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Deliverable overview

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Deliverable summary D 3.3 consists of three main sections.

- Overview of work in WP 3, including task 3.2 & task 3.3
- Cooperation & piloting potential within WP 3
- Conclusions and lessons learned

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Report on infrastructural cooperation and piloting potential of Sharing Research Infrastructures and develop research support resources

WP3 addresses research infrastructure (RI) as technical and physical research infrastructure facilities (e.g., core facilities and instruments, databases, digital libraries) as well as research infrastructure technical support staff, and the centralised research support units, including advisory and administrative services in research support at all stages and levels.

As stated in the Protocol, submitted as Deliverable 3.1, objectives of the WP include developing a strategy towards sharing resources and infrastructures, and search for promising models for sharing infrastructures across research groups, with business and students.

In Task 3.2, a mapping analysis of the partner universities and their research infrastructure (e.g., core facilities and instruments, databases, digital libraries) was performed, in order to identify best practices for management and potential for sharing and scaling infrastructure investments. The comprehensive and up-to-date mapping of the existing and planned research infrastructures across the alliance provided a basis for comparison of RI.

Additional possibilities for international infrastructure collaborations, cross-University coordination of research infrastructure investments, sharing of experts, and expertise on research support and management, as well as shared experience on management of cost and centralised usage of technical infrastructure were identified as further goals. Potentials for piloting new models for enhancing the value of research infrastructure through collaboration inside, across and outside of universities within the Alliance were analysed.¹

In addition, possibilities for joint utilisation of core facilities and other research infrastructure in order to facilitate and initiate proposals for joint research projects across partner universities were explored, thus setting a future objective to the European Universities Alliances in research cooperation.

In Task 3.3, cross-over learning innovation and piloting transformative actions was carried out, based on the results, and on positive and negative lessons learned from Task 3.2. A set of online and physical meetings and workshops was implemented to share the analyses and ideas for new innovative approaches to shared technical infrastructure, as well and support services (on-site and in central research support units) e.g., through knowledge transfer, and by re-combining ideas and approaches into new variants.

Consultations with selected stakeholders across the partner countries to gather further inspiration for innovative new and transformative actions on how to share research infrastructures were part of Task 3. Examples of potential stakeholder inclusion concerned core facility management systems, such as operational software for allocation of equipment, research management solutions (e.g., support by experienced staff), collaboration platforms

¹ Acronyms of the partner universities used in this document:

CU - Charles University Prague

UM - University of Milan

HU - Heidelberg University

UCPH - University of Copenhagen

UW - University of Warsaw

SU - Sorbonne University



and research coordination offices (fundamental service). Based on this assessment, best practice benchmarks and a set of innovations and learning-driven transformations suitable for upscaling across the alliance were identified, demonstrating potential for exploitation by other European universities.

1. Results of the mapping analysis in Task 3.2

The TRAIN4EU+ mapping exercise highlighted the anticipated distribution of research infrastructure facilities between scientific domains with Life Sciences as the domain with the majority of registered Core Facilities at most Universities. Differences were displayed with regard to centralised and decentralised management systems with University of Milan displaying the best practice with the UNITECH facilities in terms of centralised management of Core Facilities. In the domain of Natural Sciences some Core Facilities could also be mapped, however these tend to be less organised than Core Facilities in Life Sciences. Some cases mixed scientific domain (Life + Nat. Sc.), displayed at the University of Warsaw.

A positive conclusion of the mapping was the relatively large number of facilities, classified as Research Facilities (RF) by TRAIN4EU parameters in the domains Social Sciences and Humanities, since these domains usually fall short when research infrastructure at European Universities is illustrated. Here especially facilities characterised as those dealing with digitalisation in different fields of humanities (and to some extent in social sciences), or Digital Humanities could be found at most portrayed Universities. Additionally, some interdisciplinary research facilities were mapped out, as well as research support offices at two universities, displaying vast similarities in research support activities.

As centralised and decentralised management emerged as the focal point in the administration of research infrastructure, the assessment of best practice at the University of Milan was the next step towards optimising the management of research infrastructure facilities at all Alliance universities. As the mapping showed, only few research infrastructures are administratively hosted at the central level or at faculty level at most universities. The majority are located in a decentralised manner within different departments. One of the main benefits with regard to this model is closeness (physical, organizational and mental) to the relevant scientists and (domain specific) scientific community, who are the actual and potential users of the equipment.

A disadvantage of the decentralised model is potential lack of visibility and lack of focus of cross cutting issues, as well as key objectives to European Infrastructures. These include avoidance of duplication and fragmentation of research infrastructure, better coordination of development and usage of RI, as well as often neglected issues such as training and career development of the specialized staff who are running the scientific equipment.

However, while the management and encouragement of research is a prime determinant of organisational structures in all six Alliance universities, there is no „single model“. The key point from all the universities is that ongoing uncertainty from unidentified and unresolved managerial issues lead to research inefficiency.

Other challenges emerging from the mapping analysis were linked to topics such as funding, especially issues regarding operational costs, core funding, staff funded by host institutions,



national institutions (ministries), external funders and/or user fees and the need the facilities often face to constantly balance economical existence and scientific relevance in the research network of a university. Staff issues were particularly addressed by all facilities and institutions, since the problematic of sustainable employment for “scientific technical experts” – as they were called during the implementation of Task 3.3 and will be addressed further – appears to be omnipresent. The working group thus included these issues in a working paper, which will be presented in the following report.

2. Decision making and meeting structure of Task 3.3

For delivering the potential for collaboration and pilot actions, the participants of WP 3 held several meetings during the period from August 2022 until November 2023.

The work on Task 3.3 started in August 2022, when the participants met to discuss the first steps towards a piloting potential in the WP. In October, the WP leader presented the results from the review process, initiated by the European Commission on 9 September 2022, where all WPs were represented. WP3 received a positive review, alongside some recommendations. Specifically, a strategy for development of the topics of WP3 was requested by the reviewers, as well as enhanced industrial collaboration.

Subsequent focus of the WP was laid on a physical meeting planned during Task 3.3, in order to assess the best practice for management of the UNITECH Core facilities at the University of Milan. The final date for the planned meeting in Milan was set to be 23-24 March 2023. Additionally, ideas for further possible pilot actions were discussed. Among others, a workshop for scientific and/or administrative staff of Core Facilities (or other RI facilities), possibly selected by scientific field or a meeting on scientific level between researchers were put forward. Opportunities for enhanced industrial collaboration would also be addressed at such a meeting. However, a networking event of this scope would likely fall short of funding during the TRAIN4EU+ project lifespan.

During the first implementation phase of Task 3.3, the University of Milan put forward the idea of a working paper, in order to highlight the results of the mapping analysis and present to the public the challenges and opportunities of research infrastructure management at European Universities. The idea for writing a working paper received overall approval by the WP participants and work on the paper was set to start in November 2023. WP leader circulated the idea of a working paper as a pilot action in WP 3 at the 4eu+ Annual Meeting 2022 in Copenhagen, where issues concerning WP3 were discussed, and it was positively met by the coordinators at the University of Copenhagen.

The WP discussed possible positions of the working paper: Summary of the work in WP3, discussion about Core Facilities and other RI facilities. Three main points were brought out: 1. RI as physical infrastructures 2. Technicians and staff training 3. Finances of RI facilities. In addition, the issue of shared data and shared experiences were raised, as well as control and validation of data.



Initially, the publication of the paper was intended over the 4EU+ alliance as an online alliance working paper. However, during the physical meeting in Milan the participants agreed to submit the paper to a peer-reviewed journal. During the physical meeting in Milan 23-24 March 2023 the participants received a thorough presentation of the UNITECH Core Facilities, followed by a physical WP-meeting at the University of Milan. At this meeting, the text of the working paper was finalised, and further possible actions were discussed.

Another presentation of local Core Facilities was organised by the University of Warsaw on 18 September 2023. The WP leader as well as the project manager from the University of Copenhagen were present at the meeting. During the period October 2023 until December 2023 the participants will continue to meet regularly online, in order to discuss further collaboration after the TRAIN4EU+ project. The cooperation network will likely continue in the future, albeit reduced without project funding.

3. Cooperation and piloting potential

Possible pilot actions in WP3 were aimed at enhancing the cooperation between research infrastructure facilities at the partner universities across the alliance. Through the extensive mapping analysis, many aspects from facilities in all scientific fields were displayed as ground for cooperation and best practice experience. The 4EU+ joint mapping exercise of the six universities provided the first common mapping of research infrastructures and core facilities across the 4EU+ University alliance and showed best practice of Core Facilities management at UNITECH facilities at the University of Milan.

3.1. Best practice assessment of UNITECH Core Facilities at the University of Milan

A thorough description of all UNITECH facilities was carried out in Task 3.2. and can be found in the respective deliverable D 3.2. At the University of Milan, 4 research infrastructures called UNITECH are classified as Core Facilities (CF) and are located at the campus of Università degli Studi di Milano in Italy. UNITECH Core facilities in the scientific domain of Life Sciences are COSPECT, NOLIMITS and OMICs) and Natural Science (INDACO). Keywords for identifying the facility in general search option in COSPECT are mass spectrometry, NMR spectrometry, X-ray Diffractometry. In NOLIMITS the keywords are Microscopy Services, live imaging, in vivo analysis, Transmitted Optical Microscopy, Fluorescence Optical Microscopy, Electron Microscopy, Cryogenic electron microscopy and OMICs can be characterised by keywords Metabolomics, Proteomics, Lipidomics, Peptidomics.

During the WP meeting and best practice assessment at the University of Milan on 23-24 March 2023, the UNITECH facilities were presented to the WP participants. The facilities visited included INDACO, COSPECT, NOLIMITS and OMICs. The presentations consisted of on-site visits to the facilities, including assessment of the equipment, staff exchange, as well as presentations of the features of the facilities in a subsequent meeting with TRAIN4EU+ WP participants and facility leaders. During the meetings, facility managers and scientific technical experts presented the facilities and answered questions.



At the presentation and discussion round, the following features of UNITECH facilities were addressed: Research activities, past and future prospects of the UNITECH Core Facilities, including the new model for UNITECH 2.0 with 11 facilities planned for 2026, staff and equipment of UNITECH facilities, the current Core Facility model and topics linked to Core Facility accounting. All UNITECH facilities presented details from their facilities, including management models, specific equipment, user details, services and platforms offered, as well as investment possibilities. Additionally, future perspectives and cooperation interests were discussed.

Overall, the presentation of the UNITECH facilities gave the WP participants a comprehensive overview of the features in place at the University of Milan and revealed considerable potential for future cooperation in the Alliance, as well as insights for possible implementation of the UNITECH management model at their respective universities. Joint research and administrative collaboration within the Alliance between UNITECH facilities and research infrastructure facilities at Alliance universities in the future, however, is greatly dependent on further funding.

3.2. Working paper

The working paper “*Navigating the Frontier: Research Infrastructures, Core Facilities and the Shaping of a New Paradigm at European Universities*” was written jointly by the WP participants between November and March 2023. All WP participants are listed as authors upon submission. The participants reviewed the text of the working paper and prepared it for submission Between April and June 2023. An external reviewer carried out a spelling and grammar check.

The paper was submitted to the [European Management Journal](#) in August 2023 and the [European Journal of Innovation Management](#) in September 2023. After rejection due to the scope of the first two journals, the paper was submitted to the [Journal of Education Policy](#) in October 2023, where it is currently with the Editor (M35). If it is not accepted by this journal, it is planned to publish the paper within the 4EU+ network by the end of 2023.

The content of the paper is described by the following abstract:

Research Infrastructures (RI) and Core Facilities (CF) are strong drivers for generating research results and, thus, knowledge at European Universities. In this paper, we provide insight into different features of RI and CF, their organisational structure and governance, funding mechanisms, critical factors for success, and challenges and opportunities associated with implementing and operating these research support structures. Our results are based on a comparative analysis across six European research-intensive universities from the 4EU+ University Alliance. Due to the lack of a clear definition of RI and CF, we provide a variety of indicators and criteria attributed to such facilities. We highlight differences between CF and RI in terms of goals and objectives. Establishing Core Facilities can be seen as a response to the evolving needs and challenges of researchers and academic communities at European Universities. With a centralised management and collaborative governance model, Core Facilities provide a practical solution to address these needs. We explore the legal framework, organisation, access, users and charge rate models at Core Facilities. We also identify several



challenges in setting up and maintaining Core Facilities. Special attention is directed towards staff challenges, including introducing the staff category we identify as “scientific technical experts”. Finally, we present a Core Facility Manifesto and share our conclusions.

The overall scope of the paper seeks to highlight the features of research infrastructure and particularly of Core Facilities and to demonstrate the challenges many facilities face when dealing with recognition and criteria for incorporation in the research framework of universities and other higher education institutions (HEI). Especially issues of sustainable funding and the challenge of long-term perspectives for infrastructure staff, who the authors refer to as “scientific technical experts”, pose serious obstacles for fostering infrastructure development. These issues, among others, are addressed in the paper.

3.3. Other meetings

The WP leader and project coordinator were offered an insight to the Core Facilities at the University of Warsaw on 18. September 2023. Here, the laboratory accreditation process at the CNBCH was highlighted, as well as Core Facilities CeNT and CePT, alongside business-academia processes were presented. There was an opportunity to visit the facilities and have a dialogue with the scientists and managers in charge. The insights to the facilities at UW further completed the mapping of the research infrastructure at the universities across the Alliance.

3.4. Future collaboration

Based on our assessment of the research infrastructure and Core Facilities, we have identified potential for innovations and learning-driven transformations suitable for upscaling across the alliance with the potential of exploitation by other European Universities. Although we found great variation in the networks and management structure of infrastructure facilities, there is also vast potential for joint development of infrastructure facilities across the Alliance in the future.

For example, a pilot action proposed during the physical meeting in Milan in March 2023 was that of a workshop for scientific and/or administrative staff of Core Facilities (or other RI facilities), possibly selected by scientific field or a meeting on a scientific level between academics working at the facilities to exchange potential for joint research. Such a workshop could be transformed into a series of exchange events, on-site or virtual, in order to explore infrastructure facilities at Alliance universities, find common ground for research projects and explore opportunities for staff exchange, both administrative and academic. However, lack of funding remains the main barrier for creating such an exchange.

Another instrument to foster collaboration is a database of research infrastructure facilities across university alliances. During the lifespan of TRAIN4EU+ we experienced only parts of the infrastructure networks at our universities. Further development of an infrastructure network would need time and funding, yet it would greatly contribute to future cooperation.



The project team on WP3 in TRAIN4EU+ will likely maintain the established network and continue the extremely collegial and fruitful cooperation, albeit the liaison is prone to be reduced without project goal and funding. However, we will still explore cooperation possibilities within the 4EU+ Alliance in the future.

4. Conclusion and lessons learned

We have undertaken measures to search for promising models for sharing infrastructures across research groups and explored possibilities for joint utilisation of core facilities and other research infrastructure facilities. We have created an inventory and categorization of physical research infrastructure across 4EU+ and identified best practices for management and potential barriers for utilising, sharing and scaling infrastructure investments. We have found potential best practices for strengthened competences and on-the-job development of the research infrastructure technical support staff, and the centralised research support units. We have summarized our findings in a working paper, which we aim to publish in a peer-reviewed journal.

Based on the results from Task 3.2, a co-learning effort across all six universities has taken place. Our analysis has been supported through a set of online meetings and one physical meeting at the University of Milan as best practice for centralized management units for Core Facilities. During these meetings, we have shared ideas for new innovative approaches for management and support for technical infrastructure as well as support services. We have found a new category for Core Facilities support staff which we call “scientific technical experts” and which we suggest implementing at all European Universities. Our findings will be published in a working paper. We will continue cooperating on the development of shared resources in Core Facilities and research infrastructure facilities.

We have engaged in consultations with selected stakeholders. Examples of potential stakeholder inclusion concern core facility management systems, such as operational software for allocation of equipment, research management solutions (e.g. support by experienced staff), collaboration platforms, and research coordination offices (fundamental service). We have found potential barriers to staff development and joint utilization of Core Facilities, which are located on management and funding level. We will continue to consult stakeholders to overcome obstacles for shared infrastructure development and sustainable Core Facility management.

We have learned that there is immense potential for collaboration in the research infrastructure network across European Universities. We have found out that despite many differences there are also many similarities and particularly capacity for learning, especially with respect to Core Facilities and their utilisation and management. We have agreed that the development of staff and especially of career paths of scientific technical experts has considerable impact on the sustainability and development of Core Facilities and should be addressed on the European level. Overall, we have achieved strong basis for collaboration, which we hope to continue evolving in the future.

