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D8.3 Report of second period of Transnational Access

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Scientific Large-scale Infrastructure for Computing Communication Experimental Studies **Starting Communities**

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Table of content

TABLE OF CONTENT **2**
LIST OF ABBREVIATIONS **3**
1. EXECUTIVE SUMMARY **4**
2. TRANSNATIONAL ACCESS DEFINITION **5**
2.1. TRANSNATIONAL ACCESS IN SLICES 5
2.2. REMOTE TRANSNATIONAL ACCESS 6
3. OVERVIEW: OPEN CALLS FOR TRANSNATIONAL ACCESS **6**
3.1. DISSEMINATION CAMPAIGNS OF THE OPEN CALLS 7
3.2. SLICES RIS PROVIDING TA FOR PROJECTS OF THE 2ND OPEN CALL 9
4. EVALUATION AND RESULTS OF THE 2ND OPEN CALL **10**
4.1. AWARDED PROJECTS FROM THE 2ND OPEN CALL (CUT-OFF DATE 31 MARCH 2023) 10
4.2. RESULTS OF THE EXPERIMENTS 11
5. EVALUATION AND RESULTS OF THE 3RD OPEN CALL (CUT-OFF DATE 15 MAY 2023) **12**
5.1. AWARDED PROJECTS FROM THE 3RD OPEN CALL 12
5.2. EARLY RESULTS OF THE EXPERIMENTS 12
6. EVALUATION AND RESULTS OF THE 4TH OPEN CALL (CUT-OFF DATE 30 SEPTEMBER 2023) **12**
6.1. AWARDED PROJECTS FROM THE 4TH OPEN CALL 12
6.2. RESULTS OF THE EXPERIMENTS 13
7. EVALUATION AND RESULTS OF THE 5TH OPEN CALL (CUT-OFF DATE 29 FEBRUARY 2024) **14**
7.1. AWARDED PROJECTS FROM THE 5TH OPEN CALL 14
7.2. RESULTS OF THE EXPERIMENTS 15
8. LESSONS LEARNED FROM THE OPEN CALLS **15**
8.1. DIRECT FEEDBACK FROM THE EXPERIMENTERS 16
8.2. HIGHLIGHTS OF THE OUTCOMES 17
9. LESSONS LEARNED FROM THE RESEARCH MOBILITY SCHEME **18**
9.1. EXPERIENCES FROM THE RESEARCH MOBILITY SCHEME 19
10. CONCLUSION **20**
ANNEX – SCIENTIFIC ARTICLES PREPARED UNDER THE OPEN CALLS' PROJECTS **21**

List of figures

Figure 1. Definition of accesses in SLICES-SC....5
Figure 2. SLICES-SC portal....6
Figure 3. SLICES-SC Open Call announcement in the web site....7
Figure 4. Announcement of the winners of the open calls in the SLICES web site....7
Figure 5. LinkedIn promotion of SLICES Open Calls (example)....8
Figure 6. Results of the Open calls in social media....8
Figure 7. Presentation of the results of the Open Calls (examples) in the web site....9
Figure 8. Front page of the Success Story flyers....17
Figure 9. SLICES-SC mobility of researchers....18

List of abbreviations

RI	Research Infrastructure
TA	Transnational Access
VA	Virtual Access
NLP	Natural Language Processing
LLM	large language model
ML	Machine Learning
EEG	ElectroEncephaloGram
IoT	Internet of Things
RSS	Received Signal Strength
HD	High-Definition
AVOBMAT	Analysis and Visualization of Bibliographic Metadata and Texts

1. Executive summary

The deliverable reports on the second reporting period Transnational Access (TA) and the initiatives undertook to achieve such activities. The deliverable reports on the Open Call Process, the organisation of the 2nd and 3rd Open Call for proposals, including the dissemination campaign, the evaluation of the proposals received, the initial results of the experiments and the assessment of the RI from the experimenters. The 2nd and the 3rd Open Call for proposals was organised and provided Remote Transnational Access to SLICES Research Infrastructures nodes.

The deliverable reports on lessons learnt and the achievements from the 2nd and the 3rd Open Call and the success stories and experiences gained from the open callers /experimenters.

2. Transnational Access definition

SLICES-SC is providing two different types of accesses for the provided Research Infrastructure (RI). These are broken down to either 1) Transnational Access (TA), for selected users conducting experiments over the infrastructure, who validate their novel solutions, algorithms and protocols with an experimentally driven approach, or 2) Virtual Access (VA) for providing experimental results, datasets, experiment definitions and open source code for replicating and reproducing experiments in other premises.

This document delves into the transnational access activities that have taken place during the second period of accesses. Overall, SLICES-SC develops tools regarding both access schemes, in order to provide high-quality services to the end users who access the infrastructure. SLICES-SC complies with the EU guides for accessing RIs[1].

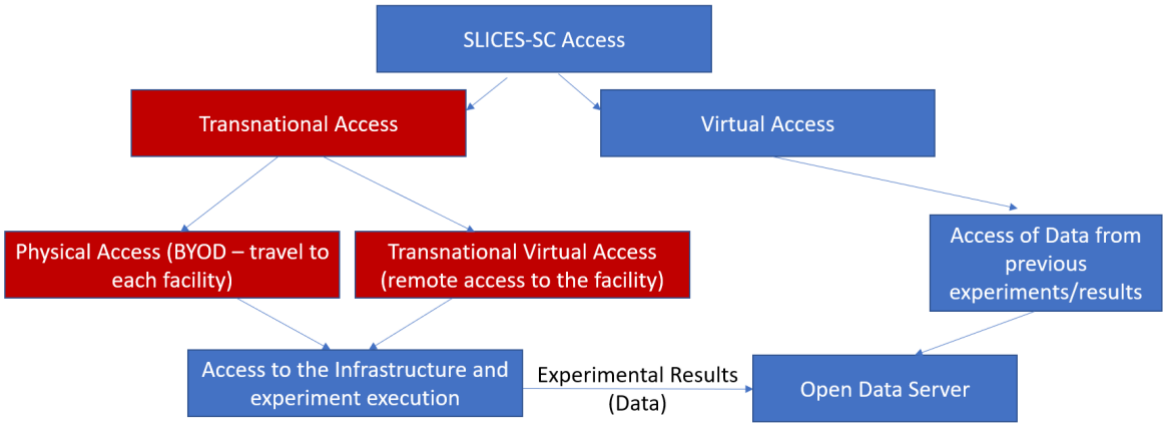


Figure 1. Definition of accesses in SLICES-SC

2.1. Transnational Access in SLICES

The transnational access in SLICES-SC is broken down to:

(1) **physical transnational access**, where the experimenters visit the facilities, and might install their own IP protected equipment, so as to conduct their experiments.

(2) **remote transnational access**, where the experimenters use resources that are already installed at the different testbeds and conduct their experiments remotely. The case of remote transnational access is further elaborated in the next subsection.

SLICES-SC has developed through the contributions in WP2 the necessary tools for enabling transnational access to the infrastructure. ***The tools are web-based (e.g., the SLICES-SC portal – https://portal.slices-sc.eu), ensuring that remote access of the facilities can take place over the Internet, and all the required tools for making remotely available the infrastructure***. On the other hand, the protocols for on-site visits and enabling the addition of new equipment to the infrastructure

[1] European Commission, Directorate-General for Research and Innovation, *European charter of access for research infrastructures : principles and guidelines for access and related services*, Publications Office, 2016, https://data.europa.eu/doi/10.2777/524573 [Last accessed 27 August 2024]

have been specified, as part of the different mobilities that are supported by SLICES. During the second period of transnational access, only remote transnational access experiments were approved for being executed over the involved RIs.

2.2. Remote Transnational Access

The remote transnational access in SLICES-SC has been the main form of access during the second period of Open Calls. During such accesses, experimenters used the provided tools from the testbeds and get access to the resources and accompanying tools that each testbed provides. The experimenters can access the SLICES-SC portal and use it to select nodes for their experiment (filtering them based on their type/capabilities), load specific distributions of operating systems to them, and access testbed specific services (e.g. services for changing the wireless channel configuration for wireless network/5G experiments) for conducting their experiments.

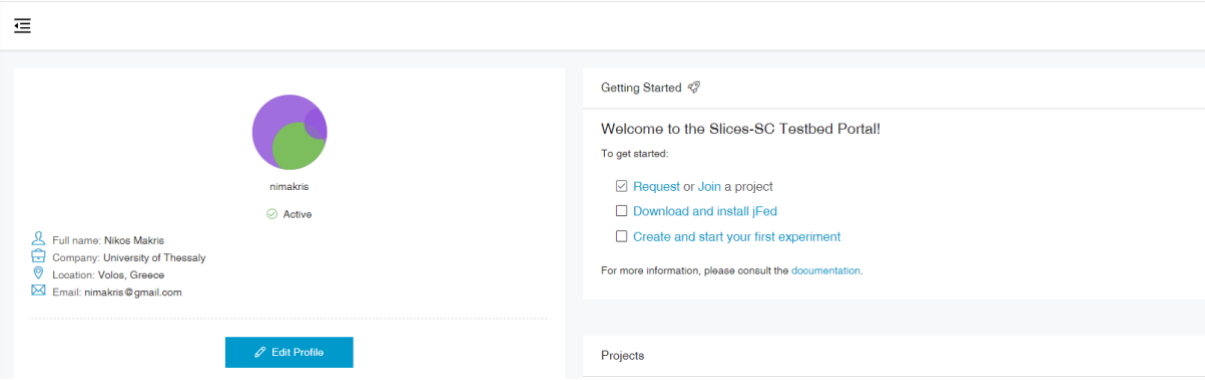


Figure 2. SLICES-SC portal

Several of the facilities within SLICES-SC have been integrated within the SLICES-SC portal for the second period of accesses. The remaining facilities use their own tools for providing remote access, mainly by giving remote terminal access to the experimenters for bare metal access. All the partners in the project have been participating in several other projects with their infrastructure, as a mean for verifying contributions under real-world settings, and have therefore developed their own tools for providing access to their dedicated resources. The set of resources provided by each testbed in the first period of transnational access in the project are detailed in the next section.

3. Overview: Open Calls for Transnational Access

Throughout the project's lifetime, SLICES-SC provided access to the infrastructure available at the time via organizing Open Calls. An Open Call is continuous submission call with multiple cut-off dates. Users could submit their proposals whenever they preferred, but the evaluation process was linked to the following cut -off dates:

#	Date
1.	10 June 2022
2.	31 March 2023
3.	15 May 2023
4.	30 September 2023
5.	29 February 2024

3.1. Dissemination campaigns of the Open Calls

The Open Calls are published in SLICES web page where the template for the proposal was also available. The proposals were submitted through the SLICES web site.

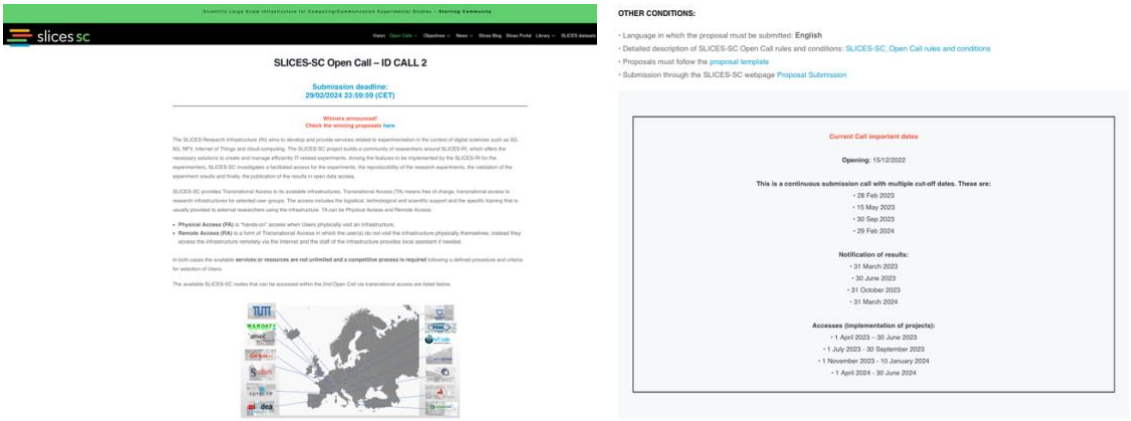


Figure 3. SLICES-SC Open Call announcement in the web site

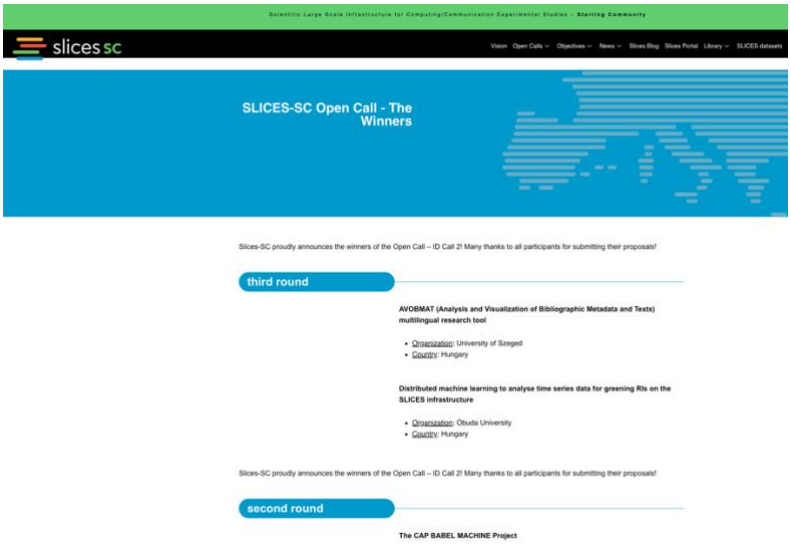


Figure 4. Announcement of the winners of the open calls in the SLICES web site

The open calls were promoted through social medial and SLICES newsletters and though their presentation in national info days.

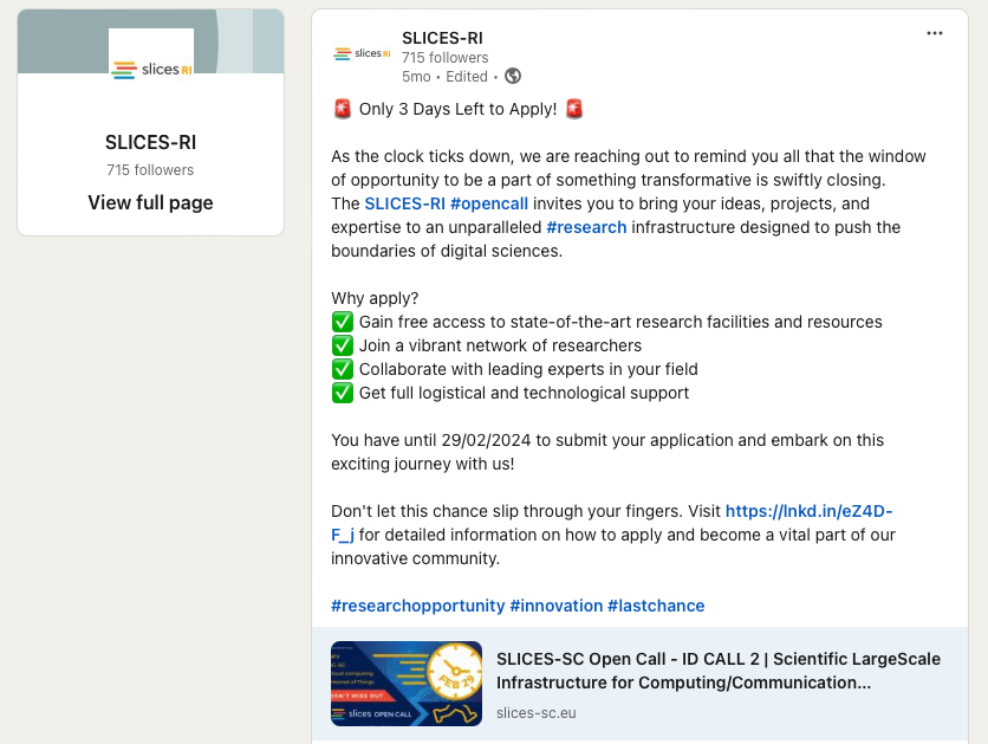


Figure 5. LinkedIn promotion of SLICES Open Calls (example)

The results of the open calls are presented in SLICES blog and social media.

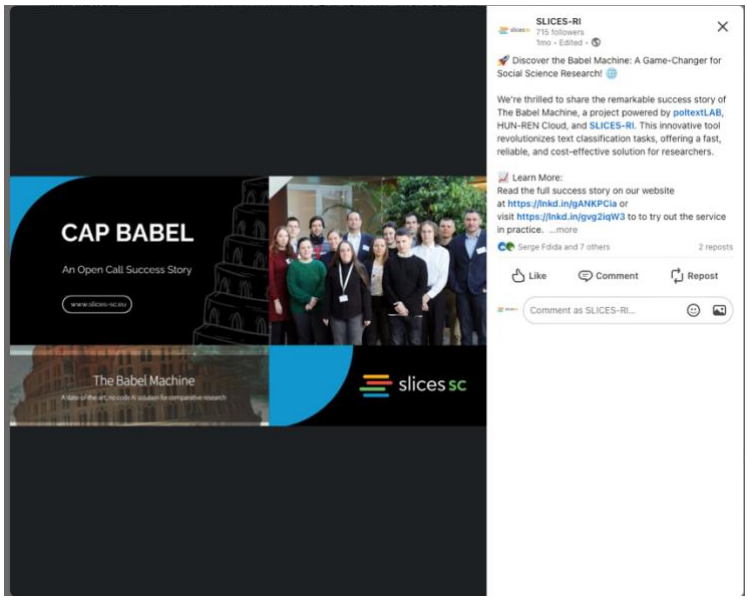


Figure 6. Results of the Open calls in social media

A Week in Ghent: Hungarian Researcher's Journey at imec

Balázs Gáspár from Óbuda University, Hungary ended the spring academic season with a site visit to the GPULab in Ghent. Let's have a closer look at how he spent his time there!

My visit to the imec laboratory in Ghent marked a pivotal moment in my academic journey. Thanks to SLICES-SC Open Call, I got the opportunity to spend a week at the Ardoyen campus, working on my master's thesis. The testbed at imec provides a range of environments and features for carrying out different experiments, such as the Virtual Wall for networking, cloud resources, and virtualization research. In addition, the testbed offers abundant computing resources, such as GPU accelerators for distributed deep learning initiatives, and I was given access to the latter. The high-performance GPUs notably accelerated my calculations, and their significant memory capacity allowed me to train large-scale machine-learning models.

My project focused on evaluating the environmental footprint of digital infrastructures, aiming to develop strategies for minimizing energy consumption. By leveraging imec's advanced technology, I could conduct a deep analysis of a vast amount of time series data – coming from research infrastructures – to uncover patterns in energy usage. The results and the experience can help researchers develop strategies to minimize energy consumption and overall environmental impact.

Greetings from Côte d'Azur!

Working hard or hardly working? Marcell Szabó, a Hungarian researcher from the HSN Lab, Budapest University of Technology and Economics had the chance to spend two weeks at the 5G laboratory of EURECOM. Marcell's commentary lets us get a sneak peek at what it's like to conduct a site visit at a SLICES-RI situated at the heart of the French Riviera.

Main text and photos: Marcell Szabó

Recently, during late November and early December of 2023, I had the opportunity for a two-week visit at the 5G laboratory of EURECOM in Sophia Antipolis, France. Located on the French Riviera, (Côte d'Azur) it has a wonderful setting, among the deservedly famous and breathtaking cities of Nice, Antibes, Cannes, or Menton, and of course next to the micro-state of Monaco. The weather is rather pleasant even during early winter, with lots of sun and mild temperatures.
The EURECOM building is in the heart of the Sophia Antipolis technology park, right next to the Polytech Nice Sophia university. EURECOM has a dual focus of teaching (offers master's degrees) and conducting research in various areas, like data science, communication systems (5G), or digital security.
During my site visit, I got access to the full-fledged laboratory 5G network running at the facility, using OpenAirInterface. The core network runs on a cluster, while the eNodeBs and UEs run on dedicated machines with 5G-NR in between. There is also one UE that is on an outside node making testing with some radio deterioration available.

imec welcomes Hungarian open call winner

Krisztán Póra from Óbuda University, Hungary kicked off the fall academic season with a site visit to the GPULab in Ghent. Let's have a closer look how he spent his time there!

Written by: Krisztián Póra

At the end of September, I had the pleasure of visiting the imec facility in Belgium. The opportunity was granted to me after submitting a successful project proposal for the second SLICES-SC Open Call. Both the city of Ghent and the Ardoyen campus were a sight to behold. Walking among the modern office buildings of the area, the imec building captures one's attention, as one side of it is completely covered with solar panels.

Upon arrival, I got to meet two colleagues from the research institute, namely Brecht Vermeulen and Thijs Walcarius. In our first meeting, we went over the technical and organizational details of the experiment. I was granted an opportunity to view the infrastructure and its server rooms, and other experimental areas. The tour included a closer look at the resources allocated for my experiment. The facility bolsters considerable computational resources, including highly sought-after GPU cards.

Figure 7. Presentation of the results of the Open Calls (examples) in the web site

3.2. SLICES RIs providing TA for projects of the 2nd Open Call

Looking at the final number of submitted proposals, it is indisputable that imec's facility, especially the GPULab was the most desired infrastructure: more than 60% of the experiments required access to imec's research infrastructure.

Experimenters also benefited from running their projects on other SLICES RIs, like Open5GLab experimental 5G sites or NITOS testbeds.

4. Evaluation and results of the 2nd Open Call

4.1. Awarded Projects from the 2nd Open Call (Cut-off date 31 March 2023)

The following six projects were awarded from the 2nd Open Call:

Number	Project title	Submitting organisation	Requested SLICES RIs
05	**The CAP Babel Machine Project 1**	***Artificial Intelligence National Laboratory at the Centre for Social Sciences, HU***	***Imec IDLab, iLab.t, GPULab***
The Artificial Intelligence National Laboratory at the Centre for Social Sciences in Budapest ("Lab") focuses on social science applications of machine learning (ML) with a special emphasis on natural language processing (NLP). The Lab is developing fine-tuned large language models (LLMs) for tasks traditionally treated by large scale human coding. These include sentiment analysis, geographical classification, and topic recognition. Given the GPU and RAM needs of training LLMs (BERT, RoBERTa etc.), the projects can only be handled with cloud computing services. Due to budget constraints an academic partner providing these services is preferred. "CAP BABEL MACHINE" serves as a pilot for several other classification services in the pipeline. BABEL is a ML project which aims to classify political, legal, social and economic text sources (from newspaper articles to laws) for 100+ languages according to the codebook of the Comparative Agendas Project (CAP). It assigns policy topic categories (from education to defense) to text units ranging from quasi-sentences to several hundred pages. With the proper cloud computing background, BABEL allows researchers from all over the world to directly access this tool and receive classification outputs for their corpora in real time.			
06	**Vibration analysis at pipelines 2** **VAPEUR 2**	***Euroil Kft.***	***Imec IDLab, iLab.t, GPULab***
After the evaluation and notification of the winners, the company stated that they cannot fit running such a project in their schedule, so they withdrew from the opportunity. The project aimed to determine the vibration of a gas pipeline system that results from the flow. The gas pipeline in question was still in the design phase, so various types of finite element analyze were envisioned to specify the flow and its behaviour in advance with ANSYS. Since these calculations require enormous computing resources, they intended to use the GPULab in imec. The outcome supposed to be a Docker image with ANSYS environment.			
07	**Large-scale EEG Workflow Execution on Multi-GPU Systems** **LEWE-GPU**	***University of Pannonia***	***Imec IDLab, iLab.t, GPULab***
The University of Pannonia aimed to continue the parallel EEG processing algorithm development work they started after the first Open Call. This time the team aimed to integrate the previously developed EEG processing algorithms into complete EEG pre-processing pipelines that provide fast, efficient, and standardized processing facilities for the EEG research community, which can be used effectively in multi-subject experiments. These developments enable researchers to conduct large-scale EEG studies increasing statistical power without sacrificing temporal and/or spatial resolution to keep execution time within practical limits.			

08	**On the Evaluation of Different Cell Selection Approaches in Wi-Fi Community Networks (Sci-Fi)**	*Polytech S.A.*	*5GTN*
POLYTECH SA is based in Larissa Greece, and since 1984 is dedicated exclusively to the design, development and implementation of didactic solutions and laboratories, using the most modern available technologies. The scope of this experiment is to consider several association approaches for the Wi-Fi standard and examine how each of them, affect both the user performance and the social welfare. It is critical to examine the interoperability of the considered association mechanisms in 5G and beyond architectures, as the Wi-Fi standard proposed widely for utilization as a non-3GPP technology in them.			
09	**Raft for Cloud Continuum RAFT4CC**	***PANGAEASA***	***NITOS –UTH, Greece Open5GLab - EURECOM, France***
PANGAEASA is an innovative start-up enterprise established in Volos, Greece 2017. The leading team involve highly skilled people who have long experience in the field of research and experimental development in computer science but also in the production fields. Cloud continuum helps to address the pressing challenges in exploiting data generated at the network edge and by IoT devices. The project investigated a consensus protocol (Raft) in order to coordinate the geo-distributed sites. Raft needed to be redesigned to adapt to this new environment. RAFT4CC paves the way for creating consensus protocol assisting high-quality distributed applications on the computing continuum.			
10	**Evaluating a distributed deep learning framework on the SLICES infrastructure**	***Óbuda University***	***Imec IDLab, iLab.t, GPULab***
The team members are affiliated with the Neumann János Faculty of Informatics at Óbuda University. This project experimented with distributed deep learning. While the resource requirements of deep learning are considerable, distributing the training process over a cluster of nodes introduces additional challenging factors into the fray. Many frameworks have been developed, which provide tools and methodologies appropriate for this task, and enable the efficient utilization of the underlying infrastructure for distributed deep learning. The experiment evaluated the performance of such framework on the SLICES infrastructure in order to learn about the possibilities of carrying out such research on a transnational level.			

4.2. Results of the experiments

Once they finish their experiments, the researchers must fill out the experiment feedback report template, so SLICES-SC has a deeper understanding of their experiences and outcomes using the RI. Based on these inputs, we can gather the following results concerning the experiments in this round:

- The CAP Babel Machine project was successful in fine-tuning and evaluating 61 LLMs on multilingual and multi-domain corpora, with performances peaking at 0.91 F1-score.
- The LEWE-GPU team was able to perform general and domain specific GPU benchmarks on a V100 GPU-based multi-GPU system to characterise I/O and compute operation performance and the execution time of various signal processing algorithms that serve as building blocks of EEG processing pipelines. They managed to test alternative multi-GPU communication and data transfer strategies that can help with designing multi-GPU processing pipelines that can speed up large-scale EEG studies involving hundreds or thousands of participants.

- Project number 08's main outcome was the evaluation of the IEEE 802.11ax protocol. They tested several Access Point association approaches and observed performance.
- RAFT4CC have proven that the Raft Consensus Algorithm, initially designed for distributed systems that operate over networks with short delays, can be adapted to efficiently work over networks with special features, such as long delays.
- The 10th experiment was able to execute a large variety of tests, using different servers, GPU cards and even network technologies. This enabled to gather a large volume of data, and thus gain deeper understanding of the distributed deep learning process, along with its challenges and characteristics.

5. Evaluation and results of the 3rd Open Call (Cut-off date 15 May 2023)

5.1. Awarded Projects from the 3rd Open Call

The 3rd Open Call for proposals received 0 applications for this cut-off date.

5.2. Early results of the experiments

Not relevant.

6. Evaluation and results of the 4th Open Call (Cut-off date 30 September 2023)

6.1. Awarded Projects from the 4th Open Call

The following four projects were awarded from the 4th Open Call:

Number	Project title	Submitting organisation	Requested SLICES RIs
11	**The CAP Babel Machine Project 2**	***Artificial Intelligence National Laboratory at the Centre for Social Sciences***	***Imec IDLab***
This is the continuation of CAP Babel Machine Project 1. In this phase the research team focused on two key deliverables: expanding language support for the CAP Babel Machine and improve existing models and implementing a validation feature so that users can validate Babel's predictions themselves. This is valuable feedback for both the users and for the developers to improve the models further. The team intends to refine the models and expand them to cover multiple languages.			
12	**Locating Reliably and Accurately over LoRa** **LoRa 2**	***University of Cagliari Department of Electrical and Electronic Engineering (DIEE)***	***Imec CityLab***
This proposal was not awarded due to its poor proposal description.			

The proposed project focuses on implementing accurate and trustworthy localization algorithms using Received Signal Strength (RSS) and multilateration techniques, which rely on measuring and triangulating the distances between the objects and several known reference points. The growing IoT landscape raises security issues the experiment intends to focus on. Experiments are foreseen to collect RSS LoRa data and evaluate the accuracy of this technology, assess robustness against malicious actors, and analyse the ability of the algorithms to detect and mitigate attacks.			
13	**Enabling Next-Generation XR Applications: Developing a Cross-Layer Rate Control Approach for 5G Edge Networks**	***Eindhoven University of Technology***	***Open5GLab***
The aim is to develop a novel rate control mechanism (at the transport layer) in 5G edge networks, enabling high data rate and low latency communication for next-generation XR applications. This includes the design of a cross-layer rate control policy that dynamically adjusts the send rate on the server side, using network statistics received from the UE as feedback, to ensure that a persistent queue backlog does not develop at the BS. This approach enables effective adaptation to fluctuations in capacity across the 5G air interface. Due to scheduling difficulties this experimenter was not able to perform its experiment. SLICES is open to accommodate him outside the project's lifetime. The details are still under discussion.			
14	**Blockchain-assisted federated learning in 5G-powered vehicular systems with smart resource management**	***Budapest University of Technology and Economics*** ***HSN Lab***	***Open5GLab***
When it comes to cooperative and automated driving, sharing information efficiently is a must. This can be done by leveraging the aggregation of high-definition (HD) maps. These multi-layered maps contain static and dynamic information regarding a certain situation. To obtain a shared understanding between the vehicles without revealing the actual data, federated learning is introduced. It preserves data privacy because the actual data is not travelling through the 5G network, only the local model parameters. To realize this idealized system the good intentions of each participant are also required. With the current advancements in distributed ledger frameworks, introducing a consortium blockchain that tracks the reputation and trustworthiness of the participants is essential, along with a detailed resource analysis. Given the fact that shared resources like network bandwidth are used, it is a core requirement to manage and preserve these. Moreover, to provide a comprehensive system the economic aspects are also under scrutiny, specifically the incentivization of users by applying a separate blockchain-based compensation protocol. To collaborate the theory, simulations must be performed. There is special emphasis on the resource management of the system, from the used CPUs to other shared resources like the 5G network. Measuring and analysing the network-related data sharing using the broadcast feature in GPP Release 17 for 5G network is the main objective of the proposed SLICES-SC experiment.			

6.2. Results of the experiments

- CAP Babel 2 reported that during their access to the infrastructure, they successfully fine-tuned and evaluated LLMs on multilingual and multi-domain corpora for multiple classification tasks, with performances peaking at 0.96 F1-score. Additionally, they batch-translated multilingual corpora using Open Neural Machine Translation to augment the existing training data, improving model performance.

- Project number 14 reported that the experiment was able to run the tests and measurements of the simulated HD map delivery to several clients using the laboratory 5G testbed. These prove that the 5G bandwidth is sufficient for such a service, making the HD map sending feasible.

7. Evaluation and results of the 5th Open Call (Cut-off date 29 February 2024)

7.1. Awarded Projects from the 5th Open Call

The following two projects were awarded from the 5th Open Call:

Number	Project title	Submitting organisation	Requested SLICES RIs
15	**Analysis and Visualization of Bibliographic Metadata and Text multilingual research (AVOBMAT)**	***University of Szeged***	***Imec GPULab***
The Natural Language Processing Research Group of the University of Szeged has been involved in human language technology research since 1998, and by now, it has become one of the leading workshops of Hungarian computational linguistics. The Group is engaged in processing mostly Hungarian and English texts. Its general objective is to develop language-independent or easily adaptable technologies. The project aimed to conduct experiments concerning the beta version of the AVOBMAT (Analysis and Visualization of Bibliographic Metadata and Texts) multilingual research tool. The software enables researchers to critically analyse bibliographic data and texts at scale with the help of data-driven methods supported by NLP techniques. This exploratory tool offers a range of dynamic text and data mining tasks and provides interactive parameter tuning and control from the pre-processing to the analytical stages. It can pre-process, analyse and (semantically) enrich a vast number of texts and metadata in several languages due to its scalable, cloud-based infrastructure. Users can benefit from the use of transformer models. The analytical functions include topic modelling, Part of Speech tagging, Named Entity Recognition, disambiguation and linking to knowledge graphs such as Wikidata. The implemented analytical and visualization tools provide micro-and macroanalysis of texts and bibliographic data. It combines bibliographic data and NLP research methods in one integrated, interactive, user-friendly web application. SLICES-SC infrastructures enable testing the software, assess and compare the effectiveness of the different infrastructures. During the project, the use of AVOBMAT is available for the research community. A key objective is to measure the cost implications of infrastructure usage by the system and identify the most cost-efficient solutions. The performance of the system is also to be evaluated, and another a critical component of the project is to measure the accuracy of the models, ensuring the analyses are both precise and reliable. These would result in better understanding the scalability and efficiency of the system and refining the software to match the needs of exploring extensive datasets in a multilingual context.		
16	**Distributed machine learning to analyse time series data for greening RIs on the SLICES infrastructure**	***Óbuda University***	***Imec IDLab iLab.t GPULab***
Óbuda University, John von Neumann Faculty of Informatics not only offers quality teaching but also hosts research groups and labs conducting research in informatics and computer science. The			

faculty focuses on various areas such as medical informatics, cybersecurity, drone development, parallel and distributed systems, and artificial intelligence.

This proposal aims to address the challenges of sustainable computing by conducting a comprehensive analysis focused on reducing the environmental footprint of digital infrastructures within research institutes. The project intended to use distributed machine learning to process time series data coming from research infrastructures for the purpose of greening. Distributed deep learning is one of the prime examples of resource-intensive computing processes. Distributing the training process over a cluster of nodes introduces additional challenging factors (such as bandwidth and latency between the devices) into the fray. Various frameworks have been created to facilitate efficient utilization of infrastructure for distributed deep learning tasks, which will be assessed on the

7.2. Results of the experiments

- The AVOBMAT team stated that the experiments conducted using the requested RI allowed us to process and analyze the complete English, German, Portuguese and Spanish corpora of the European Literary Text Collection (ELTeC) database.
- Project number 16 reported that they managed to drastically reduce the time required for complex computations with the help of the high-performance GPUs, allowing them to run more analyses in a shorter period. Plus, the GPUs with substantial memory capacity enabled the training of large-scale machine learning models.

8. Lessons learned from the Open Calls

As SLICES-SC stands for “Starting Community” our first, and most important goal was to learn how to approach and reach our potential users. Based on our experience, it is clear that while central communication and dissemination activities are inevitable, they were not sufficient to reach this goal. Local outreach is a must, we should go where our users are, because this way there is a higher chance of convincing them to use our services. We found out that they do appreciate in-person events and online demonstrations too.

We had several users who applied for more than one calls because they were satisfied with our service. Our application process was evaluated by the applicants as an easy one, plus several experimenters highlighted that they appreciated the help of the infrastructure managers either remotely or on-site.

A number of experimenters stated that they would like to continue using SLICES-RI. SLICES partners are open to accommodate these needs, the details of this access are currently being developed.

There is a difference between experimenters coming from the industry and the ones coming from academia. The first group tend to be more impatient and have second thoughts even after they gained access to the infrastructure while the latter group seemed to be more understanding. Users coming from academia and research facilities are aware of the nature of the research infrastructures, while users coming from the industry are used to a 24/7 service that might not be applicable when acquiring these resources. The support staff of the different RIs are not hesitant to go an extra mile to fulfil these requirements, however the pace of the procedures still could be acknowledging as slow.

Initially, the scheduling allowed 3 months of runtime/access to the required infrastructure, but in fact, in most cases, the experiments are not mature enough to access and make good use of the dedicated

infrastructure right away. They might need some time to fine-tune their project and prepare it to be compatible with the tools they can access. This is where the professional experience of the site managers is invaluable, they can enhance this process with their proficient insight. Users highlighted that direct communication with the site managers and on-site experts were invaluable.

SLICES-RI must evaluate the feedback the experimenters provided via the online form and revisit the idea and approach of the evaluation process, since it was one of the hardships we faced. We need to pinpoint how the external evaluators can stay motivated and how to maximize the benefits of their expertise.

8.1. Direct Feedback from the experimenters

After completing their Open Call experiment, Transnational Access beneficiaries are required to provide feedback regarding their SLICES-SC Open Call experience via filling out the Experiment Feedback Report template[2], which is available for download on the project's website. They are aware of this obligation from the moment they submit an application on the website.

Once we aggregated their feedback, we can state that experimenters found the SLICES-SC portal easy to use (average points: 8,36/10) and access to the resources were granted smoothly (average points: 8,18/10). They reported that setting up and starting their application on the desired RI was a simple procedure (average points: 8,36/10). Description of the requested RI and documentation of the resources were considered informative (average points: 4,27/5) and usable (average points: 4,64/5). Having a closer look at the support they received during conducting their experiments, users declared that the staff of the RI in question was rather responsive (average points: 9,09/10) and extremely helpful (average points: 4,82/5) thus troubleshooting was successful (average points: 4,27/5). They concluded that their experiments were successful (average points: 4,55/5). All in all, the cumulated average points were 56,66 out of 65, which is a rather positive outcome. Nevertheless, users also identified rooms for improvement. Their suggestions include the following:

- provide an environment that is equipped with docker images,
- accessing the data storage area should be made as easy as possible,
- resource availability was a bottleneck, especially when using GPUs, so a more sophisticated scheduling is advised, applying a more transparent job scheduling policy,
- documentation could be even more detailed (indicate diskspace limitations),
- make sure that the documentation is up to date,
- configuration of the resources should be automated,
- the process of registering and creating a project should be more clearly defined,
- more data storage always has an added value.
- novice users flagged that they would appreciate a stronger personal support,
- job list should feature a better filtering option, or by adding a search button,
- expand the available resources, especially GPUs,
- reminders about the timeframe during which the resources are available would be useful,
- streamline the processes connecting the SLICES-SC portal with the available services.

When asked about plans the majority of the experimenters said that they would be glad to continue using the SLICES-RI for their upcoming projects.

[2] SLICES-SC Open Call – ID Call 2, https://slices-sc.eu/events/slices-sc-open-call-id-call-2/ [Last accessed 26 August 2024]

8.2. Highlights of the outcomes

Open Call winners are asked to fill out an Experiment Feedback Report. Based on these documents and the monthly updates the experimenters provided, we chose the top three projects and ask them to collaborate with us via creating a digital flyer to demonstrate the benefits of gaining access to SLICES-RI. The intention behind this was to have a tangible output of these projects that easily indicate the benefits of SLICES-RI and might initiate and convince other potential users to exploit this opportunity.

The following flyers are accessible on our website:

- Large-scale EEG Workflow Execution on Multi-GPU Systems[3]
- CAP Babel[4]
- Raft for Cloud Continuum[5]

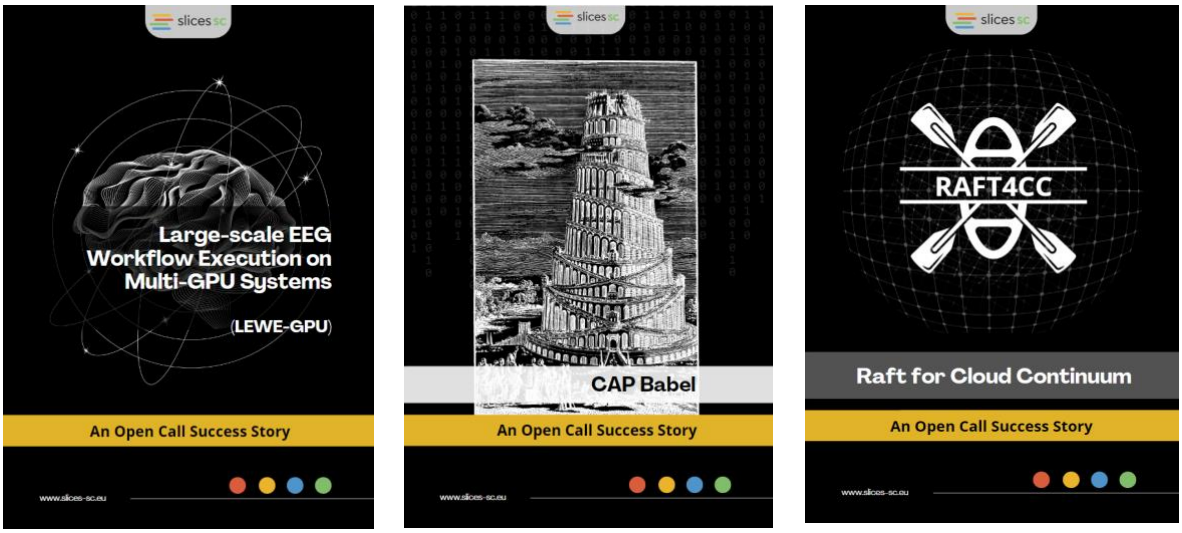


Figure 8. Front page of the Success Story flyers

[3] Large-scale EEG Workflow Execution on Multi-GPU Systems, https://slices-sc.eu/an-open-call-success-story-ii-large-scale-eeg-workflow-execution-on-multi-gpu-systems/ [Last accessed 26 August 2024]

[4] CAP Babel,https://slices-sc.eu/an-open-call-success-story-i-the-babel-machine/ [Last accessed 26 August 2024]

[5] Raft for Cloud Continuum, https://slices-sc.eu/an-open-call-success-story-iii-raft-for-cloud-continiuum/ [Last accessed 26 August 2024]

9. Lessons learned from the research mobility scheme

Within the framework of the WP4 activities, SLICES-SC is financially supporting a mobility of researchers' programme to enable researchers and professionals from academia and industry to physically visit a SLICES site and to learn how to use the research facility of that site for experimentation purposes. The mobility of researchers' programme entails different types of visits that are managed through dedicated calls, targeting both members of the consortium, as well as researchers not affiliated with any of the consortium partners. Of particular relevance for the Transnational Access activities are the calls for "*micro-projects*". Specifically, micro-projects are short research visits from one up to four weeks, aiming not only at offering to the visiting researcher a specific training on the SLICES research facility of the hosting institution, but also at producing a tangible scientific output (e.g., a data set, a software package, a joint collaboration for a publication, an official technical report) to be made available to the research community at large through the SLICES open-data portal. Therefore, the mobility of researchers' programme can also be leveraged to offer travel grants to the users of the Transnational Access, who want to physically access the SLICES facilities to receive on-site training and to perform (part of) their experimentation plan.

The mobility of researchers programme has been officially launched in January 2023 and the call for micro-projects has been opened in February 2023 (see the website[6] for a detailed description of the application procedures). Applications for micro-projects will be evaluated on a first-come, first-served basis until resources are available.

In the Proposal template of the 2nd Open Call applicants could indicate if they need mobility grant to the requested RI. Since the transnational access applications' evaluation process is much more sophisticated than the evaluation process of the "*micro-projects*" WP4 and WP8 agreed that those transnational access applications that were granted by the User Committee and asked for travel grant will automatically get the required mobility grant (up to 6.000 €).

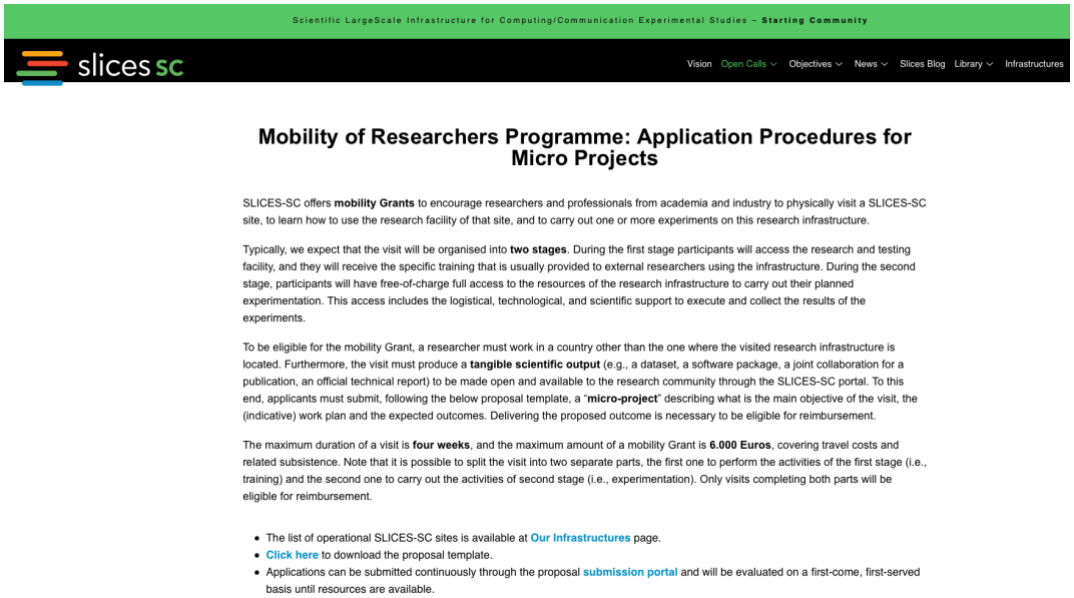


Figure 9. SLICES-SC mobility of researchers

[6] Mobility of Reserchers Programme, https://slices-sc.eu/mobility-of-researchers-programme-application-procedures-for-micro-projects/ [Last accessed 26 August 2024]

9.1. Experiences from the research mobility scheme

SLICES' research mobility scheme enhances the experimenters professional encounter during their Open Call access. 7 researchers benefited from this opportunity throughout the project's lifetime. Based on their accounts this in person experience helped them to learn about the infrastructures in detail and they managed to fine-tune their experiment with the help of the hands-on guidance of the on-site professionals, who served as mentors while implementing their projects.

Researcher were asked to provide a personal account about their time spent at the infrastructure provider the accessed. Their stories were published on the SLICES website accompanied by photos.[7] [8] [9]

Meeting these experts in person gave a boost to the experimenters' professional network, which is at the end of the one of the main goals of SLICES-Starting Community.

[7] Research Visit to iMEC GPULab Ghent, Belgium, https://slices-sc.eu/research-visit-to-imec-gpulab-ghent-belgium/ [Last accessed 26 August 2024]

[8] imec welcomes Hungarian open call winner, https://slices-sc.eu/imec-welcomes-hungarian-open-call-winner/ [Last accessed 26 August 2024]

[9] Greetings from Côte d'Azur!, https://slices-sc.eu/greetings-from-cote-dazur-2/ [Last accessed 26 August 2024]

10. Conclusion

SLICES-SC is providing two different types of accesses for the provided Research Infrastructure (RI). The subject of this deliverable is the transnational access type, where we enable users to conduct experiments over the infrastructure, to validate their novel solutions, algorithms and protocols with an experimentally driven approach. Since the transnational access type requires real access to the infrastructures it can raise capacity issues and hence a fair selection of potential users is required. Therefore, we organized two open calls for potential users. The 2nd Open Call was successfully managed, and its results are covered in this deliverable.

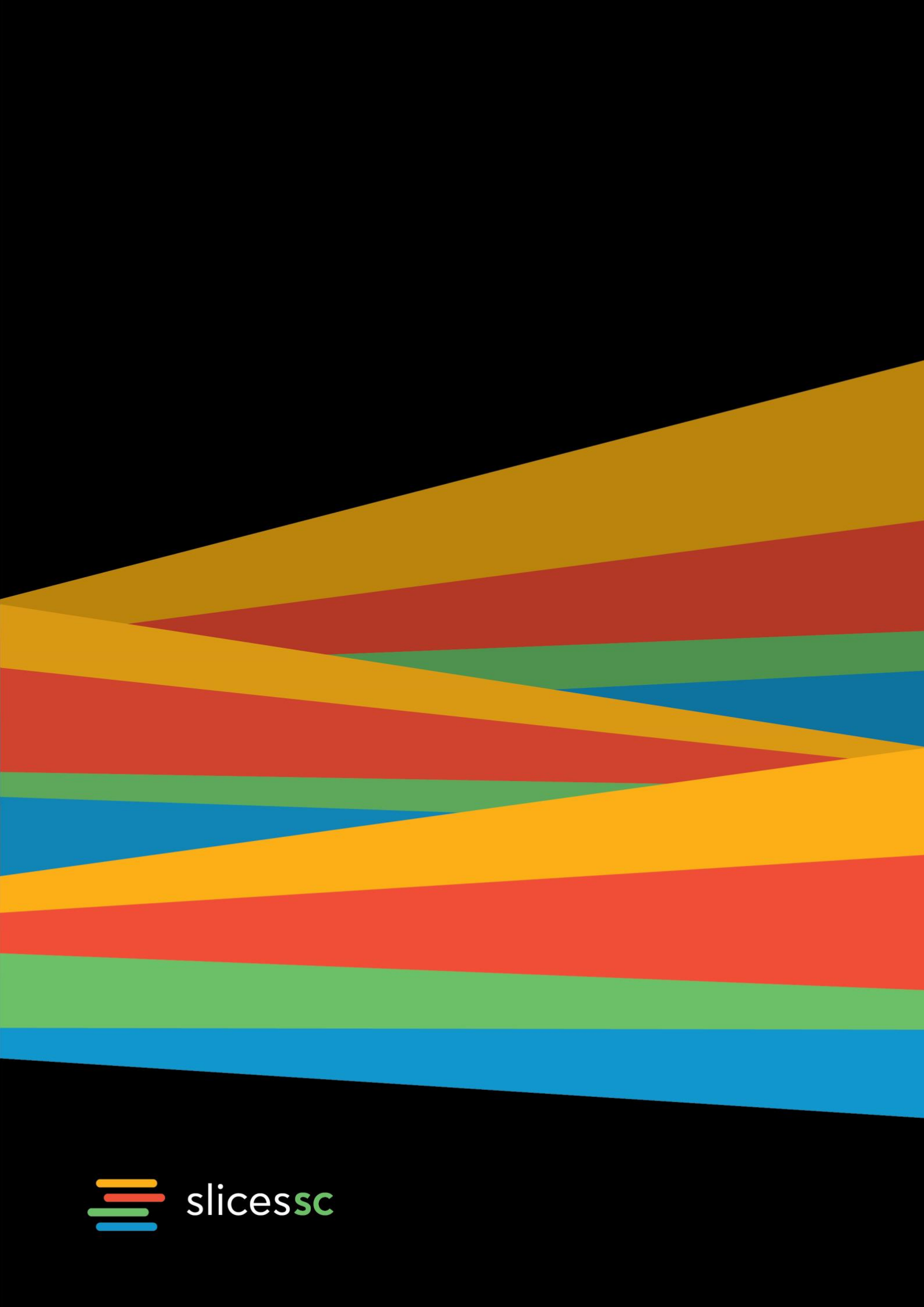
This document reports on the transnational access activities that have taken place during the second period of accesses. The deliverable covers the whole procedure of organizing the open calls including the evaluation process of applications and documents required to assess the applications.

ANNEX – Scientific articles prepared under the open calls' projects

FIRST NAME	LAST NAME	EXPERIMENT TITLE	SCIENTIFIC DISSEMINATION
Zoltán	**JUHÁSZ**	**Massively Parallel EEG Processing on Multi-GPU Systems 1**	Zeyu Wang and Zoltan Juhasz **Analysis of the Effects of Input Parameter Settings on the Quality of Electrophysiological Signal Decomposition in Empirical Mode Decomposition**, In: Bari, Ferenc; Rárosi, Ferenc; Szűcs, Mónika (szerk.) Az egészségügyi informatika COVID előtt és COVID után - A XXXV. Neumann Kollokvium konferencia kiadványa, Szeged, Magyarország: Neumann János Számítógép-tudományi Társaság (2022) pp. 90-98., 9 p.3.9)
Eszter Zoé	**TÖRÖK BAUMGARTNER**	**The CAP Babel Machine Project 1**	Mate, A., Sebők, M., Wordliczek, L., Stolicki, D., & Feldmann, Á. (2023). **Machine Translation as an Underrated Ingredient? Solving Classification Tasks with Large Language Models for Comparative Research.** Computational Communication Research, 5(2), 1–34. https://doi.org/10.5117/CCR2023.2.6.MATE
Zoltán	**JUHÁSZ**	**Large-scale EEG Workflow Execution on Multi-GPU Systems LEWE-GPU 2**	Zeyu Wang and Zoltan Juhasz **Massively parallel EEG algorithms for pre-exascale architectures,** in Proc. Euro-Par 2023, PhD Symposium, Cyprus, in press Zeyu Wang and Zoltan Juhasz **Extracting Neural Oscillations in Multi-channel EEG: Multivariate Empirical Mode Decomposition vs Digital Filtering** 7th Hungarian Neuroscience Doctoral Conference for Undergraduate Students, Graduate Students and Junior Post-Docs (HunDoc), poster, Pecs, 24 January 2024 Zeyu Wang, Zoltan Juhasz **Implementation strategies for EEG processing on multi-GPU computing systems** XXXVI. Neumann Kollokvium, Pannon Egyetem, Veszprém, 2023. december 1-2., ISBN 978-963-396-272-5, pp 81-89. Wang Z, Juhasz Z. **GPU Implementation of the Improved CEEMDAN Algorithm for Fast and Efficient EEG Time–Frequency Analysis** Sensors. 2023; 23(20):8654. https://doi.org/10.3390/s23208654 (SJR Q1/Q2, IF: 3.9) Z Wang and Z Juhasz **Efficient GPU Implementation of the Multivariate Empirical Mode Decomposition Algorithm** Journal of Computational Science, 2023, 102180, https://doi.org/10.1016/j.jocs.2023.102180 (SJR Q1, IF: 3.3)
Zoé	**BAUMGARTNER**	**The CAP Babel Machine Project 2**	Mate, A., Sebők, M., Wordliczek, L., Stolicki, D., & Feldmann, Á. (2023) **Machine Translation as an Underrated Ingredient? Solving Classification Tasks with Large Language Models for Comparative Research** Computational Communication Research, 5(2), 1–34. https://doi.org/10.5117/CCR2023.2.6.MATE

			Sebők, M., Máté, Á., & Cavari, A. (2024) **Staying on the Democratic Script? A Deep Learning Analysis of the Speechmaking of U.S. Presidents** POLICY STUDIES JOURNAL p. 1 https://doi.org/10.1111/psj.12534 Sebők, M., Máté, Á., Ring, O., Kovács, V., & Lehoczki, R. (manuscript; 2024) **More Data, More Problems? The Co-variates of Multilingual Machine Coding Performance for Agendas, Manifesto and Sentiment Classification**. Sebők, M., Máté, Á., Ring, O., Kovács, V., & Lehoczki, R. (under review; 2024) **Leveraging Large Language Models for Comparative Social Research: The Babel Approach to Automated Policy Topic Classification** Sebők, M., Máté, Á., Ring, O., Kovács, V., & Lehoczki, R. (manuscript; 2024) **The Effect of Domain- and Category-level Data on Multiclass Classification Performance: Experiments with the CAP Babel Machine**. Sebők, M., Kovács, V., Bánóczy, M., Neptune, N., Eriksen, D., & Roussille, P. (manuscript; 2024) **Evaluating the Longformer for the CAP classification task: The impact of input text length on classification results** Sebők, M., Kis György, M., Ring, O., & Dinnyés, Á. (under review; 2024) **The geopolitics of vaccine media representation in Hungary – A deep learning analysis**. Sebők, M., Pakot, L., Ring, O., Molnár, C., Holányi, Á., & Üveges, I. (manuscript; 2024) **Drifting towards the East? An AI-supported analysis of the sentiment of Central-Eastern European parliaments towards great powers** Sebők, M., Máté, Á., Ring, O., & Kovács, V. (manuscript; 2024) **Using Multilingual Large Language Models for Large Scale Classification of Manifestos** Ring, O., & Üveges, I. (manuscript; 2024) **Aspect-based emotion analysis of Hungarian parliamentary speeches** Sebők, M., Máté, Á., Ring, O., Kovács, V., & Lehoczki, R. (2024) **Leveraging Open Large Language Models for Multilingual Policy Topic Classification: The Babel Machine Approach** *Social Science Computer Review p.1* DOI: https://doi.org/10.1177/08944393241259434 Conferences: **COMPTEXT 2023** (May 12-13 2023): Ákos Máté – Miklós Sebők – Ádám Feldmann: The last frontier for automated classification in comparative politics? Using multilanguage large language models **MILAB professional day** (June 15, 2023): Orsolya Ring - Viktor Kovács: The last frontier for automated classification in comparative politics? A blueprint for leveraging large language models in practical research **15th Annual CAP Conference** (June 26-27, 2023): Miklós Sebők: Introducing the CAP BABEL MACHINE: A state-of-the-art AI solution for automated CAP coding

			2023 ECPR General Conference (September 4-8, 2023): Máté Ákos: Introducing the CAP BABEL MACHINE: A state-of-the-art AI solution for automated coding of policy agendas **Manifesto Project User Conference 2023** (November 27-28, 2023): Ákos Máté: Using Multilingual Large Language Models for Large Scale Classification of Manifestos **MSZNY2024** (January 26, 2024): Sebők Miklós: Nagy nyelvi modellek az összehasonlító politikatudományban: Közpolitikai témák klasszifikációja a Babel-rendszerrel **EDMO SCIENTIFIC CONFERENCE 2024 ON DISINFORMATION** (February 27, 2024) Orsolya Ring: Uncovering disinformation: analyzing the thematic patterns and emotional content of Hungarian fake news portals during the COVID-19 pandemic and the Ukrainian war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