



H2020-INFRAEDI-2018-2020



Communication and Dissemination Plan

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Executive Summary

This Communication and Dissemination Plan follows on the strategies and actions presented in Deliverable D6.10, which covered the project months M1 – M11. These strategies and actions are necessary to share the developments of the European Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale” (CoE RAISE) with people that are external to the project, and to drive the awareness creation. Existing activities were improved in a targeted manner, and new ideas were implemented. Thereby, the project's position as a specialist in the field of Artificial Intelligence (AI) in conjunction with High-Performance Computing (HPC) further raised and was strengthened. The statistics confirm the positive trend and the Communication and Dissemination team will continue to optimized them.

1 Introduction

A Communication and Dissemination Plan (CDP) is key to ensure a successful transfer of the scientific and technological developments of the European Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale” (CoE RAISE) to related communities, to the general public, and beyond. It is mandatory to communicate novel research results obtained in RAISE not only to academia and industry, but also to the general public to:

1. create project awareness and strong visibility,
2. grow the confidence in scientific research, especially in the field of Artificial Intelligence (AI),
3. demonstrate added value of European Union (EU) projects,
4. get in touch with EU citizens,
5. create the fundamentals for the sustainability of CoE RAISE’s developments, and
6. to reach out to other researchers and research communities to establish new collaborations and to exploit synergies.

To successfully reach these targets and to promote the wide spectrum of CoE RAISE activities through dissemination and communication, a joint effort is necessary. For this purpose, all CoE RAISE members are part of Task 6.3 “*Dissemination and communication*” of Work Package (WP) 6 “*Outreach and Services*”, and have allocated personal resources to this task. That is, the dissemination and communication activities are cross-cutting and the work is carried out in close collaboration with all project WPs. This is to obtain feedback and content that can be used to disseminate and communicate the project developments to external and public audiences. Each project partner has the task and/or effort to actively participate in the dissemination and communication of the project results by using the provided tools and by following the defined strategies.

This document aims to show how the communication and dissemination strategy has evolved since Deliverable D6.10¹ submitted in project month M12 to the EU. In doing so, Sec. 2 describes how the CoE RAISE website has developed in general (number of visitors, sessions, etc.) and which new features have been implemented. For the Social Media channels, interesting content was created to constantly inform the community with news and to increase the follower numbers. The developments and the statistics are described in Sec. 3, which also explains an idea that has been considered since the positive feedback of the Mid-Term Review of CoE RAISE, i.e., to promote the project through a large YouTube channel. In the current year 2022, due to the adapted COVID-19 rules, many events could be visited on site. Events were partly organized by CoE RAISE and recordings were made available on YouTube. A list of these events along with the design of a business card for such events is presented in Sec.4. Subsequently, Sec. 5 reports on non-scientific and non-peer-reviewed publications and Sec. 6 provides an update on the Key Performance Indicators (KPIs), which were revised again as a result of the successful strategy. Finally, Sec. 7 gives an outlook on the coming activities by providing a CDP for 2023.

¹ D6.10 https://www.coe-raise.eu/files/ugd/248388_4d93d96034b6425a9df1353c448623e3.pdf

2 Website

As already described in Deliverable D6.10, the CoE RAISE website² remains the central point of contact for communicating and disseminating information. Existing elements such as news, events, publications, and the training portal have been retained.

In the course of 2022, it has been restructured in one place or another and additional elements have been added to feed the community with new content and to keep it engaged with the project. Subpages such as the Unique AI Framework (UAIF)³, Open Data⁴, or Press Mention⁵ have been added, and the Newsletter⁶ and Service Portal⁷ are currently under construction.

Figure 1 compares the current Google Analytics⁸ data from the months M13 – M23 to the period M2 – M11. Obviously, the development of the content and further progressing promotion of the website has led to an immense increase in all categories. More specifically, the users, sessions, and page views have doubled in some cases. Compared to the previous year, there were ~660 users and 3,800 page views. It should be noted that the recordings start from M2 because the website was created in January 2021.

Especially in the months from March to July 2022, an enormous increase of sessions has been achieved. This curve is due to the five events CoE RAISE participated in live on-site. In May 2022, these were the High Performance Computing in Science and Engineering (HPCSE) conference in the Czech Republic⁹, the 33rd Parallel CFD International Conference (ParCFD)¹⁰ in Italy, and the HDCRS Summer School in Iceland¹¹. The ISC High Performance¹² and the TeraTec Forum¹³ took place in June 2022, which are described further in Sec. 4. In the months of March and April 2022, the preparatory work was performed on Social Media and the events were advertised in steady intervals, until the events started in May 2022. The maximum was then reached over the month of June 2022 with 668 users. The statistics show that the exchange of knowledge on site has the greatest impact on the visibility of the project. It is hence planned to continue visiting in-person events in the future.

In the following, the updates to website are summarized in various sections. Section 2.1 presents details on update on the News page of CoE RAISE. This is followed in Sec. 2.2 providing an overview of the Press Mentions, added this year to the website. Furthermore, a subpage on the Unique AI Framework (UAIF) developed with in CoE RAISE, see. Sec. 2.3, was added to the website along with the possibility to subscribe to a Newsletter (Sec. 2.4). Finally, Sec. 2.5 provides a glimpse on the development of the Service Portal, which will in the future provide access to Jupyter-JSC¹⁴ and ClearML¹⁵, hosted by the Jülich Supercomputing Centre (JSC) of Forschungszentrum Jülich GmbH (FZJ) and Flandes Make (FM).

² CoE RAISE website <https://www.coe-raise.eu/>

³ UAIF <https://www.coe-raise.eu/uaif>

⁴ Open Data <https://www.coe-raise.eu/open-data>

⁵ Pressmention <https://www.coe-raise.eu/press-mention>

⁶ Newsletter <https://www.coe-raise.eu/newsletter>

⁷ Service Portal <https://www.coe-raise.eu/services> (under construction)

⁸ Google Analytics <https://analytics.google.com>

⁹ HPCSE <https://hpcse.it4i.cz/HPCSE22/>

¹⁰ ParCFD <https://parcfd2022.org>

¹¹ HDCRS Summer School <https://www.grss-ieee.org/community/groups/initiatives/high-performance-and-disruptive-computing-in-remote-sensing-hdcrs/hdcrs-summer-school-2022/>

¹² ISC High Performance <https://www.isc-hpc.com>

¹³ TeraTec Forum <https://teratec.eu/gb/forum/workshops.html>

¹⁴ Jupyter-JSC <https://jupyter-jsc.fz-juelich.de>

¹⁵ ClearML <https://clear.ml>



Figure 1: Graphical representation of the Google Analytics statistics recorded for CoE RAISE’s website in M13 – M23 of the project, compared to the period M2 – M11.

2.1 News

The website visits on the day news are published is another positive trend indicator. The corresponding statistics are shown in Figure 2 for 2022. Always more than 10 visitors registered and in June 2022 a maximum of 43 visitors was reached. The related article is an interview with Marcel Aach¹⁶, a Ph.D. student jointly supervised by FZJ and UOI. As in the previous year, a look behind the scenes attracted the most attention. Figure 3 displays a screenshot of the website from the June 2022 contribution. Such news articles will continue to be a part of CoE RAISE’s communication strategy over the next year, see the CDP in Sec. 7. Firmly scheduled for the February 2023 news are interviews for the International Day of Women and Girls in Science¹⁷. A report on CoE RAISE’s All-Hands Meeting (AHM), which will be held in-person in January 2023 at the European Organization for Nuclear Research (CERN) is scheduled for April 2023.

The articles from WP2 “AI- and HPC-Cross Methods at Exascale” (May & November 2022) and WP3 “Compute-Driven Use-Cases at Exascale” (July 2022) are still being processed, as the latest results are still being analyzed before they can be published. The December 2022 article has recently been published. It describes the visit of members from the Riga Technical University (RTU) to the Barcelona Supercomputing Center (BSC), which met in the frame of Task 3.2 “AI for wind farm layout optimization”¹⁸. The RTU scientists are experts of Machine Learning (ML) algorithms and the BSC scientists are the providers of the respective use case

¹⁶ Interview <https://www.coe-raise.eu/news-2022-06>

¹⁷ Women and Girls in Science <https://www.un.org/en/observances/women-and-girls-in-science-day>

¹⁸ CoE RAISE Task 3.2 <https://www.coe-raise.eu/wind-farm>

and experts in Computational Fluid Dynamics (CFD). They had technical meetings every day to advance the development of suitable algorithms for this specific use case.

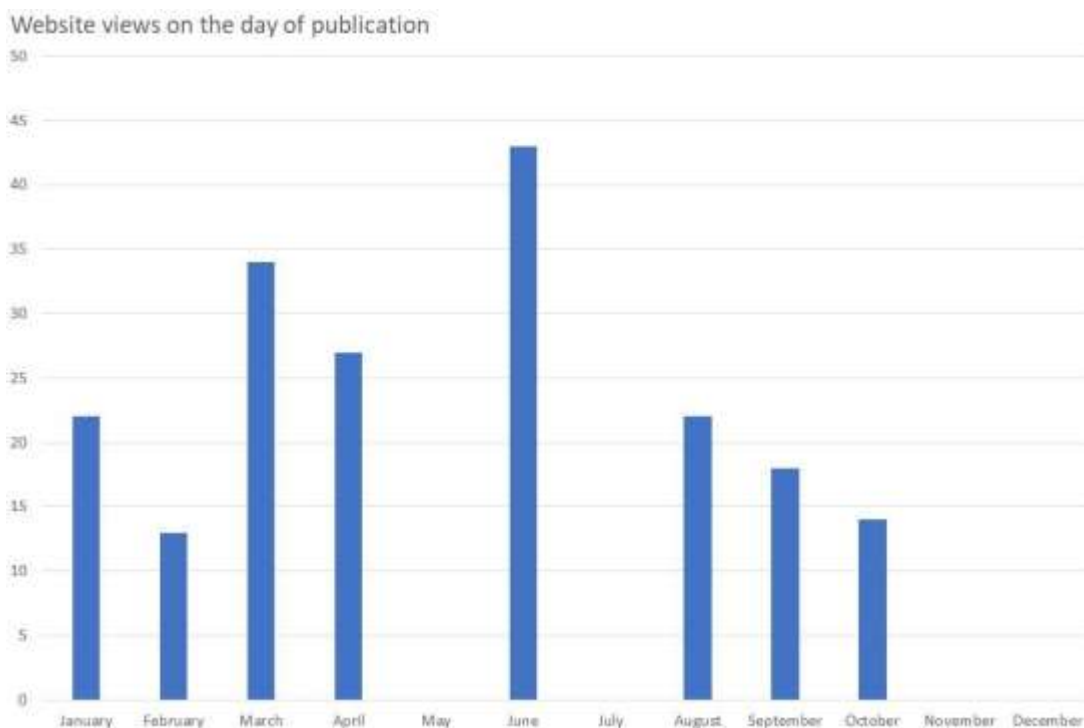


Figure 2: Website visitor numbers on the days of interview publications (2022).



Figure 3: Screenshot of the News section for the article that appeared in June 2022 on CoE RAISE's website.

2.2 Press Mentions

In April 2022, another category was added to the website. In the Media section the Press Mentions subpage was implemented. It shows at a glance when and in which media the project was actively present. A link to the respective article is provided for further information. Figure 4 shows an excerpt of all all Press Mentions on the RAISE website. A total of 34 articles were generated.

RAISE in press



Figure 4: Screenshot of the Press Mention section on CoE RAISE's website.

2.3 Unique AI Framework

CoE RAISE follows the rules of open science and publishes its results open-access when they are ready for wider application. All developments of CoE RAISE are being integrated into the UAIF, which will not only contain the trained models but also documentation on how to use them on current Petaflop and future Exascale HPC, prototype, and disruptive systems. The developments toward the UAIF are continuously progressing. At present, the code base includes repositories from "Machine-Learned Particle-Flow"¹⁹ (developed by CERN), "AI for HPC"²⁰ (provided by FZJ), and the "AI4Sim Model Collection"²¹ (developed by BULL). The example in Figure 5 shows a snapshot of the Machine-Learned Particle-Flow (MLPF) section on the website.

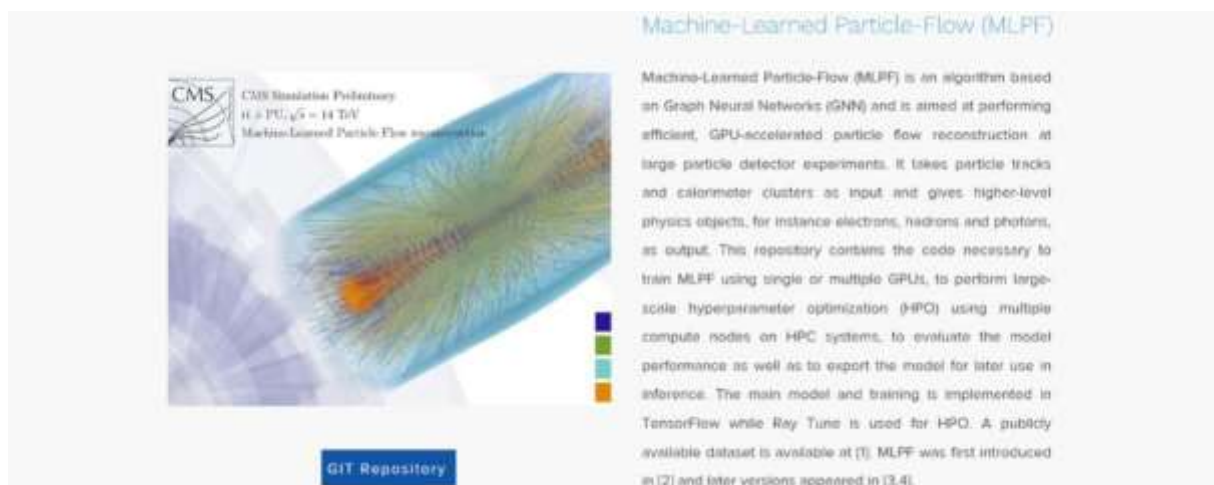


Figure 5: Screenshot from the UAIF subpage on MLPF.

¹⁹ Machine-Learned Particle Flow repository <https://github.com/jpata/particleflow>

²⁰ AI for HPC repository <https://gitlab.jsc.fz-juelich.de/CoE-RAISE/FZJ/ai-for-hpc-oa>

²¹ AI4Sim repository <https://github.com/AI4SIM/model-collection/tree/main/combustion>

The screenshot displays the GitHub repository for 'particleflow' by 'jpsata'. The repository page includes a file browser with folders like 'github/workflows', 'clic', 'delphes', 'habone', 'images', 'mlpf', 'models', 'notebooks', 'parameters', 'scripts', and files like 'LICENSE', 'README.md', and 'requirements.txt'. The right sidebar shows repository statistics: 16 stars, Apache 2.0 license, and 25 forks. Below the repository page, there are four plots. The top plot is a 3D visualization of particle tracks and clusters. The bottom two plots are scatter plots comparing reconstructed vs. truth particles and energy resolution for charged hadrons and neutral hadrons. The plots include statistical data such as Pearson correlation coefficients (ρ) and Spearman correlation coefficients (τ) for different methods like Rule-based PF and MLPF.

Figure 6: Code base and description of the MLPF with Delphes GitHub repository.

The different sections on the UAIF components contain short descriptions of the code, a representative image, and a link to the repository (button “GIT Repository in Figure 5). The link directly points to the code base including documentation, e.g., for MLPF it is explained how the algorithm was processed. The repository also features detailed information and tested codes. Figure 6 shows the corresponding GitHub entry page with the code root and the explanatory text.

2.4 Newsletter

The CoE RAISE Newsletter²² is currently in the test phase. In the first stage, the subscribers will be informed about the YouTube trainings that are offered each month. It will be sent in addition to the announcements on Social Media, see Sec. 3, to keep the community engaged. Figure 7 shows how the button is integrated in the header and what the page looks like when subscribing to the Newsletter. The entry to this page can be found on each subpage of the CoE RAISE website. A button has been placed left of the drop-down menu on every page.

If it turns out that many subscribers sign up, the second stage will be to consider expanding the Newsletter and integrating more topics.

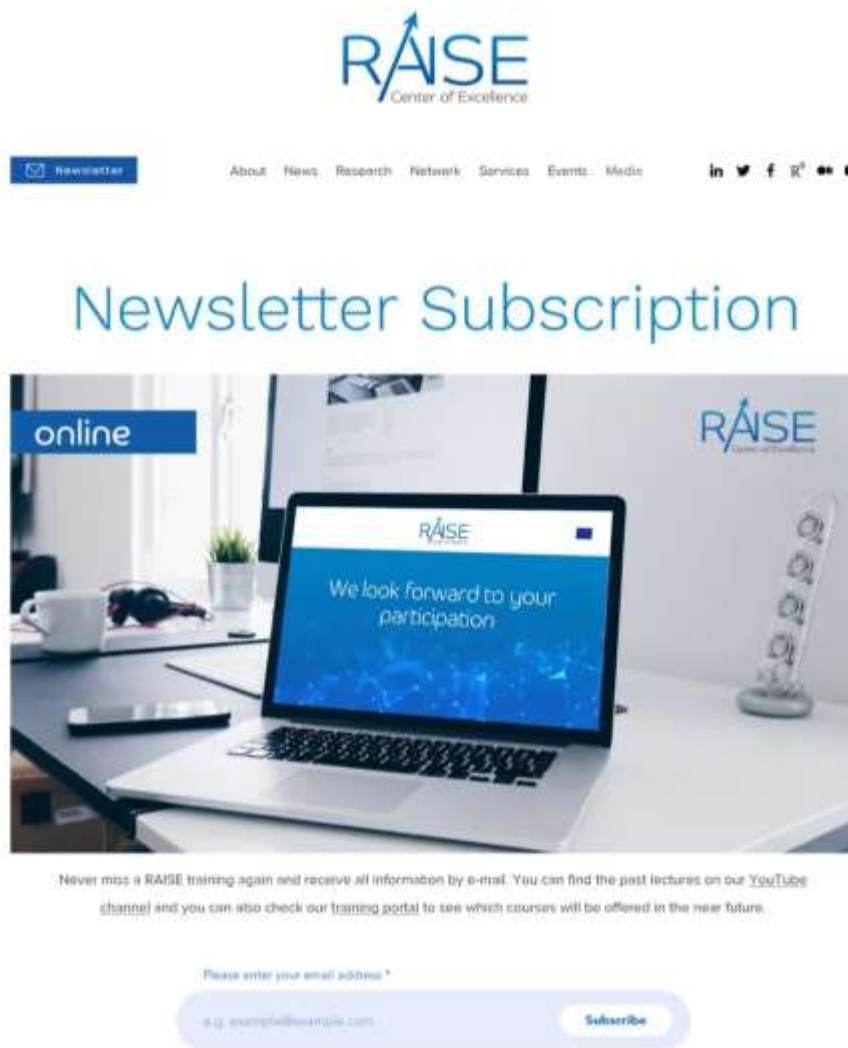


Figure 7: Screenshot from the CoE RAISE website for Newsletter signup.

²² Newsletter: <https://www.coe-raise.eu/newsletter>

2.5 Service Portal

The latest planned extension to the website is the construction of the Service Portal, shown in Figure 8.

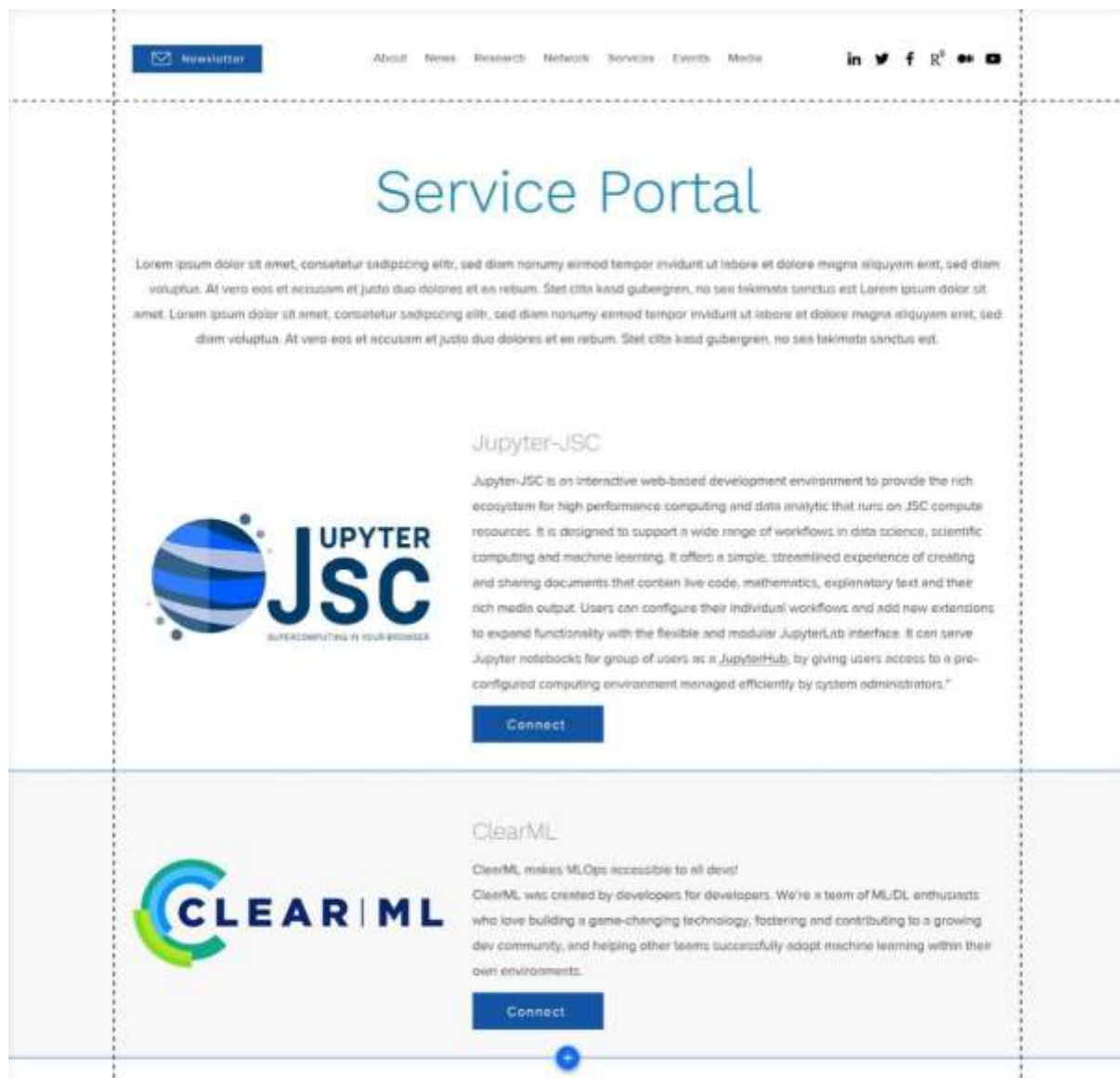


Figure 8: Screenshot of the overview of the offered services.

To facilitate the deployment of novel HPC-based AI methods developed within CoE RAISE and bridge expertise between multiple industrial and academic partners, tailored services and information should be provided to the user communities. Access to Jupyter-JSC and ClearML are currently under development and are soon to be integrated into the service menu²³ on CoE RAISE's website.

Jupyter-JSC is an interactive, web-based development environment running on compute nodes of the HPC systems of JSC. The service is made available by IT experts from JSC to support a wide range of workflows and offers a simple way for sharing code and pre-configured computing environments. ClearML is an open-source platform that simplifies development of ML solutions. It is designed to seamlessly integrate ML workflows with customized environments and offers improved versioning, visualization, and data tracking.

²³ CoE RAISE Services: <https://www.coe-raise.eu/services>

Together with the Training Platform²⁴, the Service Portal promotes collaboration and knowledge transfer between the CoE RAISE partners and the wider domain, AI, and HPC communities. It also contributes to the construction of the UAIF for Exascale HPC systems by enabling code and data sharing among existing and future user communities, easy deployment, and reproducibility of models. It thereby increases the impact of CoE RAISE.

²⁴ CoE RAISE Training Platform <https://raise.learning.lv/public/about>

3 Social Media

The Social Media channels Twitter²⁵, LinkedIn²⁶, Facebook²⁷, ResearchGate²⁸, Medium²⁹, and YouTube³⁰ will continue to be maintained. Over the course of the project, it has become clear which channels have the greatest reach and where it is difficult to gain new followers or content. LinkedIn is developing best compared to Twitter and Facebook. In addition, the YouTube channel has been greatly expanded in recent months and has 19 videos in total generated in-house.

In the following sections, the individual areas are illustrated. Section 3.1 provides information on the main Social Media channels for directly communicating with the community, i.e., LinkedIn, Twitter, and Facebook. The successful employee campaign promoted by CoE RAISE over the main Social Media channels is presented in Sec. 3.2. Updates to ResearchGate and Medium are provided in Sec. 3.3 and Sec. 3.4. Major contributions to CoE RAISE's YouTube channel are provided in Sec. 3.5. Finally, this section closed with an analysis of the overall performance of the Social Media channels in Sec. 3.6.

3.1 LinkedIn, Twitter, and Facebook

In Figure 9 to Figure 12, the most important key figures of the three channels as of Nov. 23, 2022, included their top post, are depicted.

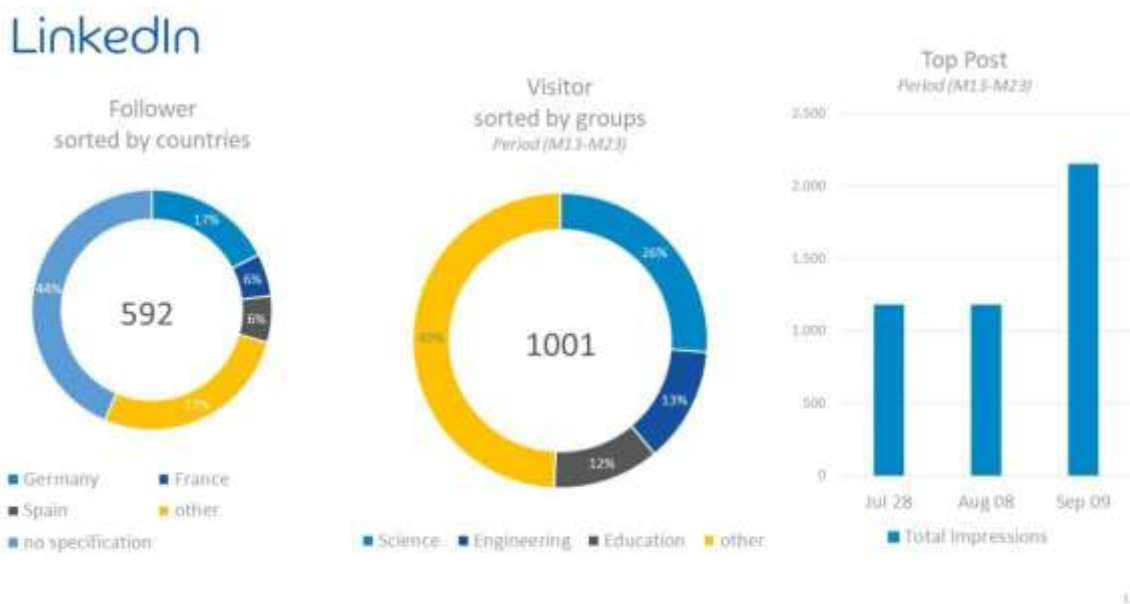


Figure 9: Follower numbers, visitor groups, and statistics on the posts with the most impressions on LinkedIn (M13 – M23).

The first two circular diagrams in Figure 9 show a breakdown of LinkedIn followers. The platform allows a detailed view on the geographical location of the followers and on the visitor groups. At the end of June 2022, the mark of 500 followers was reached. At present (as of the

²⁵ Twitter: <https://twitter.com/CoeRaise>

²⁶ LinkedIn: <https://www.linkedin.com/company/coe-raise>

²⁷ Facebook: <https://www.facebook.com/CoE-RAISE-102841751904457>

²⁸ ResearchGate: <https://www.researchgate.net/project/CoE-RAISE>

²⁹ Medium: https://medium.com/@raise_info

³⁰ YouTube: <https://www.youtube.com/channel/UCAdIZ-v6cWwGdapwYxdN7dg>

production of this document) CoE RAISE has 607 followers. Compared to 2021, when almost 50% of the followers came from Germany, the geographical distribution has expanded considerably as shown in Figure 9. Germany, France, and Spain still have the highest shares. Overall, the European countries are the most widely represented, with occasional followers from America, Australia, and Asia. Unfortunately, 44% have no specification. The bar chart shows the top three posts where the announcement about the Mid-Term Report was able to reach more than 2,000 impressions. Figure 10 shows the screenshot from the LinkedIn timeline, on which the team is standing in front of the video wall at JSC.



Figure 10: Top LinkedIn post with over 2,000 impressions about the mid-term report in September 2022.

Similar analyses are shown for CoE RAISE's Twitter account in Figure 11. Unfortunately, this platform does not provide as many details as LinkedIn. Twitter's statistics are presented via two charts. The total number of followers increases up to 297 and the two posts from the months of June and September 2022 each achieved a value of around 700, while the top post in February 2022 clearly took first place with almost 6,000 impressions. Figure 12 shows the tweet about the announcement of the International Day of Women and Girls in Science.

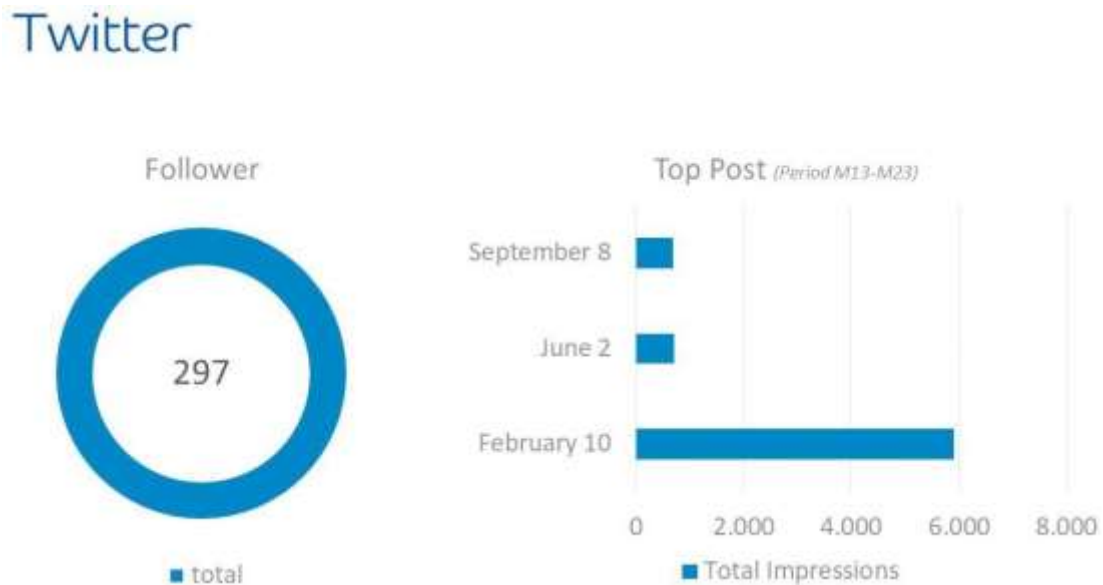


Figure 11: The absolute follower numbers and impressions of the top three posts on Twitter (M13 – M23).

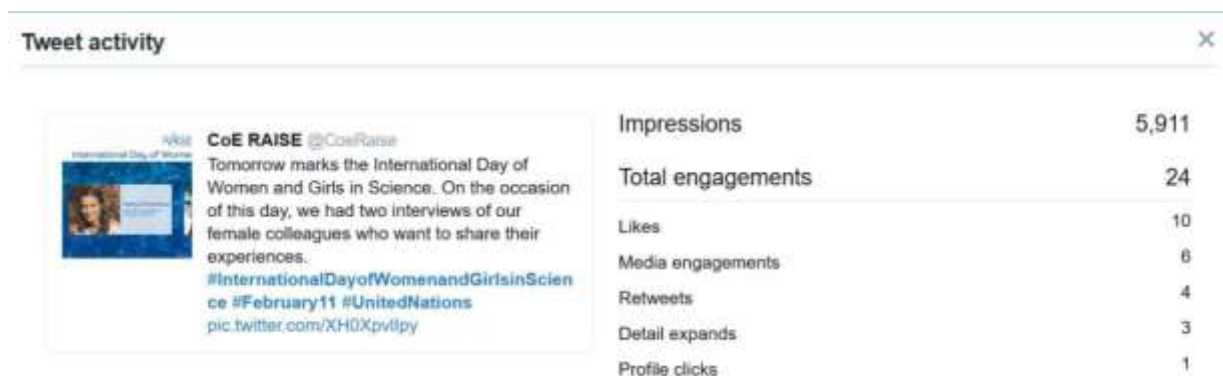


Figure 12: Top Twitter post with close to 6.000 impressions about the International Day of Women and Girls in Science.

Considering the total numbers, the Facebook channel is still developing slowly as compared to the other main Social Media channels. As shown in Figure 13, the Facebook channel has now 51 followers, which is three times as much as in the previous year. The top three posts achieved values of 83, 178, and 390 impressions. Like on LinkedIn, the announcement of the Mid-Term Report achieved the most impressions. Figure 14 shows the corresponding post with the same photo as used for the Twitter post, cf. Figure 10.

Facebook

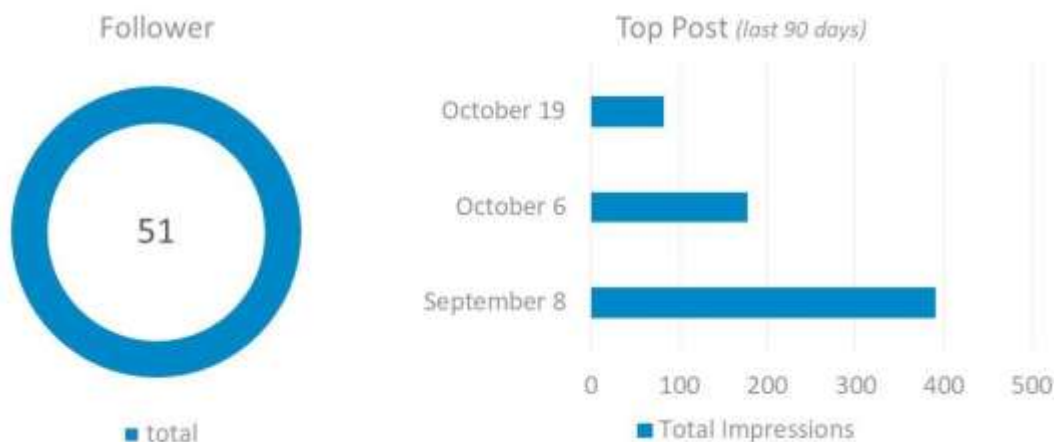


Figure 13: Facebook's key figures: followers and total impressions of the top three posts (M13 – M23).



Figure 14: Top Facebook Post with close to 400 impressions about the mid-term report in Sep. 2022.

3.2 Employee Campaign

Like in 2021, the employee campaign was launched in the third quarter of the year. An example of the design³¹ is shown in Figure 15. It carries the RAISE logo in the upper right corner, important hashtags are placed in the lower right corner, and in the center, a photo of the person providing the statement plus the affiliation, and the statement is placed. This year 2022, 10 posts were published and new colleagues were introduced. Over the entire time frame (the campaign ended at the beginning of September) ~5,000 impressions were generated across all Social Media platforms. Another campaign is planned for next year, this time to introduce "The Partner of the Week", see also Sec. 7. The aim is to get as many colleagues as possible from each partner into a group picture and to give a short statement about the project.



Figure 15: Example of CoE RAISE's employees campagne propagated via social media.

3.3 ResearchGate

For the dissemination of papers and articles related to CoE RAISE, the ResearchGate platform³² has been selected in addition to the website. Since March 10, 2021, 14 authors from the project published their work on this platform. Furthermore, small but relevant updates from the project, such as the release of the RAISE video, were provided via ResearchGate. In Figure 16, it is visible that with the 17 contributions so far, over 2,623 reads have already been generated, which represents a threefold increase compared to the previous year 2021. The six new releases were uploaded to the platform in the last 6 months. The topic "A machine-learning-based method for automatizing lattice-Boltzmann simulations of respiratory flows"³³ [1] achieved 139 reads, which is the highest number of the six publications. In total, the new articles generated 303 of the reads. Of all publications, the conference paper "Quantum

³¹ Campaign Design: <https://twitter.com/CoeRaise/status/1542035059787661312>

³² ResearchGate <https://www.researchgate.net>

³³ Conference Paper: https://www.researchgate.net/publication/357577713_A_machine-learning-based_method_for_automatizing_lattice-Boltzmann_simulations_of_respiratory_flows

Support Vector Machine Algorithms for Remote Sensing Data Classification³⁴ [2] has achieved the greatest reach with 756 reads.

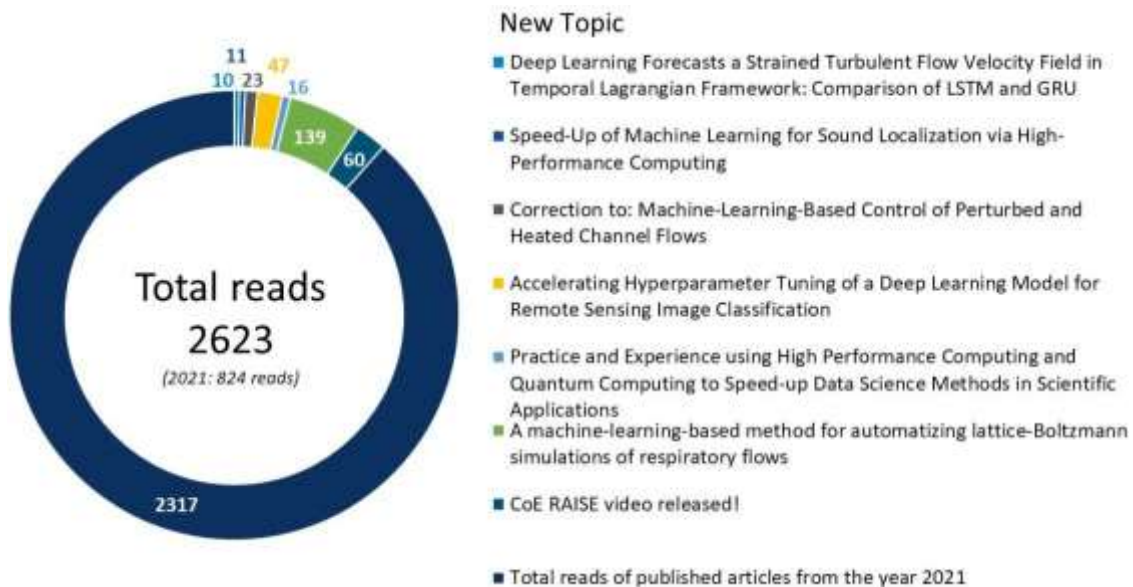


Figure 16: Overview of the various contributions and the number of reads on the ResearchGate platform until Nov. 23, 2022.

3.4 Medium

The platform Medium is used for the dissemination of our internal interviews. Since the last Deliverable, the interviews³⁵ of Maria Girone (CERN) and Kathy Christoforou from the Cyprus Institute (CYI), as part of the campaign dedicated to the International Day of Women and Girls in Science, and the interview with Marcel Aach (FZJ) have been uploaded. Views have since increased from 9 to over 50, as shown in Figure 17.

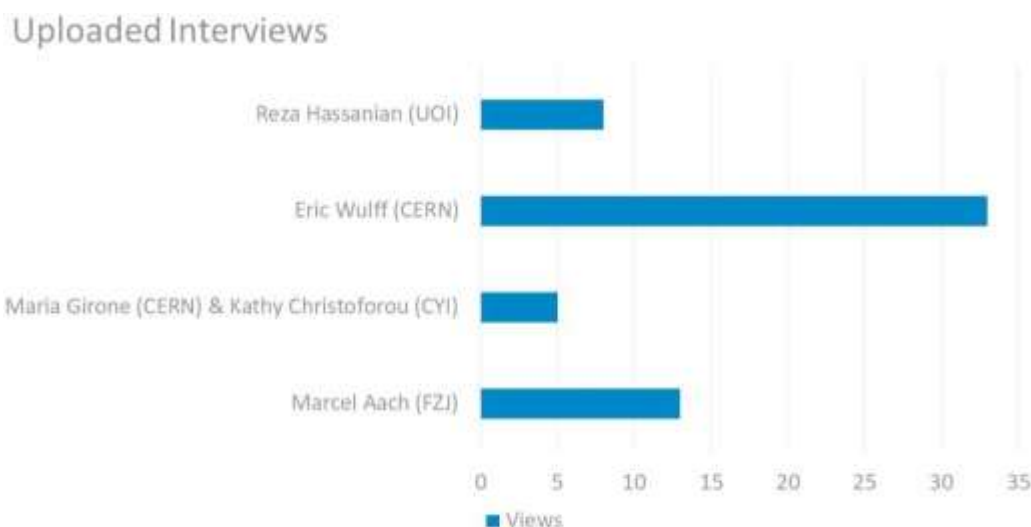


Figure 17: Statistics of published interviews on the Medium platform since Oct. 15, 2021.

³⁴ Quantum Support Publication: https://www.researchgate.net/publication/353296104_Quantum_Support_Vector_Machine_Algorithms_for_Remote_Sensing_Data_Classification

³⁵ Interviews: https://medium.com/me/stories/public?source=your_stories_page-----1-----

3.5 YouTube

The YouTube channel has been one of the biggest projects in communication and dissemination this year. The platform has expanded by 13 own videos since the third quarter 2022. Figure 18 shows the structure of the RAISE landing page. The image video is highlighted and starts automatically when visitors come to the page. Below it, the recordings of the RAISE Trainings are located, publicly accessible to all. The monthly Training sessions are now uploaded at regular intervals and offer the opportunity to watch missed events in the aftermath. The CoE RAISE image video³⁶ and the Training course “Accelerating Machine Learning with GraphCore”³⁷ achieved the highest number of views with 432 and 347, respectively. The access details of all RAISE Trainings are listed in Table 1. From the past ParCFD event in Italy, two presentation recordings (for complete sessions organized by CoE RAISE) have been uploaded with the separate talks to follow as individual videos in January 2023.

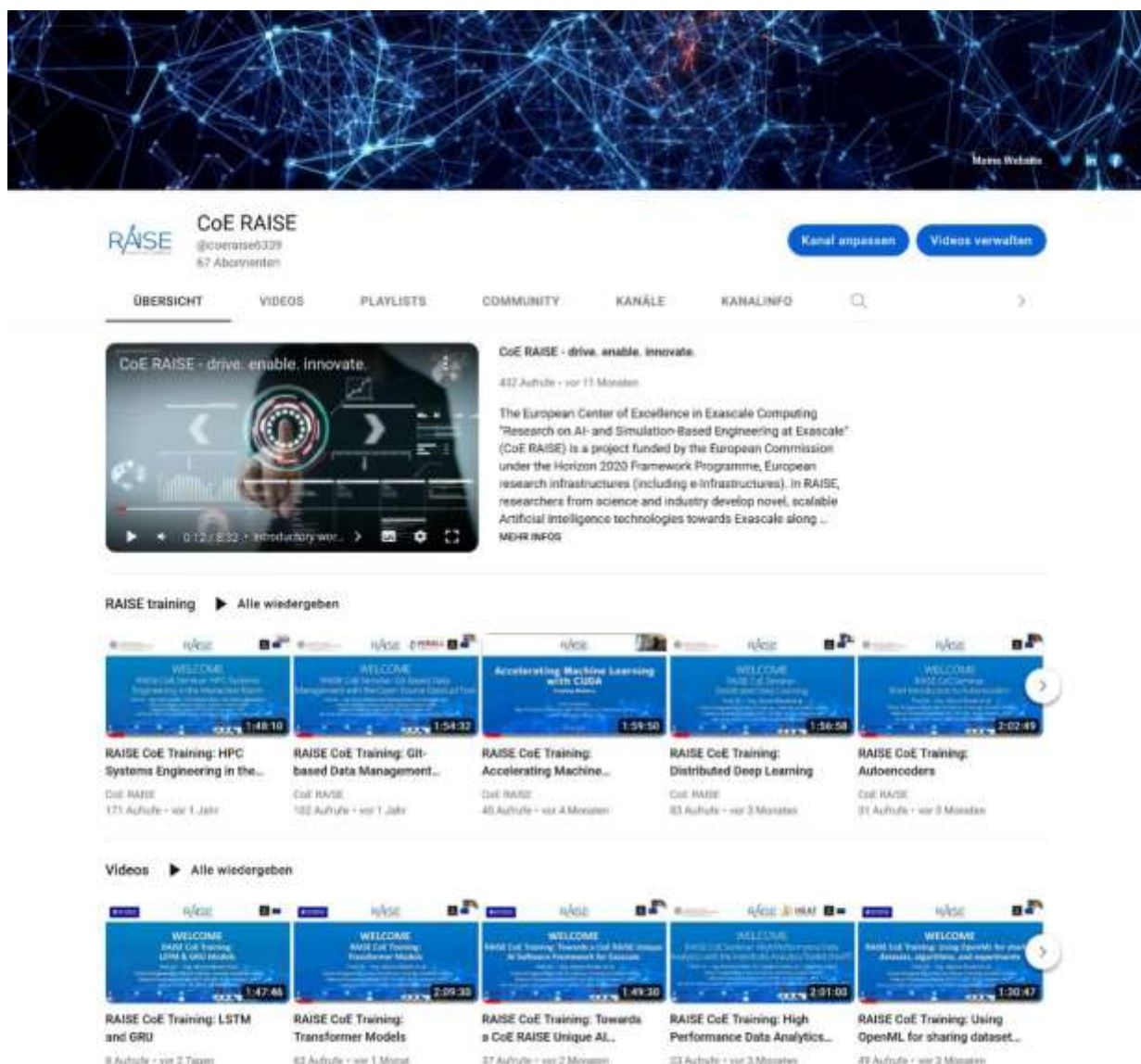


Figure 18: A part of the videos available on CoE RAISE’s YouTube channel.

³⁶ RAISE Image Video: <https://youtu.be/W9OCiIFJMx0>

³⁷ RAISE Training: <https://youtu.be/ETNR8ETzw8o>

Title	Day of release	Views as of M23
RAISE CoE Training: HPC Systems Engineering in the Interaction Room	13.04.2021	171
CoE Training Course - "Interactive HPC with JupyterLab" - Part 1	31.05.2021	139
CoE Training Course - "Interactive HPC with JupyterLab" - Part 2	31.05.2021	90
Parallel & Scalable Machine & Deep Learning driven by High Performance Computing (HPC)	29.06.2021	71
RAISE CoE Training: Git-based Data Management with the Open-source DataLad Tool	13.07.2021	102
CoE RAISE – Drive. Enable. Innovate.	06.12.2021	432
RAISE CoE Training: Accelerating Machine Learning with GraphCore	11.07.2022	45
RAISE CoE Training: Distributed Deep Learning	08.08.2022	83
RAISE CoE Training: Autoencoders	09.08.2022	31
RAISE CoE Training: MLOps with ClearML	10.08.2022	25
RAISE CoE Training: Hyperparameter Tuning with Ray Tune	11.08.2022	33
RAISE CoE Training: Accelerating Machine Learning with GraphCore	12.08.2022	347
RAISE CoE Training: Graph Neural Networks	13.08.2022	59
RAISE CoE Training: Quantum Support Vector Machine Algorithms	14.08.2022	48
RAISE CoE Training: Using OpenML for sharing datasets, algorithms, and experiments	15.08.2022	49
RAISE CoE Training: High Performance Data Analytics with the Helmholtz Analytics Toolkit (HeAT)	16.08.2022	23
RAISE CoE Training: Towards a CoE RAISE Unique AI Software Framework for Exascale	01.09.2022	37
RAISE CoE Training: Transformer Models	29.09.2022	63
RAISE CoE Training: LSTM and GRU	22.11.2022	8

Table 1: List of all recorded online events for the CoE RAISE YouTube channel.

One idea that has been pursued since the Mid-Term Review is to promote the project through a tech or science expert, with a large YouTube community. The idea is to make the project simple and understandable for the wider community. It is planned to find an English-speaking channel to distribute the contributions internationally. The two science channels In a Nutshell³⁸ and CrashCourse³⁹ serve as examples here, as they manage to present complex topics in a simple way. This type of presentation corresponds to the ideas and would be a huge success

³⁸ In a Nutshell: <https://www.youtube.com/@kurzgesagt>

³⁹ CrashCourse: <https://www.youtube.com/@crashcourse>

to present the project there. The advantage of such a video would be that it could be the ideal medium to transport what CoE RAISE is doing to a broad audience and could be used on any type of event.

3.6 Overall development of Social Media channels in terms of number of followers

Figure 19 shows the overall development of the Social Media channels, measured by the number of followers. Overall, a positive development can be seen. With slightly above 600 followers, LinkedIn is the strongest platform in terms of numbers and was able to almost double the number. The numbers on YouTube more than doubled and Facebook even tripled. Although the total number of followers is still the weakest here, the positive trend is clearly visible. The Twitter account is about to break the 300-follower mark and also achieved a development of more than 30%. The positive trend will be carried over to the last year of the project and the development will continue in order to steadily increase the reach of the project.

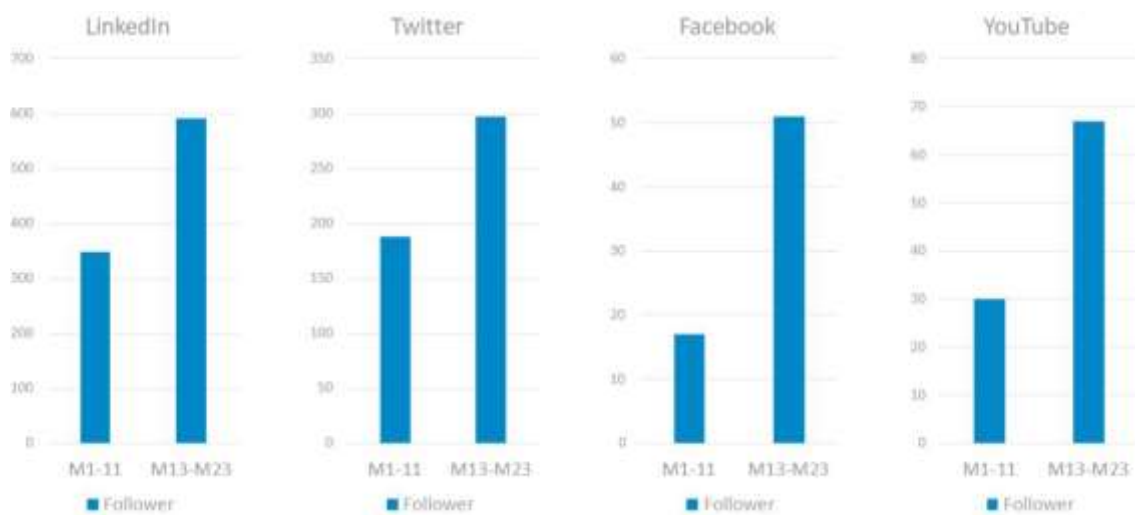


Figure 19: Comparison of the development from the first to the second project year.

4 Events with CoE RAISE participation or own organization

An important channel to effectively disseminate (scientific) information is the attendance of different kinds of events such as conferences, workshops, symposia, meetings, and seminars. The presentation of the latest updates of the project on such events is an effective means of involving industry leaders in discussions early on.

The participation in or the organization of such events is announced on the Events page⁴⁰ of the website and disseminated through Social Media sufficiently ahead of time. The following overview in Table 2 shows which events have been attended or organized by CoE RAISE members this year 2022. The focus is on the expansion of existing cooperations and further networking with new cooperation partners and scientific exchange. In addition, the position of the project in the field of AI in interaction with HPC will be strengthened to perceive the project as a specialist. Figure 20 shows a few impressions from the past events. The audience at most events does not only come from the Scientific Community (SC), but also from the Industry (I), the Civilian (C) population, and Politics (P).

Event	Date	Target audience
RAISE part of presentation in CASTIEL/EuroCC Teaching Experience Exchange Event	04.02.2022	SC
CoE NCC Workshop	07.02.2022	SC
SimEA Seminar Series	22.02.2022	SC
4 th Icelandic HPC (IHPC) Workshop co-organized by COE RAISE: ihpc.is/community	23.02.2022	SC, I, C, and P
AI4EU Webcafé	17.03.2022	SC
European Digital Innovation Hub of Iceland (EDIH-IS)	05.04.2022	SC, I, C, and P
5 th Icelandic HPC (IHPC) Workshop co-organized by COE RAISE: ihpc.is/community	25.04.2022	SC, I, C, and P
NCC Iceland Presentation mentioning CoE RAISE at EuroCC2	28.04.2022	SC
Icelandic HPC (IHPC) Steering Board Presentation of NCC Iceland mentioning CoE RAISE	02.05.2022	SC
High Performance Computing in Science and Engineering	16.05.2022	SC
Co-organized Responsible HPC Workshop	19.05.2022	SC, I, C ,and P
MasterClass for PhD Students Event, Talk about EU Projects Experiences including CoE RAISE	25.05.2022	SC
ParCFD 2022 - RAISE organized mini-symposia - Hybrid Event	25.05.2022	SC and I
Paper Presentation with CoE RAISE Material at IEEE MIPRO Conference	26.05.2022	SC

⁴⁰ CoE RAISE Events page <https://www.coe-raise.eu/events>

ISC High Performance	29.05.2022	SC, I, C, and P
HDCRS Summer School 2022	30.05.2022	SC
Delphi Consortium Sponsor Meeting	31.05.2022	SC
Workshop during the ISC High Performancs	02.06.2022	SC
TeraTec Forum	14.06.2022	SC, I, C, and P
Open HPC week 2022	28.06.2022	SC
EAEIE 2022	30.06.2022	SC
Barcelona Build vs Buy HPC Summit 3B4HPC	30.06.2022	SC
MIT-France Symposium	12.07.2022	SC
39 th International Symposium on Combustion	27.07.2022	SC
6 th Icelandic HPC (IHPC) Workshop co-organized by COE RAISE: ihpc.is/community	31.08.2022	SC, I, C, and P
European Drag Reduction and Flow Control Meeting	09.09.2022	SC
European Fluid Mechanics Conference EFMC14	13.09.2022	SC
EGI Conference	19.09.2022	SC
INSPIRE European Research night Cyprus	30.09.2022	SC and C
HPC for research and development" organized by EuroCC Latvia	04.10.2022	SC
SC22 Supercomputing Conference (Dallas, TX)	12.11.2022	SC, I, C and P
AI & Simulation-Based Engineering Workshop	01.12.2022	SC
Mini-Symposium in the 3 rd HiFi-LeD	14.12.2022	SC

Table 2: List of seminars, conferences etc. CoE RAISE members organized or participated in; Scientific Community = SC, Industry = I, Civilian = C, and Politics = P.

On December 1st, 2022, the AI and Simulation Based Engineering Workshop⁴¹ (ASBE) was held in Prague. This workshop brought together the experts of the NCCs⁴² of the Czech Republic, Germany, and Iceland with those of CoE RAISE to identify common scientific interests and, even more importantly, to discuss prospective end-to-end collaborations including research, national HPC nodes, and end-users from science and industry. Thereby, three out of six sessions were taken over from the RAISE project, which means a total of 16 presentations. The workshop enabled to present the project as whole, the UAIF, AI- and HPC-cross-methods at Exascale, compute-driven use cases (CFD and AI), and data-driven use cases. Researchers from various supercomputing centers, universities, and companies showed great interest in this workshop, and the high quality of the presentations led to lively discussions and opened collaboration opportunities. These discussions continued during the

⁴¹ ASBE Workshop <https://www.it4i.cz/en/welcome-to-the-national-competence-center-in-hpc/ai-and-simulation-based-engineering-workshop>

⁴² NCCs <https://www.eurocc-access.eu/>

social event after the workshop, where the attendees exchanged their experiences and discussed their current AI-related challenges with the experts of CoE RAISE and the NCCs. This fruitful workshop demonstrated the importance of knowledge exchange between scientific and industrial sectors.



Figure 20: Impressions from the past events.

As the participation of CoE RAISE members at such events is increasing, a business card⁴³ has been created to give interested parties a contact. The business card is generic and hence modifiable to the specific needs, i.e., it can be individualized. Figure 21 shows the front and back of the business card. It carries the CoE RAIE logo on the left and pictures of the Social Media channels. The title of the project is printed on the right together with the website link, the general contact email address, and a Quick Response (QR) code pointing to the website.

⁴³ Business Card <https://bscw.zam.kfa-juelich.de/bscw/bscw.cgi/3943063>



Figure 21: Front and back of the business card.

5 Non-scientific and non-peer reviewed publications

Publications of RAISE contribute to the communication and dissemination strategy and support reaching the project's objectives. They are key to communicate the existence of the RAISE project to a specific target audience, e.g., to the general public or to related institutions, and attract attention to the project's progress and its achievements. Table 3 shows the non-scientific and non-peer reviewed publications from the period M13 – M23 and Figure 22 to Figure 24 some examples.

Medium & Title	Date
Focus CoE Newsletter #14	25.01.2022
Scientific Computing World Magazine – Interview A. Lintermann	02.02.2022
Focus CoE Newsletter #15	31.03.2022
CoE Impact Brochure	12.04.2022
Newsletter 4/2022 IT4Innovations – Interview A. Lintermann	10.06.2022

Table 3: Non-scientific and non-peer reviewed publications from the period M13 – M23.



Figure 22: Excerpted from the Focus CoE Newsletter.

Realising the potential of AI and HPC

7 February 2022

Winter 2022

AI, HPC

Three experts in the field shared their thoughts about some of the potential from the increased combining of AI and HPC. By David Stuart



Image: SeventyFour/Shutterstock.com

The convergence of artificial intelligence (AI) and high-performance computing (HPC) promises to transform the scientific computing landscape, with its potential to enable research groups to tackle challenges that would otherwise have been beyond their capabilities.

Over the past decade, we have begun to see AI penetrate nearly all industries and scientific disciplines, from the headline-grabbing integration in autonomous vehicles and the protein-folding predictions of AlphaFold, to the more quietly heralded work managing traffic flows, creating more efficient jet engines, and removing the noise from astronomical images. This is, undoubtedly,

only the beginning, especially as AI is increasingly combined with the processing power possible from HPC and that is necessary for dealing with the large data sets that are being made available, or may need to be simulated, and the complexities of the deep-learning models.

There are, however, many challenges to be overcome. This includes challenges inherent to AI, challenges to the integration of AI in HPC, and challenges to successfully transfer knowledge to the people who need it.

Figure 23: Excerpted from the Scientific Computing article.

RAISE - RESEARCH ON AI- AND SIMULATION-BASED ENGINEERING AT EXASCALE

THE MISSION
In the CoE RAISE, researchers from science and industry develop novel, scalable Artificial Intelligence (AI) technologies for application in non-generation supercomputers. These methods are developed in conjunction with representative use cases from Engineering and Natural Sciences, which address important societal challenges, such as modelling subsurface regions suitable for geothermal energy capture or carbon storage, or optimising wind farm layouts and their operation.

BACKGROUND: COMPLEX HYBRID WORKFLOWS
AI tasks run very efficiently on graphics processing units (GPUs) while traditional HPC methods (like simulations) usually use clusters of standard server CPUs. However, many workflows run AI and simulation tasks concurrently on different hardware and stitch them to regularly exchange required data.

THE CHALLENGE
The main challenge is to find scalable, generalisable AI solutions that interoperate with traditional simulation and data processing methods and so the same can efficiently utilize heterogeneous supercomputing hardware. This includes architectural methods using all hardware components of current, heterogeneous supercomputers, where each component is best suited for a specific set of tasks, and supporting complex hybrid workflows. CoE RAISE develops such methods and workflows to benefit important use cases, for instance for 'seismic imaging with remote sensing for energy applications', or 'AI for wind farm layout optimisation'.

SEISMIC IMAGING WITH REMOTE SENSING FOR ENERGY APPLICATIONS
Climate change requires a rapid move from hydrocarbon energy to sustainable energy sources such as geothermal sources. The primary method for discovering promising geothermal sites is seismic imaging, which relies on sound waves. Seismic imaging is applied over large geographic

al areas and extends deep into the Earth's subsurface. In RAISE, scientists employ such techniques to reveal the underground structure of the earth. This information is combined with exact knowledge of the surface conditions extracted from satellite imaging data (see Figure 2). AI methods combine both techniques and extract the maximum information from the available data to facilitate the exploration of sustainable energy resources, locate regions suitable for carbon storage, and provide corresponding maps for monitoring subs and efficient operation.

AI FOR WIND FARM LAYOUT OPTIMISATION
The wind energy industry relies on advanced simulations for the design of wind turbines and wind farms, and for what are power predictions. At this stage, the objective is to assess the potential of a wind farm and to optimise the placement of wind turbines on the terrain. Short- and long-term forecasts are necessary for gauging the wind resources available in the coming days or months/year. Simulating the flow over a full wind farm is extremely difficult and consumes a huge amount of time and computing resources. To save costs and energy, reduced-order models were developed that bridge the spatial and time scales between the detailed dynamics of the turbine blades and the wind flow across the full farm. Replacing the individual turbines featuring many geometric details by simple "blades" for the overall aerodynamic wind turbine flow (see Figure 2) and to do the same time much cheaper. RAISE develops deep learning methods based on detailed turbine simulation results to model such cheap solutions.

BACKGROUND: LARGE-EDDY SIMULATION (LES)
LES is a method for simulating fluid flow that fills the gap between physics phenomena from an industrial and modeler's sub-grid-scale models. LES is computationally cheaper than resolving all physical scales per delivers sufficiently accurate results for many applications.

ACHIEVEMENTS / KEY RESULTS
In the first months of operation, RAISE has already demonstrated that the combination of traditional, simulation-based HPC methods with AI techniques produces better results with less costs, energy and time.

Figure 2: 3D seismic imaging volume showing the subsurface layering structures (left) and satellite image highlighting the different components of the earth's surface (right).

Figure 2: Training process to create a wind turbine model.

GET IN TOUCH WITH US

Figure 24: Excerpted from the HPC3 Impact brochure.

6 Monitoring of dissemination and exploitation

During the preparation for the Mid-Term Report in September 2022, the current status of the KPIs was compiled. It became clear that the goals set at the beginning for the completion of the project have almost all been achieved. During the presentation at the Review meeting, it was suggested to review the goals for the last year 2023 and to define new ones in order to keep the motivation to develop the project high. In the last column of the Table 4, the updated key figures for the last year are defined.

Key Performance Indicator	Description	Total target (by the end of the project)	M 18 (mid-term report)	New Target
Press mentions	Press mentions in various media	20	30	40
Non-Scientific and non-peer reviewed publication	Articles about RAISE	15	14	20
Project Fact Sheet	At least one fact sheet that will be updated if necessary	1	1	1
Website views	Number of page views registered by Google Analytics	1,500 page views per year	9,139 (M2 – M18)	12,000 total page views
Project presentations	Number of presentations about RAISE research at conferences, workshops, etc.	35	52	70
Scientific publications	Peer-reviewed journals, conference proceedings, etc. – in green open access.	12	14	20
Employees Campaign	Campaign to identify with the project	1	2	3

Table 4: Updated Key Performance Indicators for dissemination and communication activities.

7 Dissemination and Communication Plan for M25 - M36

The newly set goals are intended to keep the motivation high for the coming year, to present the project in the best possible way, to increase the reach, and to consolidate the social benefits in order to achieve the big goal: To continue the project beyond the three years. The strategy so far gives hope for this.

In summary, the following activities are already planned for the coming year:

1. In the area of the website, the News section will remain an integral part of the continuous activities. The articles on the International Day of Women and Girls in Science and a report on the All-Hands Meeting at CERN, coming up in January 2023, are firmly planned for the first quarter, in addition to the articles from WP2, WP3, and WP4 "*Data-Driven Use-Cases at Exascale*", which will continue until the end of the project.
2. Together with the Training Platform, the Service Portal promotes collaboration and knowledge transfer between CoE RAISE partners and the broader professional, AI, and HPC communities. It also contributes to building the UAIF for Exascale HPC systems by enabling code and data sharing among existing and future user communities, ease of deployment, and model reproducibility. Through the two newly established subpages, it is expected to grow the community and build new networks and collaborations.
3. The Newsletter will be used to keep in touch with the community and to communicate the trainings from WP2. A possible extension, if the user numbers increase noticeably, are also current news from the project.
4. With the third Social Media campaign "Partner of the Week", a new idea will be realized, after two years in a row with a highly successful employee campaign, which will be continued. This gives each partner another opportunity to present themselves as a whole team and can report on their experiences and responsibilities within the project and beyond. The campaign will be launched in the second quarter of 2023.
5. Events/trainings will continue to be in the focus of the CDP, and possible resulting recordings that can be published on the YouTube channel will be produced. On-site networking and knowledge exchange bring new ideas and enhance the scientific work. Online, the monthly training from WP2 will continue to be offered and made available on YouTube. This type of communication has paid off noticeably in 2022. In addition, the presence at the ISC High Performance 2023⁴⁴, the SC23⁴⁵, the co-organized HDCRS Summer School⁴⁶, the PASC23 conference⁴⁷, another participation at the ParCFD 2023 in Ecuador⁴⁸, and an event of the ECCOMAS conference series "Math 2 Product (M2P) Emerging Technologies in Computational Science for Industry, Sustainability and Innovation"⁴⁹ are firmly planned. If possible, another AI & Simulation-Based Engineering Workshop will be organized with the EuroCC partners, which has been a great success.

⁴⁴ ISC <https://www.isc-hpc.com/>

⁴⁵ SC <https://sc23.supercomputing.org/>

⁴⁶ HDCRS <https://www.hdc-rs.com/>

⁴⁷ PASC <https://www.pasc-conference.org/>

⁴⁸ ParCFD 2023 <https://www.ucuenca.edu.ec/servicios/sala-de-prensa/noticias-institucional/2827-parcfd-2023-welcome-bienvenida-a-parcfd>

⁴⁹ M2P Conference <https://m2p2023.cimne.com>

6. Last but not least, as described in Sec. 3.5, an attempt to present the RAISE project next year through an external YouTube channel, or tech influencers, will be started. The channels "In a Nutshell" and "CrashCourse" will serve as good examples to implement the idea.

If further ideas and opportunities arise during the course of the project, new ways to increase awareness of the RAISE project are sought.

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List of Acronyms and Abbreviations

AI	Artificial Intelligence
BSC	Barcelona Supercomputing Center
BSCW	Basic Support for Cooperative Work
CDP	Communication and Dissemination Plan
CERN	European Organization for Nuclear Research
CFD	Computational Fluid Dynamics
CoE	Center of Excellence
CoE RAISE	European Center of Excellence in Exascale Computing “Research on AI- and Simulation-Based Engineering at Exascale”
CYI	The Cyprus Institute, Cyprus
EU	European Union
FM	Flanders Make
FZJ	Forschungszentrum Jülich GmbH
HPC	High-Performance Computing
JSC	Jülich Supercomputing Centre
KPI	Key Performance Indicator
M2P	Math 2 Product (ECCOMAS Thematic Conference)
ML	Machine Learning
MLPF	Machine-Learned Particle-Flow
ParCFD	Parallel CFD International Conference
QR	Quick Response
RAISE	see CoE RAISE
RTU	Riga Technical University
UAIF	Unique AI Framework
UOI	Háskóli Íslands – University of Iceland, Iceland
WP	Work Package