Network Evaluation Document

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Executive Summary

Task 6.2 of the Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale” (CoE RAISE) aims at developing a European RAISE Network to (i) raise awareness on technical developments and services implemented in the project, (ii) enhance their impact, and (iii) dynamize the use through Europe of Artificial Intelligence (AI) in a High-Performance Computing (HPC) context. Connecting smaller (≤Tier-2) HPC centers, local academic institutions, industry, and Small- and Medium-Sized Enterprises to RAISE’s developments and expertise, will allow to uncover new user communities and to provide corresponding service and education. Hence, CoE RAISE will act as an enabler for AI-based Exascale technologies.

The RAISE team comprises experts from AI, HPC, and High-Performance Data Analytics (HPDA), coming from countries all over Europe. The partners will oversee a concrete region, taking advantage of their existing partnerships but also looking for new opportunities. Figure 1 shows the partners’ locations and their network regions. It should be noted that the geographical influence of one RAISE partner can overlap the region of another if privileged relations are already in place.

The contribution of each partner consists of:

- Status of the region. A short description of the region's status in terms of AI and HPC usages as well as available computational resources.
- Stakeholder interactions. A summary of the interactions carried out or planned to be carried out with the selected institutions of the region.
- Stakeholder interaction plan. Calendar of past and future interactions.
- Review and opportunities. Description of possible upcoming opportunities for the regional network.
- Stakeholder monitoring tables. Detailed monitoring of the interactions with the network institutions.

This deliverable is the first of a series of three that will be updated periodically as the network will be continuously expanding.

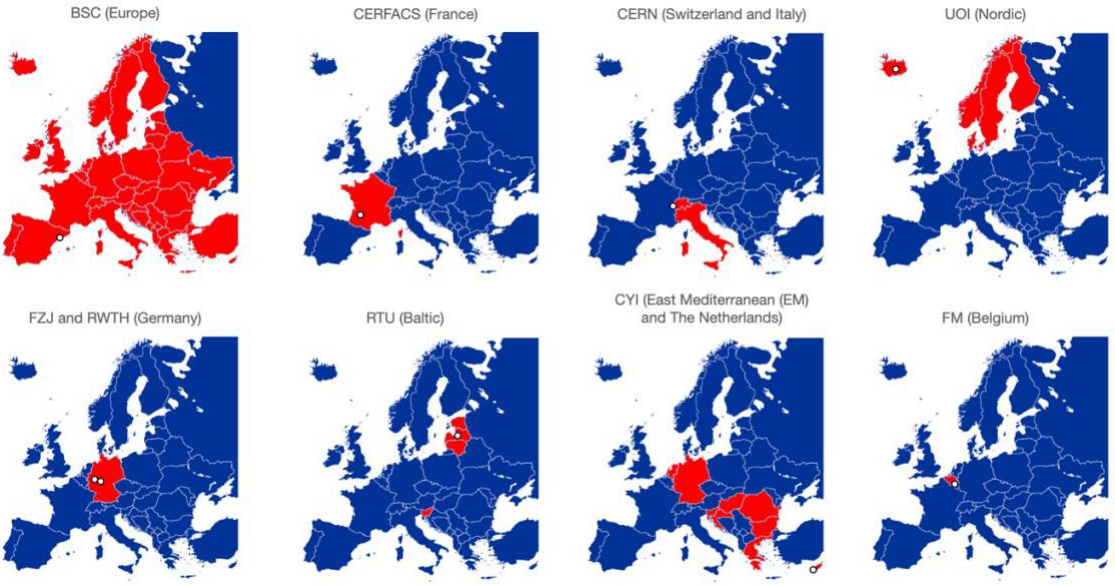

Figure 1: Geographical location of the partners of RAISE and their network regions.

1 Introduction

The Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale” (CoE RAISE) is designed in such a way that it covers and unites expertise from various directions that are relevant for the centers’ success. Therefore, RAISE needs to cover both academic and industrial aspects in a balanced way. This is achieved by having both partners from academia, e.g., internationally renowned universities such as the University of Iceland (UOI), the Cyprus Institute (CYI), or RWTH Aachen University (RWTH), and from industry (SAFRAN, Atos/BULL, and ParTec) in the consortium. This balanced mix of know-how from diverse backgrounds allows to tackle the objectives of CoE RAISE from different perspectives while each partner progresses in its field of expertise. That is, the hand-in-hand activities between the academic and industrial partners of RAISE cover the whole value-chain from novel technical inventions through targeted planning and integration to bringing new products to market.

Geographically, the consortium partners come from seven countries (Germany, Iceland, Cyprus, Spain, Switzerland, France, Belgium, and Latvia); see Figure 1. These countries cover all European regions and come with a different development status in High-Perormance Computing (HPC), Artificial Intelligence (AI), simulation science, and big data-driven workflows. With each partner being integrated into extended local national and international networks, i.e., into industry, Small- and Medium-sized Enterprises (SMEs), and academic user communities, the consortium setup is ideally suited to broadly distribute RAISE’s developments. The distribution of know-how in RAISE’s relevant fields of expertise will, on the one hand, empower countries and institutions, as per definition of the connected user communities, that are less developed with respect to RAISE’s core competences, in advancing their methods in the corresponding fields. On the other hand, knowledge transfer to industry and SMEs will be supported by offering tailored trainings to local companies connected to the partners’ networks and beyond. This will lead to improvements of industrial processes etc., that will finally help to increase European companies’ competitiveness on the global market.

From an infrastructural point of view, the involved HPC centers in RAISE cover the range from European Tier-0 (Forschungszentrum Jülich - FZJ and Barcelona Supercomputing Center - BSC), national Tier-1 (also FZJ and BSC, and CYI), and regional Tier-2 (UOI and RWTH) to Tier-3 (Riga Technical University - RTU) centers. The corresponding user communities hence also come with different demands with respect to system performance, scalability, system heterogeneity, and different HPC services and trainings. By connecting all these HPC centers in RAISE it will be possible to target the various user communities individually and to push technical hard- and software developments on Tier-0 and Tier-1 level down to the Tier-2 and Tier-3 centers, thereby adapting to the users’ needs. The partner networks will be ideal channels to forward RAISE’s developments and offered services to other connected HPC centers and user communities. Universities (UOI, RWTH, and RTU) and research institutions (FZJ, CYI, BSC, Conseil Européen pour la Recherche Nucléaire - CERN, Centre de recherche fondamentale et appliquée spécialisé dans la modélisation et la simulation numériques - CERFACS, and Flanders MAKE - FM), and industry (BULL, ParTec as third party from FZJ, and Delphi).

Finally, the following topics have been identified as relevant outcomes of the networking activity:

- Sharing of repositories
- Establishment of common databases
- Organization of courses, trainings, workshops, hackathons, etc.
- To increase the number of participants at events organized by RAISE
- Definition of uses cases
- Definition of standards
- Recruitment of new stakeholders
- Integration of RAISE services on existing platforms
- Delivery of RAISE derived software to a specific community
- To push the adoption of RAISE tools
- To enhance the development of scalable AI using parallel computing resources
- To propose services for commercial users
- To exploit synergies in the provision of services, education, and knowledge and technology transfer in general
- To create awareness in a broader audience
- To participate in official committees

It should be stressed that new opportunities will constantly be identified.

In the following, Sec. 2 presents the methodologies to evaluate RAISE's network activities, i.e., it describes the approach to establish a network and identifies stakeholders and RAISE's initial regions. In Sec. 3, a regional analysis is carried out and Sec. 4 discusses specific outcomes of this analysis. Finally, some conclusions are drawn in Sec. 5.

2 Network evaluation: methodology

2.1 Description of the approach to execute the task

- Identification of stakeholders and RAISE responsible persons to interact with.
- Identification of RAISE region/country responsible persons.
- Table to be filled to document the interaction with the stakeholders, including references to the meetings minutes.
- Report per country/region which must be digested and updated as a section in Deliverable 6.5 (due dates: M6, M18, and M36).

2.2 Identification of initial stakeholders

Many of the consortium partners are involved in endeavors that are in line with the proposed activities of RAISE. These activities can be split into research and innovation, and network-building efforts. A first identification of the stakeholders which may compose the European AI Network is herein identified. The network will increase according to the timeline of the CoE. It is of paramount importance to communicate the different technical outcomes of RAISE to other stakeholders and engage their added value to strengthen the AI community at the EU level. Table 1 at the end of Sec. 2.2.2 shows the partners in charge of their respective identified institutions.

2.2.1 Research and innovation activities (EU funded)

CoE EXCELLERAT[1]: European Centre of Excellence for Engineering Applications. Potential synergies with EXCELLERAT arise from its focus on enabling engineering applications for Exascale computing. RAISE may benefit from the developments within EXCELLERAT in this respect. Vice-versa, EXCELLERAT may benefit from RAISE's developments in AI for Exascale.

CoE POP[2]: Performance Optimisation and Productivity. Potential synergies with POP arise from POPs industrial and academic focus, i.e., to support applications via performance analyses and code-engineering on mini-app level to achieve higher scalability and lower times to solution. This is in line with RAISE's activities, which can be seen as POP's extension to AI and HPC at Exascale on full application level.

EoCoE-II[3]: Energy-oriented Centre of Excellence. EoCoE-II focuses on Exascale science challenges in energy research, i.e., in wind, materials, hydrology, fusion, and meteorology research. Considering the use-cases of RAISE, EoCoE-II is hence complementary to the efforts of RAISE. Both projects, however, aim at preparing applications for Exascale and can learn from one another.

EPI[4]: European Processor Initiative. RAISE applications will be prepared to work on heterogeneous environments, including the chip-level heterogeneity foreseen in EPI, where

[1] CoE EXCELLERAT https://www.excellerat.eu/
[2] CoE PoP https://pop-coe.eu/
[3] EoCoE-II https://www.eocoe.eu/
[4] EPI https://www.european-processor-initiative.eu/

Central Processing Unit (CPU) and accelerator cores share an interposer. Simultaneously, requirements raised by RAISE will be communicated to EPI in order to serve as co-design input for next generation EPI products.

DEEP Series[5]: Dynamical Exascale Entry Platform (DEEP); DEEP Extended Research (DEEP-ER); DEEP Extreme Scale Technologies (DEEP-EST); DEEP Programming Environment for European Exascale Systems (DEEP-SEA), started in 2021. RAISE will use hardware prototypes and software technologies developed in DEEP. A benefit is hence intrinsically given. Vice-versa, DEEP-SEA shall benefit from requirement analyses leading to co-design input for the future development of the Modular Supercomputing Architecture (MSA).

PRACE[6]: Partnership for Advanced Supercomputing in Europe. PRACE enables high-impact scientific discovery and engineering research, developments across all disciplines, offers world class computing and data management resources and services, and strengthens European users of HPC in industry. At FZJ (via the Gauß Centre for Supercomputing - GCS) and at BSC the PRACE High Level Support Teams are active. Obviously, PRACE's mission is in line with that of RAISE and hence a strong collaboration is planned.

EOSC-NORDIC[7]: European Open Science Cloud - Nordic. It aims at coordinating all European Open Science Cloud at Nordic level (EOSC-Nordic) relevant initiatives within the Nordic & Baltic countries and exploits synergies to achieve greater harmonization at policy and service provisioning level, in compliance with EOSC agreed standards and practices. Synergies with the EOSC-Nordic consortium may arise by offering new capabilities developed in RAISE through training and other activities, adopting RAISE outcomes, and data sharing & data management.

NI4OS-Europe[8]: The project supports the development and inclusion of the national Open Science Cloud initiatives in a consortium of 15 member states and associated countries comprising primarily of the Balkan countries, as well as Georgia and Armenia. Synergies with the NI4OS consortium may arise by raising awareness of the new capabilities brought about by developments in the RAISE project through dissemination activities, as well as by supporting these user communities adopt the outcomes of the RAISE project.

Sound of Vision[9]: Design, implementation, and validation of an original non-invasive hardware and software system to assist visually impaired people by creating and conveying an auditory representation of the surrounding environment. RAISE continues the activities of this project in analyzing large data quantities using HPC, following the sound engineering design and recording and ear engineering methods developed in Sound of Vision.

Delphi Consortium[10]: The consortium comprises of oil and gas companies and is led by scientists at the Technical University of Delft. It focuses on challenges in geo-imaging and its applications. CYI has ongoing collaborations with the consortium through common projects. The use case in seismic imaging will be leveraged to consolidate and expand the collaboration with the Delphi consortium from which other opportunities for joint ventures will emerge.

[5] DEEP https://www.deep-projects.eu/
[6] PRACE https://prace-ri.eu/
[7] EOSC-NORDIC https://www.eosc-nordic.eu/
[8] NI4OS-Europe https://ni4os.eu
[9] Sound of vision https://soundofvision.net/
[10] Delphi Consortium https://www.delphi-consortium.com/

JLESC[11]: The Joint Laboratory for Extreme Scale Computing (JLESC) is an international, virtual organization whose goal is to enhance the ability of member organizations and investigators to make the bridge between Petascale and Extreme computing. The aims are hence in line with RAISE and connections will be established on the annual JLESC meetings.

ANITI[12]: The Artificial and Natural Intelligence Toulouse Institute (ANITI), has been selected to be one of four institutes spearheading research on AI in France. The challenge is to make Toulouse one of the world leaders in AI in research, education, innovation and economic development. The strategic application sectors targeted by the project are mobility and transportation, and robotics/cobotics. CERFACS is a full member and will use it to spread best practices and developments of RAISE.

2.2.2 Network-building activities

IRT[13]: The Industry Relations Team (IRT) at FZJ is hub for industrial collaborations of FZJ with industry/SMEs. It maps expertise of FZJ's domain-specific Simulation and Data Labs (SDLs)[14] in HPC and AI to requests of industry/SMEs. The IRT will be used to reach out to existing and new customers from industry/SMEs.

HAICU[15]: Helmholtz Artificial Intelligence Cooperation Unit. In HAICU, AI and Machine Learning (ML) methods are developed to analyze complex data from fields as diverse as climate research and health research. FZJ will connect the project to its HAICU local unit.

NeIC[16]: The Nordic e-Infrastructure Collaboration is a strong collaboration of Nordic countries through a distributed organization consisting of technical experts from academic institutions across the Nordic area, i.e., Iceland, Denmark, Norway, Sweden, Finland. Regular workshops, e.g., using the Pool Competencies program, ensure a constant exchange of experts & know-how among the members. UOI acts as a hub to NeIC in RAISE and will organize RAISE workshops under the NeIC umbrella. This enables RAISE to spread its results and encourage joint working in RAISE with EU/EEA partners in Nordic and, to some extent, also Baltic regions.

EM: Leverage the regional role of CYI established through current and past projects with countries in the Eastern Mediterranean (EM) to reach out to regional scientists and promote the adoption of RAISE's new capabilities. Particularly strong links exist with Egypt, Greece, Israel, Jordan and Lebanon, through years of common research and community building activities. Importantly, synergies will be explored in the development of tools to optimally process massive amounts of data collected at the SESAME synchrotron facility in Jordan[17].

EMME-CARE CoE[18]: The Eastern Mediterranean and Middle East - Climate and Atmosphere Research CoE is established within CYI under the WIDENING call to address environmental and climate change challenges. RAISE will be able to tap the CoE's network to forge collaborative links to address HPC challenges in these fields.

[11] JLESC https://jlesc.github.io/
[12] ANITI https://aniti.univ-toulouse.fr
[13] IRT http://www.fz-juelich.de/ias/jsc/industry-relations
[14] SDLs at JSC https://www.fz-juelich.de/ias/jsc/EN/Expertise/SimLab/simlab_node.html
[15] HAICU https://www.haicu.de
[16] NEIC https://www.nordforsk.org/programs/nordic-e-infrastructure-collaboration-neic
[17] SESAME http://www.sesame.org.jo
[18] EMME-CARE http://emme-care.cyi.ac.cy

Flanders MAKE network[19]: FM will disseminate RAISE's research to its network of industrial manufacturing companies with more than 150 members.

GCS[20]: The Gauß Centre for Supercomputing (GCS) will be used as a channel to propagate RAISE's developments to professional HPC users' communities in Germany.

Gauß-Alliance[21]: The Gauß Alliance (GA) in Germany promotes science and research and supports the scientific community in Germany in the sustainable and efficient use of HPC resources. This is achieved through the coordination and pooling of complementary skills and diversified computer architectures, and the associated access structure on Tier-2 level. Strengthening research and increasing the visibility to compete on an international level are further goals of the GA. The GA will be used as a channel to propagate RAISE's developments in particular to Tier-2 level in Germany.

HPC.NRW[22]: HPC.NRW is the HPC competence network within the state of North Rhine-Westphalia (NRW) in Germany. The initiative combines the expertise of Tier-2 centers with the services of Tier-3 centers since 2019. For a broad range of HPC topics, HPC.NRW represents the first point of contact in NRW, providing educational, consultancy and support services. HPC.NRW will be used as a channel to propagate RAISE's developments in particular to the Tier-2 level in Germany.

SESAME Net[23]: Supercomputing Expertise for Small & Medium Enterprise Network. SESAME Net is an open and inclusive network consisting of a mix of centers and organizations aiming to exchange knowledge, success stories, use-cases and best practice materials on engaging SMEs in HPC. The network facilitates interaction between centers in order to "help each other to help SMEs". RTU is a full member of the network and will use it to spread best practices and developments of RAISE.

EU COST Action CA18203 - Optimising Design for Inspection[24]: Uses ultrasound based Non-Destructive Evaluation (NDE) techniques, energy harvesting, and wireless sensor networks to effectively monitor damage in aerospace components, e.g., at Airbus at TRL 3. UOI is Cost Action Vice Chair and Grant Holder Scientific Representative (Prof. Unnþórsson).

Spanish Supercomputing Network[25]: The Spanish Supercomputing Network (RES), coordinated by BSC, consists of a distributed virtual infrastructure of supercomputers located at 11 sites, each of which contributes to the total processing power available to users of different R&D groups in Spain or based in another country but developed by with participation of Spanish researchers.

CERN openlab[26]: CERN openlab is a unique public-private partnership, through which CERN collaborates with leading Information and Communication Technology (ICT) companies and other research organizations. Together the work is carried out to accelerate the development of cutting-edge ICT solutions for the research community.

[19] FM https://northsearegion.eu/growin4/project-partners/flanders-make-belgium/
[20] GCS https://www.gauss-centre.eu/
[21] Gauß Allianz https://gauss-allianz.de/en
[22] HPC.NRW https://hpc.dh.nrw/
[23] Sesame Net https://sesamenet.eu
[24] COST Action CA18203 http://odin-cost.com/
[25] RES https://www.res.es/en/about
[26] CERN openlab https://home.cern/science/computing/cern-openlab

ETP4HPC[27]: The European Technology Platform for High-Performance Computing is a private, industry-led, and non-profit association, promoting European HPC research and innovation in order to maximize the economic and societal benefit of HPC for European science, industry, and citizens. It is hence a good candidate to find new customers from industry and increase the visibility of RAISE.

[27] ETP4HPC https://www.etp4hpc.eu

		RESPONSIBLE PARTNER TO INTERACT WITH THE STAKEHOLDER								
INSTITUTION	REGION	FZJ +RWTH	BSC	UOI	CYI	RTU	RWTH	CERN	CERFACS	FM
GCS	GERMANY	■								
HAICU	GERMANY	■								
IRT	GERMANY	■								
PRACE	EU	■	■							
Nordic e-Infrastructure Collaboration (NeiC)	NORDIC			■						
COST Action CA18203	NORDIC			■						
EOSC-NORDIC	NORDIC			■		■				
SESAME NET	EM/BALTIC				■	■				
NI4OS-Europe	BALTIC REGION				■					
Delphi Consortium	The NETHERLANDS				■					
SimEA ERA Chair project	EM				■					
Gauss Alliance	GERMANY						■			
HPC NRW	GERMANY						■			
INFN	ITALY							■		
SIEMENS	GERMANY							■		
E4 Computer Engineering	ITALY							■		
ISAE-Supaero	FRANCE								■	
IRT	FRANCE								■	
ONERA	FRANCE								■	
AIRBUS	FRANCE								■	
CNES	FRANCE								■	
SAFRAN	FRANCE								■	
Artificial and Natural Intelligence Toulouse Institute (ANITI)	FRANCE								■	
FM Industrial Network	BELGIUM/EU									■
EXCELLERAT	EU	■								
POP	EU		■							
EoCoE-II	EU	■								
CoEC	EU		■							
CHEESE	EU		■							
EPI	EU		■							
DEEP	EU		■							
EMME-CARE	EU		■		■					
ETP4HPC	EU		■							
Spanish Supercomputing Network	SPAIN		■							

Table 1: List of stakeholders.

2.2.3 Network evaluation: segmentation analysis

The European engineering industry consists of 130,000 companies of diverse size. Overall, these companies employ over 10.3 million people, with high levels of qualifications and skills. The European engineering industry plays a key role in realizing the goal of increasing the industrial production value above 20% GDP (Gross Domestic Product) by 2025. To achieve this aim and meet the challenges of the fourth wave of industrialization, it is essential to support European engineering companies in their use of HPC, simulation, and High-Performance Data Analytics (HPDA), thus increasing European industrial competitiveness.

All RAISE partners will actively participate in the establishment, operation, support, and sustainability of the project ecosystem. Furthermore, they will contribute to the gradual and continuous expansion of the ecosystem based on additional stakeholders in all AI and HPC domains. In this view, the main potential actors involved in the RAISE project, together with potential exploitation objectives of each stakeholder are the following:

Industrial end-users: as the main potential users/clients of RAISE. RAISE is primarily developing its services and technologies to meet the needs of the industry, in particular in the manufacturing, aviation, automotive and energy sectors. Regarding domain and software experts, especially those catering these sectors, they will be also interested to enlarge their business offerings (and therefore market position) thanks to the added value and value proposition offered directly or indirectly by RAISE.

Independent Software Vendors (**ISVs)**: for the code owners participating in RAISE and external ISVs interested in exploiting project results by becoming users of services related to their products improvement. Consultancy services (performance improvement, advanced visualization capabilities, data flows optimization, etc.) plus the possibility to launch new projects (to be developed also after the end of RAISE) are the main exploitation possibilities. Some partners will also particularly be interested in expanding their business portfolio within their interest domains with new offerings and strengthened business liaisons with other partners.

HPC/HPDA and technology providers: they benefit form the possibility to exploit the know-how acquired during the project for co-design activities, that might be helpful to build new components and systems with added value for AI-based applications users.

Academic experts and research code developers: they benefit from RAISE by increasing their knowledge and expertise, and potentially launching spin-offs in a vision of open innovation, aiming to obtain external innovation opportunities by exploiting capabilities and resources built by the RAISE project.

Citizens: in the RAISE vision, they are especially product users, who will benefit from the added-value services. RAISE will be able to provide in an indirect manner by ultimately becoming the final consumers of innovative, more effective and competitive products, contributing to the overall positive growth of the European manufacturing market.

Based on this information, different types of stakeholders have been targeted and herein identified in Table 2.

INSTITUTION	CATEGORY	RAISE REGION
GCS	Supercomputing Center	GERMANY
HAICU	Research hub	GERMANY
IRT	Industry relations	GERMANY
PRACE	EU Association	EU
Nordic e-Infrastructure Collaboration (NeiC)	Network	NORDIC
COST Action CA18203	EU Cost action	NORDIC
EOSC-NORDIC	EU Project	NORDIC
SESAME NET	Company	EM/BALTIC
NI4OS-Europe	Partnership	BALTIC REGION
Delphi Consortium	Consortium	The NETHERLANDS
SimEA ERA Chair project	Project	EM
Gauss Alliance	Association	GERMANY
HPC NRW	Competence network	GERMANY
INFN	Institute	ITALY
SIEMENS	Company	GERMANY
E4 Computer Engineering	Company	ITALY
ISAE-Supaero	Education	FRANCE
IRT	Education	FRANCE
ONERA	National laboratory	FRANCE
AIRBUS	Aerospace company	FRANCE
CNES	National laboratory	FRANCE
SAFRAN	Aerospace company	FRANCE
Artificial and Natural Intelligence Toulouse Institute (ANITI)	Laboratory AI	FRANCE
Helios Multi-laboratory workgroup	Academic multi-lab	FRANCE
FM Industrial Network	Companies	BELGIUM/EU
EXCELLERAT	EU CoE	EU
POP	EU CoE	EU
EoCoE-II	EU CoE	EU
CoEC	EU CoE	EU
CHEESE	EU CoE	EU
EPI	EU Project	EU
DEEP	EU Project	EU
EMME-CARE	EU Research Center	EU
ETP4HPC	EU Private association	EU
Spanish Supercomputing Network	Spanish Association	SPAIN

Table 2: Stakeholder segmentation.

2.3 Identification of RAISE initial regions

In order to ensure the success of this networking activity, it is of paramount importance to define RAISE region/country responsible persons. These partners are in charge not only of collecting all the information directly related to the interaction of all the partners with the

stakeholders in their region but also to give an overview of the current status of the region directly related to RAISE objectives, developments, new initiatives and potential synergies. Table 3 gives the list of responsible party per region, also depicted in Figure 1.

RESPONSIBLE	REGIONS/COUNTRY	CONTACT PERSONS
FZJ	GERMANY + supports EU level	A.Lintermann@fz-juelich.de
BSC	EU LEVEL	guillaume.houzeaux@bsc.es joan.farnos@bsc.es
UOI	NORDIC COUNTRIES	morris@hi.is
CYI	EAST MEDITERRANEAN (EM) + The NETHERLANDS	k.christoforou@cyi.ac.cy
RTU	BALTIC REGION	Lauris.Cikovskis@rtu.lv hpc@rtu.lv
RWTH	Supports FZJ in GERMANY	M.Albers@aia.rwth-aachen.de M.Meinke@aia.rwth-aachen.de Terboven@itc.rwth-aachen.de
CERN	ITALY	christina.bolanou@cern.ch
CERFACS	FRANCE	lapeyre@cerfacs.fr
FM	BELGIUM	kurt.degrave@flandersmake.be (will change to Wouter Lammens after settling-in period)

Table 3: Identification of RAISE responsible per region/country.

On the other hand, and in order to homogenize the information for each RAISE-Stakeholder interaction, all the references to the Minutes of the Meetings (MoM) are finally summarized using the next template in Table 4. This approach serves as a mechanism to facilitate the register of all the interactions during the whole project. It must be reminded that D6.5 is now delivered in Month 6, but later will be updated in the corresponding updates in M18 and M36.

Name of institution:	XXX
RAISE REGION:	XXX
Register of the interaction	Include reference to all the minutes of the meeting (i.e., RAISE_MoM_Stakeholder_YYMMDD)
Type of organization	Academia, EU project, industry (SME, Large Enterprose - LE), R&D center, etc.
Contact persons	

Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Scientific meetings, development of common libraries, sharing of repositories, establishment of a common database, organization of trainings, workshops, Hackathons etc., definition of use-cases, definition of standards, access to new stakeholders.
Main outcomes of the discussion and next planned actions	

Table 4: Template to be filled by RAISE responsible based on the interaction with the institution/initiative.

3 Network evaluation: region analysis

This section presents the contributions of all the regions, successively. For each one, the technical and political status of the region is first described. Then, the stakeholder interactions that have taken place as well as a calendar for future interactions is summarized. Finally, each region subsection is concluded by discussing new opportunities for the network.

3.1 German region

3.1.1 Status of the region

The HPC landscape in Germany is quite well developed. It is organized in different categories of HPC performance classes with the Gauss Centre for Supercomputing (GCS) as an association leading the performance list.

The three large HPC centers Jülich Supercomputing Centre (JSC), High-Performance Computing Center Stuttgart (HLRS), and the Leibniz Supercomputing Centre (LRZ) in Bavaria are member of GCS and offer their computational resources to academia and in parts (JSC and HLRS) also to industry and SMEs. In Germany the resources are offered on Tier-1 level and in Europe via PRACE on Tier-0 level. All three HPC centers have a well-developed support structure and provide guidance in using their HPC systems, support on technical issues, perform performance engineering on various simulation codes running on their systems, and provide education and training. Domain scientists are supported by individual teams at the different sites, e.g., by the SDLs and the Algorithms, Tools, Methods Labs (ATMLs), also known as Cross-Sectional Teams (CSTs)[28], at JSC. The SiVeGCS project[29] and the establishment of the German National Competence Center (NCC) within the EuroCC project are good examples, where the activities of the three centers are synchronized through GCS. In the latter project, GCS is a direct partner and the three HPC centers are linked third parties. EuroCC focuses on bridging activities and competence mapping not only in the field of HPC, but also in AI and HPDA. HLRS is coordinating the project.

Similar to GCS on the Tier-1 level, there is NHR[30] - National High Performance Computing in Germany on the Tier-2 level, which has been established as an association in 2021. The eight centers located at the universities in Aachen, with the IT Center and NHR4CES@RWTH[31] as part of RAISE, Berlin, Darmstadt, Dresden, Erlangen, Göttingen, Karlsruhe and Paderborn offer compute time and storage resources, complemented with domain-specific and methodical support services. At NHR4CES@RWTH, this includes SDLs with a focus on the Computational Engineering Sciences and Cross-Sectional Groups (CSGs) on Parallelism and Performance, Visualization, and Data Science and Machine Learning, which are well-connected to the corresponding institutions at JSC.

The Tier-2 centers and some Tier-3 (regional) centers are also organized in the Gauss Alliance (GA)[32], which has been established as an association. The GA centers provide, depending on their capacity, also support for their users and offer services for SMEs.

[28] CST at JSC https://www.fz-juelich.de/ias/jsc/EN/Expertise/Support/support_node.html
[29] SieVeGCS https://www.fz-juelich.de/ias/jsc/EN/Research/Projects/_projects/sivegcs.html
[30] NHR https://www.nhr-gs.de
[31] NHR4CES https://www.itc.rwth-aachen.de/cms/IT-Center/Forschung-Projekte/~nkbpn/NHR4CES/
[32] GA https://gauss-allianz.de/

JSC as a member of GCS and RWTH as a member of NHR and GA have good connections to the corresponding partner HPC centers. They are going to exploit their connections to create awareness for the developments made in CoE RAISE and thereby support the knowledge transfer in AI, HPC, and HPDA. This will also happen through various projects JSC and RWTH are involved in, e.g, the EuroCC project, EoCoEC-II, or EXCELLERAT, as well as through other connections to the local industry, including also SMEs.

That is, the HPC landscape in Germany is currently in a transition phase, which offers great potential for CoE RAISE to connect to various projects and stakeholders, thereby reaching new communities in academia and industry. CoE RAISE can play an important role also in the restructuring process and may shape, with its new developments towards exascale and its connection to other European initiatives, the transition to a broader application of HPC in general with a focus on next-generation hardware and AI technologies. Vice-versa it can be the entry point for channeling expertise available in Germany to other international stakeholders, which is an activity that complements the EuroCC undertakings.

3.1.2 Stakeholder interactions

3.1.2.1 Contacted stakeholders (M6)

At Month 6, the current contacted stakeholders are herein described. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. Additional information can be found in Annex A.

Gauss Centre for Supercomputing (GCS): Association consisting of the three largest HPC centers in Germany that provide resources on Tier-0 and Tier-1 level, i.e., JSC, HLRS, and LRZ. Discussions already took place with Dr. Claus Axel Müller (Managing Director GCS) a priori the project and hence there are no minutes available. *Community: HPC.*

Helmholtz AI (previously named HAICU): Research-driven hub for applied AI as part of the Helmholtz Association in Germany. An informal meeting with Helmholtz AI (Dr. Stefan Kesselheim, Head of the AI consultant team at FZJ, took place on Jan. 14, 2021. No minutes have been recorded. *Community: AI.*

Industry Relations Team (IRT): The IRT is part of JSC and is responsible for bridging HPC, AI, and HPDA expertise from JSC to industrial customers. The Coordinator or CoE RAISE is a member of the IRT. Meetings take place bimonthly. *Community: HPC & Industry.*

NHR - National High Performance Computing in Germany: Association consisting of the eight large HPC centers located at universities in Germany that provide resources on Tier-2 level. As a member of NHR, RWTH has listed its project participation and presented the project. *Community: HPC.*

GA - Gauss Alliance: Association consisting of 18 HPC centers in Germany that provide resources on Tier-2 and/or Tier-3 level. As a member of GA, RWTH has listed its project participation and presented the project. *Community: HPC.*

HPC.NRW: Association consisting of the eight large HPC centers located at universities in Germany that provide resources on the regional level**.** As a member of HPC.NRW, RWTH has listed its project participation and presented the project. *Community: HPC.*

3.1.2.2 Stakeholder interactions plan

Table 5 shows the planning for the interactions for the German region.

Institution	2020				2021				2022			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
GCS				X	X	X						
Helmholtz AI					X							
IRT	X	X	X	X	X	X						
NHR	X	X	X	X	X	X						
GA	X	X	X	X	X	X						
HPC.NRW	X	X	X	X	X	X						

Table 5: German interactions stakeholder plan.

3.1.3 Review and opportunities

FZJ and RTWH are embedded in the ABCD (Aachen, Bonn, Cologne, Düsseldorf) region. This region is characterized by a heavy energy industry with a lot of opencast coal mines and coal power plants. The German government has decided to end fossil fuel mining in this region before 2035 and supports a structural change in this region with up to 14 billion Euros. Amongst others, the money is also intended to push digitalization in this region from which not only JSC, but especially the local economy may benefit. Digitalization and the usage of AI, which requires more and more compute power, go hand in hand, and there already exist companies such as aiXbrain[33] in Aachen bringing AI to industry 4.0 (and provided a letter of intent to the CoE RAISE project). Another example is Cognigy[34] in Düsseldorf with their product Cognigy.AI, which is the leading enterprise conversational automation platform. Other than that, research institutions and universities more and more concentrate on AI research. For example, RWTH has established the AI Center[35] and FZJ is part of the Helmholtz AI network. All these entities provide a great opportunity to collaborate with CoE RAISE on a local basis and may benefit from Exascale computing.

[33] aiXbrain https://www.aixbrain.de
[34] Cognigy https://www.cognigy.com
[35] RWTH AI Center https://www.ai.rwth-aachen.de/cms/KI/~fsfai/Das-KI-Center/lidx/1/

3.2 European Union (EU) region

3.2.1 Status of the region

At the EU region level, CoE RAISE will start establishing relationships with the different projects involving, or likely to involve, AI. Centers of Excellence are application-oriented projects, aiming at porting applications towards the Exascale. Some of them explicitly involve AI in their Description of Actions (DoAs). As an example, CoE Combustion (CoEC) proposes the "Development of flow and chemical subgrid models for LES and RANS using Artificial Intelligence and Machine Learning", involving three Work Packages WP4, WP6, and WP7. There thus exists a clear connection to RAISE WP3 in terms of applications and methodologies. The CoE for Exascale in Solid Earth (CoE ChEESE) proposes in WP4 the use of AI to "explore massive datasets (big data) efficiently and finding patterns in them", making a direct connection to RAISE WP4.

One of the scientific objectives of establishing relations to the CoE is therefore to share expertise, aiming at accelerating and maximizing progress towards the proposed objectives.

Common dissemination activities (training, workshops, hackathons) will also be planned. In that sense, a hackathon will be held in Autumn 2021 in collaboration with ChEESE and the CoE in Computational Biomedicine (Compbiomed2) CoEs[36]. A first joint RAISE-CoEC CoE Training Course - "Interactive HPC with JupyterLab" took place in May 2021.

Additionally, the complementarity of the different CoEs, in terms of applications, algorithms and numerical methods will also be an asset for the establishment of standards or the definition of interfaces, as planned in WP2 of RAISE.

3.2.2 Stakeholder interactions

3.2.2.1 Contacted stakeholders (M6)

At Month 6, the current contacted stakeholders are herein described. Additionally, a short description of the stakeholder is included to link the contact to the addressed community, shown in Table 2. Additional information can be found in Annex B.

EXCELLERAT: Center of Excellence addressed to general engineering community in academia and industry. First informal meetings between the Coordinators of CoE RAISE and EXCELLERAT have taken place. *Community: HPC Engineering.*

FocusCoE / HPC3: Since 11/2020, the CoE RAISE Coordinator participates in the HPC3 meetings. The minutes are available on the RAISE workspace of the Basic Support for Cooperative Work (BSCW) server[37]. HPC3 has the following objectives: (i) identify European HPC CoEs common interests, (ii) represent the CoEs in the current European HPC landscape, and (iii) be a representative body for the European HPC applications. That is, the creation of synergies is implicitly given. *Community: HPC CoE (applications).*

[36] BSC/NVIDIA Hackaton https://www.gpuhackathons.org/event/bsc-gpu-hackathon
[37] BSCW link to the minutes of HPC3 meetings: https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3567457

EuroHPC EuroCC: The existence of the new CoE RAISE was mentioned in multiple EuroCC meetings. However, since these were mainly EuroCC meetings, minutes cannot be provided. *Community: HPC.*

EoCoE-II: Informal discussions took place with the EoCoE-II contact points at FZJ and BSC. Minutes have not been recorded. Dr. Edoardo Di Napoli (WP1 leader in EoCoE-II). *Community: HPC Energy.*

CoEC: A first meeting was held between Dr. Daniel Mira (Project Coordinator of CoEC) and Dr. Joan Farnós from CoE RAISE in April 14th, 2021 (reference to minutes: RAISE_MoM_CoEC_210414). BSC is CoEC's leading partner and is also partner of RAISE. CoEC and RAISE actively participate at FocusCoE meetings as well as in the HPC3 Council. A first joint RAISE-CoEC CoE Training Course - "Interactive HPC with JupyterLab" 26-27th has taken place in May 2021. *Community: HPC Combustion.*

ChEESE: A first meeting initially planned for April 28th, 2021 has been re-scheduled to September 2021. *Community: HPC Solid Earth.*

3.2.2.2 Stakeholder interactions plan

Table 6 shows the planning for the interactions for the EU region.

Institution	2021				2022				2023			
	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
PRACE				X								
FM Industrial Network			X									
CoEC		X										
ChEESE		X										
EuroCC	X											
FocusCoE/HPC3	X											
EXCELLERAT	X											
EoCoE-II		X										
POP			X									
EPI				X								

DEEP				X								
EMME-CARE				X								
ETP4HPC				X								

Table 6: EU interactions stakeholder plan.

3.2.3 Review and opportunities

Many interactions have already taken place or will very soon. New opportunities will arise from the new Horizon Europe funding programme for research and innovation. Not only those projects are specifically centered on AI, e.g., HORIZON-CL4-2021-TWIN-TRANSITION-01-07 - Artificial Intelligence for sustainable, agile manufacturing (IA), but also those projects involving physical modeling or involving large datasets. Also, through the MareNostrum V partnership, close collaborations with Turkey, Portugal, and Croatia are expected.

3.3 Nordic region

3.3.1 Status of the region

The Nordic region covers five Nordic countries: Finland, Denmark, Norway, Sweden, and Iceland, all part of the European HPC landscape. Each of these countries is differently advanced in HPC, HPDA, and AI. The coordination of those countries is quite strong, also in HPC and networking via the Nordic e-Infrastructure Collaboration (NeiC) for a long time. In recent years, coordination and skills development in HPC have noticeably improved thanks to involvement in the Euro-CC, EOSC-Nordic, and other HPC-related projects. Knowledge transfer from CoE RAISE to the region is essential to support the growth of HPC, HPDA, and AI skills. Apart from these projects and initiatives, more recently, the cooperation has become more robust in joining together the LUMI[38] pre-exascale multi-national consortium.

3.3.2 Stakeholder interactions

Regular interactions take place through EuroCC and CASTIEL activities. A short discussion with NeiC has been performed to address a call for proposals with a Nordic simulation and data simulation lab approach. The most regular stakeholder interaction is through a wide variety of calls within the LUMI HPC consortium for user support, pilot user program, resource access policies, and many other elements to prepare LUMI for its production use (expected end of 2021).

3.3.2.1 Contacted Stakeholders (M6)

At Month 6, the current contacted stakeholders are herein described. Additional information can be found in Annex C.

[38] LUMI Consortium: https://www.lumi-supercomputer.fi/lumi-consortium/

COST Action CA18203: There is a regular interval of interaction planned for this project as it is complementary to some RAISE activities (i.e., sound engineering use case). Meetings primarily focused on informing about RAISE and its activities and including searching for a Ph.D. student in the network for the RAISE use case. There are no meeting minutes of these meetings, but the Principal Investigators (PIs) of this project are also part of the RAISE project contributing to regular interactions. *Community: HPC users*.

NeiC: There are regular NeiC calls in different aspects of technologies relevant to HPC and policy matters. There are no meeting minutes available, but topics in the last month focused on a joint user support strategy with respect to authentication and authorization of users (also known as PUHURI[39]). *Community: HPC technologists & HPC leadership*.

3.3.2.2 Stakeholder interactions plan

Table 7 shows the planning for the interactions for the Nordic region.

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
NeiC				X				X				X
COST Action CA18203	X		X		X		X		X		X	
EOSC-Nordic	X	X										

Table 7: Nordic region interactions stakeholder plan.

3.3.3 Review and opportunities

Opportunities for collaboration have been reviewed with a particular focus on possible RAISE cooperation. One SME in Iceland called Treble[40] has been identified as relevant for the Sound Engineering use case in RAISE. It also joined as a member of the Acoustic and Tactical Engineering Lab (ACUTE)[41]. Treble requires computational Exascale capabilities, and more regular interactions with this SME will follow in RAISE through the use case and the ACUTE lab. Other engaging Icelandic SMEs have been Nordverse[42] that work on Natural Language Processing (NLP) models in healthcare and require Exascale computing capacity to train cutting-edge NLP models. Although healthcare application communities are not directly relevant in RAISE, the cooperation has been started to exchange experiences and lessons learned on sequence models (i.e., Gated Recurrent Units - GRUs, Long Short-Term Memory - LSTM - networks) that are relevant for NLP, but also for a wide variety of datasets within RAISE.

[39] PUHURI NeiC project https://neic.no/puhuri/
[40] Treble SME https://treble.ac/
[41] ACUTE Lab of IHPC https://ihpc.is/simulation-and-data-lab-acoustic-and-tactile-engineering/
[42] Nordverse SME https://nordverse.com/

More broadly in the Nordic regions we have identified the Swedish National Center for applied Artificial Intelligence[43]. Several activities in AI modeling might become relevant also for RAISE and a cooperation is explored in the next reporting period. Also, several activities in Denmark at the Denmark Technical University (DTU)[44] and their research is interesting and will be monitored more in the next reporting period. Given the close interaction of LUMI countries there is a high chance that solutions from RAISE will be also become of interest for the LUMI supercomputer in Finland (expected to be operational end of 2021). Apart from nordic countries, our partner countries are Estonia[45], Belgium[46], Czech Republic[47], Poland[48] and Switzerland[49]. We have been also looking into the Norwegian.AI[50] for cooperation opportunities with respect to event planning to distribute RAISE solutions jointly in the Nordic regions.

3.4 East Mediterranean (EM) and The Netherlands

3.4.1 Status of the region

CYI has many well-established connections within the Middle East and Eastern Mediterranean (SESAME), Netherlands (Delphi) and Balkans (NI4OS-Europe), as outlined in Table 1 for each respective area. We will now begin to explore the possibility of connecting RAISE to companies and research institutions in these regions through discussion with our contact points.

3.4.2 Stakeholder interactions

3.4.2.1 Contacted stakeholders (M6)

At Month 6, no stakeholder has been contacted yet. Additional information can be found in Annex D.

3.4.2.2 Stakeholder interactions plan

Table 8 shows the planning for the interactions for this region.

	2021				2022				2023			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Delphi				X	X				X			
SESAME			X									

[43] Swedish National Center for Applied AI https://www.ai.se/en/about-0
[44] DTU research https://www.dtu.dk/english/research
[45] Estonian scientific computing infrastructure https://etais.ee/
[46] Belgian Science Policy Office http://www.belspo.be/
[47] VSB –Technical University of Ostrava, IT4Innovations National Supercomputing Center https://www.it4i.cz/
[48] AGH University of Science and Technology, Academic Computer Centre Cyfronet AGH https://www.cyfronet.krakow.pl/en/4421,main.html
[49] ETH Zürich https://ethz.ch/en.html
[50] Norwegian AI Initiative https://www.norwegian.ai/

NI4OS			X									
SimEA ERA Chair			X									

Table 8: EM and The Netherlands interactions stakeholder plan.

3.4.3 Review and opportunities

The Delphi consortium comprises a well-established community of approximately 30 companies in the geo-energy sector. A list of these companies within this consortium can be found Delphi's website[51]. Task 4.2 of RAISE will be presented to the sponsoring community of the Delphi Consortium at Delft University of Technology in the Netherlands, in particular at the semi-annual meetings (October 2021 and March 2022) and the yearly report (January 2022).

Potential new communities will be explored through initial discussions with our contact points for NI4OS, SESAME and the SimEA ERA Chair project at CYI, in the third quarter of 2021. CYI participates in these projects, and we will seek to establish contact with them through the CYI personnel involved in them.

3.5 Baltic region

3.5.1 Status of the region

The Baltic region covers three Baltic countries - Estonia, Latvia, and Lithuania, which all are present in the European HCP landscape. Coordination and skills development in HPC has noticeably improved in recent years thanks to involvement in the EUROCC, EOSC, and other HPC-related projects. Knowledge transfer from CoE RAISE to the region is important to support growth of HPC&AI skills.

Each country has a leading HPC service provider - University of Tartu (UT) in Estonia, Riga Technical University (RTU) in Latvia and Vilnius University (VU) in Lithuania. The UT HPC center, which is part of Estonian scientific computing infrastructure (ETAIS), has a well-established HPC infrastructure and support team, and also strong collaborations with Nordic countries (for example NeiC collaboration). The RTU HPC Center plays an important role in the Latvian e-infrastructure providing HPC competence and services to organizations in Latvia and has collaborations with other computing centers both at national and Baltic level. VU is hosting the Lithuanian national supercomputer.

The Baltic countries have several joint projects and activities although the coordination and common developments always have room for growth. The countries were partners in FP6 and FP7 projects BalticGrid I and II, which helped to establish links among the main universities of the countries and give initial boost to HPC development in the region. More recently, VU was involved in the SESAME.net project in which HPC competence network was created to provide supercomputing expertise for SMEs. The network has also been joined by RTU becoming a full member of the network. UT, RTU, and VU together with partners from Nordic countries are involved in EOSC-Nordic project which aims to foster and advance the take-up of the European Open Science Cloud at Nordic and Baltic region. The CERN Baltic Group (CBG) is a

[51] Delphi consortium https://www.delphi-consortium.com/files/stacks-image-8cf3319-1200x748.jpg

collaboration of Baltic higher education and research institutions involved in CERN-related activities, including computing.

3.5.2 Stakeholder interactions

3.5.2.1 Contacted stakeholders (M6)

At Month 6, an initial contact with SESAME.NET board members has been established. It has been agreed to organize meetings between SESAME.NET and CoE RAISE to identify possible interactions. Additional information can be found in Annex E.

3.5.2.2 Stakeholder interactions plan

The interaction plan of the Baltic region is given in Table 9.

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SESAME.NET		x	x									
EOSC-Nordic			x									

Table 9: Baltic region interactions stakeholder plan.

3.5.3 Review and opportunities

RTU as the largest technical university in the Baltic countries has well-established links to academia, industry, and HPC centers in the region that will be used to spread RAISE outcomes. The first step is to contact networks/projects RTU is already involved in with HPC partners from other Baltic countries (e.g., SESAME.NET, EOSC-Nordic).

A typical enterprise in the region is digitized but not HPC&AI ready. There is a lack of knowledge about HPC and methods of its application in various fields of technology and science. The training services and portfolio of courses developed in CoE RAISE could be targeted to those. There are exceptions such companies as “Tilde” or the start-up “Asya”, which have strong AI expertise and previous HPC experience. Such companies could potentially be interested in software libraries developed by RAISE. There is active involvement in Digital Innovation Hubs which have ties with industries in the Baltic countries that can be used to approach industry.

The “Baltic HPC and Cloud conference”[52] is organized at RTU bringing together HPC experts and newcomers from the region, which is a great opportunity to also present RAISE and to connect new communities to the RAISE network.

[52] Baltic HPC and Cloud conference https://hpc.rtu.lv/4th-baltic-hpc-and-cloud-conference/?lang=en

3.6 Italy & Switzerland

3.6.1 Status of the region

The region of Switzerland covers mostly the already established connections that CERN has here, including those with leading industries and research organizations in ICT via CERN openlab, various scientific collaborations in High Energy Physics (HEP) at CERN and via the World-Wide Large Hardron Collider (LHC) Computing Grid (WLCG), links and collaborations to HPC facilities via PRACE (e.g. via the CERN/SKAO./GEANT/PRACE HPC Collaboration), and the direct connections with HPC facilities, i.e., the Swiss National Supercomputing Center - Centro Svizzero di Calcolo Scientifico (CSCS), in Lugano.

3.6.2 Stakeholder interactions

3.6.2.1 Contacted stakeholders (M6)

CERN has been in close contact with WLCG and CERN openlab to discuss the common areas of work and potential collaboration on topics, such as data access, data transfers and data delivery infrastructures, HPC Integration, including aspects of Authorization and Authentication Infrastructures and the exploitations of Heterogenous Computing and Accelerators, e.g., Compute Unified Device Architecture (CUDA) porting and unified programming models. Another important aspect is the ever-increasing prominent role that AI is playing in HEP and how this will impact the use of HPC in the community.

Several articles are published to bring awareness of HEP community on the latest developments happening within HPC, specifically CoE RAISE.

3.6.2.2 Stakeholder interactions plan

The interaction plan of this region is given in Table 10.

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
CERN openlab		X	X	X								
WLCG and LHC Experiments		X	X	X								
CSCS			X	X								

Table 10: Italy and Switzerland region interactions stakeholder plan.

3.6.3 Review and opportunities

CERN is the European Laboratory for Nuclear Research hosting the Large Hadron Collider and many High Energy Physics experiments, including the 4 large-scale ones: CMS, Atlas,

LHCb, Alice. Such a large presence of physics collaborations allows to foster interaction between researchers and, in turn, accelerates scientific activities. Such an environment should prove to be an ideal place to exploit the outcomes of the CoE RAISE.

So far, first contacts were established only within the CERN environment (i.e., CERN openlab and WLCG/CMS experiment) in order to clarify the objectives of the CoE RAISE. The next steps will include expanding the reach to other LHC experiments and also contacting Swiss HPC center CSCS, with whom we will have 2 PRACE Summer of HPC projects running during the Q3 / 2021.

3.7 France

3.7.1 Status of the region

CERFACS is an active contributor to the HPC community in France and has ongoing collaborations with academic institutions and computing centers. Many industrial groups that rely on HPC and simulation are shareholders of CERFACS: Airbus, CNES, EDF, Météo-France, ONERA, SAFRAN, Total. This creates an active platform of exchanges between academia and industry through CERFACS and will offer many opportunities to interact with RAISE's material and services.

3.7.2 Stakeholder interactions

3.7.2.1 Contacted stakeholders (M6)

ISAE-Supaéro is involved in joint PhDs with CERFACS precisely on the topic of AI-assisted simulation. As such, interactions occur on a regular basis, and will continue throughout the project.

In the proposal stage (AISee), SAFRAN was only a stakeholder and is now a partner of RAISE. Through Tasks 3.3 and 3.4 of CoE RAISE, a close collaboration has started with them, which will continue throughout the project.

The interactions with AIRBUS are yet to be determined, as AIRBUS chose to retract from RAISE. The new formulation around hydrogen combustion could be of interest to them, but it is unclear if they are willing to interact with this project at this time.

3.7.2.2 Stakeholder interactions plan

The interaction plan of France region is given in Table 11.

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ISAE-Supaero	X	X	X	X	X	X	X	X	X	X	X	X
IRT					X							

ONERA					X							
AIRBUS					X							
CNES					X							
ANITI		X										

Table 11: France region interactions stakeholder plan.

3.7.3 Review and opportunities

Initial interactions with industrial entities are planned though CERFACS' yearly reporting. As work in Tasks 3.3 and 3.4 advances, the advantages of developed techniques and solutions to challenges encountered will be shared with the French academic HPC community, notably via the Teratec[53] and ORAP[54] networks.

3.8 Belgium

3.8.1 Status of the region

FM maintains a network of manufacturing companies and their technology providers that conduct R&D projects together. It is planned to disseminate RAISE activities and results from year 2, except for relevant training announcements, which will be made whenever appropriate.

3.8.2 Description of targeted stakeholders

3.8.2.1 Contacted stakeholders (M6)

At Month 6, no stakeholders have been contacted as of yet. Additional information can be found in Annex H.

3.8.2.2 Stakeholder interactions plan

The stakeholder interaction plan for the Belgium region is given in Table 12.

Institution	**2021**				**2022**				**2023**			
	Q1	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
FM Industrial Network					X				X			X
Materialise											X	

[53] Teratec http://www.teratec.eu/gb/index.html
[54] ORAP http://orap.irisa.fr/

3D Systems										X		

Table 12: Belgium region interactions stakeholder plan.

3.8.3 Review and opportunities

The FM network of industrial manufacturing companies and their technology providers comprises about 150 members. Membership is not free, so each and every one of those companies actively conduct R&D to improve their competitiveness. Engineering is essential for all manufacturing companies. Many run simulations of products or machines, and at least a dozen conduct AI research. HPC use, and especially large-scale HPC, is not yet common, so there is a lot to learn on that front for those R&D teams from the expertise in the CoE RAISE.

A few companies in the network have a business specifically in additive manufacturing, e.g., Materialise, Layerwise, and ESMA. Those companies will likely be very interested in the results of Task 4.3.

4 Baseline of the EU AI community at M6 (initial interests)

From the outcome sections of the tables of the Annexes, the following specific outcomes have been identified:

Germany (Annex A)

- **Gauss Centre for Supercomputing (GCS)**. GCS is interested in RAISE's activities, especially as it is responsible for the establishment of the National Competence Center in the context of the EuroCC project. FZJ will discuss with GCS and the German EuroCC NCC on how to reach and involve stakeholders in HPC, AI, and HPDA.
- **Helmholtz AI**. Helmholtz AI supports researchers within Helmholtz and pushes AI-based collaborations between different Helmholtz centers. The focus of the consultant team at FZJ is on general AI with a wish to develop towards scalable AI using parallel computing resources. Here, a collaboration with RAISE could lead to mutual benefits. Further discussions need to take place to elaborate on a collaboration.
- **NHR - National High Performance Computing in Germany**. RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.
- **GA - Gauss Alliance**. RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.
- **HPC.NRW**. RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.

Europe (Annex B)

- **EXCELLERAT**. Previous discussions were rather superficial and concrete collaboration plans also with respect to the applications in both CoEs need to be set up. This will be discussed in upcoming meetings with EXCELLERAT.
- **FocusCoE / HPC3**. Main topics that were discussed in the meetings the CoE RAISE Coordinator attended: organization of a joint workshop on co-design, contribution to the EuroHPC summit week 2021, preparation for the EC fitness-check. Recently, CoE RAISE has become a full member of HPC3 with voting rights.
- **EuroHPC EuroCC**. CoE RAISE believes that the National Competence Centers (NCCs) to be established in EuroCC can play a key role in paving the way for knowledge and technology transfer to national academic institutions and industry. It hence is planned to connect to EuroCC to exploit synergies in the provision of services, education, and knowledge and technology transfer in general. It was generally agreed on that a collaboration between CoEs and the NCCs makes sense. Further details of a collaboration need to be worked on.
- **EoCoE-II**. CoE RAISE and EoCoE-II have a joint use case on wind energy harvesting. While in EoCoE-II BSC's Alya code is brought to exascale in order to tackle large-eddy simulations of full wind farms, CoE RAISE deals with modeling single wind turbines with AI technologies to accelerate the prediction of full wind farms and at the same time to lower the cost of the simulations. That is, a collaboration will be beneficial for both projects. Further technical discussions on the joint use case are necessary and will be tackled next.

- **Center of Excellence in Combustion (CoEC).** ML and Data Analytics. A further exploration about RAISE capabilities is expected in a follow-up meeting among both CoEs. There is a clear interest from both sides to establish well-articulated collaborations. RAISE is clearly interested in this community as well as CoEC improving the skills and impact of the own tasks and the CoE itself. A new meeting will be scheduled between Project Coordinator and person responsible for Task 6.2.
- **CHEESE.** ML techniques applied to new cutting-edge numerical simulations, including mesh generation, etc. Also, a BSC/NVIDIA hackathon promoted by RAISE, CHEESE and CompbioMed2 will take place in Nov. 2021. Scheduled meetings.

Nordic region (Annex C)

- **COST Action CA18203**. Partners are aware of the existence of RAISE, and more exchange of methods is planned within Task 4.4 in the context of the RAISE project.

East Mediterranean and The Netherlands region (Annex D)

- **Delphi Consortium.** There is great potential in establishing collaboration with the CoE in the longer term, since Task 4.2 strongly aligns with the domains of activity of the consortium. Within the next reporting period, the research results of Task 4.2 will be presented by Prof. Eric Verschuur to the sponsoring community of the Delphi Consortium at Delft University of Technology in the Netherlands (community described above). This includes semi-annual meetings (October 2021 and March 2022) and the yearly report (January 2022).
- **NI4OS-Europe (N**ational **I**nitiatives for **O**pen **S**cience in **Europe).** To explore the possibility of establishing contacts within NI4OS-Europe.
- **SESAME** (Synchrotron-light for Experimental Science and Applications in the Middle East), Jordan. To explore the possibility of establishing contacts with organizations within SESAME.
- **SimEA (Modelling and SIMulation for Engineering Applications) ERA Chair.** To explore the possibility of establishing collaborations with industry contacts.

Baltic region (Annex E)

- **EOSC-Nordic.** Inclusion of RAISE services in EOSC's service catalogue.
- **SESAME.NET.** Sesame.net is interested in spreading HPC expertise to its members. Could be interested in RAISE training events.

Italy and Switzerland (Annex F)

- **CERN openlab**. Published articles.
- **WLCG and LHC Experiments.** CERN is using software written and maintained by members of the High Energy Physics community (e.g., WLCG, LHC Experiments) within the RAISE project, therefore by definition we assume very close collaboration. Many of the software packages that CERN is working on within the RAISE project are

developed and supported by either WLCG or directly by LHC experiments. Submitted 2 projects for PRACE Summer of HPC with 2 students per project (4 students total) working on RAISE related topics.

France (Annex G)

- **ISAE-Supaéro**. Monthly meetings, education.
- **IRT-Saint Exupéry**. Specific interest list to be made soon.
- **ONERA**. Specific interest list to be made soon.
- **AIRBUS**. Unclear due to retraction from RAISE (formerly AISee). Continued interaction remains to be determined.
- **CNES**. Specific interest list to be made soon.
- **SAFRAN**. Specific interest list to be made soon.
- **ANITI**. Interactions between Ph.D. students of ANITI and RAISE

Belgium (Annex H)

- **FM Industrial Network.** Spreading HPC simulation and AI expertise to member companies. Member companies could be interested in RAISE training events.

5 Conclusions

At this early stage of the project, interactions have already taken place for most of the regions. Some have already established clear objectives but in general, specific opportunities still need to be defined. The expected outcomes cover the education, industrial, and scientific sectors, enabled by the diversity of the institutions of the network. In addition, the geographical and technical heterogeneity of RAISE's partners will enable to disseminate efficiently RAISE activities and set a wide range of collaborations and partnerships.

In the next update of this Deliverable, a clear definition of current collaborations as well as new opportunities coming from this constant networking activity are expected.

Annex A Stakeholder monitoring of the German region

Name of institution	**Gauss Centre for Supercomputing (GCS)**
RAISE REGION	Germany
Register of the interaction	Discussions already took place a priori the project and hence there are no minutes available.
Type of organization	Association consisting of the three largest HPC centers in Germany that provide resources on Tier-0 and Tier-1 level, i.e., Jülich Supercomputing Centre (JSC), High-Performance Center Stuttgart (HLRS), and Leibniz Supercomputing Centre (LRZ)
Contact persons	Dr. Claus Axel Müller (Managing Director GCS)
Web page	https://www.gauss-centre.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	JSC is a partner in GCS.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	In principle, all communities using Tier-1 resources from JSC, HLRS, and LRZ through GCS.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA.
Main outcomes of the discussion and next planned actions	GCS is interested in RAISE's activities, especially as it is in Germany responsible for the establishment of the National Competence Center in the context of the EuroCC project. FZK will disciss with GCS and EuroCC NCC to reach and involve stakeholders in HPC, AI, and HPDA.

Name of institution	**Helmholtz AI (previously named HAICU)**
RAISE REGION	Germany
Register of the interaction	An informal meeting with Helmholtz AI took place on Jan. 14, 2021. No minutes have been recorded.
Type of organization	Research-driven hub for applied AI as part of the Helmholtz Association in Germany.
Contact persons	Dr. Stefan Kesselheim (Head of the AI consultant team at FZJ)
Web page	https://www.helmholtz.ai
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	FZJ is part of the Helmholtz Association in Germany. Helmholtz AI has established several Helmholtz AI consultant teams with Dr. Stefan Kesselheim, being also a staff member at JSC, representing the field "Information". Contact was established through relations.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	In principle, all research communities within the Helmholtz centers in Germany[55] showing interest in AI.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA.
Main outcomes of the discussion and next planned actions	Helmholtz AI supports researchers within Helmholtz and pushes AI-based collaborations between different Helmholtz centers. The focus of the consultant team at FZJ is on general AI with a wish to develop towards scalable AI using parallel computing resources. Here, a collaboration with RAISE could lead to mutual benefits. Further discussions need to take place to elaborate on a collaboration.

[55] Helmholtz centers Germany: https://www.helmholtz.de/en/about-us/helmholtz-centers/centers-a-z/

Name of institution	**Industry Relations Team (IRT)**
RAISE REGION	Germany
Register of the interaction	The Coordinator or CoE RAISE is a member of the IRT. Meetings take place bimonthly.
Type of organization	The IRT is part of JSC and is responsible for bridging HPC, AI, and HPDA expertise from JSC to industrial customers.
Contact persons	Dr. Hartmut Fischer (Head of the IRT)
Web page	https://www.fz-juelich.de/ias/jsc/industry-relations
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Coordinator or CoE RAISE is a member of the IRT since 10/2015.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Industrial customers using HPC resources at JSC.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA. Provision of HPC resources to industrial customers (Infrastructure as a Service - IaaS), Platform as a Service (PaaS), and Software as a Service (SaaS).
Main outcomes of the discussion and next planned actions	Services for commercial users offered by JSC could be integrated into RAISE. The IRT could forward requests from customers in case there is no expertise at JSC available. The IRT could furthermore be an entrypoint to have new joint collaborations using European funding and resources, e.g., through FF4EuroHPC[56] or PRACE SHAPE[57].

[56] FF4EuroHPC https://www.ff4eurohpc.eu
[57] PRACE SHAPE https://prace-ri.eu/hpc-access/shape-access/

Name of institution	**NHR - National High Performance Computing in Germany**
RAISE REGION	Germany
Register of the interaction	As a member of NHR, RWTH has listed its project participation and presented the project. Minutes were not taken.
Type of organization	Association consisting of the eight large HPC centers located at universities in Germany that provide resources on Tier-2 level.
Contact persons	Office (german: Geschäftsstelle) of NHR: https://www.nhr-gs.de/kontakt, plus individual contacts to other members.
Web page	https://www.nhr-gs.de/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	RWTH is a partner in NHR.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	In principle, all communities using Tier-2 resources in Germany.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA.
Main outcomes of the discussion and next planned actions	RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.

Name of institution	**GA - Gauss Alliance**
RAISE REGION	Germany
Register of the interaction	As a member of GA, RWTH has listed its project participation and presented the project. Minutes were not taken.
Type of organization	Association consisting of 18 HPC centers in Germany that provide resources on Tier-2 and/or Tier-3 level.
Contact persons	Office (german: Geschäftsstelle) of GA: https://gauss-allianz.de/de/helpcenter/contacts, plus individual contacts to other members.
Web page	https://gauss-allianz.de/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	RWTH is a partner in GA.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	In principle, all communities using Tier-2 and/or Tier-3 resources in Germany.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA.
Main outcomes of the discussion and next planned actions	RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.

Name of institution	**HPC.NRW**
RAISE REGION	Germany
Register of the interaction	As a member of HPC.NRW, RWTH has listed its project participation and presented the project. Minutes were not taken.
Type of organization	Association consisting of the eight large HPC centers located at universities in Germany that provide resources on the regional level.
Contact persons	Office (german: Geschäftsstelle) of HPC.NRW located at the IT Center at RWTH: https://hpc.dh.nrw/kontakt, plus individual contacts to other members.
Web page	https://hpc.dh.nrw/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	RWTH is the project lead in HPC.NRW.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	In principle, all communities using regional HPC resources in Germany.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Expertise channeling in HPC, AI, and HPDA.
Main outcomes of the discussion and next planned actions	RWTH will present RAISE' services at the next opportunity. Based on this, concrete actions could be set up.

Annex B Stakeholder monitoring of the EU region

Name of institution	**EXCELLERAT**
RAISE REGION	EU
Register of the interaction	First informal meetings between the Coordinators of CoE RAISE and EXCELLERAT have taken place. Minutes were not taken.
Type of organization	CoE
Contact persons	Dr.-Ing. Bastian Koller (Coordinator of EXCELLERAT)
Web page	https://www.excellerat.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Coordinator or EXCELLERAT is a personal contact of the Coordinator of CoE RAISE. They are also working together in the EuroHPC EuroCC project.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	The general engineering community in academia and industry.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Some simulation codes in EXCELLERAT are also further developed in CoE RAISE, i.e., AVBP from CERFACS and Alya from BSC. While EXCELLERAT concentrates in some sense on the scalability of the core solvers of these two simulation packages, CoE RAISE is working on advancing AI technologies to be coupled to these codes. The combination of both aspects creates an obvious synergy that needs to be explored to be beneficial for the stakeholders of both CoEs and beyond (code users, etc.).
Main outcomes of the discussion and next planned actions	Previous discussions were rather superficial and concrete collaboration plans also with respect to the applications in both CoEs need to be set up. This will be discussed in upcoming meetings with EXCELLERAT.

Name of institution	**FocusCoE / HPC3**
RAISE REGION	EU
Register of the interaction	Since 11/2020, the CoE RAISE Coordinator participates in the HPC3 meetings. The minutes are available on the RAISE workspace of the BSCW server[58].
Type of organization	CoE / HPC Council
Contact persons	Guy Lonsdale (CEO at scapos) Edouard Audit, Ph.D. (Coordinator of CoE EoCoE-II, Director of CEA)
Web page	https://www.hpccoe.eu https://www.hpccoe.eu/hpc-coe-council/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	As a representative of CoE RAISE, the Coordinator was asked to join HPC3.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	All CoE communities.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	HPC3 has the following objectives: (i) identify European HPC CoEs common interests, (ii) represent the CoEs in the current European HPC landscape, and (iii) be a representative body for the European HPC applications. That is, the creation of synergies is implicitly given.
Main outcomes of the discussion and next planned actions	Main topics that were discussed in the meetings the CoE RAISE Coordinator attended: organization of a joint workshop on co-design, contribution to the EuroHPC summit week 2021, preparation for the EC fitness-check. At present, CoE RAISE is a permanent observer in HPC3. Upon agreement on the terms of references of HPC3, CoE RAISE will become a member with voting rights. FZJ is still waiting for the acknowledgements from the partners that the Coordinator can represent CoE RAISE in HPC3 (at the time of the Deliverable due date, CoE RAISE is certainly already a full member of HPC3).

[58] BSCW link to the minutes of HPC3 meetings https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3567457

Name of institution	**EuroHPC EuroCC**
RAISE REGION	EU
Register of the interaction	The existence of the new CoE RAISE was mentioned in multiple EuroCC meetings. However, since these were mainly EuroCC meetings, minutes cannot be provided.
Type of organization	EuroHPC-funded project, which aims at establishing
Contact persons	Dr.-Ing. Bastian Koller (Coordinator of EuroCC)
Web page	https://www.eurocc-access.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	Many partners of C oE RAISE are also partners or linked-third parties in the EuroCC project.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Industry and academia interested in HPC, AI, and HPDA.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	CoE RAISE believes that the National Competence Centers (NCCs) to be established in EuroCC can play a key role in paving the way for knowledge and technology transfer to national academic institutions and industry. It hence is planned to connect to EuroCC to exploit synergies in the provision of services, education, and knowledge and technology transfer in general.
Main outcomes of the discussion and next planned actions	It was generally agreed on that a collaboration between CoEs and the NCCs makes sense. Further details of a collaboration need to be worked on.

Name of institution	**EoCoE-II**
RAISE REGION	EU
Register of the interaction	Informal discussions took place with the EoCoE-II contact points at FZJ and BSC. Minutes have not been recorded.
Type of organization	CoE
Contact persons	Dr. Edoardo Di Napoli (WP1 leader in EoCoE-II)
Web page	https://www.eocoe.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	FZJ, BSC, and CERFACS are partners in both CoE RAISE and EoCoE-II.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Engineering / wind energy community.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	CoE RAISE and EoCoE-II have a joint use case on wind energy harvesting. While in EoCoE-II BSC's Alya code is brought to exascale in order to tackle large-eddy simulations of full wind farms, CoE RAISE deals with modeling single wind turbines with AI technologies to accelerate the prediction of full wind farms and lower the cost of the simulations. A collaboration will be beneficial for both projects.
Main outcomes of the discussion and next planned actions	A collaboration has already been agreed on in the proposal stage. Further technical discussions on the joint use case are necessary and will be tackled next.

Name of institution	**Center of Excellence in Combustion (CoEC)**
RAISE REGION	EU
Register of the interaction	RAISE_MoM_CoEC_210414
Type of organization	Center of Excellence (European Project) H2020-INFRAEDI-2018-2020
Contact persons	Dr. Daniel Mira
Web page	https://coec-project.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	BSC is CoEC leading partner and is also partner from RAISE. CoEC and RAISE actively participate at FocusCOE meetings as well as at HPC3 Council. **A first joint RAISE-CoEC CoE Training Course - "Interactive HPC with JupyterLab" 26-27th May 2021 is under preparation.**
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	HPC Combustion (transport, industry)
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Machine Learning and Data Analytics. A further exploration about RAISE capabilities is expected in a follow-up meeting among both CoEs.
Main outcomes of the discussion and next planned actions	There is a clear interest from both sides to establish well-articulated collaborations. RAISE is clearly interested in this community as well as CoEC improving the skills and impact of the own tasks and the CoE itself. A new meeting will be scheduled between PC and T6.2 responsible.

Name of institution	**CHEESE**
RAISE REGION	EU
Register of the interaction	Include reference to all the minutes of the meeting (i.e., RAISE_MoM_Stakeholder_YYMMDD)
Type of organization	Center of Excellence
Contact persons	Dr Arnau Folch (Project Coordinator), Dr. Josep de la Puente (WP4 leader)
Web page	https://cheese-coe.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	BSC is CHEESE leading partner and is also partner from RAISE. CHEESE and RAISE actively participate at FocusCOE meetings as well as at HPC3 Council.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	HPC Solid Earth
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	ML techniques applied to new cutting-edge numerical simulations, including mesh generation, etc. Also, a BSC/NVIDIA hackathon promoted by RAISE, CHEESE and CompbioMed2 will take place in Nov. 2021.
Main outcomes of the discussion and next planned actions	Scheduled meeting 28th April 2021 (cancelled and re-scheduled to September 2021)

Annex C Stakeholder monitoring of the Nordic region

Name of institution	**COST Action CA18203**
RAISE REGION	Nordic
Register of the interaction	At month 6: a meeting of information exchange about RAISE to report on (also engaging in recruitment for PhD student)
Type of organization	COST Action relevant for the Sound Engineering Use Case in RAISE
Contact persons	Prof. Dr. Runar Unthorsson
Web page	https://www.cost.eu/actions/CA18203/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Icelandic IHPC national competence center with its Acoustic and Tactical Engineering Lab (ACUTE) are part of the RAISE project but also part of the COST Action CA18203
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	acoustic, sound, and tactical engineering
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	There is great potential in establishing collaboration with the CoE in the longer term, since T4.4 has some overlap in approaches to the COST action witrh respect to sound engineering methods.
Main outcomes of the discussion and next planned actions	One meeting to inform the COST action about the RAISE project and to recruit a suitable PhD student in the network. **Next planned actions:** Within the next reporting period, the research results of Task 4.4 will be presented by Prof. Runar Unthorsson to explore further collaboration opportunities and exchange of methods.

Name of institution	**COST Action CA18203**
RAISE REGION	Nordic
Register of the interaction	At month 6: regular meetings about streamlining the authentication and authorization for HPC systems in the nordic region (also known as PUHIRI)
Type of organization	The Nordic e-Infrastructure Collaboration (NeIC) facilitates the development and operation of high-quality e-infrastructure solutions in areas of joint Nordic interest.
Contact persons	Prof. Dr. Ebba Hvannberg
Web page	https://neic.no/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The partner UOI is a partner in NeiC together with many other Nordic partners.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	HPC technology communities streamlining access to HPC resources in the Nordics (e.g., including LUMI through PUHURI)
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	The collaboration with NeiC is given implicitly with a great potential to expand the results from RAISE into the nordic territories.
Main outcomes of the discussion and next planned actions	Several meetings have been performed to ensure a common authorization and authentication to HPC systems for HPC users. **Next planned actions:** Within the next reporting period, concrete solutions of PUHURI methods should be deployed on HPC systems in Iceland and the Nordic regions that make it easier for RAISE solutions to be deployed in the Nordic regions if it becomes interesting for other Nordic partners. At the time of writing, RAISE has not yet concrete results to distribute to Nordic partners.

Annex D Stakeholder monitoring of the East Mediterranean and the Netherlands region

Name of institution	**Delphi Consortium**
RAISE REGION	The Netherlands
Register of the interaction	At month 6: no meetings to report on.
Type of organization	Consortium of oil and gas companies led by scientists.
Contact persons	Prof. Eric Verschuur: D.J.Verschuur@tudelft.nl
Web page	https://www.delphi-consortium.com/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Delphi Consortium (https://www.delphi-consortium.com) is a third party to the Cyprus Institute. It is sponsored by approximately 30 companies in the geo-energy sector. A list of these companies within this well-established community can be found here: https://www.delphi-consortium.com/files/stacks-image-8cf3319-1200x748.jpg A&P, M&I, C&M are different projects in DELPHI, namely Acquisition and Preprocessing, Migration and Inversion, Reservoir Characterization and Monitoring. There is potential to establish further contacts with companies within the consortium and beyond.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Seismic imaging and remote sensing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	There is great potential in establishing collaboration with the CoE in the longer term, since T4.2 strongly aligns with the domains of activity of the consortium.
Main outcomes of the discussion and next planned actions	Currently no meetings to report on. **Next planned actions:** Within the next reporting period, the research results of Task 4.2 will be presented by Prof. Eric Verschuur to the

	sponsoring community of the Delphi Consortium at Delft University of Technology in the Netherlands (community described above). This includes semi-annual meetings (October 2021 and March 2022) and the yearly report (January 2022).

Name of institution	**NI4OS-Europe (N**ational **I**nitiatives for **O**pen **S**cience in **Europe)**
RAISE REGION	Balkans
Register of the interaction	At month 6: no meetings to report on.
Type of organization	Project
Contact persons	Dr. Andreas Athenodorou: a.athenodorou@cyi.ac.cy Ognjen Prnjat: oprnjat@grnet.gr
Web page	https://ni4os.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Cyprus Institute is a partner in RAISE and in NI4OS-Europe (Dr. Andreas Athenodorou is a work package leader) and thus will connect RAISE to other NI4OS-Europe partners, primarily in the Balkans.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	On-boarding services to serve the open science initiatives of the European Commission, amongst others, related to AI applications in engineering and sciences.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	To be explored in a forthcoming meeting.
Main outcomes of the discussion and next planned actions	Currently no meetings to report on. **Next planned actions:** Discussions to be held with Dr. Andreas Athenodorou, our contact point at the Cyprus Institute for NI4OS-Europe to explore the possibility of establishing contacts within NI4OS-Europe.

Name of institution	**SESAME** (Synchrotron-light for Experimental Science and Applications in the Middle East), Jordan.
RAISE REGION	Eastern Mediteranean and Middle East (EMME)
Register of the interaction	At month 6: no meetings to report on.
Type of organization	Centre of excellence and synchrotron light research facility and
Contact persons	Dr. Charalambos Chrysostomou c.chrysostomou@cyi.ac.cy
Web page	https://www.sesame.org.jo
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	Cyprus is one of eight member states of SESAME. The Cyprus Institute has been engaged in projects such as OPEN-SESAME and BEATS at SESAME, thereby acting as a European link to SESAME. In this way, the Cyprus Institute may serve to foster links between RAISE and universities and research institutes within the member states of SESAME that currently comprises Egypt, Iran (Islamic Republic of), Israel, Jordan, Pakistan, Palestine, and Turkey.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Synchrotron applications, visualization in tomography, data-intensive applications, data management, archiving.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	To explore in forthcoming meetings: support them in the adoption of AI tools in the analysis of synchrotron data.
Main outcomes of the discussion and next planned actions	Currently no meetings to report on. **Next planned actions:** Discussions to be held with Dr. Charalambos Chrysostomou, our work package leader in BEATS at the Cyprus Institute, to explore the possibility of establishing contacts with organisations within SESAME.

Name of institution	**SimEA (Modelling and SIMulation for Engineering Applications) ERA Chair**
RAISE REGION	Cyprus and Eastern Mediteranean
Register of the interaction	At month 6: no meetings to report on.
Type of organization	Project
Contact persons	Prof. Vangelis Harmandaris, ERA chair Dr. Christos Christodoulou, SimEA innovation scout Dr. Kathy Christoforou, SimEA scientific Coordinator.
Web page	https://simea.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	In 2018, Computation-based Science and Technology Research Center (CaSToRC) was awarded an ERA Chair in "Modelling and SIMulation for Engineering Applications" (SimEA) to establish a team in **computation-based engineering while advancing entrepreneurship and industrial collaboration at CaSToRC**. Through its collaborations with industry, CaSToRC will explore the possibility of potential collaborations with RAISE.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Multi-scale modelling, data-intensive applications
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Developments in AI within RAISE can support the establishment of synergies in projects related to the multiscale modelling of complex materials.
Main outcomes of the discussion and next planned actions	Currently no meetings to report on. **Next planned actions:** Discussions to be held with Prof. Vangelis Harmandaris (ERA chair), Assist. Prof. Nikos Savva (senior scientist and faculty in SimEA and task leader in RAISE: contact point for both projects) and Dr. Christos Christodoulou (SimEA innovation scout) to explore the possibility of establishing collaborations with industry contacts.

Annex E Stakeholder monitoring of the Baltic region

Name of institution	**EOSC-Nordic**
RAISE REGION	BALTIC/NORDIC
Register of the interaction	Contact is not established yet.
Type of organization	Project
Contact persons	Ilja Livenson from University of Tartu (WP3 leader)
Web page	https://www.eosc-nordic.eu/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	RTU is a partner in the EOSC-Nordic project
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	European Open Science Cloud, services, FAIR data
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Inclusion of RAISE services in EOSC service catalogue.
Main outcomes of the discussion and next planned actions	Not contacted yet. Meeting could take place Q3 / 2021

Name of institution	**SESAME.NET**
RAISE REGION	BALTIC/EM
Register of the interaction	Email exchange on May 2021. Agreed to have meeting this summer.
Type of organization	Network
Contact persons	Martina Murovec (Arctur) Eduardas Kutka (Vilnius University) Tomi Ilijas (Arctur)
Web page	http://sesamenet.eu (site is currently down)
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	RTU is a full member in the network.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Network unites industrial and academic partners from different communities. The main focus is on supporting industry in HPC uptake.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Sesame.net is interested in spreading HPC expertise to its members. Could be interested in RAISE training events.
Main outcomes of the discussion and next planned actions	Current network status/aliveness should be clarified. We have contacted Vilnius University (SESEME.NET partner, Lithuania) and board members from Arctur (Slovenia). Meeting will be organized this summer.

Annex F Stakeholder monitoring of the Italy and Switzerland region

Name of institution	**CERN openlab**
RAISE REGION	Switzerland
Register of the interaction	TODO
Type of organization	Research Organization
Contact persons	Alberto Di Meglio (CERN openlab)
Web page	https://openlab.cern
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	CERN openlab collaborates with many leading ICT companies and research organizations. Maria Girone is the CTO of CERN openlab.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	High Energy Physics / High Throughput Computing / Experimental Physics / Artificial Intelligence / Quantum Computing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	CERN openlab performs extensive research in various domains such as artificial intelligence, machine learning, and quantum computing — topics that are also of core interest to the RAISE community
Main outcomes of the discussion and next planned actions	Published article(s) https://openlab.cern/high-energy-physics-and-high-performance-computing-european-projects-and-european-summit https://sciencenode.org/feature/The%20future%20of%20high-energy%20physics.php

Name of institution	**WLCG and LHC Experiments**
RAISE REGION	Switzerland
Register of the interaction	TODO
Type of organization	Research Organization
Contact persons	Simone Campane (WLCG)
Web page	https://wlcg.web.cern.ch/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	The Worldwide LHC Computing Grid (WLCG) project is a global collaboration of around 170 computing centers linking up national and international grid infrastructure. Maria Girone is an active member of various joint R&D projects with WLCG (e.g., DOMA, HPC benchmarking, HPC Data Access, etc.)
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	High Energy Physics / High Throughput Computing / Experimental Physics / Grid Computing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	CERN is using software written and maintained by members of the high-energy physics community (e.g., WLCG, LHC experiments) within the RAISE project. As such, very close collaboration is assumed by definition. Many of the software packages that CERN is working on within the RAISE project are developed and supported by either WLCG or directly by LHC experiments
Main outcomes of the discussion and next planned actions	Submitted 2 projects for PRACE Summer of HPC with 2 students per project (4 students total) working on RAISE related topics. Students will work during July-August. The topics of the projects are 1) Benchmarking of HEP production workflows on HPC 2) HPC Data Access for Large Scale HEP data processing

Annex G Stakeholder monitoring of the France region

Name of institution	**ISAE-Supaéro**
RAISE REGION	France
Register of the interaction	Frequent collaboration with CERFACS, co-supervision of PhDs on the core topics of RAISE.
Type of organization	Higher education
Contact persons	Dr Michaël Bauerheim
Web page	https://www.isae-supaero.fr/en/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	ISAE works closely with CERFACS on topics related to AI for Computational Fluid Dynamics (CFD) applications, in HPC contexts
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Turbomachinery, aerospace
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Hybrid CFD solvers, including data-driven components, in an HPC context.
Main outcomes of the discussion and next planned actions	Monthly meeting between ISAE-Supaéro and CERFACS AI teams

Name of institution	**IRT-Saint Exupéry**
RAISE REGION	France
Register of the interaction	No interaction on this topic at this time
Type of organization	Research center
Contact persons	TBD
Web page	https://www.irt-saintexupery.com/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	ISAE works closely with CERFACS on topics related to AI for CFD applications, in HPC contexts
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Turbomachinery, aerospace, manufacturing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Specific interest list to be made soon

Name of institution	**ONERA**
RAISE REGION	France
Register of the interaction	ONERA is heavily vested in the development of CFD solvers in FRANCE, including using data driven techniques, where CERFACS is also included. It is also part of ongoing EU project collaborations on AI for CFD (HiFi-Turb).
Type of organization	National Laboratory
Contact persons	TBD
Web page	https://www.onera.fr/en
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	ONERA is an actor of the French CFD and HPC ecosystem. Several previous and ongoing collaborations exist with CERFACS on developing CFD solvers.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Turbomachinery, aerospace
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Specific interest list to be made soon

Name of institution	**AIRBUS**
RAISE REGION	EU
Register of the interaction	Ongoing joint work on next generation CFD solvers with CERFACS, ONERA.
Type of organization	Aerospace Company
Contact persons	TBD
Web page	https://www.airbus.com/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	Ongoing collaborations and joint PhDs, expressed interest in hybrid solvers. Previously implicated in RAISE (formerly AISee).
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Aerospace
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Unclear due to retraction from RAISE (formerly AISee). Continued interaction remains to be determined

Name of institution	**CNES**
RAISE REGION	FRANCE
Register of the interaction	No interaction at that time
Type of organization	National Laboratory
Contact persons	TBD
Web page	https://cnes.fr/en
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	TBD
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Aerospace, manufacturing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Specific interest list to be made soon

Name of institution	**SAFRAN**
RAISE REGION	FRANCE
Register of the interaction	Ongoing EU project collaborations on AI for CFD (HiFi-Turb)
Type of organization	Research center
Contact persons	TBD
Web page	https://www.safran-group.com/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	HiFi-Turb EU project
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Turbomachinery, manufacturing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Specific interest list to be made soon

Name of institution	**ANITI**
RAISE REGION	FRANCE
Register of the interaction	Joint PhDs on new hybrid CFD solvers
Type of organization	Research center
Contact persons	Corentin Lapeyre
Web page	https://aniti.univ-toulouse.fr/en/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	ISAE works closely with CERFACS on topics related to AI for CFD applications, in HPC contexts
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Aerospace, hydrodynamics
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	TBD
Main outcomes of the discussion and next planned actions	Interactions between Ph.D. students of ANITI and RAISE

Annex H Stakeholder monitoring of Belgium region

Name of institution	**FM Industrial Network**
RAISE REGION	Belgium
Register of the interaction	Contact is not established yet.
Type of organization	Company consortium
Contact persons	Different per company. Wouter Lammens will coordinate.
Web page	https://www.flandersmake.be/en/about-us/flanders-make-members
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	Member companies have a single point of contact within Flanders MAKE. FM newsletters are read by the CTO, head of R&D, or equivalent.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Manufacturing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Spreading HPC simulation and AI expertise to member companies. Member companies could be interested in RAISE training events.
Main outcomes of the discussion and next planned actions	

List of Acronyms and Abbreviations

ABCD	Aachen, Bonn, Cologne, Düsseldorf
ACUTE	Acoustic and Tactical Engineering Lab
AI	Artificial Intelligence
AISee	AI- and Simulation-Based Engineering at Exascale; renamed to RAISE
ANITI	Artificial and Natural Intelligence Toulouse Institute
ATMLs	Algorithms, Tools, Methods Labs
BSC	Barcelona Supercomputing Center
BSCW	Basic Support for Cooperative Work
CaSToRC	Computation-based Science and Technology Research Center (Cyprus)
CBG	CERN Baltic Group
CERFACS	Centre de recherche fondamentale et appliquée spécialisé dans la modélisation et la simulation numériques
CERN	Conseil Européen pour la Recherche Nucléaire
CFD	Computational Fluid Dynamics
CINECA	Consorzio Interuniversitario del Nord est Italiano Per il Calcolo Automatico
CoEC	CoE in Combustion
CoE ChEESE	CoE for Exascale in Solid Earth
CoE Combiomed	CoE in Computational Biomedicine
CoE EXCELLERAT	CoE for Engineering Applications
CoE POP	CoE Performance Optimisation and Productivity
CoE RAISE	European Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale”
CPU	Central Processing Unit
CSCS	Centro Svizzero di Calcolo Scientifico
CSG	Cross-Sectional Group
CST	Cross-Sectional Team
CUDA	Compute Unified Device Architecture
CYI	The Cyprus Institute
DEEP	Dynamical Exascale Entry Platform
DEEP-ER	DEEP Extended Research
DEEP-EST	DEEP-Extreme Scale Technologies
DEEP-SEA	DEEP Programming Environment for European Exascale Systems
DoA	Description of Action
DTU	Denmark Technical University
EC	European Commission
EM	Eastern Mediterranean
EoCoE	Energy-oriented CoE
EOSC-Nordic	European Open Science Cloud at Nordic
EPI	European Processor Initiative
ETAIS	Estonian scientific computing infrastructure
ETP4HPC	European Technology Platform for High-Performance Computing
EU	European Union
EMME-CARE CoE	The Eastern Mediterranean and Middle East - Climate and Atmosphere Research CoE
FM	Flanders MAKE
FZJ	Forschungszentrum Jülich GmbH
GA	Gauß-Allianz

GCS	Gauss Centre for Supercomputing
GDP	Gross Domestic Product
GRU	Gated Recurrent Units
HAICU	Helmholtz Artificial Intelligence Cooperation Unit
HEP	High-Energy-Physics
HL-LHC	High-Luminosity Large-Hadron Collider
HLRS	High-Performance Center Stuttgart
HPC	High-Performance Computing
HPDA	High-Performance Data Analytics
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
IRT	Industry Relations Team
ISV	Independent Software Vendor
JLESC	Joint Laboratory for Extreme Scale Computing
JSC	Jülich Supercomputing Centre
LE	Large Enterprise
LHC	Large Hadron Collider
LRZ	Leibnitz Supercomputing Centre of the Bavarian Academy and Sciences and Humanities
LSTM	Long Short-Term Memory
ML	Machine Learning
MSA	Modular Supercomputing Architecture
MoM	Minutes of the Meetings
NCC	National Competence Center
NDE	Non-Destructive Evaluation
NeiC	Nordic e-Infrastructure Collaboration
NHR	Nationales Hochleistungsrechnen
NI4OS-Europe	National Initiatives for Open Science in Europe
NLP	Natural Language Processing
NRW	North Rhine-Westphalia
PaaS	Platform as a Service
PI	Principal Investigator
PMT	Project Management Team
PRACE	Partnership for Advanced Computing in Europe
PU	Public
RAISE	see CoE RAISE
RES	Spanish Supercomputing Network
RTU	Riga Technical University
RWTH	Rheinisch-Westfälische Technische Hochschule Aachen
SaaS	Solution as a Service
SDL	Simulation and Data Laboratory
Sec.	Section
SESAME	Synchrotron-light for Experimental Science and Applications in the Middle East
SimEA	Modelling and SIMulation for Engineering Applications
SME	Small- and Medium-sized Enterprise
UOI	University of Iceland / Haskoli Islands
UT	University of Tartu

VU	Vilnius University
WP	Work Package