THE PATH TOWARDS POOLING THE EUROPEAN UNIVERSITY ALLIANCE RESEARCH INFRASTRUCTURE

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ABSTRACT

This article uncovers opportunities and strategies on how to implement common measures allowing to boost academic excellence synergising access to digital research infrastructure and resources, to understand the current state of knowledge and identify gaps, contradictions and emerging trends, a conceptual framework that outlines the key theoretical constructs. Closed and open-question surveys were used to identify the path of pooling digital research infrastructure resources on the input of all partners in the consortium of the European Universities Alliance. The article is based on survey responses from nine universities across nine countries. The Alliance's partner universities have decided to collaborate by sharing physical and virtual resources, infrastructure and best practices. The article focuses on identifying university infrastructure, finding synergies between digital infrastructures, and exploring possibilities for sharing physical and virtual infrastructure. It highlights how the Alliance prioritises collaboration between partner universities and improves the overall entity by creating synergies of digital infrastructure. The conclusion suggests that the European Union's financial support for physical and digital infrastructure, as part of the R&I agenda, would help alliances deepen connections and collaboration with partners and stakeholders.

KEY WORDS: *digital infrastructure, research, alliance, synergies*.

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Introduction

Research infrastructures are understood as facilities that provide resources and services for researchers, innovators and similar focused communities, to conduct research and (or) foster innovation. It plays a key role in technological development supporting science and innovation. They can be single-sited, distributed, or virtual. The European Commission states that it includes major scientific equipment, sets of instrument collections, scientific data computing systems and other infrastructure of a unique nature. The most important thing is that the EC wants to make it open and accessible to all researchers and external users in Europe and beyond (Mikkonen, 2022).

The research problem: How to implement common measures allowing to boost academic excellence with access to digital research infrastructure and resources.

In June 2019, the European Commission started the European Universities Alliance project with 17 newly established alliances involving 114 higher education institutions from 24 member states. In 2023, there were 44 European University alliances established and supported by the European Commission. These alliances are still project-oriented, as Erasmus+ and Horizon's (2020) project financing tools support their main joint activities. Alliances are ready for various collaboration opportunities with partners, including sharing scientific resources and physical and digital infrastructure, and aligning with FAIR (Wilkinson, 2016) principles (Findable Accessible Interoperable Reusable).

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Research object: the pooling of the European Universities Alliance digital research infrastructure.

The research aims to find out how to implement common measures allowing to boost academic excellence with access to digital research infrastructure and resources. To reach this target, there was a need to investigate and analyse the synergies and advantages resulting from collaborative efforts in digital infrastructure in the context of the European Universities Alliance.

The aim of finding ways to share and/or synergise universities' infrastructure is to get closer to the EC goal to make it open and accessible to all, which also responds to sustainability needs and the free circulation of science and innovations. Anderson (2013) took a beautiful definition of infrastructure from the *American Heritage Dictionary*, saying that it is 'the basis facilities, services and installations needed for the functioning of a community or society' (Anderson, 2013). Sharing scientific resources could take the concept of open science to the next level (European Research Infrastructures, 2018). However, Open Science terminology does not include sharing physical and digital infrastructure. This is the next step for Open Science for future generations. These days, we can say that Open Science is about sharing scientific resources (research data) through physical and digital infrastructure (servers, clouds, computing systems, etc) (Mikkonen, 2022) (OpenAIRE | EOSC Association). Research infrastructure is something different, expensive and mainly dependent on the place where it is, so the sharing is paid and needs mobility. To achieve the purpose of this research, we need to uncover the path of pooling research infrastructure and resources. For this reason, one European University Alliance case study was made.

This article shows the path of identification of physical/digital infrastructure and the synergy of some digital infrastructures for researchers, innovators and stakeholders from nine universities from one European University Alliance. A study of research literature helped to fit the survey results into managerial language.

Research methods: A comprehensive review and synthesis of existing literature on the topic to understand the current state of knowledge and identify gaps, contradictions and emerging trends; constructing a conceptual framework that outlines the key theoretical constructs and their interrelationships, helping to guide the analysis and understanding of the research object; an open question survey to identify potential key informants or participants who can provide deeper insights into the theoretical aspects of the research.

This article was prepared by paying attention to these research integrity and ethical principles:

- Honesty in all research aspects.
- Accountability in the conduct of research.
- Professional courtesy and fairness in working with others.
- Good stewardship of research on behalf of others.

The research information, including survey results, is stored in the Alliance.

Methodology. In writing this article, as a researcher I was guided by principles of reliability, confidentiality, honesty, respect and accountability. The article is essentially about one study based on the results of several surveys. Different participants took part in the polls, depending on the result. Researchers, professors, associate professors or people responsible for the R&D department participated in one survey, while only experts in a specific field were used for another survey. In the latter case, the group of experts provided an individual answer for each university. The same model was used for the bilateral meetings with universities' policymakers for interviews on strategic questions: one response per university. The surveys were carried out sequentially; after each survey the data was analysed and the subsequent research direction was chosen to achieve the best possible research results. To achieve the desired goals, and to reveal a deeper picture of the problems and their solutions, different respondents were chosen for different surveys. While for one survey responders were researchers, professors, associate professors or people responsible for the R&D department, and the results came to almost 100 responses, another survey collected one response per university, no matter how many experts worked with the survey to prepare the answers. The data were collected from only one European University Alliance, so it is reliable and not falsified. Because the research was carried out over about 1.5 to two years, the primary data were used to implement European universities' goals (the joint digital infrastructure created/synergised) and were later stated as a fact, they were not manipulated, but based on

the collected data conclusions, and recommendations were made. Even though the research data was collected by respondents voluntarily providing answers to the surveys when presenting the research results, it was taken into account that the Alliance is made up of nine European universities, so the name of the Alliance is not revealed, thus maintaining high scientific ethical standards and avoiding any conflict of interest.

1. Digital infrastructure in institutions of higher education

One newly established European University Alliance (European Universities Initiative, anonymous), which consists of nine partner higher education institutions (HEI) and many associated partners, decided to find out what actually is the digital infrastructure (European Research Infrastructures, 2018) for those communities. The fact that countries have different histories and levels of development, as well as different general knowledge backgrounds, terminology, experience and visions of what digital infrastructure is, arises as the first issue that managers from higher education institutions should agree with. Agreeing with Zendulková (2022) for the scientific community, but also for the creation of science policy in the European Universities Alliance in this case, it is necessary to have an overview of the research infrastructure that is available in the partner universities (Zendulková et al., 2022). There is a need to know how other countries and institutions describe and interpret the same term, and what digital infrastructure they have or are using in the local community and university.

For the scientific community, as well as for the creation of a transnational science policy, it is necessary to have an overview of the research infrastructure that is available.

The internal European Universities (EU) Alliance research regarding physical and digital infrastructure and possible synergies was done in the period 2021 to 2023. During this period, each university delegated at least one person to create a group working towards research infrastructure and resource questions. This working group, which consists of 17 permanent people, did huge primary work in finding possible directions and prospects for gathering information, and then ways of using it to benefit being a part of the Alliance.

Several closed-question surveys were established to separately collect information about:

- scientific resources, and
- physical and digital infrastructure.
- First of all, a questionnaire was created that aimed to collect information regarding:
- academic research databases accessed by each member of the consortium (Scopus, Web of Science, Springer, etc);
- alternative databases needed by each partner;
- existing subscriptions of the partners and sources of funding that are currently used;
- ways to purchase common access/share access to different databases, etc.

This survey contained 39 questions about the researcher's habits in using scientific material (on a daily basis or less), the type of material (print/online), subscriptions and access mode (e.g. open access), and the possibility of using institutional subscriptions to scientific journals, databases and similar. A total of 94 responses were received and analysed in this survey. Most of the respondents were researchers, professors, associate professors, or people responsible for the R&D department.

The main result of this survey was the identification of the need for scientific database access. The consortium working group accepted these results as a reason to develop a common strategy to maximise the access of each member consortium to scientific resources. The working group analysed the results, and identified the opportunity to create a journal with a relevant topic for the consortium.

The first survey results showed Alliance researchers' needs, but not the possibilities or tools to do so. The working group decided to go to the second round, and for that purpose, they created a second survey for the identification of possible tools already existing in Alliance institutions

As described above, after the analysis of the previous survey, a second important survey was created for mapping research facilities, resources and services in the universities of the Alliance. This survey contained

questions about the name and description of the infrastructure, service or other research items; dependence on the Research Unit or Research Team; availability; accreditation (if it has or not, or maybe in progress); relevance to one of the joint research institutes established within the Alliance (Life Sciences and Biotechnology Institute, Environmental Sciences and Biodiversity Institute, Coastal Engineering Institute, Social, Culture and Human Sciences Institute); category of access (e.g. physical access for external users available, sample processing only, or no physical access for external users; and questions about the possibility to use it remotely (e.g. for e-infrastructure). The survey also contained questions regarding who might be the users of a particular service or infrastructure (researchers, students, business representatives, and others). The survey also asked about access fees (free, free conditionally, paid, no access available, other). This questionnaire targeted only those people responsible for infrastructure, and requested only one answer per university. Each university delegated the most competitive experts to answer the survey. The survey aimed to receive only one response per university, so the experts in each university worked together to gather the information required by the survey to present a unanimous answer. For this reason, nine responses about currently existing physical and digital infrastructure in nine higher education institutions were received and analysed. By analysing this survey, an attempt was made to identify the needs and possibilities of synergies of digital infrastructure in each university.

The survey result showed that the universities of the Alliance have a complex ensemble of hardware, software, data, digital policies and training. After filtering the answers, some components of Digital Infrastructure were emphasised and presented below:

Hardware (Urrutia, 2023)

- Data centres, servers, connection devices, optical fibre networks, and Internet hubs.
- Storage solutions (on-site, small to large network, cloud).
- High-performance computing.
- IoT (Internet of Things) sensors, microcontrollers, actuators etc.
- Specialised (digitalised) educational and research equipment.
- Software (Urrutia, 2023).
- Databases & data management programs, data-driven decision software.
- Educational software, virtual solutions for education, AI (artificial intelligence) and augmented reality.
- Software for research: commercial and in-house.
- Websites, specialised platforms.
- Cybersecurity solutions: security policies, access policies; threat prevention: antivirus, anti-spyware, vulnerability; global protection: VPN (Virtual Private Network) etc.
- Digital process continuity: back-up and data recovery.

Some of the most interesting digital infrastructure that universities noted is drones (including underwater); a ship simulator with a nautical simulator with screens, controllers and instruments, and an engine room with all the devices in an engine room; a circular jet with a user interface; water-water ejector; Quantum Security Testbed; Satellite Communications Lab.

The team that created the survey took into account John Wood's proposed vision of research infrastructure, but sought different, more concrete results.

Foundational research software infrastructure, such as Matplotlib (MatPlotLib: a 2D Graphics environment, 2007), NumPy (Lang et al., 2019), Pandas (Team, 2023), Machine Learning in R (MLR) (Harris et al., 2020) and similar, is expensive, not all universities can afford to have it, but it is still particularly important for science. Unfortunately, public digital tools (we should take into consideration the fact that many universities are public) are unsustainably funded (Knowles et al., 2021). That is why European University alliances are trying to find synergies in digital infrastructures: to find opportunities and possibilities to spread science, to make it accessible at least at the Alliance level.

2. Identification of synergies of digital infrastructure

The collection of information from the surveys about digital infrastructure in partner universities in the Alliance leads to the second step, the detection of possible sharing of the infrastructure and/or creating of synergies (Synergy Definition & Meaning, 2020) of current and future digital infrastructures underpinning open science (Mikkonen et al., 2022).

For this task, interview questions to responders were open-ended, and targeted institutional policymakers. The first task was to define the key actors that handle information about digital infrastructure. For gathering strategic and/or visioner information, the respondents were, for example, vice-rectors for research and innovation, or university senators responsible for strategic observations and decisions regarding institutional research infrastructures, together with managers of IT department(s). The same model as for the second survey was taken: only one response per university was accepted.

To develop a common vision for the Alliance, it was necessary to find out the universities' philosophy and strategy to establish a common goal. This was made by bi-lateral 30-minute discussions to understand the particular digital infrastructure and its particular organization. Three general topics about physical/digital infrastructure were touched on during this interview, and then the same question was asked, to be answered in writing:

- The university's vision (individual and collaborative).
- The university's contribution to the Alliance (current and possible) (sharing).
- A wish-list for the university and the Alliance (intention to synergy).

The respondents talked about having an Alliance policy of using each other's infrastructure. Others wanted to have a joint database for each researcher, research infrastructure and laboratory. Some limited themselves to the wish to have a free access database of all universities' scientific data. We will not talk in this article about the too futuristic approach from some respondents.

By using information from previous surveys, and also adding new information from interviews, these mapping targets were defined:

- Hardware (servers, networks, storage solutions, HPC, IoT sensors, etc).
- Data.
- Software (commercial/in-house, available/non-available, etc).
- Digital Libraries.
- Policies (access, cybersecurity, etc).
- EDUROAM.
- Training.

The working group found that some universities have already discovered digital infrastructure synergies with other communities and universities outside the Alliance. Some of those synergies are influenced by territory, some are influenced by national/government orientation and support, or they are limited to particular association members.

Another thing that was uncovered is that some of the digital tools, such as computing architecture, are end-of-life, and some others are too small, or too inconvenient to be offered for sharing or synergising. Also, some digital infrastructures encountered language, political or legal barriers, or even universities' established practices that created an obstacle to sharing or synergising them. However, some universities were open and courageous about the idea of sharing almost all their digital infrastructure, and suggested their good practices for doing it.

To the question of what digital infrastructure universities want to share with the Alliance by creating (or not) synergies of digital infrastructure, the respondents' vision was various. For example:

- to have joint digital resources via an electronic library system by sharing resources;
- to create an easy way for students and staff to collaborate and participate in activities or studies;

- to offer each other software services;
- to create a common database (or information search and sharing) platform for projects (and current scientific initiatives);
- a common information portal/directory of exceptional infrastructure (not only digital but physical as well);
- to connect HUBs already created in universities to a common platform, so that members of the Alliance community can find access to HUBs that meet their interests and are curated by the universities of the Alliance;
- the interconnection of data management platforms with data transfer procedures;
- the investigation of common access possibilities to scientific literature;
- open data/metadata procedures between partners (for example, for the creation and use of monitoring and measurement databases), and the standardisation of data/metadata;
- the development of remote research (Zendulková et al., 2022).

Concerning their university's vision for future digital infrastructures in the Alliance, respondents would suggest the following priorities (not in any specific order):

- ensure the smooth integration of the Alliance's Student Information Systems (Hodapp, Hanelt, 2022);
- work towards a common research information system to allow research administration and collaboration in the Alliance, adhering to international standards;
- catalogue digital facilities that are available within the Alliance and describe the processes for access by partner academics and develop a common policy for open access;
- create a consortium for digital assets of libraries.

However, there were also proposals to share more exotic infrastructure, such as:

- a newly established efficient system for setting up virtual computer laboratories;
- a backbone for a high-speed network, a data-centre, computing mesocentre for high-performance computing, which is now under development in the collaboration between national government and the local region.

Unfortunately, the possibility of synergizing this type of infrastructure is very low because of political, legal and territorial reasons.

Nevertheless, universities made a list of physical and digital infrastructure that could be shared with researchers from the Alliance. Also, it was found that some of the research infrastructure could be shared with stakeholders too. Sharing resources will bring lower costs for the Alliance community, and will offer the opportunity to reach the ecological impact of multiple purchases and investment in new resources. Given that using research infrastructure needs specific skills, they established training courses for teaching how to use their offered research infrastructure. These resources are accessible in the open-access Research & Innovation Infrastructure System (RIIS).

3. Current synergy of digital infrastructures

Later on, the discussion followed up adopting best decisions on ways to enlarge access to scientific databases, sharing subscriptions and strategies for the co-creation of Open Science via a common Alliance portal and Journal(s) synergy. Also, they decided to promote further open-access science in the consortium, by creating a common Alliance portal that will enable researchers to disseminate their research results widely and quickly, and which will encourage interaction between researchers in the true Open Science spirit.

Digital innovation enables new forms of digital research ecosystems. The realisation of the opportunities arising from such innovation basically depends on the ability of two or more systems to exchange information, and understand that information in particular. If we understand synergy as 'the interaction or

cooperation of two or more organisations to produce a combined effect greater than the sum of their separate effects' (Synergy Definition & Meaning, 2020), we can say that during the three-year period, this Alliance has established these joint digital infrastructures:

- Research Innovation and Information System (RIIS).
- InnovationHUB.
- Gateway in the OpenAIRE platform (Iatropoulou, n.d.).

All these three platforms are freely accessible to researchers, the innovation community, small and medium enterprises (SMEs) and business entities, society, and others.

The Research Innovation and Information System (RIIS) is a large set of databases, which includes a human resources database emphasising researchers, including PhD students and scientific managers, and data on researcher infrastructures, services and digital resources. The system allows reaching and filtering options for the following activities:

- Life Science and Biotechnology.
- Environmental Science and Biodiversity.
- Coastal Engineering.
- Social, Cultural and Human Sciences.

This large-scale system is nurtured by Alliance universities, but it is open to the public to be more effective by connecting researchers for joint projects or with society. Making this system user-friendly required significant financial resources, but the platform was established and launched with the support of the national government (The EU is failing to take full advantage of regional funding for research and innovation, auditors say, n.d.) Before launching this platform, the Alliance prepared a common definition of the Research and Innovation Information System Architecture and Data Management Plan. These two documents were the very first steps in creating the RIIS. With this vision, they started creating a meta-data structure, collecting and/or extracting human resource (HR) data, mapping research facilities, equipment, resources and services, as well as creating policy documents, general principles for access providing research infrastructure to users, and selecting institutional system managers, etc.

The second infrastructure, an innovation showcase, is a website where information and services related to innovation and commercialisation are provided for all types of stakeholders. It is a virtual platform that facilitates communication between the economic environment and the research field, like a social space, where investors, entrepreneurs and researchers can identify opportunities and initiate new ideas. It is made as a solution for real-time interaction between different players within the innovation ecosystem. This platform is understood as a 'one-stop shop' for business representatives looking for ready-made innovative products, and a partnering tool for the industry searching for partners (Mursalov et al., 2023).

The third, gateway in OpenAIRE, is mostly based on sharing scientific resources such as publications, research data, projects, research software, and other research products, as well as projects and data sources. OpenAIRE is a non-profit partnership established in 2018. It is the main EU e-infrastructure for establishing, maintaining and operating an open and sustainable R&I communication infrastructure. It provides the necessary services, resources and networks to support the EU research environment. The partnership opened the gateway to an invaluable opportunity to delve into extensive research outputs for researchers and the wider scientific community and research ecosystem. This heightened visibility of the Alliance and each university generates tangible benefits for all stakeholders involved, facilitating seamless knowledge sharing, and amplifying the overall impact of research endeavours.

These platforms enable public and intra-alliance access to information, increase exchanges, enable cooperation and co-creation, and build inter-partner projects. Research infrastructure promotes open access to human capital, a shared infrastructure, innovations, scientific resources and services provided by the Alliance research infrastructure, for all users to conduct scientific experiments, use state-of-the-art research instruments and equipment, and benefit from the technical services, expert support and training, or access

specific services within the limits of the facilities' capacities. The RIIS and the Innovation showcase have implemented a mechanism for users' feedback to regularly collect information from users on the range and quality of the research infrastructure service to properly tailor them according to evolving user needs, based on an overview of general legislative documents presuming that joint Alliance research infrastructure complies with European and national legislation as applicable regarding the protection of personal data and privacy, environmental science data.

That is why they additionally invested in the dissemination of these tools to reach and inform the local Alliance community, and also to reach stakeholders. As these three digital infrastructure tools were launched in 2023, it takes time to describe their effectiveness and usefulness, although there is a lot of hope.

4. Future targets

Currently in the developing stage are:

- Online Open Access Journal. The Alliance is near the finishing line to launch their first popularised open-access journal on smart/coastal/urban/sustainable topics available to researchers, students, stakeholders and the general public. They gathered relevant articles by partner institution researchers which have already been published. The journal will be published online, not using the earth's resources, and will use the English language. This journal has an epi-journal or overlay journal model, by re-using papers already published in an open archive, which means there are no copyright issues. Quality control is ensured by publishing the workflow for a peer-reviewed journal.
- Virtual Library. This tool created for educational resources will include digital educational resources, such as interactive online courses, open archives, research data services, etc, for teaching staff and students.
- Smart Campus will be a virtual pedagogical and administrative environment to help the students, teaching and administrative staff of each partner institution of the Alliance share information and work together. The main objective of this digital tool is to provide a common digital solution to meet the intrinsic needs of the Alliance, and in the long run, to have all partners' information systems interconnected, to facilitate communication between all services.

As we can see, the Alliance chose to prioritise establishing a joint infrastructure for the research and innovation community, rather than educational. It shows the importance of supporting researchers and innovators in European institutions of higher education to foster excellence at a national and European level. Generally, the research and innovation area is less financed than education, because of the wrong understanding that all innovations become start-ups, and all researchers work in the private sector to explore their professional research curiosity. But the reality shows that innovators have no entrepreneurial skills, and researchers are inspired by environmental issues that do not always go along with the goals of private corporation and supporting spheres.

5. Preferable synergies in the future

After synthesising the survey results, the future (possible) synergy of the digital infrastructure of the Alliance are the following:

- The development of an Alliance open science platform which includes:
  - A common database for research project proposals;
  - The standardization of data/metadata;
  - An open database on measurement data/research data/research software.
- Access to cloud and HPC (high-performance computing).
- Sharing software services.
- Common tools.

- The interconnection of hardware/software infrastructure in the Alliance.
- The interconnection of hardware/software infrastructure with other alliances.
- Remote research.

One or more of these digital infrastructures could be based on Artificial Intelligence tools (Rios-Campos et al., 2023). The best example from these days and the near future is AI used in research, which in general helps/could help us to summarise and analyse huge amounts of data, and to do it for many expected outcomes (Williams et al., 2023). The questions you ask AI, and the data you give to AI, have some risks and bias. The result might be different from the formulation of the question or evaluating data, which is influenced by human nature and which might affect the result. It takes time to practise using AI (Anthes, 2017). Doing this internationally and interdisciplinary could lead to research excellence.

Conclusion and recommendations

All these noticeable results described in the article were influenced by three-step research consisting of two surveys and one open question interview. With this case study, it was identified that the main difference between scientific resources and the research infrastructure is tangibility. The first survey showed that scientific resources are intangible, narrowly understandable resources, such as articles and research data. The second survey was about mapping research facilities, resources and services among members of the Alliance. The result showed that the research infrastructure is rich in various devices, appliances and apparatus, as well as non-tangible and virtual infrastructure. The third step in this research offered two options: the possibility of sharing infrastructure, and the possibility of synergising infrastructures. It showed that there is a need to share them, no matter how: by synergising them, or by offering access to exclusive and unique infrastructure by saving money and making research more accessible. This case study gives us an example of the whole path in the creation of three different infrastructures in the HEI Alliance. One, for HR (researchers, in particular) database synergisation. The second is for showcasing innovations. The third for sharing scientific resources (emphasising scientific articles). As these synergy-based infrastructures are freshly launched, all the benefits and sustainability will be revealed in the future. From the perspective of these days, it should be very successful.

In addition to the benefits mentioned in the article, it is worth noting that sharing digital infrastructure can also lead to cost savings for universities. By pooling resources and utilising existing infrastructure, universities can avoid the need to invest in expensive new technologies or equipment. This can be particularly beneficial for smaller universities with limited budgets. Furthermore, sharing infrastructure can also promote innovation and collaboration, as researchers from different institutions can work together more easily on joint projects. Overall, it is clear that investing in digital infrastructure and promoting collaboration between universities is a key priority for advancing Open Science, and research in general.

It is also important to organise courses in learning to work with infrastructure that another partner university is offering, including paid learning for paid or free access infrastructure. Indeed, it is necessary to offer members of the Alliance at least cheaper access to the infrastructure than market prices. This would join Alliance members faster than fictitious collaboration on infrastructure.

Moreover, not all researchers are aware of free digital platforms that may help to boost their research, as well as learning to work with open access platforms, funding and tender portals, and other physical and digital infrastructure for improving research.

During the period when alliances were established, the European Union constantly communicated with the alliances. They find symbiosis in this dialogue, as alliances consist of higher education institutions that are the main actors for European Research Area (ERA) consumption, so they can give recommendations by directing the EC in this pathway. Conferences and forums, ERA policy briefs, HUB fiche and many other instruments are used for conversations between these entities. If this communication was based on hearing (and not only listening to) each other's wishes and possibilities, the parties would synchronise their actions, and

harmoniously expand the Research and Innovation (R&I) agenda of the European Union in the field of digital infrastructure. In the meantime, as this case study showed, European University alliances have a great vision of the future synergies of digital infrastructure, and they are already creating and using them successfully. The recommendation would be to look for the creation of more efficient infrastructure, to bring more benefits to Europe by creating it at the whole European level, and not only in each Alliance separately. Extending the dialogue between the EC and European University alliances in this direction would be the first step.

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TYRIMŲ INFRASTRUKTŪROS SUSIEJIMO GALIMYBĖ EUROPOS UNIVERSITETŲ ALJANSE

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Santrauka

Nuo 2019 metų birželio Europos Komisija inicijuoja aukštųjų mokyklų aljansų kūrimąsi. Ji skiria tam atitinkamą biudžetą, kurį kviečia naudoti per projektinę veiklą, taip nurodydama aljansų veiklos kryptį ir užduodama plėtros toną. Greta šios iniciatyvos, Europos Komisija atskirai kuria savo atvirojo mokslo politiką, investuodama į atvirąjį mokslą Europoje vienijančią infrastruktūrą. Jos pavyzdžiu seka daugelis įsikūrusių ir besikuriančių Europos universitetų aljansų, siekdami sukurti savo atvirojo mokslo infrastruktūras, dalijimosi politiką ar priimti Europos Komisijos iniciatyvas.

Išnagrinėję vieno iš aljansų pionierių atvejo analizę, matome, kad įvairūs universitetai mokslo infrastruktūrą, įskaitant ir virtualią, supranta skirtingai, atsižvelgdami į kiekvieno jų turimą infrastruktūrą ir kylančius iššūkius. Analizė atskleidė didžiulę turimos mokslo infrastruktūros įgalinimo įvairovę. Dalis šios infrastruktūros gali būti ir buvo sinergizuota, dalimi gali naudotis aljanso mokslininkai. Straipsnyje atskleidžiama, kad aljansas savo prioritetus teikė skaitmeninei mokslo infrastruktūrai sinergizuoti:

1. Mokslinių tyrimų ir inovacijų informacinė sistema (RIIS) – tai duomenų bazė, apimanti aljanso mokslininkų (įskaitant ir doktorantus) dosjė bei kontaktinę informaciją, universitetuose naudojamą infrastruktūrą, teikiamas paslaugas ir skaitmeninius išteklius. Tai vartotojui patogi sistema, turinti patogias temines filtravimo opcijas. Aljansas nusprendė šią platformą atverti visiems vartotojams, siekiant kuo didesnio jos našumo.
2. Inovacijų demonstracinė platforma (*Innovation showcase*). Šis tinklalapis yra tarsi aljanso mokslininkų sukurtų inovacijų vitrina, kurioje populiariai verslui bei visuomenei pateikiama informacija apie sukurtas inovacijas ar inovatyvias idėjas. Be to, pateikiamas sąrašas paslaugų, orientuotų į inovatyvių sprendimų paieškas klientus dominančiose srityse.
3. Prisijungimas prie atvirojo mokslo platformos OpenAIRE. Tai Europos Komisijos inicijuota atvirojo mokslo infrastruktūra, kur viešai perpublikuojami moksliniai straipsniai ir kita mokslinė informacija iš kitų duomenų bazių.

Visos šios skaitmeninės infrastruktūros atliepia atvirojo mokslo principus ir eina išvien su Europos atvirojo mokslo politika. Tuo tarpu studijų infrastruktūros sinergijos kūrimas nukeltas į kitą etapą. Tai parodo mokslo ir inovacijų finansavimo būtinybę, edukacinių skaitmeninių infrastruktūrų kūrimo viršenybę. Sinerginių infrastruktūrų kūrimas numatytas kitam plėtros etapui, netolimoje ateityje sukuriant virtualią biblio-

teką, išmanųjį miestelį (angl. *smart campus*) bei elektroninį atviros prieigos žurnalą perpublikuojamiems, plačiajai visuomenei pritaikytiems straipsniams.

Įdomu tai, kad universitetai leido sau postuluoti apie virtualios infrastruktūros ateities sinergijas, kurios atrodo visiškai realios ir reikalingos. Universitetai norėtų turėti virtualią platformą nuotoliniams tyrimams, be to, atrasti būdų, kaip sujungti techninės / programinės įrangos infrastruktūrą tiek aljanso, tiek visos Europos lygmenimis. Universitetai pageidautų prijungti prieitį prie debesijos saugyklų ir didelio našumo kompiuterijos (angl. HPC – *high performance computing*). Turbūt viena aktualiausių šiandien pasiūlytų infrastruktūros sinergijų yra vadinamoji atvirojo mokslo platforma, kurią aljansas supranta kaip bendros mokslinių projektinių pasiūlymų duomenų bazės, duomenų ir metaduomenų standartizavimo bei atviros prieigos prie matavimų ir kitų mokslinių tyrimų duomenų bei specifinės tyrimų programinės įrangos visumą. Ši platforma sutelktų skirtingų sričių mokslininkus bendrai projektinei paraiškai, kartu leistų bendrai vykdyti mokslą virtualioje standartizuotoje platformoje. Šiam tikslui universitetų išteklių lyg ir nepakanka, todėl manoma, kad Europos Komisijos prisidėjimas yra būtinas. Juolab kad tiek atvirojo mokslo vizija, tiek tvarumo idėja yra bendros mokslo infrastruktūros kūrimo realija.

PAGRINDINIAI ŽODŽIAI: *skaitmeninė infrastruktūra, mokslas, aljansas, sinergijos.*

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