H2020-FETHPC-3-2017 - Exascale HPC ecosystem development

EXDCI-2

European eXtreme Data and Computing Initiative - 2

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First report on EXDCI-2 technical workshop

Final

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References and Applicable Documents

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List of Acronyms and Abbreviations

AI	Artificial Intelligence
AIOTI	Alliance for the Internet of Things Innovation
API	Application Programming Interface
BD	Big Data
BDEC	Big Data and Extreme Scale Computing
BDVA	Big Data Value Association
BoF	Birds of a Feather
BSC	Barcelona Supercomputing Center
BSCW	Basic Support for Cooperative Work
CEA	Commissariat à l'Energie Atomique
CoE	Center of Excellence
cPPP	contractual Private Public Partnership
DoW	Description of Work
EC	European Commission
ECMI	European Consortium for Mathematics in Industry
EDI	European Data Infrastructure
EHPCSW	European High Performance Computing Summit Week
EMS	European Mathematical Society
EPCC	Edinburgh Parallel Computing Center
EPI	European Processor Initiative
EsD	Extreme-scale Demonstrator
ETP4HPC	European Technology Platform for High Performance Computing
EU	European Union
EXCELLERAT	European Centre of Excellence for Engineering Applications
EXDCI-2	Extreme Data and Computing Initiative-2
F2F	Face to Face
FET	Future and Emerging Technologies
FP9	Framework Programme 9
GENCI	Grand Equipement National de Calcul Intensif
H2020	Horizon 2020
HiPEAC	High Performance and Embedded Architecture Compilation
HLRS	High Performance Computing Center Stuttgart
HPC	High Performance Computing
HPC GIG	High Performance Computing Governance Intelligence Gathering

HPDA	High Performance Data Analytics
IAC	Industrial Advisory Committee
ICT	Information and Communication Technologies
IN	Indiana
INRIA	Institut National de Recherche en Sciences du Numérique
IoT	Internet of Things
IRISA	Institut de Recherche en Informatique et Systèmes Aléatoires
ISV	Independant Software Vendor
KAUST	King Abullah University of Science and Technology
KPI	Key Performance Indicator
M	Month
ML	Machine Learning
MS	Member State
NAFEMS	International Association for the Engineering, Modelling, Analysis and Simulation Community
PMO	Project Management Office
PMR	Progress Monitoring Report
PRACE	Partnership for Advanced Computing in Europe
PSNC	Poznan Supercomputing and Networking Center
Q	Quarter
R&I	Research and Innovation
ROI	Return On Investment
RP	Reporting Period
RWTH	Rheinisch-Westfälische Technische Hochschule
SC	Super Computing
SC	Selection Committee
SHAPE	SME HPC Adoption Programme
SME	Small and Medium Enterprise
SRA	Strategic Research Agenda
T	Task
TB	Technical Board
TBD	To Be Determined
UK	United Kingdom
UPJV	Université Picardie Jules Verne
US	United States
USA	United States of America
WP	Work Package

Executive summary

Two technical workshops were scheduled during the EXDCI-2 project as a transverse action for the partners to exchange and coordinate their efforts, as well as to meet and exchange with other initiatives of the European HPC ecosystem. The first technical workshop of the EXDCI-2 project was organised in Brussels the 28th September 2018.

Introduced by Serge Bogaerts – the EXDCI-2 coordinator – the workshop was built on sharing the vision and objectives of each work package and tasks of the project, as well as cross-pollination among them. Specific items regarding dissemination of the project's results were discussed with the participants.

The workshop also dedicated specific time to exchange with the other European HPC initiatives and the best ways for EXDCI-2 to collaborate and support them. A focus was put on FocusCoE as the new support action to federate the European CoEs with a presentation and discussion of the project by Guy Lonsdale, Focus CoE coordinator.

Finally, implementation details were discussed to have an overview of the next concrete actions of EXDCI-2 with a view on process and a budget overview.

1   Introduction

The European project EXDCI-2 sets up actions to coordinate the European HPC ecosystem with important activities to better address the convergence of big data, cloud computing and HPC. EXDCI-2 strategic objectives are:
- Development and advocacy of a competitive European HPC Exascale Strategy
- Coordination of the stakeholder community for European HPC fir a sound and efficient European HPC ecosystem

EXDCI-2 mobilizes the European HPC stakeholders through the joint action of PRACE and ETP4HPC. The project promotes global community structuring and synchronization in domains such as HPC, Big Data, cloud and embedded computing, for a more competitive related value chain in Europe.

To achieve its objectives, the project develops a HPC technology roadmap addressing the convergence with HPDA and the emergence of new HPC uses. The project also delivers application and applied mathematics roadmaps that will pave the road towards Exascale simulation in academic and industrial domains. It will develop a shared vision for the future of HPC that increases the synergies and prepares for targeted research collaborations. EXDCI-2 will work to increase the impact of the H2020 HPC research projects, by identifying synergies and supporting market acceptance of the results.

The project also contributes to the international visibility of Europe and improve HPC awareness.

In EXDCI-2, a transverse work package has been designed. Transverse coordination is important for the HPC community to share its visions alongside the HPC value chain, as well as to exchange with other communities, such as Big Data and IoT.
Among EXDCI-2 transversal actions, two technical workshops are organized during the course of the project. These workshops bring together all EXDCI-2 participants, as well as invited European and international HPC stakeholders. Through these dedicated meetings, all the participants can share information on various aspects, including funding models of relevant research and needs/challenges with respect to efficient software for future Exascale systems.

In the course of the EXDCI-2 project, the first project technical workshop has been organized in Brussels the 28th September 2018, 6 months after the project's start.
The event was the occasion for all invited stakeholders to share their vision and to prepare coordinated actions.

A dedicated time has been scheduled to exchange with the FocusCoE project, in order to identify, in advance, the collaborations that could be put in place between the projects.

2   Setting and Agenda

The first EXDCI-2 technical meeting took place in Brussels the 28th September 2018, at the Renaissance Hotel. The city of Brussels was chosen for its proximity with PRACE.

The number of participants in the meeting was 31, of which 4 were women. 1 person participated through conference call. The names and affiliations of the participants can be found in annex.

Figure 1 - Technical workshop group photo

Program of the workshop

The indicative program of the workshop is given below. Some minor modifications occurred during the course of the meeting.

Introduction		
10:00 – 10:40	General Presentation • Objectives overview • Processes (quality insurance) • Timeframe • Success KPI / Expected results	S. Bogaerts / F. Bodin
Workpackages update		
	WP Presentations – comprising the following: workplan, implementation progress, risk analysis and proposal for organization improvement	
10:40 – 11:10	WP1-*Management*	Chair: K. Soto
11:10 – 11:40	WP2-*Competitive HPC technologies ecosystem*	Chair: J-F Lavignon
11:40 – 12:10	WP3-*Excellence in HPC applications and usage*	Chair: M. Bode
✪	--------------------------------- **Lunchbreak**--------------------------------	
13:10 – 13:40	WP4-*Transversal actions*	Chair: F. Bodin
13:40 – 14:10	WP5-*International development*	Chair: S. Girona
14:10 – 14:40	WP6-*Dissemination and outreach*	Chair: M. Oorsprong
Other topics		
14:40 – 15:10	Strategic collaborations discussion (Eurolab4HPC, AIOTI, BDVA, EuroHPC, FET, CoE, BDEC, EC, …)	All
15:10 – 15:25	EHPCSW 2019 program	S. Bogaerts
15:25 – 15:40	Toward a common SC20 booth?	M. Oorsprong
15:40 – 16:00	Budget update and process	I. Yenes
Conclusion		

3   Report of the meeting

3.1   General presentation of the project

General objective:

As it shall build upon the achievements of the EXDCI project, the objective of EXDCI-2 is to coordinate the update and implementation of a common strategy for the European HPC Ecosystem in order to achieve the competitiveness goals of the Horizon 2020 Programme and contribute to a wealth of societal, economic and scientific challenges.

The project officially started in March 2018, for a duration of 30 months, and with a budget of €2.44 million.

Strategic goals:
- Development and advocacy of a competitive European HPC Exascale strategy – by supporting the implementation of a common European HPC strategy, and the elaboration of a transversal prospective vision covering innovation opportunities. This will be covered by WP4.

- Coordination of the stakeholder community for European HPC at the Exascale – by promoting community structuring and synchronisation, which requires to ensure the EXDCI-2 stakeholders are represented in various activities (e.g. development of HPC SRA, convergence PRACE-2 with upcoming EDI, BDEC activities, mapping and analysis of R&I agendas, etc.). Particular attention will be paid to the outcomes of ongoing FET HPC projects as well as involving the CoEs (WP4 & T2.4). We aim to facilitate the development of European human resources, reaching out to young talent and academia.

The HPC ecosystem was originally set across 3 pillars (Infrastructure, HPC technology and Applications/Centres of Excellence) but the European Commission approach would now be structured around 2 pillars (Infrastructure and Research & Innovation) only. The EXDCI project will use this new model.

Objectives and work programme:

The project sets various goals across 3 sections – strategic objectives, mobilizing the European HPC community and operational objectives – each WP working on several goals and WP1 (management) overseeing all of them.

Long and short-term impacts are expected from the project.

Long-term / High-level impacts:
- Political – increased competitiveness, improved decision making, set goals at EU level member states may not achieve on their own otherwise.
- Economic – development of workforce, of HPC and Big Data as economic sectors, and of other sectors using HPC and Big Data.
- Social – Help address several Grand Societal challenges.
- Technology – development of the European technology value chain and promotion of "Green Computing" technologies.

- Science and Innovation – HPC and Big Data as a key for maintaining scientific competitiveness and enable innovation in several sectors.

Short-term impacts:
- SRA (cPPPs, ESD, technology providers, EC) – focused HPC research programmes, industries interested in intercepting technical innovation and improved value chain integration.
- Scientific Case (EC & MS cPPP, EIPs, ISVs, scientific/industrial users) – basis for improving scientific and industrial offerings, focused HPC and Big Data research programmes and improved consideration for research opportunities using HPC and Big Data.
- Application Roadmap (EC, cPPPs, EIPs) – actors interested in intercepting applicative innovation, improved understanding of feasibility of very large research infrastructures.
- Mathematics and algorithmic roadmap (EC, cPPP, EIP, scientific users) – improve ability to effectively use Exascale, improve applications competitiveness, prepare the use of innovative architectures and technologies, and reduce risks for end-user organizations.
- KPIs and assessment (cPPP, EC & MS) – better assessment of ROI, of EC and governmental support and improve planning & reduce risk for industrial application.
- International Events – coordination of European HPC strategy with international developments and increased visibility and influence of European HPC programmes.
- Dissemination (all stakeholders) – foster uptake of project results and engage new stakeholders.
- Community building (CoEs…) & preparation for research collaborations (EC, MS, user communities) – improve community self-acquaintance, improve high-end HPC & BD project impact, reduce project risks, and more dynamic HPC & BD research communities, better support of ambitious projects.

3.2   Workpackages update

3.2.1   *WP1 – Management*

The consortium involves 4 main partners:
- PRACE – and 15 linked third parties
- ETP4HPC – and 6 linked third parties
- University of Rennes I (UR1)
- University of Picardie Jules Verne (UPJV)

The Management WP is composed of 5 main tasks:
- T1.1 Management
- T1.2 Internal Communication
- T1.3 Quality Control
- T1.4 Financial Management
- T1.5 Communication with the Commission

Organizational structure:

The Management Board is the decision-making body while the Technical Board supervises the execution of the project. PRACE, as the Project Management Office, will ensure the project is progressing according to schedule and budget.

- **T1.2 – Internal Communication**

The PMO will provide the participants with a collaborative space (i.e. [BSCW](#) portal) and mailing lists for all bodies and WPs, support F2F meetings as well as organising regular telco (via WebEx) and ensure a smooth transition from EXDCI-1 to EXDCI-2.

- **T1.3 – Quality Control**

25 deliverables are to be produced during the project, all of them will be reviewed by the PMO and TB – internal reviewers will be assigned soon. Templates for EXDCI-2 deliverables and internal reviews will be available – they are based on the ones used for EXDCI. Access to all information as well as the list of deliverables will be available on the BSCW portal.

- **T1.4 – Financial Management**

There are 3 payments to be made: a pre-financing payment, an interim payment and the payment of the balance. A quarterly financial report is requested from each beneficiary to justify the use of resources (PMO effort incl.).

- **T1.5 – Communication with the EC**

2 interim progress reports shall be issued – one for the period M1-M15 and another for M16-M30.Partners are responsible for producing said deliverables and reports (as mentioned in the DoW), which will then be submitted to the EC by the coordinator.

The PMO will coordinate with the PO the organization of the annual project reviews.

3.2.2   *WP2 – Competitive HPC technologies ecosystem*

This WP led by Michaels Malms (ETP4HPC) and Jean-François Lavignon (TS-JFL) has 4 main objectives:
- Prepare an HPC-HPDA technologies roadmap for FP9 timeframe
- Coordinate the European actions on HPC technologies
- Develop a competitive value chain for HPC technology
- Experiment how to accelerate start-up creation from research projects

The WP tasks are the following:

- **T2.1 – HPC-HPDA technology roadmap (M. Malms, M. Ostasz)**

The process to issue this roadmap is managed by ETP4HPC and will involve European stakeholders. An analysis of the European competitive position regarding HPC-HPDA technologies will be made with information provided by partners, market studies and international reports. Workshops and consultations with other projects (e.g. HiPEAC, BDEC) will help build a global vision for the research focus in FP9. The outcome will be a Strategic Research Agenda that should be issued by the end of 2019.

- **T2.2 – Liaison with upstream technologies (JF. Lavignon, M. Duranton)**

Task 2.2 aspires to figure out how to take advantage of European research in upstream technologies in order to help in having more competitive European HPC systems.

WP2.2 work started in June 2018, with a main effort in 2019 to produce a deliverable in February 2020.

The planned activities involve:
- Analysing the current photonics and microelectronics initiatives, at the EC level (and at the national level if relevant) and in terms of US action (e.g. Electronics Resurgence Initiative).
- Selecting the most relevant actions in Europe
- Organising workshops with European (or international) potential HPC technology providers and users.
- Influencing for an HPC focus in photonic and electronics road mapping activities, as well as welcoming experts from those fields to better complete the roadmap

The team already organized a list of contacts and an analysis of some EC projects. Recommendations for a research call have been made and a workshop is scheduled on Nov.7th with research organizations in the electronics field (both actions jointly with WP2.1).

An organizational change has been made: Marc Duranton from CEA is involved as 3rd party partner (with initial 20K€ budget) instead of ETP4HPC subcontractor Malcolm Muggeridge.

The task associated risks imply low responsiveness from photonics and microelectronics ecosystems, low involvement of European HPC players and uncertain capacity to industrialize current research results.

- **T2.3 – Synergies with other computing markets (M. Malms, M. Duranton)**

Task 2.3 and Task 2.1 actions include organising meetings, working groups and workshops to issue several documents:
- HPC post H2020 vision document (EuroHPC) – (by both tasks) final draft to be submitted in March 2019

A first draft is in progress and is expected by Oct. 20th. A second pass involving the workshop team from June 24th is to start right after this date. Team also want to reach out to technology institutes (i.e. Fraunhofer, etc.) and has planned a session on November 7th. ICT event (December 2018) and HiPEAC summit (Jan. 2019) will be used to review and synchronize.
- HPC + BD + IOT + AI use case analysis – (T2.3) text proposal in Sept. 2018, summary document in October 2018, Round 2 would deal with industrial use cases, which would involve some work with industries (e.g. Siemens, ATOS, SAP, etc.)
- R&I recommendation 2019-2020 – (T2.1) 2-page document submitted in Sept. 2018. Expected feedback from EC during cPPP meeting on October 23rd.

- **T2.4 – Coordination of HPC technology actions (JF. Lavignon, T; Bidot, M. Ostasz)**

The objective is to coordinate the research actions targeting HPC technologies in Europe – through increasing the impact of the results of the FET HPC projects 2015, coordinating the technology research projects 2016-2017 and maintaining liaison with EPI to identify and promote the synergies of this project with the other research actions on HPC technologies.

A dialog with FET HPC projects 2015 has been established from June to September 2018. A work plan for increasing the impact of these projects is expected in October 2018. The main work (i.e. work plan implementation, dialog with co-design projects, FET 2017 projects and

EPI) will be done from November 2018 to April 2020 for the deliverable to be submitted in May 2020.

So far, the team is up to a good start with FET HPC projects 2015 as it received positive feedback from 17 out of 19 and completed an analysis for 15 of them. The risks for this task involve a low level of interest from the projects and a cancellation of ESD.

- **T2.5 – Technology SMEs development (H. Falter, M. Gilliot)**

Based on the idea previously developed in EXDCI-1 that is to unlock innovations in EU-projects by stimulating projects spin-offs, this task aims to define and launch a call for proposal amongst the current FET HPC projects before selecting the awarded project and provide it with the funds.

The consolidation of the Selection Committee (SC) as well as the definition of the context, criteria, procedure and follow-up procedure are done. The SC is currently revising a draft of Call (prepared by WP2.5 following a telco in June) and will discuss administrative issues with the project coordinator and the project officer. Next actions include:

- Publish open call and collect submissions – planned in October 2018
- Selection process – planned in December 2018
- Follow up on selected project (and, if applicable), "final review" – planned in January or Feburary 2019
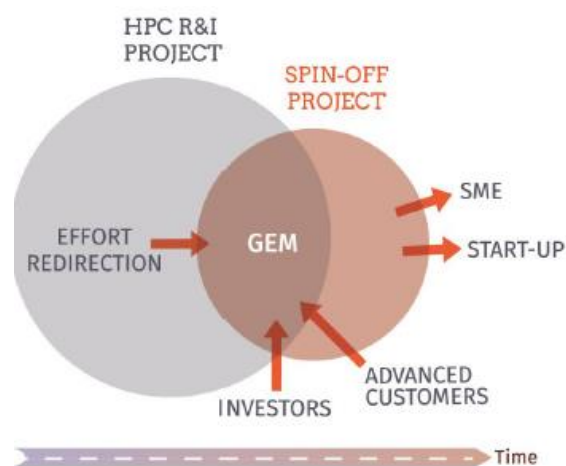
Figure 2 - Leveraging impacts of R&I projects

3.2.3   *WP3 – Excellence in HPC applications and usages*

WP3 is led by Mathis Bode (RWTH Aachen) and Stéphane Requena (GENCI). It has 3 main objectives:

- Develop a roadmap of HPC applications and usages
- Foster engagement with users' communities and CoEs
- Prepare industrial codes to Exascale

5 deliverables will be produced by this WP: one report on the updated roadmap of HPC applications & usages (due M24), two reports on joint brainstorming activities (due M15 & M27) and two reports on organization of WP3 workshops during HPC Summit Week 20 and 2020 (due M15 & M27).

The work is organized around 3 main tasks:

- **T3.1 – Roadmap of HPC applications and usage (C. Lambert, JC. André)**

The objective is to follow the roadmap activities of EXDCI, PRACE SC and ETP4HPC / BDVA SRA to produce new elements, and to integrate experts from new communities (humanities, AI, urgent computing, decision-making, etc.). WP3.1 also works in collaboration with WP2 as well as CoEs and FET HPC projects.

The work plan is the following:

- Establish a list of application experts from CoEs (approx. 10-12) and add some representatives from social sciences
- Extend expertise to representatives from transversal methods (AI, cloud… – approx. 2-3)

The foreseen size of this group of experts is about 15 people, who will communicate through teleconferences mostly but also during 2 physical meetings: one during EHPCSW19 and another to finalize the report (between M20 & M24).

To conduct said actions, WP3.1 will use the ETP4HPC survey of FET activities to identify relevant on-going research activities, extend it to BDVA, and share prospective documents from other European and international bodies.

- **T3.2 – Engagement with HPC users' communities and CoEs (G. Aloisio, S. Krieg)**

The objectives of Task 3.2 are to strengthen relations with end-user communities from HPC, HPDA and AI & collaborate with FET HPC projects, organize joint events dealing with common challenges across communities, and disseminate knowledge about national and European open calls through match-making events and results.

WP3.2 will establish a working group of HPC user communities' experts from CoEs FET HPC projects and other areas such as AI, cloud computing, etc. The size of this group of experts is expected to be around 20 to 30 people, as experts will play a key role in the dissemination of information and active participation to key events (i.e. EHPCSW19/20, BDEC meetings).

A mailing list and a shared workspace will be set up for task experts. Experts will have periodic teleconferences as well as physical meetings (see T3.1). They will be involved in various tasks: provide feedback from their community, help with the dissemination as well as sharing HPC-related information and knowledge among their network, help with the organization of joint brainstorming sessions across user communities on HPC/HPDA, and help in the preparation of white papers to be widely disseminated among the project.

- **T3.3 – Preparation of industrial codes to Exascale (L. Margetts, Y Fournier)**

The objective is to address the industry's lack of knowledge about HPC attributes as well as disseminate information and establish a network of experts. Task 3.3 will collaborate with CoEs, new industry-oriented CoE (i.e. EXCELLERAT led by HLRS), NAFEMS, and PRACE IAC and PRACE SHAPE.

The main actions for this task consist of improving HPC adoption in industry, leveraging existing organizations and gathering information (through desk studies, surveys, telephone interviews, workshops, etc.).

3.2.4   *WP4 – Transversal actions*

WP4 is led by François Bodin (UR1) and aims to address "high level" project questions and integrate other WPs results. This WP is organized around 7 tasks.
- **T4.1 – Transversal vision**

Task 4.1 established a think tank to discuss the future of HP/HPDA. It is composed of 10 members:

- Marc Asch (UPJV)
- Olivier Beaumont (INRIA)
- Henri Calandra (Total)
- Thierry Bidot (Néovia Innovation)
- Paul Carpenter (BSC)
- Guillaume Colin de Verdière (CEA)
- Jean-François Lavignon (TS-JFL)
- Bernd Mohr (Juelich)
- Jean-Philippe Nominé (ETP4HPC)
- Dirk Pleiter (Juelich)

The think tank will address the following questions:
- HPC as a cloud service / HPC in the cloud / HPC as a service – how to use HPC facilities, how to provide elasticity, how to combine HPC centres and cloud data centres, etc.
- Is workflow orchestration API the right "spanning layer"? – how is complex workflows /dataflows (sensors to simulation) deploying on multi-owner, multi-tenant infrastructures.

The group will have monthly teleconferences until the deliverable is done by February 2019.

- **T4.2 – Coordination with European actions on mathematics and machine learning (M. Asch, J. Povh)**

Task 4.2 will foster cooperation between HPC community and EU actions/actors from the Mathematics and Machine Learning (ML) domains. It has detected EMS (European Mathematical Society) and ECMI (European Consortium for Mathematics in Industry) as actors, and prepared the following list of actions:
- Mailing list of representatives of EU mathematics and ML societies – by October 31st, 2018
- Questionnaire / web survey, about "Future Math for Europe" – by November 30th, 2018
- Getting response from the learned societies and possibly to some selected industrial groups to cooperate in survey – by January 31st, 2019
- Organization, with the EMS, of a session (perhaps linked to one of their major conferences) to present and exchange with the participants (public of mathematicians) – by September 30th, 2019
- Organization of an exchange visit with the European Commission, to present the vision (could maybe take place in one of the permanent representations) – by October 31st, 2019
- Writing a report, which would be the only and final deliverable – by December 31st, 2019

- **T4.3 – Liaison and best practices analysis from the European Pre-exascale and Exascale system (M. Malms, JF. Lavignon)**

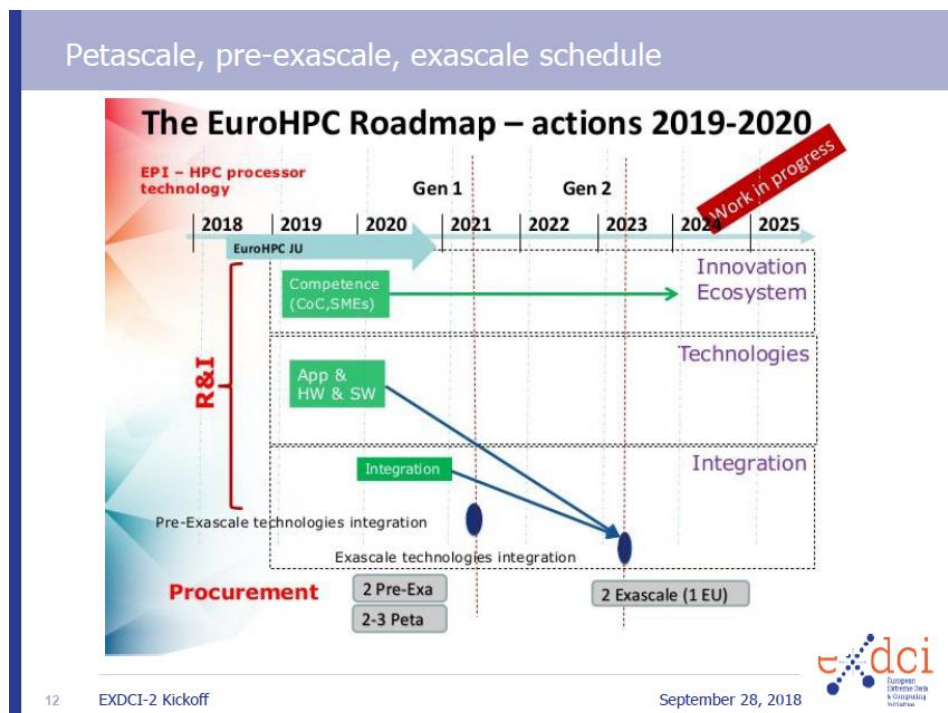This task aims to understand the ecosystem though the evaluation of the impact of pre-exascale and exascale.
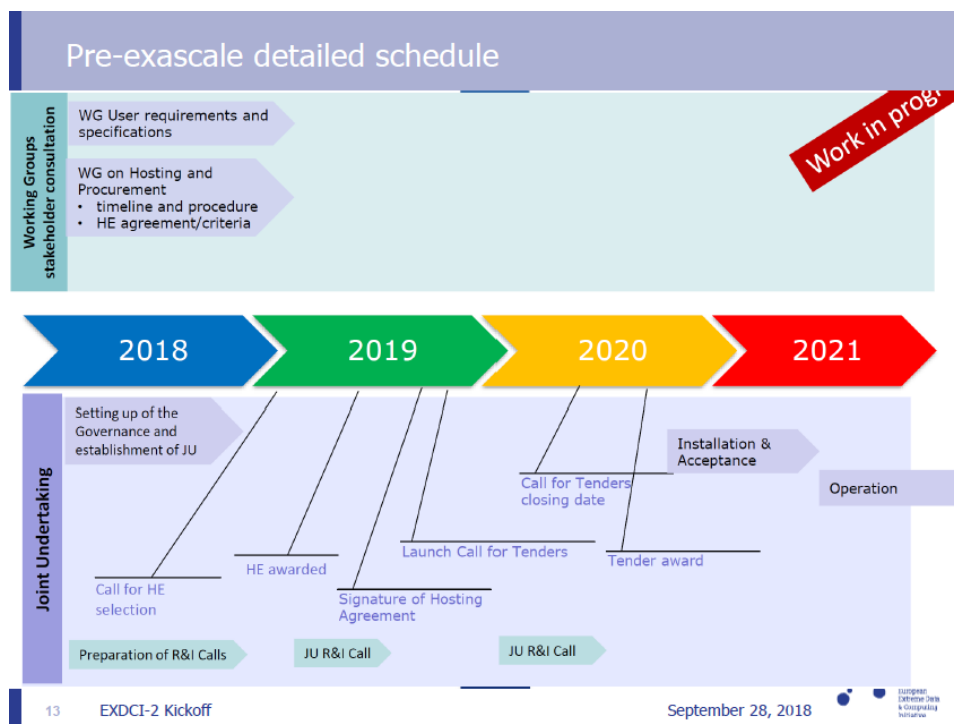
Figure 3 - EuroHPC Roadmap

Figure 4 - EU Pre-exascale systems schedule

Information regarding procurement:

Petascale system
- Targeting infrastructures installed at sites of new partners of EuroHPC
- Budget and number will depend of Member States (MS) participation
- EC view on budget: 20-30M€ per system for acquisition

Pre-exascale system
- Infrastructures installed at sites of funding MS of EuroHPC
- EC view on budget: 125M€ per system for acquisition

Exascale system
- Horizon Europe budget (not yet committed)
- Acquisition budget per system: 250M€

- **T4.4 – Analysis and assessment of the EU ecosystem (JP. Nominé, G. Lonsdale)**

This task will continue the impact assessment effort set up in EXDCI, with the methodology already developed (and improved) for data collection and analysis as well as for KPI tracking (this regular activity will be synchronized with HPC cPPP annual progress report). The outcomes will deal with industrial competitiveness and socio-economic impact, operational and management aspects of the HPC program, and include an ecosystem map identifying all EU HPC stakeholders and their capabilities. WP4.4 will also have to consider the moving landscape (i.e. termination of HPC cPPP, start of EuroHPC).

Task 4.4 will last until M24, when it delivers its assessment on the ecosystem report, consisting of an analysis of the KPIs for the development of the HPC ecosystem and of the progress made.

HPC cPPP Progress Monitoring Report (PMR) on 2017 was delivered on September 7, 2018. It used resources from EXDCI-1 then EXDCI-2 (from March onward) for this effort. EXDCI-2 contribution was some manpower and participation in a few meetings with the EC and other cPPPs, to fine tune the new KPIs and new PMR template implementation.

The T4.4 work plan for the next steps is the following:
- PMR on 2018 (Q2 2019) –cPPP likely termination by the end of 2018 will be discussed on October 23rd, 2018 was still under cPPP umbrella and will require a last PMR
- For the next 9 months we will thus focus on this PMR, same KPIs and template as for 2017 – improving our current methodology
- Then we will adapt to the changing situation in line with the EuroHPC ramp-up and taking over the HPC R&I programme

WP4.4 will work in collaboration with EXDCI-2 T2.4 (coordination of HPC technology actions, analysis of the FETHPC projects), T5.2 (standards) and with the HPC ecosystem (FocusCoE).
Next T4.4 meeting is planned in Kaiserslautern on October 2nd.

- **T4.5 – Legacy codes and software modernization / transition (G. Colin de Verdière, F. Bodin)**

This task aims to answer the following question: how much is the software technical debt?

This task lasting from M1 to M24 has 2 main objectives:
- Measure the capital of software (being) developed in the EU ecosystem – through developing a measuring methodology and highlighting the amount of effort need to do the transition.
- Propose a set of recommendations to help the next generation of software for the next generation of HPC systems – this work will be performed in collaboration with the application and the technology workgroups, in particular with T3.3.

A first white paper explaining the methodology is almost complete and another one will be submitted to WP4 for improvement (refine metric and survey entries). The survey will then be sent to European developers and analysed, and recommendations will be issued.

- **T4.6 – Transverse coordination and technical workshops organisation (T. Bidot, M. Gilliot, F. Bodin)**

This task is coordinating workshops. A first one-day project meeting is organized on September 28th, 2018. WP4.6 will organize a second two-day meeting in 2019.

- **T4.7 – HPC outreach (D. Henty, F. Bodin)**

This task aims to promote HPC at school. The main action consists of organizing a workshop with HPC experts and school teachers – in July 2019 at EPCC (although the funding issue is yet to be solved) and potentially organize a demo at SC18.

Connections with schools are setup already (at least in France and in the UK)
- Promotion of tools and practices to the national structures
- Timing is favourable In France as more computer science is being included in school

Points to discuss:
- The context may be more volatile during EXDCI-2 than under EXDCI
- The budget needs to be fixed
- How to disseminate the way the EC expects us to?
  - Technical DoW as opposed to a communication/marketing vision
  - How do we reach investors, users, SMEs, etc.
  - What channels can be used for the recommendations?
  - Need to avoid a repletion of the EXDCI-1 evaluation feedback

3.2.5   *WP5 – International development*

This WP is led by Sergi Girona (BSC) and consists of 2 tasks, the first one led by Mark Asch (UPJV) and the second led Jean-François Lavignon (TS-JFL) with Marcin Ostasz (ETP4HPC) as his co-lead.

3 deliverables and milestones are to be done under WP5:
- International workshop #1 – in April 2019 (M14)
- Report on the first WP5 international workshop – due in August 2019 (M18)
- International workshop #2 – in April 2020 (M26)

- Report on the second WP5 international workshop – due in August 2020 (M30)
- Presence of Europe in HPC-HPDA standardization and WP5 recommendations to promote European technologies – due in February 2020 (M24)

The budget is officially planned for organizing 2 international events
- 10K€ for invitations to workshops
- 20K€ for logistic travel experts
- 120K€ for the 2 meeting (WP6 budget)

However, this raises a problem as this low travel budget could prevent the European participation to international events.

- **T5.1 – International liaison and workshops (M. Asch)**

A BDEC2 organizational meeting was held in Chicago in   March 2018.

The BDEC Pathways to Convergence 40-page report written by 40 people among which 12 from the EU, was published in the *International Journal of HPC and Applications* in June 2018 and was read over a thousand times on ResearchGate. It is also accessible on HPCwire.

The objective of the BDEC2 series is to foster the co-design of a shared software infrastructure for extreme-scale science that draws on international cooperation and supports a broad spectrum of research domains, through notably the organization of six international workshops (over a year period) in order to enable transnational research communities in a wide range of disciplines to converge on this challenge.

An Executive Committee has been established with the following members
- Jack Dongarra (University of Tennessee) – Chair
- Mark Asch (UPJV)
- Rosa Badia (BSC)
- Haohuan Fu (Wuxi NSC, Tsinghua University)
- François Bodin (IRISA)
- Nicola Ferrier (Argonne National Laboratory, Northwestern University)
- Geoffrey Fox (Indiana University)
- Pete Beckman (Argonne National Laboratory, Northwestern University)
- David Keyes (KAUST)
- Yutong Lu (Guangzhou NSC, Sun Yat-sen University)
- Judy Qiu (Indiana University)
- Dan Reed (University of Utah)
- Michela Taufer (University of Tennessee)

6 meetings will be held in total – the aim is to arrange 3 meeting a year (alternating small and large ones), each dealing with a specific topic. This organization will also include inter-meeting working groups (e.g. for application/workflow analysis and DCP architecture).

The calendar so far is:

Date	Location	Focus
November 28-30	Bloomington, IN, USA	Defining application requirements for a data-intensive computing continuum
February 19–21, 2019	Kobe, Japan	Exploring alternative platform architectures
Q2, 2019	EU	TBD
Q4, 2019	USA	TBD
Q2, 2020	EU	TBD
Q4, 2020	Asia	TBD

Figure 5 - BDEC2 calendar

Task 5.1 is planning on displaying several deliverables following the workshops (i.e. presentations, summary reports, etc. on the BDEC website, and some collective products of the workshops series such as the "BDEC Strategy for International Cyberinfrastructure Convergence" series report or the Plan for International Demonstration Project).

BDEC proposes a series of actions regarding communication and outreach:
- A presentation to the EuroHPC consortium, followed by a high-level debate on how to implement BDEC recommendations into the European HPC strategy
- A BDEC forum with the other PPPs – BDVA, IOT, Cybersecurity, 5G – where BDEC's notion of continuum computing can be presented and discussed
- A presentation at the EuroHPCSW
- Regular postings and follow-up on EC blogs
- High profile publications relating EU adoption of BDEC recommendations

BDEC also has a proposal regarding a potential integration in the EuroHPCSW: the aim would be to create a BDEC built into the EHPCSW each May in order to produce a broader international event of a great quality, and create a European BDEC organization committee which would work jointly with the international BDEC committee with the EHPCSW organization committee. International BDEC collaborators may as well be invited to the EHPCSW and the following BDEC programme would be suggested:
- Keynote: public
- International Perspectives: public
- Application talk: most of them would be made public but not all
- Break out talk: restricted still but enlarged within the EHPCSW framework
- Social event: gathering personalities of the 3 continents involved

- **T5.2 – Increasing European impact on standards (JF. Lavignon, M.Ostasz, T.Bidot)**

The objective of Task 5.2 is to strengthen the position of Europe in standard relevant for HPC:
- For ICT standard organizations to make sure that the technical directions will consider HPC constraints such as performance or scalability
- For HPC standard organizations to promote the European user views and new technologies developed in Europe

The planned activities for this task involve the mapping (of organizations, EU experts and EU elements to be promoted), interviews (of standards' members and large organizations standard

people), a questionnaire for ETP4HPC members, connecting EU people (via mailing lists), the promotion of European technologies as potential standard (at international events, to EU standard members and to non-EU influential people), and a workshop (to enable contact between standard experts and technology providers).

The questions to the ETP4HPC members would cover the following aspects:
- Standard organization that are interesting for the member
- Member presence in standard organization
- Technologies developed by the member that could be promoted as standards
- Member experts that could be involved in standard organizations

The standard organization list currently consists of the following:
- Consortia that define hardware interface such as JEDEC, CCIX consortium, OpenCapi, OpenPOWER, RISC-V
- Open source communities that deliver software used in the HPC stack, such as Linux Foundation, open container initiative, Open HPC
- Open source communities and vendors that deliver software used in the HPDA stack, such, as ScikitLearn, Tensorflow (Google), DMTK (Microsoft), Apache
- HPC-oriented languages and communications libraries: OpenACC, MPI standar, Open MP language committee
- Communities of software tools designed for HPC as Lustre user group, Slurm user group

3.2.6   *WP6 – Dissemination and outreach*

Marjolein Oorsprong is leading the dissemination work package, whose objectives are to disseminate the results of the EXDCI-2 Project, to organize the EuroHPC Summit Week and to promote European HPC to industry and academia.

This WP consists of 3 tasks:
- T6.1 – Organization of the EuroHPC Summit Week conference series and logistical support to the organization of other EXDCI-related events/workshops/exhibitions (M. Oorsprong, R. Giménez)
- T6.2 – Support to international events (T. Bidot, R. Giménez)
- T.6.3 – Dissemination materials (R. Giménez)

WP6 will produce the following deliverables:
- Strategy report (requested by EC)
- D6.1 – First report on Dissemination Activities (M15 – May 2019); report on completed dissemination and outreach activities in the first year of the project
- D6.2 Second report on Dissemination Activities (M30 – August 2020); report on completed dissemination and outreach activities in the second year of the project

Website www.exdci.eu:

The website (along with Twitter) will continue playing a key role in the dissemination activities as it is the most important channel for publishing information and updates related to the project. The design needs to be improved, focusing more on the results of the first phase of EXDCI.

Social media – Twitter:

The objective of this account, which exists since March 2016, is to help "spread the word" among the target audience and encourage visits to the website.

The content spread on this account includes public lists created with CoEs and FET HPC projects, re-tweets of all the content of CoEs, FET HPC, European Exascale projects as well as the own EXDCI activities and HPC-related activities, events or call for papers.

The account's top tweets were the ones conveying information about the European HPC Summit Week and about the BDEC "Pathway to Convergence" report.

The audience we aim to reach is a European audience whose main interest is technology.

Tweets	Following	Followers	Likes
1 205	191	625	2 797

Figure 6 - EXDCI-2 Twitter account KPIs

The EXDCI-2 project is taking part in several exhibitions:
- Teratec Forum (jointly with ETP4HPC) in France in June 2018/19/20
- International Supercomputing Conference (jointly with PRACE) in Germany in June 2018/19/20
- Supercomputing Conference (jointly with PRACE) in the USA in November 2018/19/20/21

It will present 2 Birds-of-a-Feather at SC 2018:
- Consolidating the European Exascale Effort
- Big Data and Exascale Computing (BDEC2) Application Roundtable

As mentioned by WP4, 6 BDEC meetings will be organized as follows:
- #1 -   November 2018 in Bloomington, IN, USA
- #2 -   February 2019 in Kobe, Japan
- #3 -   Q2 2019 in Europe (EHPCSW19 collaboration TBD)
- #4 -   Q4 2019 in the USA (TBD)
- #5 -   Q2 2020 in Europe (EHPCSW20 collaboration TBD)
- #6 -   Q4 2020 in Asia (TBD)

The dissemination WP also has collaborations regarding:
- FET projects (with WP2.4) – pilot action to promote projects results (i.e. Mont-Blanc project, another one is to yet to be selected) closely linked with previous surveys
- SME-related actions (with WP4.5) – presentation of the results of 2 SMEs from HPC projects at SC18 "Consolidating the European Exscale Effort" BoF and booth
- CoEs – FocusCoE collaboration as well as PRACE-CoEs-FETHPC-EXDCI workshop on 30-31 October 2018 in Phantasialand, Germany

EuroHPC Summit Week conference series:
The main key event in the EXDCI projects has been the organization, specific request of the EC, is to create a yearly conferences series that gathered as many European HPC initiatives in a single week but under the umbrella of EuroHPC – hence the change of name to EuroHPC Summit Week.

The strategy/ positioning needs to be defined in the strategy report requested by EC (due on 5 October). This might affect the branding of the EuroHPC Summit Week, as well as other branded materials of EXDCI-2.

3.3 Other topics

3.3.1 *Strategic collaborations – Focus CoE*

FocusCoE 4 main objectives are:
- To create a platform, the EU HPC CoE General Assembly, that allows all HPC CoEs to collectively define an overriding strategy and collaborative implementation for interactions with and contributions to the EU HPC Ecosystem

- To support the HPC CoEs to achieve enhanced interactions with industry, and SMEs in particular, through concerted out-reach and business development actions

- To investigate concerted action on training by and for the complete set of HPC CoEs: providing a consolidating vehicle for user training offered by the CoEs and by PRACE (PATCs) and providing cross-area training to the CoEs (e.g. on sustainable business development)

- To promote and concert the capabilities of and services offered by the HPC CoEs and development of the EU HPC CoE "brand" raising awareness with stakeholders and both academic and industrial users
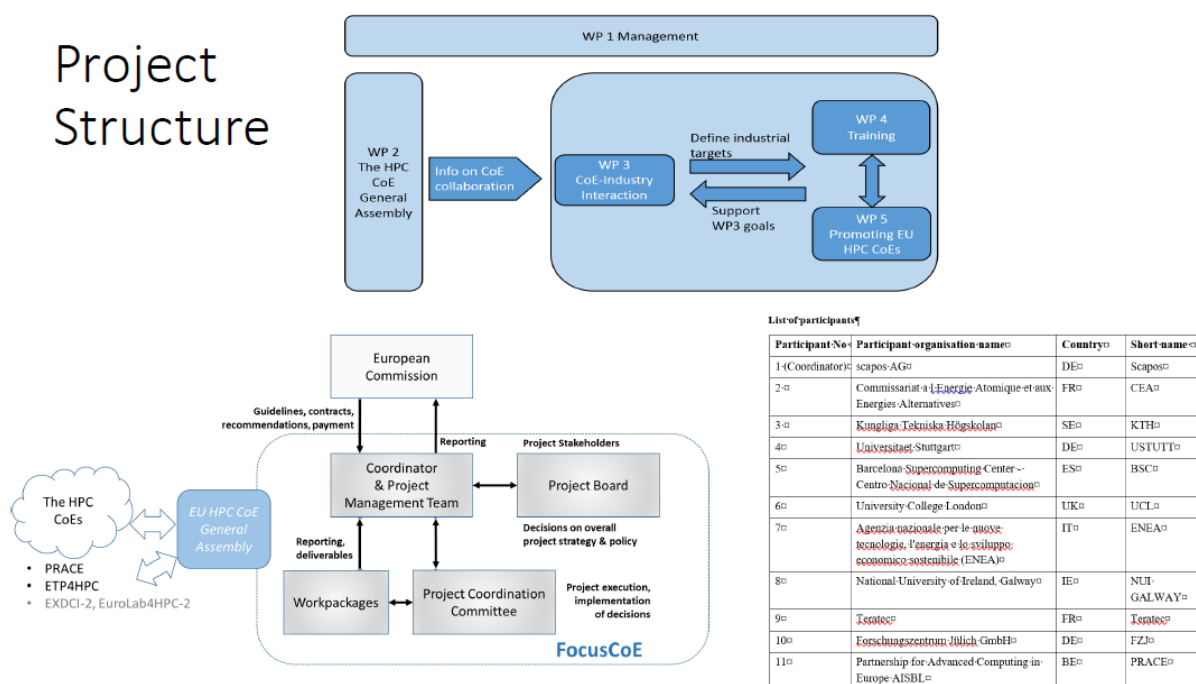

Figure 7 - Focus CoE presentation

3.3.2 *EHPCSW Organization – Serge Bogaerts (PRACE, Coordinator)*

The next EHPCSW will take place from 13 to 17 May 2019 in Poznan, Poland, and, as is the tradition, will be hosted by a PRACE member (i.e. PSNC). However, the EC might reconsider the way the host is chosen for future editions.

Storytelling approach:

- Have stakeholders of the three pillars of the European HPC ecosystem (i.e. Infrastructure, Technology Developers, Applications & Skills) share their latest developments and current needs of future expectations to define synergies
- Bring the different constituencies of HPC in Europe together to participate in shaping its future
- Offer a floor for decision makers to present the latest advances and perspective of structuring the political and financial framework of HPC in Europe chiefly through the EuroHPC Joint Undertaking

Aim and positioning:
The EHPCSW stands as a user-focused event, encouraging cross-fertilisation of academia and industry while providing HPC stakeholders in Europe with networking opportunities.
It aims to promote EU efforts (EC policy, projects…), EU academic and industrial HPC usage and EU HPC technologies and research, as well as to get views from international HPC, share technology evolutions and success stories, and identify opportunities among three pillars interactions.

Target audiences:
This one-week event is targeting several audiences:
- HPC users (technical and management levels), i.e. academic, industrial, new user communities and new users (students)
- Application owners, i.e. scientists and CoEs
- Infrastructure providers, i.e. PRACE members and centres
- Technology providers, i.e. ETPH4HPC members and FET HPC projects

The following new additions must also be considered:
- Flagships and other research infrastructures
- Centres of Competence – when they are created

Branding:
There has been some struggle in the past regarding PRACE days position / slot (and EXDCI) in EHPCSW.
The objective today is for EuroHPC to rise as a common branding, and EXDCI as an umbrella project.
- #EHPCSW would still be valid despite the name change
- Each session would be co-branded with the name / logo of the respective organizers and follow the pillar structure

Programme structure:
The current draft programme structure follows the following principles:
- Sessions should reflect the pillars
- Sessions holding a strategic place for everyone should be featured as a central part of EHPCSW
- Activities of ETP4HPC, BDVA, CoEs, etc.
- Unique elements of PRACE days
- Main venues for EuroHPC-related working groups and committees ($\leftarrow\rightarrow$ HPC-GIG project)
- Convergence between HPC / AI / Big Data (transversal)
- Training (i.e. hands-on workshops)
- Minimize impact of private meetings

So far, the content is organized around three "categories":

- Strategic / Synergetic sessions
  - Infrastructure plans for Pre-exascale and Exascale (e.g. including data)
  - Application co-design with technologies – by CoE, integrated programme
  - User requirements for future procurements (HPC-GIG)
  - Technological roadmaps for software, hardware and applications
  - PRACE-CoE-FETHPC-EXDCI meeting (follow-up of October 2018)
  - PRACE Award Ceremony
  - Panel Session

- Topical / Self-standing sessions
  - PRACE User Forum Open Session
  - (national) HPC Competence Centres session – widening the use of HPC, SME uptake of HPC
  - HPC skills (across elements like PRACE, CoEs and Competence Centres) – PRACE Scientific Track(s), PRACE Industrial Track(s), PRACE Poster Session…

- Particular / Isolated sessions
  - Workshops by specific projects

Committees:
The Organization and Programme Committee is established and composed of the following members:
- Chair – Serge Bogaerts (PRACE, HPC-GIG project)
- Vice-chair – François Bodin (EXDCI project)
- Vice-chair – Veronica Teodor (PRACE xIP projects)
- Co-organizer – Pascale Bernier-Bruna (ETPH4HPC) & Maike Gilliot as substitute
- EC Project Officers – Vangelis Floros & Leonardo Flores as substitute
- Scientific Steering Committee – Sinéad Ryan & a substitute
- Industrial Advisory Committee – Lee Margetts & Dieter Jahn as substitute
- User Forum – Troels Haugbølle & Koen Hillewaert as substitute
- Local host – Donata Sikorska & Norbert Meyer as substitute
- Main organizer – Marjolein Oorsprong & Silke Lang a substitute

A Logistics Committee is settled as well.

3.3.3   *Towards a common SC20 booth*

PRACE will have a booth at SC20, which is the biggest fair worldwide dedicated to the HPC. The participants discuss the opportunity for EXDCI-2 to call for the creation of a "Eurozone" at the fair, in order to display EU HPC ecosystem excellence.

As the proposition could cope with some EU stakeholders' needs (for example to promote the results of the FET-HPC projects), a coordinated Eurozone integrating all EU stakeholders is not a project that can be pursued.

EXDCI-2 will contact the potential participants of such a Eurozone to explore the feasibility of the idea.

3.3.4   *Budget and financial reporting – Inigo Yenes (PRACE)*

ODC- Others		Initial budget
PRACE & 3RD PARTIES- ODC		**434.334,00**
WP1	kick-off meetings	8.000,00
WP3	Meetings logistic	45.000,00
	Expert travel reimbursement	15.000,00
WP4	Workshop logistics	20.000,00
WP5	Workshop logistics	10.000,00
	Expert travel reimbursement	18.000,00
WP6	Design promo material	24.000,00
	Videos	10.000,00
	Brochure/Flyer printing	3.000,00
	Web domain	1.334,00
	Joint booth with PRACE at SC & ISC	68.000,00
	3 editions of the organisation of EHPCSW	81.000,00
	Media Sponsorship	5.000,00
	Promo material	3.000,00
	Joint booth with ETP4HPC at Teratec	3.000,00
	2 international events WP5	120.000,00
ETP4HPC & 3RD PARTIES- ODC		**145.000,00**
WP2	Meetings logistic	60.000,00
	Coordination of HPC technology actions	20.000,00
	Project spin off	65.000,00

Figure 8 - EXDCI-2 budget

SUBCONTRACTORS			€
A) IDENTIFIED - PRACE		**WP**	**Initial budget**
PRACE			**50.000,00**
Electricité de France - EDF	T3.3 co-leader	3	20.000,00
JCA Consultance	T3.1 co-leader	3	20.000,00
TOTAL	T4.1 participant	4	10.000,00
ETP4HPC			**20.000,00**
Mmconsulting	T2.2 co-leader	2	20.000,00
			70.000,00
B) NON IDENTIFIED - PRACE			
	Global trends and Statistics	7	50.000,00
	Studies WP5	5	10.000,00
			60.000,00
	TOTAL		**130.000,00**

Figure 9 - EXDCI-2 Subcontracting budget

Budget reallocation may be from a cost category to another and/or a beneficiary to another without amendment.

The financial reporting lasts 30 months – from 01/03/2018 until 31/08/2020

There are 2 reporting periods:
- RP1 from 01/03/2018 to 30/05/2019 (Q1-Q5)
- RP2 from 01/06/2019 to 31/08/2020 (Q6-Q10)

Pre-financing equals 75% of the funding (80% minus 5% guarantee fund)

Regarding request for interim payments: the coordinator must submit a periodic report within 60 days following the end of each reporting period.

4   Annex

4.1   Attendance list

The EXDCI2 project has received funding from the European Union's Horizon 2020 research and innovation programme under the grant agreement n° 800957

EXDCI2 - 1st Technical Meeting

Brussels, 28th of September, 2018

First Name	Last Name	Organisation	Signature
Giovanni	Aloisio	CMCC	
Jean-Claude	André	JCA Consultance	
Mark	Asch	UPJV	
Olivier	Beaumont	INRIA	
Costas	Bekas	IBM	
Florian	Berberich	PRACE	
Thierry	Bidot	NEOVIA	
Mathis	Bode	RWTH	
François	Bodin	URI	
Serge	Bogaerts	PRACE	
Henri	Calandra	Total	
Paul	Carpenter	BSC	
John	Clifford	PRACE	
Guillaume	Colinn de Verdière	CEA	
Peter V.	Coveney	UCL	
Marc	Duranton ✳	CEA	✳Comfcall Attendee
Fouad	El-Khaldi	ESI	
Stelios	Erotokritou	The Cyprus Institute	
Hugo	Falter	ParTec	EXCUSED (ill)
Sandro	Fiore	CMCC	
Evangelos	Floros	European Commission	
Yvan	Fournier	EDF	
Emilie	Germetz	Néovia Innovation	
Maike	Gilliot	ETP4HPC	
Renata	Gimenez	BSC	
Sergi	Girona	BSC	
Marine	Guerin	CNRS	

David	Henty	EPCC	
Hans Christian	Hoppe	Intel	
Stefan	Krieg	Juelich	
Catherine	Lambert	CERFACS	
Erwin	Laure	KTH	
Jean François	Lavignon	TS-JFL	
Corentin	Lefevre	NEOVIA	
Guy	Lonsdale	SCAPOS	
Michael	Malms	ETP4HPC	
Lee	Margetts	UoM	
Bernd	Mohr	Juelich	
Malcolm	Muggeridge	MMConsulting	
Jean-Philippe	Nomine	ETP4HPC	
Marjolein	Oorsprong	PRACE	
Martin	Ostasz	BSC	
Jean-Pierre	Panziera	ETP4HPC	
Franz-Josef	Pfreundt	FRAUNHOFER	
Heinz	Pitsch	RWTH	
Dirk	Pleiter	Juelich	
James	Powh	UL	
Stephane	Requena	GENCI/PRACE	
Pascale	Rosse-Laurent	Bull	
Allen	Sache-Brun	CEA	
Katia	Soto	PRACE	
David	Tur	HPCNow	
David	Wright	UCL	
Iñigo	Yenes	PRACE	