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Concerted action for the European HPC CoEs
Project Number: 823964

D2.3 – First Summary of Consolidated CoE Input Provided to the EU HPC Ecosystem

WP2 – The HPC CoE General Assembly

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List of abbreviations

BioExcel	Centre of Excellence for Computational Biomolecular
CEF	Connecting Europe Facility
ChEESE	Centre of Excellence for Exascale in Solid Earth
CoE	Centres of Excellence
CompBioMed	Centre of Excellence in Computational Biomedicine
D	Deliverable
DoW	Description of Work
EC	European Commission
E-CAM	An e-Infrastructure for Software, Training and Consultancy in Simulation and Modelling
EoCoE-II	Energy oriented Centre of Excellence
EOSC	European Open Science Cloud
ESiWACE	For future exascale climate and weather predictions
ETP4HPC	European Technology Platform for High-Performance Computing
EU	European Union
EU13	[Refer to new EU member states since 2004]
EuroHPC JU	European High Performance Computing Joint Undertaking
EXCELLERAT	The European Centre of Excellence for Engineering Applications
EXDCI2	European Extreme Data & Computing Initiative2
FZJ	Forschungszentrum Jülich (Juelich Research Centre)
H2020	Horizon 2020 –The EC Research and Innovation Programme in Europe
HLRS	Höchstleistungsrechenzentrum Stuttgart (High Performance Computing Centre Stuttgart)
HPC	High Performance Computing
HPC cPPP	HPC contractual Public Private Partnership in HPC
KTH	Kungliga Tekniska högskolan (Royal Institute of Technology, Stockholm)
MFF	Multiannual Financial Frameworks
PRACE	Partnership for Advanced Computing in Europe
POP	Performance Optimisation and Productivity Centre of Excellence Computing Applications
HiDALGO	HPC and Big Data Technologies for Global Challenges
Max	Material design at eXascale
SRA	Strategic Research Agenda
UCL	University College London
WIK-Consult GmbH	Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste GmbH (Research and Advisory Institute for Communications Services of Germany)
WP	Work Package

Executive Summary

The FocusCoE EU project has been established to support the European High Performance Computing (HPC) Centers of Excellences (CoEs) to act as one of the three pillars of the European HPC Initiative. It contributes to the success of the EU HPC ecosystem and the EuroHPC Initiative by supporting the EU HPC CoEs to more effectively fulfil their role: ensuring that extreme scale applications result in tangible benefits for addressing scientific, industrial, or societal challenges. It does this by creating an effective platform for the CoEs to coordinate strategic directions and collaboration (addressing possible fragmentation of activities across the CoEs and coordinating interactions with the overall HPC ecosystem) and to provide support services for the CoEs in relation to both industrial outreach and promotion of their services and competences by acting as a focal point for users to discover those services[1].

FocusCoE created an effective forum to coordinate strategic directions involving the CoEs in conjunction with the key stakeholders in the HPC ecosystem, EuroHPC JU, PRACE and ETP4HPC, and the wider HPC research community represented by the CSAs EXDCI-2 and EuroLab4HPC-2 from the FET HPC Programme.

Moreover, CoEs are frequently asked to provide input to the EC, ETP4HPC, or other projects on matters concerning the European HPC ecosystem. Thus, there was a need for coordination and consolidation of these requests in order to achieve a higher frequency of input from CoEs with minimum disturbance.

Within work package 2 (WP2) of Focus CoE, a dedicated task 2.3 (T2.3) called "Consolidated CoE Communication to the EcoSystem" has been defined to coordinate and consolidate these types of requests to CoEs. Examples of these requests are the positions and input from the CoEs on certain questions, inputs to position papers, input to the SRAs, collection of statistics, etc.

In addition, T2.3 is aimed at collaborating with the CoEs in order to support their preparation for the comprehensive European stakeholder workshops on HPC training and skills development needs organised by FocusCoE itself.

During the first project year, T2.3 received five requests for the CoE's input coming from both the EU HPC Ecosystem representatives and industry representatives. The five requests to the CoEs were:

1. Short questionnaire by ETP4HPC/EXDCI2 for the contractual Public Private Partnership in HPC (HPC cPPP) Progress Monitoring Report
2. Use case input for the Strategic Research Agenda (SRA 4) of ETP4HPC
3. Input for legacy code studies of the EXDCI2 project
4. Questionnaire from WIK-Consult GmbH (Research and Advisory Institute for Communications Services of Germany) for the Multiannual Financial Frameworks (MFF) and Connecting Europe Facility (CEF) (SMART 2017/0018).
5. Request of the CoEs' contact points by European Open Science Cloud (EOSC) for population of their portal.

T2.3 proactively worked on these requests, analysing them and ensuring their suitability for the CoEs. Furthermore, the requests were adjusted and communicated to the CoEs in a coordinated manner. The timely input received from the CoEs for these requests were clear indications of their interest and appreciation of T2.3 coordinated activities. The results of these requests were communicated back to the requestors and served as part of the important

inputs to the HPC Ecosystem from the CoEs. The details of some of these requests are listed in the Appendix of this document.

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1 Introduction

The ten CoEs for HPC applications were selected following a funding call under the European Research Infrastructures. Their aim is to promote the use of upcoming exa-scale and extreme performance computing capabilities and scale up existing parallel codes towards exa-scale scaling performance [3].

As was mentioned by European Commission, the CoEs bring together the European world-class knowledge and expertise in applying established mechanisms, user-driven development, performance tools and programming models for HPC, and co-design activities for real systems based on leading edge technologies.

Accordingly, their input is essential for many actors such as the key stakeholders in the HPC ecosystem, EuroHPC JU, PRACE and ETP4HPC, and the wider HPC research community representatives including industry.

In this context, one of the main purposes of FocusCoE is to act as a consolidator of communications between the HPC ecosystem representatives and the CoEs. More specifically, T2.3 within WP2 is dedicated to coordinate and consolidate all the requests for CoEs' inputs such as contributions to position papers, input to the SRAs, collection of statistics, etc. to the HPC ecosystem representatives including industry.

This document describes in detail the activities of FocusCoE that were initiated and conducted in order to enable consolidated and coordinated communication between the CoEs and the HPC ecosystem representatives including industry during the first year of the project. The document is organised as follows: This first section is the introduction to the document. The second section introduces the CoEs, the HPC ecosystem stakeholders, and describes FocusCoE's activities towards the establishment of routines and contacts with CoEs. It also describes the list of requests from the CoEs that have already been handled by FocusCoE during this project period. The final section summarises the results of the work done by FocusCoE T2.3 towards the consolidated CoE input during the first project year.

2 Consolidated CoE Input

The first activities of T2.3 were with the help of the CoE contact list generated by T2.1 in order to initiate the first contacts with the ten CoEs. T2.3 received positive replies from the CoEs and willingness to contribute to the HPC ecosystem through the consolidated and filtered requests by T2.3.

2.1 The HPC Ecosystem and the ten CoEs

The HPC ecosystem presented in the ETP4HPC strategic research agenda published in advance of the first EuroHPC JU call for proposals, "SRA-3") – being a contribution to the, then active HPC cPPP (which has been superceded by EuroHPC) – included the representation shown in Figure 1 below of the 3 pillars of the HPC ecosystem. In terms of the European players contributing to the strategic development of R&D&I within the HPC cPPP,

there was a very clear alignment with those 3 pillars: ETP4HPC for the HPC technology supply chain; PRACE (Partnership for Advanced Computing in Europe) for the HPC research infrastructure; the HPC Centres of Excellence for HPC applications. Essentially, the 3 pillars of Figure 1 are still at the core of the HPC ecosystem, though more recent planning considers complementary actions linked to HPC services and usage skills. The balanced evolution of these three elements ensures the development of a globally competitive HPC ecosystem that benefits the European economy and citizens

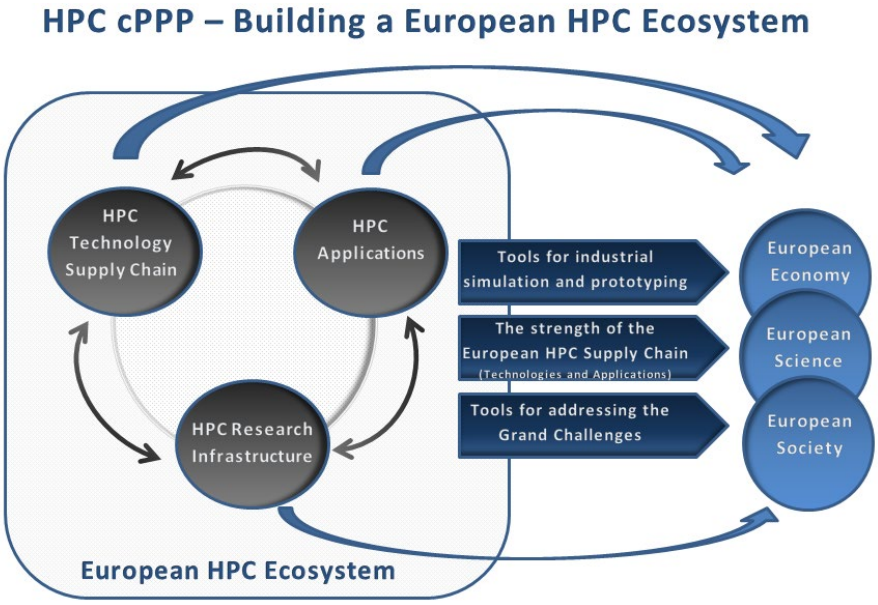

Figure 1: EU HPC Ecosystem as presented by the HPC cPPP

In terms of the H2020 or EuroHPC contributors to the R&D&I actions for the EU HPC ecosystem – building on the funding programmes of the European Commission, the EuroHPC Joint Undertaking and the individual EU member states – the ecosystem has become richer. Figure 2 shows a representation of roles and interactions prepared by the EuroLab4HPC CSA, in the 2nd half of 2020, these will be complemented by the EuroHPC national Competence Centres (coordinated by the CASTIEL CSA and combined through the single EuroCC project) and the complementary FF4EuroHPC project addressing the broader HPC take-up by SMEs.

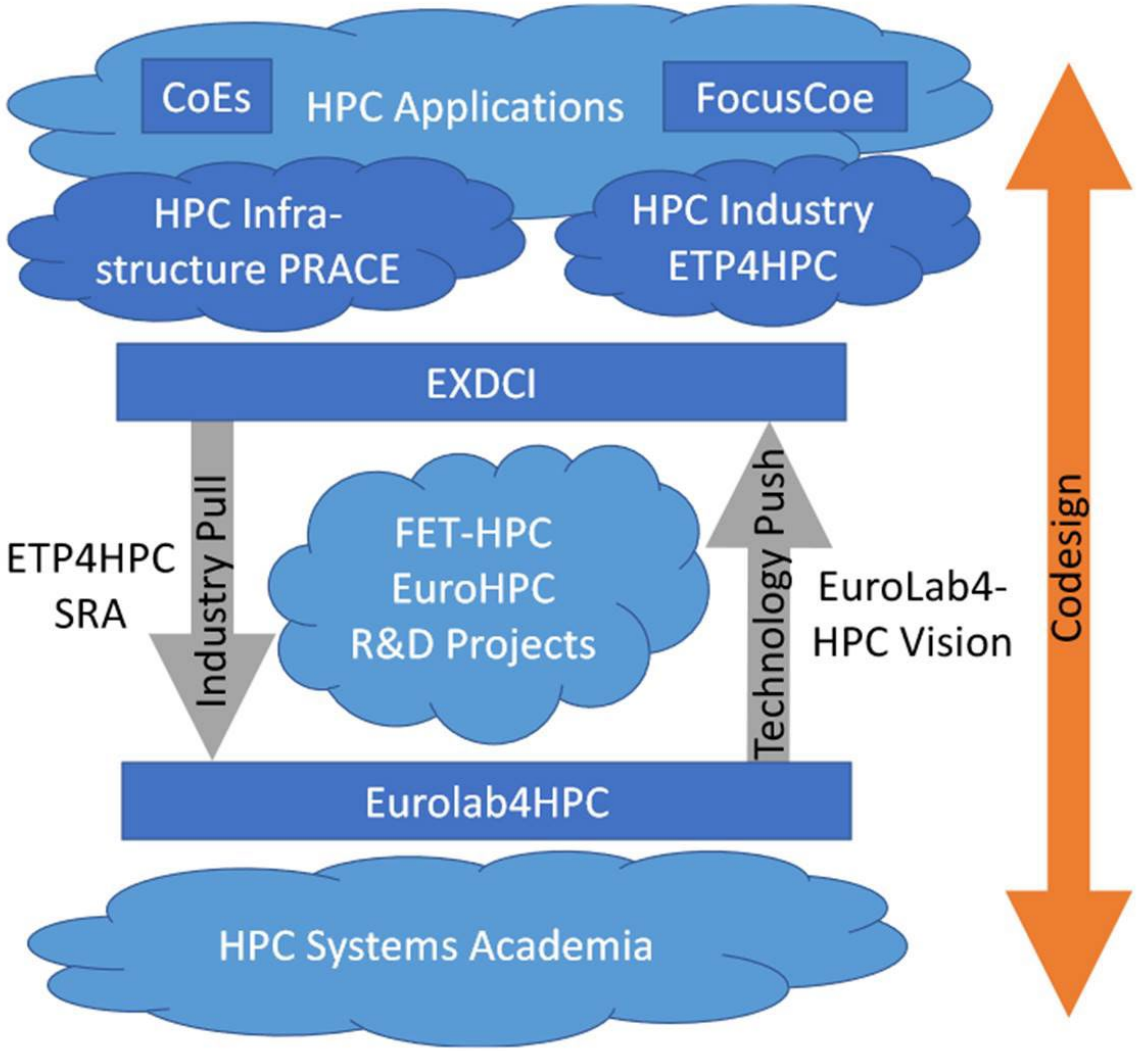

Figure 2: EU HPC Ecosystem presented by Eurolab4HPC

The CoEs active and engaged during the first project period were the following [2]:

CoE name	Scientific domain	Website
BioExcel-2	Centre of Excellence for Biomolecular Research	https://bioexcel.eu/
ChEESE	Centre of Excellence for Exascale in Solid Earth	https://cheese-coe.eu/
CompBioMed2	A Centre of Excellence in Computational Biomedicine	https://www.compbiomed.eu/
E-CAM	An e-infrastructure for software, training and consultancy in simulation and modelling	https://www.e-cam2020.eu/
EoCoE-II	Energy oriented Centre of Excellence for computer applications	https://www.eocoe.eu

EsiWACE2	Excellence in Simulation of Weather and Climate in Europe	https://www.esiwace.eu/
EXCELLERAT	The European Centre of Excellence for Engineering Applications	https://www.excellerat.eu
HiDALGO	HPC and Big Data Technologies for Global Challenges	https://hidalgo-project.eu/
MaX 2	Materials design at the Exascale	http://www.max-centre.eu/
POP2	Performance Optimisation and Productivity	https://pop-coe.eu/

Table 1: CoE list

During the first year of the project, T2.3 received five requests from several key HPC ecosystem actors and/or initiatives, which T2.3 filtered and adjusted before passing them on to the CoEs. The answers to these requests were also gathered by T2.3 in organised manner. Below, we described these five requests and present the successful handling of these by T2.3.

At the start of the FocusCoE project, the Task 2.2 set up the contact list of CoEs that was used by T2.3 during the complete reporting period. When requests for inputs from CoEs came from parties active within the HPC ecosystem (or acting on behalf of organisatiuons engaged with the HPC ecosystem), these were received by FocusCoE, Task 2.3 then took over the handling of the process.

The requests were handles through four main steps:

1. Analyze the request to make sure it fits to the profile and scope of the CoEs.
2. Discuss the level of details of the requested information with the requestor. Accept/reject the request based on its relevance to CoEs.
   a. If needed, adjust and simplify the request to the profiles of CoEs
3. Communicate the request with CoEs and gather their feedback
   a. If needed, communicate the request with each CoE separately based on the type or the delay of the answer from CoE
4. Collect and (if needed) consolidate the answers from CoEs before communicating back to requestors.

Experience showed that the analyses of the requests by T2.3 were much appreciated by CoEs as they avoided receiving requests for information or the completion of surveys that were inappropriate in the sense of being unaligned with their profile and scope. On the other hand, the communication through T2.3 with CoEs was much appreciated by requestors as they received the answers in an organized and on-time manner.

2.2 ETP4HPC/EXDCI2: short questionnaire for HPC cPPP Progress Monitoring Report

ETP4HPC

ETP4HPC is the European Technology Platform (ETP) in the area of High-Performance Computing (HPC). It is an industry-led think-tank comprised of European HPC technology stakeholders: technology vendors, research centres, and end-users. The main objective of ETP4HPC is to define research priorities and action plans in the area of HPC technology provision (i.e. the provision of supercomputing systems). ETP4HPC issues and maintains a Strategic Research Agenda as a mechanism to help the European Commission define the

contents of HPC Technology Work Programmes. It also acts as the "one voice" of the European HPC industry in relations with the European Commission and national authorities. ETP4HPC was formed in October 2011[4].

EXDCI-2

Through the joint action of PRACE and ETP4HPC, EXDCI-2 mobilises the European HPC stakeholders. The project builds upon the achievements of EXDCI and will continue its participation in the support of the European HPC ecosystem with two main goals [5]:

- Development and advocacy of a competitive European HPC Exascale Strategy by supporting the implementation of a common European HPC strategy, open to synergistic areas including High Performance Data Analytics (HPDA) and Artificial Intelligence (AI). The expertise of the partners and stakeholders will permit to elaborate a transversal prospective vision.
- Coordination of the stakeholder community for European HPC at the Exascale through joint community structuring and synchronisation. This entails ensuring EXDCI-2 stakeholder representation in the main development of the European HPC eco-system towards Exascale, such as:
    - The development of relationships with other ecosystems including upstream technologies as photonics and electronics, High Performance Embedded Computing (HiPEAC) and Big Data (BDVA)
    - In the context of the upcoming European Data Infrastructure (EDI) a road mapping activity toward future converged HPC, HPDA and AI needs and new services from PRACE user communities and CoE
    - The continuation of BDEC activities, for international participation of European stakeholders on the integration from edge computing to HPC, including Data Analytics and AI
    - The mapping and analysis of related national and international R&I research agendas

EXDCI-2 gives particular attention to creating synergies with the CoEs – for example with the CSA FocusCoE – and in building on the outcomes of FET HPC projects [5].

Questionnaire

On behalf on the EC and according to the Key Performance Indicators (KPIs) and monitoring activity within EXDCI-2, there was a need to gather information from the CoEs in order for these to serve as input for the 2018 Annual Progress Report of the contractual Public Private Partnership in HPC (HPC cPPP). EXDCI-2 prepared a questionnaire that provided the basis for discussions with the CoEs. The EC was asking EXDCI-2 and ETP4HPC to investigate in particular aspects related to innovation stemming from the projects, and efforts oriented towards talent generation and training. This questionnaire was comprised of three questions calling for a few figures and sometimes brief extra information, explanations, or descriptions of achievements.

The request was distributed to all ten CoEs with clear guidelines and deadline. The answers from the CoEs were gathered on time and successfully passed on to EXDCI-2 and ETP4HPC. The questionnaire itself is listed in the Annex.

Case specific added value: The answers for the questionnaire were needed at short notice and group communication to CoEs would have not been successful due to the pressing time restraints, as well as the need of further explanations on the level of detail for the answers needed. T2.3 had a key role in communicating with CoEs one-by-one and also in detailing each question asked. With the help of T2.3, all the answers were gathered within a few days.

2.3 Use case input for the Strategic Research Agenda (SRA 4) of ETP4HPC

The ETP4HPC Strategic Research Agenda (SRA) is a key deliverable that outlines a roadmap for the achievement of exa-scale capabilities by the European HPC ecosystem [4]. As indicated by ETP4HPC, the milestones set in the SRA help the European Commission – now the EuroHPC Joint Undertaking – define the contents of the HPC Technology R&D work programmes as part of the European Research programme – Horizon Europe (or FP9).

Within the SRA4, eight research areas were discussed and one of these research areas was the "Application co-design" area where the input of the CoEs was essential. ETP4HPC asked the help of FocusCoE Task 2.3 to gather the input from the ten CoEs for this specific research area on the use cases for application co-design.

This request was handled by T2.3 and the input of use cases from the CoEs was gathered accordingly and on time. This input has been integrated in different sections of the SRA4 of ETP4HPC that was published in the beginning of 2020 [4], and specifically the related points of the use cases have been addressed in an application co-design chapter of SRA4. These inputs were also essential for the "cluster" analysis and development of the "research clusters" and "research domains" matrix of the SRA4, as shown in the figure below.

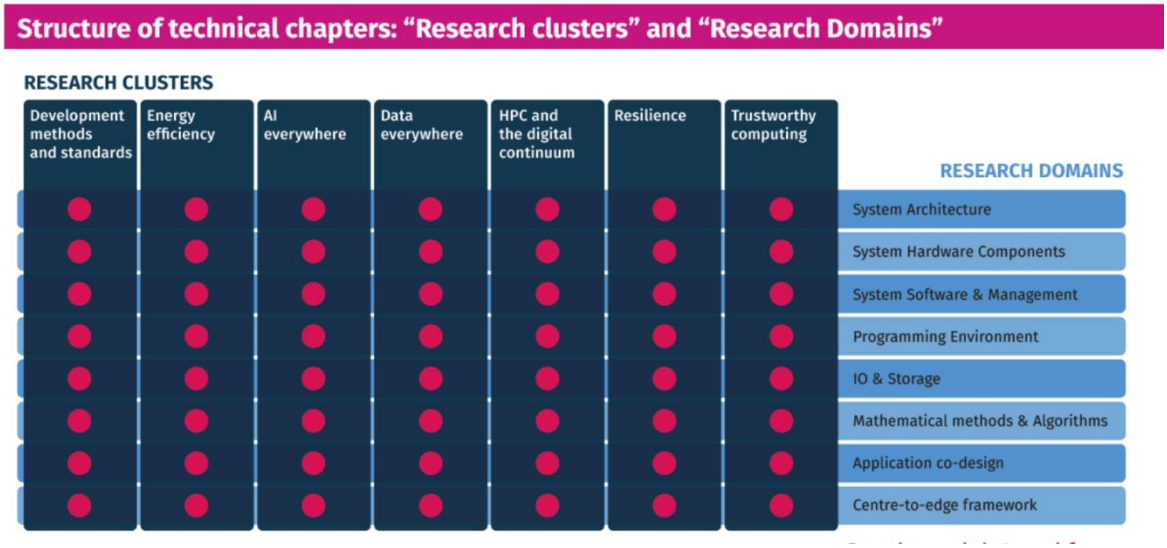

Figure 3: ETP4HPC SRA4 cross matrix of research clusters and research domains.

Case specific added value: As shown in the figure above, the SRA was written by several sub-groups divided per research domain. The request T2.3 received was from the Application co-design domain, its leader was a T2.3 member. FocusCoE funded the role of Applications co-

design leader and thus played a strategic role in the applications-related components of SRA-4.

2.4 Input for legacy code studies of the EXDCI2 project

EXDCI-2 has set-up a working group to analyse European code legacy towards the Exascale. The EXDCI-2 working group took several actions, which included the creation of new metric (Code Viscosity) and its display through a European survey that will be the basis for a global evaluation of the efforts that will be required to port EU codes to the next generation of machines [5].

To further proceed with these tasks, there was a need for a software survey among the CoEs to understand and to "measure" the effort needed to adapt code to new architectures. The survey was based on several key parameter that easily identify the efforts needed for enabling them on new architectures without code analysis.

EXDCI-2 contacted T2.3 for help with conducting the survey with the CoEs. The survey, as well as the white paper draft about the legacy code studies, were shared with the CoEs to gather their input. The answers were received from all of the CoEs and the results of these activities have been published on the EXDCI-2 webpage [5]. The survey is listed in the Annex.

Case specific added value: This request was very specific targeting software development within the CoEs and the answers for the questionnaire were needed from all CoEs. T2.3 had a key role in communication with CoEs one-by-one and also detailing each question asked. With the help of T2.3 all the answers were gathered within a week and The timely provision of input from the CoEs supported EXDCI-2 in completing their analysis in line with their project time-lines, and the study has been published on the EXDCI-2 webpage [5].

2.5 Questionnaire from WIK-Consult GmbH

As described in the webpage of WIK-Consult GmbH [6], WIK was set up in 1982 as the think tank of the Ministry of Post and Telecommunications. Since then WIK (Wissenschaftliches Institut für Infrastruktur und Kommunikationsdienste GmbH, formerly the Wissenschaftliches Institut für Kommunikationsdienste GmbH) has become Germany's leading research and advisory institute for communications services. Their scientific work focuses on regulatory and policy issues in the field of telecommunications and post as well as digitisation, intelligent networking and internet including smart energy.

The work of WIK contributes to regulatory decision-making and sets the course for policy. In the field of digitisation, intelligent networking and internet, WIK assists the political discourse of stakeholders. Since the mid-1990s, the think tank has increasingly undertaken work for international organisations such as the EU Commission and foreign regulatory authorities as well as private entities.

WIK is backed by the Federal Ministry of Economic Affairs and Energy. Representatives of science, business and government actively follow the work and performance of WIK through their role on its supervisory board and advisory boards.

Questionnaire

WIK-Consult GmbH's request was stated in the following way: In the context of the preparations for the implementation of the next Connecting Europe Facility (CEF) programme throughout the next Multi-Annual Financial Framework, and in particular for the implementation of the new CEF Digital part, the European Commission must ensure that the available funding is best targeted between and within the proposed CEF Digital objectives and actions. These objectives and actions include the deployment of very high speed fixed and wireless (5G) access and backhauling networks under specific conditions. For that purpose, the Commission has awarded Ecorys, in partnership with WIK, ID ATE and VVA, a study preparing the implementation of CEF Digital in the period 2021-2027.

The questionnaire linked to this request was implemented in the SurveyMonkey online tool and was comprised of 32 questions. As the questions were related to mainly network capabilities, these were answered only by CoEs that had a relation to the requested information. Thus, the answers were received only from a few CoEs. However, these answers were of great value for WIK-Consult GmbH to analyse in their further studies. The results of the study constituted an important input to the preparation of the relevant Multi-Annual Work Programmes.

Case specific added value: The first version of the request was poorly formulated and was not appropriate given the scope of the CoEs. T2.3 explained the role of the CoEs to WIK-Consult GmbH and insisted on reformulating and reformatting the request into a web questionnaire. This was done: the questions were simplified, the quantity was decreased, and a web-based form was used. The changes encouraged CoEs to answer the questions and only the CoEs who had relevant information were addressed. Thus, T2.3 was a clear filter between the requestor and the CoEs which produced an advantageous result for both sides.

The figure below depicts the first page of the questionnaire:

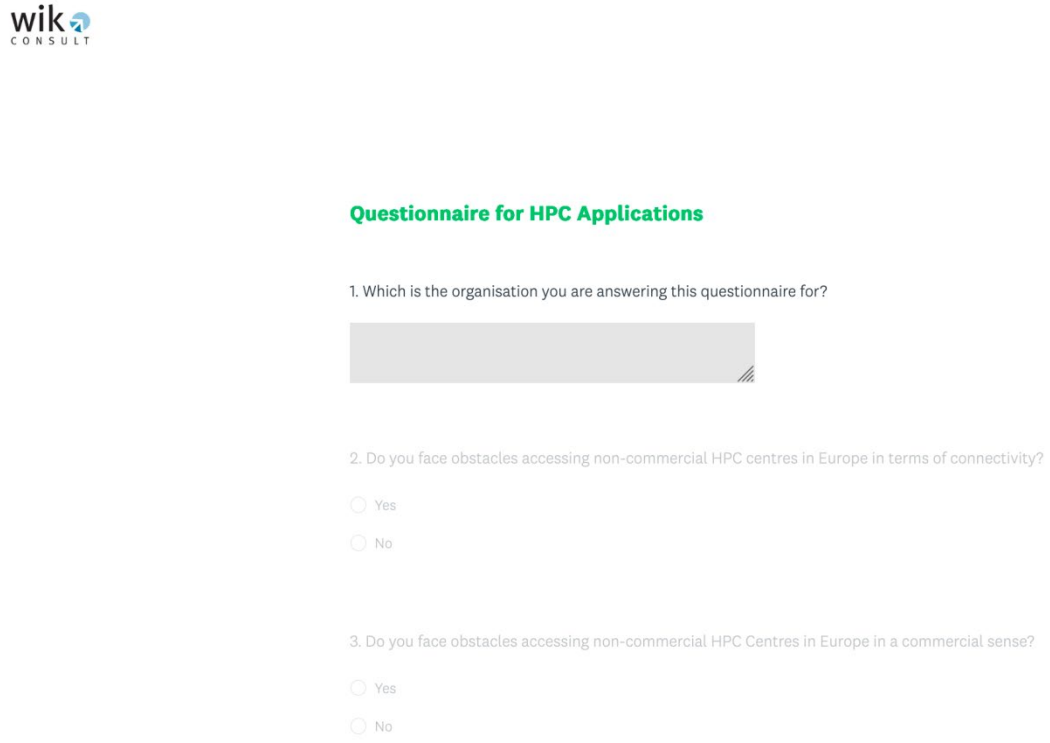

Figure 4: WIK-Consult GmbH SurveyMonkey questionnaire screenshot

2.6 Request of CoEs' contact points by EOSC

The European Open Science Cloud (EOSC) initiative has been proposed in 2016 by the European Commission as part of the European Cloud Initiative to build a competitive data and knowledge economy in Europe. An extensive consultation with scientific and institutional stakeholders took place in 2016 and 2017. An engagement process was initiated with the first EOSC Summit in June 2017, resulting in the EOSC Declaration endorsed by more than 70 institutions. The summary outcome of the consultation was presented in March 2018 by the European Commission in the form of a roadmap for implementing the EOSC [7].

Within the EOSCsecretariat.eu project, the CSA that supports the EOSC Governance & executive boards wishes to understand and document the assets, services, products from the individual Centres of Excellence (CoEs). It also wishes to see how many of these could potentially fit into one or more of the EOSC portal [7]. Currently there are eight services in the portal: networking, compute, storage, sharing & discovery, data management, processing & analysis, security & operations, training & support.

For this purpose, EOSC contacted T2.3 of FocusCoE and asked for the help of gathering the dissemination contact points of the CoEs. T2.3 in turn discussed with the 10 CoEs if these would be of any interest in further exploring the EOSC catalogue and services and whether the CoEs wold be interested in contributing. After gathering the positive feedback from the CoEs, T2.3 requested that their dissemination contact points should pass this information on to EOSC for future contacts to populate the EOSC portal with CoE provided services. The contact information of those responsible for dissemination activity were gathered form all of the CoEs and the list was sent to EOSC.

3 Conclusion

During the first project year, FocusCoE received five request form different HPC ecosystem stakeholders that needed organised input from ten CoEs. Task 2.5 already established contact details for the CoEs at the beginning of the project and thus had all the prerequisites for successful implementation of future requests. The requests came from ETP4HPC, EXDCI-2, EOSC, WIK-Consult GmbH. All of the requests, except from WIK-Consult GmbH, were addressed and answered by all of the CoEs. The questionnaire from WIK-Consult GmbH was answered partially due to its specific topic that was not relevant for some of the CoEs. Overall, T2.3's activities were very successful during the first year of the project and were in organised in a manner that caused minimum disturbance for the CoEs. All of the requests were analysed and filtered to make sure that these were suitable for the CoEs to answer. This filtering was done in advance, prior to contacting CoEs. T2.3 will continue its activities with the current CoEs as well as it will establish the contacts with the new four CoEs. It will continue act as a filter between CoEs and external actors. T2.3 will also continue its support to the organisation of the stakeholder workshops.

4 References

[1] FocusCoE project, http://www.focus-coe.eu/
[2] FocusCoE Deliverable D1.2, “Management Report”, Project Month 19 (June 2020)
[3] https://ec.europa.eu/digital-single-market/en/news/ten-new-centres-excellence-hpc-applications
[4] https://www.etp4hpc.eu/sra.html
[5] https://exdci.eu/assessment-eu-legacy-code-and-software-modernisation
[6] https://www.wik.org/index.php?id=356&L=1
[7] https://www.eosc-portal.eu/

5 Annex

5.1 ETP4HPC and EXDCI_2 questionnaire

CoEs Short Questionnaire by ETP4HPC/EXDCI2 for HPC cPPP Progress Monitoring Report

ETP4HPC EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

April 2019

exdci

To: 2015-2016 H2020 Centres of Excellence for Computing Applications

On behalf on the EC, we are collecting data for the 2018 Annual Progress Report of the contractual Public Private Partnership in HPC ("HPC cPPP"). Since your project has received H2020 funding in the scope of this cPPP, we contact you now via FocusCoE.

The EC is asking us to investigate in particular aspects related to innovation stemming from the projects, and efforts oriented towards talent generation and training.

We believe this data collection is of mutual interest, and can also be re-used by FocusCoE for the promotion of CoEs and their activities.

We would be very grateful to receive your feedback in the course of in the course of the next 4.6 weeks , in a "best effort" spirit (better incomplete answers than no answers at all!).

This questionnaire encompasses 3 questions calling for a few figures and sometimes brief extra information, explanations, or descriptions of achievements.

For further questions please contact Guy Lonsdale (guy.lonsdale@scapos.com) or the FocusCoE WP2 team who will have contacted you with this request.

1

CoEs Short Questionnaire by ETP4HPC/EXDCI2 for HPC cPPP Progress Monitoring Report

ETP 4 HPC EUROPEAN TECHNOLOGY PLATFORM FOR HIGH PERFORMANCE COMPUTING

April 2019

exdci

Q0a. Name of the project and coordinator name for these answers:

Q0b. Project start/end dates (be it finished, or not):

NB: below we will be interested in information relating to the *timeframe*:

[start of the project; end of the project OR end of 2018 for projects still running]

Q1. Patents: were there any patents filed by your project partners during the project, stemming from the H2020 funded R&D work in the CoE, and if so can you give an estimated number of these patents? (You can also indicate if the filing of some patents is still pending or planned)

Q2. Training: we know all CoE projects had/have had an extensive training activity. Can you provide quick statistics on your training activities:

- **Number of training events** organized, topics covered (possibly and if relevant with details about categories of events e.g. webinar, school, tutorial, coding sessions etc.....):

	Topic (such as domain/application specific, HPC technologies, profiling and optimization ...)	Number of events / by category (e.g. webinar, coding session, tutorial....)	Extra details on topics/contents	(optional) #of participants
EXAMPLE	*Advanced Numerical Methods for Domain XXX*	*2 Webinars* *1 Summer School*	*Introductory webinars* *3-day / tutorials+hands-on*	*ca. 2*45 attendees* *36 attendess*

- **Recapitulation: total number of participants** (and if possible person*days of training delivered):

Q3. Innovation: this relates to the so-called 'Significant innovations' KPI of the PMR – actually common to all 10 H2020 cPPPs.
Would you select and briefly describe your choice of what you would consider **significant innovations (up to 3)** achieved by the project thanks to H2020 funding (your self-assessed 'Top3'...)? Please indicate the nature of the result (e.g. full application, or application extension or optimization, library or tool etc. - in case of s/w) + a few hints on dissemination e.g. open source or other channel, integration in some application, simulation results made possible if relevant etc. and please indicate a contact point with whom we could follow up if need be.

Alternatively you can summarise what you would consider **a general 'innovative' achievement of your CoE**, for instance in terms of methodology or services delivered, with a few facts and figures (please indicate which option you are dealing with General Achievement or Achievement#1, #2 in your answer).

5.2 Legacy code survey from EXDCI-2

	Question	Your answser	Comment
1	Code Name:		
2	Owner organization:		
3	Field & method (short summary):		*Will be useful to sort results by types of codes, as a secondary outcome of the survey*
4	Development method:	company/lab owned ☐ community development ☐	
5	Code status:	Open source ☐ licensed ☐	
6	Code team size at origin:		
7	Current code team size:		
8	Development started in:		*date*
9	How important is this application for your organization / for your work?		*(1=useful to 5=highly critical)*
10	Current number of line of codes (excluding 3rd party libraries):		*in (measured) millions of lines*
11	Language(s):		• *FORTRAN* • *C* • *C++* • *MPI* • *OpenMP,* • *CUDA, OpenACC,*
			• *Python,* • *…*
12	Major 3rd party libraries:		*Will be useful as a secondary outcome of the survey*
13	Acceleration:		*quantify the adaptation of the code to accelerated petascale systems: range [0..1], 0 = unfit to accelerated computing, 1 = code running ne on an accelerated petas-cale machine, e.g. 0.5 = job half way done*
14	Are you planning to port your codes on an exascale system when available?		*yes / no*
15	If yes in how many years?		
16	Do you think your team has the expertise to do a port on an accelerated exascale machine		*range [0..1], 0 = cannot, 1 have the expertise and team to perform the jobs, in-between building expertise and/or team to do so.*
17	Can you describe the reasons for a move to exascale class systems		• *more data analytics* • *more compute capabilities (finer grain model, more elaborate models)* • *code coupling* • *new scientic instrument* • *etc*
18	Estimated time of rewrite for a radical change of computer architecture:		

Please return the survey to guillaume.colin-de-verdiere@cea.fr, francois.bodin@irisa.fr and maike.gilliot@teratec.fr ; thanks.