

E³UDRES²

Engaged and Entrepreneurial European University as
Driver for European Smart and Sustainable Regions

D4.1 E³UDRES² Joint Doctoral Programmes – Concept and Methodology

Work Package 4
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Executive Summary

This deliverable presents the **Concept and Methodology for the Development of E³UDRES² Joint P(h)D Programmes**, providing a strategic and operational framework for strengthening doctoral education and research collaboration across the E³UDRES² Alliance.

The document has the following main objectives:

- To establish a common vision for joint doctoral collaboration while respecting the diversity of national higher education systems and institutional regulations.
- To define a progressive methodology for implementing joint doctoral activities, ranging from joint supervision and doctoral mobility to sustainable Joint P(h)D Programmes.
- To map and enhance the alliance's doctoral education capacity by analysing qualified doctoral supervisors, research domains and researchers' readiness to participate in collaborative doctoral activities.
- To identify and advance opportunities for inter-university and interdisciplinary cooperation in doctoral research aligned with the E³UDRES² research Strategy, the E³UDRES² Focus Areas and the priorities of the European Higher Education Area and the European Research Area.
- To support the integration of doctoral education with research, innovation, education and talent development within the alliance.

The main outcomes of the deliverable include:

- A progressive implementation model for joint doctoral collaboration based on academic integration, quality assurance and institutional flexibility.
- A comprehensive analysis of the alliance's critical mass of doctoral supervisors and complementary research expertise across partner institutions.
- The identification of a strong pool of researchers committed to participating in co-supervision, joint doctoral training, international juries and collaborative research activities.
- The successful launch of an Open Call for Joint P(h)D Programme proposals, resulting in four pilot joint programme initiatives evaluated by the E³UDRES² Scientific Council.
- Recognition of doctoral summer schools, joint training activities and international mobility as effective instruments for building a collaborative doctoral ecosystem.
- A set of recommendations for the sustainable development of Joint P(h)D Programmes that strengthen research excellence, interdisciplinary collaboration, regional engagement and the international attractiveness of doctoral education within the E³UDRES² Alliance.

Overall, the methodology provides a realistic and scalable roadmap for developing a collaborative European doctoral ecosystem, positioning E³UDRES² to implement innovative Joint P(h)D Programmes and contribute to the long-term objectives of the European Higher Education Area and the European Research Area.

The document will be revised / updated / expanded to reflect the developments of the project in terms of relevant concepts and policies for joint research.

List of concepts and abbreviations

Cooperative Doctoral Programme – Involves joint supervision and collaboration between a higher education institution (university or another institution with doctoral degree-awarding authority) and a higher education institution without doctoral degree-awarding authority. In this model, a doctoral candidate's research is supervised by faculty from both institutions, and the doctoral degree is awarded by the higher education institution with the authority to do so. The doctoral candidate's research may be conducted at any of the two institutions. This is an additional option for doctoral students at higher education institutions without doctoral degree-awarding authority e.g. in Germany, Austria and The Netherlands to obtain a doctoral degree, if there is a cooperation of the supervisor / department with a higher education institution with doctoral degree-awarding authority and a supervisor there.

Doctoral education – overarching institutional structures and processes geared towards the completion of a doctoral degree (primarily the PhD, but also including professional doctorates, industrial doctorates, etc.).

Doctoral programme – set of related doctoral activities that lead to a doctoral degree upon completion.

Doctoral school – An organisational structure that groups and coordinates research teams, coordinates training activities for doctoral candidates and prepares them for their professional career.

E³UDRES² Applied Research Centres of Excellence – joint-research centres established between a minimum of three E³UDRES² partners, based on their proved capacity to provide excellence in research on specific topics.

E³UDRES² Bank of Researchers (BoR) – a shared pool of scientists, pools of already existing expertise within multinational research networks in order to further expand knowledge and experience.

E³UDRES² Executive Board – consists of one high-ranking representative (president, rector, vice-rector, executive director) per E³UDRES² partner and the chair of the E³UDRES² board of student representatives. The E³UDRES² Executive Board takes strategic decisions inside the alliance.

E³UDRES² Focus Areas – the priority areas established within E³UDRES², that integrates not only research but also education and innovation activities, on specific thematic fields based on the needs of the regions. The areas in which E³UDRES² focuses, are currently:

- Creative Industries for Regions' Identity
- Digital Solutions and (Applied) Deep Tech for Regions
- Health, Wellbeing and Social Inclusion for Regions
- Resilient Economy & Innovation for Regions

E³UDRES² researcher – a researcher from any of the partner universities or from the associated partner universities, that is registered in the Bank of Researchers constituting the Research Networks.

E³UDRES² Research Networks – promotes an innovative approach to co-ideate and co-create mission-oriented research, challenge-based, human-centered innovation, and/or open and engaged knowledge exchange; they also motivate, encourage, and strengthen (young) researchers as well as learners, innovators, entrepreneurs and other stakeholders to participate in European collaborations.

E³UDRES² research team – currently, Work Package 4 – “Research and Knowledge Serving Users” team.

E³UDRES² Scientific Council – the relevant body for academic and strategic aspects of research activities in E³UDRES², established in May 2024 and composed of senior researchers/scientists from all partner universities.

ECTS – European Credit Transfer and Accumulation System.

EEA – European Education Area, which fosters collaboration among European Union Member States to build more resilient and inclusive national education and training systems. The aim of building the EEA is to ensure that everyone in the EU has access to quality education and training by 2025.

ERA – European Research Area, that has the vision to create a single, borderless market for research, innovation and technology across the EU.

EUA – European University Association.

Joint degree programme – Refers to a joint programme leading to a joint degree.

Joint programme – Refers to an integrated curriculum coordinated and offered jointly by different higher education institutions, leading to double/multiple degrees or a joint degree.

Micro-credentials – Records of the learning outcomes that a learner has acquired following a small volume of learning. These learning outcomes have been assessed against transparent and clearly defined criteria. Learning experiences leading to micro-credentials are designed to provide the learner with specific knowledge, skills and competencies that respond to societal, personal, cultural or labour market needs. Micro-credentials are owned by the learner, can be shared and are portable. They may be stand-alone or combined into larger credentials. They are underpinned by quality assurance following agreed standards in the relevant sector or area of activity.

Open education – A way of carrying out education, often using digital technologies. Its aim is to widen access and participation to everyone by removing barriers and making learning accessible, abundant, and customisable for all. It offers multiple ways of teaching and learning, building and sharing knowledge. It also provides a variety of access routes to formal and non-formal education. It relies on Open Educational Resources (OER), open licensing (like Creative Commons licenses), and open pedagogical practices to ensure free and equitable access to education globally.

Open science – research approach based on open cooperative work that emphasises the sharing of knowledge, results, and tools as early and widely as possible by using digital technologies and new collaborative tools.

PD – Professional Doctorate, which is a doctoral degree that focuses on the development and application of knowledge and skills to practical problems in a specific field. Unlike a PhD, which often emphasizes research and contributing to new knowledge, a PD is designed for working professionals who want to advance their careers and leadership skills by applying their existing experience to solve real-world issues.

P(h)D – Term used within this report in order to address both PhD and PD types of doctoral research supported by the E³UDRES² alliance.

PhD – Doctor of Philosophy, which is the highest academic degree (EQF-8) in most fields and typically requires original research and a dissertation. It is a prestigious qualification demonstrating a high level of expertise and a deep understanding of a specific area of study. PhD holders often pursue careers in academia, research, or other specialized fields.

PhD dissertation – is a substantial, original piece of scholarly research that doctoral students (PhD candidates) undertake as the culmination of their doctoral program. It demonstrates the candidate's ability to conduct independent research and make a significant contribution to their field of study.

PhD dissertation defence – Is a formal oral examination where a candidate presents their research and defends it before a committee of experts. It is a crucial step in completing the doctoral degree, demonstrating the candidate's knowledge, independence, and ability to engage in scholarly discussion. The defence typically involves a presentation followed by a question-and-answer session.

Physical, blended, or virtual mobility – Different modes through which students and staff can engage in cross-border learning, teaching, and research activities among higher education institutions in the European Union.

UAS – University of Applied Sciences

WP4 – E²UDRES² Work Package 4 – “Research and Knowledge Serving Users”, responsible amongst others for Doctoral Schools/Programmes and cooperation in the field of doctoral research and education

1. Introduction

E³UDRES², the Engaged and Entrepreneurial European University as Driver for European Smart and Sustainable Regions¹, a European University alliance, promotes Smart and Sustainable Regions (S²-Regions) to shape a peaceful and prosperous European future for responsible citizens as a pioneering full-fledged Engaged and Entrepreneurial European University (E³-University).

As stated in the E³UDRES² research strategy, developed as MS13 milestone by the WP4 team in November 2024, the alliance aims to develop motivating framework conditions for academic careers, in line with the European Research Area², with the recommendation on attractive and sustainable careers in higher education³, and with the principles of the European Charter for Researchers⁴.

Regarding the specific challenges, opportunities and assets of the regions, E³UDRES² builds research collaborations related to the Focus Areas, which are currently four, as follows:

- Creative Industries for Regions' Identity
- Digital Solutions and (Applied) Deep Tech for Regions
- Health, Wellbeing and Social Inclusion for Regions
- Resilient Economy & Innovation for Regions

Joint doctoral programmes can make a significant contribution to this. These joint programmes, each of which should be thematically related to the focus areas, offer the expansion of P(h)D offers for those partners who are already allowed to award P(h)Ds. Above all, however, they also enable those young researchers who do not have the opportunity to complete a P(h)D programme at their home university, mainly due to national legal restrictions, to gain access to this advanced scientific training.

The offer of joint doctoral programmes should include both the opening of existing courses for doctoral students within the E³UDRES² Alliance and considerations for the establishment of concrete new joint innovative programmes.

The objective assumed by the E³UDRES² alliance is to establish 2-4 joint P(h)D schools / programmes based on E³UDRES² shared values, principles, methodologies and co-operation across the alliance.

The aim of this document is to describe the concept and methodology of the E³UDRES² alliance for increasing collaboration at the level of doctoral studies in partner universities.

2. Previous activities and experiences

One of the Milestones of the project was finalized in June 2025, under the title *E³UDRES² doctoral studies concept & policy* (MS16⁵).

¹ <https://eudres.eu/>

² <https://european-research-area.ec.europa.eu/>

³ <https://www.consilium.europa.eu/en/press/press-releases/2024/11/25/council-adopts-recommendation-on-attractive-and-sustainable-careers-in-higher-education/>

⁴ <https://euraxess.ec.europa.eu/hrexcellenceaward/european-charter-researchers>

⁵ https://eudres.eu/assets/files/deliverables_phase_2/eudres_ms16_doctoral-studies-concept.pdf

The concept and policy document:

- maps the situation and doctoral study programmes conditions across partners' national systems
- maps partners' experience & capacity
- establishes: criteria, characteristics, model & rules, variable scope of partners' support and engagement, including financing and mobility model
- identifies feasible fields within the focus areas, agreements on lead universities and other partners' engagement
- sets up a framework for the development of concrete programmes

According to the mapping exercise, the documents presents a number of suggestions considered feasible for the E³UDRES² alliance in order to implement joint doctoral research:

- Joint coordination of P(h)D thesis in co-supervision
- Joint participation to international juries for P(h)D thesis defence
- Joint offer for specialized topics in doctoral research
- Development of Joint P(h)D programmes

According to MS16, the development of Joint P(h)D schools was not found as a viable solution for the moment, due to the major differences between the organization of doctoral activities in the E³UDRES² partnership.

Based on this finding, the previous initiatives have been revised and formalized from a conceptual and methodological point of view. Those previous initiatives (that will be referred to later in more details according to their actual status of implementation and contributions to the development of joint doctoral activities within the E³UDRES² network) are:

- E³UDRES² Research strategy, approved in November 2024, that forms the fundament of the alliance vision on the advancement of (applied) research between partners.
- Implementation of two PhD Summer Schools in 2025 and 2026.
- Implementation of a joint PhD programme between ViA and VEA (another Latvian HEI), accredited by the Quality Agency for Higher Education (AIKA), having as associated partners USTP and IPS.
- Launch of an Open Call for E³UDRES² Joint P(h)D Schools / Programmes & other Joint Doctoral activities, in February 2026.

It should also be mentioned that the situation analysed in our mapping is in continuous change (introduction of the Professional Doctorates in the Netherlands a couple of years ago, the rapid changes in Portugal with the first PhD programme already submitted for accreditation at IPS, the political changes in Hungary making possible for MATE to re-join as full partner again in 2027 etc). So, we are working in a context were new „windows of opportunity“ emerge.

3. Concept for the development of the Joint P(h)D programmes

The vision of joint collaboration in doctoral studies in E³UDRES² has the following objectives:

- Advancement of research in the 9 partner universities, mainly as applied research, but also including application-oriented fundamental research.
- Taking into consideration the various institutional priorities and strategies: traditional doctoral studies (PhD), professional doctoral studies (PD), co-operative doctoral studies, etc.
- Helping some partner universities to get the status for awarding PhD degrees, with respect to all forms of P(h)D administrative ways of delivery.
- Creating the human resource for the future of the alliance, both for education and research.
- Respecting each partners' own institutional priorities.

It is important to define what a joint doctoral collaboration means. This is accurately described in the MS16 document *E³UDRES² doctoral study concept & policy*⁵, approved in June 2025. Taking into consideration all identified national and institutional differences, possible solutions to implementation of the joint doctoral collaboration are:

- Creation of Joint PhD programmes (feasible, with already started initiatives)
- Creation of Joint PhD schools (not feasible in E³UDRES² for the moment)
- Joint thesis co-supervision
- Joint participation in final juries for defending the thesis
- Join participation in different committees: tutoring, joint courses, etc
- Joint proposals for doctoral thesis topics
- Mobilities between different research centres, both for students and staff: Erasmus mobilities
- Organisation of short courses (PhD Summer Schools, workshops, trainings etc)
- Organisation of short teaching/research stays at other E³UDRES² universities and/or short research placements with non-academic partners from business and regions, for doctoral students and/or researchers/supervisors

E³UDRES² Joint Doctoral Programmes intend to create a collaborative distributed European doctoral ecosystem that combines the scientific excellence of doctoral-degree-awarding institutions with the applied research strengths, regional engagement, and innovation capacities of Universities of Applied Sciences.

Based on complementary strengths of the alliance partners, the programmes should foster/motivate interdisciplinary and societal challenges-driven research aligned with the E³UDRES² Focus Areas, while contributing to the European Research Area (ERA) and the attractiveness of doctoral education in Europe.

E³UDRES² cooperative activities in the field of doctoral education follow the strategic key objectives for core activities as established in the E³UDRES² Long-term Vision & Mission Statement:

- ❖ Enable Smart Learners to unfold talents

⁵ MS16: E³UDRES² Doctoral studies concept & policy:

https://eudres.eu/assets/files/deliverables_phase_2/eudres_ms16_doctoral-studies-concept.pdf

- ❖ Empower Ent-r-e-novators to accelerate future universities
- ❖ Serve as a platform for collaborative innovation to connect entrepreneurial minds
- ❖ Engage in regional communities to contribute to a peaceful and prosperous society
- ❖ Shift to a fully-fledged European university to ensure excellent quality

For doctoral education, this means that in our joint activities we strive to introduce elements (e.g. in the curricula, in Summer Schools, in research topics and approaches as appropriate etc.) and structures supporting:

- Entrepreneurial mindset and know-how for early-stage researchers, to enable them to shape future innovations
- Active links to and participation in education activities, to foster the tight intertwining of the missions and especially of research and education
- Open science and open innovation approaches and infrastructures, to develop innovation ecosystems with other players in our regions
- Citizen science and community engagement, to foster public involvement and trust in science
- Impact for the regions, encouraging early-stage researchers to actively interact with the practice in companies and society and their challenges

By supporting Joint Doctoral Programmes and Activities, the E³UDRES² alliance aims at reaching Strategic Goals such as:

- Strengthening the research dimension of the Alliance in general
- Enhancing Applied Research for Regions through E³UDRES² focus areas-related PhD theses and research projects
- Securing the future, dynamism and sustainability of the Alliance by reaching out to younger and early-stage researchers as a “E³UDRES² generation”
- Linking Researchers of all stages (R1-R4) in the Alliance by participation of professors in Co-Supervision, Joint Juries, Short-term Research Stay Schemes for P(h)D Students at other E³UDRES² universities / research lab facilities
- Strengthening the entrepreneurial dimension of the Alliance by linking E³UDRES² universities closer to regional partners, offering Short-term Internship Research Challenge Schemes for P(h)D Students in stakeholder institutions in regional innovation ecosystems
- Offering graduates from E³UDRES² partner universities without the right to award doctoral degrees more opportunities to pursue a doctoral degree within the alliance at a partner university with the right to award doctoral degrees

For individual universities in E³UDRES², additional strategic goals can be reached, supporting and complementing the goals of the alliance. These can include:

- Increasing the number of P(h)D students and P(h)Ds in general
- Increasing the number of international P(h)D students and P(h)Ds
- Enlarging the pool of early stage and younger researchers for recruitment of future professors and academic staff
- Enhancing the international experience and co-supervision competence of professors and academic staff at the own institution
- Strengthening the (applied) research profile of the own institution, in line with the E³UDRES² focus areas and individual regional innovation ecosystems
- Promoting Innovation in the region

4. Methodology for establishing E³UDRES² Joint P(h)D programmes

4.1. Methodological approach

The establishment of E³UDRES² Joint Doctoral Programmes should follow a progressive methodology that enables partner institutions to strengthen doctoral education while respecting institutional autonomy and national regulatory frameworks. Rather than requiring the immediate implementation of fully integrated joint degrees, the methodology promotes incremental academic integration through joint supervision, collaborative assessment, coordinated doctoral training and shared research activities. This approach allows institutions to establish common academic practices before introducing more complex organisational and legal arrangements.

Joint doctoral education extends beyond the delivery of a joint programme or joint degree. It requires the development of a collaborative doctoral ecosystem in which researchers, supervisors and doctoral candidates participate in shared academic activities throughout the doctoral lifecycle. This gradual integration improves institutional interoperability by aligning academic procedures, strengthens collaboration through sustained interactions among research groups, and supports the convergence of supervisory and quality-assurance practices. To guide and support these activities, the alliance will further the exchange within E³UDRES² on supervision practices, doctoral training activities, reviewer pools and quality assurance procedures, while monitoring the progressive implementation of the Joint Doctoral Programmes, in dialogue with the Scientific Council.

Joint supervision, or co-supervision, is the primary mechanism for academic integration. Doctoral candidates benefit from complementary scientific expertise, which provides broader disciplinary perspectives, access to specialised research infrastructures, the use of facilities unavailable at the home institution, and expanded international research networks, increasing opportunities for collaborative publications and future research projects. Depending on institutional regulations, supervision may involve a primary supervisor supported by an international co-supervisor or a joint supervisory team comprising academics from multiple E³UDRES² institutions. Effective supervision requires clearly defined responsibilities, jointly agreed research objectives, regular progress meetings and coordinated feedback. Where appropriate, partner institutions should establish joint supervision agreements that address supervisory responsibilities, intellectual property, publication policies, research data management, and dispute resolution.

The methodology also promotes the participation of E³UDRES² academics in doctoral examination committees. Joint juries strengthen academic quality through independent evaluation, encouraging the adoption of consistent assessment criteria across partner institutions and facilitating the exchange of good examination practices. As collaboration develops, the alliance should progressively define common principles for jury composition, evaluation criteria, reporting procedures and hybrid participation where institutional regulations permit.

A further component involves jointly identifying and evaluating doctoral research opportunities. Partner institutions should develop a shared catalogue of doctoral research topics that reflect complementary expertise and common strategic priorities, including regional innovation, sustainability, digital transformation, and societal challenges. Cross-institutional peer review should support proposal evaluation, candidate selection, research

progress reviews and, where appropriate, final thesis assessment. This collaborative evaluation process improves transparency through independent review, strengthens research quality by incorporating diverse academic perspectives, and promotes interdisciplinary collaboration across the alliance.

The methodology also requires coordinated doctoral training that complements institutional programmes. The alliance should organise doctoral summer schools, seminars, workshops, guest lectures, and trainings in research methodology, academic writing, research ethics, open science, open publication, research valorisation and communication, and transferable skills. These activities facilitate mobility between partner institutions and strengthen interactions among doctoral candidates and supervisors. Where feasible, institutions should support mutual recognition of participation through compatible workload allocation or micro-credentials.

Doctoral consortiums should become a recurring component of this training framework. A Doctoral consortium should be a structured academic event where doctoral candidates present research in progress and receive feedback from experienced researchers and peers. Unlike conference presentations, which primarily disseminate completed research, Doctoral consortiums focus on refining research questions, validating methodological choices and identifying opportunities for collaboration. Integrating these events with doctoral summer schools or alliance research conferences will strengthen mentoring, promote interdisciplinary dialogue and contribute to the continuous improvement of doctoral research quality.

4.2. Progressive implementation pathway

The proposed methodology follows a phased implementation pathway that enables partner institutions to progressively strengthen academic integration while accommodating differences in institutional practices and national regulatory frameworks. Rather than requiring immediate structural harmonisation, the pathway introduces collaborative practices that can be implemented within existing doctoral programmes and progressively expanded as institutional experience and organisational capacity increase.

- The first phase establishes collaboration through shared doctoral activities, including seminars, guest lectures, doctoral summer schools, reviewer exchanges and Doctoral consortiums. These initiatives create opportunities for academic networking, facilitating interactions between researchers and doctoral candidates, and promote familiarity with the alliance's research expertise without requiring substantial administrative changes.
- The second phase extends collaboration to joint supervision and the coordinated development and evaluation of doctoral research opportunities. Shared supervision broadens the scientific expertise available to doctoral candidates, while cross-institutional reviewer pools improve the transparency and consistency of proposal evaluation, candidate selection and research progress assessment.
- The third phase introduces common quality assurance practices through joint doctoral defence juries, coordinated training activities and shared evaluation principles. These measures improve consistency in doctoral assessment, encourage

the exchange of good practices and strengthen confidence in academic procedures across partner institutions.

- The final phase consolidates these collaborative practices into sustainable Joint Doctoral Programmes supported by integrated curricula, coordinated mobility, shared governance and, where national legislation permits, joint or multiple doctoral degrees. This phased implementation reduces organisational risk by validating collaborative practices before deeper institutional integration while providing sufficient flexibility to accommodate the diverse legal and administrative contexts across the E³UDRES² alliance.

Table 1 summarises the activities and expected outcomes for each implementation phase, illustrating the progression from initial collaboration to fully established Joint Doctoral Programmes.

Table 1. Progressive implementation pathway for E³UDRES² Joint Doctoral Programmes

Phase	Main activities	Expected outcomes	Governance milestone
Phase 1: Collaboration	Guest lectures, seminars, graduate qualification courses and workshops, doctoral summer schools, reviewer exchanges and Doctoral consortiums	Academic networking, training, doctoral community building and initial research collaboration	Alliance-wide doctoral network established
Phase 2: Academic Integration	Joint supervision, co-supervision agreements, shared doctoral topic catalogues and reviewer pools	Harmonised supervisory practices, interdisciplinary collaboration and stronger research partnerships	Joint doctoral coordination mechanisms operational
Phase 3: Quality Integration	Joint defence juries, common evaluation principles and coordinated doctoral training	Convergence of quality assurance practices and greater consistency in doctoral assessment	Shared quality assurance procedures adopted
Phase 4: Joint Programme Consolidation	Integrated curricula, coordinated mobility, shared governance and, where legally feasible, joint or multiple doctoral degrees	Sustainable E ³ UDRES ² Joint Doctoral Programmes	Integrated programme governance established

4.3. Open Call for collaboration for joint doctoral activities

As a methodological step for implementing joint PhD activities, in February 2026, an Open Call for collaboration for joint doctoral activities was launched. The call aimed to formalize and support doctoral-related activities across different levels, with particular emphasis on initiatives that contribute to the target of creating 2 – 4 joint doctoral schools / programmes. The call was built on the Joint E³UDRES² Concept & Policy for Doctoral Studies (milestone approved in June 2025), which provided the framework, principles, partner roles, financing and mobility models, and priority research fields for programme development. There was no foreseen limit on the number of joint P(h)D proposals that could be selected by the

Scientific Council. The Scientific Council only had to give recommendations for further development from the point of view of the E³UDRES² vision on joint doctoral activities. Four proposals have been submitted and all four received the confirmation of the Scientific Council regarding the alignment with the doctoral studies policy framework. The proposals and the Scientific Council feedback are briefly described in section 4.6.1.

4.4. Analysis of the critical mass of qualified P(h)D supervisors / co-supervisors

The E³UDRES² Alliance applies a structured methodology to analyse the critical mass of doctoral thesis supervisors across its partner institutions, with the objective of assessing the alliance's doctoral research capacity, identifying complementary expertise, and supporting the development of joint doctoral education initiatives.

The analysis begins with the identification of each partner institution's legal status regarding the right to award doctoral degrees, as national legislation differs significantly across European higher education systems. Institutions are therefore grouped into two categories:

- (i) universities and universities of applied sciences with the legal right to organise doctoral studies and award doctoral degrees,
- (ii) universities of applied sciences that currently do not possess this legal mandate but actively contribute to doctoral education through research, co-supervision, industrial doctorates, professional doctorates or collaborations with degree-awarding institutions.

For each partner with doctoral awarding rights, the number of officially recognised doctoral thesis supervisors is collected according to national legislation and institutional regulations. These data provide a quantitative indicator of the alliance's supervision capacity and represent the potential pool of academic staff eligible to supervise doctoral candidates. The resulting critical mass enables the alliance to evaluate the availability of expertise across scientific disciplines and thematic research domains.

For partners without the legal right to award doctoral degrees, the analysis considers the number of research-active academics who fulfil national or institutional criteria for doctoral supervision or who participate in doctoral education through international partnerships. Although these academics cannot independently supervise doctoral candidates within their institutions, they constitute an important component of the alliance's research ecosystem by acting as co-supervisors, mentors, hosts for research mobility, or members of doctoral committees.

The collected data are subsequently analysed at both institutional and alliance levels. Institutionally, the methodology identifies the supervision capacity of each partner and its disciplinary strengths. At alliance level, the aggregated figures provide an overview of the collective doctoral supervision capacity, allowing the identification of complementary expertise, potential supervisory networks, and opportunities for interdisciplinary and inter-institutional collaboration.

The methodology also recognises that numerical indicators alone do not fully capture doctoral supervision capacity. Consequently, the quantitative analysis is complemented by qualitative information regarding supervisors' research profiles, international collaboration experience, participation in European research projects, publication performance, and

involvement in innovation ecosystems. This broader perspective enables the alliance to map expertise more accurately and to identify suitable supervisors for future joint doctoral activities.

Finally, the analysis serves as a strategic planning instrument for the E³UDRES² Alliance. It supports the design of joint doctoral programmes, co-supervision agreements, doctoral mobility schemes, research internships, and collaborative doctoral projects. It also contributes to monitoring alliance Key Performance Indicators related to doctoral education by providing an evidence-based assessment of the available supervisory capacity and its evolution over time.

Table 2 presents a quantitative evaluation of the total number of qualified academic staff in each partner university that can provide PhD candidates (co-)supervision.

Table 2. Critical mass of doctoral thesis supervisors

Nr.	Partner	Legal right to award doctoral degrees	Number of thesis supervisors, according to national legislation
1	MATE – Hungarian University of Agriculture and Applied Sciences	Yes	421
2	UPT – Politehnica University Timisoara	Yes	174
3	HFD – Fulda University of Applied Sciences	Yes	60
4	ViA – Vidzeme University of Applied Sciences	Yes	18
5	IPS – Polytechnic University of Setúbal	Yes	86
6	USTP – University of Applied Sciences St. Pölten	No	19
7	Saxion – Saxion University of Applied Sciences	No	34
8	JAMK – JAMK University of Applied Sciences	No	21
9	UCLL – UCLL University of Applied Sciences	No	-
Total	All partners	Yes (majority) / No	833

Even though the rationale for including in this analysis researchers from partner universities that do not hold at the moment the legal right to award PhD degrees was already explained at the beginning of the section, some remarks have to be made regarding the strategy to select those supervisors.

IPS received the legal right to award PhD degrees in some educational/research domains very recently (during the preparation of this report). This is an important proof regarding how dynamic this topic is both in the Alliance and in Europe.

Since there are no hard criteria for supervising doctoral theses in Portugal, members of the team agreed on a methodology to select those from IPS that will most probably be accepted by any Scientific Committee of any PhD study programme (at least in Portugal).

In Portugal, there are no national regulations on who is allowed to supervise PhD students. The law sets general requirements, while each university establishes its own regulations.

In general, a PhD supervisor must:

- Hold a doctoral degree (PhD).

- Be formally appointed by the university's competent academic body.

In practice, universities often also consider factors such as:

- An active research profile and recent publications.
- Expertise in the student's research area.
- Membership in a recognized research unit.

Taking all the above into account, for IPS we first collected a list of all PhD permanent academic staff. Being aware that the assessment of a researcher's scientific track record is highly dependent on the norms and expectations of each scientific field, to minimise disciplinary bias, we adopted eligibility criteria based on prior peer-reviewed academic evaluation. Specifically, we considered only who had already undergone rigorous assessment within their own discipline, such as those appointed through competitive procedures for the position of, at least, Associate Professor and/or those recognised as integrated members of a research unit that had received a rating of at least "Very Good" in the national research evaluation process. The ones that had supervised PhD students in the past have also been added to the list.

USTP list includes all colleagues either having a formal habilitation or fulfilling the requirements established by the Austrian Science Fund for faculty members and (co-)supervisors in the national scheme for cooperative doctoral programmes, involving traditional universities and Universities of Applied Sciences.

In Latvia, there are new Rules of the Cabinet of Ministers on Basic qualification requirements for doctoral thesis supervisors and members of the promotion council, and basic requirements for the establishment of the promotion council for academic doctoral study programmes, which will be in force since 1 January 2027. The higher education institution is authorized to set specific requirements for the academic supervisors of doctoral theses.

The E³UDRES² Alliance applies a multidisciplinary methodology to analyse the critical mass of doctoral thesis supervisors by research domain, with the objective of identifying the scientific strengths of the alliance, mapping complementary expertise across partner institutions, and supporting the development of joint doctoral education and research activities. The methodology builds upon the institutional analysis of doctoral supervision capacity by considering not only the total number of eligible doctoral supervisors, but also their distribution across accredited doctoral domains and research fields.

For each partner institution, doctoral supervisors are classified according to nationally accredited doctoral domains or recognised research areas. For easier match between different national classifications of the research domains, we proposed a methodology based on the European classification based on Open AIRE (<https://explore.openaire.eu/fields-of-science#01%20natural%20sciences>).

The mapping captures the number of supervisors available in each domain, allowing the alliance to assess both disciplinary depth within individual institutions and complementarity between partners. The resulting dataset provides a comprehensive overview of the scientific expertise available throughout the alliance.

Table 3 presents the number of qualified PhD supervisors in each partner university distributed on the research domain where they are working.

Table 3. Accredited research domains for doctoral studies and number of supervisors (classification based on Open AIRE)

Accredited doctoral domains	MATE	UPT	HFD	ViA	IPS	USTP	Saxion	JAMK	UCLL	Total
01 Natural Sciences	48	1		1						50
0101 Mathematics		1			6					7
0102 Computer and Information Sciences		30	8	2	8	7		3		58
0106 Biological Sciences	25				4					29
02 Architecture and landscape	19	7								26
0201 Civil engineering		27			3		1			31
0202 Electrical engineering, electronic engineering, information engineering		29	1	1	8	1	1			41
0203 Mechanical engineering	28	38			9		2			77
0204 Chemical engineering		17			6					23
0205 Materials engineering		8			2					10
0207 Environmental engineering		3			3		10			16
0210 Nano-technology							2			2
0303 Health sciences			18		14	4	5	8		49
0402 Animal Science	49									49
0404 Agricultural biotechnology	77				1			1		79
0405 Other agricultural sciences	73									73
0501 Psychology and cognitive sciences				1				3		4
0502 Economics and business	102	7	1	8	7	1	1	3		130
0503 Education				2	4		3			9
0508 Media and communications		1		2		1				4
0509 Other social sciences		2	32		7	1	9			51
06 Humanities and Arts				1	4	4		3		12
0602 Languages and literature		3								3

TOTAL:	421	174	60	18	86	19	34	21	0	833
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Note: Some Doctoral Research Schools / Centres are interdisciplinary and some researchers have interdisciplinary expertise and doctoral supervision competence in more than one academic discipline – an important asset in the alliance for matchmaking purposes.

An internal nominal table with all PhD supervisors exists at the level of the E³UDRES² WP4 team. It contains all detailed field of doctoral research interests for those supervisors and will be used to facilitate matching between different researchers that might collaborate on a specific PhD research proposal.

The harmonisation of doctoral research domains across the E³UDRES² Alliance provides a comprehensive overview of the scientific expertise available within the consortium and highlights the complementary strengths of its partner institutions. By grouping nationally accredited doctoral domains into common European research domains, the analysis enables comparison despite differences in national doctoral education systems and institutional missions.

The analysis demonstrates that the Alliance possesses a balanced portfolio of research areas spanning engineering, natural sciences, agriculture, health, social sciences, education, humanities, and emerging technologies. The diversity of expertise creates favourable conditions for interdisciplinary doctoral research and the development of joint supervision networks.

A summary of the most important fields of research available in the E³UDRES² alliance that would be of the main interest for joint collaboration in doctoral education is presented in Table 4, while a more in deep presentation is following after the table.

Table 4. "Heat Map" of doctoral cooperation

OpenAIRE field	HFD	IPS	Jamk	MATE	Saxion	UCLL	UPT	USTP	Via	Total
01 Natural Sciences	8	18		73			32	7	3	141
02 Engineering and Technology	1	31	3	47	16		129	1	1	229
03 Medical and Health Sciences	18	14	11		5			4		52
04 Agricultural and veterinary sciences		1	1	199						201
05 Social sciences	33	18	3	102	13		10	3	13	195
06 Humanities and the arts		4	3				3	4	1	15
Total	60	86	21	421	34	0	174	19	18	833

Engineering and Digital Technologies

Engineering and digital technologies represent one of the strongest research pillars within the alliance. UPT contributes the largest concentration of doctoral supervisors in this field, with 30 supervisors in Computer and Information Sciences, 29 in Electrical Engineering, Electronic Engineering and Information Engineering, 27 in Civil Engineering, 38 in Mechanical

Engineering, 17 in Chemical Engineering, 8 in Materials Engineering and 3 in Environmental Engineering.

Complementary expertise is provided by HFD (inter-university Doctoral Research Centre on Applied Computer Science PZAI and inter-university Doctoral Research Centre on System-integrated Engineering PZ Ing), ViA, IPS, USTP and Saxion, particularly in Computer and Information Sciences (other 25 supervisors outside UPT), Electrical Engineering (12 supervisors), Mechanical Engineering (11 supervisors), Civil Engineering (4 supervisors) and Environmental Engineering (13 supervisors). This distribution demonstrates that engineering expertise is widely shared across the alliance, facilitating international doctoral supervision and collaborative research in digital transformation, smart systems, robotics, artificial intelligence, advanced manufacturing and sustainable engineering.

Agricultural and Life Sciences

Agricultural and life sciences constitute another major strength, almost entirely concentrated within MATE. The university contributes 77 doctoral supervisors in Agricultural Biotechnology, 73 supervisors in Other Agricultural Sciences (including plant sciences and horticulture), 49 in Animal Science, 25 in Biological Sciences, 48 in Natural Sciences and 19 in Architecture and Landscape.

This concentration positions MATE as the alliance's centre of excellence in agriculture, food systems, biological sciences and environmental sustainability. These research capacities complement engineering and environmental expertise available at other partners, enabling interdisciplinary research addressing sustainable agriculture, climate resilience, food security and bioeconomy. HFD also is very strong in this field with 2 full academic departments (out of 8 in total): the Department of Food Technology and the Department of Nutritional, Food and Consumer Sciences. 6 professors and doctoral supervisors from these departments are members of the Doctoral Research Centre on Public Health with the right to award doctoral degrees.

Economics, Business and Regional Development

Economics and Business represents one of the largest research domains across the alliance. MATE contributes 102 doctoral supervisors, while additional expertise is available at UPT, HFD, ViA, IPS, USTP and Saxion, resulting in representation across seven partner institutions.

This widespread distribution demonstrates that economic development, entrepreneurship, innovation management and regional transformation constitute common research priorities throughout the alliance. The combination of business expertise with engineering, digital technologies and social sciences provides an excellent basis for research on innovation ecosystems, smart regions and sustainable economic development.

Health Sciences

Health Sciences form another significant interdisciplinary research area. HFD contributes 18 supervisors in the Doctoral Research Centre on Public Health (PZPH), IPS 14, Saxion 5 and USTP 4, creating a distributed network of expertise in healthcare, nursing, rehabilitation and health technologies.

The geographical distribution of this expertise enables collaboration in areas such as digital health, medical technologies, healthy ageing, healthcare innovation and technology-

supported care, particularly when combined with engineering and information technology research.

Social Sciences, Education and Humanities

The alliance demonstrates substantial capacity in the social sciences. HFD contributes the largest number of doctoral supervisors in Other Social Sciences (in the Doctoral Research Centre on Social Work and the Fulda Graduate Centre on Social Sciences (FGCSS) on Social and Cultural Sciences – 32), while UPT, IPS, USTP and Saxion also contribute expertise in this domain. Research areas include media & communication, social work, social counselling, community work, political sciences, public policy, European integration, regional development and interdisciplinary social and cultural sciences.

Education is represented primarily by IPS (4 supervisors), followed by Saxion (3), ViA (2) and UPT with a strong involvement in Digital learning technologies (that are credited to the IT domain), reflecting the alliance's commitment to educational innovation, digital learning and higher education research.

Humanities and Arts, Languages and Literature, Media and Communications, and Psychology and Cognitive Sciences complement the alliance's scientific portfolio by providing expertise in communication, intercultural dialogue, ethics, creativity and human-centred innovation. Although these domains involve fewer doctoral supervisors, they play an important role in supporting multidisciplinary research addressing societal challenges and contributing in an innovative way to social sustainability and resilience.

Natural Sciences, including Mathematics

Foundational scientific disciplines are represented through Mathematics and Natural Sciences, ensuring the theoretical basis for many engineering and technological research activities. While these domains involve comparatively fewer supervisors outside MATE, they strengthen the alliance's capacity for fundamental scientific research.

Complementarity Across the Alliance

The analysis demonstrates a high degree of complementarity among the partner institutions rather than duplication of expertise. MATE contributes strong leadership in agriculture, biological sciences and economics; UPT serves as the principal engineering and technology hub; HFD strengthens applied computer science, social and cultural sciences, social work and public health; IPS combines engineering, business, education and health sciences; ViA contributes communication and education; while USTP and Saxion reinforce applied research in digital technologies, sustainability, health and emerging technological fields.

This distribution supports the creation of multidisciplinary supervisory teams capable of addressing complex research challenges requiring expertise from multiple institutions and scientific disciplines.

Overall Assessment

Overall, the E³UDRES² Alliance demonstrates a robust and diversified doctoral research capacity with in total more than 800 professors having the right and experience to supervise P(h)D theses, coming from almost every partner university. Engineering and digital technologies, agricultural and life sciences, economics and business, health sciences, and social sciences emerge as the strongest research clusters, while education, humanities and emerging technologies provide valuable complementary expertise. The balanced

distribution of research domains across the partner institutions establishes a strong foundation for joint doctoral programmes, international co-supervision, interdisciplinary research projects and collaborative doctoral training aligned with the alliance's mission of promoting smart and sustainable European regions.

4.5. Analysis of the critical mass of researchers within E³UDRES² ready to provide joint collaboration in doctoral studies

To assess the interest and readiness of the E³UDRES² partners to participate in joint doctoral collaboration, the alliance conducted a structured collection of Expressions of Interest. Researchers from all partner institutions were invited to indicate their readiness to engage in various doctoral activities, including co-supervision of doctoral candidates, participation in thesis review and defense committees, joint development of doctoral research topics, teaching and tutoring, organisation of doctoral Summer Schools, and implementation of joint doctoral programmes. In addition, participants specified their areas of expertise, enabling the mapping of disciplinary strengths and the identification of potential cross-institutional supervisory teams. The collected expressions of interest provide evidence of the alliance's existing academic capacity and commitment to collaborative doctoral education, while serving as a basis for establishing international co-supervision schemes, interdisciplinary doctoral networks, joint training activities, and future European joint doctoral initiatives.

We should state clearly that all joint collaborations will be based on mutual consensus between partners and on checking if all national requirements are satisfied for the specific collaboration.

The current results are summarised in Table 5. The described status reflects the situation at this moment and will be regularly updated by all partners.

Table 5. Partner expertise and involvement in E³UDRES² joint doctoral activities

Partner	Area	Type of involvement in E³UDRES² joint doctoral activities
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Food sciences	Review, joint juries for thesis defense
MATE	Food sciences	(Co-)supervision, review, joint juries for thesis defense, Teaching
MATE	Mechatronics	Review, joint juries for thesis defense
MATE	Mechanical and Agricultural engineering	(Co-)supervision, review, joint juries for thesis defense, Teaching
UPT	Computers and Information technologies	(Co-)supervision, review, joint juries for thesis defense
UPT	Computers and Information technologies	(Co-)supervision, review, joint juries for thesis defense
UPT	Systems engineering	(Co-)supervision, review, joint juries for thesis defense

UPT	Electronics, telecommunications and informational technologies	(Co-)supervision, review, joint juries for thesis defense
UPT	Electronics, telecommunications and informational technologies	(Co-)supervision, review, joint juries for thesis defense
UPT	Electronics, telecommunications and informational technologies	(Co-)supervision, review, joint juries for thesis defense, training courses, Summer Schools
UPT	Electrical engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Civil engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Civil engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Geodesic engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Geodesic engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Geodesic engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Mechanical engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Mechanical engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Mechanical engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Mechanical engineering	(Co-)supervision, review, joint juries for thesis defense
UPT	Engineering and management	(Co-)supervision, review, joint juries for thesis defense
UPT	Engineering and management	(Co-)supervision, review, joint juries for thesis defense
UPT	Engineering and management	(Co-)supervision, review, joint juries for thesis defense
UPT	Engineering and management	(Co-)supervision, review, joint juries for thesis defense
UPT	Physics	(Co-)supervision, review, joint juries for thesis defense
UPT	Digital education, AI in education, IT	Review, tutoring, joint juries for thesis defense, tutoring, training courses, Summer Schools
UPT	Digital education, entrepreneurship	Review, tutoring, joint juries for thesis defense, tutoring, training courses, Summer Schools
UPT	AR/VR, UAX, IT	Review, tutoring, joint juries for thesis defense, tutoring, training courses, Summer Schools
UPT	Image processing, IT	Review, tutoring, joint juries for thesis defense, tutoring, training courses, Summer Schools
UPT	Digital education, IT platforms	Review, tutoring, joint juries for thesis defense, tutoring, training courses, Summer Schools
ViA	Regional economics; tourisms	Supervision, Review, organising of Summer schools, participation in Joint juries for PhD defense, Teaching
ViA	Pedagogy in higher education	Supervision, Review, Teaching
ViA	Communication science	Supervision, Review
ViA	Management of pedagogy	Teaching (study course "Assessment of competencies")
ViA	Business management	Supervision, Review, Teaching
ViA	Electrical Engineering, Electronics, Information and Communication Technologies	Supervision, Review, organising of Summer schools, participation in Joint juries for PhD defense, Teaching
ViA	Systems analysis, modeling, and design in the information technology sector	Supervision, Review, Teaching, participation in Joint juries for PhD defense
ViA	Information Technology	Supervision, Review, Teaching, participation in Joint juries for PhD defense
ViA	Economics	Review, participation in Joint juries for PhD defense
ViA	Humanities and Arts	Supervision, Review, Teaching, participation in Joint juries for PhD defense
ViA	Economics and Business	Supervision, Review, Teaching, participation in Joint juries for PhD defense

ViA	Systems Analysis, Modeling, and Design	Supervision, Review, Teaching, participation in Joint juries for PhD defense
ViA	Business and management	Supervision, Review, participation in Joint juries for PhD defense
ViA	Psychology, Social Psychology	Supervision, Review, participation in Joint juries for PhD defense
ViA	Doctor of Philosophy in Latvian History	Supervision, Review, Teaching, organising of Summer Schools
ViA	Business Management	Supervision, Review, organising of Summer schools, participation in Joint juries for PhD defense, Teaching
ViA	Mass Media and Communication, Communication Theory	Supervision, Review, organising of Summer Schools, participation in Joint juries for PhD defense, Teaching
IPS	Computers and Information Sciences	Co-supervision, joint juries for PhD defense, joint offer of doctoral topics, and evaluation
IPS	Biotechnology	Supervision, Review, participation in Joint juries for PhD defense
IPS	Environmental Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Nursing	Supervision, Review, participation in Joint juries for PhD defense
IPS	Electrical and Computer Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Chemistry	Supervision, Review, participation in Joint juries for PhD defense
IPS	Physiotherapy	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mechanical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Civil Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Public Health	Supervision, Review, participation in Joint juries for PhD defense
IPS	Physiotherapy	Supervision, Review, participation in Joint juries for PhD defense
IPS	Informatics	Supervision, Review, participation in Joint juries for PhD defense
IPS	Information Systems	Supervision, Review, participation in Joint juries for PhD defense
IPS	Sociology	Supervision, Review, participation in Joint juries for PhD defense
IPS	Civil Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Computers and Information Sciences	Co-supervision, joint juries for PhD defense, joint offer of doctoral topics, and evaluation
IPS	Electrical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mathematics	Supervision, Review, participation in Joint juries for PhD defense
IPS	Communication Sciences	Supervision, Review, participation in Joint juries for PhD defense
IPS	Philosophy	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mechanical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Sport Sciences	Supervision, Review, participation in Joint juries for PhD defense
IPS	Management	Supervision, Review, participation in Joint juries for PhD defense
IPS	Physiotherapy	Supervision, Review, participation in Joint juries for PhD defense
IPS	Communication studies	Joint juries for PhD defense
IPS	Chemical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Biology	Supervision, Review, participation in Joint juries for PhD defense
IPS	Management	Supervision, Review, participation in Joint juries for PhD defense
IPS	Sport Sciences	Supervision, Review, participation in Joint juries for PhD defense
IPS	Biochemistry	Supervision, Review, participation in Joint juries for PhD defense
IPS	Informatics Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mechanical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Electrical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mathematics	Supervision, Review, participation in Joint juries for PhD defense
IPS	Chemical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Chemical Engineering and Biochemistry	Supervision, Review, participation in Joint juries for PhD defense
IPS	Human Kinetics	Supervision, Review, participation in Joint juries for PhD defense
IPS	History	Supervision, Review, participation in Joint juries for PhD defense
IPS	Computer Science	Supervision, Review, participation in Joint juries for PhD defense
IPS	Economy	Supervision, Review, participation in Joint juries for PhD defense
IPS	Health, physical activity	Co-research etc
IPS	Environment, sustainability	Joint juries, joint evaluation

IPS	Chemical Engineering	Supervision, Review, participation in Joint juries for PhD defense
IPS	Mathematics	Supervision, Review, participation in Joint juries for PhD defense
IPS	Industrial engineering	Joint juries for PhD defense
HFD	Members of 6 Doctoral Research centres	Co-supervision, joint juries for PhD defense, joint offer of doctoral topics, and evaluation
USTP	Computers and Information Sciences, data science	(Co-)supervision, review, joint juries for thesis defense, implementation of joint PhD programmes
USTP	Media and Digital Technologies	Joint juries for thesis defense, implementation of joint PhD programmes
USTP	Computers and Information Sciences, Cybersecurity	Co-supervision, review, joint juries for thesis defense
USTP	Computers and Information Sciences, Mathematics	Co-supervision, review, joint juries for thesis defense
USTP	Computers and Information Sciences, Mathematics	Co-supervision, review, joint juries for thesis defense
USTP	Computers and Information Sciences, Mathematics	Co-supervision, review, joint juries for thesis defense
USTP	Humanities, digital humanities	(Co-)supervision, review, joint juries for thesis defense
USTP	Humanities, ethics	(Co-)supervision, review, joint juries for thesis defense
USTP	Humanities, digital humanities	(Co-)supervision, review, joint juries for thesis defense
USTP	Humanities, arts, modern and contemporary art	(Co-)supervision, review, joint juries for thesis defense
USTP	Medical and Health Sciences, health sciences, sport and fitness sciences	(Co-)supervision, review, joint juries for thesis defense
USTP	Medical and Health Sciences, clinical medicine, physiotherapy	(Co-)supervision, review, joint juries for thesis defense
USTP	Medical and Health Sciences, health sciences, public health	(Co-)supervision, review, joint juries for thesis defense
USTP	Medical and Health Sciences, clinical medicine, physiotherapy	(Co-)supervision, review, joint juries for thesis defense
USTP	Computer and Information sciences, game theory, video games, software, software applications, virtual reality	(Co-)supervision, review, joint juries for thesis defense
USTP	Computer and Information sciences, artificial intelligence, machine learning	(Co-)supervision, review, joint juries for thesis defense
USTP	Electrical engineering, electronic engineering, information engineering, sensors, smart sensors, biosensors	(Co-)supervision, review, joint juries for thesis defense
USTP	Computer and Information Sciences, data science, artificial intelligence, machine learning	(Co-)supervision, review, joint juries for thesis defense
USTP	Computer and Information Sciences, artificial intelligence, machine learning, computer vision	(Co-)supervision, review, joint juries for thesis defense
USTP	Computers and Information Sciences, data science	(Co-)supervision, review, joint juries for thesis defense
USTP	Computer and Information Sciences, artificial intelligence,	(Co-)supervision, review, joint juries for thesis defense

	machine learning, computer vision	
USTP	Social Sciences, sociology	(Co-)supervision, review, joint juries for thesis defense
USTP	Social Sciences, media and communications	(Co-)supervision, review, joint juries for thesis defense
USTP	Social Sciences, economics and business, economics	(Co-)supervision, review, joint juries for thesis defense
USTP	Social Sciences, transport engineering	Review, joint juries for thesis defense
USTP	Computers and Information Sciences, data science	Review, joint juries for thesis defense
USTP	Social Sciences, media and communications	Review, joint juries for thesis defense
USTP	Engineering and Technology, civil engineering, transport engineering	Review, joint juries for thesis defense
USTP	Computers and Information Sciences	Review, joint juries for thesis defense
USTP	Medical and Health Sciences, nutrition sciences	Review, joint juries for thesis defense
USTP	Computers and Information Sciences, sound engineering, auditory display	Review, joint juries for thesis defense
USTP	Computers and Information Sciences, Cybersecurity	Review, joint juries for thesis defense
USTP	Computers and Information Sciences, operations research	Review, joint juries for thesis defense
USTP	Social Sciences, economics & business	Review, joint juries for thesis defense
USTP	Engineering and Technology, transport engineering	Review, joint juries for thesis defense
USTP	Computers and Information Sciences	Review, joint juries for thesis defense
USTP	Computer and Information Sciences, artificial intelligence, machine learning, computer vision	Review, joint juries for thesis defense
USTP	Social Sciences, social work	Review, joint juries for thesis defense
USTP	Social Sciences, social work	Review, joint juries for thesis defense
USTP	Computers and Information Sciences, Cybersecurity	Review, joint juries for thesis defense
USTP	Computers and Information Sciences	Review, joint juries for thesis defense
USTP	Medical and Health Sciences, nutrition sciences	Review, joint juries for thesis defense
USTP	Humanities, digital humanities	Review, joint juries for thesis defense
SAXION	Ambient Intelligence	Co-supervision, review, joint juries for thesis defence
SAXION	Ambient Intelligence	Co-supervision, review, joint juries for thesis defence
SAXION	Applied Nanotechnology, Nanobio	Co-supervision, review, joint juries for thesis defence
SAXION	Applied Nanotechnology, Nanophysics	Co-supervision, review, joint juries for thesis defence
SAXION	Business models	Co-supervision, review, joint juries for thesis defence
SAXION	Data Driven Innovation	Co-supervision, review, joint juries for thesis defence
SAXION	Human Capital	Co-supervision, review, joint juries for thesis defence

SAXION	Human Capital, Work and Organizational Behavior	Co-supervision, review, joint juries for thesis defence
SAXION	Ethics and Technology	Co-supervision, review, joint juries for thesis defence
SAXION	Industrial Design	Co-supervision, review, joint juries for thesis defence
SAXION	Lightweight Construction	Co-supervision, review, joint juries for thesis defence
SAXION	Modeling Societal Impact	Co-supervision, review, joint juries for thesis defence
SAXION	Online Resilience	Co-supervision, review, joint juries for thesis defence
SAXION	Regional Development	Co-supervision, review, joint juries for thesis defence
SAXION	Smart Cities	Co-supervision, review, joint juries for thesis defence
SAXION	Smart Health	Co-supervision, review, joint juries for thesis defence
SAXION	Podiatry	Co-supervision, review, joint juries for thesis defence
SAXION	Smart Health	Co-supervision, review, joint juries for thesis defence
SAXION	Social Work	Co-supervision, review, joint juries for thesis defence
SAXION	Sustainable Areas and Soil Transitions	Co-supervision, review, joint juries for thesis defence
SAXION	Sustainable & Functional Textiles	Co-supervision, review, joint juries for thesis defence
SAXION	Technology, Health & Care	Co-supervision, review, joint juries for thesis defence
SAXION	Resilient Democracy	Co-supervision, review, joint juries for thesis defence
SAXION	Innovative Education	Co-supervision, review, joint juries for thesis defence

The E³UDRES² Alliance demonstrates a strong commitment to the development of a collaborative doctoral ecosystem through the active involvement of researchers from at least six partner institutions (UPT, ViA, IPS, HFD, USTP and Saxion). The identified researchers represent a broad range of scientific disciplines, including engineering, information technologies, digital education, natural sciences, business and economics, health sciences, social sciences, communication, humanities, sustainability, and emerging technologies.

The analysis shows that **doctoral supervision and co-supervision** constitute the most common forms of collaboration, particularly among institutions with doctoral awarding rights. Researchers have also expressed significant willingness to participate in **joint thesis evaluation, peer review, and international doctoral defense juries**, establishing the foundations for cross-institutional quality assurance and academic cooperation.

Beyond supervision activities, many researchers are prepared to contribute to **doctoral training through teaching, tutoring, specialised training courses, and the organisation of doctoral Summer Schools**, reinforcing the educational dimension of the alliance. Several partners also propose involvement in the **joint definition of doctoral research topics, collaborative research projects, implementation of joint doctoral programmes, and co-development of innovative doctoral curricula**, highlighting a strategic vision that extends beyond individual supervision.

UPT contributes the largest number of researchers, primarily in engineering, digital technologies and applied sciences, while ViA demonstrates broad multidisciplinary participation across education, business, communication and information technologies. IPS provides expertise in engineering, sustainability, management and computer sciences, with particular emphasis on co-supervision and joint doctoral topics. HFD has 6 interdisciplinary doctoral research centres in Applied Computer Science, Mobility and Logistics, Public Health, Social Work, System-integrated Engineering and Social and Cultural Sciences with 60 HFD professors as members and doctoral supervisors in the centres. USTP contributes to the implementation of joint doctoral programmes, particularly in digital technologies, while Saxion brings specialised expertise in emerging interdisciplinary research areas, including

ambient intelligence, smart health, sustainability, education and human capital, primarily through participation in international doctoral juries.

Overall, the identified commitments demonstrate that the alliance already possesses a substantial pool of researchers willing to engage in joint doctoral education. The diversity of expertise and collaboration formats provides a strong basis for developing international co-supervision schemes, interdisciplinary doctoral networks, joint doctoral training activities and future European joint doctoral programmes within the E³UDRES² Alliance.

4.6. Proposals for joint doctoral programmes

To foster deeper research collaboration and strengthen doctoral education within the alliance, E³UDRES² launched a call for Expressions of Interest for the development of Joint P(h)D Programmes. The call invited consortia of E³UDRES² partner universities to propose collaborative doctoral programmes built around shared research strengths and complementary expertise.

Applicants were asked to define the academic profile of the proposed programme, identify the lead degree-awarding institution and participating partners, and describe the organisational model, including supervision arrangements, joint training activities, mobility opportunities, and programme delivery. Particular emphasis was placed on establishing multidisciplinary supervisory teams, demonstrating research excellence through internationally visible supervisors, and outlining the scientific quality and sustainability of the proposed collaboration.

The call also encouraged the involvement of associated universities, external partners, research centres and Centres of Excellence where relevant, while promoting opportunities for co-supervision, joint doctoral topics, summer schools, and international mobility. Furthermore, proposals were expected to demonstrate their potential to attract doctoral candidates and to contribute to the development of doctoral supervision capacity within the alliance, including supporting researchers in obtaining habilitation or equivalent qualifications required for doctoral supervision.

Overall, the call aimed to identify mature, high-quality initiatives that can serve as pilot Joint P(h)D Programmes and establish a sustainable framework for future European collaborative doctoral education within the E³UDRES² Alliance.

4.6.1. Submitted proposals for joint PhD programmes

Four proposals have been submitted to the Open Call launched in February 2026, described in section 4.6. We provide a brief description of the proposals in Table 6.

Table 6. Proposals submitted to the Open Call launched in February 2026 (all selected)

Name of the proposed programme	E ³ UDRES ² university legally awarding the P(h)D title	Other E ³ UDRES ² institutions in the partnership	Field of doctoral studies
Applied Technologies and Innovation for Smart and Sustainable Regions	UPT	IPS, MATE, USTP	Architecture, Systems Engineering, Computers and Information Technology, Geodesical Engineering, Civil Engineering and Installations, Chemical

			Engineering, Materials Engineering, Electrical Engineering, Energy Engineering, Electronic Engineering, Telecommunications and IT, Engineering and Management, Mechanical Engineering, Industrial Engineering
OPHELIA+ – One and Planetary Health Ecosystem Livestock and Interdisciplinary Alliance-PhD	HFD	IPS, JAMK, UPT	Public Health//Public Health Nutrition
Socio-Technical Systems Engineering	ViA	IPS, USTP	Electrotechnics, electronics, information and communication technologies
Sustainable Food Systems and Food Innovation	MATE	HFD (to be confirmed), UPT	Food Innovation, Product Development, and Advanced Shelf-Life Extension, Smart Quality Control, Digitalization, and Robotization for Resilient Food Production

It is worth mentioning that proposals OPHELIA+ and Socio-Technical Systems Engineering are driven by two of the prospective E³UDRES² Applied Research Centers of Excellence, namely, the One Health Applied Research Center of Excellence for Regional Wellbeing and Sustainability and Regional Socio-Technical Innovation and Intelligence Center, respectively. This underscores the strength of the research links already established and indicates a solid foundation for future collaborative activities within the alliance.

4.6.2. Evaluation criteria by the Scientific Council

The feasibility evaluation of the eligible proposals was done by the E³UDRES² Scientific Council according to the following criteria:

- Quality and credibility of the proposed partnership (E³UDRES² participants and possible other associated participants)
- Quality of the proposed team involved in the proposal: international visibility and performances of the doctoral supervisors and co-supervisors
- Quality of the description for the proposed programme:
 - Field of research aligned with the E³UDRES² priority areas
 - Clear roles for all partners' involvement
 - Coherence and quality of the curricula or content of the programme
 - Quality of the expected outcomes, their relevance and credibility for obtaining them
 - Coherence of the envisaged delivery mode (onsite, online, hybrid)
 - Envisaged support for doctoral students and/or staff
 - Language(s) for delivery

4.6.3. Results of the evaluation for joint programmes

As a result of the evaluation by the Scientific Council of the 4 submitted proposals for joint PhD programmes, a set of remarks regarding the strong points and recommended improvements have been received.

Those are briefly presented for the 4 proposals, together with the replies and statements of the implementation teams of the proposals, if available.

1. Applied Technologies and Innovation for Smart and Sustainable Regions (lead UPT, partners MATE, IPS, USTP)

a. Strong points:

- Broad and multidisciplinary scope covering engineering, ICT, environment, health, and circular economy themes
- Strong institutional capacity at lead university (UPT)
- Extensive research-active supervisory team with strong publication and project track records (Horizon Europe, Erasmus+, national projects)
- Clear integration of smart regions, sustainability, and Industry 5.0 topics
- Openness to associate partners (Ukraine, Balkans) and other involved organisations
- Possibility for joint doctoral degrees via co-supervision.
- Team quality is fine, but way too large.

b. Recommended improvements:

- Further clarify the overall programme structure (duration, ECTS, curriculum design), not explicitly specified now.
- Provide more details on mobility arrangements and joint activities across partners.
- Strengthen description of governance and coordination mechanisms across institutions.
- Role commitment of partners, especially those “to be confirmed” (USTP)
- Specify doctoral training components beyond research (courses, transferable skills)
- Clearer information on funding models and sustainability of the programme.
- Even the title is aligned with the E³UDRES² priority areas from the proposal is not clear how this is due.
- The roles of partners are not detailed
- Proposal did not clarify that is a credible partnership. The lead partner is simply mentioning its running program. What is the advantage of a joint program then.
- The topic is encompassing all technical disciplines. No topic has been selected.
- Not a good example of a JOINT program as the balance is not equal. I do not see any added value in doing this in a joint construct.
- There are too many PIs, the focus is not clear enough and it is not clear who does what
- What are the classes dedicated to?
- What are the research training activities concretely?
- What is the research design of the programme?

c. Replies from the implementation team:

The implementation team is currently updating the project according to the recommendation of the Scientific Council.

There are two ideas to be mentioned again, as they were probably differently understood or interpreted by different members of the SC:

- The proposal is deliberately designed in a large spectrum of already accredited domains, in order to easily allow integration of researchers from different partner universities as co-supervisors, tutors or members of the final defense juries in order to transform work of some PhD students into a joint E³UDRES² one, thus allowing to fulfil the goal of minimum 30 enrolled PhD students on E³UDRES² topics
- UPT is accredited for PhD studies based on doctoral domains, not on doctoral programmes. This means that, if a Memorandum of Understanding MoU for a joint new programme between UPT and another one or more partners is signed, inside those broad domains, the accreditation process is already recognized for UPT and has only to be done for the partners.

Currently, the implementation team launched a call for collaboration for 35 PhD topics related to E³UDRES² that are offered for doctoral students for this session of admission in the UPT doctoral school. For all those topics, co-supervisors, members of the revision teams and tutors are looked for from the partner institutions.

A discussion has been started with USTP for establishing a Memorandum of Understanding for establishing a joint PhD programme in the field of Information Technology.

2. One and Planetary Health Ecosystem Livestock and Interdisciplinary Alliance-PhD OPHELIA+ (Lead HFD, partners IPS, JAMK, UPT)

a. Strong points:

- Excellent concept + strong consortium + Very strong conceptual framing (One Health) + Strong societal relevance and policy impact orientation + Integration with Master programme
- Clearly defined thematic focus on One and Planetary Health, integrating human, animal, and environmental dimensions.
- Clearly articulated interdisciplinary and transdisciplinary approach (health, environment, food systems, social sciences).
- Well-developed programme vision and objectives (5 structured goals).
- Structured elements such as joint governance board, supervisory committees, and co-supervision model.
- Integration of living labs, citizen science, and applied regional innovation contexts.
- Defined doctoral duration (3–4 years) and training component (30–60 ECTS)
- Strong senior supervision profiles with international research experience and funded projects
- Emphasis on mobility, joint activities, and European collaboration structures
- Clear description of curricula.
- Objectives well described.
- Nice delineated topic, well connected to existing networks

b. Recommended improvements: Operational clarity

- Several organisational elements remain “to be elaborated”

- Clarify operational details of co-supervision and curriculum implementation, currently partly unspecified.
- Also clarify description of funding mechanisms, including reliance on tuition and external funding
- Further detail mobility funding and support mechanisms is needed
- Specify course structure and delivery components more concretely.
- Clarify partner roles and commitments in governance and delivery.
- Alignment with EUDRES priority areas needs to be explained.
- The existence of a structured programme not clear from the proposal.
- The roles of partners are given in a very general way.
- What are the research training activities concretely?

c. Replies from the implementation team:

OPHELIA+ will stress operational details in consequential meetings (online and on-site/in-person meetings) of the involved researchers, once the alliance frame and primary hosting institution have been elaborated.

Partners will contribute their complementary expertise, participate actively in the programme's governance through representation on academic and management committees (e.g. Steering Committee, Doctoral Training Board, Supervisory Board), and deliver their assigned responsibilities. A key commitment is to integrate knowledge across disciplines, fostering transdisciplinary collaboration in application-oriented research, doctoral training, supervision, and knowledge exchange to maximise scientific and societal impact.

OPHELIA+ will clarify agreements of supervision and primary hosting institution with help of the alliance responsible personnel and with candidates and topic frame ahead (Cotutelle Agreements, etc.).

The researchers will apply for third party funding, also outside European Union sources, as part of their daily business to establish funded PhD research. The tuition for the program may be cofunded through such funding regimes. PhD students will be encouraged and supported when raising individual funding and applying for other grants and scholarships as well.

Specific funding regimes for alliances are sought after in collaboration with the management personnel to establish an even more competitive and pro-active funding and teaching scheme.

An OPHELIA+ PhD Winter/Spring University is envisaged as a starting point.

The goal is to bring most suitable knowledge together and share especially in the application fields (transdisciplinary engagements)

The programme combines discipline-specific training with interdisciplinary courses, application-oriented research, and professional skills development, ensuring a consistent and high-quality doctoral training experience across all participating institutions. Courses are jointly coordinated and delivered by academic staff from different partner institutions,

with shared teaching responsibilities that bring together complementary expertise. To facilitate participation across the consortium, a substantial part of the programme is delivered through online classes, complemented by in-person training events (e.g. week-long schools), workshops, and mobility activities.

Public Health, Nutrition, and a comprehensive analysis of health in a holistic sense align and concretise the E³UDRES² focus area of Health, Wellbeing and Social Inclusion for Regions, especially in rural areas and in times of climate change and global threats to healthy food production and sustainable food supply.

OPHELIA+ is inspired by the German network Doctoral Certificate Program in Agricultural Economics (<https://www.agraroeconomik.de/overview.html>, OPHELIA+ lead researcher from HFD involved) when developing its own structured doctoral programme, courses and training modules in E³UDRES².

The OPHELIA+ doctoral programme will provide a structured portfolio of research training activities organised around seasonal Spring, Summer, Autumn, and Winter Schools. This format offers flexibility for academic staff while ensuring a regular and coordinated training offer across the E³UDRES² alliance.

Research training activities will include:

- * advanced disciplinary and interdisciplinary courses related to the programme's research themes;
- * methodology training (e.g. research design, quantitative and qualitative methods, data analysis, modelling, and responsible research practices);
- * transferable skills development, including scientific writing, research communication, project management, entrepreneurship, innovation, and open science;
- * doctoral seminars, research presentations, and peer-learning activities;
- * workshops with academic and non-academic stakeholders to strengthen application-oriented and transdisciplinary research;
- * international mobility, networking opportunities, and collaboration across partner institutions.

The programme will consist of core modules completed by all doctoral candidates, complemented by elective modules that can be selected according to each PhD candidate's research project and individual training needs. All activities will be recognised through a common credit framework, ensuring transparency and comparability across the participating institutions.

3. Socio-Technical Systems Engineering (Lead ViA, partners IPS, USTP)

a. Strong points:

- Clear curriculum design + Strong integration with industry (industrial PhD option)
- Clearly defined 3-year, 180 ECTS structure with strong research focus (150 ECTS dedicated to research)
- Flexible pathways including industrial PhD and vacancy-based positions

- Strong interdisciplinary scope (AI, digital twins, ICT, environmental modelling)
- Joint supervision model including international co-supervisor.
- Integration with research projects and Horizon-type initiatives

b. Recommended improvements: Weak supervision strength + limited integration

- Strengthen the role of associated partners, especially since they are not degree-awarding
- More details on mobility requirements, which are currently optional (summer/winter schools) is needed
- Better explain supervision capacity, given several supervisors with limited completed PhD supervision experience
- Further specify funding stability and long-term sustainability beyond project-based recruitment
- The alignment to EUDRES priority areas not described.
- The description of the role of the partners is very limited
- The description of existence of a structured programme is not clear from the proposal.
- Better describe the expected outcomes.
- The team has a significant number of PhD supervisors, but many without any experience in supervision of PhD students.
- Structure description is rather standard. Suggestion is to have A-courses on specific sites, but the rationale for this is not really given. What are these courses then. Topic delineation is not done. Topic is very broad now.
- What are the classes dedicated to?
- What are the research training activities concretely?
- what is the research design of the programme?

c. Replies from the implementation team:

Something worth mentioning is that this proposal was included in the application UAS4Joint, submitted to the call ERASMUS-EDU-2025-PE-EUED — Partnerships for Excellence: European Universities – European Degree Exploratory action, with one of its aims to redesign the proposal to implement the criteria for accreditation under the European Approach. The consortium received the approval of the UAS4Joint application during July 2026.

4. Doctoral Programme in Sustainable Food Systems and Food Innovation (Lead MATE, partners, UPT, HFD)

a. Strong points:

- Strong structure + clear design
- Strong interdisciplinary focus combining food science, biotechnology, and digitalisation
- Well-structured 4-year, two-phase programme (education + research)
- Clearly embedded mandatory international mobility (1–3 semesters)

- Strong senior supervision capacity (e.g., high h-index, multiple completed PhDs)
- Clear links to industry and applied research (Cooperative Doctoral Programme)
- Integration with Centers of Applied Research Excellence and societal challenges (food, health)
- Priority area of resilient economy and innovation.
- Topic/field is clearly indicated.

b. Recommended improvements: Funding & partner commitment

- Confirm partner-participation where currently indicated as “to be confirmed”
- Provide more detail on courses and credit allocation
- Clarify financial support for course development, currently not stated
- Further specify operational mechanisms for collaboration with industry partners.
- Quality of PI is not very high. One has 2-4 papers per year and has experience with PhD students. Other low experience, are rather starting researchers. Some of the supervisors are also in the proposal **Applied Technologies and Innovation for Smart and Sustainable Regions** and is not clear how they will be involved in two PhD – programs.
- Include in the program the group of Abeje Mersha from Saxion focused in robotics.
- Curricula description is very generally described and mainly educational part.
- Description expected outcomes needs to be done more specific.
- The quality description of proposed program is ok, but rather standard. It is not entirely clear what the added value of putting this together is. This needs to be justified better
- What are the classes dedicated to?
- What are the research training activities concretely?
- What is the research design of the programme?

c. Replies from the implementation team:

The implementation team would like to sincerely thank the Scientific Council for its thorough evaluation, positive assessment, and constructive recommendations.

The proposal is currently undergoing a comprehensive revision in response to the reviewers' comments, with substantial progress already achieved. The revised version expands the original concept by providing a clearer and more detailed description of the programme's academic structure, implementation framework, governance model, and expected impact.

The curriculum has been further developed into a structured doctoral training pathway, including a detailed curriculum framework, indicative course groups and credit allocation, research-training activities, mobility components, and the overall research design of the programme. The governance framework has also been elaborated by defining the proposed coordination mechanisms, quality assurance processes, and the responsibilities of the participating partner institutions.

In addition, new sections have been prepared to better demonstrate the added value of the joint doctoral programme by highlighting the complementary expertise of the E³UDRES²

partners, the interdisciplinary research approach, and the integration of engineering, robotics, and innovation-related competences. The proposal also includes an expanded framework for collaboration with industry through a structured partner-engagement model and provides a clearer overview of potential funding opportunities supporting mobility, course development, and joint research activities. Furthermore, the expected outcomes and impact indicators have been refined to include measurable objectives related to doctoral education, scientific excellence, international collaboration, knowledge transfer, and institutional development.

Most of these revised sections have already been completed. The remaining elements mainly concern the confirmation of the participating institutions and experts. This includes the planned incorporation of the expertise of Saxion University of Applied Sciences, which will further strengthen the programme's engineering and robotics dimension. We are currently awaiting feedback from several partner universities, after which the proposal will be finalised and updated accordingly.

All implementation teams of the proposals were invited to reply to the remarks from members of the Scientific Council and to further specify and elaborate on their proposals. The written replies received by the time of the final drafting of this document were included here. Of course, also after the deadline dialogue and exchange between the Scientific Council, WP4 team and the researchers from the implementation team of the 4 proposals will continue in order to answer open questions, support the development of the proposals and strengthen doctoral collaboration in the alliance.

4.6.4. Other existing initiatives for joint PhD programmes

The inter-university Doctoral Research Centre on Social Work / Promotionszentrum Soziale Arbeit (set up together with other universities of applied sciences in the federal state of Hesse (<https://promotionszentrum-soziale-arbeit.de/>) and located administratively at Hochschule Fulda is preparing within the E³UDRES² alliance a close cooperation with the University of Applied Sciences St. Pölten (USTP) in the field of doctoral studies and research in Social Work. Several meetings of professors from both universities have already taken place in February, March and June 2026 at Fulda University. For September 2026 another online-meeting has been scheduled, in January 2027 a "match-making" workshop will take place in Fulda. The goal is to set up concrete joint doctoral agreements (cooperation scheme), enabling doctoral candidates at both universities to benefit from co-supervision, joint juries, short-term research stays, graduate qualification courses (such as for example courses on Good Academic Practices in Social Work, well established at HFD). Since USTP has not yet the right to award doctoral degrees in the field of Social Work, but students and graduates in this discipline, through this cooperation with HFD, the opportunities for prospective Social Work doctoral students from both universities to receive a doctoral degree will be significantly enhanced. Furthermore, professors and co-supervisors from both universities will gain additional international research and doctoral supervision experience.

4.7. Topics of interest within the E³UDRES² focus areas

While the four proposals submitted under the open call are concentrated in three focus areas, namely, Digital Solutions and (Applied) Deep Tech for Regions, Health, Wellbeing and

Social Inclusion for Regions and Resilient Economy & Innovation for Regions, the critical mass of prospective supervisors (section 4.2) demonstrates capacity across a much broader spectrum of research topics, suggesting that additional proposals may emerge as the initiative develops.

The alliance agrees on fostering joint PhD activities mainly along the lines of the E³UDRES² Focus Areas as described in the E³UDRES² Long-term Vision & Mission Statement, but potentially also including other research areas of interest for two or more E³UDRES² partners for cooperation and innovation within their regions. The focus lies on applied research corresponding to the overall strategy of the alliance, also including application-oriented fundamental research depending on the institutional profile of the involved partners. This is the same approach implemented with the E³UDRES² associated projects (third-party funding projects mainly from Horizon, Erasmus+, EIT HEI Calls), which foster research and innovation related topics of the alliance outside of the funding framework of the main Erasmus+ project, and has proved very successful allowing different levels of engagement depending on specific topics.

4.8. PhD Summer Schools as a tool for delivering joint PhD collaboration

4.8.1. E³UDRES² – Ent-r-e-novators PhD Summer School 2025 – Open Practices in Higher Education

In June 2025, Politehnica University Timișoara successfully hosted the first edition of the E³UDRES² – Ent-r-e-novators PhD Summer School on the topic *Open Practices in Higher Education*.

The event brought together a vibrant academic community in Timișoara, both physically and online: over 70 PhD students and young researchers from 22 countries (Romania, Portugal, Italy, Belgium, Latvia, Hungary, the Netherlands, Austria, Kenya, Germany, Pakistan, Philippines, Ukraine, Greece, Sri Lanka, Bangladesh, Iran, India, Indonesia, Syria, Ecuador, and Morocco). These students represented 12 universities (Hungarian University of Agriculture and Life Sciences, Budapest University of Technology and Economics, Politehnica University of Timisoara, Vidzeme University of Applied Sciences (ViA), Leiden University, Hellenic Mediterranean University, „Lucian Blaga“ University Sibiu, Polytechnic University of Setúbal, St. Pölten University of Applied Sciences, Sumy State University, Cherkasy State Business College, and West University of Timisoara).

The participants interacted with 14 internationally recognized speakers in their fields, from Romania, Portugal, Italy, Belgium, Latvia, Hungary, the Netherlands, and Austria, leading a series of intensive sessions for students, ranging from cutting-edge information presentations to exceptionally valuable practical workshops. The topics were related to open education, open science, open access, and open innovation.

An additional number of 400 students were able to attend the presentations online via Zoom.

All presentations were conducted in English. After the summer school, students were awarded official participation certificates, recognized for 2 ECTS credits, confirming the successful completion of the required criteria for this post-university training, validated by Politehnica University of Timisoara, Romania, for activities held both in Timișoara and online. In addition, participants also received two open digital certificates: one for completing the

MOOCs (Massive Open Online Courses) focused on Licensing and Open Licensing, and a second open digital certificate confirming the completion of learning modules on the new Arena Hub E³UDRES² platform (<https://arena.eudres.eu/>).

The main presentations were:

- Intensive practical workshop, "Open Access & Open Science Ethics"
 - Representative from Leiden University, PLOS, UNESCO, Netherlands, who delivered the presentation "Implementing Open Science Principles in Early-Career Research: From Policy to Practice"
 - Representative from Vidzeme University of Applied Sciences, Latvia presented "Ethical Dilemmas in Open Science"
- intensive practical workshop, "Open Access & Open Science Ethics"
- Representative from the European University Institute (Italy), presented "Open Science practices in support of Open Access publishing"
- Representative from West University of Timisoara (Romania) delivered the presentation "Open Data Analysis and Visualization for Transparency and Change"
- The workshop "Empowering Researchers: Skills and Roles in Open Science" was led by the Open Science Projects Coordinator, and the Open Science Knowledge Hub Expert, both from UEFISCDI (Romania)
- Practical workshop, "Openness, reproducibility and trust: practical advice"
- Representative from St. Pölten University of Applied Sciences delivered the online presentation "Open Data 1-0-1" via Zoom, exploring key concepts of open data and licensing
- Prof. Em. Dr. Eng. Radu Vasiu from Politehnica University of Timișoara followed with a discussion on "Open Publishing", delving into digital competences and the principles of open access publishing
- Representative from Politehnica University of Timisoara (Romania) presented "Open Science & Open Innovation Tools", introducing students to the Open Science taxonomy
- Representative from the UPT Central Library (Romania), presented "How to publish with Open Access"
- Intensive practical workshop titled "Open Research and Digital Tools"
- Representative from UC Leuven-Limburg University of Applied Sciences, Belgium, delivered the presentation "Open Innovation in SMEs: Transitioning from a Linear to a Circular Economy"
- Representative from the Hungarian University of Agriculture and Life Sciences, Hungary presented on "Open Data & FAIR", elaborating on the FAIR principles (Findable, Accessible, Interoperable, and Reusable)
- Students benefited from a one-on-one mentorship session in the hall, provided by representatives from Politehnica University of Timisoara (Romania)

The Summer school took place between 2 – 6 June 2025, involving all E³UDRES² partners, but was financed completely through the Horizon Europe project E³UDRES² – Ent-r-e-novators.

More details on presentations and on the event are available at: <https://elearning.upt.ro/ro/noutati/e%20b3udres%20b2-ent-r-e-novators-phd-summer-school-2025-hundreds-of-international-students-dozens-of-international-experts/>

4.8.2. E³UDRES² PhD Summer School 2026 – The Impact of Artificial Intelligence in Science and Education

The second edition of the E³UDRES² PhD Summer School – *The Impact of Artificial Intelligence in Science and Education* took place during 25 –29 May 2026, at Politehnica University of Timișoara (UPT), Romania, organized by UPT's Digital & Distance Education Department (DeL).

The program brought together 28 Master and PhD students from six European countries – Hungary, Ukraine, Portugal, the Netherlands, Romania, and Germany – representing Hungarian University of Agriculture and Life Sciences, Cherkasy State Business College, Polytechnic University of Setúbal, Saxion University of Applied Sciences, Politehnica University of Timișoara, and Fulda University of Applied Sciences. 14 speakers from Malta, Austria, Portugal, and Romania delivered the morning sessions, which were also streamed live via Zoom and attended by over 20 additional online participants, free of charge.

All sessions were marked by high levels of interactivity: participants actively engaged with speakers, asked numerous questions, and contributed to live polls and debates through the Mentimeter application.

The main activities were:

Day 1 – Opening and mentoring matching session

- A session on academic publishing and Open Science was led by an experienced academic, doctoral advisor shared their perspective, highlighting the practical advantages and disadvantages of Open Access.
- An academic expert led an extensive session on AI ethics in education and science – the AI Act, DigComp 3, UNESCO recommendations, the ecological impact of generative AI, and strategies for using AI in research while upholding academic integrity.
- Afternoon hands-on activities: exploring the E³UDRES² Arena Learning Hub and the Alliance's research tools, completed by hands-on exercises with AI tools for research
- Another mentoring “matching” session, in which students from partner countries were connected with UPT faculty members based on shared research topics.

Day 2 – AI in education, digital badges and AI agents revolution

- Lecture on AI in education and research delivered by the Rector of “Ioan Slavici” University of Timișoara, covering generative AI paradigms, EDUCAUSE Horizon 2025, and live NotebookLM demonstrations.
- Session on digital badges and microcredentials within the E³UDRES² framework delivered by an E³UDRES² academic expert, including a live Mentimeter poll engaging 28 students.
- Session on skills and the agentic AI revolution of 2025 delivered by an academic expert.
- Afternoon hands-on practical sessions led by an academic expert, applying the tools and frameworks presented that morning.

- Afternoon mentoring and research collaboration sessions, in which students from the six participating countries worked together on common topics, guided by UPT faculty members. UPT doctoral supervisors also joined these sessions. Common research interests were identified among some of the participating PhD students, which will lead to the internationalization of their doctoral studies within the E³UDRES² alliance.

Day 3 – Ethics using AI, rethinking education and open science

- Session on ethical AI fluency, including a live VitaScience exercise demonstrating the real-time energy consumption of AI models, delivered by an expert from the Knowledge Innovation Center, Malta.
- Session on reconceptualising learning processes in the generative AI age, delivered by an academic representative from the Polytechnic Institute of Setúbal, Portugal.
- Practical walkthrough of Open Science and Open Innovation tools, ranging from Zotero to arXiv and PubPeer, delivered by an academic representative from UPT.
- Afternoon practical workshops facilitated by an expert from the Knowledge Innovation Center, Malta.
- EdNEos AI demonstration delivered by an academic expert.
- Private tour of UPT's 360° Igloo Vision immersive space, the first of its kind in Romanian higher education, showcasing VR applications related to Timișoara's heritage developed by the DeL team as part of the Spotlight Heritage Timișoara project.

Day 4 – Creative AI, Campus without borders, emerging technologies and circular economy

- Session on creative uses of AI and the role of art in the AI era, delivered by the CEO of University of Applied Sciences St. Pölten.
- Session on Edge Intelligence and the dissolution of physical campus limits through 5G and 6G networks, delivered by an academic expert from University of Applied Sciences St. Pölten.
- Session on CoARA and ResearchComp – the European Competence Framework for Researchers, delivered by an expert from University of Applied Sciences St. Pölten.
- Session on emerging technologies in science and education, delivered by an academic expert from UPT.
- Presentation of the E³UDRES² CIRCULATE Centre of Excellence for circular materials, innovation and education, delivered by an academic expert from UPT.
- Afternoon practical workshop and mentoring session

Day 5 – Research pitches and closing ceremony

- Research pitches in the framework of the 23rd IAFes NETTIES Conference (*Artificial Intelligence and Humanity: Shaping Society, Culture, Education and Science Together*), co-organized by IAFes – International Association for eScience, E³UDRES², and UPT. Some of the participating PhD students presented their research as part of the conference.

- Two presentations led by two of the UPT student teams from the Innovation Labs 2026 finals – AgriTwin (AI-based precision agriculture) and Tenue Vibe (rapid website modernization)

Participants were handed certificates of completion, while speakers received recognition diplomas.

All participants received digital badges issued through the E³UDRES² platform and physical certificates of participation, while those who completed all practical activities received 2 ECTS credits.

More details on presentations and on the event are available at: <https://elearning.upt.ro/en/noutati/phd-summer-school-2026-the-impact-of-artificial-intelligence-in-science-and-education/>

4.8.3. 8th international summer school “PhD. Writing Lab: Craft, Refine and Publish” at ViA, June–July 2026

ViA PhD School organised the 8th International Summer school *PhD. Writing Lab: Craft, Refine and Publish* (3 ECTS), from June 29 to July 3, 2026 in Valmiera, Latvia. The call was communicated through the E³UDRES² website and distributed through the prospective Research centre of Excellence Business Modelling. The summer school was planned as a BIP event and, finally, it complied with the rules to be a BIP summer school.

The summer school brought together 24 doctoral students, doctoral degree candidates, researchers, and academic staff from universities in Romania (Politehnica University of Timișoara and 1 Decembrie 1918 University of Alba Iulia), Hungary (MATE), France (Le Mans Université), Germany (FULDA), and Latvia (ViA and University of Latvia). The aim of the summer school was to strengthen participants' scientific writing skills by working in interdisciplinary international teams and providing hands-on experience in developing research publications. The BIP programme included a 2-hour online boarding session on May 22, 2026, by explaining information and requirements of the summer school (content and organisational).

The summer school was opened by Rector of ViA with an inspiring speech, which she concluded with the well-known saying:

“A good PhD thesis is one that has been defended.” The Director of the joint PhD programme Economics and Business emphasized three points: sincerity and simplicity in relationships; collaboration, networking and trust; to act within the time we are given!

The Director of the joint PhD programme on Social Engineering Modelling gave details of working rules for five days by highlighting scientific quality and science impact.

On the first day, each participant gave a 3-minute pitch on their research topic, which they plan to write this week. After the pitches, ViA PhD School co-leaders divided the participants into five writing teams.

Over the course of five in-person days, participants worked intensively in teams on their research paper manuscripts using the Pomodoro writing method, which helps structure writing sessions and improve productivity. During practical workshops, they refined every section of a scientific paper step by step—from developing the title and keywords to writing

conclusions and polishing the final manuscript—while also gaining insight into the peer-review process.

The summer school programme included lectures and workshops on publication strategies, manuscript structure, research methods, writing the discussion section, university–industry collaboration, science communication and the editorial processes of scientific journals.

An important part of the summer school was the collaborative work in interdisciplinary and international teams, where doctoral researchers, supported by experienced mentors, improved their manuscripts, strengthened their collaboration skills, and exchanged knowledge and experience. Alongside the academic programme, team-building activities and informal networking events were organised, fostering new professional connections and intercultural cooperation. At the end of the first day, the participants introduced the traditional foods and drinks they had brought with them, shared stories about them, and tasted them together.

The summer school concluded with participants presenting their revised manuscripts, receiving reviewers' recommendations for further improvement, and discussing the next steps towards successful publication in scientific journals.

This summer school also offered the option of participating for just one day—an event we called a colloquium. On the second day of the summer school, the schedule for one-day participants ran partly in parallel; while there were lectures attended by everyone, the practical work differed. This option was used by 5 PhD students and candidates, and 3 professors attended a one-day session.

Summer school participants received a digital transcript from Vidzeme University of Applied Sciences for 3 ECTS credits; additionally, the best writing team and the best pitches from the first day (based on homework assignments) were awarded prizes. Participants attending for a single day received a certificate confirming 8 hours of participation.

The programme was coordinated by the co-directors of the doctoral summer school, with practical workshops delivered by academic experts from Riga Technical University (Latvia), Vidzeme University of Applied Sciences (Latvia), and BOKU University (Austria).

4.8.4. In planning – PhD (Winter) School at Europacampus Hainburg, Austria (USTP)

USTP is in the process of planning a new campus at Hainburg (Lower Austria), together with TU Wien, to become operative as Europacampus Hainburg starting in September 2028, including both new study programmes and new research groups. In the context of this longer planning phase, several activities are already being envisioned including other partners from E³UDRES² and EULiST (the European University Alliance TU Wien is member of) especially from the cross-border, central European region. As one of the first exploratory activities, a PhD School with E³UDRES² partners will be organized during fall/winter 2026/2027 fostering entrepreneurial, innovation and impact-oriented approaches for early-stage researchers, open to all E³UDRES² partners and beyond.

5. Integration with education and talent development

Within the E³UDRES² Alliance, doctoral education is recognised as the third cycle of higher education in accordance with the Bologna Process and plays a central role in the alliance's strategy for education, research, innovation and talent development. Doctoral studies are

viewed not only as advanced research training but also as a key mechanism for developing highly skilled researchers, innovators and future academic leaders capable of addressing complex societal and technological challenges, according to the alliance' own model of "Ent-r-e-novators" (Entrepreneurs, researchers, educators, innovators).

The integration of doctoral activities follows a lifelong learning perspective, creating coherent educational pathways from bachelor's and master's programmes to doctoral and postdoctoral research. This approach supports the identification, attraction and development of talented students throughout the educational continuum, encouraging research engagement from the early stages of higher education and facilitating progression towards doctoral studies. It also helps the professional development of academics in the early stages of their careers who do not hold a PhD yet (for example, colleagues with intersectoral experience in disciplines where PhDs are not yet widely spread).

E³UDRES² promotes an integrated doctoral experience through joint supervision, interdisciplinary research projects, doctoral students mobility, international summer schools, specialised training courses and participation in collaborative research and innovation ecosystems. Doctoral candidates benefit from access to the complementary expertise, research infrastructures and innovation environments of all alliance partners, while developing both disciplinary excellence and transferable competences, including digital skills, entrepreneurship, intercultural collaboration, leadership, open science and research integrity.

By embedding doctoral education within its broader educational and talent development strategy, the alliance strengthens the links between teaching, research and innovation, enhances the international attractiveness of its doctoral programmes, and contributes to building a new generation of researchers equipped to support the sustainable development and resilience of European regions.

For an alliance with a strong focus on education and innovation, a tight integration of PhD offers with the core activities is paramount. This will be pursued around several pillars:

- Research-based learning: for example, involving master students in research-based activities and PhD students in the development and deployment of research-based education
- Interdisciplinary competences: for example, supporting challenge-based doctoral activities, not driven primarily by the discipline but by the need and relevance of and for society and industry
- International mobility, fostering physical and virtual mobility not only with other E³UDRES² partners but also beyond – and where feasible also beyond Europe, allowing early-stage researchers to start building their own international networks
- Intersectoral competences: for example, involving early-stage researchers in activities with stakeholders from society and industry, and in translational research or knowledge-transfer activities, to collect first experiences in the interaction outside academia
- Career development: for example, developing and offering trainings for early-stage researchers also additionally to their PhD curricula (e.g. in the field of Good Academic Practices, Open Science, Open Access, Open Innovation, Citizen Science), and fostering exchange and matchmaking among early-stage researchers from

different E³UDRES² partners to broaden the range of opportunities by opening existing (general) graduate qualification courses for doctoral students from other E³UDRES² universities (hybrid and on-site) and by the development of joint E³UDRES² graduate qualification courses

- To attract talent, the E³UDRES² consortium should consider participating in Marie Skłodowska-Curie Doctoral Network calls; these enable the recruitment of outstanding doctoral candidates for thematic networks while fostering networking and collaboration among ten doctoral students working on a similar overarching topic. This is a very valuable potential, but requires very high quality for project proposals.

6. Management of risks

The implementation of joint doctoral activities within the E³UDRES² Alliance may face several challenges arising from the diversity of national higher education systems, institutional regulations and doctoral education frameworks. Differences in legislation governing doctoral studies, supervision rights and conditions, accreditation procedures and degree-awarding responsibilities may complicate the establishment of joint programmes and co-supervision arrangements.

Additional risks include varying institutional capacities, differences in funding availability for doctoral mobility and joint activities, administrative complexity, and the long-term sustainability of collaborative initiatives. Furthermore, aligning academic calendars, quality assurance procedures and doctoral regulations across partner institutions requires close coordination.

To mitigate these risks, the alliance promotes early institutional engagement, clear cooperation agreements, harmonised operational procedures, continuous communication among partners, and the gradual implementation of pilot activities that can inform the development of sustainable joint doctoral programmes.

The specific potential risks expected in the alliance, together with the possible mitigation measures are summarised in Table 7.

Table 7. Specific potential risks in the implementation of joint E3UDRES2 doctoral activities

Potential risk	Estimation of occurrence probability	Possible measures
Significant differences in national and institutional pre-conditions for joint PhD activities are shown by the mapping conducted by the partners	Medium to high	The existing mapping provides a robust basis for analysis and design of joint PhD activities. Future plans have to allow different levels of engagement and different roles for partners depending on their institutional profile.
National regulations concerning PhDs are changing relatively fast for applied education in some European countries	Medium to high	E ³ UDRES ² partners are tightly involved at their national level in current developments (e.g. IPS and Saxion). Flexible arrangements will have to be made (e.g. Joint PhD Programme by ViA and Ventspils including IPS and USTP as associate partners, with the possibility to become full partners when national legislation allows).
Political developments affect the composition and capability of the	Low to medium	With MATE having the possibility to become again full partner in the funding phase 2027–2029, the E ³ UDRES ²

alliance, as shown by the example with MATE		alliance has again a much stronger capacity in the area of doctoral education. The experience with Hungary shows that trust and flexibility allow to keep a strong involvement of partners even during critical phases.
PhD activities are sometimes very tightly connected with individual researchers, generating instability or insecurity when those are moving to another institution	Medium	PhD cooperation will be as much as possible integrated in schools and programmes to make sure that it can be pursued even in case of some key faculty members leaving the institution. Partnership agreements will define and establish the framework, providing guidance to all involved colleagues.
Relatively high experience in the field of joint programmes at bachelor and master level, but still few experiences at PhD level	Middle to high	Some of the E ³ UDRES ² partners already have a long experience in the field of joint doctoral programmes and can provide support where needed.

7. Conclusions

The development of the E³UDRES² Concept and Methodology for Joint P(h)D Programmes represents a major step towards establishing a sustainable framework for doctoral collaboration within the alliance and contributes to the broader ambitions of the European Higher Education Area (EHEA) and the European Research Area (ERA). The work undertaken in this deliverable demonstrates that meaningful collaboration in doctoral education can be achieved despite the diversity of institutional missions, national legislative frameworks and doctoral education models existing across Europe. Rather than attempting to harmonise fundamentally different systems through a single organisational model, the methodology recognises diversity as one of the alliance's main strengths and proposes a flexible approach that enables each partner to contribute according to its institutional profile and vision, legal framework and research capacity.

The analyses conducted throughout this report confirm that E³UDRES² possesses the academic excellence, critical mass and institutional commitment necessary to develop a collaborative European doctoral ecosystem. The alliance brings together research-intensive universities with long-established doctoral traditions, universities of applied sciences that have played a pioneering role in the development of the right to award doctoral degrees for universities of applied sciences in their home countries and universities of applied sciences that contribute internationally recognised expertise in applied research, innovation, entrepreneurship and regional engagement. This combination creates a unique environment in which fundamental research and application-oriented research complement one another, offering doctoral candidates opportunities that extend beyond those available within individual institutions.

A fundamental outcome of this work is the recognition that joint doctoral collaboration should not be understood solely as the creation of fully integrated joint doctoral degrees. While joint degrees remain a long-term ambition wherever national legislation permits and European legislation might support, the report demonstrates that doctoral collaboration encompasses a much broader spectrum of academic activities. Joint supervision, co-supervision agreements, international doctoral defense juries, reviewer exchanges, collaborative research topics, doctoral mobility, summer schools, specialised training, doctoral consortia and shared research infrastructures all contribute to building a genuinely integrated doctoral ecosystem. By broadening the concept of joint doctoral education, the alliance creates numerous opportunities for collaboration that can be implemented

immediately while simultaneously preparing the foundations for more advanced forms of institutional integration.

The proposed progressive implementation methodology constitutes one of the report's most significant contributions. Instead of requiring immediate structural harmonisation, the methodology introduces a phased development model that allows collaboration to mature gradually through practical experience and institutional trust. Beginning with shared doctoral activities, training courses and networking, progressing towards joint supervision, joint juries and common quality assurance practices, and ultimately leading to sustainable Joint P(h)D Programmes, this approach minimises organisational risks while allowing partners sufficient flexibility to adapt implementation to their national and institutional contexts. Such an incremental methodology reflects the reality of European university alliances, where successful long-term integration depends not only on formal agreements but also on the gradual development of shared academic culture, mutual confidence and operational experience. With this gradual approach, E³UDRES² can successfully achieve that many doctoral students can already now benefit significantly from the alliance and add a European dimension to their doctoral research and education.

The mapping of doctoral education systems across the alliance provides clear evidence of substantial research capacity. The analysis of qualified doctoral supervisors demonstrates that the alliance possesses a considerable critical mass distributed across a wide range of scientific disciplines. Engineering and digital technologies, agricultural and life sciences, economics and business, health sciences, social sciences, education and humanities all contribute to a balanced research portfolio aligned with the strategic priorities of E³UDRES². Importantly, the analysis also demonstrates that expertise is distributed in a complementary rather than redundant manner. Each institution contributes distinctive strengths, allowing the alliance to create multidisciplinary supervisory teams capable of addressing complex scientific and societal challenges that increasingly require knowledge spanning multiple disciplines and sectors.

Equally significant is the collection of Expressions of Interest from researchers ready to participate in joint doctoral activities. The large number of academics expressing readiness to engage in supervision, co-supervision, doctoral training, thesis evaluation, international defence juries, curriculum development and doctoral summer schools demonstrates that the alliance already possesses a strong human foundation for implementing collaborative doctoral education. This commitment extends well beyond institutions with formal doctoral awarding rights and includes universities of applied sciences that, although operating under different legal frameworks, contribute substantial expertise through research collaboration, industrial partnerships, innovation ecosystems and international academic networks. Such engagement confirms that the future success of joint doctoral activities depends not only on institutional regulations but also on the willingness of researchers to collaborate across disciplinary, institutional and national boundaries.

The launch of the Open Call for Joint P(h)D Programmes proposals provides further evidence of the maturity of the alliance. The submission of four proposals covering engineering, socio-technical systems, health and sustainable food systems illustrates the breadth of scientific expertise available within E³UDRES², aligns with E³UDRES² focus areas and demonstrates that researchers are already prepared to transform strategic intentions into concrete educational initiatives. Moreover, the evaluation conducted by the Scientific

Council established common quality criteria and generated constructive recommendations that is expected to strengthen future programme development. Rather than acting as a competitive selection process, the call functioned as a collaborative exercise supporting continuous improvement, institutional learning and alignment with the shared vision of doctoral education within the alliance.

An important observation emerging from the evaluation process is that the scientific quality of the proposed programmes is generally high, while organisational aspects require further development. This finding reflects the current stage of alliance development. Scientific collaboration among researchers is already well established through joint projects, publications and research networks, whereas common governance structures, shared curricula, coordinated mobility arrangements and sustainable funding mechanisms remain areas for future consolidation. Consequently, the proposed methodology appropriately places considerable emphasis on governance, quality assurance and operational coordination as essential components of future Joint P(h)D Programmes.

The report also demonstrates that doctoral education represents a natural intersection between the alliance's core missions of education, research, innovation and regional engagement. As the third cycle of the Bologna Process, doctoral studies provide an essential bridge connecting advanced education with knowledge creation and societal impact. Within E³UDRES², doctoral candidates are expected not only to conduct excellent research but also to contribute to innovation ecosystems, interact with regional stakeholders, participate in interdisciplinary teams and develop transferable competences that prepare them for careers both within and outside academia. This broader understanding of doctoral education reflects current European policy priorities concerning research careers, knowledge transfer, open science, entrepreneurship and societal engagement, for example as defined in ResearchComp: the European Competence Framework for Researchers (available at https://research-and-innovation.ec.europa.eu/document/download/7da29338-37bf-4d51-b5eb-a1571b84c7ad_en?filename=ec_rtd_research-competence-presentation.pdf).

The integration of doctoral education within the alliance's talent development strategy further strengthens this perspective. By creating coherent educational pathways from bachelor and master studies towards doctoral and postdoctoral research, E³UDRES² contributes to identifying and nurturing future researchers at an early stage. Activities such as challenge-based learning, research-based education, doctoral summer schools, mentoring, interdisciplinary collaboration and international mobility provide students with progressive opportunities to engage in research throughout their educational journey. Such integration supports not only the recruitment of talented doctoral candidates but also the long-term sustainability of research capacity across the alliance.

Particularly noteworthy are the doctoral summer schools implemented during the project. These initiatives have already demonstrated their effectiveness as instruments for internationalisation, interdisciplinary learning and researcher networking. Bringing together doctoral candidates, supervisors and internationally recognised experts from numerous countries, the summer schools illustrate how relatively flexible educational activities can generate substantial added value without requiring complex legal or organisational arrangements. Their focus on topics such as Open Science, Artificial Intelligence, digital transformation, research ethics and innovation complements institutional doctoral

curricula while strengthening the European dimension of doctoral education. The experience gained from these activities provides a valuable model for future alliance-wide doctoral training and confirms that collaborative learning environments can significantly enhance the doctoral experience.

The proposed methodology is also strongly aligned with broader European developments. Its emphasis on open science, interdisciplinary research, responsible research assessment, international mobility, entrepreneurial competences and regional impact reflects the priorities promoted by the European Commission, the European Research Area, the Bologna Process and the European Universities Initiative. In this respect, the methodology does not merely respond to current policy objectives but actively contributes to their implementation by translating strategic European ambitions into practical institutional cooperation.

Another important contribution of this report is its recognition of the dynamic nature of doctoral education in Europe. The analysis clearly demonstrates that national legislative frameworks continue to evolve, particularly regarding the role of universities of applied sciences in doctoral education. Recent developments within several partner countries illustrate that new opportunities for doctoral collaboration may emerge during the coming years. Rather than designing a rigid organisational structure, the proposed methodology intentionally remains agile, allowing institutions to increase their participation as legislative and institutional conditions evolve. This flexibility will enable E³UDRES² to respond effectively to future changes while maintaining continuity in collaborative activities.

The risk analysis presented in this report further supports the realism of the proposed approach. The alliance openly recognises potential challenges, including differences in legislation, funding availability, institutional capacities, quality assurance procedures and governance models. However, these challenges should not be regarded as obstacles preventing collaboration. Instead, they represent typical characteristics of transnational university alliances that can be successfully managed through gradual implementation, continuous dialogue, clear partnership agreements and mutual trust among participating institutions. Indeed, the experience accumulated during the project already demonstrates that many collaborative doctoral activities can be implemented effectively without requiring complete harmonisation of institutional procedures.

Looking forward, the implementation of the methodology should focus on consolidating existing pilot initiatives into sustainable institutional structures. Future priorities include expanding international co-supervision arrangements, strengthening interdisciplinary supervisory teams, developing common doctoral training modules, increasing doctoral mobility, establishing shared reviewer pools and doctoral consortia, promoting collaboration with the E³UDRES² Centres of Excellence, and progressively implementing the four pilot Joint P(h)D Programmes proposed within the Open Call. At the same time, continued monitoring of national legislative developments will allow the alliance to seize emerging opportunities for deeper institutional integration, including the potential introduction of joint or multiple doctoral degrees where feasible.

Beyond its direct relevance for E³UDRES², the methodology presented in this deliverable offers a transferable model for other European University Alliances facing similar challenges. Many alliances operate in environments characterised by institutional diversity, different national regulations and varying research capacities. The experience gained within E³UDRES² demonstrates that successful doctoral collaboration does not require immediate

legal harmonisation but can instead evolve through practical cooperation, mutual learning and progressively increasing academic integration. In this sense, the methodology contributes not only to the future development of E³UDRES² but also to the broader European discussion on collaborative doctoral education within and beyond European university alliances.

In conclusion, this deliverable establishes a comprehensive, realistic and sustainable framework for the future of doctoral education within the E³UDRES² Alliance. It demonstrates that the alliance has moved beyond conceptual discussions and has already created the academic, organisational and human foundations required for long-term collaboration. Through its emphasis on complementarity, interdisciplinarity, flexibility and progressive integration, the proposed methodology provides a clear roadmap for developing and implementing Joint P(h)D Programmes that combine research excellence with innovation, regional engagement and societal impact. By strengthening collaboration among researchers, institutions and regions, E³UDRES² is well positioned to educate a new generation of researchers capable of addressing Europe's most pressing scientific, technological and societal challenges, while simultaneously contributing to the continued development of the European Higher Education Area and the European Research Area.