Network Evaluation Document

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Executive Summary

Task 6.2 of the European 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: raise awareness on technical developments and services implemented in the project; enhance their impact; dynamize the use through Europe of Artificial Intelligence (AI) in an High-Performance Computing (HPC) context. Connecting smaller (≤Tier-2) HPC centers, local academic institutions, industry, and SMEs to RAISE's developments and expertise will allow to uncover new user communities and to provide corresponding service and education. Hence, the 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 from 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' location and their network regions. 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 on 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 second of a series of three that are updated periodically as the network is continuously expanding. This series is incremental to have, eventually, a coherent and self-contained document.
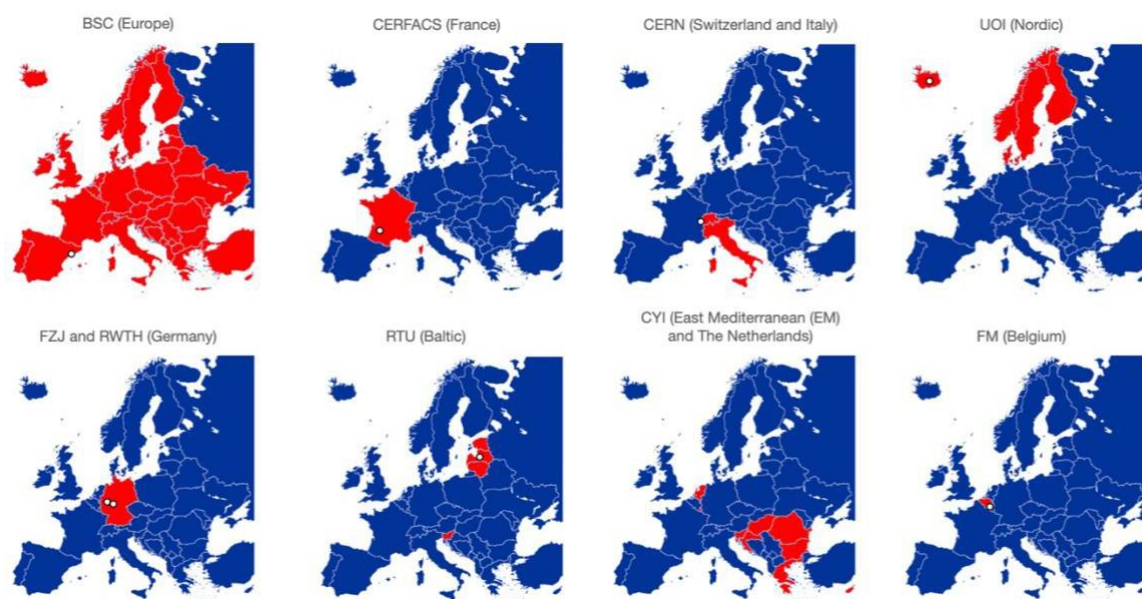

Figure 1: Geographical location of the partners of RAISE and their network regions.

1   Introduction

As mentioned earlier, this deliverable is the second of a series of three, and we decided to make it incremental for the sake of clarity and self-contained. This introduction and part of the text were thus already present in the previous version, but they now include new contributions and corrections.

The 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 academic and industrial aspects in a balanced way. This is achieved by having both partner aspects in the consortium, e.g., from academia the internationally renowned universities UOI and CYI, and SAFRAN from the industry side. This balanced mix of know-how from diverse backgrounds allows to tackle the objectives of the CoE RAISE from different perspectives while each partner progresses in its field of expertise. That are the hand-in-hand activities between the academic and industrial partners of RAISE, which 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 HPC, AI, simulation science, and big data-driven workflows. With each partner being integrated into extended local national and international networks, i.e., into industry, 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 (FZJ and BSC), national Tier-1 (also FZJ and BSC, and CYI), and regional Tier-2 (UOI and RWTH) to Tier-3 (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, CERN, CERFACS, and FM), and industry (BULL ATOS, SAFRAN, ParTec as third party from FZJ, Delphi (an industry consortium at TUDelft) as third party from CYI).

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.
- Increasing the number of participants at events organized by RAISE
- Definition of use cases
- Definition of standards
- Recruitment of new stakeholders
- Integration of RAISE services on existing platforms
- Delivery of RAISE derived software to a specific community
- Pushing the adoption of RAISE tools
- Enhancing the development of scalable AI using parallel computing resources
- Proposing services for commercial users
- Exploiting synergies in the provision of services, education, and knowledge and technology transfer in general
- Creating awareness in a broader audience
- Participating in official committees
- Carrying out scientific collaborations

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

This document is structured as follows. First, the network evaluation methodology is presented in Sec. 2. A regional analysis of the networking activities is provided in Sec. 3. Section 4 gives the baseline of the EU AI community at project month M18. Finally, some conclusions are drawn in Sec. 5.

2   Network evaluation: methodology

This section provides an overview of the network evaluation methodology. Section 2.1 gives a brief description of the approach to execute the evaluation. This is followed by a description of role of the initial stakeholders in Sec. 2.2 and of the identification of the RAISE's initial regions in Sec. 2.3.

2.1   Description of the approach to execute the task

The creation of the network involves identification and interaction activities that are reported in different subsections for each region:

- Identification of stakeholders and RAISE responsible to interact with.
- Identification of RAISE region/country responsible.
- Table to be filled because of 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 D6.5 at M6, D6.6 at M18 and D6.7 at M36.

2.2   Identification of initial stakeholders

Many of the consortium partners are involved in endeavours 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 identified in Table 1 and in Sec. 2.2.1. The network increases 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 shows the partners in charge of their respective identified institutions. This section is subdivided into stakeholders with respect to research and innovation activities (Sec. 2.2.1) and network-building institutions (Sec. 2.2.2). A segmentation analysis is provided in Sec. 2.2.3.

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

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[1] COE EXCELLERAT https://www.excellerat.eu/
[2] COE PoP https://pop-coe.eu/

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 CPU and accelerator cores share an interposer). Simultaneously, requirements set up 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-Software for Exascale Architectures (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, as well as strengthens European users of HPC in industry. At FZJ (via 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) 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.

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[3] EOCOE-II https://www.eocoe.eu/
[4] EPI https://www.european-processor-initiative.eu/
[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

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.

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 institutions

CoE RAISE is clearly committed to interact with as many EU initiatives as possible directly related to the goals of the CoE. Thus, a clear alliance with them would strength and facilitate the technical cooperation among those institutions belonging to both CoE RAISE and the external initiatives. The main idea of RAISE is not only to enlarge the AI community itself but also to interact through specific events and under bilateral frameworks in order to foster the adoption of the CoE assets.

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) 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[14]: Helmholtz Artificial Intelligence Cooperation Unit. In HAICU AI and 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.

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[9] Sound of vision https://soundofvision.net/
[10] Delphi Consortium https://www.delphi-consortium.com/
[11] JLESC https://jlesc.github.io/
[12] ANITI https://aniti.univ-toulouse.fr
[13] IRT https://www.irt.rwth-aachen.de/go/id/iung/?lidx=1
[14] HAICU https://www.haicu.de

NeIC[15]: 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 Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME) facility in Jordan[16].

EMME-CARE CoE[17]: 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.

Flanders Make network[18]: FM will disseminate RAISE's research to its network of industrial manufacturing companies with more than 150 members.

GCS[19]: The Gauß Center for Supercomputing (GCS) will be used as a channel to propagate RAISE's developments to professional HPC users' communities in Germany.

Gauß-Alliance[20]: 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[21]: 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.

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[15] NEIC https://www.nordforsk.org/programs/nordic-e-infrastructure-collaboration-neic

[16] SESAME http://www.sesame.org.jo

[17] EMME-CARE http://emme-care.cyi.ac.cy

[18] FM https://northsearegion.eu/growin4/project-partners/flanders-make-belgium/

[19] GCS https://www.gauss-centre.eu/

[20] Gauß Allianz https://gauss-allianz.de/en

[21] HPC.NRW https://hpc.dh.nrw/

SESAME Net[22]: 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[23]: 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[24]: 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[25]: CERN openlab is a unique public-private partnership, through which CERN collaborates with leading 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.

ETP4HPC[26]: 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.

DIH4CAT[27]: The Digital Innovation Hub of Catalonia (Spain) is a regional non-profit innovation ecosystem, formed by the main agents of support for the digitalization of Catalonia, which aims to promote the technological transformation of Small and Medium Enterprises (with a special focus on industrial sectors and technology providers), technology start-ups and public entities. BSC-CNS is former member.

CIDAI[28]: The Center of Innovation for Data Tech and Artificial Intelligence (CIDAI) from Catalonia (Spain) promotes the transfer of knowledge and the realization of joint projects between knowledge-generating entities (universities, research and innovation centers), companies providing technology and services, and user companies and institutions demanding innovative solutions in applied artificial intelligence. CIDAI follows the model of Digital Innovation Hubs established by the European Commission and is configured as a networked center at the service of companies and institutions. BSC-CNS is former member of this initiative.

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[22] Sesame Net https://sesamenet.eu
[23] COST Action CA18203 http://odin-cost.com/
[24] RES https://www.res.es/en/about
[25] CERN openlab https://home.cern/science/computing/cern-openlab
[26] ETP4HPC https://www.etp4hpc.eu
[27] DIH4CAT https://dih4cat.cat/
[28] CIDAI https://cidai.eu/

INSTITUTION	REGION	RESPONSIBLE PARTNER TO INTERACT WITH THE STAKEHOLDER								
		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-ll	EU	███								

CoEC	EU									
CHEESE	EU									
EPI	EU									
DEEP	EU									
EMME-CARE	EU									
ETP4HPC	EU									
Spanish Supercomputing Network	SPAIN									
DIH4CAT	SPAIN									
CIDAI	SPAIN									

Table 1: List of stakeholders.

2.2.3 Network evaluation: segmentation analysis.

The European engineering industry consists of 130,000 companies of diverse sizes. 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 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
DIH4CAT	Spanish Association	SPAIN
CIDAI	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 a RAISE region/country responsible. This partner is in charge not only of collecting all the information directly related to the interaction of all the partners with the stakeholders in the 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	thibault.crepain@flandersmake.be

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 D6.6 is now delivered in Month 18, but later will be updated in the corresponding update in 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, 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, we summarize the stakeholder interactions that have taken place as well as a calendar for future interactions. Finally, we conclude each region subsection by discussing new opportunities for the network.

3.1   German region

This section first provides an overview of the status of the German region in Sec. 3.1.1. Subsequently, stakeholder interactions are documented in Sec. 3.1.2. Finally, a review is given and opportunities are identified in Sec. 3.1.3.

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 small- and medium-sized enterprises (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 Simulation and Data Labs (SDLs)[29] and the Algorithms, Tools, Methods Labs (ATMLs), also known as Cross-Sectional Teams (CSTs)[30], at JSC. The SiVeGCS project[31] 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[32] - 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[33] 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

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

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)[34], 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.

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

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.1.2.3. Additional information can be found in Annex A.

3.1.2.1 Contacted stakeholders (M6)

At Month 6, the current contacted stakeholders are herein described.

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., Jülich Supercomputing Centre (JSC), High-Performance Center Stuttgart (HLRS), and Leibniz Supercomputing Centre (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.*

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[34] GA https://gauss-allianz.de/

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 Contacted stakeholders (M18)

NCC Germany: The National Competence Center (NCC) Germany. Informal exchange between RAISE and FZJ's participants took place. Topics were interactive supercomputing using Jupyter notebooks, parallel Python execution on FZJ's production and experimental systems, as well as simulation code porting and performance engineering. *Community: HPC, AI, Industry.*

Helmholtz AI (previously named HAICU): Stefan Kesselheim contributed in-kind to the internal review of Deliverable D2.14 "Report on porting & performance engineering", which was due in M12. *Community: AI.*

3.1.2.3 Stakeholder interactions plan

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

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
GCS				X	X	X		X				
Helmholtz AI					X				X			
IRT	X	X	X	X	X	X	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						

NCC Germany				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[35] in Aachen bringing AI to industry 4.0 (and provided a letter of intent to the CoE RAISE project). Another example is Cognigy[36] 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[37] 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.

3.2 European Union (EU) region

This section first provides an overview of the status of the European region in Sec. 3.2.1. Subsequently, stakeholder interactions are documented in Sec. 3.2.2. Finally, a review is given and opportunities are identified in Sec. 3.2.3.

3.2.1 Status of the region

At the EU region level, we 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 DOWs. As an example, 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 with RAISE WP3 in terms of applications and methodologies. 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. ChEESE CoE has recently ended (March 2022) but has submitted a new proposal at the EuroHPC JU CoE Call, where AI will, for sure, play an important role. The communication channel between CoEs is open and further discussions will be done if ChEESE 2 is granted.

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

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

Common dissemination activities (training, workshops, hackathons) will also be planned. In that sense, one hackathon will be held next Autumn in collaboration with CHEESE and Compbiomed2 CoEs[38]. A first joint RAISE-CoEC CoE Training Course - "Interactive HPC with JupyterLab" took place in May 2021. Also, RAISE team took part in a AI4Media AI Café with CoEC and HiDALGO[39].

Additionally, the complementary 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

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.2.2.3. Additional information can be found in Annex B.

3.2.2.1 Contacted stakeholders (M6)

At Month 6, the current contacted stakeholders are herein described.

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 to the HPC3 meetings. The minutes are available on the RAISE workspace of the BSCW server[40]. 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).*

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 (PC of CoEC) and Dr. Joan Farnós from CoE RAISE in April 14th, 2021 (Reference to minutes: RAISE_MoM_CoEC_210414). 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 took place in May 2021

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[38] BSC/NVIDIA Hackaton https://www.gpuhackathons.org/event/bsc-gpu-hackathon
[39] AI4Media AI Café: https://www.youtube.com/watch?v=WF_OYTV4pDQ&t=11s
[40] BSCW link to the minutes of HPC3 meetings: https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3567457

Community: HPC Combustion. A second technical meeting was held in May 2022 between scientists of RAISE and COEC in order to setup common technical strategies for interfacing AI tools with CFD codes, in Fortran.

ChEESE: Scheduled meeting 28th April 2021 (cancelled and re-scheduled to September 2021). The CoE RAISE-ChEESE interactions and in stand-by as ChEESE ended March 30th 2022, whereas It has submitted a proposal to continue under the EuroHPC JU new funding scheme. *Community: HPC Solid Earth.*

3.2.2.2 Contacted stakeholders (M18)

TREX[41]: A first informal meeting with the CoE "Targeting Real Chemical accuracy at the EXascale" (TREX) between the project coordinators (Claudia Filipi - TREX, and Andreas Lintermann - RAISE) took place on March 9, 2022[42]. It was agreed on exchanging further details including technical experts. More details were discussed between Lintermann and Matthias Rupp (TREX) on March 16, 2022[43]. TREX will be included in the RAISE seminar series. A forum for a RAISE talk in TREX still needs to be identified. *Community: Chemistry, Molecular Dynamics.*

EuroCC[44]: CoE RAISE participated in two workshops organized by FocusCoE, where the CoEs presented their work to the National Competence Centers (NCCs). The first one was on Computational Fluid Dynamics (CFD) and took place on Sep. 22, 2021. The second workshop was on tools and took place on Feb. 07, 2022. Minutes were taken by FocusCoE. In addition, the coordinator of CoE RAISE was invited to participate in the *High Performance Computing in Science and Engineering Conference 2022* (HPCSE 2022)[45] by the EuroCC NCC of Czech Republic (CZ). EuroCC NCC CZ claimed a strong interest to collaborate with CoE RAISE in the future (see Sec. 3.2.3).

CoEC[46]: A technical meeting was held in May 2022 between scientists of RAISE and COEC to setup common technical strategies for interfacing AI tools with CFD codes in Fortran.

DIH4CAT[47]: BSC was contacted by the promoters of the DIH4CAT in order to explain, via an interview to Dr. Joan Farnós, how supercomputing and AI can help the industrial network, specially SMEs. The video has not been yet made it public but it is done.

CIDAI[48]: CIDAI follows the model of Digital Innovation Hubs established by the European Commission and is configured as a networked center at the service of companies and institutions. BSC-CNS is a former member of this initiative and thus in the position to spread the CoE RAISE developments within the community. A first meeting will be scheduled by T4 2022 in order to explore how RAISE can contribute to enhance the capacities of the regional community, via BSC as a former member in this initiative.

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[41] TREX Center of Excellence: https://trex-coe.eu

[42] Minutes: https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3839724-6/*/*/*/*/*/2022_03_09%20-%20TREX%20minutes.html

[43] Minutes: https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3839715-6/*/*/*/*/*/2022_03_16%20-%20TREX%20minutes.html

[44] EUROCC: https://www.eurocc-access.eu/

[45] HPCE 2022 https://hpcse.it4i.cz/HPCSE22/

[46] COEC Center of Excellence: https://coec-project.eu/

[47] DIH4CAT https://dih4cat.cat/

[48] CIDAI https://cidai.eu/

3.2.2.3 Stakeholder interactions plan

Table 6 shows the planning for the interactions for the EU region. Nevertheless, as the EU region is mainly composed by EU funded projects, we are currently waiting for the results of the first EuroHPC JU call where ChEESE, Excellerat, EoCoE, MAX, POP, FocusCOE, etc. are being evaluated to be renewed. Thus, many interactions are in stand-by due to this time gap. Additionally, PRACE is being substituted by EuroHPC JU, so this interaction will be reoriented.

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
PRACE				X								
FM Industrial Network			X									
CoEC		X				X						
ChEESE		X		X	X				?			
EuroCC	X		X		X	X	X	X				
FocusCoE/HPC3	X								?			
EXCELLERAT	X								?			
EoCoE-II		X							?			
POP			X						?			
EPI				X								
DEEP				X								
EMME-CARE				X								
ETP4HPC				X								
TREX					X							

DIH4CAT					X		X			
CIDAI					X		X			

Table 6: EU interactions stakeholder plan.

3.2.3 Review and opportunities

Lots of interactions have already taken place during the first half of the project. New opportunities will come from new Horizon Europe funding programms. Not only those projects 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 Marenostrum V partnership, we expect close collaborations with Turkey, Portugal and Croatia.

Furthermore, in discussions at the HPCSE 2022 Conference with the EuroCC NCC CZ, it was agreed on to start a more intense collaboration (see Sec. 3.2.2.2). It is planned to have a joint workshop at Prague for this purpose in Oct. 2022 to connect the Czech academic and industrial user community to CoE RAISE. The NCC Germany has also claimed interest in joining this workshop. Such a EuroCC outreach activity brings the opportunity to connect the (fundamental) research performed in CoE RAISE to the direct user community from academia and industry on national levels. This is also in line with the objective of the European Commission to more tightly intertwine the activities of EuroCC and the CoEs, as it is obvious from the current call of the EuroHPC JU "National Competence Centres for High Performance Computing (DIGITAL-EUROHPC-JU-2022-NCC-01)"[49].

3.3 Nordic region

This section first provides an overview of the status of the Nordic region in Sec. 3.3.1. Subsequently, stakeholder interactions are documented in Sec. 3.3.2. Finally, a review is given and opportunities are identified in Sec. 3.3.3.

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[50] pre-Exascale multi-national consortium. That also includes many more pilot applications for LUMI and its preparations within the nordic region.

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[49] Call EuroCC2
[50] LUMI Consortium: https://www.lumi-supercomputer.fi/lumi-consortium/

Furthermore, initial adoptions were observed of the CoE RAISE Unique AI Framework in different fields of science driven by the Simulation and Data Labs of the EuroCC National Competence Center for HPC & AI in Iceland.

3.3.2 Stakeholder interactions

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.3.2.3. Additional information can be found in Annex C.

3.3.2.1 Contacted Stakeholders (M6)

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).

3.3.2.2 Contacted Stakeholders (M18)

At Month 18, the current contacted stakeholders are herein described. Additional information can be found in Annex C.

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 PhD student in the network for the RAISE use case. There are no meeting minutes of these meetings, but 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 (aka PUHURI[51]). Community: HPC technologists & HPC leadership.

EuroCC NCC: More recently, the close interaction with NCC Sweden and the activities building up the Reykjavik Institute facility represent an enormous positive set of opportunities for a close cooperation in the nordics following basically the blueprint of the successful LUMI model in Finland. Although it is early in the process, CoE RAISE members are part of these activities from the start and chape the form of cooperation in the nordics.

3.3.2.3 Stakeholder interactions plan

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

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[51] PUHURI NeiC project: https://neic.no/puhuri/

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										
EuroCC NCC Sweden						X	X	X	X	X	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[52] 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)[53]. 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[54] 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., GRUs, LSTMs) that are relevant for NLP, but also for a wide variety of datasets within RAISE.

More broadly in the Nordic regions, the Swedish National Center for applied Artificial Intelligence[55] has been identified. 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)[56] and their research are 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 also become of interest for the LUMI supercomputer in Finland (expected to be operational end of 2021). Apart from nordic countries, further partner countries are Estonia[57], Belgium[58], Czech Republic[59], Poland[60] and

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[52] Treble SME: https://treble.ac/
[53] ACUTE Lab of IHPC: https://ihpc.is/simulation-and-data-lab-acoustic-and-tactile-engineering/
[54] Nordverse SME: https://nordverse.com/
[55] Swedish National Center for Applied AI: https://www.ai.se/en/about-0
[56] DTU research: https://www.dtu.dk/english/research
[57] Estonian Scientific Computing Infrastructure: https://etais.ee/
[58] Belgian Science Policy Office: http://www.belspo.be/
[59] VSB –Technical University of Ostrava, IT4Innovations National Supercomputing Center: https://www.it4i.cz/
[60] AGH University of Science and Technology, Academic Computer Centre Cyfronet AGH: https://www.cyfronet.krakow.pl/en/4421,main.html

Switzerland[61]. We have been also looking into the Norwegian.AI[62] for cooperation opportunities with respect to event planning to distribute RAISE solutions jointly in the Nordic regions.

In interactions with the LUMI steering board, the NCC Sweden, and the national players of HPC in Iceland, it became clear that the unique AI framework of CoE RAISE is useful to adopt for user support and application enabling activities. Hence, many opportunities have been assessed to influence the outcomes of the AI framework building blocks in the light of different application areas outside the CoE RAISE application fields.

Two key examples are the use of artefacts of the framework for Covid-19 research or Soil Moisture predictions. Primarily these activities are bottom-up activities of using several artefacts of the unique AI framework (e.g., specific unique configuration of using all GPUs in a node via specific lines in Python codes) that would be otherwise hard to find out be scientific-domain experts.

3.4   East Mediterranean (EM) and The Netherlands

This section first provides an overview of the status of the East Mediterranean and the Netherlands region in Sec. 3.4.1. Subsequently, stakeholder interactions are documented in Sec. 3.4.2. Finally, a review is given and opportunities are identified in Sec. 3.4.3.

3.4.1   Status of the region

The Cyprus Institute 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 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

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.4.2.3. Additional information can be found in Annex D.

3.4.2.1 Contacted stakeholders (M6)

At Month 6, no stakeholder has been contacted yet.

3.4.2.2 Contacted stakeholders (M18)

On May 23, 2022, CoE RAISE members met with NI4OS-Europe members from CYI to discuss possible collaborations. NI4OS-Europe offers smaller compute resources that could be used by CoE RAISE. This requires writing a compute time application and as the deadline was already on May 25, 2022, CoE RAISE agreed to postpone this. NI4OS-Europe provides

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[61] ETH Zürich: https://ethz.ch/en.html
[62] Norwegian AI Initiative: https://www.norwegian.ai/

expertise in Open Data following the FAIR (Findable, Accessible, Interoperable, and Reusable) principles, as well as allows sharing software repositories that are, upon evaluation, also provided to the NI4OS-Europe user community. Additional information can be found in Annex D.

On the other hand, 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 here: https://www.delphi-consortium.com/files/stacks-image-8cf3319-1200x748.jpg. 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).

3.4.2.3 *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					
NI4OS						X	X	X				
SimEA ERA Chair						X						

Table 8: EM and The Netherlands interactions stakeholder plan.

3.4.3 Review and opportunities

Potential new communities are continuously being explored through initial discussions with our contact points for NI4OS, SESAME and the SimEA ERA Chair project at the Cyprus Institute (CYI) during the whole timeline of CoE RAISE. CYI participates in these projects, and the project will seek to establish contact with them through the CYI personnel involved in them.

3.5 Baltic region

This section first provides an overview of the status of the Baltic region in Sec. 3.5.1. Subsequently, stakeholder interactions are documented in Sec. 3.5.2. Finally, a review is given and opportunities are identified in Sec. 3.5.3.

3.5.1 Status of the region

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

3.5.2 Stakeholder interactions

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.5.2.3. Additional information can be found in Annex E.

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 organise meetings between SESAME.NET and CoE RAISE to identify possible interactions. There were established contacts (M9) with the network partners (Lithuania, Slovenia). Network is not very active now, but through contact with network partners, RAISE services and training events can be promoted.

3.5.2.2 Contacted stakeholders (M18)

RTU is active in the EOSC-Nordic network in analysing situations and possible solutions in cross-border data exchange, as well as in introduction of FAIR principles. RTU Baltic partners in this network are Tartu University (Estonia) and Vilnius University (Lithuania). For the further development of EOSC related activities in Latvia there was created and approved a strategy document "The Latvian National Open Science Strategy 2021-2027". According to this document Open Science development in Latvia will be based on 3 pillars: Open Access, FAIR data and Citizen Science. According to the strategy "The Higher Education and Science Information Technology Shared Service Centre" will be developed and RTU is one of the

members of this organisation. It is planned that this centre will become the representative of Latvia in the EOSC Association. This will enable us to foster inclusion of RAISE services in EOSC's service catalogue.

RTU HPC Centre is involved in the EuroCC project and network of 33 National HPC Competence Centers in Europe. There are good contacts with Baltic partners Tartu University (Estonia) and Vilnius University (Lithuania). There is also established collaboration with the EuroCC National Competence Centre Sweden. Arctur (Slovenia) being the member of SESAME.NET is also a partner in NCC Slovenia.

3.5.2.3 Stakeholder interactions plan

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

Institution	2021				2022				2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SESAME.NET		X	X				X					
EOSC-Nordic			X	X	X	X	X					
EUROCC					X	X	X	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, where RTU is already involved in with HPC partners from other Baltic countries.

There are planned twinning and mentoring activities with the EuroCC network partners, as well as joint training and other events. For example, the "Baltic HPC and Cloud conference" which have been postponed due to Covid pandemic. Regional conference or workshop could be a good opportunity to promote the RAISE project. RTU will promote RAISE Educational Service Platform in EAEEIE 2022 Conference [1] in Coimbra. Conference is being organized by the European Association for Education in Electrical and Information Engineering.

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 like "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 an active involvement in Digital Innovation Hubs which have ties with industries in the Baltic countries. This can be used to approach industry.

"Baltic HPC and Cloud conference" is organized at RTU[63] bringing together HPC experts and newcomers from the region. This also offers a great opportunity to present RAISE and connect new communities to the RAISE network.

3.6   Italy & Switzerland

This section first provides an overview of the status of the Italy and Switzerland region in Sec. 3.6.1. Subsequently, stakeholder interactions are documented in Sec. 3.6.2. Finally, a review is given and opportunities are identified in Sec. 3.6.3.

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 at CERN and via the World-Wide 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 CSCS, in Lugano.

3.6.2   Stakeholder interactions

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.6.2.3. Additional information can be found in Annex F.

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., CUDA porting, 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 Contacted stakeholders (M18)

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. CUDA porting, unified programming models). Another important aspect is the ever-increasing

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

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.

3.6.2.3 Stakeholder interactions plan

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

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

Table 10: Italy and Switzerland region interactions stakeholder plan.

3.6.3   Review and opportunities

So far, contacts were established only within the CERN environment (i.e., CERN openlab and WLCG/CMS experiment) in order to execute the objectives of the CoE RAISE. The next steps will include leveraging on the work within CERN openlab and execute a thorough benchmarking of the CERN applications on the newest heterogeneous architectures which came to the market in 2022. We will share all future results with our RAISE partners.

3.7   France

This section first provides an overview of the status of the France region in Sec. 3.7.1. Subsequently, stakeholder interactions are documented in Sec. 3.7.2. Finally, a review is given and opportunities are identified in Sec. 3.7.3.

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

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.7.2.3. Additional information can be found in Annex G.

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 Contacted stakeholders (M18)

An "AI Day" was organized at CERFACS in Q1 2022, with over 60 participants from the French academic and industrial high-performance simulation ecosystem. This included members of IRT, ONERA, AIRBUS, CNES, SAFRAN, TotalEnergies, Météo-France, as well as several public labs.

Other dissemination activities have targeted the French ecosystem, such as an intervention at the 2022 Teratec Forum.

At this stage, it seems that this type of dissemination of the work performed in RAISE is the most appropriate type of interaction with many of the stakeholders of the French ecosystem. As more services become available in RAISE, other forms of interactions will arise, and this type of event will be a good opportunity to broadcast them.

3.7.2.3 Stakeholder interactions plan

The interaction plan of France region is given by 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

The interest of many stakeholders in the French community has been spiked by the first 18 months of RAISE. However, at this stage the project does not yet offer concrete services that can benefit this community. In the near future, pursuing the dissemination efforts will be key to keep the interest in the project developments alive, and to use these opportunities to transition into new types of interactions, such as around tools and services.

3.8   Belgium

This section first provides an overview of the status of the Belgium region in Sec. 3.8.1. Subsequently, stakeholder interactions are documented in Sec. 3.8.2. Finally, a review is given and opportunities are identified in Sec. 3.8.3.

3.8.1   Status of the region

Flanders Make maintains a network of manufacturing companies and their technology providers that conduct R&D projects together. We plan 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

The following two subsections summarize the contacts with the stakeholders during the first and second periods, respectively M6 and M18. Additionally, a short description of the stakeholder is included to link the contact to the addressed community. This is followed by a stakeholder interaction plan in Sec. 3.8.2.3. Additional information can be found in Annex G.

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 Contacted stakeholders (M18)

During Q1 2022, a newsletter was sent around to the FM Industrial Network, consisting of industrial manufacturing companies with more than 150 members. The content of the news

article was mainly focussed on the contribution of FM to the RAISE project regarding defect-free metal additive manufacturing. Tangible outputs related to other use-cases relevant to the manufacturing industry are still limited in this phase of the project.

As a result of this newsletter, one member of the network requested to be kept informed about further results obtained. Melotte is located in Belgium and focuses on 3D metal printing and high precision manufacturing. Melotte will be contacted during a later phase in the project when tangible results from task 4.3 are available. Other companies in the 3D manufacturing business and member of the FM industrial network, e.g., Materialise, Layerwise, and ESMA, have not responded to the newsletter.

3.8.2.3 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	
3D Systems										X		
Melotte										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, on the other hand, 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. However, they did not respond to the newsletter from 2022 Q1 presenting preliminary results of Task 4.3. At this stage of the project, no tangible outputs are available that directly could be implemented or exploited by the industry. This could be the reason of the low reaction rate. Melotte, also active in this market, and previously not yet on the radar for future opportunities for business development reacted to be informed about further progress on the project.

4   Baseline of the EU AI community at M18

This section describes the baseline of the EU AI community at project month M18. Section 4.1 thereby provides an overview of the activities per region and Sec. 4.2 a summary of the activities per outcome.

4.1   Summary of activities per region

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 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. 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).
- **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).** Machine Learning 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. Technical meeting for the co-development of interfaces for AI tools and Fortran CFD codes.
- **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 took place in Nov. 2021. A new proposal has been submitted under the EuroHPC JU call 2022, where AI has an important role. It has been agreed that the collaboration has to be explored in case ChEESE 2 is funded.

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 T4.2 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 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. Meetings with E4, an Italian company delivering High Perfomance Computing solutions.
- **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. Development of a machine-learned particle-flow (MLPF) reconstruction algorithm in collaboration with the CMS experiment. Extensive studies on hyperparameter optimization of MLPF leveraging large-scale high performance computing systems.

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 PhD 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.

4.2 Summary of activities per outcome

The following list summarizes the different activities organized by the type of relevant outcome identified in the introduction.

- Sharing of repositories:
  - German Region: Sharing of the RAISE repositories at FZJ with the community (open-source), FZJ, available for all German and international communities.
  - European region: Aligned with the German Region approach, the repositories are being put in place to allow for technical discussion on specific topics. An example of the material which RAISE is aiming to share are trainings related (technical and recording).

- o East Mediterranean and the Netherlands region: NI4OS, On-boarding of services has been explored with respect to the RAISE repository, thereby improving exposure to the RAISE repository and its research and demonstrating that RAISE is compatible with open science. This will also put the repository through an evaluation to determine if it conforms to the FAIR principles.

- Establishment of common databases

  - o German region: Sharing of RAISE data at FZJ with the community (open-access), FZJ, RWTH, CERFACS. Provide data for all German and international communities

- Organization of courses, trainings, workshops, hackathons, etc.

  - o German region: Organization of trainings for the community (RAISE trainings) accessible world-wide; various RAISE members, available for all German and international community
  - o European region: AI-HPC hackathon co-organized with NVIDIA, Cheese and Compbiomed; CoE and EuroCC workshops (RAISE + other CoEs + EuroCC NCCs); RAISE-CoEC CoE Training Course - "Interactive HPC with JupyterLab" in May 2021.
  - o France region: Organized an "AI Day" to disseminate hybrid simulation strategy concepts to CERFACS' research and industry partners network
  - o Belgium region: Training/coaching of a Master thesis student in the use of AI training on HPC (1 student for academic year 2021-2022, likely 1 or 2 students for 2022-2023).
  - o East Mediterranean and the Netherlands region: NI4OS will provide training on FAIR principles to foster open science. NI4OS can give training as part of the seminar series. Specifically, an idea is to give hands-on training on the preparation of a data management plan.

- To increase number of participants at events organized by RAISE

  - o German region: Reached out to people in the network of the German RAISE members, FZJ, RWTH: addressed University of Siegen, RWTH Aachen University (other institutes outside RAISE), FZJ (other institutes outside RAISE), NVIDIA Germany
  - o East Mediterranean and the Netherlands region: information on courses of interests is forwarded to the whole centre and promoted at weekly meetings. Retweeting of CoE RAISE tweets where events are advertised, thereby promoting through the existing contacts.

- Definition of use cases

  - o European region: collaboration with EOCOE2 for T3.2.

- Definition of standards

- Recruitment of new stakeholders

  - o European region: The approach that is being carried out in this task is to maintain a continuous monitoring of the EU funded projects as well as new EU/National initiatives which are directly related to the goals of RAISE. As an example, the next wave of the Centers of Excellence (CoEs) funded by

EuroHPC will allow to maintain and/or invite new CoEs to the already created network.

- Integration of RAISE services on existing platforms

    o European region: As it is stated in the definition of the task, RAISE consortium members are opening new technical discussions with many different stakeholders. The main goal is to embed the generated foreground into the existing assets portfolio, enhancing their own services via a close collaboration with RAISE experts and tools.
    o East Mediterranean and the Netherlands region: NI4OS, On-boarding of services has been explored. See outcome "To increase number of participants".

- Delivery of RAISE derived software to a specific community

    o German region: See above
    o European region: RAISE is clearly committed to support the uptake of software, APIs, data and workflows by the community. Each one of the codes has its own repository and, depending on the IP strategy, different approaches are considered in order to have access.

- To push the adoption of RAISE tools

    o German region: This has maybe taken place through the trainings
    o European region: RAISE is promoting not only the AI community as a whole but also the foregorund which supports the initiative. Thus, in each interaction with the AI community, including those already known stakeholders and potential ones, some examples about the use-cases are shown in order to attract the attention of the audience.
    o Belgium region: By means of to experience gained in RAISE, self-hosted MLOps platform ClearML was adopted widely within Flanders Make. This improved the quality of its research and innovations, and encourage the adoption of MLOps tools in the Belgian industry through exposure.
    o Baltic region: Promoting RAISE services and training events with SESAME.net and including RAISE services in EOSC's service catalogue are ways to push the adoption.
    o East Mediterranean and the Netherlands region: See outcome "To increase number of participants".

- To enhance the development of scalable AI using parallel computing resources:

    o German region: Supercomputing tools, porting, performance engineering with NCC Germany. Helmholtz kind-contribution to D2.14.
    o European region: The clear commitment and expertise that the RAISE HPC Centers bring to the consortium is not only based on the large knowhow over the multi-physics but also about the expertise in new HPC architectures, porting, etc. Thus, the link with new initiatives like EPI is already in place because the same institutions (e.g. FZJ, BSC) are participating as well in this project and therefore, boosting the implementation of new AI resources.

- To propose services for commercial users

    o German region: This still needs to be discussed with EuroCC NCC Germany, but we are in contact

- o European region: Dissemination of the application of HPC in the innovation applications with DIHCAT.
- o East Mediterranean and the Netherlands region: To be explored at a later stage by leveraging ties to industry through the SimEA project.

- To exploit synergies in the provision of services, education, and knowledge and technology transfer in general

  - o European region: Creation of synergies between COEs with FocusCoE/HPC3

- To create awareness in a broader audience

  - o European region: RAISE team took part in a AI4Media AI Café with CoEC and HiDALGO.
  - o Belgium region: RAISE results mentioned in the FM newsletter sent to the 150 members of the FM network.

- To participate in official committees

  - o German region: Participation in HPC3 organized by FocusCoE (all CoEs participate)
  - o European and German regions: Two members of RAISE are now part of the PARCFD conference committee (Andreas Lintermann and Guillaume Houzeaux).
  - o Belgium region: Flanders Make is represented in the User Committee of the Vlaams Supercomputer Center (VSC), its advisory board to consolidate user requirements and improve VSC services (see https://www.vscentrum.be/org).

- To provide common scientific/technological solutions:

  - o European region: collaboration with COEC to design AI/Fortran interfaces.
  - o Joint user support strategy with respect to authentication and authorization of users with NeiC.
  - o East Mediterranean and the Netherlands region: NI4OS-Europe provides expertise in Open Data following the FAIR principles.

- To carry out scientific collaborations:

  - o Italy and Switzerland region: Publications with Openlab.
  - o France region: Joint PhD with ISAE-Supaéro and CERFACS.

5 Conclusions

At this stage of the project, interactions have already taken place for most of the regions. Some have already established clear objectives. Nevertheless, 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 partners enable to disseminate efficiently RAISE activities and set a wide range of collaborations and partnerships.

In the next update of the deliverable, we expect a clear definition of current collaborations as well as new opportunities coming from this constant networking activity. Beside these permanent interactions, Task 6.2 is currently focused to establish the AI RAISE Network by means of strengthening the community building approach through joint events. Additional to the direct scientific (e.g. PhD Students, joint publications, etc.) and technical interactions (e.g. CoE RAISE-CoEC, CoE RAISE-POP), it is important to strength the collaboration with the EuroCC initiative. National Competence Centers (NCC) are playing a key role bridging the gap between HPC applications and many industries (mainly SMEs). EuroCC CZ and CoE RAISE are planning to start a more intense collaboration (see Sec. 3.2.2.2). It is planned to have a joint workshop in Prague for this purpose in Oct. 2022 to connect the Czech academic and industrial user community to CoE RAISE. The NCC Germany has also claimed interest in joining this workshop. Also, the NCC Spain is interested to support the CoE RAISE community building approach enhancing the interactions not only with the private sector (SME, LE, etc.) but also through the Spanish Supercomputing Network (RES), where many institutions (private/public) should benefit from the EU funded project outcomes.

Such a EuroCC outreach activity brings the opportunity to connect the (fundamental) research performed in CoE RAISE to the direct user community from academia and industry on national levels. This is also in line with the objective of the European Commission to more tightly intertwine the activities of EuroCC and the CoEs, as it is obvious from the current call of the EuroHPC JU "National Competence Centres for High Performance Computing (DIGITAL-EUROHPC-JU-2022-NCC-01)"[64].

CoE RAISE is playing a fundamental role at EU level in the field of HPC pre-exascale enabled applications in the field of AI. It is, thus, fundamental, to continue strengthening the interaction and collaboration with the already identified network while opening technical discussions in specific fields of interest, both scientific and market oriented. The CoE RAISE community is clearly materialised and from Month 18 on-wards the commitment is asked to co-organize joint events with different NCC (linked to EuroCC), where CoE RAISE acts as a hub and CoE RAISE partners keep the technical discussions under the CoE umbrella.

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[64] Call [EuroCC2](#)

Annex A Stakeholder monitoring of 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 channelling 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 discuss with GCS and EuroCC NCC to reach and involve stakeholders in HPC, AI, and HPDA. Interactions in the direction of industry require EuroCC to provide a mature competence map. Only then companies and stakeholders can be identified for which services in AI+HPC make sense. Furthermore, the WP5 activities have to advance first before specific services can be provided to industry through EuroCC and/or GCS. The German NCC is furthermore interested in contributing to a joint workshop that CoE RAISE intends to organize with the EuroCC NCC of Czech Republic.

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	In principle, all research communities within the Helmholtz centers in Germany[65] showing interest in AI.

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

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?)	Expertise channelling 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. As a first step, Stefan Kesselheim, head of the Helmholtz AI unit at FZJ, was involved in internally reviewing the AI methods developed in RAISE. This allowed him to get a good overview of the work performed in RAISE.

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	The Coordinator or CoE RAISE is a member of the IRT since 10/2015.

is member of the organization, …)	
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 in channelling 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[66] or PRACE SHAPE[67]. Through the IRT the interactions of JSC with companies interested in AI development and in hardware suited for AI was monitored. At present, no real Exascale case coming from industry was identified.

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.

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

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 in channelling 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, 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 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. The project ended in 2022 and applied for an extension in the next CoE round offered by EuroHPC. Further discussions are planed if a continuation is guaranteed.

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[68].
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.

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

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). The project ended in 2022 and applied for an extension in the next CoE round offered by EuroHPC. Further discussions are planed if a continuation is guaranteed. In the HPC3 meetings it was agreed that in the meantime a loose gathering of the stakeholders can still take place.

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. Also at the HPCSE Conference (see Sec. 3.2.2.2) the discussions were informal and hence no minutes can be provided.
Type of organization	EuroHPC-funded project, which aims at establishing
Contact persons	Dr.-Ing. Bastian Koller (Coordinator of EuroCC) Tomas Karsasek (WP leader NCC Czech Republic, Technical University of Ostrava) Diana Wang (PMT, HLRS, NCC Germany)

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. The CoE RAISE coordinator was invited to the HPCSE Conference 2022 by the EuroCC NCC Czech Republic.
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. Two workshops on CFD and Tools took place, where RAISE presented their methods to the NCCs. A contact to NCC Turkey, including a possible collaboration in the field of wind energy, was established. Furthermore, it is intended to organize a joint workshop with the EuroCC NCC of Czech Republic (and potentially with NCC Germany) in Prague in Oct. 2022 to bridge the gap between the activities of the CoE and the end user community from academia and industry from Czech Republic (and Germany).

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 if EoCoE is renewed under the EuroHPC JU recent call.

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. And A. Roth.
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. Also, a technical meeting was held to develop common interfaces for AI tools and Fortran CFD codes. COEC has already started to work on such interface for Alya code.
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. Regarding the interfacing, we will generalize what was coded in the context of COEC for the purposes of RAISE[69].

Name of institution	**CHEESE**

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[69] Pytorch interface for Alya developed in COEC: https://gitlab.com/bsc-alya/alya/-/merge_requests/1087

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 took 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). The CoE RAISE-ChEESE interactions and in stand-by as ChEESE ended March 30th 2022, whereas It has submitted a proposal to continue under the EuroHPC JU new funding scheme.

Name of institution	TREX
RAISE REGION	EU
Register of the interaction	https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3839724-6/*/*/*/*/*/2022_03_09%20-%20TREX%20minutes.html

	https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3839715-6/*/*/*/*/*/2022_03_16%20-%20TREX%20minutes.html
Type of organization	Center of Excellence
Contact persons	Claudia Filippi (Project Coordinator), Matthias Rupp (WP4 leader)
Web page	https://trex-coe.eu
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	Through FocusCoE and HPC3.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	HPC Chemistry / Molecular Dynamics
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Joint cross-presentation to learn from each other on the topics: ML model, HPC systems, Performance engineering for AI + simulation codes.
Main outcomes of the discussion and next planned actions	TREX presentations will be included in an upcoming RAISE seminar. RAISE presentations will be included in a TREX platform that still needs to be identified.

Annex C Stakeholder monitoring of 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 w.r.t. 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 (aka 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 East Mediterranean and The Netherlands region

Name of institution	Delphi Consortium
RAISE REGION	The Netherlands

Register of the interaction	See above for schedule of semi-annual meetings and yearly report.
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 Consortiumis 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 Pre-processing, 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	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. First meeting held on 23rd May 2022 Minutes are available on the BSCW server[70].
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?)	First meeting was held with Andreas Lintermann (RAISE), Andreas Athenodorou (NI4OS, CyI) and Nikos Savva (RAISE, CyI). On 23 May 2022. Various ways of connecting to NI4OS were explored, the following being the most viable at present: • **Provision of computing time**. There is a call that is currently open. RAISE might apply if there is any interesting hardware. • Training on **FAIR principles** to foster open science - NI4OS can give training in the seminar series. An idea was to do hands-on training on the preparation of a Data Management Plan. In the future, the **on-boarding of services** will be explored, e.g. RAISE repository, which will improve exposure to research and demonstrate that RAISE is compatible with open science - this will be explored at a later stage. This will also put the repository through an evaluation to determine if it conforms to the FAIR principles.

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[70] Minutes NI4OS meeting https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/d3929058-3/*/*/*/2022_05_23_Meeting_NI4OS.html

Main outcomes of the discussion and next planned actions	**Next planned actions**: • RAISE to explore the possibility of applying for computing time. • Arrange training event on DMP preparation.

Name of institution	**SESAME** (Synchrotron-light for Experimental Science and Applications in the Middle East), Jordan.
RAISE REGION	Eastern Mediterranean and Middle East (EMME)
Register of the interaction	At month 18: 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, visualisation in tomography, data-intensive applications, data management, archiving.
Information and (service) request transfer in RAISE network (which interest does the stakeholder have	To explore in forthcoming meetings: support them in the adoption of AI tools in the analysis of synchrotron data.

that allows RAISE to establish a synergy?)	
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 Mediterranean
Register of the interaction	At month 18: 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, 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	Multi-scale modelling, data-intensive applications

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?)	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	Initial discussions held with Prof. Vangelis Harmandaris (ERA chair), Assist. Prof. Nikos Savva (senior scientist and faculty in SimEA and task leaders in RAISE: contact point for both projects) and Dr. Christos Christodoulou (SimEA innovation scout) to explore the possibility of establishing collaborations with industry contacts. It was decided that it is still too early in the project to establish any collaborations. This will be revisited in the future. **Next planned actions**: Reconsider the possibilities of collaboration once further progress has been made in RAISE.

Annex E Stakeholder monitoring of 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	https://cordis.europa.eu/project/id/654416/de
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 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 Meetings with E4, an Italian company delivering High Performance Computing solutions.

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 3 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 3) Development of a machine-learned particle-flow (MLPF) reconstruction algorithm in collaboration with the CMS experiment. Extensive studies on hyperparameter optimization of MLPF leveraging large-scale high performance computing systems.

Annex G Stakeholder monitoring of 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 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. 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	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 PhD 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	Newsletter has been circulated in March 2022

	https://www.flandersmake.be/en/news/defect-free-metal-additive-manufacturing
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	Melotte has showed interest in RAISE results. Next actions see next stakeholders table.

Name of institution	**Melote**
RAISE REGION	Belgium
Register of the interaction	Reacted to the Flanders Make newsletter
Type of organization	Industrial company
Contact persons	TBD
Web page	https://www.melotte.be/
Entry points (through LinkedIn, personal, joint R&D projects, RAISE partner is member of the organization, …)	CEO of Melotte.
Stakeholder community (hydrodynamics, manufacturing, physics, turbomachinery, and aerospace. In case of another please specify)	Manufacturing, Additive Manufacturing
Information and (service) request transfer in RAISE network (which interest does the stakeholder have that allows RAISE to establish a synergy?)	Additive manufacturing is the core business of Melotte. They have interest in tools or methodologies developed within RAISE on defect free additive manufacturing
Main outcomes of the discussion and next planned actions	Identification of stakeholder interests from RAISE results

List of Acronyms and Abbreviations

AA	Active Archive
AI	Artificial Intelligence
AISee	AI-and Simulation-Based Engineering at Exascale; renamed to RAISE
API	Application Programming Interface
BN	Booster Node
BSC	Barcelona Supercomputing Center
BSCW	Basic Support for Cooperative Work
CA	Consortium Agreement
CAGR	Compound annual growth rate
CaSToRC	Computation-based Science and Technology Research Center (Cyprus)
CEA	Comissariat à l'énargie atomique et aux énergies alternatives
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
CIDR	Classless Inter-Domain Routing
CINECA	Consorzio Interuniversitario del Nord est Italiano Per il Calcolo Automatico
CLAIX	Cluster Aix-la-Chapelle
CM	Cluster Module
CN	Cluster Node
CoE RAISE	European Center of Excellence in Exascale Computing "Research on AI- and Simulation-Based Engineering at Exascale"
CPU	Central Processing Unit
CSC	Finland IT Center for Science
CSCS	Centro Svizzero di Calcolo Scientifico
CTE	Cluster de Tecnologies Emergents
CUDA	Compute Unified Device Architecture
CYI	The Cyprus Institute
DAM	Data Analytics Module
DCPMMDC	Persistent Memory Module
DEEP	Dynamical Exascale Entry Platform
DEEP-EST	DEEP-Extreme Scale Technologies
DDR	Double Data Rate
DFN	Deutsches Forschungsnetz Verein
DIMM	Dual Inline Memory Module
DoA	Description of Action
DoW	Description of Work
DPC++	Data Parallel C++
DRAM	Dynamic Random-Access Memory
DTU	Denmark Technical University
EAB	Expert Advisory Board
EC	European Commission
EDR	Endpoint Detection and Response
EFLOP	Exaflops
EM	Eastern Mediterranean
EPMB	Executive Project Management Board
ESB	Extreme-Scale Booster

EU	European Union
EXT4	Extended File System (v4)
FEFS	Fujitsu Exabyte File System
FDR	Fourteen Data Rate
FM	Flanders MAKE
FPGA	Field Programmable Gate Array
FZJ	Forschungszentrum Jülich GmbH
GA	Gauß-Allianz
GA	Grant Agreement
GCS	Gauss Centre for Supercomputing
GPA	General-purpose architecture
GPL	General Public License
GPFS	General Parallel File System
GPGPU	General-Purpose Graphics Processing Unit
GPU	Graphics Processing Unit
GRU	Gated Recurrent Units
GUI	Graphical user interface
HBM	High Bandwidth Memory
HDD	Hard Disk Drive
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
HPE	Hewlett Packard Enterprise
HTC	High-Throughput Computing
IaaS	Infrastructure as a Service
ICT	Information and Communication Technology
IDM	Identity Management
IRHPC	Icelandic Research High Performance Computing
ISV	Independent Software Vendor
I/O	input/output
IP	Intellectual Property
IPR	Intellectual Property Rights
ISV	Independent Software Vendor
JARA	Jülich Aachen Research Alliance
JARA-HPC	JARA High-Performance Computing
JURECA	Jülich Research on Exascale Cluster Architectures
JSC	Jülich Supercomputing Centre
JU	Joint Undertaking
JUST	Jülich Storage Cluster
JUWELS	Jülich Wizard for European Leadership Science
KNL	Knight's Landing
LES	Large Eddy Simulation
LRZ	Leibnitz Supercomputing Centre of the Bavarian Academy and Sciences and Humanities
LSTM	Long Short-Term Memory
MCDRAM	Multichannel DRAM
Mcore-h	Million core-hours

MIC	Many-Integrated Core
ML	Machine Learning
MPI	Message Passing Interface
MSA	Modular Supercomputing Architecture
NAS	Network-Attached Storage
NCC	National Competence Center
NFS	Network File System
NIC	John von Neumann-Institute for Supercomputing
NLP	Natural Language Processing
NUMA	Non-Uniform Memory Access
NVMe	Non-volatile memory
OpenBLAS	Open Basic Linear Algebra Subprograms
OpenCL	Open Computing Language
OpenMP	Open Multi-Processing
OS	Operating System
PA	Project administrator
PaaS	Platform as a Service
PC	Project Coordinator
PFLOPs	Petaflops per second
PI	Principal Investigator
PGI	Portland Group
PMT	Project Management Team
PRACE	Partnership for Advanced Computing in Europe
PU	Public
RAISE	see CoE RAISE
RANS	Reynolds Averaged Navier-Stokes
RDMA	Random direct memory access
RoCER	DMA over Converged Ethernet
QA	Quantum Annealer
QDR	Quad Data Rate
QoS	Quality of Service
RAID	Redundant Array of Independent Disks
RAM	Random-Access Memory
Rannís	Icelandic Centre for Research
RTU	Riga Technical University
RWTH	Rheinisch-Westfälische Technische Hochschule Aachen
SaaS	Solution as a Service
SATA	Serial AT Attachment
SC	Scientific Coordinator
SDL	Simulation and Data Laboratory
SDV	Software Development Vehicle
Sec.	Section
SIMD	Single instruction, multiple data
SME	Small- and Medium-sized Enterprise
SSD	Solid-state disc
SVE	Scalable Vector Extension
SVN	Subversion
TaL	Task Leader
TBLs	Turbulent Boundary Layers

TCB   Technical Coordination Board
TFLOPs   Teraflops per second
TofuD   Tofu Interconnect D network
TORQUE   Terascale Open-source Resource and QUEue Manager
ToW   Team of WPLs
TSM   Tivoli Storage Manager
UDP   User Datagram Protocol
UFTP   UDP-based File Transfer Protocol
UOI   University of Iceland / Haskoli Islands
VSR   Vergabe von Supercomputerressourcen
WP   Work Package
WPL   Work Package Leader
XFS   Extended File System