EUROPEAN UNIVERSITY OF TECHNOLOGY

EUt+ ACCELERATE

European University of Technology (EUt+): Accelerate phase

Deliverable D15

EUt+ data exchange formats and interface definitions

Del. Rel. No D8.1

WPA8

Dissemination level: **PU**-Public

https://www.univ-tech.eu/phase-2-results

This initiative has received funding from the European Union's programme under grant agreement 101124533 — ERASMUS-EDU-2023-EUR-UNIV.

Foreword to Deliverable 8.1

In a context where digital infrastructures are central to the transformation of higher education, Work Package 8 (WPA8) plays a pivotal transversal role within the EUt+ Accelerate initiative. It supports all university missions by providing the digital processing capabilities required for a fully integrated European University alliance. Rather than introducing isolated solutions, WPA8 has focused on establishing a common digital layer that connects the legacy systems of the nine member institutions, enabling seamless data exchange and supporting long-term cooperation at alliance level.

A key achievement concerns the development of digital capabilities for joint educational programmes and student mobility. As national curricula converge toward shared European programmes, WPA8 has complemented the academic work of WPA3 through the development of the **EUt+ Mobility Application**. This system, now live and publicly accessible, supports students, teachers, and programme designers in planning mobility pathways embedded within study programmes, contributing to a more transparent and integrated European learning experience. It is presented in Chapter 1.

WPA8 has also addressed the full mobility lifecycle by facilitating the smooth and inclusive implementation of student mobility. Through alignment with European standards and the implementation of **Erasmus Without Paper (EWP)**, the alliance has enabled the fully digital processing of learning agreements and mobility data, reducing administrative burden and preventing information loss. The development of the **EUt+ Student Card**, in line with the **European Student Card Initiative (ESCI)**, further supports incoming students by granting access to campus services across alliance member universities, strengthening inclusion and a sense of belonging. This achievement is outlined in Chapter 2.

Beyond education, WPA8 has delivered key digital infrastructures to support research and Open Science. The **EUt+ Academic Press** and a **sustainable Open Access repository** enhance the visibility of joint research outputs and contribute to the European Research Area. Their usefulness and added value are discussed in Chapter 3.

Taken together, the results presented in this deliverable demonstrate how digital tools serve as more than technical solutions: they act as socio-technical infrastructures that enable coordination, interoperability, and institutionalisation at alliance level. The progress achieved in establishing a joint information layer positions EUt+ to move confidently into its next phase—building on solid digital foundations to further integrate education, research, and services across Europe. The following sections detail these achievements and outline how they collectively support the long-term ambition of a resilient, inclusive, and digitally enabled European University alliance.

Co-funded by the European Union

Table of Figures

Introduction

In the 21st century, digital tools have become a core infrastructure of higher education systems, underpinning how institutions organise learning, governance, and cooperation. Within Europe's broader digital transition, information technologies are no longer peripheral support mechanisms but key enablers of scalability, efficiency, and inclusion. They shape how institutions manage complex processes, share data securely, and ensure continuity across organisational boundaries. In the context of higher education, digitalisation is closely linked to public policy objectives such as widening participation, reducing administrative burdens, increasing transparency, and enabling cross-border collaboration at scale.

In the European University of Technology (EUt+) nine members have come together from across Europe. Establishing a European higher education super campus is a pivotal step for EUt+ towards fostering a cohesive and interconnected academic community.

For a university alliance composed of multiple autonomous institutions, the role of IT tools becomes both strategic and structural. Alliances introduce a level of organisational complexity that exceeds traditional bilateral cooperation: multiple partners, heterogeneous information systems, diverse national regulations, and large numbers of mobile students and staff. In this setting, digital tools are essential to move from fragmented coordination to integrated cooperation. They support shared workflows, common reference frameworks, and collective visibility, allowing the alliance to function as a coherent ecosystem rather than a loose network of institutions.

For example, student mobility – which is one of the EUt+ key pillars (cf. D3.1) – is a particularly demanding domain in this respect. Effective mobility across an alliance requires **interoperability** between institutional systems for student identification, course catalogues, learning agreements, academic records, and recognition processes. Without interoperable digital tools, mobility remains administratively heavy, error-prone, and unevenly accessible. By contrast, interoperable IT systems enable students to move more seamlessly across institutions, reduce duplication of data entry, and provide consistent information before, during, and after mobility periods. For institutions, this interoperability supports reliable data exchange, more transparent governance, and evidence-based monitoring of mobility flows and outcomes.

More broadly, shared digital tools enable alliances to exchange information efficiently, align decision-making, and sustain collective action over time. They support transparency across governance levels, facilitate coordination between central alliance structures and local institutional units, and create durable organisational memory through shared data and documentation. In this sense, IT tools are not only technical solutions but sociotechnical infrastructures: they mediate collaboration, shape organisational practices, and underpin the long-term institutionalisation of the alliance. For a nine-member university alliance, investing in interoperable user-centred digital tools is therefore a prerequisite for delivering meaningful mobility, coherent governance, and sustained European cooperation in a digitally integrated higher education landscape.

Co-funded by the European Union

Within the framework of the EUt+ Accelerate initiative, WPA8 focuses on the creation and provision of common digital services and the applicable tools for processing support. For the provision of digital services, each member university is locally operating their IT systems in accordance with national requirements and available options. For enabling automated data exchange and joint operation between the members for the benefit of the alliance, EUt+ member institutions are working together on creating an overarching information layer for providing **common digital services**. These services aim to **support the Europeanisation** of the EUt+ members and facilitate the processing of the information generated from joint processes as an alliance. As a guiding principle, the multiplicity of systems in use within the alliance members should be acknowledged in accordance with the given national regulations in place. Our objectives and activities align with European initiatives such as the European Student Card or the developments related to the Common European Research Information Format for sharing research information.

The work package's all-encompassing purpose is therefore the conceptualisation, design, creation and implementation of common digital IT services for the alliance members. Ultimately, the establishment and continuous further development of the IT infrastructure of relevant systems for collaborative alliance activities involves the creation, implementation, and maintenance of a comprehensive and integrated IT landscape that supports the effective execution of joint activities. The primary technology-oriented objectives of this work package are multifaceted and can be summarised as follows:

1. **Alignment with European-level developments**: To realise and benefit from European-level initiatives such as the European Student Card Initiative (ESCI), the Erasmus+ app, Erasmus Without Paper (EWP), and the Common European Research Information Format (CERIF), thereby promoting harmonisation and standardisation across the European research and education landscape.
2. **Development of an integrated information layer**: To establish a comprehensive information layer that complements existing IT services at a European level, thereby providing a unified and standardised framework for information sharing and processing across the disparate systems in use across the alliance. This includes the development of data exchange formats for the technical provision of information flows and the exemplary implementation of interfaces for data exchanges and joint data processing.
3. **Focus on a pan-European approach:** To provide digital tools specifically aimed at supporting the alliance-wide activities and enabling unambiguous information sharing, exchange and communication in a uniform and clear manner.
4. **Decentralised data availability**: To facilitate the decentralised availability of data from a unified, standardised data pool for dedicated services, ensuring seamless information sharing and processing across various systems and for different stakeholders.
5. **Interoperability through standardisation**: To enable the use of data from diverse sources by implementing joint exchange formats, thereby promoting interoperability and facilitating the integration of decentralised and differing systems.

6. **EUt+ IT landscape development**: To develop an overarching EUt+ IT landscape through the creation of an EUt+ information technology architecture, ensuring alignment of information systems and subsequent reuse of information for joint EUt+ activities.
7. **Overarching information management**: To establish an overarching information management framework that integrates and coordinates various information systems, ensuring efficient information sharing and processing within the alliance.
8. **GDPR compliance**: To ensure that all developments and initiatives within this work package are guided by the principles and regulations of the General Data Protection Regulation (GDPR), thereby upholding the highest standards of data protection and privacy.

Through achieving these objectives, this work package aims to establish a robust and harmonised EUt+ IT landscape that promotes interoperability, standardisation, and efficient information sharing and processing across the alliance. The digital service provision is thereby grounded in common databases, digital support and portals based on repositories.

This deliverable presents the digital and structural achievements of EUt+, demonstrating alignment with European initiatives such as the European Student Card Initiative (ESCI), the Erasmus+ App, Erasmus Without Paper (EWP), and the Common European Research Information Format (CERIF). Chapter 1 showcases the EUt+ Mobility Application, developed to support students, teachers, and programme designers in planning mobility pathways embedded within joint study programmes, enabling a more transparent and integrated European learning experience. Chapter 2 details the facilitation of the full mobility lifecycle through fully digital learning agreements and mobility data exchange, in line with EWP standards, alongside the EUt+ Student Card, providing seamless campus access and strengthening inclusion across alliance members. Finally, Chapter 3 focuses on research infrastructures, including the EUt+ Academic Press, a sustainable Open Access repository, enhancing research visibility, collaboration, and contributions to the European Research Area.

1 The EUt+ Mobility Application: Continuous convergence towards the European Degree

1.1 State-of-the-art: digital tools to support joint programmes in Europe

European higher education increasingly prioritises joint programmes and joint degrees as **structural mechanisms** to strengthen transnational cooperation, student mobility, and academic integration. Central to this agenda is the European Higher Education Area (EHEA[1]), which aims to create a transnational educational space by promoting mobility, mutual recognition of qualifications, and high quality, inclusive learning across the EU. A key innovation is the European Degree[2], a jointly awarded qualification recognised across Member States and supported by aligned quality assurance and digital tools. The EHEA enhances coherence, mobility, and institutional integration, enabling students, universities, and employers to benefit from a more transparent and connected European higher education landscape.

The proof of concept of a European Degree in Engineering is one of the main objectives of WPA3 (cf. D3.1). A two-step approach is proposed: first, awarding a European degree label to joint programmes that meet particular qualitative criteria, and later establishing a formally recognised plurinational degree. This framework aims to remove legal, administrative, and recognition barriers, strengthening Europe's competitiveness and cohesion.

Digital tools are central to the effective implementation of these joint programmes. Platforms such as the European Student Card Initiative (ESCI[3]) and Erasmus Without Paper (EWP[4]) allow seamless digital exchange of learning agreements, academic records, and student services, reducing administrative friction and supporting real-time tracking of student mobility. Additional digital infrastructures, such as shared course catalogues, mobility platforms, and expertise mapping and management systems, facilitate joint curriculum planning, doctoral cotutelle arrangements, and collaboration opportunities across institutions (cf. Chapter 2 below for a detailed description of EUt+ efforts towards this objective). Continued development is needed for interoperable curriculum management, integrated student services, automated credit recognition, and data-driven monitoring, ensuring that **digitalisation fully supports mobility, curricular convergence, and the ambitions of the European Education Area**.

Together, these **policy and technological advances** provide a solid foundation for alliances like EUt+ to expand joint programmes, enhance mobility, and deliver high-quality, internationally-recognised education. By aligning institutional practices, leveraging shared digital tools, and adhering to European quality standards, alliances can realise the full potential of a connected, innovative, and competitive European higher education ecosystem.

---

[1] https://education.ec.europa.eu/about-eea/the-eea-explained
[2] https://education.ec.europa.eu/education-levels/higher-education/joint-european-degree/working-towards-a-joint-european-degree
[3] https://erasmus-plus.ec.europa.eu/european-student-card-initiative
[4] https://erasmus-plus.ec.europa.eu/european-student-card-initiative/ewp

Despite these advancements, challenges remain. Current digital tools are often fragmented and do not fully support the integration of multiple legacy systems across institutions or cover the full spectrum of administrative and academic workflows required for joint programmes. **Key gaps** include:

1. **Interoperable curriculum management**: shared platforms that allow institutions to design, update, and deliver joint curricula while tracking student progress across borders.
2. **Integrated student services**: digital access to housing, library services, campus facilities, and social support for mobile students, ideally through a single interface such as a common student card.
3. **Automated recognition and credit transfer**: systems capable of real-time validation of course equivalences, reducing delays in academic recognition and supporting compliance with European Credit Transfer and Accumulation System (ECTS) standards.
4. **Data-driven monitoring and quality assurance**: tools that provide actionable insights on student performance, mobility flows, and programme effectiveness to guide continuous improvement.

In the context of the European Education Area (EHEA), these developments are crucial. **Digital tools make curricular convergence tangible**, enabling institutions to

- Operationalise joint learning outcomes,
- Harmonise programme structures, and
- Facilitate recognition at scale.

They allow alliances to deliver on the **EHEA's ambition of a coherent, transnational educational ecosystem**, where students can move seamlessly between institutions and participate in joint programmes that are academically robust, administratively efficient, and internationally visible.

It is towards bridging some of these gaps that the work done around the EUt+ mobility application presented in this chapter aims to contribute.

1.2 Supporting convergence in education

As a key component of its convergence efforts in education, the EUt+ alliance is actively pursuing the development of a full-fledged European plurinational Degree in Engineering, transcending traditional exchanges and joint degree or double degree models. This endeavour seeks to create a cohesive and integrated academic landscape, fostering increased and inclusive mobility as well as recognition of academic credentials across borders (cf. D3.1).

The work towards this goal has gradually progressed towards the convergence to European curricula by creating clusters of national curricula in several disciplines, which will eventually result in joint European curricula, delocalised on several campuses. Clusters are thematic groups that serve as a crucial mechanism for connecting programmes, research activities, and innovation initiatives across the EUt+ alliance. By structuring knowledge and aligning academic content across member institutions, clusters play a fundamental role in harmonising curricula, fostering interdisciplinarity, and enabling student mobility.

The implementation of clusters within the EUt+ alliance has several benefits, including:

1. **Progressive harmonisation of curricula**: Clusters ensure that EUt+ students gain the same knowledge regardless of the campus where they studied, thereby promoting a unified academic experience.
2. **Fostering interdisciplinarity**: Clusters facilitate the integration of different disciplines, enabling students to develop a comprehensive understanding of complex issues. The focus is on engineering fields with a strong emphasis placed on the arts, humanities, social sciences and transversality in all curricula.
3. **Enabling and fostering student mobility**: Clusters open mobility opportunities for students, allowing them to benefit from the expertise of each campus while gaining a real multicultural experience.
4. **Building the EUt+ plurinational European Degree**: Clusters play a central role in building the EUt+ European Degree, ensuring coherence and compatibility between different national systems, creating shared academic pathways, and strengthening the integration of common learning outcomes.

1.3 Academic embedding of student mobility within EUt+

The EUt+ educational experience fundamentally includes student mobility as a core component. Enhancing mobility and recognition offers students a unique opportunity to engage in integrated programmes and earn joint diplomas that are recognised and respected across Europe. Embedding mobility as a naturally given part of a study programme within EUt+ is intended to be seamlessly achievable for the student and the member institutions's administrative processing.

The cluster works towards a common pedagogical model based on the description given in the European Degree in Engineering EUt+ reference guide. They are structured in the same way:

1. **A single set of final learning outcomes**: specific to the European target curriculum, which serves as a progressive convergence point for each of the existing curricula entering this convergence process.
2. **A mobility map**: displays the list of courses open to mobility with automatic recognition, with all necessary information, and including language modules. It is regularly updated. This is the basis for getting to know each other and opening up mobility to students before European curricula formally exist.
3. **Awarding of EUt+ Certificate**: coordinated through a cluster committee, students obtaining their degree from an EUt+ member institution having formally joined the applicable agreement, the information of the ECTS obtained in a mobility is gathered for issuing the certificate.

The mobility maps are concrete applications of the clusters. In principle, here the modules are listed, including all necessary technical details that each member institution is offering to incoming students and that is automatically recognised by the other members. The modules are described in basic learning outcomes. A mobility map details the pedagogical and technical information needed for the choice and the organisation of students' study tracks.

1.4 The EUt+ Mobility Application

To promote and ease access to student mobility across its nine member universities, EUt+ has created a novel type of IT system specifically designed for its needs as a European University Alliance, and its intended convergence in education and focus on mobility. A benchmark analysis has revealed that, currently, there are no systems readily available for this purpose. Thus, the need emerged to develop a tool that fits EUt+ needs and purpose. The tool created is a web application that provides a simple search tool for students to discover the opportunities for study on any of the EUt+ campuses. This tool is aligned with the EUt+ vision of creating a truly integrated European higher education area, providing an intuitive and accessible tool for students to explore academic opportunities across the alliance.

All mobility maps have been brought together in a single common digital database. For easy access and executability, this EUt+ Mobility Application has been developed as a **strategic digital platform to simplify student mobility**. Its purpose is the digital provision of all information for students wishing to search for and choose their mobility through one single application. It provides catalogued courses online for choosing and matching automatically recognised courses for mobility planning.

The EUt+ Mobility Tool offers a range of key features and benefits, including:

1. **Centralisation of distributed information**: Brings together the content of the cluster mobility maps in one EUt+ database giving teachers, administrators, and international relations staff full visibility.
2. **Search and comparison functionality**: Enables students to search and compare study options available at the EUt+ campuses, with detailed information about programmes, courses, teaching languages, semesters, and thematic clusters.
3. **Personalised mobility planning**: Supports personalised mobility planning by offering filters and user-friendly navigation, helping students identify courses that fit their academic paths and mobility ambitions for including a semester abroad into their study programme.
4. **Single point of information**: Serves as a reference source of all relevant information related to courses, learning outcomes, data input functionality, regular updates and revisions and downloads of information.
5. **Transparency and cooperation**: Strengthens academic cooperation among institutions by fostering transparency, encouraging joint curriculum development, and promoting the harmonisation of educational offers.
6. **Catalyst for building a European University**: Acts as a catalyst for building a European University where mobility is not an exception but an integrated, natural part of the student experience.

The tool is publicly available on the website of EUt+ at https://info-mobility.univ-tech.eu/en/. Support information, and a usage tutorial are available at https://www.univ-tech.eu/mobility-tool.

1.5 Output: application developed

The requirement to synchronise support corresponding with the progressive maturation of the clusters led to the decision to adopt an incremental development strategy for the mobility application. Successive, interrelated development phases allowed digital support functionalities to be deployed at an early stage, while maintaining sufficient flexibility to embed future functional and technical requirements, as illustrated in Figure 1.

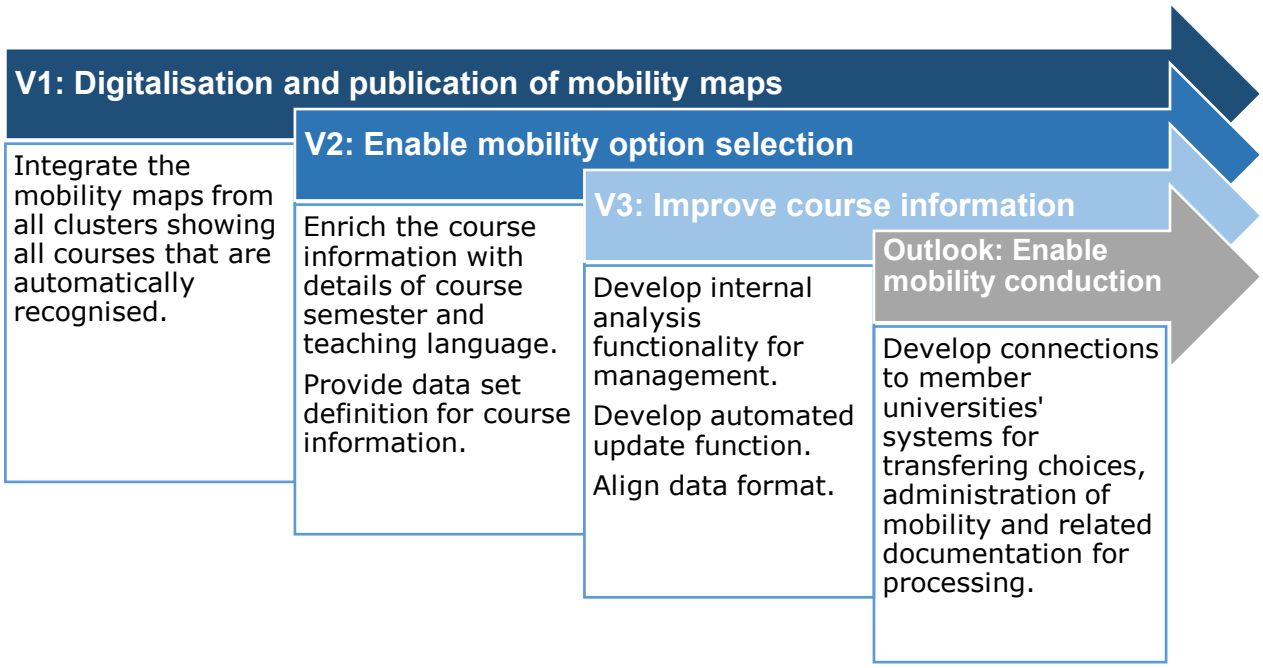


Figure 1: Process Steps of the EUt+ Mobility Application Development

In most cases, academic and pedagogical databases are *ad hoc* registries of the courses delivered by a given university. They therefore reflect the curricula structure as defined by the academic regulations, and the courses they describe are hardly separable from the curriculum and from the institution that delivers them. In our case, we had to identify a method to make the courses offered by one member institution easily available to students from another in their own curriculum. This means that courses must be accessible within an academic regulation framework different from their original one, since our European curricula are being built through a process of progressive convergence of the national ones in the clusters.

The originality of this database lies in its very structure, which treats a course as the fundamental building block, independently of the curricula which in turn are considered as being external to courses. This requires an underlying ontology that differs from the standard approach, where the primary object is the student curriculum, broken down into semesters, which are themselves broken down into courses. In the given case here, courses are not subdivisions of a linear curriculum. They are blocks that enable progression from one group of basic learning outcomes (BLO) representing prerequisites, to another group of BLO representing the learning objectives of the course. Describing courses as a transfer function between BLO makes it possible to represent any type of curriculum structure

(linear, fully or partly elective, etc.) by combining the courses differently. In particular, it enables curricula to be rethought as a global and flexible pathway, adaptable to the student from entry level (admission) to exit level (graduation).

This approach enables the support of step-by-step evolution of national curricula towards European curricula. Since universities have a high degree of autonomy in structuring study pathways, we must foster a shift in mindset, reinforced, in particular, by the observation of the large-scale mobility that is emerging within clusters.

Two "levels" of learning outcomes are used here:

- **Basic learning outcomes (BLO)**: used to describe a course, with approximately one BLO per ECTS.
- **Final learning outcomes (FLO)**: used to describe the objectives of a curriculum (10~15 ECTS for a bachelor programme, 20~25 ECTS for a master programme).

As a first step, this provided clear descriptive elements at the course level. At the cluster level, it also enabled rapid experimentation and deployment of tests, with a very positive initial uptake. To date, more than **2,700 courses** are available on the EUt+ Mobility Application, representing over **14,000 ECTS**, and they have already been actively used for mobility by more than **500 students**. It was this large-scale test that confirmed the relevance of this model.

It should be noted that these information elements are not yet connected to individual students, as this will require the development of a joint database and management system linked to the European Student Card and an ePortfolio.

The initial version of the EUt+ Mobilily Application providing the digitalisation and publication of the mobility maps has been concluded with a pilot phase followed by publication on the web for public availability. At the time of finalising this deliverable, version 2.2 has been implemented, offering the steps of finding mobility options for students. Ongoing development activities primarily address the incorporation of analytical features, with further upgraded capabilities planned as subsequent development steps. Looking ahead to the post-2027 phases of the Alliance, these enhancements are designed to provide the technical foundations for digital mobility pathway integration with the corresponding member universities' systems.

1.5.1 Functional requirements

Functional requirements in the conceptual design of an IT system **specify what the system is expected to accomplish** by defining its required **features**, **functionalities**, and **behaviours**. They describe the tasks that users must be able to perform, the data the system must manage, and the outputs it must generate. Early specification of functional requirements is essential, as they constitute the foundation of system development by defining the project scope, informing design decisions, and serving as the basis for testing and validation. Clearly articulated functional requirements ensure a shared understanding among stakeholders of the system's intended purpose and help prevent misunderstandings or rework in later development phases.

The compilation of functional requirements clarifies system objectives and enables the formulation of a functional concept. **Conceptual design**, in this context, refers to the high-

level definition of the system's architecture, functionality, and requirements, outlining its overall structure and behaviour, including interactions with human users and other IT systems. System goals, constraints, and stakeholder need collectively determine the essential characteristics of the system, providing a structured foundation for the subsequent detailed design and implementation.

The scope of the EUt+ Mobility Application is defined through a set of identified action areas. An action area represents, at a high level, a functional system focus, that encapsulates a coherent set of system functionalities and behaviours. It serves as a structuring concept for defining the system's scope and for organising its behaviour. In an action area the related use cases, actors, and other system components are grouped, providing a concise view of the system's conceptual design and architecture. This structuring approach supports both clarity and traceability between requirements, functionality, and system components. For the EUt+ mobility application, three such areas have been defined:

1. **General public**: Information on EUt+ mobility opportunities integrated into the curricula of the alliance's clusters is intended to be fully available and easily accessible without restrictions to specific target groups, and openly shared with all interested stakeholders.
2. **EUt+**: The management, administration, expansion, and quality assurance of cluster information should be carried out by designated cluster managers.
3. **System provision**: In addition to the technical operation, maintenance, and further technical developments, the EUt+ IT team is responsible for user management.

For each area, the application user requirements have been defined by **identifying the relevant actors**. An actor is an entity that interacts with the system, either a human user or an external system. Actors are external to the system boundary and initiate interactions with it. Each actor is associated with specific roles, responsibilities, and goals, which are used to define the system's functionality and behaviour. The use of abstract roles, rather than specific individuals or concrete systems, allows the definition of generic system functions independent of particular implementations. In accordance with the three identified action areas, three designated user roles have been defined for the application:

1. **Public**: with the role USER - encompassing the general public
2. **Manager**: with the role ORG - information provision from the clusters and information administration,
3. **System administrator:** with the role ADMIN – responsible for overall system management and technical configuration.

The USER role requires the fewest functionalities, while the system administrator has the most. For a detailed description of the interactions with the system, **business use cases** have been modelled to specifically describe the interaction, the objects involved, and the required behaviour. Such a diagram depicts a specific goal or task that an actor wants to achieve by interacting with the system. A use case comprises a coherent workflow, is initiated by an actor, and ends with the delivery of a result by the system. It does not consider how the system can implement this functionality.

To capture the detailed requirements, **use case diagrams** are used for uniform presentation.

The role USER describes all users wishing to obtain information and may include the general public. The uses cases are presented in Figure 2.

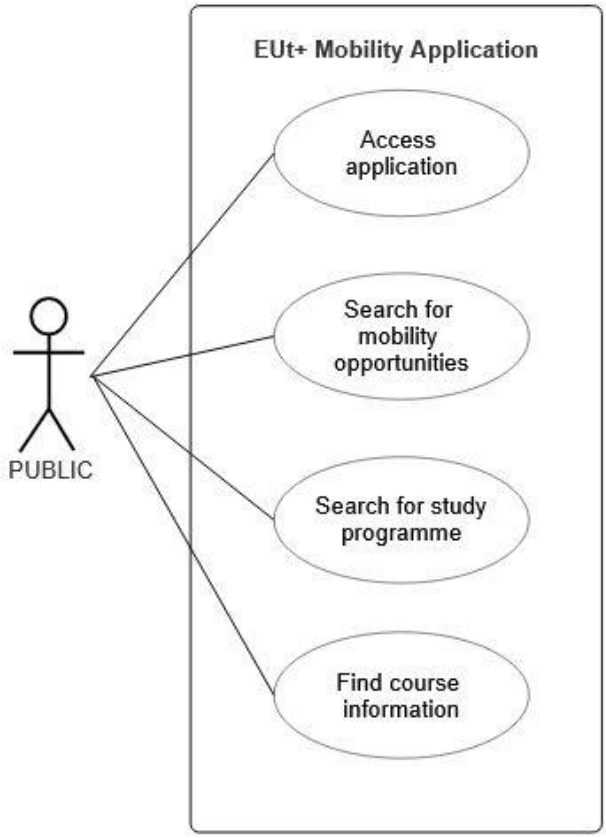


Figure 2: Use Case Diagram for the Role PUBLIC

This user wants to find different options for undertaking part of their studies abroad, depending on the semester in which they wish to be abroad. By stating their sending institution, the semester in which they wish to be mobile, and their degree programme, they can find out which institution(s) within EUt+ offer courses that match their degree programme and semester. For intuitive usage and direct accessibility, the use cases can be performed without the prior need to create a user account or logging in with student credentials.

For providing all information for the role PUBLIC, all information need to be gathered, validated and entered. For this purpose, the ORG role encompasses all functions of the PUBLIC role, as well as additional functions required to manage course and mobility details, as illustrated in Figure 3.

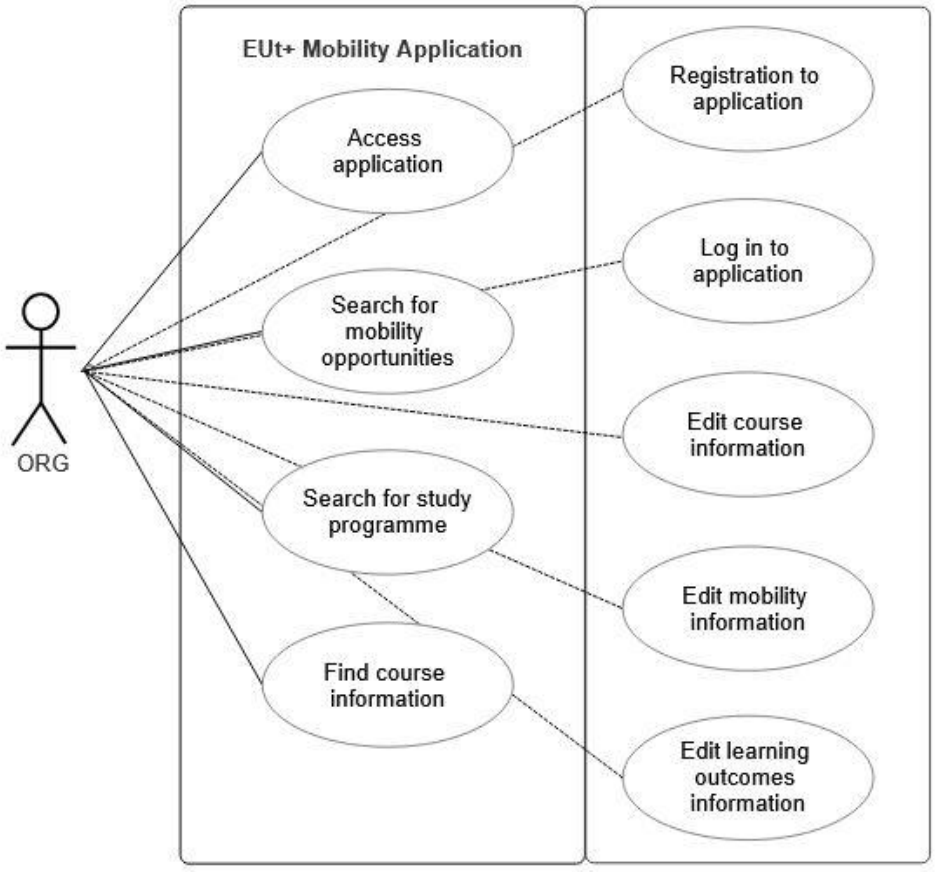


Figure 3: Use Case Diagram for the Role ORG

This user is a member of EUt+ and is concerned with the provision of all information. For performing these tasks, the user needs to initially register with the application for setting up their access for this role. This enables the possiblity for logging in and entering or editing the details for:

1. **Course information**: course, course category, course format, course difficulty, course type, course relevance, restrictions, and course history.
2. **Mobility information**: member, campus site, faculty, semester, cluster, season, course language, examination language.
3. **Learning outcome information**: basic learning outcomes, final learning outcomes.

In addition to supporting domain users by the system, effective system administration is essential. These functions are performed by members of the EUt+ IT team for enabling the mobility information offer as presented in Figure 4.

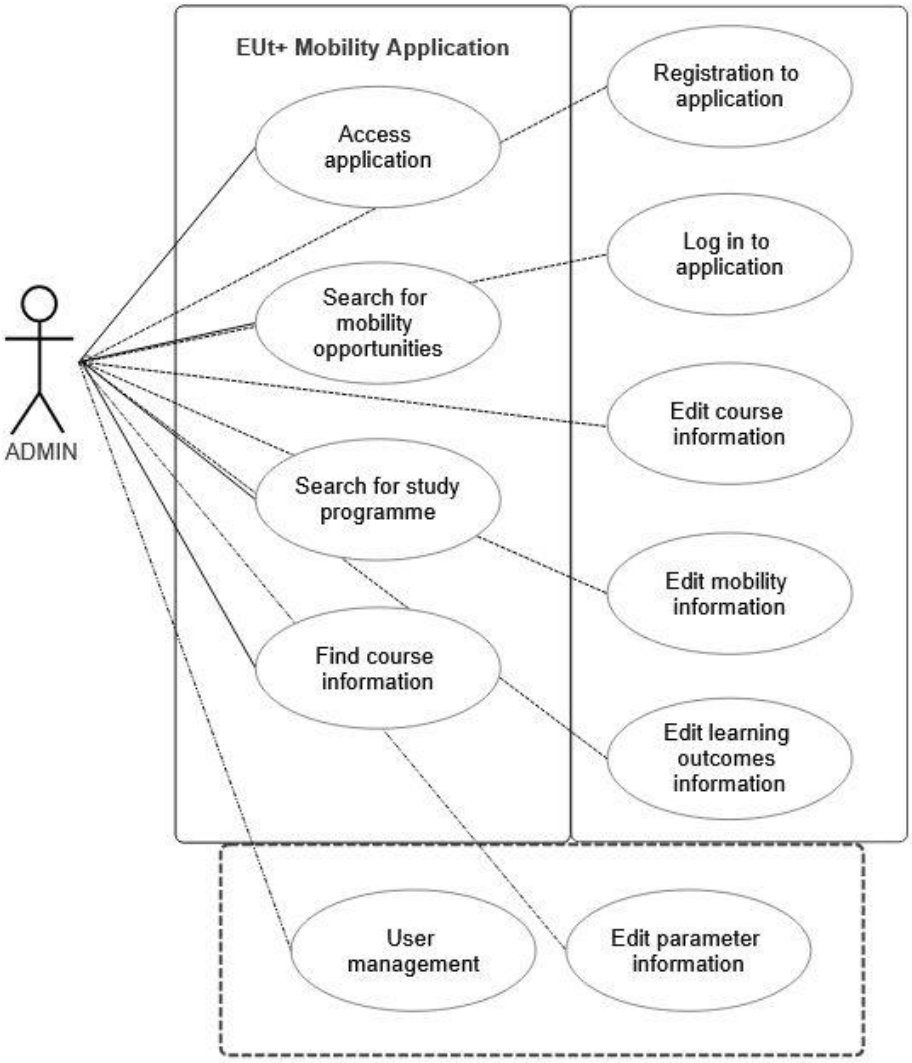


Figure 4: Use Case Diagram for the Role ADMIN

This user fulfills a support role for the PUBLIC and ORG roles. User management includes handling registration requests from a technical perspective and configuring parameters necessary for entering course details in accordance with the clusters' programmes and mobility maps.

Apart from the three roles described above, the application development team has not been assigned a particular role within the system.

1.5.2 Non-functional requirements

Non-functional requirements in the conceptual design of an IT system define how the system should operate, rather than what it should do by specifying qualities like performance, security, usability, and reliability. These requirements encompass aspects such as implementation constraints, response time, data storage capacity, scalability, and

accessibility. Describing them early is crucial because they significantly impact architectural choices and technology selection. Unlike functional requirements which detail features, non-functional requirements ensure the system meets quality standards and user expectations. They guide development towards a robust and effective solution.

The development of the EUt+ Mobility Application was defined based on a core set of system design principles. Primarily, the system architecture prioritises the utilisation of free and open-source software tools and adherence to open standards. Furthermore, a modular architecture was adopted to facilitate further developments and future integration with other systems. This framework-like approach is intended to ensure the necessary connectivity and interoperability to be be readily implemented as required, supporting adaptability and thus, longevity of the work. The non-functional requirements for such a web-based IT system encompass a broad range of qualities beyond core functionality:

1. **Flexibility and extendability**: The development of the system is foreseen as an iterative process with different phases to allow for creating new functions, addition of further classes or attributes to the data model.
2. **Accessibility**: Users are to be able to directly access the system without any installation of client software, applications or need for registration through the Web.
3. **Vendor independence**: Openly available tools prevent lock-in, minimise licensing costs, and remove usage restrictions or other constraints.
4. **Availability**: To adapt to the need and comfort of users being for the most part digital natives, the system has to be available 24x7.
5. **Performance:** Fast loading times are essential for user acceptance, in particular, page loading and responsiveness to user interactions should be under two seconds. The system must also support concurrent usage by the EUt+ student population, estimated at 100,000 students, along with an additional 12,000 staff members.
6. **System utilisation**: The system is expected to experience medium to high transaction rates, reflecting ongoing and increasing usage and with active promotion of the platform.
7. **Security:** Protection against unauthorised access, data breaches, and cyber threats; compliance with data privacy regulations, in particular to GDPR, must be ensured, given that this alliance system shall be operated independently of member universities' systems.
8. **Usability:** Intuitive interface with easy navigation, accessibility for users with disabilities compliant to the Web Content Accessibility Guidelines (WCAG), robust error handling with clear and informative error messages.
9. **Reliability:** The system should achieve a target uptime of 99.9%, with maintenance scheduled, wherever possible, during European night time hours to minimise disruption. While reliability is important for usability, the system is not safety-critical and does not pose significant financial risk.
10. **Scalability:** Ability to handle increasing user loads and data volumes without performance degradation, ensuring full scalability to accommodate future growth.

11. **Maintainability:** Easy updating, modification, and debugging , minimising delays or misunderstandings in case of staff changes or changes in responsibilities, as expected for long-term operation.
12. **Portability:** Compatibility with different browsers, operating systems, and devices is of the essence, in particular the needs to offer meaningful and fully functional use on mobile devices.
13. **Compatibility:** Integration with member universities' systems, as well as external systems and APIs. Connectivity between a variety of systems is necessary, including student, course, learning, and mobility management systems, potentially via web services to ensure seamless interoperability.
14. **Capacity:** Sufficient storage space for data and resources needs to be made available.
15. **Backup & recovery:** Regular daily data backups and a robust recovery plan in case of system failures is to be developed.
16. **Internationalisation**: The demand for access in different language is very high, as the system should have translation into all the languages of the nine EUt+ campuses.
17. **Scope of documentation**: The requirement is of medium scope, as it must be complete, but is not bound by specifications.
18. **Reusability and transferability**: Both are of high importance, as the system is a novel type of software and is intended to also be able to benefit European developments in this area.

These requirements are deemed crucial for ensuring a **positive user experience**, **data security**, and **long-term system viability**.

1.5.3 Technical realisation

Based on the conceptual design, the software design decisions guiding subsequent development were defined. To ensure independent operations as alliance-level software, a dedicated server separate from the alliance members' IT environments has been deployed, offering a production and a pre-production environment hosted in the cloud by an external provider for both the application and the database, and is operated under the legal responsibility of the French EUt+ member (UTT). For implementation the following are used:

1. **Operating system**: Rocky Linux
2. **Programming language**: PHP
3. **Framework**: Symfony
4. **Dependency Manager**: Composer
5. **Database**: MariaDB.

The tool is in productive use and publicly available at https://info-mobility.univ-tech.eu/en/.

The interface design adheres to the EUt+ branding guidelines and is implemented using a a minimalist and accessible design approach as shown in Figure 5 for all roles.

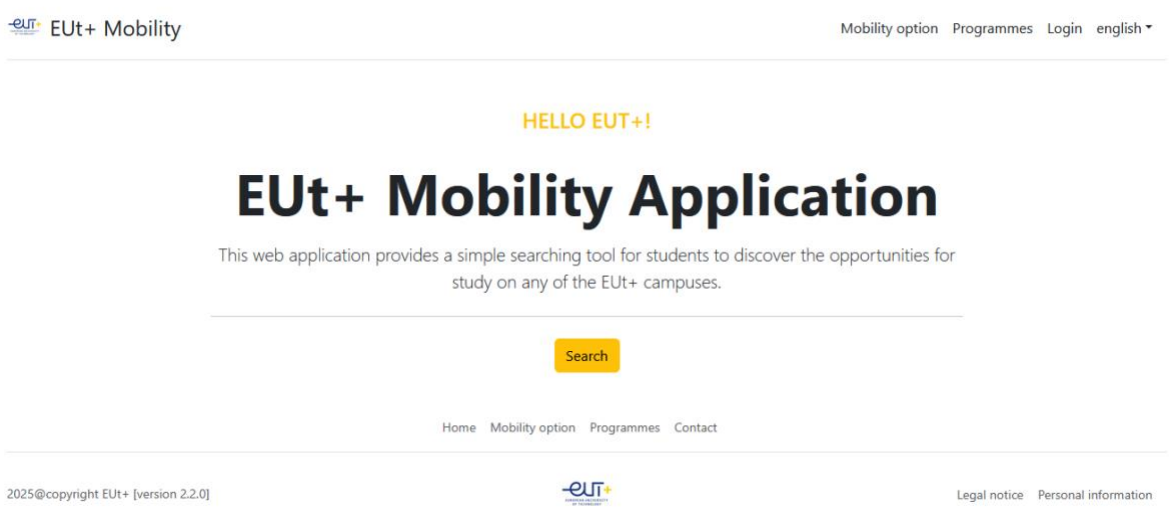


Figure 5: Screenshot of the EUt+ Mobility Application Landing Page for all roles

The landing page offers a choice of language to users. Currently, an English and a French version are available with the courses displayed in their respective teaching languages. Additional language versions are planned for the upcoming second phase.

As an example for the finding of offers of mobility options, Figure 6 shows a search result for all roles. The scenario chosen here is a student from UTT in the study programme of Bachelor of Industrial Engineering having searched for finding possible choices for going on a mobility at one of the other Alliance members in their second year of studies.

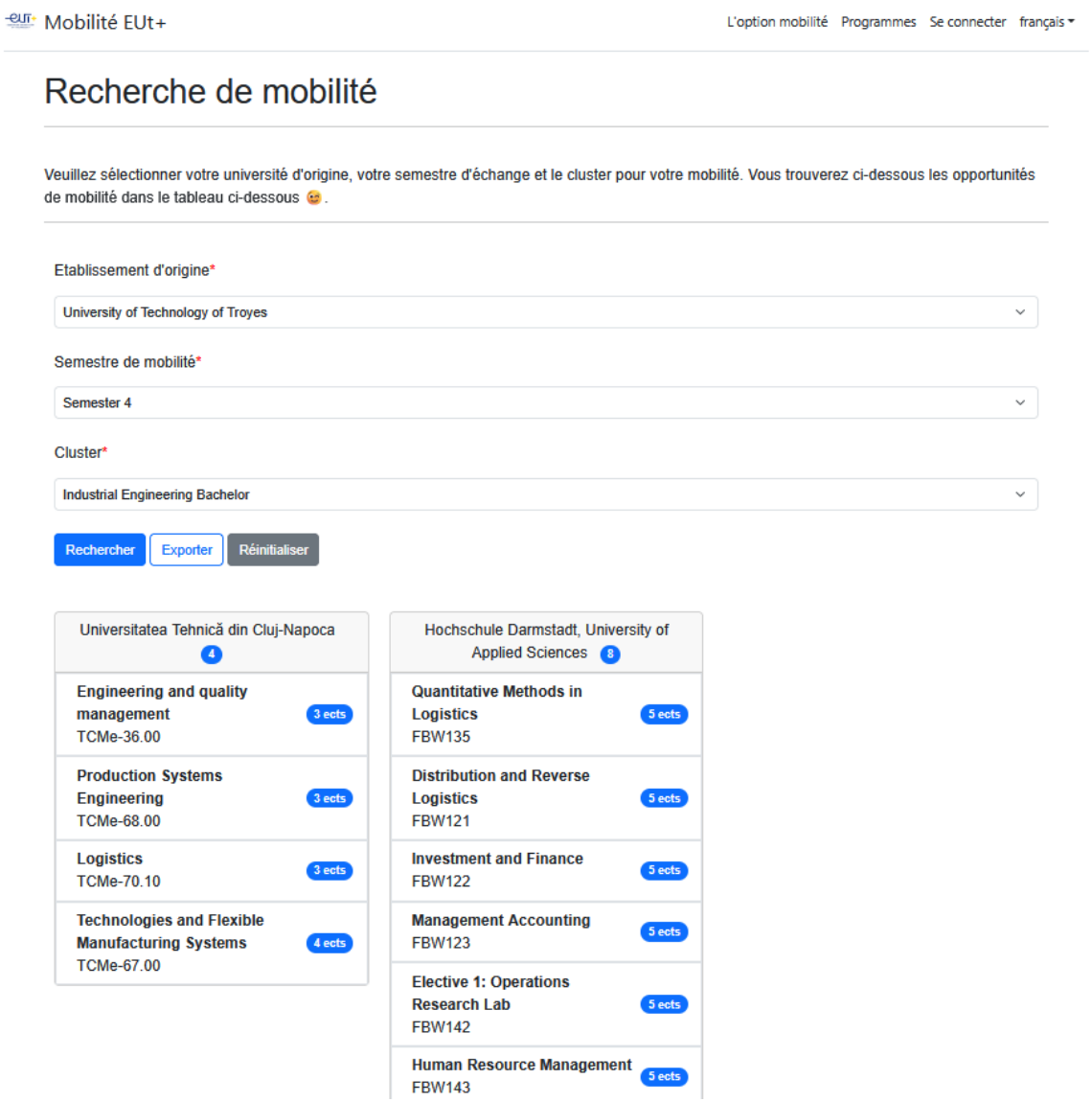


Figure 6: Screenshot of the EUt+ Mobility Application with Mobility Options Offer for all roles

Here it is important to note that the offered mobility opportunities list includes exclusively those courses that are automatically recognised by the home institution. This reflects the approach of the EUt+ clusters and their relevant mobility mapping.

As an example for a more general search of courses available for mobility, Figure 7 shows a scenario wherein a user, be it a student or EUt+ staff member, is searching for courses offered in the study programme Bachelor of Industrial Engineering taught in Spanish.

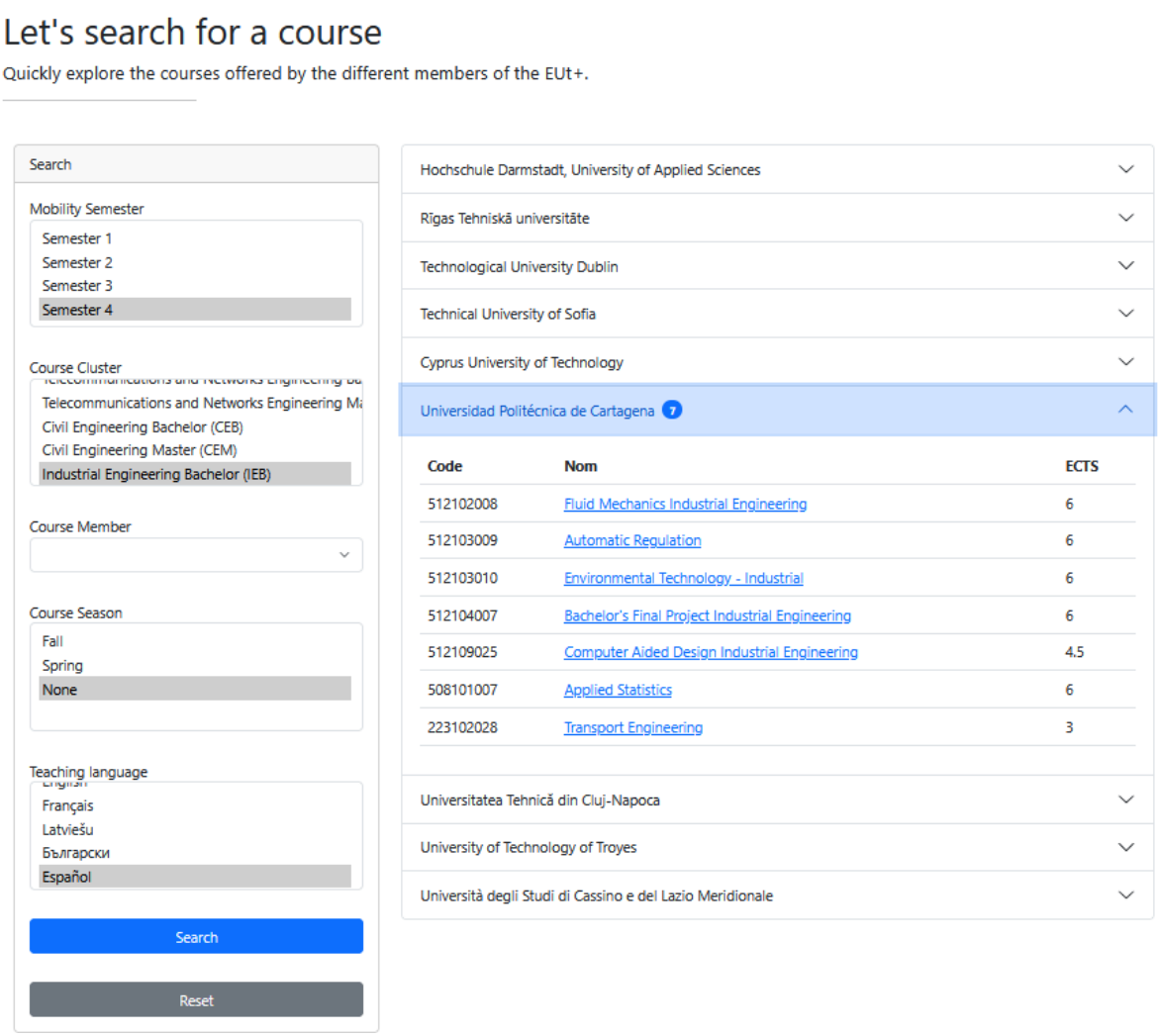


Figure 7: Screenshot of the EUt+ Mobility Application with Course Availabilities for all roles

For easy access, the Mobility App is accessible through the EUt+ website at https://www.univ-tech.eu/mobility-tool. This resource also offers additional information together with a tutorial about the usage of the application.

For data entries and information editing, users with the role ORG are required to login as described above for access to editing functionality. As an example, for the information

management, Figure 8 shows the digitalised operational mobility maps for potential analysis and/or updating or editing.

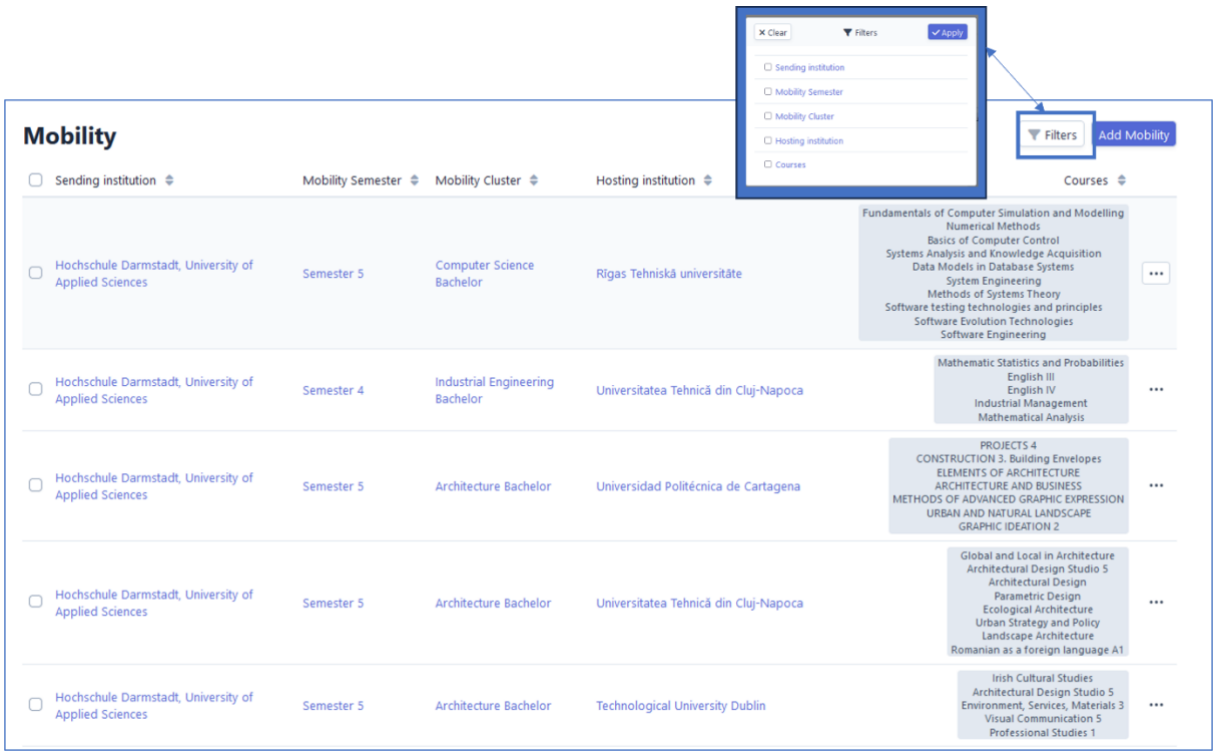


Figure 8: Screenshot of the EUt+ Mobility Application with Course Availabilities for role ORG

For quality analysis and mobility insights, a Power BI-based tool is in its final development stage and is being piloted by clusters. Hereby, the completeness and linking of the course information is verified. Updating the mobility maps is prescheduled on a semesterly basis, following a validation of the course fit and availability in each cluster.

1.5.4 Data exchange format

For automated digital data exchange, potential incompatibilities must be addressed and data formats coordinated. Beyond regulating message transport and defining the communication medium, protocols, and security measures, this also includes specifying any necessary transformations between standardised message structures and local in-house formats at both the sending and receiving ends. A key prerequisite is agreement on the use of either a general standard or a proprietary data structure specification. Standards constitute documented and commonly accepted specifications that are applied consistently as application rules or for the precise definition and identification of classification characteristics. Within EUt+, the foundation for an agreed specification has been established through cluster work defining the data fields required to represent a mobility map. This format is work in progress, as further requirements and extensions are

being developed, included and implemented. Figure 9 shows an overview of the current status of the underlying data model.

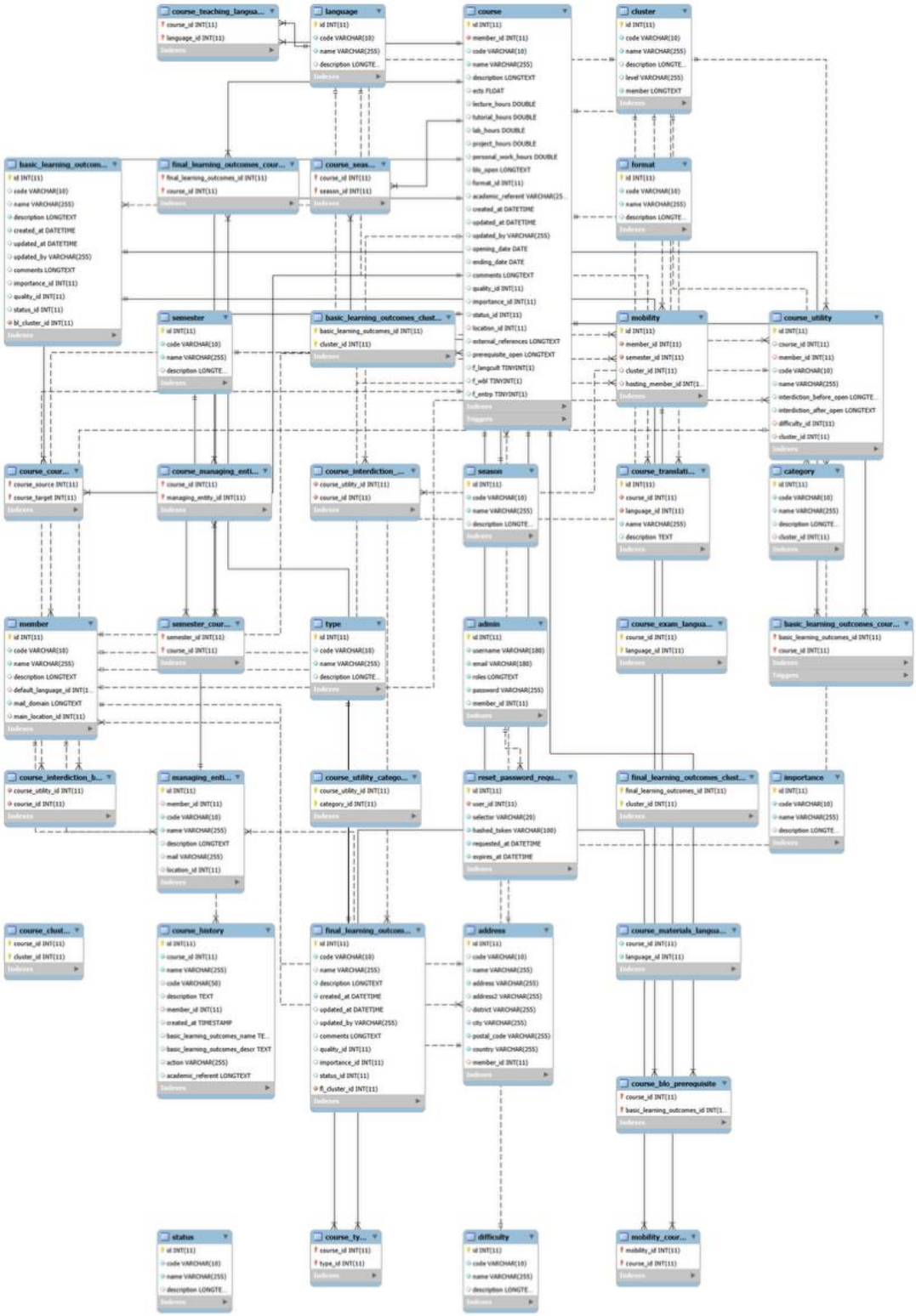


Figure 9: ER diagramm as an overview of current data model of the EUt+ Mobility Application

To support future application extensions and the planned interoperability with alliance members' institutional systems, the current data format is being mapped to European higher education standardisation initiatives, as outlined in the European Higher Education Interoperability Framework.

1.6 Outcome: Transformational role for EUt+

The EUt+ Mobility Application places students enrolled in cluster-based study programmes at the center as primary beneficiaries and supports them in leveraging the Alliance's collective resources. By providing a **user-friendly platform for identifying mobility opportunities**, the application facilitates student mobility and collaboration among member institutions, contributing to enriched academic experiences and stronger connections within the European education community. Overall, it supports a more integrated and coherent European higher education landscape.

As of October 2025, all 20 clusters established with common final learning outcomes and developing mobility maps are fully integrated into the system, encompassing more than **2,700 courses** and representing over **14,000 ECTS credits**. The platform provides comprehensive visibility of mobility-relevant curricula, including areas such as language and cultural studies, entrepreneurship, and work-based learning. For newly approved clusters, the corresponding information will be added progressively. To date, more than 3,000 users have accessed the EUt+ Mobility Application, with over **500 users** employing it to plan a semester-long mobility. Survey results indicate that the mobility maps provided were applied in more than 80% of mobility cases, demonstrating their practical relevance and added value for students. Academic staff and coordinators also benefit from the shared platform, which supports curriculum alignment and the definition of recognition arrangements. By digitalising and operationalising the outcomes of the clusters' work, the application supports systemic integration within EUt+. The Alliance further aims to share these practices and experiences with the wider higher education community to foster continued collaboration and joint advancement.

2 Seamless student mobility: European Student Card and Digital processing

2.1 State-of-the-art: digitalisation for inclusive student mobility

Across European higher education, digitalisation is increasingly recognised as a central enabler of effective, inclusive student mobility. One of the most significant policy frameworks is the **European Student Card Initiative[5] (ESCI)**, a cornerstone of the European Education Area and Erasmus+ Strategy that aims to simplify and streamline mobility procedures. The initiative combines three interlinked elements – a European Student Card, the Erasmus+ mobilily app, and the Erasmus Without Paper (EWP) network – to create a **coherent digital ecosystem** supporting students before, during, and after their mobility experience. By transforming traditional paper-based procedures into secure, online workflows, the ESCI reduces administrative burdens for both students and higher education institutions (HEIs) and makes mobility more student-centred and efficient.

A concrete example of added value is the digitalisation of key mobility documents such as Inter-Institutional Agreements (IIA) and Learning Agreements (LA). Through the EWP network[6], HEIs can exchange mobility data online, eliminating the need for manual paperwork and enabling more secure, timely information exchange between home and host institutions. This not only accelerates administrative processes but also **supports higher education internationalisation strategies** by reducing obstacles to mobility participation.

Recent data from the ESCI monitoring framework[7] demonstrate meaningful progress and adoption trends. A growing majority of Erasmus Charter for Higher Education (ECHE) holders are processing Learning Agreements digitally via the EWP network, with digital processing now preferred by over 60% of participating institutions as of early 2025. At the same time, the number of European Student Cards issued, as well as the number of connected institutions, continue to increase substantially, with millions of digital cards in circulation across multiple countries. These trends reflect a shift from pilot projects towards institutionalised digital mobility practices that enhance administrative efficiency and the overall student experience.

In this context, European University alliances have an emerging role in shaping the future of digital mobility beyond compliance. Multiple alliances[8] have advocated for extending the EWP network to include technically capable third-country higher education institutions, aiming to support even wider international cooperation and make **digital mobility tools more inclusive and globally relevant**. This signals not only a policy preference for cross-institutional digital infrastructures, but also a collective push from alliance consortia to co-

[5] https://erasmus-plus.ec.europa.eu/european-student-card-initiative
[6] https://erasmus-plus.ec.europa.eu/fr/european-student-card-initiative/ewp
[7] https://erasmus-plus.ec.europa.eu/european-student-card-initiative/the-initiative/digitalisation-rates-and-trends
[8] https://enhanceuniversity.eu/for-an-inclusive-future-of-mobility-in-european-higher-education
https://civis.eu/en/get-informed/news/european-universities-alliances-advocate-to-include-third-country-heis-in-erasmus-without-papers
https://eutopia-university.eu/english-version/partner-news/erasmus-without-paper-ewp-involvement-of-third-countries

design and expand digital mobility systems, in line with strategic priorities for cooperation, equity, and innovation.

Added value for European University alliances

Within the European Universities Initiative, digital tools for student mobility generate **added value** primarily by enabling **systemic and alliance-wide interoperability** that goes beyond bilateral Erasmus+ exchanges. The European Commission explicitly positions **European University alliances as testbeds for advanced digital mobility solutions**, notably in the context of the European Student Card Initiative (ESCI) and the emerging European higher education interoperability framework. Alliances are encouraged to experiment with **shared digital infrastructures** such as interoperable course catalogues, digital learning agreements, and student data exchange that would be difficult to deploy at the level of individual institutions acting alone. This collective scale allows alliances to address structural barriers to mobility, including fragmented IT systems and inconsistent administrative practices. A first area of concrete added value lies in the acceleration and consolidation of digital mobility workflows through alliance-level coordination. Many European University alliances actively support the uptake of Erasmus Without Paper (EWP) services among their member institutions, aligning internal processes and timelines to facilitate digital Learning Agreements, nominations, and inter-institutional data exchange. By **acting as coordination hubs**, alliances reduce uneven adoption across members and help **embed digital mobility tools into routine institutional practice** rather than treating them as isolated compliance tasks. This collective approach strengthens administrative reliability and improves the student experience by making mobility procedures more predictable and transparent across multiple destinations.

A second, distinct form of added value concerns the **extension of digital mobility beyond traditional Erasmus+ mechanisms**, particularly through alliance-level experimentation. Several European University alliances have jointly advocated expanding EWP connectivity to include technically capable third-country institutions (see above), arguing that digital mobility tools should support the broader international ambitions of alliances rather than remain limited to programme boundaries. This reflects a shift from digitalisation as a reporting or efficiency tool toward **digitalisation as a strategic enabler of inclusive and global mobility ecosystems**, a position formally articulated by multiple alliances in policy dialogue with the European Commission.

Finally, European University alliances contribute added value by **linking digital mobility tools to new forms of mobility**, including blended and virtual mobility pathways. Through shared digital platforms, alliances can combine physical mobility with online components, shared courses, and joint credentials, supported by interoperable student management and recognition systems. This alignment directly feeds into EU-level work on a higher education interoperability framework, where alliances are explicitly identified as pioneers capable of translating technical standards into operational mobility solutions. In this sense, alliances play a critical role in transforming digital tools from isolated administrative instruments into **integrated socio-technical infrastructures** that sustain mobility at scale and over time.

The work done at EUt+ within WPA8 is in line with the trends and opportunities presented above, as well as with the importance that the alliance attaches to physical student mobility embedded into the curricula.

2.2 *Physical* Student mobility at EUt+

Student mobility is a cornerstone of EUt+ activities and a key contributor to the Alliance's common identity and sense of belonging. As a foundational step in the first phase of the Alliance, the jointly established Erasmus Common Office (ECO) was created to coordinate and strengthen Erasmus activities across EUt+, supported by bilateral agreements between member institutions. The ECO facilitates a seamless and inclusive mobility experience for students and staff moving between EUt+ campuses. Mobility within the Alliance is guided by robust academic criteria developed through the clusters' mobility mapping work and made digitally accessible via the EUt+ Mobility Application, as presented in the previous chapter. Beyond enabling study pathways tailored to individual learning objectives and training needs, and fostering linguistic skills and cultural immersion, ensuring that each campus feels welcoming and familiar with the motto "feeling at home on every campus" is a central element of the EUt+ mobility experience.

As EUt+ evolves, student mobility is expected to increase, driven by the ambition to foster multiculturalism and multilingualism. To achieve this, a key component is the implementation of seamless and flexible mobility schemes for students and staff, facilitating free and effortless movement across campuses. This mobility is designed to allow students to navigate different linguistic environments with ease. For this, the EUt+ curricula are structured to enable automatic recognition of credits (ECTS) across institutions, ensuring that students can move freely across several EUt+ campuses without having to worry about credit transfer issues, and obtain the EUt+ Certificate as an attachment to their national diploma. Through this mobility scheme students have the opportunity to develop new learning experiences and engage in cultural exchange, broadening their academic and personal horizons. With the alliance-wide collaboration, the goal persued is to make mobility as easy and welcoming as possible, ensuring that students feel at home on every campus

Developing relevant and effective digital support for student mobility within the European Higher Education Area requires the adoption of European standards. In this context, the European Student Card Initiative (ESCI) offers EUt+ multiple benefits, including streamlined mobility, simplified administrative processes, and an enhanced student experience. ESCI enables students to verify their status across Europe, access services and resources, and participate in joint programmes and activities. By implementing ESCI, the Alliance promotes European integration, fosters a sense of community, and provides students with a seamless and efficient experience. Conceptual analysis has identified three key action areas related to Erasmus+ mobility. The educational dimension of facilitating meaningful study pathways and appropriate mobility opportunities is captured in the EUt+ Mobility Maps, as described in Chapter 1. The managerial dimension of ensuring smooth mobility operations relies on the digitalisation potential of Erasmus Without Paper (EWP), focusing on the digital processing of agreements between member institutions and the exchange of data of and with students undertaking mobility. Finally, access to resources and services during the mobility period is provided through a common student card. These components together

constitute the operational foundation and direct support for student mobility, as detailed in the following sections.

2.3 Supporting mobility through the European Student Card Initiative

The European Student Card Initiative (ESCI) constitutes an important component of the Erasmus+ programme and its seamless operation across Member States. It offers a framework for simplifying student mobility within the EHEA. This initiative seeks to create a seamless and efficient experience for students, enabling them to move freely between institutions and countries by simplifying administrative processes and enhancing the digitalisation of Erasmus+ exchanges for students of all level and higher education institutions. The ESCI aims to achieve the objectives of:

1. **Simplification of student mobility**: Streamline the process of student mobility, reducing administrative burdens and increasing the ease of movement, thus lowering barriers.
2. **Enhancing student experience**: Improve the overall experience of students, enabling them to focus on their academic pursuits rather than administrative tasks.
3. **Promotion of European integration**: Foster a sense of European identity and integration among students, promoting cultural understanding and exchange.

For achieving these goals, the ESCI is based on three key practical building blocks[9]:

1. **Building Block 1: The European Student Card:** The European Student Card (ESC) has been designed as a means to simplify study mobility across Europe. It is a digital card that serves as a single identifier for students, facilitating access to services and resources across institutions and countries. By transforming current student cards into a European Student Card, students can benefit from on- and off-campus services during their mobility period. The ESC is a key component of the ESCI, enabling students to easily verify their student status and access services and resources across Europe. The ESC offers the following key features:
    a. **Digital Identity**: A digital identity for students, enabling them to access services and resources across institutions and countries.
    b. **Standardised Verification**: A standardised and easily verifiable means of confirming student status, facilitating seamless mobility and recognition of academic credentials.
    c. **Interoperability**: Ensuring that systems and services are interoperable, enabling seamless communication and data exchange between institutions and countries.
2. **Building Block 2: The Erasmus+ App:** The Erasmus+ App is a mobile application designed to support students in managing their mobility by providing access to services and resources across Europe. The tool provides a range of practical features

[9] https://erasmus-plus.ec.europa.eu/european-student-card-initiative?pk_source=website&pk_medium=link&pk_campaign=hp&pk_content=hp-cta-esci

and functionalities that allows a seamless planning, execution, and evaluation of student mobility. It is a single app for access of students to their European Student Card, verify their student status, and access services and resources across institutions and countries.

   a. **Supporting Students: Practical administration and planning**: The app offers a suite of features that assist students with all aspects of their mobility experience during all phases. For example, for pre-mobility, when planning the stay abroad, including information on visa requirements, accommodation options, and cultural orientation. The in-mobility support assists during the stay at the host institution for accessing practical resources and support services, including information on academic requirements, language support, and cultural adaptation. As a post-mobility evaluation after completing the mobility experience, the app can be used to reflect on the experience, evaluate the learning outcomes, and provide feedback on the host institution.
   b. **Enhancing institutional engagement: The mobility module**. The Erasmus+ App also includes a mobility module that enables Higher Education Institutions (HEIs) to interact with students in a more effective and engaging way. This module is based on data from Inter-institutional Agreements and provides students with a range of opportunities and resources, including event promotion related to mobility, such as cultural festivals, language courses, and academic workshops. Furthermore, the app enables HEIs to share information with students on a range of topics related to mobility, including academic requirements, language support, and cultural adaptation.

3. **Building Block 3: Erasmus Without Paper – a digital platform for simplifying student mobility.** Erasmus Without Paper (EWP) is a digital platform designed to support the exchange of documents and information between institutions and countries. EWP enables the secure and efficient exchange of documents and information in a digital manner, reducing administrative burdens and enhancing mobility. EWP offers a range of key features and benefits, including:
   a. **Digital document exchange**: A secure and efficient means of exchanging documents and information between institutions and countries.
   b. **Reduced administrative burden**: Reduced administrative burdens for institutions and countries, enabling them to focus on supporting students and promoting mobility.
   c. **Improved recognition**: Improved recognition of academic credentials, enabling students to access services and resources across institutions and countries.
   d. **Increased mobility**: Increased mobility for students, reducing administrative burdens and increasing the ease of movement.

By providing a standardised and verifiable method for confirming student status, the European Student Card Initiative (ESCI) supports European integration, enhances the student experience, and facilitates the free movement of students within the European Higher Education Area (EHEA). Beyond establishing agreements on the automated recognition of courses among Alliance members, the mobility process must be executed without interruptions caused by media friction or the need for manual intervention which

can introduce delays or errors. Achieving fully electronic data exchange requires resolving potential incompatibilities and harmonising data formats. This involves not only specifying message transport mechanisms, communication protocols, and security measures, but also defining any necessary transformations between standardised message structures and local institutional formats at both sending and receiving ends. A general standard or a specific structural specification must be agreed upon to ensure consistency. In this context, standards are documented agreements on specifications and properties that are applied consistently as operational rules or for the precise identification of classification purposes. Compliance with ESCI thus provides the technical and operational foundation for EUt+ to develop seamless, reliable, and interoperable student mobility across the Alliance.

2.4 Erasmus Without Paper (EWP) in EUt+

As introduced above, the Erasmus Without Paper (EWP) project is an initiative to digitalise administrative processes in the Erasmus+ Mobility Programme. It supports the digitalisation of existing administrative processes. The key elements of this digital data exchange are:

1. **Secure data transfer**: Ensuring the secure transfer of data and information between universities in different countries. Each partner participating in Erasmus organises and manages its mobility programmes in a dedicated online database chosen at their discretion. The EWP network enables relevant data to be exchanged digitally between the various databases and partner universities.
2. **Simplified administration**: Automating the management and administration of international mobility by reducing the administrative burden. A higher education institution can maintain its existing system for managing student mobility and connect it to the EWP network without the need for a new or separate IT system.
3. **Paperless exchange**: Eliminating the exchange of paper documents and using digital solutions instead of uploading, downloading or printing PDFs or paper copies of documents for processing.
4. **Efficient processing**: Accelerating and automating the processing of data and information, in particular for improved recognition of academic credentials, enabling students to access services and resources across institutions and countries.

Erasmus Without Paper serves as a management system for European higher education institutions, enabling students and institutions to manage mobility online. The Erasmus Dashboard, funded by the European Commission, is a digital platform that supports the administration of Erasmus mobility programmes by providing a centralised, user-friendly interface for students, institutions, and national agencies to track and manage individual mobilities. This online tool, available free of charge, facilitates the management of Inter-Institutional Agreements, the creation and processing of Learning Agreements, and the entry of relevant data into the Erasmus+ App, ensuring a streamlined and efficient mobility workflow and enhancing the overall student experience. Adoption of the EWP Dashboard by all EUt+ Alliance members provides standardised and uniform support for the administrative tasks associated with mobility, promoting efficiency, transparency, and cooperation within Erasmus+ programmes. Furthermore, compliance with this European

interoperability standard enables future extension and seamless integration with the broader Erasmus ecosystem, avoiding the need to develop individual solutions.

EWP offers a range of features, including mobility management, reporting, and analytics, to facilitate the administration of Erasmus programmes and enhance the overall mobility experience. The dashboard aims to streamline processes, reduce administrative burdens, and promote transparency and efficiency in Erasmus mobility management by offering the digital processing of inter-institutional and learning agreements, nomination of students and the processing of the mobility details for the creation of Transcripts of Records. As a result, EWP offers several benefits:

1. **Time savings**: Accelerating the processing of data and information.
2. **Cost savings**: Simplifying and cost-effectively managing international mobility.
3. **Increased security**: Ensuring the secure transfer of data and information.
4. **Improved efficiency**: Efficiently and automatically processing data and information enabling universities to streamline their processes and reduce costs.
5. **Increased mobility**: Increased mobility for students, reducing administrative burden and increasing the ease of movement.

It should be noted that the development of the EWP Dashboard is ongoing, with additional features expected over time. Accordingly, efforts to promote the digitalisation of each Alliance member must take into account the current capabilities and the feasibility of connecting local management systems to the Dashboard. To provide a comprehensive foundation for further integration at the Alliance level, EUt+ has analysed the current status of Erasmus digitalisation in each member university, as reported in the following section.

2.4.1 The Erasmus+ Mobility Process

The Erasmus+ mobility process is a sequence of events that necessitates coordinated communication between the sending (or home) Higher Education Institution (HEI) and the receiving (or host) HEI as depicted in Figure 10.

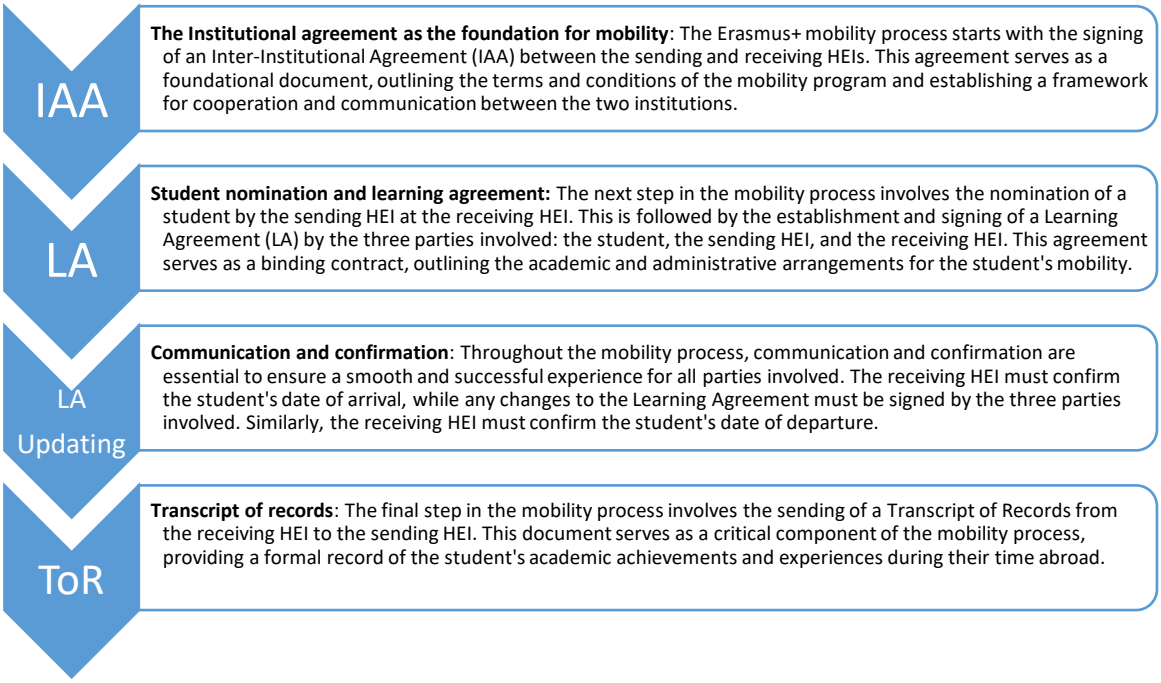


Figure 10: The Erasmus+ Mobility Process

Within EUt+ this process is supported through the activities of the ECO to align the implementation of mobilities. For digital processing all alliance members are connected to the EWP Dashboard, albeit with a different usage potential of the possible functionalities, depending on the implementation of the Dashboard Application Programming Interfaces (API).

2.4.2 Role of member universities in mobility data management

Each university participating in the Erasmus programme is responsible for organising and managing its respective mobility programmes within a dedicated online database. The choice of database is determined by each individual university, allowing for flexibility and adaptability in the management of mobility programmes. As of October 2025, analysis shows that all nine EUt+ Alliance members are connected to the EWP Dashboard through their respective EWP service providers or system, as detailed below:

- 3 members using the EWP Dashboard,
- 4 members using the QS MoveOn application,
- 2 members using locally developed individual systems.

It is important to note that experience with the operation of the relevant local systems varies across the member universities. In 2025, two of the member universities using MoveOn only implemented it this year, whereas the others have been working with their systems for several years. Within the alliance, it has been observed that knowledge transfer and support for troubleshooting can benefit newly onboarded member universities.

Regarding the services offered by each Alliance member within the EWP Dashboard, all nine member universities have implemented the same version of the primary network API. Additionally, six of the nine universities have implemented the Echo API, which enables verification of the node's operational status and functionality, as well as confirmation that authentication processes are correctly executed.

The dashboard's General Purpose APIs enable the exchange of information for communication purposes, covering various aspects such as:

1. **Institutions:** Retrieval of general information about institutions recognised by the host.
2. **Organisational units:** Access to general information about specific organisational units, including faculties, departments, and divisions.
3. **Courses:** Provision of information on courses and other learning opportunities offered by the Higher Education Institution (HEI).
4. **Simple course replication:** Replication of the HEI's course catalogue.
5. **File sharing:** Secure sharing of files among member universities.

Table 1 presents the versions of these implemented APIs.

General Purpose APIs at member universities	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
Institutions	2.2.0	2.2.0	2.2.0	2.2.0	2.2.0	2.2.0	2.1.0	2.2.0	2.2.0
Organisational units	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1	2.1.1
Courses	-	-	-	-	-	-	0.7.1	-	-
Simple course replication	-	-	-	-	-	-	1.0.0	-	-
File	-	-	1.0.0	-	1.0.0	1.0.0	1.0.0	-	1.0.0

Table 1: EWP Dashboard General Purpose APIs implementation at the EUt+ member universities

These APIs facilitate efficient data exchange and communication, supporting the dashboard's functionality and user experience. The exchange of data concerning the member institutions and their units is effectively implemented. Further analysis of the APIs for exchanging data on courses needs to be undertaken in connection with the EUt+ Mobility Application to conceptualise and define the data exchange processes to be implemented.

The processing of Inter-Institutional Agreements (IIAs) as the foundation for the EWP Process has been analysed as depicted above. The dashboard's APIs for processing facilitate the exchange of information and agreements, allowing member universities to:

1. **IIA (Get/Index/Stats)**: Compare and Validate IIAs to retrieve, index, and compare their copies of Erasmus+ Inter-institutional Agreements with those of other members.
2. **IIA CNR**: Monitor IIA Changes to listen for updates and changes in other members' copies of IIAs within the EWP network.

Co-funded by the European Union

3. **IIA Approval**: Approve IIAs to enable Higher Education Institutions (HEIs) to approve IIAs sent by their partners.
4. **IIA Approval CNR**: Track IIA Approvals to allow member universities to receive notifications when their copies of IIAs are approved by other institutions.
5. **Mobility Factsheet**: Share Mobility Information to exchange useful information for incoming students during the mobility process, such as factsheets, through a dedicated API.

Table 2 presents the versions of these implemented APIs .

Inter-institutional Agreements APIs at member university	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
IIA (Get/Index/Stats)	7.0.0	7.0.0	7.0.0	7.0.0	7.0.0	7.0.0	7.0.0	7.0.0	7.0.0
IIA CNR	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0	3.0.0
IIA Approval	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0
IIA Approval CNR	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0	2.0.0
Mobility Factsheet	1.2.0	1.2.0	1.1.0	1.2.0	1.1.0	1.1.0	-	1.2.0	1.1.0

Table 2: EWP Dashboard IAA APIs implementation at the EUt+ member universities

These APIs streamline the management of Inter-institutional Agreements, enhancing collaboration, transparency, and efficiency among the alliance members. The overview shows that the exchange of IAA relies on the same versions of the APIs at all members. As a result, the technical foundation for a meaningful data exchange is given. Nevertheless, the use of the Mobility Factsheet needs to be further explored and promoted, as there are potential connections, not only to the Erasmus+ App, but also with regard to the information contained in the mobility maps and its potential reuse at several points during the implementation of the digitalisation steps.

An inquiry into the present state of realising the digitalisation of the closing and management of IAA has shown that presently within the alliance, the number of IAA between the alliance members is not given as eight per members as would be the case if each member university has one all-encompassing agreements with the others. Instead, agreements have been or are in the process of being created at different levels, e.g. faculty to faculty or faculty to institution. At the time of reporting, eight of the nine members are processing their IIAs digitally, while the remaining member is finalising the implementation of its local system.

The next steps in the EWP process involve the digitalisation of the process for nomination of students and the processing of Learning Agreements (LAs), including communication about changes or updates. Digital student nomination is a new feature of the EWP Dashboard. Within EUt+, standardising the nomination process across member institutions represents an opportunity to be addressed in the next phase. The possibilities for digitally processing Learning Agreements have also been analysed. The dashboard's APIs facilitate the exchange of information and agreements for individual student mobilities. The

functionalities differ, depending on the role of the member institution either as a sending institution for outgoing students or as a host institution for incoming students.

For outgoing mobilities, the dashboard provides the following APIs:

1. **Omobility (Get/Index):** Implemented by the sending Higher Education Institution (HEI), this API allows the receiving HEI to read and enumerate mobilities stored in the sending HEI's system.
2. **Omobility CNR:** Implemented by the receiving HEI, this API enables notifications whenever outgoing mobilities kept in the member's system are changed.
3. **Omobility Stats:** Implemented by the sending HEI, this API provides statistics describing outgoing mobilities.
4. **Omobility LA (Get/Index/Update/Stats):** Implemented by the sending HEI, this API allows the receiving HEI to read and accept Learning Agreements stored in the sending HEI's system or propose changes to them.
5. **Omobility LA CNR (Stats):** Implemented by the receiving HEI, this API enables notifications whenever Learning Agreements kept in the member university's system are changed.

Table 3 presents the versions of these implemented APIs .

Outgoing Mobilities APIs at member university	**I**	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**
Omobility (Get/Index)	2.0.0	2.0.0	2.0.0	-	2.0.0	2.0.0	1.0.0	2.0.0	2.0.0
Omobility CNR	1.0.0	1.0.0	1.0.0	-	1.0.0	1.0.0	1.0.0	1.0.0	1.0.0
Omobility Stats	-	-		-	-	-	-	-	-
Omobility LA (Get/Index/Update/Stats)	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0	1.2.0
Omobility LA CNR (Stats)	1.1.0	1.1.0	1.1.0	1.1.0	1.1.0	1.1.0	1.1.0	1.1.0	1.1.0

Table 3: EWP Dashboard LA APIs for Outgoing Mobilities Implementation at the EUt+ member universities

For data processing for incoming mobilities the dashboard provides the following APIs:

1. **iMobility (Get)**: Implemented by the receiving Higher Education Institution (HEI), this API allows the sending HEI to access the receiving HEI's portion of the information related to the sending HEI's outgoing mobilities.
2. **iMobility CNR**: Implemented by the sending HEI, this API enables notifications whenever incoming mobilities kept in the member university's system are changed.
3. **iMobility ToR (Get/Index)**: Implemented by the receiving HEI, this API allows the sending HEI to retrieve Transcripts of Records issued by the receiving HEI.
4. **iMobility ToR CNR**: Implemented by the sending HEI, this API enables notifications whenever Transcripts of Records served by the partner's system are changed.

Table 4 presents the versions of these implemented APIs .

Incoming Mobilities API at member university	I	II	III	IV	V	VI	VII	VIII	IX
iMobility (Get)	1.0.0	1.0.0	1.0.0	-	1.0.0	1.0.0	1.0.0	1.0.0	1.0.0
iMobility CNR	1.0.0	1.0.0	1.0.0	-	1.0.0	1.0.0	1.0.0	1.0.0	1.0.0
iMobility ToR (Get/Index)	2.0.0	2.0.0	-	-	-	-	-	2.0.0	-
iMobility ToR CNR	1.0.0	1.0.0	-	-	-	-	-	1.0.0	-

Table 4: EWP Dashboard LA APIs for Incoming Mobilities Implementation at the EUt+ member universities

A joint analysis of the data exchange functionalities presently available within the alliance shows that the majority of the member universities have already implemented the APIs for handling outgoing and incoming mobilities in the same versions. Although the ninth member has implemented APIs that are compatible in principle, its participation is not yet fully operational.

An inquiry into the present state of realising the digitalisation of the closing and management of LAs has shown that presently within the alliance, the percentage varies considerably between the member universities. For the academic year 2024/2025, the problems reported included differing data descriptions or field usage, and connectivity issues to the dashboard, in particular, due to the challenges surrounding the processing of digital agreements for Erasmus Blended Intensive Programmes (BIPs).

Furthermore, the analysis of the implementation of the APIs further reveals the possibility for digitally processing data concerning the Transcripts of Records as the last step of the EWP Process between member universities can be further explored. To date, this dashboard functionality is in an experimental status for exploring the exchange of the student mobility actual start and end dates, the course completion including grading and ECTS obtained by the student.

2.5 An EUt+ student card

A student of EUt+ must feel at home on every campus. To achieve this, students should have access to the same services and facilities, regardless of whether they are locally enrolled or participating in a mobility at another Alliance institution. Access to campus facilities is typically enabled through a local student card. With the introduction of the EUt+ Student Card, the alliance aims to provide digital card services across all member institutions, incorporating both local campus services and the functionality of the European Student Card (ESC). The ESC is a digital extension that provides a single, standardised student identifier, facilitating access to services and resources across institutions and countries. The ESC is part of the European Student Card Initiative (ESCI), which seeks to establish a unified and interoperable system for student identification and mobility across Europe.

Importantly, the ESC is not a newly issued or additional card; rather, it represents an upgrade or extension of existing student identification cards. Depending on the card

formats used by a Higher Education Institution (HEI), the ESC can be implemented in digital or physical form and integrated into existing cards using various technologies. By integrating ESC elements into their student cards, HEIs enable Europe-wide recognition of student status. This supports reliable identification and validation of students while on mobility and facilitates access to both on-campus and off-campus student services. Transforming member universities' student cards into an ESC requires the inclusion of a:

1. **European Student Card Number (ESCN)**: a unique card identification number allowing identification and validate a card as a European Student Card,
2. **European Student Identifier (ESI)**: A unique student identification number that enables the reliable identification of students across institutions, supporting access to online student services and recognition of student status during mobility periods,
3. **ESC Logo**: a QR code in combination with the printed text "European Student Card", and the EU flag.

The identifiers and service listings are managed through the European Student Card Router & Service Manager (ESC-R) as a digital European platform for the participating institutions to integrate the ESC features into their students' cards, to manage them and to facilitate real-time validation of student status.

However, issuing an ESC and listing the services offered by a student card does not automatically enable usage of a service itself. Here a technical definition, development and implementation are required for availability. This underlying process has been defined as comprising three stages as depicted in Figure 11. Ultimately, the result is a specific card for EUt+, usable not only as a student card, but also for staff locally and on mobility in the alliance.

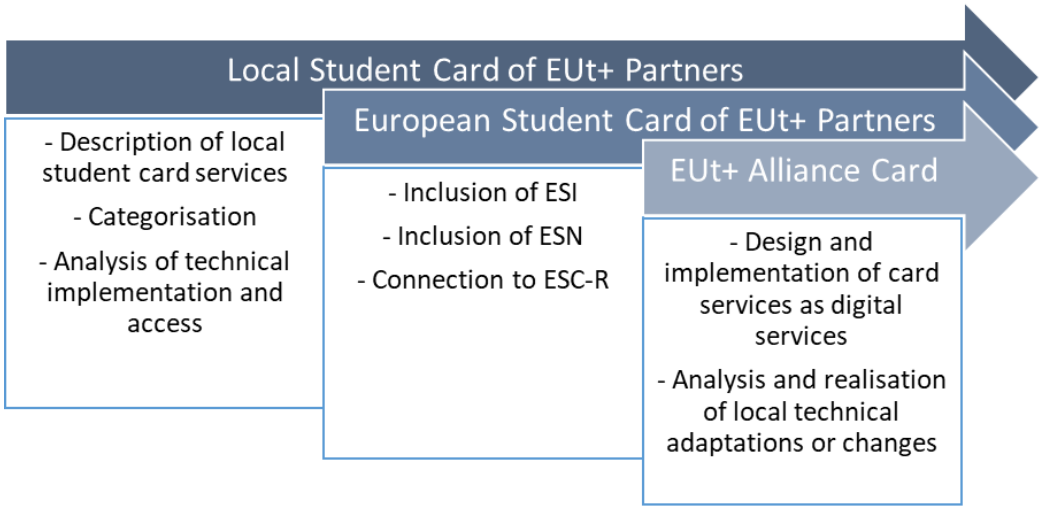


Figure 11: Process Steps for the Development of the EUt+ Alliance Card

The design of this process has been guided by the goal to adopt European standards. In addition to the ESCI initiative, the European Higher Education Interoperability Framework

provides the starting point for the last steps envisioned. In particular, the common standard processes defined, and IT systems recommended support the decision making in the last stage.

2.5.1 Services of the Alliance member universities' Student Cards

Each member institution is issuing their own student card. An in-depth analysis of the services provided or accessible through the student cards of each member university provides an overview of the type of services as depicted in Figure 12.

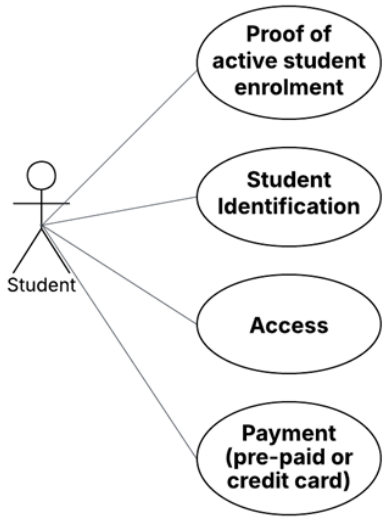


Figure 12: Use Case DiagramStudent Card

For identifying the connection of a use case to a service provider, the analysis revealed usage scenarios in detail:

1. **Proof of active student enrolment**
    a. On campus: library access, printer or copier use
    b. Off campus: semester ticket for public transportation, specific transport tickets, general eligibility for student discounts (culture institutions, events, ...), access to external libraries (regional, national)
2. **Student identification**
    a. On campus: attendance (of classes or examinations), self-check-in for borrowing books from the library
    b. Off campus: regional or national authorities (e.g. health insurance, for student employment) as proof of enrolment, semester ticket for public transportation, ESI, European and International Student Card function
3. **Access**
    a. On campus: rooms, laboratories, parking lots, lockers
    b. Off Campus: facilities by third party providers (dormitories, sports facilities)
4. **Payment**

a. On campus: canteen (student cafeteria), copier and printer fees, library fees, vending machines, print services
b. Off campus: facilities usage by third parties (washing in dormitories)
    i. Prepaid function
    ii. Credit card function

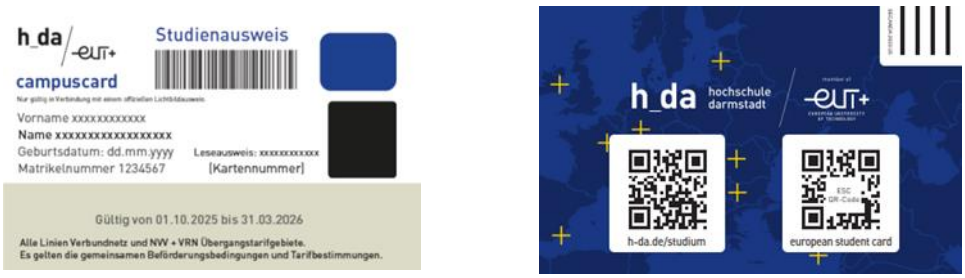
To date, the majority of the member universities provide a physical card to their students, while the first ones are either planning or have started to move the card functionalities into a campus app. Locally, the reading of either the card or the app differs among the member universities. Some of the cards have magnetic stripes, others contain a bar or QR code to be read with the applicable reading devices at the service delivery point. Wireless communication technologies, both NFC (Near Field Communication) and RFID (Radio Frequency Identification), are in use. Both enable contactless interaction, but differ in terms of their operating frequencies, and ranges. These technologies are usually employed for payment systems, access control, and management of inventory, i.e. library books and media. For the public transportation in some countries, an app provided by the transportation authority or company is used together with the physical card.

2.5.2 Extension as European Student Cards

The European Student Card (ESC) introduces a unified European identity for students in higher education, enabling them to easily verify their student status across Europe. By linking their existing student cards to the ESC router and adding the ESC logo, card issuers enhance the functionality of these cards. This allows students to access services both on and off campus during their mobility period, without needing to apply for a new or additional student card. The card provides students with simplified access to services on and off campus during their mobility, using their existing student card from their home institution, adding a European dimension to their student status which facilitates mobility and recognition across Europe. For Higher Education Institutions (HEIs), the ESC offers secure validation of the student status of external mobility students, while eliminating the need to issue a new student ID card for mobile students. For service providers, the card simplifies the verification of student status, making it easier to offer services to students from other institutions.

The analysis conducted and mentioned above, concerning the services provided by the member universities' student card, furthermore established the extension of the local cards into a European Student Card (ESC) by four of the alliance members. In Figure 13, examples from two member universities are shown.

Front



Back

Figure 13: Example of ESC of EUt+ member universities

As can be seen from the given examples, the cards still contain the individual design of a member university. However, the presentation of the EUt+ alliance membership follows the branding principles of EUt+ as can be seen on the cards' back side with the representation of the EUt+ membership logo as well as the QR-Code for identification as an ESC.

The steps for adding the European dimension to the local cards include adding of the European Student Card Number (ESCN), generated by the HEI and transmitted to the European digital platform ESC Router (ESC-R), and the European Student Identifier (ESI) also created by the HEI, based on the student number of the student's home university and additional elements to ensure that each ESI is unique. Such elements can be either the country code or the institutions code, depending on the desired range in the format SCHAC - SCHema for ACademia to enable interoperability.

The ESC-R is a digital platform hosted on the European Commission's cloud infrastructure for supporting the implementation of the European Student Card. The platform enables HEIs to issue digital ESCs and allows mobile students to validate their student status and access various student services seamlessly across the European Education Area. For this, the ESC-Router database requires and stores the ESI, the ESCN, and additionally other optional information, e.g. student name, date of birth, telephone number, email address and level of study, to provide a more comprehensive profile.

In order to facilitate further adoption of the ESC within the alliance, the process for joining, as well as the specifications provided within the frame of the ESCI, have been promoted. As a result, the basic step of registering with the ESC-R has in the meantime been successfully completed in 2025 by three more Alliance members, resulting presently in a total of seven alliance members. In the future, these activities are to be continued and extended onto the remaining members.

2.5.3 Creation of an EUt+ alliance card as digital service

As mentioned above, for facilitating students feeling at home on each EUt+ campus, the need for students in mobility to be recognised and to obtain access to services in the same manner as the locally enrolled students, is of utmost importance. The designed instrument to fit this purpose is an EUt+ Alliance Card, offering easy access to services for all Alliance members, students and staff alike. Being able to use an ESI enables identification of a student on the European level. However, as the next logical step, this identification needs to provide access to the services on campus through technical enablement.

However, in order to avoid falling back on the issuing of physical cards for local service access, the way forward is further digitalisation, with the goal of being able to offer easy access to the services as presently collected in the local student cards, or ESC, respectively. At the heart of this decision, is the idea of splitting the local student card functionalities and digitising them into separate digital service passes, usable through smart phones or generally smart device wallets. In this way, service passes can be individually downloaded into mobile wallets as needed, in accordance with the relevant role.

Collaboration with other European University Alliances revealed that EUGLOH has developed a solution called eduTAP – Educational Tapping. This open-source framework enables higher education institutions to provide seamless access to campus services via smart devices, using Apple and Google Wallets. Recognised by the European Commission and included in the European Higher Education Interoperability Framework, eduTAP eliminates the need for physical cards or dedicated apps. Instead, students can perform transactions with a simple tap – a technology that is now standard across Europe.

To explore its potential, EUt+ conducted an initial functional test in spring 2025 with one member university. The goal was to validate data transfer and define technical parameters using middleware for issuing service passes rather than direct encoding. As a functional test, a digital library pass was created and successfully tested. The full workflow with requesting, issuing, adding a pass to a wallet, and using it for library access was completed by multiple active users without issues. Building on this success, the next project phase will focus on designing a comprehensive implementation roadmap. This plan will consider local conditions and technical capabilities across all member universities to ensure interoperability and scalability.

2.6 Transformational Role for EUt+

Participating as a European University Alliance in the European initiatives for digitalisation and interoperability is central to EUt+ activities. Supporting mobility in all its aspects is firmly engrained in the acitivites surrounding the provision of seamless mobility by way of digitalisation of processes. The European Student Card initiative aims to provide students with a seamless and secure digital identity for use throughout their studies, particularly during mobility periods. EUt+ addresses this goal on two fronts. Firstly, by implementing Erasmus Without Paper (EWP) to ensure fully digital agreement processing, reducing administrative burden and delays. Secondly, by adopting the European Student Card (ESC) and developing an alliance-wide digital card, a priority that strengthens student mobility, collaboration, and the overall experience. The initial focus is on promoting mobility within

the alliance. Simplifying preparation and documentation makes mobility easier and more accessible. This approach also enhances the benefits of Erasmus+ and brings campuses closer together, an important step toward building a truly integrated, multi-campus European University.

Co-funded by the European Union

3 Services for Open Science Realisation: EUt+ Academic Press and Common Repository

3.1 State-of-the-art: Open Science and academic publishing in Europe

European research and higher education policy increasingly recognises **Open Science and digital scholarly infrastructures** as **strategic assets for Europe's competitiveness**, knowledge sovereignty, and innovation capacity. Within the European Research Area (ERA), open access to scientific knowledge is no longer a peripheral objective but a structural condition for excellence, collaboration, and societal impact. The European Commission[10] has made Open Science guided by the FAIR[11] principles (Findable, Accessible, Interoperable, Reusable) a core requirement of EU-funded research, notably under Horizon Europe, reinforcing the role of publicly governed digital infrastructures in safeguarding long-term access to research outputs.

At infrastructure level, Europe has deliberately pursued a federated model rather than centralised platforms. The European Open Science Cloud[12] (EOSC) provides a pan-European framework to interconnect institutional and national repositories, data infrastructures, and scholarly services, enabling cross-border discovery, access, and reuse of research outputs. Complementing this, OpenAIRE[13] acts as a key operational layer, aggregating metadata from thousands of institutional repositories, journals, and data sources to support open-access compliance, interoperability, and visibility of European research. Together, these tools constitute the backbone of Europe's digital scholarly communication ecosystem.

Within this ecosystem, **university academic presses** and **institutional repositories** have gained **renewed strategic importance**. Across Europe, universities are developing non-profit, open-access publishing platforms to retain academic control over editorial processes, ensure cost transparency, and support multilingual and interdisciplinary publishing. These initiatives add value by increasing the visibility and reuse of European research, supporting early-career researchers, and reducing dependency on commercial publishing models. When aligned with OpenAIRE and EOSC, institutional presses and repositories directly contribute to ERA objectives by reinforcing interoperability, long-term preservation, and public ownership of knowledge (ERA Policy Agenda[14] 2025–2027).

However, significant challenges remain. Repository and publishing infrastructures vary widely in technical maturity, metadata quality, governance, and sustainability, limiting seamless interoperability at European scale. Long-term funding models, professional publishing capacities, and alignment with evolving standards are unevenly distributed, particularly among smaller institutions. At the same time, Europe's continued reliance on global commercial publishers raises concerns regarding costs, data control, and strategic

[10] https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/open-science/open-access_en
[11] https://www.go-fair.org/fair-principles/
[12] https://research-and-innovation.ec.europa.eu/strategy/strategy-research-and-innovation/our-digital-future/open-science/european-open-science-cloud-eosc_en
[13] https://www.openaire.eu/
[14] https://european-research-area.ec.europa.eu/era-policy-agenda-2025-2027

autonomy – issues increasingly framed within broader discussions on European digital and knowledge sovereignty.

In this context, the development of an alliance-level university press and shared repository framework represents a powerful and timely opportunity. An alliance university press can pool editorial expertise, technical infrastructure, and governance capacity across institutions, achieving a scale and sustainability that individual universities often cannot reach alone. Embedded within European infrastructures such as EOSC and OpenAIRE, such a press can serve as a trusted vehicle for open-access publishing, reinforce shared quality standards, and amplify the visibility and impact of joint research and educational outputs. More broadly, it embodies the ERA vision in practice: a collective, interoperable, and publicly governed scholarly communication model that strengthens Europe's research sovereignty while accelerating knowledge circulation and innovation across borders.

EUt+ Academic Press, under Task 8.3, focuses on connecting university libraries to create a unified digital publishing environment. It provides editorial and publishing services and supports the EUt+ Open Access repository. To deliver these services and assist authors, the Press team works closely with Work Package 5, ensuring effective exploitation and dissemination of research results.

This initiative builds on achievements from the first phase of EUt+. During that phase, an experimental EUt+ Open Access (OA) repository and the EUt+ Academic Press were implemented to strengthen the alliance's profile. These results now need to be stabilised, consolidated, maintained, and expanded across EUt+, with further development presented in this chapter.

3.2 EUt+ Academic Press for Open Access publishing

In this task, the university libraries of the EUt+ alliance members cooperate to ensure high quality publishing and open access publishing of a high standard. The EUt+ Academic Press is a non-profit, open access university publisher operated by the EUt+ alliance. It is available to all its member institutions, for researchers, teachers, and students alike. Committed to the principle that academic work should be freely accessible to all, the Press provides free-of-charge online access to its digitally published materials, contributing to the dissemination of knowledge in line with the Open Science paradigm for a global audience.

The guiding principle is that high-quality academic work from authors from all disciplines can be published under Creative Commons Attribution licenses (CC BY 4.0 International or CC BY-SA 4.0 International). The Press operates on a Diamond Open Access model to ensure free, immediate, and permanent online access. This commitment is formalised in the EUt+ Open Research Statement, while the EUt+ Ethics Statement defines the principles that govern the Press.

For authors within the alliance interested in publishing with the EUt+ Academic Press, all relevant information, guidelines and submission forms are made generally available on the EUt+ intranet platform. Submissions require a proposal form and a manuscript review process. This process is coordinated by local task participants and evaluated by review bodies at each university, known as the EUt+ Academic Press Committees.

Conference proceedings and seminar outputs produced under EUt+ auspices can be automatically published, provided they adhere to author guidelines, alongside individual author submissions using the provided templates (MS Word or LaTeX). The process workflow for publishing foresees several process steps as illustrated in Figure 14.

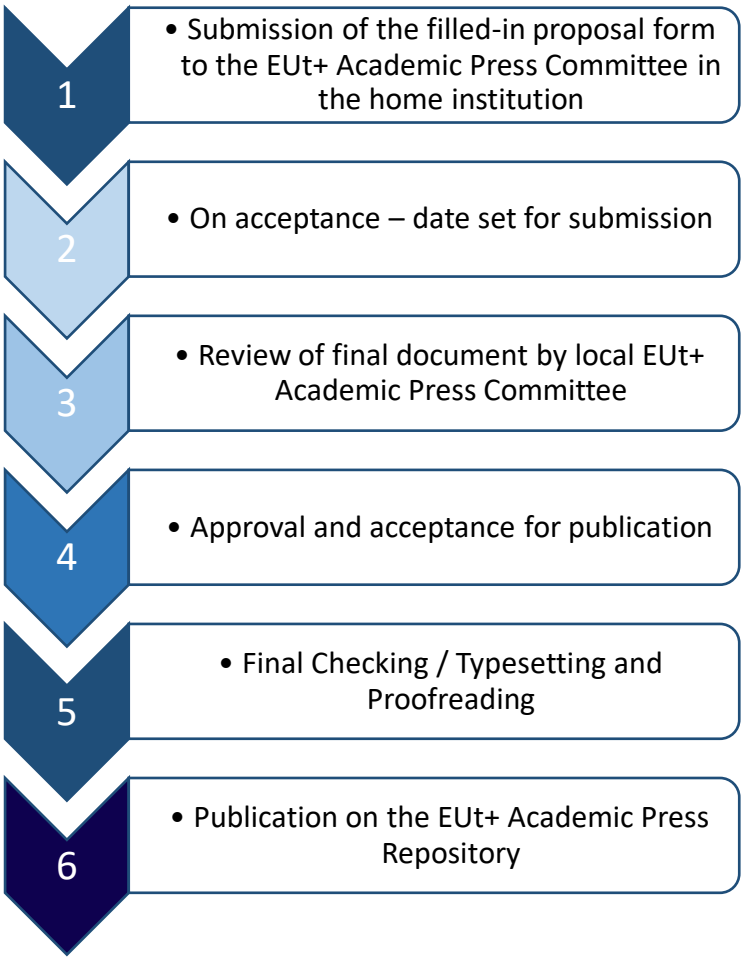


Figure 14: Process for publishing with the EUt+ Academic Press

Submissions to the Press start with completing a proposal form and following a defined workflow. Authors must comply with the author guidelines. For support, templates are available in MS Word and LaTeX. The completed proposal form and manuscript are submitted to the EUt+ Academic Press via the designated local task participant. Each submission is evaluated by the local EUt+ Press Committee, which acts as the review body at each member university. Committees can also consult subject matter experts when needed. Once approved, the manuscript undergoes typesetting and proofreading. Final publishing takes place through digital release on the dedicated EUt+ Academic Press repository.

Since its founding, the EUt+ Academic Press has published 10 conference proceedings, 16 conference papers, and 5 books, with additional publications currently under review or in the publishing process.

3.2.1 Repository requirements

A common EUt+ Open Access repository has been chosen as the central collection point for publications from the EUt+ Academic Press. In the first phase of EUt+, an experimental pilot was implemented by TU Dublin as a proof of concept. However, when the pilot license expired without renewal options, the need for a stable, future-proof solution became critical.

Furthermore, the previous, now expired pilot set-up of the first phase of EUt+ had been done for experimental purposes on the institutional repository of TU Dublin. There, the access for publications by the EUt+ Academic Press was positioned under the subpage for the member's research institutes/centres/groups as a subheading called EUt+ Academic Press, thus being one out of 60 listed in the style of the member instead of EUt+, with a second-tier level URL under the partner domain https://arrow.tudublin.ie. Figure 15 shows a screenshot of this pilot state.

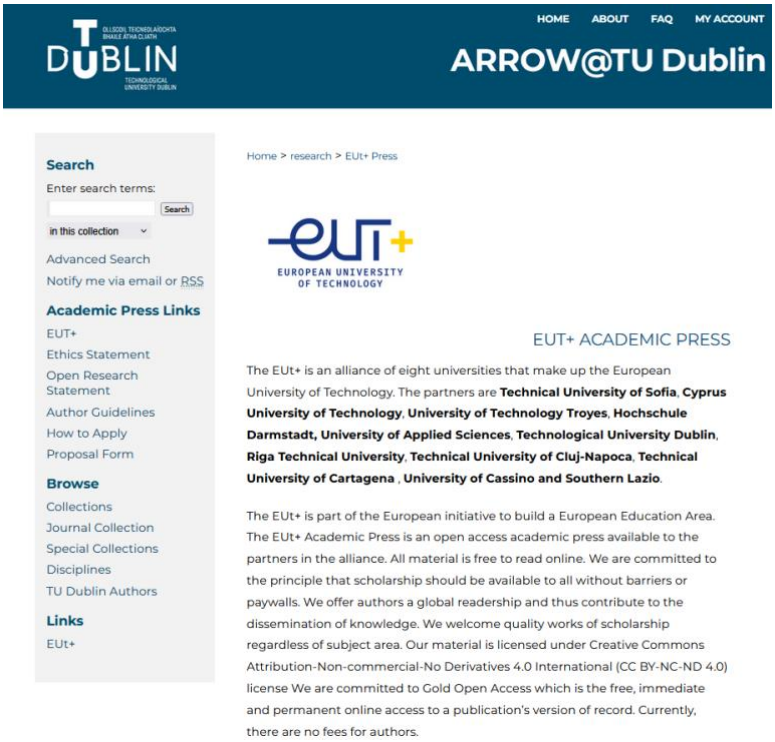


Figure 15: Screenshot of the expired pilot press repository

This allocation for experimentation purposes enabled the team to gain first experiences with the development of an academic press for the alliance and technical realisation possibilities. During this time in the previous phase from installation until the end of 2023, the shortcomings and gaps became clearly evident from user feedback and reports, and experiences in the operation of the tool. The collection and analysis of this input informed

the formulation of the general requirements for a post-pilot, alliance owned, sustainable long-term system for the alliance:

1. **Access and ease of discovery**: a unique and unambiguous EUt+ URL.
2. **Easy to find**: the repository and its the webpage of the EUt+ Academic Press is easily visible among other information available on the Alliance.
3. **Direct first-tier landing page**: recognisable as an entity of EUt+ in accordance to the EUt+ branding principles.
4. **Identification**: visible as a publishing platform instead of a result listing portal.
5. **Identification of EUt+**: recognisability of the the alliance as the publishing body instead of a single member.
6. **Clarity for formulating searching and browsing for the alliance**: inclusion of the alliance publications only instead of the full range of the institutionally contained publications of members.
7. **Direct access**: for searching and browsing the EUt+ Academic Press collection items such as books, conference proceedings, journals, and papers.
8. **Self-sufficiency**: the repository must operate independently of local system choices at member institutions, ensuring long-term stability and portability.
9. **Alliance belonging**: the layout and style decisions are aligned with EUt+ branding principles, while taking into consideration the needs of the repository.
10. **Content**: alliance-level formulation and presentation. Content must be defined, structured, and presented at alliance level.
11. **Efficient workflows**: the EUt+ press team are able to directly access and work on publishing instead of having to rely on additional work by a local university team.
12. **Analysis and feedback** are provided through dedicated webpage statistics and analytics.
13. **Promotion and dissemination** are achieved through high and clear visibility.

As a consequence, the given need for a clearly visible, easy to find and identify, directly and independently manageable, fully-fledged repository needed to be solved. Establishing an Open Access repository is a strategic investment. It enhances research visibility, impact, and accessibility. This requires careful consideration of the alliance's specific needs and the available implementation options. Several guiding principles shaped the decision and choice of the Alliance's OA repository:

1. **Open Science commitment**: There is a growing global movement towards open science, driven by funding mandates and a recognition of the benefits of freely accessible research. EUt+ as an alliance is committed to join this movement.
2. **Open scholarly communication**: OA repositories address the issues of circumventing traditional publishing barriers and reducing costs. EUt+ operates its Academic Press in a not-for-profit manner. For this, the member universities dedicate personnel and raise no processing charges to authors.
3. **Globally freely accessible digital platform**: For showcasing the alliances research output, the availability of the publications through the press support enhancing the visibility and reputation of EUt+ and attracting collaborations.
4. **Sustainability and longevity**: Repositories facilitate long-term preservation of research data and publications, ensuring their continued availability for future generations.

Co-funded by the European Union

Following the same scheme as applied for the creation of the EUt+ Mobility Application, three comparable action areas have been established:

1. **General public**: The open access publications of the EUt+ Academic Press are easy to find and access without restrictions to any specific target groups.
2. **EUt+**: Publishing, management and administration of the publications and their meta data is provided through task participants and further expert staff as need may be, e.g. for typesetting, printing etc.
3. **System provision**: Next to the press operation, technical operation, maintenance, further technical developments are required.

For deciding on a long-term stable solution, various possibilities for a repository implementation have been evaluated. Thereby, several key considerations guided the decision:

1. **Software selection**: A range of repository software options exist, each offering varying levels of functionality and customisation. The choice depends on institutional resources, technical expertise, and specific requirements.
2. **Software license model**: The choice is to be made between open-source software or a commercial system leading to differing demands concerning installation, implementation, technical operation, and maintenance.
3. **Operation**: The effort required for installation, operation, maintenance, updating, and further development must be assessed in relation to the available technical expertise and experience at the member institution where the repository is to be hosted. This assessment determines whether sufficiently qualified IT staff are available locally to carry out these tasks or whether the involvement of external service providers is required.
4. **Content scope**: Defining the scope of the repository requires to define whether it will encompass all research outputs, specific disciplines, or particular types of materials (e.g., publications, datasets, theses).
5. **Metadata standards**: Adopting standardised metadata schemas (e.g., Dublin Core, MODS) ensures interoperability and facilitates discovery of content.
6. **Preservation strategies**: Implementing robust digital preservation strategies, including format migration and data backup, is essential for long-term access.
7. **Rights management**: Establishing clear policies regarding copyright and licensing (e.g., Creative Commons) is vital to ensure legal compliance and facilitate reuse.
8. **Sustainability**: Developing a sustainable funding model and staffing plan is critical for the long-term viability of the repository.

For successfully establishing an OA repository at the EUt+ Academic Press Portal a holistic approach is required, encompassing technical infrastructure, policy development, and ongoing curation efforts. In line with the three areas identified, for the design of the application ,three designated roles for users have been identified:

1. **Public**: Encompassing the general public to enable searches.
2. **Manager**: The tasks include steering the review process, publication upload, DOI assignment, configuration for new document types, provision of search refinement options, connection provision for import and export of data, and quality assurance.
3. **System administrator:** management of users with the management role, maintenance, operation.

Building on experience from the pilot phase and considering the lack of in-house IT expertise for installing and operating an open-source repository as a standalone solution, the alliance opted for a preconfigured open-source system combined with professional hosting services. This approach compensates for missing technical capabilities and ensures reliable operation.

Within the alliance, h_da already has experience managing such environments. Based on this, the decision was made to set up a dedicated independent server for the EUt+ Academic Press. The hosting service covers consulting, setup, custom configuration, technical operation, and installation of new releases. This guarantees a short configuration cycle and rapid deployment into production. It also ensures stable, long-term availability and provides flexibility for future expansion with additional features and functions.

3.2.2 Technical realisation

The software named OPUS 4 is a flexible and free open source software for operating an institutional document server as a repository. It enables capturing, storing and distributing digital resources with indexing, publication, administration, search and distribution of documents with and without full text. Generally, this system is used for the operation of open access repositories. Since 2010, the continuous development of this software is led in Germany by the Kooperative Bibliotheksverbund Berlin-Brandenburg (KOBV) in Berlin. It is an association of university libraries, public libraries and numerous research, government and special libraries in Berlin and Brandenburg, offering application service providing and hosting services to university libraries and research institutions.

Following the conceptual consideration and decision for the software choice in combination with the hosting option, the installation and configuration have been done. The OPUS server is implemented in PHP 7.1, with the data being stored in a MySQL database. It is a robust and feature-rich system designed to manage and disseminate scholarly outputs and offers a variety of features[15] relevant for the configuration as the alliance's repository:

1. **Data model**: The system employs a standardised data model comprising approximately 50 fields, while also allowing for user-defined additional fields for adding customised metadata.
2. **Document organisation**: Documents can be organised into collections for enhanced discoverability.
3. **Repository interoperability**: For meta data exchange the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) protocol is used. By using the 'XMetaDissPlus' schema and the transfer URL contained therein, existing full texts can also be retrieved automatically.
4. **Access control**: Granular access permissions can be managed through user accounts, roles, and IP address ranges, ensuring secure access to restricted content.
5. **Bibliographic management**: The system provides a bibliographic function to showcase all institutional publications, regardless of format or full-text availability.

[15] https://www.kobv.de/entwicklung/software/opus-4/

6. **Document types**: 25 pre-defined document types are available facilitating standardised metadata entry.
7. **Collection management**: Hierarchical systems such as institutions (organisational charts of universities, working groups, research areas) and classifications (DDC, CCS, PACS, JEL, MSC, BKL), as well as entries for assigning documents to specific groups such as authors (for publication lists), OpenAIRE and Open Access, can be managed via collections. These collections are accessible upon browsing and can be created and modified in the administration area.
8. **Embargo management**: An embargo date feature allows for controlled release of content, delaying full-text access until a specified date, while maintaining metadata visibility.
9. **Data export and import**: Export options (XML, BibTeX, RIS) are available from the front-end, alongside the OAI-PMH harvesting. Import functionalities support command-line processing, and a Simple Webservice Offering Repository Deposit (SWORD) interface.
10. **Research data support**: Publication of research data is possible, either as supplementary material to publications or as standalone datasets with dedicated metadata.
11. **User interface & discovery**: The title page of a document serves as its landing page displaying bibliographic information and links to associated files.
12. **Facetted search functionality**: The search functions are implemented via the integrated Solr search engine providing simple searches, fielded search and browsing via lists. Hit lists can be restricted via facets.
13. **Persistent identifiers**: Automatic assignment of Uniform Resource Names (URNs) is facilitated and the registration of Digital Object Identifiers (DOIs) via DataCite
14. **Publication workflow**: A streamlined publication workflow allows to select document types, enter metadata, and submit content for review and approval.
15. **Statistics & administration**: Usage statistics (downloads, views) are available, and a web-based administration interface provides control over all system aspects, including user management, collections, and system configuration.
16. **Standards compliance & interoperability**: A wide range of standards is adhered to, including OpenURL, OAI-PMH, URN-DNB, XMetaDissPlus, OpenAIRE, xepicur, Print on Demand (ePubli), Google Scholar, BibTex, RIS, and SWORD ensuring interoperability.
17. **Visibility**: Through the OAI interface indexing by search engines and distribution of information is enabed for services like BASE, COAR, Google, Google Scholar, DataCite, and OpenAire.
18. **Open access suport**: Open access documents are highlighted graphically in the search results.

In conclusion, the usage of this software system provides a comprehensive and versatile platform for managing and disseminating scholarly outputs, supporting open access principles and fostering a more connected and accessible research landscape. At the same time, thanks to the features available, a more sophisticated presentation of the EUt+ publications is achieved with options for extending the offer in the future.

Co-funded by the European Union

The configuration of the repository is finalised and the server is in productive use. This repository of EUt+ Academic Press publications is publicly available at https://opus4.kobv.de/opus4-eut-academicpress/home.

The interface design follows EUt+ branding guidelines and uses a clean, minimalist layout for easy navigation and accessibility as shown in Figure 16.

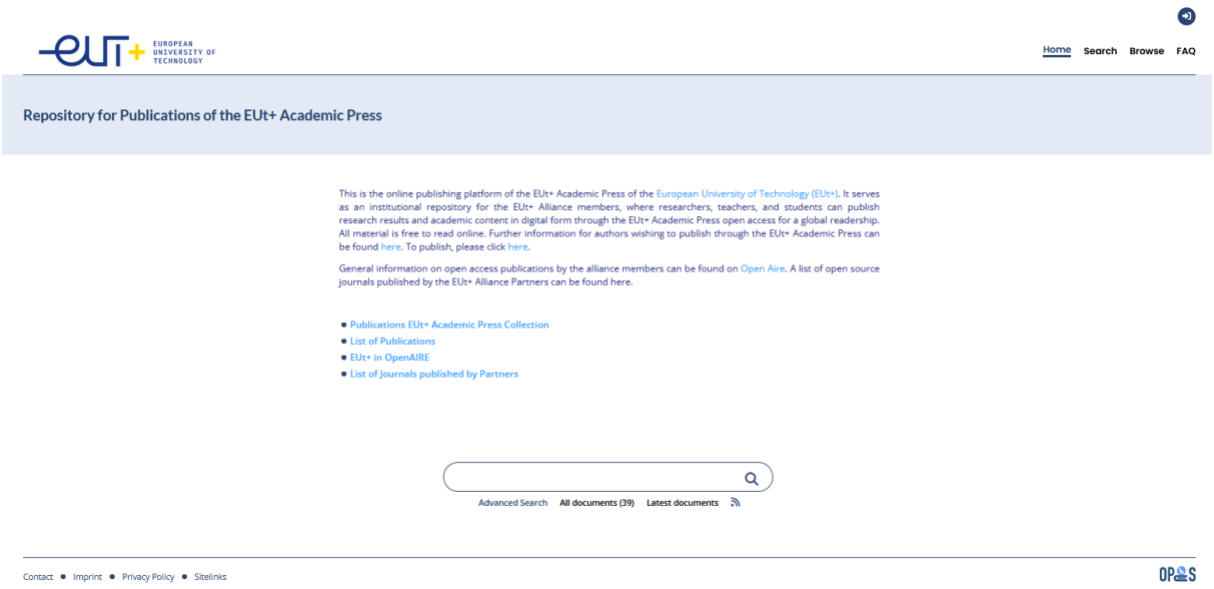


Figure 15: Screenshot of the EUt+ Academic Press Repository Homepage for the General Public

The page automatically offers information in English. The possibility for displaying further language versions is currently underway. As an example, for starting a dedicated search, a clean simplistic search entry is available. For demonstration purposes, a search for publications relating to sustainability aspects is displayed here, the search results return a result list and options for further search refinement as shown in Figure 17.

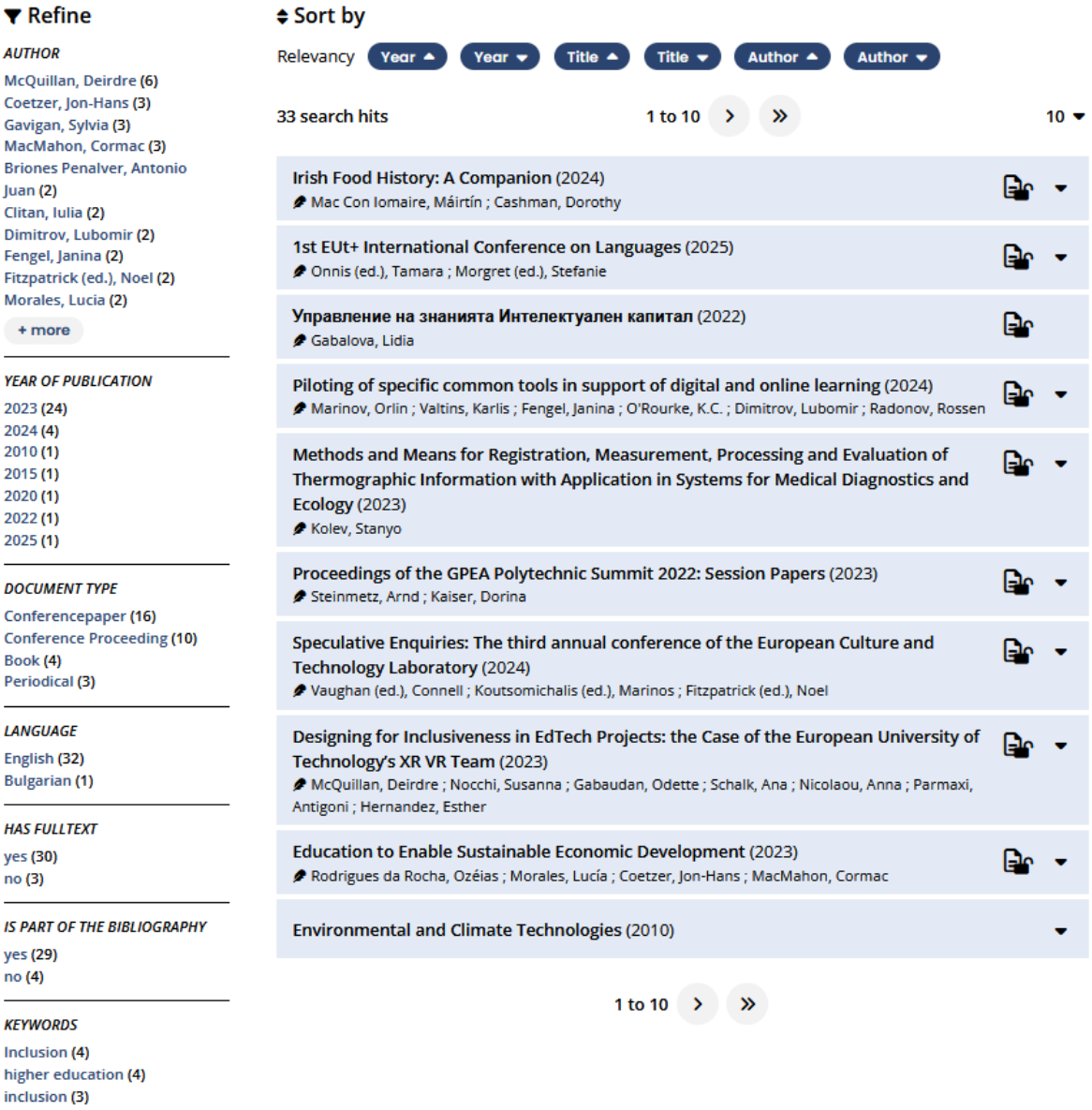


Figure 16: Screenshot of the EUt+ Academic Press Repository with a Search Result Example

The browsing function allows users to preset searches by subject matter, such as publication date, document type, EUt+ member institutions, or links to OpenAIRE as shown in Figure 18.

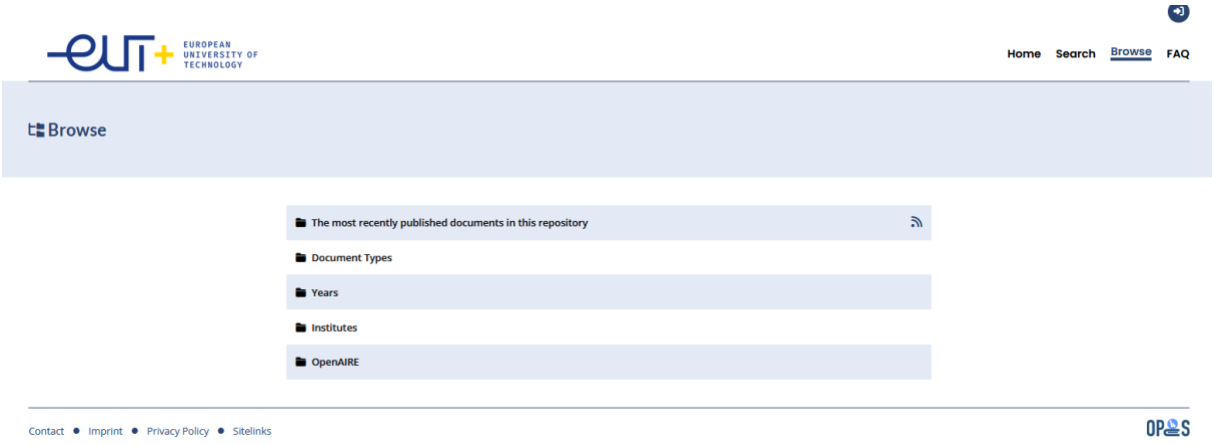


Figure 17: Screenshot of the EUt+ Academic Press Repository of the Browsing Options

The browsing option for institutional searches is well suited to support the EUt+ alliance and its members in a particularly fitting way. The configuration of the repository provides searches of OA publication through the EUt+ Academic Press per member institution, and also per EUt+ Research Institute, namely the European Culture and Technology Laboratory (ECT Lab+) and the European University of Technology Institute of Nanomaterials and Nanotechnologies (EUTINN) as shown in Figure 19.

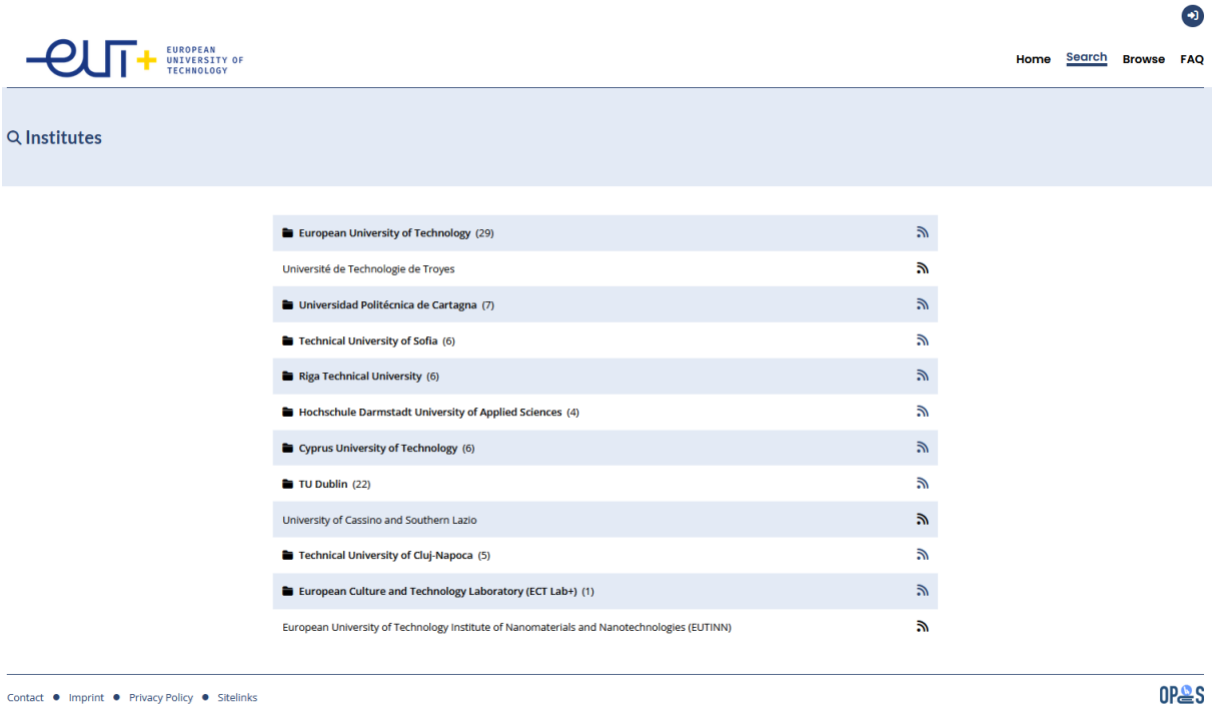


Figure 18: Screenshot of the EUt+ Academic Press Repository of the In-depth Alliance Browsing Options

As a support for users, next to easy and intuitive access, additional information for the usage of the repository is made publicly available on the page by way of the FAQ section.

With the full establishment and operationalisation of the EUt+ Academic Press Repository, the previous preliminary pilot status has been resolved and a stable environment is available with potential for extensions in the future. The preparation for further developments has started and concentrates on the questions of Open Data for complementing the Open Science commitment and the further development and improvement of the peer review process and supporting guidelines.

3.2.3 Data exchange format

To facilitate data exchange of meta data and full-text files, the opus server uses a schema called OPUS 4-XML for meta data importing. The xsd-file is openly available at https://www.opus-repository.org/schema/opus-import.xsd. To date, the standard set is used as it proved fit for purpose, without the need for defining new specific data fields for EUt+.

3.3 Open scholarly communication

The rise of academic journals in the 17th century transformed scholarly communication by enabling researchers to share findings widely. Today, digital technologies accelerate this process, reducing the time between research and publication. Researchers can now disseminate results openly in multiple formats throughout the entire research lifecycle, moving beyond static reports of completed projects.

This shift has given rise to Open Science, a paradigm that promotes transparency, reproducibility, and collaboration. It advocates free, immediate, and unrestricted online access to publications, data, methods, and other scholarly materials. Open Science spans all stages of research from design and data collection to analysis, publication, and dissemination. Key practices include citizen science, open-source hardware, and open methodologies.

Open Scholarly Communication focuses on sharing research outputs widely. Its goal is to make publications, data, and other scholarly resources accessible to all, fostering a more inclusive and collaborative research ecosystem. The main objectives are:

1. **Increase access and impact**: Broaden the reach of research, making it accessible to a wider audience, including researchers, policymakers, practitioners, and the public.
2. **Accelerate discovery and innovation**: Facilitate faster dissemination of knowledge, leading to quicker advancements in research and innovation.
3. **Enhance transparency and reproducibility**: Promote transparency in the research process, enabling verification and replication of findings.
4. **Promote equity and inclusion**: Reduce barriers to access and participation in scholarly communication, fostering a more equitable and inclusive research ecosystem.

5. **Improve public engagement**: Increase public understanding of and engagement with research.
6. **Reform scholarly publishing**: Challenge the dominance of commercial publishers and create more sustainable and equitable publishing models.

In essence, Open Scholarly Communication seeks to democratise knowledge, accelerate progress, and maximise the societal benefit of research. It represents a shift towards a more open, collaborative, and accessible scholarly landscape. Its key components are:

1. **Open Access (OA)**: Providing free and unrestricted access to research publications regardless of the publisher used.
2. **Open Data**: Making research data publicly available, often with appropriate licensing.
3. **Open Educational Resources (OER)**: Freely accessible teaching and learning materials.
4. **Open Source Software**: Utilising and developing software with openly available source code.
5. **Open Peer Review**: Transparent and collaborative peer review processes.

EUt+ is committed to promoting Open Science in all its aspects. A major component thereof is Open Scholary Communication. In the field of Open Access publishing, the EUt+ Academic Press offers EUt+ members a pathway.

3.3.1 EUt+ OpenAire portal

The EUt+ alliance and all member institutions are actively engaged in research and creating scholarly works such as publications with open and closed access, research data, research software, and student theses. For bringing these together and presenting the research of the Alliance as a whole, a jointly used digital infrastructure has been chosen. OpenAIRE began as a European project and has since evolved into an independent organisation that operates an open scholarly communication infrastructure and provides a range of services for research-performing organisations across Europe. The cooperation between OpenAire and EUt+ had begun during the first phase of EUt+. Over time, OpenAIRE transitioned from a Horizon 2020-funded project to an independent non-profit organisation operating its infrastructure for open access, data sharing, and scholarly communication. This change created the need to update and renew the partnership. In the Accelerate project, a detailed definition of the services required by the alliance was prepared as the basis for the contractual agreement. The ninth alliance member, UNICAS, was also included in the consortium. At the time of writing, the institutional repositories of all nine partners are connected. The portal is available at https://eut.openaire.eu.

The portal aggregates and showcases content from multiple data sources. This integration creates a coherent presentation of information for discovery, analysis, and tracking. The European University of Technology is represented in OpenAire with an individual portal as shown in Figure 20.

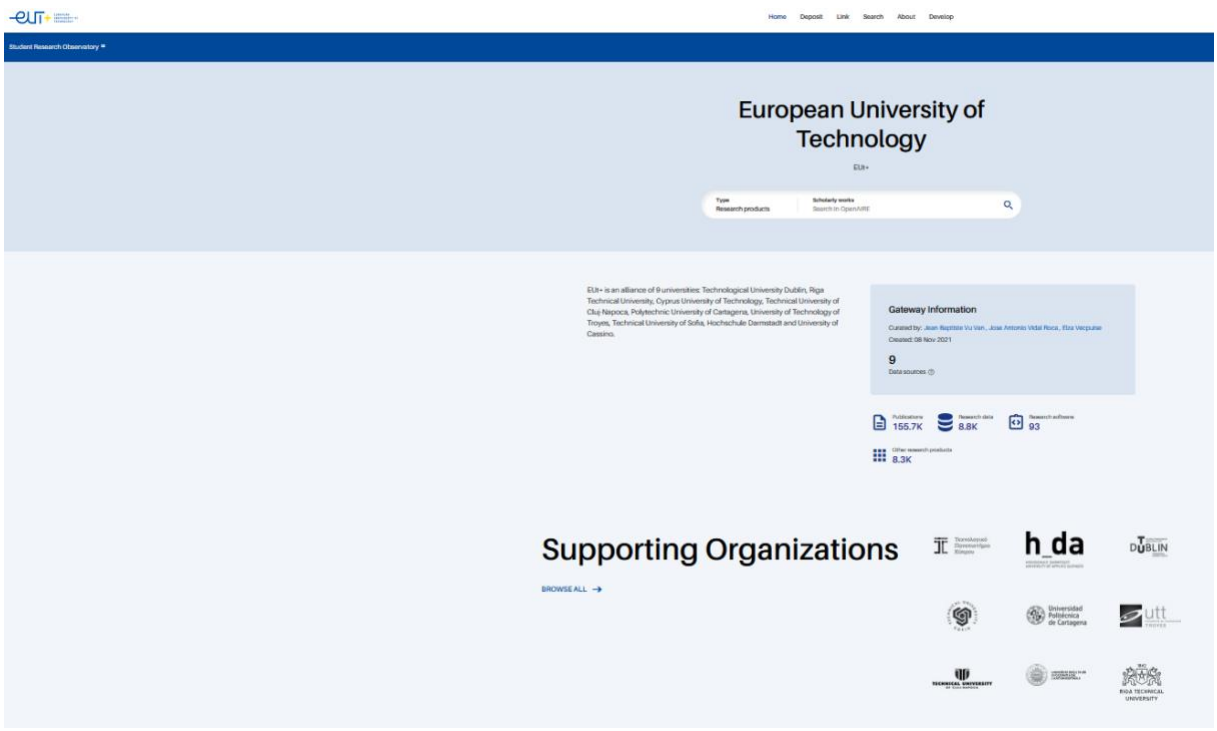


Figure 19: Screenshot of the EUt OpenAire Portal

Simple and advanced search functionalities allow searching for research outputs of the Alliances members as shown in Figure 21 with an example search for results containing the term “sensor”.

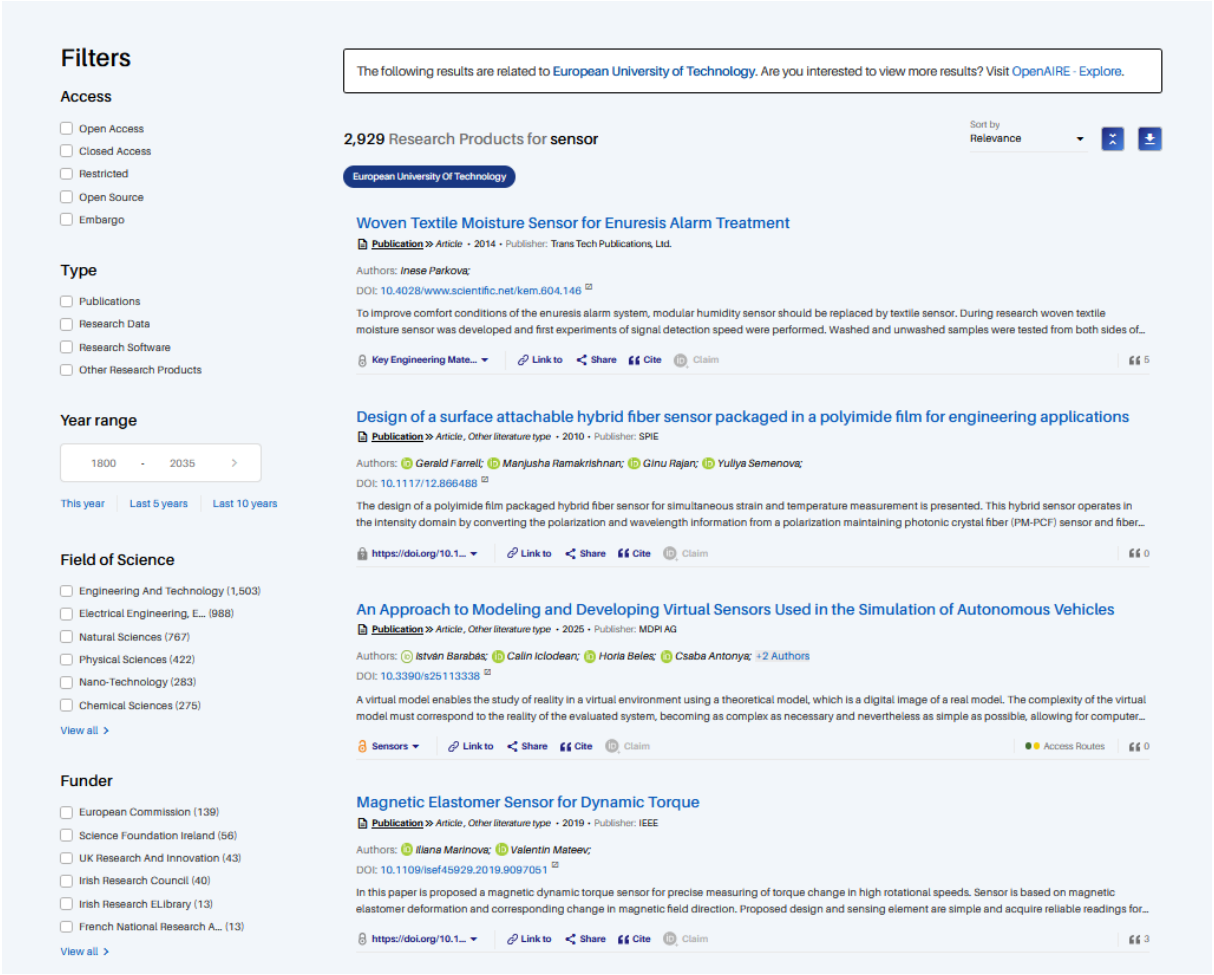


Figure 20: Screenshot of the EUt OpenAire Portal with Search Results Listing

For further refinement, search results can be filtered by:

1. **Access**: all types of access to research results ranging from open access and open source via closed and restricted access to embargoed results.
1. **Type**: as possible forms of research results, publications, research data, research software or other research products can be selected.
2. **Year**: the definition of a range can narrow or extend returned lists.
3. **Field of science**: a selection list that also provides the numbers of research results in this field.
4. **Funder**: a selection list for choosing is extracted.
5. **SDG**: the allocation of the research result to a Sustainable Development Goal (SDG) can narrow the return lists.
6. **Country, language and source**: all three possibilities can narrow down the result lists for a specific member university.
2. **Research community and subcommunity**: research results can be filtered if tagged.

As a future step, the question of how to enable the visibility of those research outputs that are published with the EUt+ common affiliation needs to be addressed.

3.3.2 Data exchange format

OpenAIRE offers a CONNECT gateway (https://connect.openaire.eu/) as a single entry point to all research outputs of the EUt+ alliance. At the same time, EUt+ ensures that the alliance members institutional repositories are compliant with the OpenAIRE Guidelines and that the research outputs are available in the gateway. Metadata and full-text access are harvested from the alliance member universities' institutional repositories with the majority using the general available OAI-PMH protocol.

3.4 Addressing challenges and taking next steps

The next steps in this task build on the results presented here and aim to extend the service offer. However, a new issue related to publishing has emerged and must be addressed. The rapid adoption of Artificial Intelligence (AI), especially large language models, raises unresolved questions. These include handling AI-generated texts, detecting manipulated images, and addressing the rise of so-called paper mills. Another concern is unauthorised AI-based access to publications for training or data collection.

Integrating AI into academic publishing introduces several challenges, including:

1. **Quality control and validation**: Ensuring the accuracy and reliability of AI-generated content, such as research papers and articles, is a significant challenge. A lack of human oversight and validation by the authors using AI to support their writing process can lead to the dissemination of incorrect or misleading information.
3. **Authorship and accountability**: As AI-generated content becomes more prevalent, questions arise about authorship and accountability, in particular the question of responsibility for content created by AI algorithms, or ensuring that AI-generated content is properly attributed and cited.
2. **Plagiarism and originality**: AI algorithms can generate content that is similar to existing works, raising concerns about plagiarism and originality. Publishers must develop strategies to detect and prevent AI-generated plagiarism, while also ensuring that AI-generated content is properly cited and attributed.
3. **Bias and discrimination**: AI algorithms can perpetuate existing biases and discrimination, particularly if they are trained on biased data sets. Publishers must be aware of these risks and take steps to mitigate them, ensuring that, if used, AI-generated content is fair, inclusive, and respectful.
4. **Intellectual property and copyright**: The use of AI in academic publishing raises complex questions about intellectual property and copyright, e.g. ownership of rights to AI-generated content, and the resulting need for publishers to ensure proper licensing and attribution.
5. **Transparency and explainability**: AI algorithms can be opaque and difficult to understand, making it challenging to explain the reasoning behind AI-generated content. Publishers must prioritise transparency, ensuring that readers can understand the basis for AI-generated conclusions and recommendations.

Co-funded by the European Union

6. **Dependence on technology**: The increasing reliance on AI in academic publishing can create dependence on technology, potentially undermining the role of human editors, reviewers, and authors. Publishers must strike a balance between leveraging AI's benefits and preserving the value of human expertise and judgment.
7. **Cybersecurity and data protection**: The use of AI in academic publishing also raises concerns about cybersecurity and data protection. Publishers must ensure that AI algorithms are secure, and that sensitive data is protected from unauthorised access or misuse.

Addressing these challenges will help ensure the potential of AI to enhance the quality, efficiency, and impact of scholarly communication, while also ensuring the integrity, validity, and reliability of the research they publish. However, further developments of the EUt+ Academic Press need to face these challenges and develop strategies, policies and potentially tailored information and training for all stakeholders as an answer. This concerns the OA publishing already in place as well as the next focus on the development of an Open Data management and publishing service for the authors of the press.

3.5 Transformational role for EUt+

Open Science includes a broad set of strategies and practices designed to make research more accessible, transparent, and reusable. It goes beyond open access to publications. It also covers open access to research data through robust data management, openly available research software, and freely accessible educational resources.

Implementing Open Science depends on digital tools such as shared infrastructures, repositories, and platforms that promote transparency and reproducibility. By establishing a sustainable alliance-wide Open Access repository and renewing the alliance's presence on OpenAIRE, EUt+ actively fosters Open Science. These steps provide a solid and operational foundation for long-term implementation. The implementation and active use of a new software solution as the EUt+ Academic Press repository is an important step accomplished for ensuring sustainability and longevity.

The services and tools developed by EUt+ for Open Access Publishing enables its researchers to disseminate their findings widely and freely, in line with Open Science principles. The upcoming next steps to further extend onto Open Data Management is intended to further facilitate collaboration and reproducibility of research findings. The alliance commitment to Open Science and the development of associated services and tools play a pivotal role in the transformation of the EUt+ member institutions towards Europeanisation and the adoption of European values:

1. **Enhanced collaboration**: Open Science fosters a culture of collaboration and cooperation among researchers, institutions, and countries. By adopting Open Science principles, EUt+ member institutions can engage in joint research initiatives, sharing resources, and leveraging each other's strengths, thereby enhancing their collective research capacity and impact.
2. **Increased transparency and accountability**: Open Science promotes transparency in research processes and outcomes, ensuring that research is conducted and reported

in a responsible and ethical manner. This transparency also facilitates accountability, as research findings are openly available for scrutiny and validation.

3. **Improved research quality and impact**: By making research more accessible and facilitating collaboration, Open Science can lead to higher quality research and greater impact. EUt+ member institutions can benefit from this by producing research that is more relevant, reliable, and applicable to societal challenges.
4. **Alignment with European values**: Open Science aligns with core European values such as openness, inclusivity, and cooperation. By embracing Open Science, EUt+ member institutions demonstrate their commitment to these values, contributing to a more unified and cohesive European academic community.
5. **Support for the European Research Area (ERA)**: Open Science is a key component of the ERA, aiming to create a single, unified research area that facilitates the free movement of researchers, knowledge, and technologies across Europe. EUt+'s commitment to Open Science supports the development of the ERA, enhancing Europe's research competitiveness and innovation capacity.

In conclusion, the commitment to Open Science and the development of associated services and tools are crucial for the transformation of EUt+ member institutions towards Europeanisation and the adoption of European values. It fosters a cultural shift through the adoption of Open Science principles and practices within EUt+ member institutions towards greater openness, collaboration, and transparency, as also the EUt+ member institutions are transforming their policies, practices, and infrastructures to support Open Science, leading to more cohesive and interconnected institutions that are better positioned to address European and global challenges.

Co-funded by the European Union

Conclusion

This deliverable shows how EUt+ is turning digital strategy into day-to-day capability across education, mobility, research, and services by building a common information layer that connects nine autonomous universities without replacing their local systems. The result is a coherent set of alliance-level tools, data models, and operating practices that make cooperation simpler, faster, and measurably more effective. **Three achievements** have been presented in this deliverable:

Mobility by design, not by exception

The EUt+ Mobility Application operationalises cluster mobility maps in a single database and public web app, enabling students and staff to find automatically recognised courses and plan mobility embedded in programmes. As of October 2025, 20 clusters, over 2,700 courses, and over 14,000 ECTS are integrated with more than 3,000 users having accessed the platform and over 500 used it to plan a semester-long mobility, with mobility maps applied in over 80% of cases.

The platform's modular, standards-ready architecture (open source stack, API-first design) lets us add analytics and future integrations with local SIS/LMS as clusters mature.

Seamless execution of Erasmus mobility

Alliance-wide adoption of Erasmus Without Paper (EWP) services covering Inter-Institutional Agreements (IIAs) and Learning Agreements (LAs) reduces administrative friction and data loss, while surfacing gaps (e.g., field usage differences, dashboard connectivity) that we are addressing collectively.

Work towards universal European Student Card Initiative (ESCI) compliance progresses on two tracks: (a) transforming local student cards with ESCN/ESI and ESC-Router registration with most members registered, and (b) designing an EUt+ Alliance Card as a digital realisation. A 2025 test using eduTAP validated wallet-based service passes (e.g., a digital library pass) and established a roadmap for scalable rollout.

Open Science as infrastructure, not slogan

The EUt+ Academic Press (Diamond OA) and a production-grade Open Access repository (OPUS-based, professionally hosted) provide a sustainable publishing and preservation backbone. The repository supports standardised metadata, OAI-PMH harvesting, persistent identifiers (URN/DOI), and faceted discovery aligned with OpenAIRE.

The alliance-level OpenAIRE portal aggregates outputs from all nine institutional repositories, strengthening compliance, findability, and impact while keeping ownership and sovereignty within the public sphere.

Our approach aligns closely with European priorities and current market trends:

- **Interoperability first:** By adopting European standards (ESCI, EWP, OpenAIRE, CERIF) and open architectures, we avoid vendor lock-ins, reduce integration costs, and remain future-proof as policies and platforms evolve.
- **From pilots to production:** We have moved beyond proofs of concept. The mobility application, Open Access repository, and EWP connectivity are now in productive use, supported by operating models, governance structures, and scalable processes.
- **User-centred and data-driven:** All tools are designed with clear value for students, staff, and researchers: faster mobility planning and processing, transparent credit recognition, visible research outputs, and actionable analytics.
- **Sovereignty and sustainability:** Open standards, public infrastructures, and Diamond Open Access reinforce European research sovereignty, ensure cost transparency, and guarantee long-term preservation.

While EUt+ has largely aligned its work with European priorities and established standards, it has taken important steps to go slightly further in practice. The Alliance has implemented a joint information layer that respects local autonomy while enabling alliance-wide services - a goal many alliances share but that few have achieved at production scale. It has operationalised programme-embedded mobility through digitised cluster-based maps with automatic recognition, making mobility planning more seamless. EUt+ has also advanced toward a wallet-based alliance card, decoupling services into digital passes and reducing dependency on physical cards. In research, the alliance has consolidated a sustainable Open Access stack – combining the Academic Press, OPUS repository, and OpenAIRE integration – to ensure quality publishing and European-level dissemination. These steps are evolutionary rather than revolutionary (no new or disruptive technology, no new protocols). The innovation lies in how these components are combined and scaled across nine autonomous universities. These developments represent tangible progress toward interoperability and user-centred services, thus reinforcing EUt+'s role as a committed contributor to Europe's digital higher education landscape.

Even though EUt+ has made tangible progress in building a shared digital foundation, we recognise that several challenges remain. Differences in local systems and operational practices require careful coordination, and we are addressing these through shared standards, API-based integration, and phased onboarding. Similarly, variations in the implementation of Erasmus Without Paper (EWP) services call for collective troubleshooting and version alignment. Emerging issues such as the use of AI in publishing ranging from authorship integrity to image manipulation demand updated policies and technical safeguards, which we are integrating into the Press workflow. Finally, sustaining analytics beyond the project phase requires moving toward maintainable pipelines and clearer indicators.

Looking ahead, our priorities focus on consolidating what works and extending functionality in a pragmatic way: connecting mobility tools with EWP for end-to-end processes, scaling the Alliance Card through wallet-based passes, and deepening Open Science with peer-review and Open Data services. Strengthening governance, security, and accessibility will underpin all these efforts. These steps are evolutionary rather than revolutionary, but they are essential for ensuring that EUt+ remains aligned with European priorities while continuing to improve alliance-wide interoperability and user experience.