund the other 50%. The total value of these machines is EUR 264.5 million. The EU contribution is EUR 130.5 million.

The LUMI consortium contains the following participating states: FI, BE, CZ, DK, PL, SE, EE, NO, CH and IS.

The LEONARDO consortium contains the following member states: IT, SI, HU, GR, SL and AT. The EuroHPC JU provided a pre-financing of EUR 33.2 million.

The contracts for the remaining two supercomputers, the petascale Deucalion (PT) and the precursor to exascale MareNostrum 5 (ES), will be concluded in 2021.
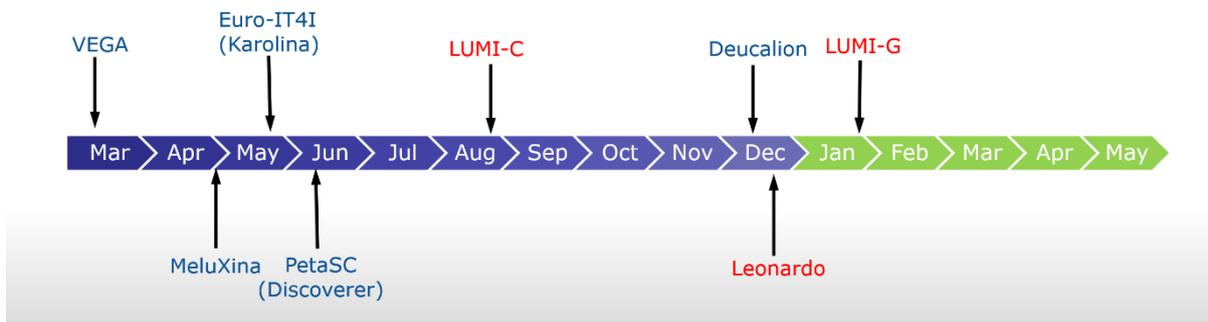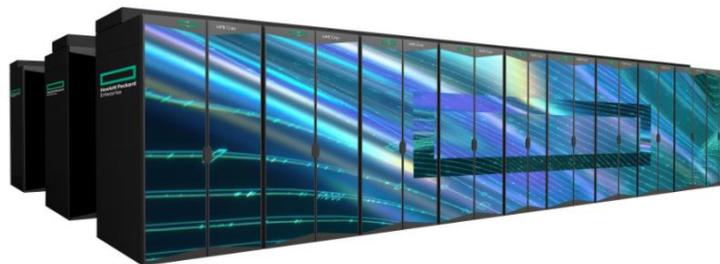
Expected EuroHPC supercomputer procurement timeline

1.5. Dissemination and information about projects results

Below are the technical specifications of the procured petascale and precursor to exascale supercomputers.
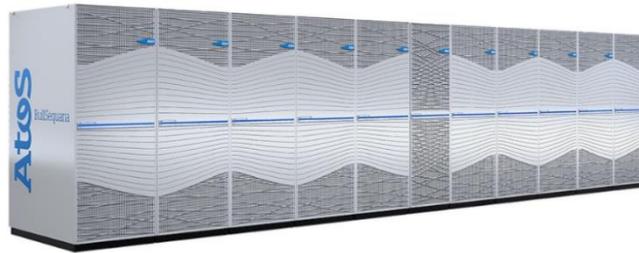
LUMI

The [LUMI](#) system will be a Cray EX supercomputer supplied by Hewlett Packard Enterprise (HPE) and located in Finland.

|	
Sustained performance:	375 petaflops
Peak performance:	552 petaflops
Compute partitions:	GPU partition (LUMI-G), x86 CPU-partition (LUMI-C), data analytics partition (LUMI-D), container cloud partition (LUMI-K)
Central Processing Unit (CPU):	The LUMI-C partition will feature 64-core next-generation AMD EPYC™ CPUs
Graphics Processing Unit (GPU):	LUMI-G based on the future generation AMD Instinct™ GPU
Storage capacity:	LUMI's storage system will consist of three components. First, there will be a 7-petabyte partition of ultra-fast flash storage, combined with a more traditional 80-petabyte capacity storage, based on the Lustre parallel filesystem, as well as a data management service, based on Ceph and being 30 petabytes in volume. In total, LUMI will have a storage of 117 petabytes and a maximum I/O bandwidth of 2 terabytes per second
Applications:	AI, especially deep learning, and traditional large scale simulations combined with massive scale data analytics in solving one research problem
Other details:	LUMI takes over 150m2 of space, which is about the size of a tennis court. The weight of the system is nearly 150 000 kilograms (150 metric tons). LUMI will use renewable electricity and its waste heat will account for about 20 percent of the district heating in Kajaani and will reduce the entire city's carbon footprint. Overall the LUMI project aligns the Digital and Green Deal policies of the EC relying on 100% renewable carbon neutral energy.

LEONARDO

[Leonardo](#) will be supplied by ATOS, based on a BullSequana XH2000 supercomputer and located in Italy.

Sustained performance:	249.4 petaflops
Peak performance:	322.6 petaflops
Compute partitions:	Booster, hybrid CPU-GPU module delivering 240 PFlops, Data-Centric, delivering 9 Pflops and featuring DDR5 Memory and local NVM for data analysis
Central Processing Unit (CPU):	Intel Ice-Lake (Booster), Intel Sapphire Rapids (data-centric)
Graphics Processing Unit (GPU):	NVIDIA Ampere architecture-based GPUs, delivering 10 exaflops of FP16 Tensor Flow AI performance
Storage capacity :	Leonardo is equipped with over 100 petabytes of state-of-the-art storage capacity and 5PB of High Performance storage
Applications:	The system targets: modular computing, scalable computing applications, data-analysis computing applications, visualization applications and interactive computing applications, urgent and cloud computing
Other details:	Leonardo will be hosted in the premises of the Tecnopolo di Bologna. The area devoted to the EuroHPC Leonardo system includes 890 sqm of data hall, 350 sqm of data storage, electrical and cooling and ventilation systems, offices and ancillary spaces

MELUXINA
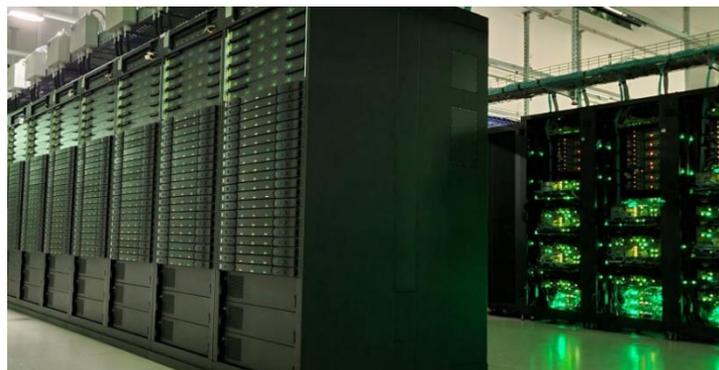
[MeluXina](#) will be supplied by Atos, based on the BullSequana XH2000 supercomputer platform and located in Luxembourg.

Sustained performance:	Committed 10 petaflops HPL (Accelerator - GPU Module), 2+ petaflops HPL (Cluster Module)
Peak performance:	Expected 15+ petaflops HPL and ~500 petaflops AI (Accelerator - GPU Module), 3+ petaflops HPL (Cluster Module)
Compute partitions:	Cluster, Accelerator - GPU, Accelerator - FPGA, Large Memory
Central Processing Unit (CPU):	AMD EPYC

Graphics Processing Unit (GPU):	NVIDIA Ampere A100
Storage capacity:	20 petabytes main storage with an all-flash scratch tier at 400GB/s, and a 5 petabytes tape library expandable to 100 petabytes
Applications:	Traditional Computational, AI and Big Data/HPDA workloads
Other details:	Modular Supercomputer Architecture with a Cloud Module for complex use cases and persistent services, an aggregated 476TB RAM, Infiniband HDR interconnect in Dragonfly+ topology, high speed links to the GÉANT network and Public Internet

VEGA

[Vega](#), first supercomputer to become operational, was supplied by Atos, based on an BullSequana XH2000 supercomputer and located in Slovenia.

Sustained performance:	6,9 petaflops
Peak performance:	10,1 petaflops
Compute partitions:	CPU partition: 960 nodes, 256GB memory/node, 20% double memory, HDR100 & GPU partition: 60 nodes, HDR200
Central Processing Unit (CPU):	122.800 cores, 1920 CPUs, AMD Epyc 7H12
Graphics Processing Unit (GPU):	240 Nvidia A100 cards
Storage capacity:	High-performance NVMe Lustre (1PB), large-capacity Ceph (23PB)
Applications:	Traditional Computational, AI, Big Data/HPDA, Large-scale data processing
Other details:	Wide bandwidth for data transfers to other national and international computing centres (up to 500 Gbit/s). Data processing throughput 400GB/s from high-performance storage and 200Gb/s from large capacity storage

KAROLINA

[Karolina](#) will be supplied by Hewlett Packard Enterprise (HPE), based on an HPE Apollo 2000Gen10 Plus and HPE Apollo 6500 supercomputers and located in the Czech Republic.

Sustained performance:	9,13 petaflops
Peak performance:	15.2 petaflops
Compute partitions:	The supercomputer will consist of 6 main parts: • a universal part for standard numerical simulations, which will consist of approximately 720 computer servers with a theoretical peak performance of 3.8 PFlop/s, • an accelerated part with 70 servers and each of them being equipped with 8 GPU accelerators providing a performance of 11 PFlop/s for standard HPC simulations and up to 150 PFlop/s for artificial intelligence computations, • a part designated for large dataset processing that will provide a shared memory of as high as 24 TB, and a performance of 74 TFlop/s, • 36 servers with a performance of 131 TFlop/s will be dedicated for providing cloud services, • a high-speed network to connect all parts as well as individual servers at a speed of up to 200 Gb/s, • data storages that will provide space for more than 1 PB of user data and will also include high-speed data storage with a speed of 1 TB/s for simulations as well as computations in the fields of advanced data analysis and artificial intelligence.
Central Processing Unit (CPU):	More than 100,000 CPU cores and 250 TB of RAM
Graphics Processing Unit (GPU):	More than 3.8 million CUDA cores / 240,000 tensor cores of NVIDIA A100 Tensor Core GPU accelerators with a total of 22.4 TB of superfast HBM2 memory
Storage capacity:	More than 1 petabyte of user data with high-speed data storage with a speed of 1 TB/s
Applications:	Traditional Computational , AI, Big Data

DISCOVERER

[Discoverer](#) will be supplied by Atos, based on a BullSequana XH2000 supercomputer and located in Bulgaria.

Sustained performance:	4,44 petaflops
Peak performance:	6 petaflops
Compute partitions:	One partition providing 1128 nodes, 4,44 petaflops
Central Processing Unit (CPU):	AMD EPYC 7H12 64core, 2.6GHz, 280W (Code name Rome)
Graphics Processing Unit (GPU):	No
Storage capacity:	2 petabytes
Applications:	Traditional Computational
Other details:	Topology - Dragonfly+ with 200Gbps (IB HDR) bandwidth per link

DEUCALION

[Deucalion](#) supercomputer will be supplied by Fujitsu and located in Portugal. It will combine a Fujitsu PRIMEHPC (ARM partition) and Atos Bull Sequana (x86 partitions).

Sustained performance:	7,22 petaflops
Peak performance:	10 petaflops
Compute partitions:	ARM Partition: 1632 nodes, 3.8 PFLops ; x86 Partition: 500 nodes, 1,62 PFLops ; Accelerated: 33 nodes, 1,72 PFLops
Central Processing Unit (CPU):	A64FX (ARM partition), AMD EPYC (x86 partitions)
Graphics Processing Unit (GPU):	NVidia Ampere
Storage capacity:	430 TB High-speed NVMe partition, 10.6 PB high-speed based Parallel File System partition.
Applications:	Traditional Computational, AI, Big Data
Other details:	Deucalion will be installed at the Portuguese Foundation for Science and Technology (FCT) Minho Advanced Computing Centre (MACC), in close collaboration with the municipality of Guimarães, in the North of Portugal, as part of a fully sustainable computing infrastructure aiming at promoting new advancements in the digital and green transitions

1.6. Operational budget execution

In summary, the Joint Undertaking operational expenditure for grants and procurement procedures is set out below:

R&I Grants

Commitment appropriations also served for the grant of the *Experimental Exascale Platform (MEEP)*, which was selected at the 2019 EuroHPC call for expression of interest for the *selection of hosting entities for precursor to exascale supercomputers*. The total maximum Union funding for an amount of EUR 5.150.000 was committed and the prefinancing of EUR 4.120.000 was paid to the coordinator in 2019. The action's duration is 36 months and the EU/JU will reimburse 50% of the eligible costs.

In July 2019, the EuroHPC Joint Undertaking published *calls for proposals* (Research and Innovation Actions (RIA), Innovation Actions (IA) and Coordination and Support Actions (CSA) for a maximum total Union funding of EUR 95 million. This amount was committed using 2019 commitment appropriations. The calls are:

- EuroHPC-01-2019 Extreme scale computing and data driven technologies (EUR 25 million);

- EuroHPC-02-2019 HPC and data driven application-oriented platforms (EUR 20 million);

- EuroHPC-03-2019 Industrial applications on extreme scale computing environments (EUR 10 million) ;

- EuroHPC-04-2019 HPC Competence Centres (EUR 30 million) ;

- EuroHPC-05-2019 Stimulating the innovation potential of SMEs (EUR 10 million).

In 2020, a further EUR 78 million was committed in 2020 for the financing of:

- H2020-JTI-EuroHPC-2020-01-a – Advanced pilots towards the European exascale supercomputers for Research and Innovation Actions (EuroHPC-RIA) (EUR 37 million). The call was awarded in 2021;

- H2020-JTI-EuroHPC-2020-01-b Pilot on quantum simulator (EUR 6 million). The call was awarded in 2021;

- H2020-JTI-EuroHPC-2020-02 – Framework Partnership Agreement in European low-power microprocessor technologies (Phase 2) for Research and Innovation Actions (EuroHPC-SGA-RIA) (EUR 35 million). The call is still under evaluation;

- The call H2020-JTI-EuroHPC-2020-03 – "Training and Education on High Performance Computing" was postponed allowing further consultation. The amount allocated is EUR 7 million and the launch is now planned for 2021.

Operating costs of pre-exascale supercomputers

Selection of Precursor to Exascale Hosting Entities:

In its Decision No 12/2019 the EuroHPC Governing Board approved the hosting agreements, including the maximum Union funding of EUR 102.250.000 to cover the Union's share of the operating costs.

The grant for the LEORNARDO hosting entity was signed in 2020 with a commitment of EUR 47.9 million of Union funding.

The grant for the LUMI hosting entity was signed in 2019, with a commitment of EUR 28.6 million of Union funding.

The grant for the Barcelona Supercomputing Centre hosting entity was signed in 2020 with a commitment of EUR 25.7 million of Union funding.

Acquisition costs of the supercomputers

The acquisition of supercomputers mobilises funds from two budgetary years: 2019 and 2020.

Six HPC contracts for the acquisition of the supercomputers were signed in 2020, and pre-financing payments were made to two HPCs (LEONARDO and PetaSC/Discoverer).

The EuroHPC JU provided 35% of the total funding to each of these supercomputers (EU contribution is EUR 25.800.000 million, total cost is EUR 74.100.000 million). In 2020, EU contribution of EUR 1.100.000 million of pre-financing was released to the vendor of PetaSC/Discoverer supercomputer.

Two contracts for precursor to exascale supercomputers were also signed by the EuroHPC JU. The total value of these machines is EUR 264.500.000 million. They are LEONARDO (IT) and LUMI (FI). The EuroHPC JU will provide up to 50% of total funding of the acquisition costs plus up to 50% of the operating costs of the pre-exascale supercomputers and the consortium will fund the remaining 50%.

1.7. In-kind contributions

Most Participation states reported late on their contributions for operational activities in 2020. An update of their activities will be provided in the final 2020 accounts and in the 2021 AAR. The EuroHPC JU secretariat is currently working with its two private members - the ETP4HPC and BDVA – to establish a reporting mechanism for the membership of these two associations.

Due the transition to post-autonomy and the delay in reporting, on 31 December 2020 there were no validated in-kind contributions. The EuroHPC JU is now collecting this information and will set out a full report of 2020 and 2021 in-kind contributions in the 2021 Annual Activity report. This is in line with the European Court of Auditors preliminary findings.

Financial contributions from participating states in 2020:

All the EuroHPC JU contributions consisted of reported[2] financial contributions, as reported by Participating States of the EuroHPC JU Governing Board.

At 31 December 2020 there were no validated in-kind contributions. All the JU contributions comprised financial contributions and can be split as follows:

EUR '000

Member	EU	Participating States	Total
Running costs contributions	*2 370*	*–*	*2 370*
Operational costs contributions	*188 549*	*28 862*	*217 411*
TOTAL	**190 919**	**28 862**	**219 781**

It should be noted that included under the cash contribution to operational costs are also EUR 12.296.000 unpaid cash contributions related to 2020 for which a recovery order was issued but not yet cashed.
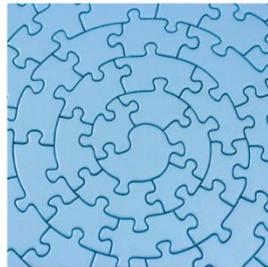
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[2] As reported by Participating States of the EuroHPC JU Governing Board

2. SUPPORT TO OPERATIONS

Communication activities

Discover EuroHPC   **Governance**   **Infrastructure Advisory Group (INFRAG)**   **Research & Innovation Advisory Group (RIAG)**

In 2019 and 2020, all communication activities were oriented to ensure public awareness about the EuroHPC JU's activities. As a new Joint Undertaking, the main objective was to foster awareness towards EU and national policy makers, as well as stakeholders of the High Performance Computing sector.

In 2020, due to COVID-19 all communication activities became virtual:

- EuroHPC JU INFO DAY was co-organised with PRACE in March 2020. Due to COVID-19, the event was moved online;
- The appointment of the new Executive Director on 16 September 2020 and the Autonomy on 23 September 2020 were all opportunities to communicate about the work of the Joint Undertaking;

- The EuroHPC JU launched its website in September 2020 (https//eurohpc-ju.europa.eu) and social media presence (Twitter followers: 1390; LinkedIn followers: 976[3]).

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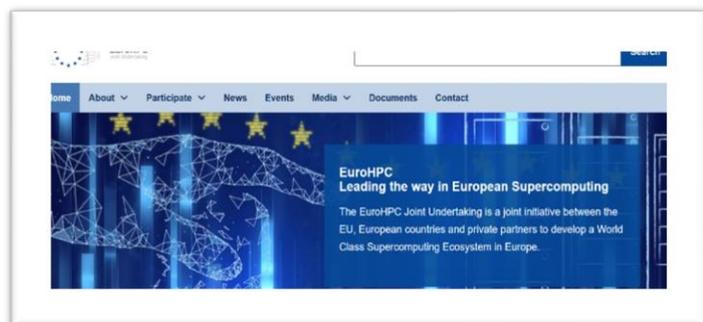
[3] Social media followers to date

EuroHPC_JU @EuroHPC_JU · Sep 29, 2020

Today our Director met @Xavier_Bettel @FranzFayot & @luxprovide to celebrate the signature of the contract 🖊 of #MeluXina, new EuroHPC #supercomputer 💻⚡

By 2021 MeluXina will support European #researchers & #industry, wherever they are in Europe 🇪🇺

👉 eurohpc-ju.europa.eu/news/meluxina-...

The EuroHPC JU also communicated about each contract and calls announced in 2020:

- MeluXina press conference with Luxembourg Prime Minister Xavier Bettel on 29 September 2020;
- The Vega HPC contract was announced in a press conference on 1 October 2020 and the Karolina HPC contract on 14 October 2020;
- Virtual press conferences for the precursors-to exascale were organised to announce the Leonardo contract on 19 October 2020 and LUMI contract signed on 21 October 2020;
- All media work was undertaken with national Hosting Entities to announce signatures of contract to procure Karolina and Discoverer;
- In November 2020, the project FF4EuroHPC launched its first open call to support European SMEs in making the most of advanced High Performance Computing (HPC) services. This is the successor project to the successful EU-funded projects Fortissimo and Fortissimo 2.

2.2. Legal and financial framework

The legal framework refers to:

- the basic EuroHPC JU Legal Act, i.e. the Council Regulation (EC) 2018/1488 of 28 September 2018;
- the Horizon 2020 Regulation (EU) 1291/2013 and its Rules for Participation;
- the CEF Regulation (EU) 1290/2013;
- the Financial Rules adopted by the Governing Board on 20 February 2020.

The financial framework is set by the Commission Decision C(2019)5357 and its annexes.

2.3. Budgetary and financial management

The Financial Rules establishes that the Accounting Officer shall be independent in the performance of his or her duties, enforcing an effective separation of duties between this position and that of Authorising Officer. In 2020, the EuroHPC JU agreed with the Commission to nominate the Commission Accounting Officer as Accounting Officer for the EuroHPC JU.

The budget of the EuroHPC JU is divided into 3 titles as follows:

- Title 1: Staff expenditure
- Title 2: Other administrative expenditure
- Title 3: Operational expenditure

Commitments and Payments executed in 2020:

2020	Title 1. Staff expenditure	Title 2. Building, Equipment and Operating Costs	Title 3. Operational Expenditure	*Total*
Commitment Appropriations executed (in €)	315.000	306.000	486.435.000	487.056.000
Payment Appropriations executed (in €)	289.000	94.000	40 371.000	40.754.000

Implementation of commitment and payment appropriations (total appropriations available compared to commitments and payments made in 2020):

2020	Title 1. Staff expenditure	Title 2. Building, Equipment and Operating Costs	Title 3. Operational Expenditure	*Total*
Commitment Appropriations – Budget 2020 (in €)	€ 1,093,000.00	€1,593,000.00	€506,389,000.00	€ 509,075,000.00
Commitment Appropriations – Executed (in €)	€ 315,000.00	€ 306,000.00	€ 486,435,000.00	€ 487,056,000.00
% implementation	29%	19%	96%	95.67%
Payment Appropriations – Budget 2020 (in €)	€ 1,093,000.00	€ 1,470,000.00	€ 178,926,000.00	€ 181,489,000.00
Payment Appropriations – Executed (in €)	€ 289,000.00	€ 94,000.00	€ 40,371,000.00	€ 40,754,000.00
% implementation	26%	6%	23%	22%

% implementation payments in 2020

- Title 1. Staff expenditure
- Title 2. Building, Equipment and Operating Costs
- Title 3. Operational Expenditure

% implementation commitments in 2020

- Title 1. Staff expenditure
- Title 2. Building, Equipment and Operating Costs
- Title 3. Operational Expenditure
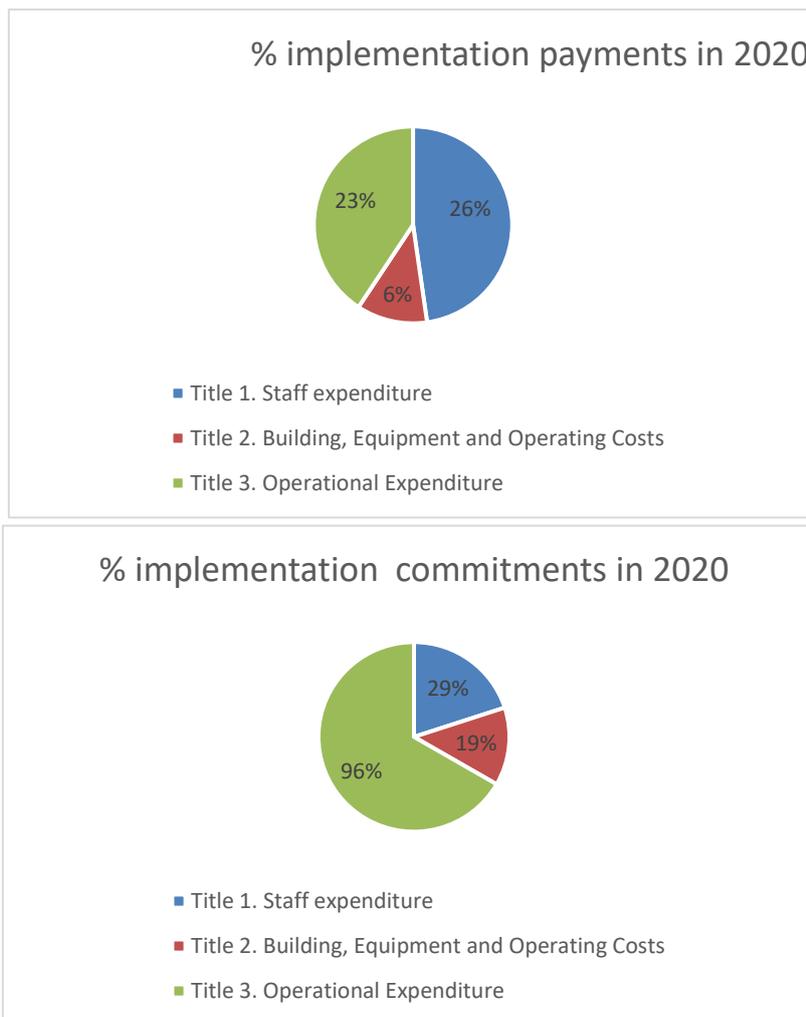
2.4. Procurement and contracts

Procurement & Contracts – Administrative

To allow its staff to perform its work, the Joint Undertaking was equipped with state-of-the-art office equipment and networking facilities, allowing the use of the standard IT toolchain of the European Commission. A number of Service Level Agreements (SLA) were signed with the Commission, which are necessary for the use of the ABAC accounting system (SLA with DG BUDG), the provision of IT equipment/services (SLA with DIGIT, HR, PMO and CdT) and secure data communication services.

A number of DIGIT's Framework Contracts were used for the purchasing of the electronic office equipment and hardware as well as the installation, configuration and maintenance of this equipment. This included the procurement and maintenance of programme packages and software licences that are necessary for the normal operation of the EuroHPC JU.

Procurement & Contracts – Operational

The EuroHPC JU also concluded contracts related to the evaluation and selection of R&I proposals (see section 1.6).

2.5. IT and logistics

In the context of the "initial actions" as described in Article 29 of the EuroHPC Regulation, the staff of the EuroHPC Joint Undertaking was at first located in the premises of DG Communications Networks, Content and Technology in Luxembourg and benefitted from its IT and logistical infrastructures.

The IT infrastructure (e.g. telephony, secure data network (sTESTA), video-conferencing facilities, IT equipment, etc.) was fully operational upon autonomy in 2020.

In April 2020, the Luxembourgish government made office space available in in the Drosbach building in Gasperich, Luxembourg. The offices were refurbished in April 2020 and the EuroHPC JU team moved to the new premises during the summer of 2020.

2.6. Human Resources

6 vacancy notices were published in 2020 for the recruitment of:

- 1 Communication Officer
- 1 Human Resources Officer
- 1 Accounting Officer
- 1 IT Assistant
- 1 Legal Officer
- 1 Senior Programme Officer

Interviews were held for all posts and suitable candidates were identified. The Communication Officer, the IT Assistant and the Senior Programme Officer were recruited in 2020 and the rest of the staff were recruited at the beginning of 2021, with one remaining post of Junior Project Officer to be filled.

3. GOVERNANCE

3.1. Governing Board

The EuroHPC JU Governing Board was established on 6 November 2018 at its first meeting when, *inter alia*, its rules of procedure were adopted.

The Governing Board is composed of representatives of the EU and the Participating States. The Commission and each Participating State appoint one representative to 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 chair of the Governing Board is Dr Herbert Zeisel, Federal Ministry of Education and Research of Germany and the vice-chair is Khalil Rouhana, Deputy Director-General of the European Commission's Directorate-General for Communications Networks, Content and Technology (DG CNECT).

In 2020, the EuroHPC JU Governing Board had five meetings: 20-21 February, 5 June, 18-19 June, 6-7 October, and 3-4 December.

A list of Governing Board members is provided in Annex 3. At the end of 2020, the EuroHPC JU counted 32 Participating States.

The Governing Board of the EuroHPC JU took the following major decisions in 2020:

- Approval for EuroHPC JU autonomy;
- Appointment of the Executive Director;
- Appointment of the Accounting Officer;
- Adoption of the Financial Rules of the EuroHPC JU;
- Amendment of the work plan and budget 2020;
- Launch of the calls for R&I proposals;
- Approval of the list of proposals selected for funding pursuant to the evaluation of the calls;
- Approval of the launch of the calls for tenders for the acquisition of the Deucalion Supercomputer;
- Approval of the launch of the call for tender for the acquisition of the PetaSC/Discoverer supercomputer;
- Selection of the 3 tenders for acquisition of the precursor to exascale supercomputers;
- Selection of the 5 tenders for acquisition of the petascale supercomputers;
- Approval of the EuroHPC Internal Control Framework;
- Extension of the mandate of the appointed members of the Infrastructure Advisory Group;
- 6 staff implementing rules;
- Adoption of work plan and budget 2021.

3.2. Executive Director

The Executive Director is the legal representative and the chief executive for the day-to-day management of the EuroHPC JU, in accordance with the decisions of the Governing Board, in line with the Statutes.

The vacancy for the post of the Executive Director was published on 17 May 2019 with a deadline for applications of 19 June 2019. The new Executive Director Anders Dam Jensen was appointed on 15 May 2020 and took office on 16 September 2020, a week before the EuroHPC JU became autonomous.

3.3. Industrial and Scientific Advisory Board

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 is chaired by Jean-Pierre Panziera, Chief Technology Director for High Performance Computing at Atos. He is also the current Chairman of ETP4HPC, the European Technology Platform for High Performance Computing. RIAG is composed of 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. In addition, the Governing Board appoints 8 observers, while the Private Members nominate 2 observers. 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 is chaired by Dr Claus Axel Müller, Director of Gauss Centre for Supercomputing, Germany. It is composed of 12 members appointed by the Governing Board. In addition, the Governing Board appoints 8 observers. 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.

4. INTERNAL CONTROL FRAMEWORK

In June 2020, the Governing Board adopted the EuroHPC JU Internal Control Framework (ICF). The new framework is based on the revised European Commission framework and consists of five internal control components and 17 principles, based on the COSO 2013 Internal Control-Integrated Framework (a framework for designing, implementing, and conducting internal control).

The internal control activities [4] underpin the structure of the ICF and supports the EuroHPC JU in its efforts to achieve its objectives. To facilitate the implementation of the ICF and management's assessment of whether each component is present and functioning, and whether the components function well together, each component consists of a set of principles. Assessments based on these principles helps to provide reasonable assurance that the EuroHPC JU's objectives are being met. The principles specify the actions required for internal control to be effective.

The characteristics of each principle are defined to assist management in implementing internal control procedures and in assessing whether the principles are functioning and being adhered to.

To be able to implement these 17 principles, the Governing Board also adopted an action plan with detailed measures to be applied in the first years of autonomy and to develop the relevant procedures and processes.

4.1. Financial Procedures

The manual of Financial Procedures is, at time of publication of this report, under preparation. The main purpose of the document is to describe the financial circuits for the implementation of the EuroHPC JU budget. The financial circuits concern the financial operations taking into account the structure of EuroHPC JU and the risks associated with the management environment and the nature of the financing operation. They are established in order to standardise the mandatory steps of the processing of financial transactions and to clarify who the different actors are.

This manual shall be prepared in line with Article 20(4) of the Financial Rules of the EuroHPC JU which states that: 'The Executive Director shall put in place the organisational structure and the internal control systems suited to the performance of duties of the Executive Director, in accordance with the minimum standards or principles adopted by the Governing Board, on the basis of the Internal Control Framework laid down by the Commission for its own departments and having due regard to the risks associated with the management environment and the nature of the actions financed. The establishment of such structure and systems shall be supported by a risk analysis which takes into account their cost-effectiveness and performance considerations.'

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[4] Control environment, risk assessment, control activities, information and communication, and monitoring activities

4.2. *Ex-ante* Controls on Operational Expenditure

Ex-ante controls are essential to prevent errors and avoid the need for *ex-post* corrective action. In 2020, the EuroHPC JU continued to apply the provisions of Article 66 of the Financial Regulation and Article 21 of the EuroHPC JU Financial Rules: 'each operation shall be subject at least to an *ex-ante* control relating to the operational and financial aspects of the operation, on the basis of a multiannual control strategy which takes risk into account'.

Therefore, the main objective of *ex-ante* controls is to ascertain that the principles of sound financial management have been applied.

The EuroHPC JU continues to apply well-developed procedures defining the controls to be performed by project and finance officers for every cost claim, invoice, commitment, and payment, taking into account risk-based and cost-effectiveness considerations.

For operational Horizon 2020 expenditure, the processing and recording of transactions in the IT accounting system (ABAC) are mainly performed via the corporate Horizon 2020 IT tools (Sygma/COMPASS), which ensures a high degree of automation, and the controls are embedded in each workflow. For operational procurement expenditure, processing and recording of transactions are undertaken in the IT accounting system (ABAC) and using the dedicated tools (Hermes-Ares-Noncom).

4.3. *Ex-post* Controls of Operational Expenditure and Error Rates identified

Ex-post controls will begin in 2021, a full year after autonomy.

4.4. Audit of the European Court of Auditors

The EuroHPC JU's first audit for 2020 is underway and conclusions will be available in 2021.

4.5. Internal Audit

Nothing to report in 2020. The European Commission Internal Audit Service will make a first risk assessment of EuroHPC JU activities in 2021.

4.6. Risk management and Conflict of Interest

The EuroHPC JU has developed a comprehensive set of rules and procedures for its staff for them to have a clear framework in which to work. These rules are effective across its entire governance structure of the JU, as follows:

- When joining the Project Management and wider JU team, each staff member agrees to the application of the Staff Regulation and signs a declaration of honour on the management absence of conflicts of interest and confidentiality.
- The EuroHPC JU applies by analogy 'mutatis mutandis' the 'Code of Good Administrative Behaviour for Staff of the European Commission in their Relations with the Public'.
- Conflict of interest procedures are in place for the members of both the EuroHPC JU GB and the advisory bodies.

- Specific measures have been implemented for the prevention and management of conflicts of interest of experts in charge of the evaluation of grant applications and of the review of projects and tenders.

In addition, the EuroHPC will adopt and implement the common Research Anti-Fraud Strategy. In March 2019, the Common Implementation Centre adopted the revised Strategy (RAFS 2019) and the associated action plan. The implementation of the action plan is monitored through regular meetings of the Fraud and Irregularities in research (FAIR) Committee in which the EuroHPC JU will participate.

Furthermore, for areas of expenditure other than grants, the EuroHPC JU applies *mutatis mutandis* and by analogy, the anti-fraud strategy approved by DG Communications Networks, Content and Technology Risk management (DG CNECT).

During most of the year 2020, the EuroHPC JU risk management was integrated in the DG CNECT. After autonomy, this function has been taken over by the JU Team. Staff recruitment is planned to be able to ensure that this activity is undertaken in full compliance.

4.7. Compliance and effectiveness of Internal Control

The EuroHPC JU Governing Board adopted the EuroHPC internal control framework (ICF) in June 2020. Additionally, an action plan to implement the Internal Control Principles and related processes and procedures was adopted, with application in the first year of the autonomy of the EuroHPC JU.

The EuroHPC JU ICF is designed to provide reasonable assurance regarding the achievement of the following five objectives:

- Effectiveness, efficiency and economy of operations;
- Reliability of reporting;
- Safeguarding of assets and information;
- Prevention, detection, correction and follow-up of fraud and irregularities;
- Adequate management of the risks relating to the legality and regularity of the underlying transactions.

The ICF is composed of 17 principles which aim at helping the EuroHPC JU to address different types of management issues and risks, so that reasonable assurance regarding the proper execution of the whole operational system has been gained.

Internal Control Principles (ICP) are based on the same principles as applied by the Commission and adapted to the EuroHPC JU's context and specificities. The EuroHPC JU's ICPs provide generic management principles and set out the minimum requirements for EuroHPC JU control activities.

5. MANAGEMENT ASSURANCE

5.1. Assessment of the Annual Activity Report (AAR) by the Governing Board

The Executive Director submits the draft AAR 2020 to the Governing Board for assessment and approval. The Governing Board approves the AAR together with the annual accounts. Once approved by the GB, the AAR is made publicly available. No later than 1 July 2021, the AAR together with its assessment will be sent by the Executive Director to the European Court of Auditors and to the European Commission.

The members of the Governing Board of the EuroHPC Joint Undertaking took note of the Annual Activity Report 2020. The presented document is the first Annual Activity Report of the EuroHPC JU since its autonomy in September 2020. The highlights of the report have been presented during the Governing Board meeting held on 26 April 2021.

The EuroHPC Joint Undertaking was established on 28 September 2018 by Council regulation No 2018/1488, published in the Official Journal of the EU on 8 October 2018 and entered into force on 28 October 2018. The mission of the EuroHPC JU is 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.

The Governing Board confirmed autonomy of the EuroHPC JU on 23 September 2020 when all autonomy criteria were met.

In 2020, and despite the challenges presented by the Covid-19 pandemic, the EuroHPC Joint Undertaking continued to meet the milestones defined by the Governing Board to fulfil its strategic mission. A new team of 11 full-time employees (on 31 December 2020) has been build-up in 2020 to support the new Executive Director, appointed on 15 May 2020. The JU made its move into its dedicated headquarters in the Drosbach building in Luxembourg.

The Board is of the opinion that the Annual Activity Report sets out the relevant highlights of the execution of the 2020 activities defined for the Joint Undertaking from both an operational and administrative point of view. The report will be sent to the European Parliament, Council of Ministers, Commission and Court of Auditors. It will form the basis of the discussion with the European Parliament in the preparation of the Budgetary Discharge in 2022.

The Board is pleased to note the acquisition and successful implementation of supercomputers (peta-scale and pre-exascale machines) that enable the set-up of a world-class HPC ecosystem in Europe that can address relevant and important socio-economic challenges. The activities realised by the JU have already a concrete and globally visible impact in strengthening the R&D&I and industrial capacities of the European HPC community.

The Board appreciates the efforts applied to exploring synergies with other HPC initiatives, e.g. with PRACE.

The Board is pleased about the excellent dissemination of the JU's activities. The appointment of the new Executive Director on 16 September 2020, the JU's autonomy on 23 September 2020 and the acquisition of supercomputers were all good opportunities to communicate about the positive work of the Joint Undertaking.

The Board notes that no critical risks have been identified regarding the JU's main business processes and internal controls and is pleased to note the further development and strengthening of the risk management approach, in particular enhancing the systematic monitoring of technical and financial risks in the projects.

The main risks associated with the initial actions regarding the setting-up and the financial autonomy of the EuroHPC JU have been appropriately addressed and overcome.

The Board takes note that the JU has fulfilled its monitoring tasks through the implementation and usage of dedicated key performance indicators (KPIs) for the achievement of strategic objectives.

In June 2020, the Governing Board adopted the EuroHPC JU Internal Control Framework (ICF). The new framework is based on the revised EC framework and consists of five internal control components and 17 principles based on the COSO 2013 Internal Control-Integrated Framework. The internal control component underpins the structure of the ICF and support the EuroHPC JU in its efforts to achieve its objectives. Assessments based on these principles help to provide reasonable assurance that the EuroHPC JU's objectives are being met. The principles specify the actions required for internal control to be effective.

The manual of Financial Procedures is currently under preparation. The main purpose of the document is to describe the financial circuits for the implementation of the EuroHPC JU budget. The financial circuits concern the financial operations taking into account the structure of EuroHPC JU and the risks associated with the management environment and the nature of the financing operation. They are established in order to standardise the mandatory steps of the processing of financial transactions and to clarify who the different actors are.

The evaluation of proposals for all calls followed the rules set out in the Horizon 2020 (H2020) framework programme. The evaluation was made against the three standard H2020 evaluation criteria (excellence, impact, and implementation). A total number of 37 experts coming from 23 different nations participated in the three evaluations of calls during 2020.

The Board acknowledges the peak effort in programme execution now underway and the high workloads resulting from this for the JU staff and states its appreciation for the efforts and progress made. The success of the EuroHPC JU was only possible thanks to the relentless efforts, dedication, and hard work of a very small and dynamic team in the Joint Undertaking, the members of the Governing Board, the members of the advisory groups, and the ongoing and helpful support of the Commission.

The year 2020 was for the EuroHPC Joint Undertaking a transition year. In early 2020, the EuroHPC JU was in its establishment phase and was managed by the European Commission

who applied the standard Commission monitoring and risks-mitigating procedures. From September 2020, after autonomy, the staff of the EuroHPC JU took over these activities and have applied, with help from the Commission. In conclusion, suitable controls are being put in place and risks were appropriately monitored and mitigated.

5.2. Elements supporting assurance

The EuroHPC JU was established in September 2018 but grant agreements were only signed at the end of December 2019. As no operational expenditures were realised by 31 December 2019, no monitoring, controls or audits of the resources assigned to the activities were needed. All support expenditures were performed in accordance with the European Commission rules and procedures following DG Communications Networks, Content and Technology's business processes.

5.3. Reservations

The period between 23 September 2020, the EuroHPC JU autonomy date, and the end of 2020 was a start-up phase. Challenges included:

- Recruiting new staff;
- Finalising the procurement procedures of the eight supercomputers and signing the contracts to procure six supercomputers;
- Managing the transition to autonomy with the Commission;
- Getting acquainted with financial and administrative tasks and procedures which had previously been managed by the Commission;
- Onboarding new staff and building a new team in the COVID-19 context;

Priorities had to be drawn in order to ensure business continuity in line with the objectives of the EuroHPC JU. When any mistakes were identified, they were rectified immediately and clearly documented. As the team grows, with new staff members reinforcing the HR, Finance, and Legal departments in 2021, these areas of the EuroHPC JU's work will be reinforced.

5.4. Overall conclusion

In 2020, the EuroHPC Joint Undertaking was in a transition year. In early 2020, the EuroHPC JU was in its establishment phase and managed by its parent DG Communications Networks, Content and Technology who applied the standard Commission monitoring and risks-mitigating procedures.

From September 2020, after autonomy, the staff of the EuroHPC JU took over these activities with help from the Commission. Suitable controls are being put in place and risks are being appropriately monitored and mitigated.

In conclusion, the management of this Joint Undertaking has reasonable assurance that, overall, suitable controls are in place and working as intended, risks are being appropriately monitored

and mitigated, and necessary improvements and reinforcements are being implemented. Therefore, the Executive Director, in his capacity as Authorising Officer, has signed the declaration of assurance presented below.

6. DECLARATION OF ASSURANCE

I, the undersigned, Anders Dam Jensen,

Executive Director of the European High Performance Computing Joint Undertaking (EuroHPC JU),

In my capacity as Authorising Officer

Declare that the information contained in this report gives a true and fair view[5].

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the self-assessment, ex-post controls, the work of the internal audit capability, the observations of the Internal Audit Service and the lessons learnt from our work in 2021 with the European Court of Auditors.

Confirm that I am not aware of anything not reported here which could harm the interests of the Joint Undertaking.

Luxembourg, on 22/06/2021

Anders Dam Jensen

Executive Director of EuroHPC JU

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[5] True and fair in this context means a reliable, complete and correct view on the state of affairs in the Joint Undertaking.

7. ANNEXES

1. Organisational chart
2. Establishment plan
3. KPIs
4. List of GB members
5. List of acronyms
6. Call schedule

Annex 1   Organisational chart 2020
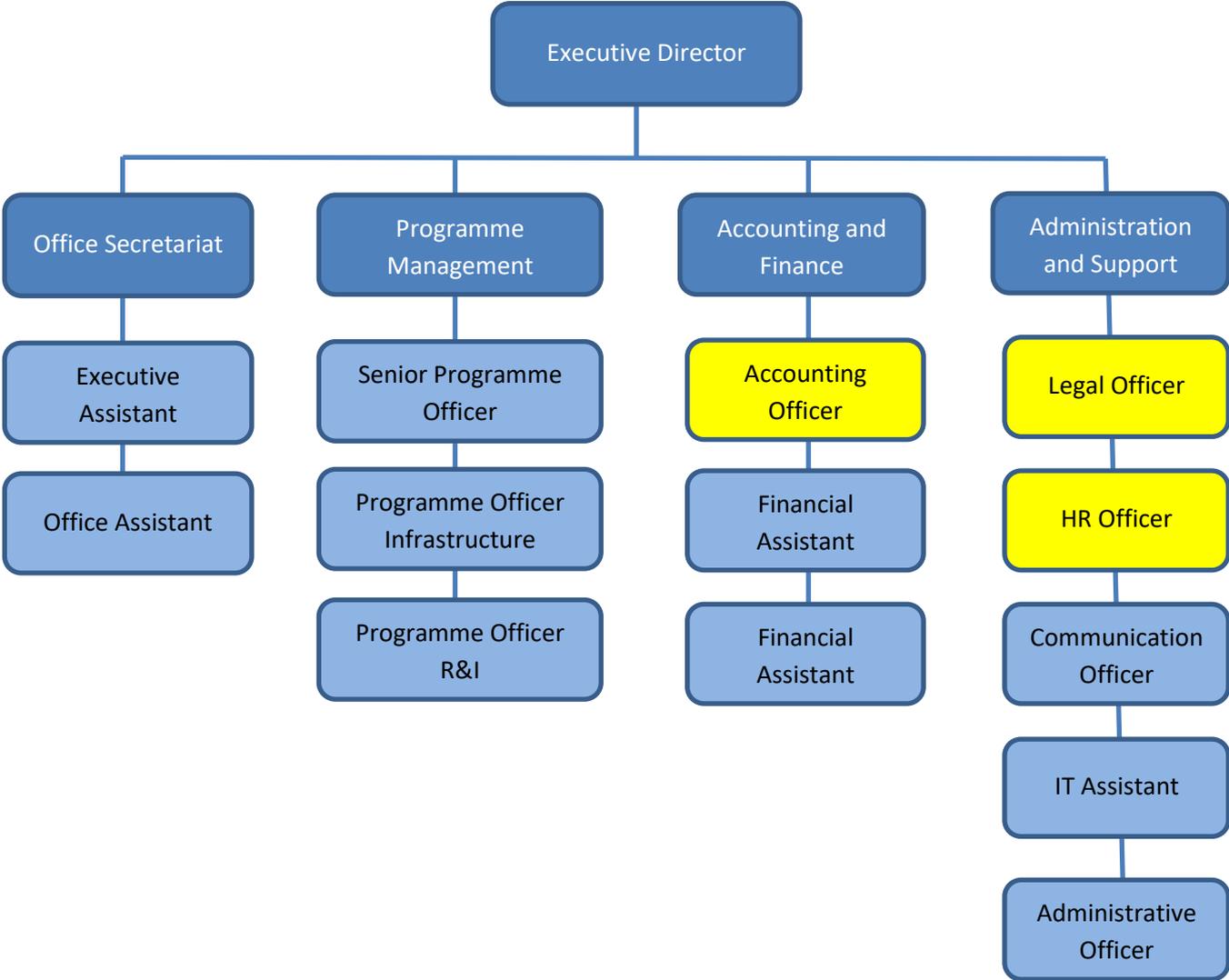
Recruitment process launched 2020 and finished beginning 2021

The Commission started the process of recruitment in 2019. In 2020, a further 9 people were recruited including the Executive Director, the Senior Programme Officer, the R&I Officer, the Communications Officer, the two Finance Assistants, the IT Assistant and the two assistants. At the time of autonomy, the Joint Undertaking had 10 members of staff. Following autonomy, the JU then completed recruitment for the last 4 staff members: IT Assistant in 2020 and Budget and Accounting Officer, Legal Officer and HR Officer who took up their functions in 2021.

Annex 2   Staff Establishment Plan

	2020	2021 estimate
Establishment plan posts: TA-AD	4	4
Establishment plan posts: TA-AST		
Total establishment plan posts	**4**	**4**
Contract Agents	10	11
Seconded National Experts	1	1
Total Staff	**15**	**16**

Category and grade	2020		2021 estimate	
	Officials	**TA**	**Officials**	**TA**
AD 16				
AD 15				
AD 14		1		1
AD 13				
AD 12				
AD 11				
AD 10		1		1
AD 9				
AD 8		2		2
AD 7				
AD 6				
AD 5				
Total AD		4		4
Total AST/SC				
TOTAL		4		4

External Personnel – Contract Agents	2020	2021 estimate
Function Group IV	4	5
Function Group III	4	4
Function Group II	2	2
Function Group I		
Total Staff	**10**	**11**

Annex 3   Horizon 2020 indicators for EuroHPC JU

Table I shows the Horizon 2020 KPIs which apply to all JUs, both under Industrial Leadership and Societal Challenges (Horizon 2020 Key Performance Indicators (Annex II - Council Decision 2013/743/EU)).

- In tables I and II, the numbers attributed to the indicators correspond with those in the Horizon 2020 indicators approved by the RTD Director-General and agreed by all the Research family DGs (according to Annexes II and III - Council Decision 2013/743/EU). The missing numbers correspond to KPIs not applicable to the JUs.

- Table II presents all indicators for monitoring of cross-cutting issues which apply to JUs (Annex III - Council Decision 2013/743/EU).

TABLE I

Horizon 2020 Key Performance Indicators[6] common to all JUs

		Key Performance Indicator	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Baseline at the Start of Horizon 2020 (latest available)	Target at the End of Horizon 2020	Automated	EuroHPC JU
EVALUATION	NA	Time to inform (TTI) all applicants of the outcome of the evaluation of their application from the final date for submission of completed proposals	To provide applicants with high quality and timely evaluation results and feedback after each evaluation step by implementing and monitoring a high scientific level peer reviewed process	Number and % of information letters sent to applicants within target Average TTI (calendar days) Maximum TTI (calendar days)	Joint Undertaking	FP7 latest know results?	153 calendar days	Yes	Nothing to report at this stage
EVALUATION	NA	Redress after evaluations	To provide applicants with high quality and timely evaluation results and feedback after each evaluation step by implementing and monitoring a high scientific level peer reviewed process	Number of redresses requested	Joint Undertaking	FP7 latest know results?			**0**
GRANTS	NA	Time to grant (TTG) measured (average) from call deadline to signature of grants	To minimise the duration of the granting process aiming at ensuring a prompt implementation of the Grant Agreements	Number and % of grants signed within target Average TTG in calendar days Maximum TTG in calendar days	Joint Undertaking	n.a. [new approach under Horizon 2020]	TTG < 243 days (as %of GAs signed)	Yes	Nothing to report at this stage

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[6] (based on Annex II to Council Decision 2013/743/EU)

		Key Performance Indicator	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Baseline at the Start of Horizon 2020 (latest available)	Target at the End of Horizon 2020	Automated	EuroHPC JU
	NA	Time to sign (TTS) grant agreements from the date of informing successful applicants (information letters)	through a simple and transparent grant preparation process	Number and % of grants signed within target Average TTG in calendar days Maximum TTG in calendar days	Joint Undertaking	n.a. [new approach under Horizon 2020]	TTS 92 calendar days	Yes	Nothing to report at this stage
PAYMENTS	NA	Time to pay (TTP) (% made on time) -pre-financing - interim payment -final payment	To optimize the payments circuits, both operational and administrative, including payments to experts	Average number of days for Grants pre-financing, interim payments and final payments; Average number of days for administrative payments; Number of experts appointed	Joint Undertaking	FP7 latest know results?	-pre-financing (30 days) - interim payment (90 days) -final payment ((90days)	Yes	Nothing to report at this stage
HR	NA	Vacancy rate (%)		% of post filled in, composition of the JU staff .[7]	Joint Undertaking	n.a. [new approach under Horizon 2020]			0%
JU EFFICIENCY	NA	Budget implementation/execution: 1. % CA to total budget 2. % PA to total budget	Realistic yearly budget proposal, possibility to monitor and report on its execution, both in commitment (CA) and payments (PA), in line with sound financial management principle	% of CA and PA	Joint Undertaking		100% in CA and PA	Yes	Nothing to report at this stage

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[7] Additional indicators can be proposed/discussed with DG HR

		Key Performance Indicator	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Baseline at the Start of Horizon 2020 (latest available)	Target at the End of Horizon 2020	Automated	EuroHPC JU
	NA	Administrative Budget: Number and % of total of late payments	Realistic yearly budget proposal, possibility to monitor and report on its execution in line with sound financial management principle	Number of delayed payments % of delayed payments (of the total)	Joint Undertaking			Yes	The JU did not have any late payments in 2020

TABLE II

Indicators for monitoring Horizon 2020 Cross-Cutting Issues[8] common to all JUs

	Cross-cutting issue	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Data to be Provided in/to	Direct Contribution to ERA	Automated	EuroHPC JU
2		2.1 Total number of participations by EU-28 Member State	Nationality of Horizon 2020 applicants & beneficiaries (number of)	Horizon 2020 applicants & beneficiaries at the submission and grant agreement signature stage	JU AAR	YES	Yes	463 applications 277 successful applications
		2.2 Total amount of EU financial contribution by EU-28 Member State (EUR millions)	Nationality of Horizon 2020 beneficiaries and corresponding EU financial contribution	Horizon 2020 beneficiaries at grant agreement signature stage	JU AAR	YES	Yes	127,835,372 €
NA	Widening the participation	Total number of participations by Associated Countries	Nationality of Horizon 2020 applicants & beneficiaries (number of)	Horizon 2020 applicants & beneficiaries at the submission and grant agreement signature stage	JU AAR	YES	Yes	46 applications 27 successful applications
NA		Total amount of EU financial contribution by Associated Country (EUR millions)	Nationality of Horizon 2020 beneficiaries and corresponding EU financial contribution	Horizon 2020 beneficiaries at grant agreement signature stage	JU AAR	YES	Yes	9,429,375 €
3	SMEs participation	3.1 Share of EU financial contribution going to SMEs (Enabling & industrial tech and Part III of Horizon 2020)	Number of Horizon 2020 beneficiaries flagged as SME; % of EU contribution going to beneficiaries flagged as SME	Horizon 2020 beneficiaries at grant agreement signature stage	JU AAR		Yes	7.5 %

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[8] (based on Annex III to Council Decision 2013/743/EU)

	Cross-cutting issue	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Data to be Provided in/to	Direct Contribution to ERA	Automated	EuroHPC JU
6	Gender	6.2 Percentage of women project coordinators in Horizon 2020	Gender of MSC fellows, ERC principle investigators and scientific coordinators in other Horizon 2020 activities	Horizon 2020 beneficiaries at the grant agreement signature stage	JU AAR	YES	Yes	14.8 %
		6.3 Percentage of women in EC advisory groups, expert groups, evaluation panels, individual experts, etc.	Gender of memberships in advisory groups, panels, etc.	Compiled by Responsible Directorate/ Service/Joint Undertaking based on existing administrative data made available by the CSC	JU AAR	YES		RIAG: 25% INFRAG: 25%
11	Private sector participation	11.1 Percentage of Horizon 2020 beneficiaries from the private for profit sector	Number of and % of the total Horizon 2020 beneficiaries classified by type of activity and legal status	Horizon 2020 beneficiaries at grant agreement signature stage	JU AAR		Yes	37.2 %
		11.2 Share of EU financial contribution going to private for profit entities (Enabling & industrial tech and Part III of Horizon 2020)	Horizon 2020 beneficiaries classified by type of activity; corresponding EU contribution	Horizon 2020 beneficiaries at grant agreement signature stage	JU AAR		Yes	27.4 %
14	Participation patterns of independent experts	14.2 Proposal evaluators by country	Nationality of proposal evaluators	Responsible Directorate/Service/Joint Undertaking in charge with the management of proposal evaluation	JU AAR			IT, DE, RO, TR, CY, EL, UK, FR, PT, BG, ES, HR, BE, IE, SE, PL, AT, LV, LT, CH, DK, CZ, SI

	Cross-cutting issue	Definition/Responding to Question	Type of Data Required	Data to be Provided by	Data to be Provided in/to	Direct Contribution to ERA	Automated	EuroHPC JU
NA	Participation of RTOs and Universities	Participation of RTO[9]s and Universities in PPPs (Art 187 initiatives)	Number of participations of RTOs to funded projects and % of the total Number of participations of Universities to funded projects and % of the total % of budget allocated to RTOs and to Universities	Horizon 2020 beneficiaries at the grant agreement signature stage	JU AAR	YES	Yes	104 participations of RTOs to funded projects 32.9 % participation of Higher or Secondary Education Establishments (HES) to funded projects 50.4 % of total RTO and HES budget allocated to HES

Notes:

* Horizon 2020 applicants - all those who submitted Horizon 2020 proposals

* Horizon 2020 beneficiaries - all those who have signed a Horizon 2020 Grant Agreement

*Responsible Directorate - DG RTD Directorates and R&I DGs family in charge with management of Horizon 2020 activities

*Services -Executive Agencies and other external bodies in charge with Horizon 2020 activities

*Project officer - is in charge of managing Horizon 2020 projects in Responsible Directorate/Service including Executive Agencies

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[9] RTO: Research and Technology Organisation

Annex 4   List of Governing Board members

Country	Representative	Substitute
European Commission	Khalil Rouhana	Thomas Skordas
Austria	Daniel Weselka	Ingo Hegny Doris Vierbauch Stefan Hanslik
Belgium	Geert Van Grootel	Laurent Ghys Didier Flagothier
Bulgaria	Ivan Dimov	Yumer Kodzhayumer
Croatia	Slaven Mihaljević	Ivana Pavlaković
Cyprus	Kyriacos Kokkinos	Evgenios Epaminondou
Czech Republic	Vít Vondrák	Petra Tomešová
Denmark	René Michelsen	Line Bekker Poulsen
Estonia	Toivo Räim	Martin Eessalu
Finland	Erja Heikkinen	Petteri Kauppinen
France	M. Laurent Crouzet	Stephane David
Germany	Herbert Zeisel	Stefan Mengel Roland Krüppel Sebastian Jester
Greece	Nectarios Koziris	Aliki Pappa
Hungary	István Erényi	Tamàs Maray
Iceland	Morris Riedel	Henning Arnór Úlfarsson Egill Þór Níelsson
Ireland	Peter Healy	Oisin McManus
Italy	Paola Inverardi	Marco Aldinucci
Latvia	Jānis Paiders	Lauris Cikovskis
Lithuania	Juozas Šulskus	
Luxembourg	Mario Grotz	Jean-Marie Spaus
Montenegro	Marko Simeunovix	Ivana Ognjanovic
North Macedonia	Boro Jakimovski	Anastas Mishev
Norway	Kim Davis	Ulrike Jaekel Pal S. Malm
Poland	Mariusz Sterzel	Cezary Blaszczyk Rafal Duczmal
Portugal	João Nuno Ferreira	Sofia Azevedo
Romania	Adrian-Victor Vevera	Dragoș-Cătălin Barbu
Slovak Republic	Lukáš Demovič	Juraj Kubica
Slovenia	Karolina Schlegel	Peter Sterle
Spain	Jose Juan Sanchez Serrano	Clara Eugenia Garcia Garcia
Sweden	David Edvardsson	Magnus Friberg

Switzerland	Peter Brönnimann	Thomas Schulthess
The Netherlands	Wendy Hoogeboom	Geertjan Holtop
Turkey	Mehmet Mirat Satoğlu	Onur Temizsoylu

Observers		
Country	**Representative**	**Substitute**
Malta		Omar Cutajar

Annex 5   List of acronyms

AAR – Annual Activity Report

ABAC – Accrual Based Accounting

CSA – Coordination and Support Actions

DG CNECT – Directorate-General Communications Networks, Content and Technology

DG RTD – Directorate-General Research and Innovation

EFTA – European Free Trade Association

EU – European Union

EuroHPC JU – European High Performance Computing Joint Undertaking

JU – Joint Undertaking

FR – Financial regulation

GB – Governing Board

HPC – High Performance Computer

IA – Innovation actions

ICF – Internal Control Framework

ICP – Internal Control Principles

INFRAG – Infrastructure Advisory Group

JTI – Joint Technology Initiatives

KPIs – Key Performance Indicators

RIA – Research and innovation actions

RIAG – Research and Innovation Advisory Group

SRIA – Strategic Research and Innovation Agenda

SMEs – Small and Medium Enterprises

TRL – Technology Readiness Level

WP – Work Plan

WP2020 – 2020 Work Plan

Annex 6 Call schedule for JU activities in 2020

Call	Opening	Closing	Evaluation Start	Funding Decision	Grant Agreement Signature*
H2020-JTI-EuroHPC-2019-1					
EuroHPC-01-2019 (RIA)	25/07/2019	14/01/2020	24/02/2020	18/06/2020	12/2020
EuroHPC-02-2019 (IA)	25/07/2019	14/01/2020	24/02/2020	18/06/2020	12/2020
EuroHPC-03-2019 (IA)	25/07/2019	14/01/2020	24/02/2020	18/06/2020	12/2020
H2020-JTI-EuroHPC-2019-2					
EuroHPC-04-2019					
CSA	25/07/2019	14/11/2019	11/12/2020	20/02/2020	08/2020
RIA	25/07/2019	14/11/2019	11/12/2020	20/02/2020	08/2020
EuroHPC-05-2019 (RIA)	25/07/2019	14/11/2019	11/12/2020	20/02/2020	08/2020
H2020-JTI-EuroHPC-2020-01					
EuroHPC-2020-01-a (RIA)	16/04/2020	15/09/2020	28/09/2020	21/12/2020	
EuroHPC-2020-01-b (RIA)	16/04/2020	28/07/2020	28/09/2020	21/12/2020	
H2020-JTI-EuroHPC-2020-02 (SGA)	18/08/2020	12/01/2021			

* indicative, in some cases the large number of grant agreements required an extended signature period