# EUt+

## European University of Technology

Deliverable 59

D4.5.2b.c Establishment of strong thematics network prefigurating research institutes

Del. Rel. No D4.19

WP 4

Description: Establishment of international mixed research units (Data sheets: Title, organization, convergence process, Objectives, key words)

Comments:

Dissemination level: **PU**-Public

https://www.univ-tech.eu/phase-1-results



This initiative has received funding from the European Union's Erasmus+ programme under grant agreement 101004088 — EUt — EPP-EUR-UNIV-2020.

Co-funded by the European Union

# Foreword to deliverable 59

Deliverable 4.5.2b.c reports the advancements achieved by the EUt+ alliance regarding the establishment of EUt+ thematic networks. Thematic networks, focusing on specific research fields, were developed in a bottom-up manner consolidating the willingness of the EUt+ research community to collaborate both in terms of basic research (i.e., papers, patents, etc) and applied research (e.g. grant proposals). The ultimate goal of those thematic networks is to prefigure research institutes, i.e., research structures with distinct legal status, researcher roles and a management body. The aim, as stated in the EUt+ bid, was that by the end of 2022 one of the thematic networks to be transformed to a research institute while another two to become research institutes by the end of the EUt+ project (Phase 1) lifespan. Another two thematic networks were foreseen to become EUt+ research institutes during 2025 (within the Phase 2 period).

Co-funded by the European Union

# Table of Contents



Co-funded by the European Union

# Introduction

Thematic networks, focusing on specific research fields, were developed in a bottom-up manner. This development consolidates the willingness of the EUt+ research community to collaborate both in terms of basic research (i.e., papers, patents, etc) and applied research (e.g. grant proposals). The ultimate goal of those thematic networks is to prefigure research institutes, i.e., research structures with distinct legal status, researcher roles and a management body.

By the end of July 2023, the following thematic networks were established and were able to report several activities which are detailed in Deliverables D4.5.4a[1], D4.5.4b[2] and D4.5.4c[3], depending on the date of their kick-off agreement[4].

1. The European Culture and Technology Laboratory[5] (ECT Lab+),
2. European University of Technology Institute of Nanomaterials and Nano/micro-technologies (EUTINN),
3. European Sustainable Science Laboratory (ESLab+),
4. Data Science Institute (DSI)
5. The European Laboratory for Pedagogical Action – Research and Student-Centred Learning (ELaRA)
6. People Oriented Smart Technologies Lab (POSTLab)

| Thematic Network | UTT | H-DA | RTU | TUD | TUS | CUT | UPCT | UTCN |
|---|---|---|---|---|---|---|---|---|
| ECT Lab+ | √ | √ | √ | √ | √ | √ | √ | √ |
| EUTINN | √ | √ | √ | √ | √ | √ | √ | √ |
| ESL | √ | √ | √ | √ | √ | √ | √ | √ |
| DSI | √ | √ | √ | √ | | √ | √ | √ |

[1] D4.20: Annual Activity Report and upgrading of the convergence plan – M12

[2] D4.21: Annual Activity Report and upgrading of the convergence plan – M24

[3] D4.22: Annual Activity Report and upgrading of the convergence plan – M36

[4] This Deliverable at M36 considers the latest developments in the structuring of the institutes, e.g., the name of the institute

[5] As of March 2023, the European Culture and Technology Network became the first EUt+ Research Institute

Co-funded by the European Union

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| ELARA | √ | √ | √ | √ | √ | √ | √ | √ |
| POSTlab | | | | √ | | √ | √ | √ |

*Table 1: Participation, at university level, for each one of the thematic networks*

In the current deliverable, the datasheets (title, organization, convergence process, objectives, keywords) of the above-mentioned thematic networks are presented along with some of their key activities. Table 1 summarizes the participation, at university level, for each one of the thematic networks.

## Work Package description

The purpose of WP4 is to organize and mutualize all research and transfer activities within the EUt+ consortium, in a structuring approach and in connection with research training aspects. A preliminary analysis of research activities across the EUt+ alliance has demonstrated the impressive potential of EUt+ for boosting the global growth of each region thanks to a macro-level approach. Indeed, whereas only 40% of individual campuses' priorities overlap with local regional priorities, a total of 93% match is achieved at the EUt+ alliance level. Nevertheless, organizing research activities at the EUt+ level, without limiting the academic freedom for researchers, in a coordinated fashion is expected to highly advance both applied and basic research in a measurable manner.

Pooling research strengths of EUt+ partners will reinforce the EUt+ alliance as a whole and create synergies, in an approach similar to the mutualization of S3 (Smart Specialization Strategy) strengths and general pooling of systems and activities. This aspect, purely centered on mutualizing quality research, will be taken care of in task 4.5. All of EUt+ partners are technology-driven institutions, some with an additional foundation in social sciences, arts and humanities, others with a closer orientation on engineering. Together, EUt+ partners can capitalize on existing research labs, which open up synergies and in the next step new technical solutions by either

Co-funded by the European Union

complementing or extending existing expertise. Linking research activities and joining efforts will provide the foundation for enabling European technology thinking human first and enabling the activity of the work packages and other tasks at the same time. The other four tasks operate at a more structural and organizational level.

### Task Description

Task 4.5 takes care of:

1. completing the task of identifying the partners' specific research strengths and mapping out interlinking potential and opportunities for joining efforts to achieve mutual project creations;
2. conceiving and implementing a strategy to foster fruitful research collaborations at the EUt+ level and beyond;
3. setting up a map of research competencies and developing means to display them to interested parties in our ecosystem in print and via the Internet;
4. ***establishment of strong thematic networks prefiguring research institutes;***
5. creating common research institutes on identified research strengths and opportunities: one institute to be launched by the end of the first year (2021), for a total of three common research institutes at the end of the three-years funding period and seven by 2025;
6. organizing annual meetings of the engaged labs in the various research fields

### Purpose

In simple words, the purpose of this document is to report the progress made by the EUt+ alliance and the EUt+ community of researchers towards the fourth goal of Task 4.5, listed above.

Co-funded by the European Union

# 1 The EUt+ Thematic Networks

Below we provide summary information for each one of the EUt+ thematic networks established so far.

## 1.1. The European Culture and Technology Laboratory

### 1.1.1 Datasheet

*Tittle:* The European Culture and Technology Laboratory

*Acronym*: ECT Lab+

*# EUt+ participants (universities)*: Eight

*# founding members (researchers)*: 45

*Mission*: The European Culture and Technology Laboratory encourages and supports research in the areas of Arts, Humanities and Social Sciences (AHSS) related to questions of technē, technics, techniques and technology. The focus of research is on the philosophical and societal aspects inherent to technology, reflecting on the relationship between European Culture and Technology: its overall historical development, its present challenges and its future development appropriate to humanity. This can be considered under two main themes: firstly, the study of cultural aspects of technology, the social practices of technologies and secondly, the evolution of technology (organology). The premise of the research programme is based upon the impacts of technology on society, impacts both positive and negative (pharmacology) on the construction of knowledge (epistemology) and impacts on cultural production (aesthetics). These questions of epistemology and aesthetics are coupled with questions of technics as practices in the world. Once technics are understood as forms of technical practices in the world, questions of ethics are not far behind. Ethics within the ECT Lab+ is envisaged equally as a form

Co-funded by the European Union

practice in the world, hence the movement away from applied ethical frameworks to wider questions of virtue ethics (the good life). Technology is here understood as an expanded technē, beyond technology simply conceived of as technical objects, as machines, but technology understood as technical systems and modes of mediation in the world. Technology, therefore, is understood not simply as applied sciences, instruments, or tools but technology as complex systems which include organic and inorganic systems.

*Research topics*:

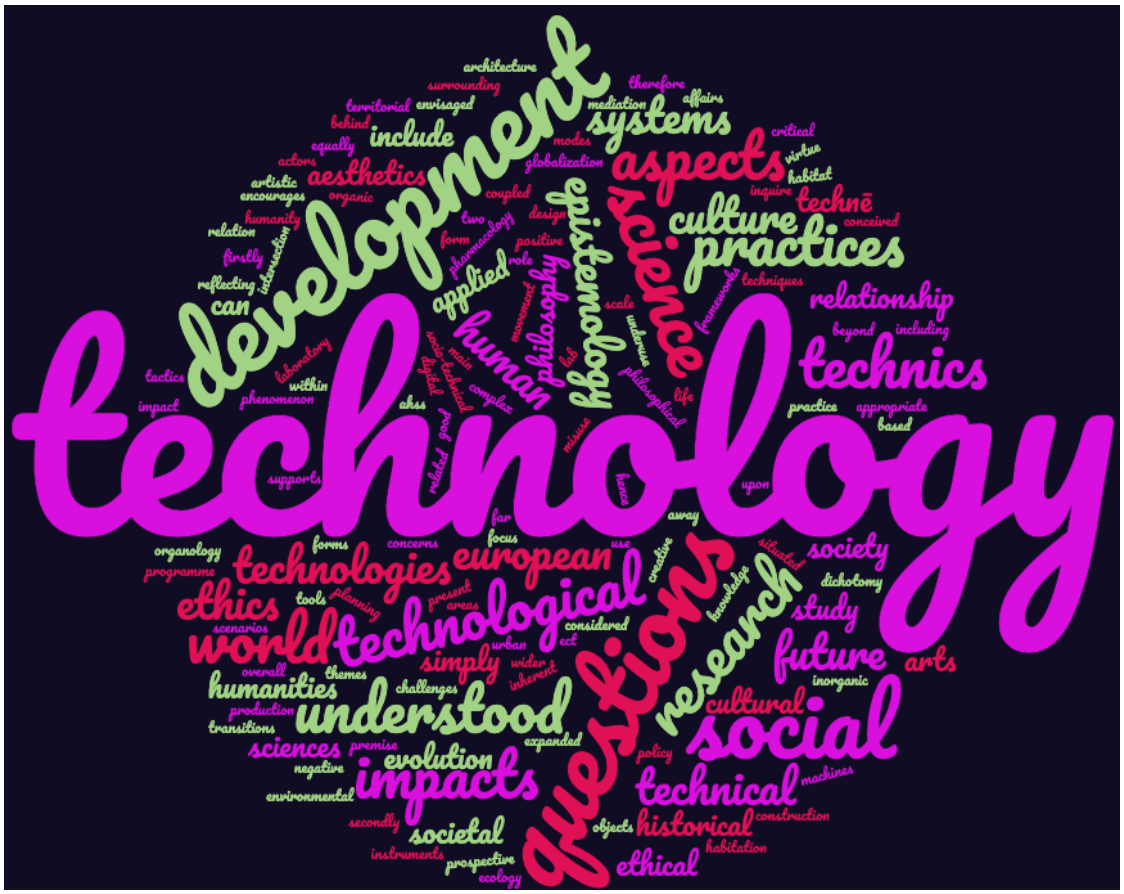
- Epistemology (the study of science or the science of science);
- The historical role of Arts, Humanities and Social Science in technology and technological development;
- Future European Policy development in relation to Technology (including digital and
  environmental technologies) up to the territorial scale;
- Artistic research, critical design, and creative practices as tactics to inquire into
  technological affairs and concerns situated at the intersection of technology, science,
  culture, ecology, and the social;
- Technologies of habitation (or habitat and technology which can include questions of
  urban planning and architecture);
- The impact of technological development on society, human and more than human
  actors and the development of prospective scenarios on these future impacts;

Co-funded by the European Union

- The societal and human aspects of socio-technical questions;
- The relationship between social transitions and technological evolution;
- The development of Philosophy of Technology and the Philosophy of Technics;
- Ethical aspects of use, misuse and underuse of the technology;
- Social phenomenon surrounding dichotomy of technology and globalization.

*Keyword wordcloud*:

Below we show the wordcloud of the ECT Lab+ as deduced by analysing (automatically) its missions and objectives.




Co-funded by the European Union

*Figure 1: The wordcloud of European Culture and Technology Network as deduced by analysing its mission and key objectives.*

### 1.1.2 Key topics of ECT Lab+

By analyzing the mission and key objectives of ECT Lab+ we can identify three main topics [4,5,3] indicated in the following Table:

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|
| The social impact of technology | technology: 0.088, question: 0.032, social: 0.025, practice: 0.024, science:0.020, world: 0.018, technic: 0.018, understand: 0.017, technical: 0.016, impact: 0.016 | 634 |
| Development, science & humans | development: 0.044, science: 0.040, human: 0.034, technology: 0.030, impact: 0.028, technological: 0.022, future: 0.021, aspect: 0.019, epistemology: 0.016, society: 0.016 | 785 |
| Technology & development relationships | technology: 0.030, development: 0.025, aspect: 0.018, relationship: 0.017, overall: 0.016, historical: 0.016, research: 0.015, culture: 0.015, appropriate: 0.015, future: 0.015 | 262 |

*Table 2: Topics and key terms of the European Culture and Technology Network*

### 1.1.3 Publication activity at EUt+ related to the ECT Lab+ topics

Figures 2-4, present in summary the publication activity, relevant to the ECT Lab+key topics, undertaken within the EUt+ research community since 2010.

Co-funded by the European Union

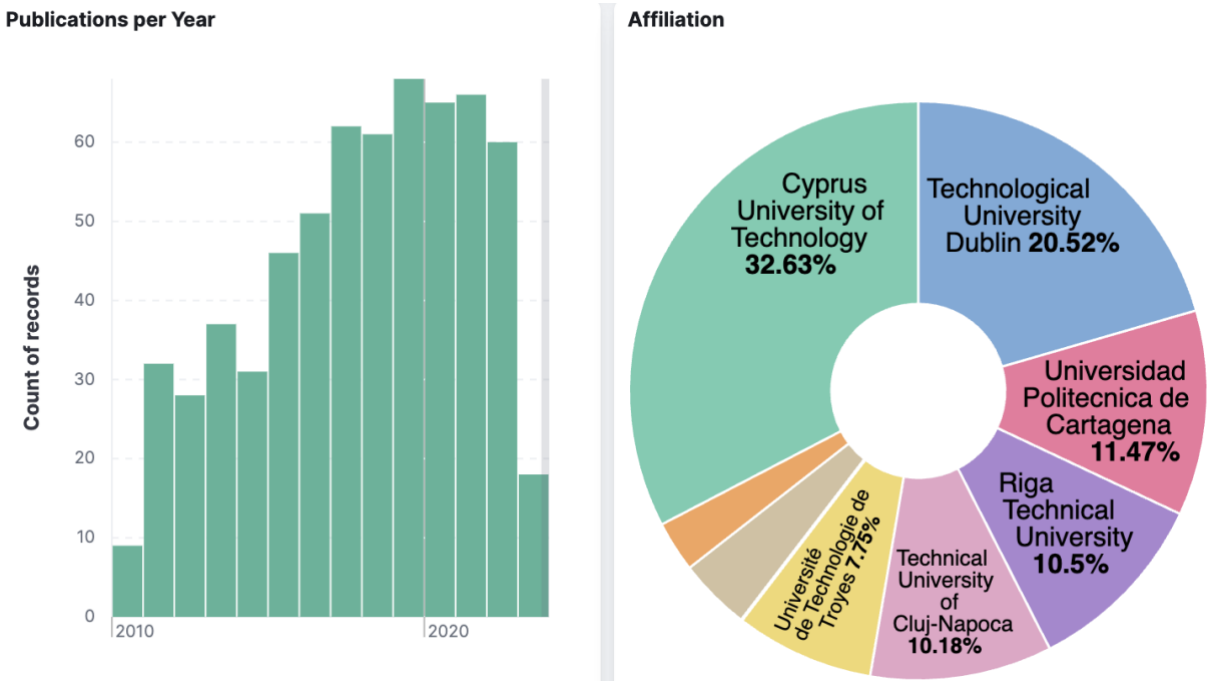



*Figure 2: Publications per year and per EUt+ partner related to the "social impact of technology" (the first key topic of ECT Lab+)*

Figure 5 shows the main subjects (as classified by Scopus) of the publications per key topic of the ECT Lab+. We observe that for topic 1 the main subject areas are computer science and social sciences, for topic 2 is computer science and engineering while for topic 3 is computer science and business.

Co-funded by the European Union

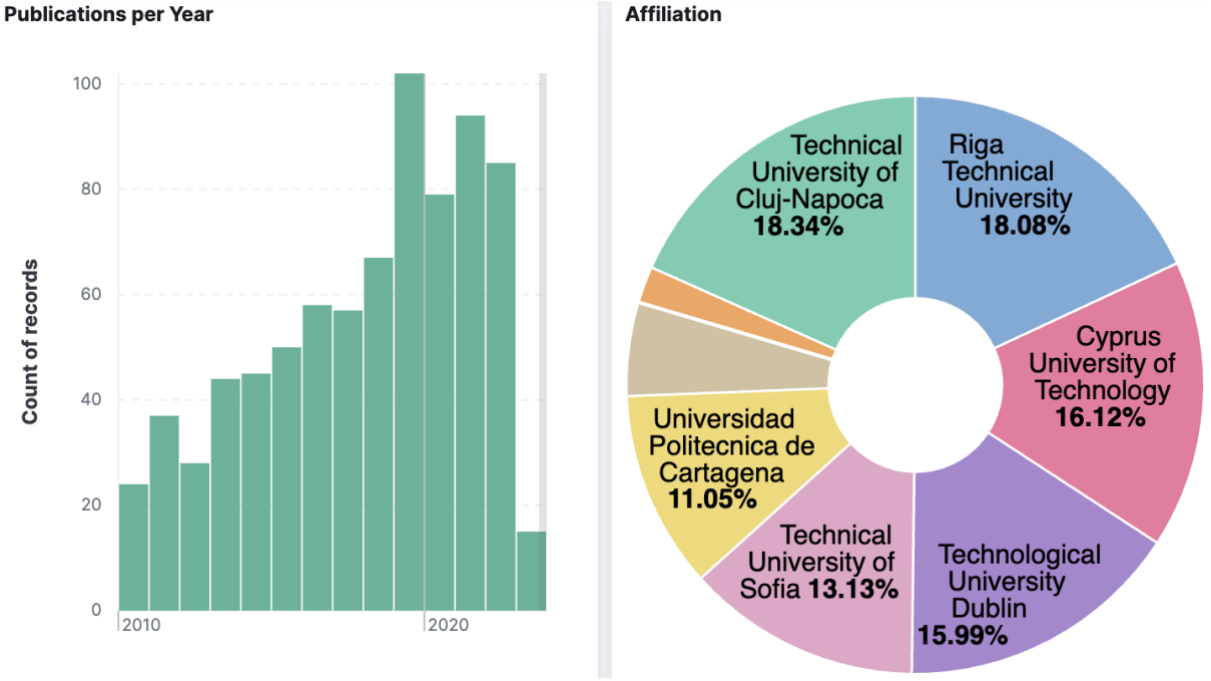



*Figure 3: Publications per year and per EUt+ partner related to the "development, science & humans" (the second key topic of ECT Lab+)*

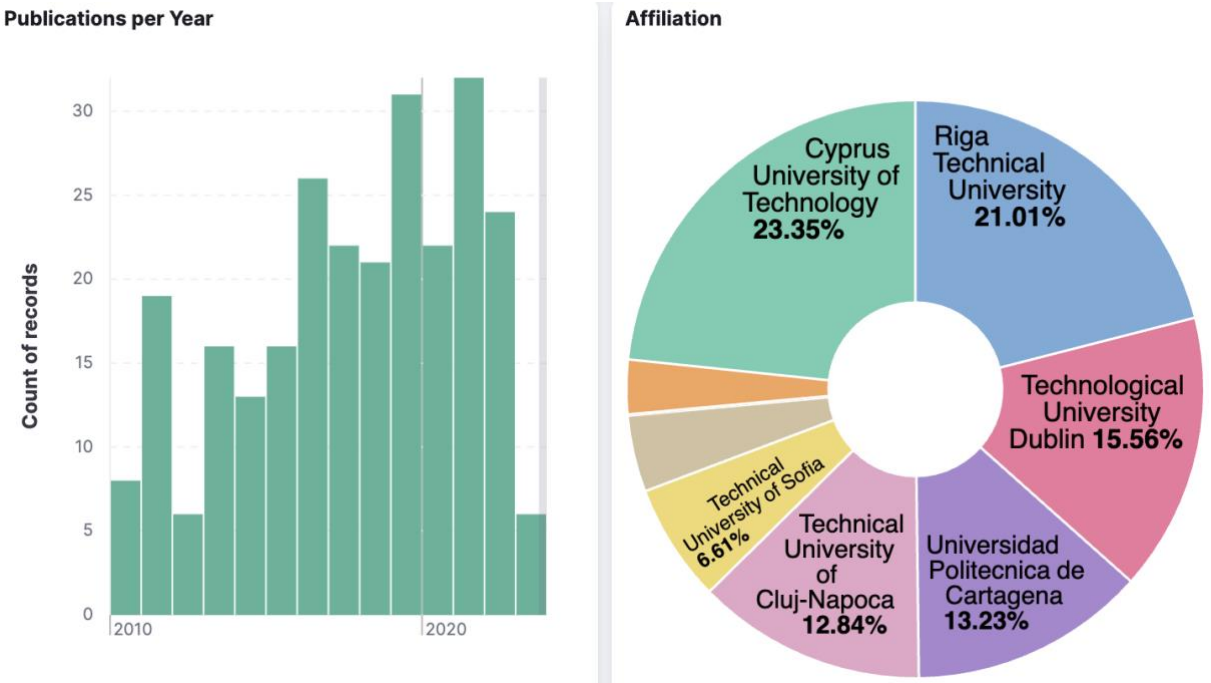


*Figure 4: Publications per year and per EUt+ partner related to the "relationships between technology and development" (the third key topic of ECT Lab+)*

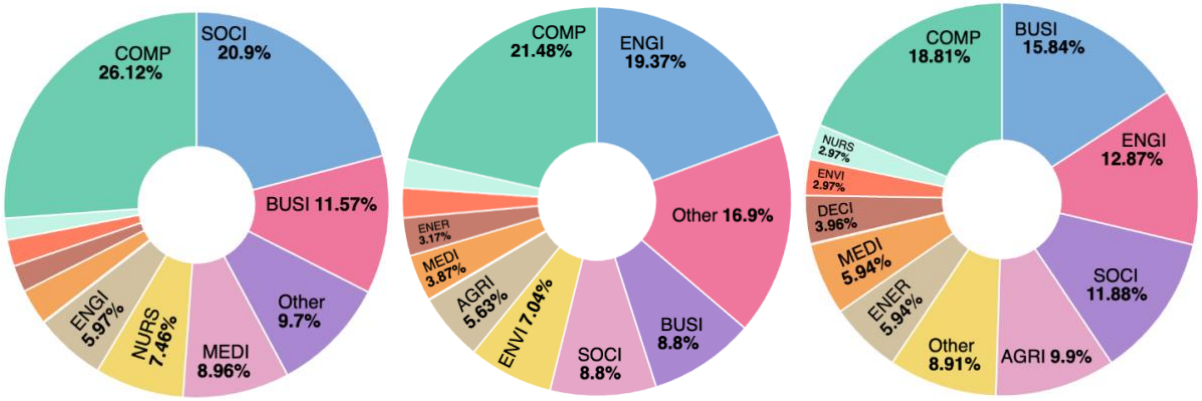



*Figure 5: Publications per subject area for key topic 1 (left), key topic 2 (center) and key topic 3 (right) of ECT Lab+*

### 1.1.4 The relevance of ECT Lab+ to the UN-SDGs

The main moto of EUt+ is "Think Human First". The thematic networks established so far have as one of their principles to fulfil the requirements of the United Nations Sustainable Development Goals as a proof of their societal impact [3]. Below we show the relevance of each one of identified ECT Lab+ topics with the UN-SDGs. The figures are produced based on the scientific publications co-authored by the EUt+ researchers.

We see in Figure 6 that topics 1 and 3 seem to be more relevant to the SDG 3 (Good Health and Well-being), SDG 10 (Reduced Inequalities) and SDG 9 (Industry, Innovation and Infrastructure). Key topic 2 is mostly related to SDG 3, while SDG 10 and SDG 7 (Affordable and Clean Energy) are also present.

Co-funded by the European Union

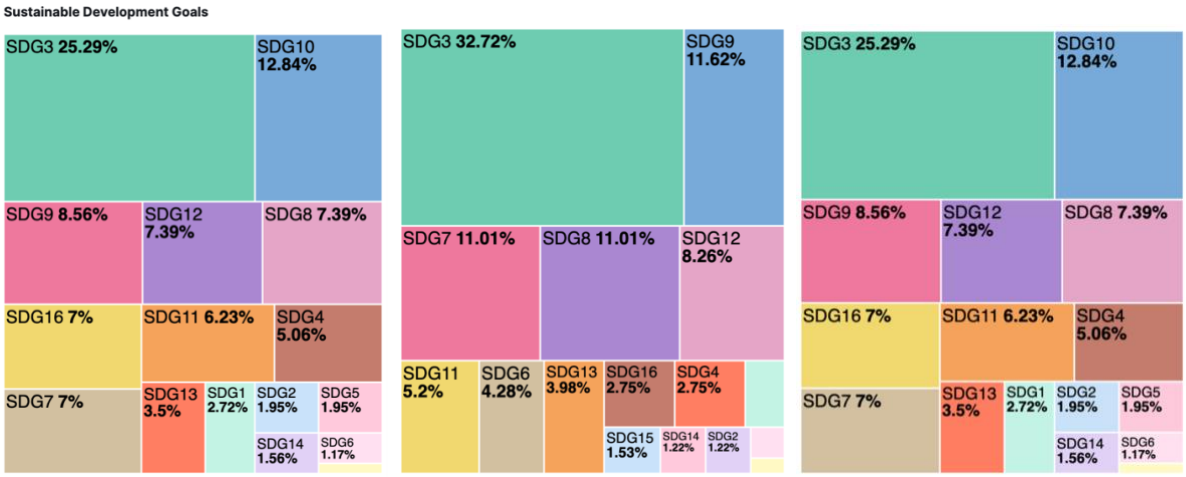



*Figure 6: The relevance of key topic 1 (left), key topic 2 (center) and key topic 3 (right) of ECT Lab+with the UN-SDGs based on the EUt+ publications.*

## 1.2 European University of Technology Institute of Nanomaterials and Nano/micro-technologies

### 1.2.1 Datasheet

*Tittle:* European University of Technology Institute of Nanomaterials and Nano/micro-technologies

*Acronym: EUTINN*

*# EUt+ participants (universities)*: Eight

*# founding members (researchers)*: 50

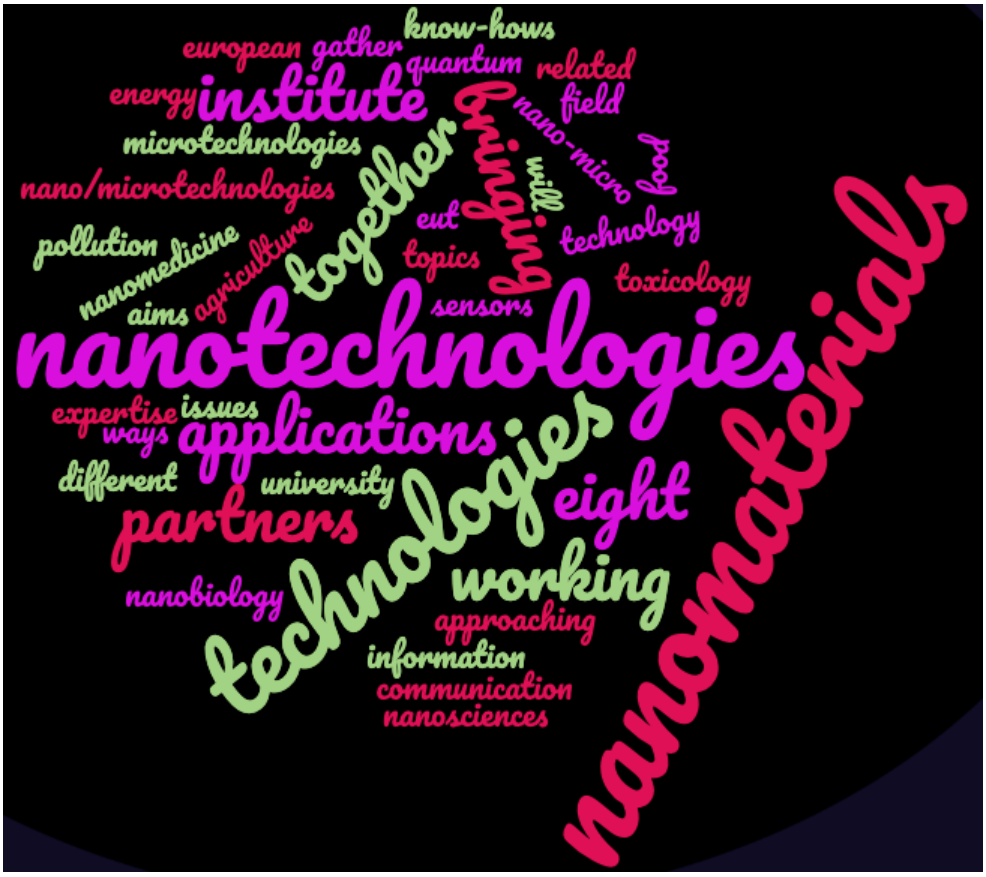
*Mission*: The European University of Technology Institute of Nanomaterials and Nano/microtechnologies aims at bringing together the eight partners of the EUt+ working on the topics of nanomaterials and nanotechnologies. This Institute will gather the expertise and know-hows of the eight partners in nano-micro related technologies, bringing together the different ways of working and approaching issues and applications in the field of nanosciences and nanotechnologies.

*Research topics*:

- Nanomaterials
- Nanotechnologies, microtechnologies and sensors
- Nanotechnologies for communication and information technologies
- Quantum technologies and nanotechnologies
- Nanotechnologies for energy applications
- Nanomedicine & nanobiology
- Nanomaterials & nanotechnologies: toxicology, pollution, food and agriculture

*Keyword wordcloud*:

In Figure 7 it is shown the wordcloud of EUTINN as deduced by analyzing (automatically) its mission and objectives.




Co-funded by the European Union

*Figure 7: The wordcloud of European University of Technology Institute of Nanomaterials and Nano/microtechnologies as deduced by analysing its mission and key objectives*

### 1.2.2 Key topics of EUTINN

The EUTINN is a thematic network with quite specific focus. Contrary to ECT Lab+ for example, only one single topic was identified by analyzing its mission and key objectives, as presented above. The key terms and the corresponding weights of this topic are shown in the Table below:

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|
| Nanotechnology and nanomaterials | nanotechnology: 0.106, nanomaterial: 0.064, technology: 0.057, application: 0.038, nano: 0.034, partner: 0.031, bring: 0.031, agriculture: 0.029, work: 0.028, energy: 0.028 | 1084 |

*Table 3: Topics and key terms of the European University of Technology Institute of Nanomaterials and Nano/microtechnologies*

### 1.2.3 Publication activity at EUt+ related to the EUTINN scope

As shown in Figure 8, the publication activity, relevant to the EUTINN scope is quite balanced among the EUt+ partners showing that a fruitful collaboration of EUt+ researchers is highly feasible.

Co-funded by the European Union

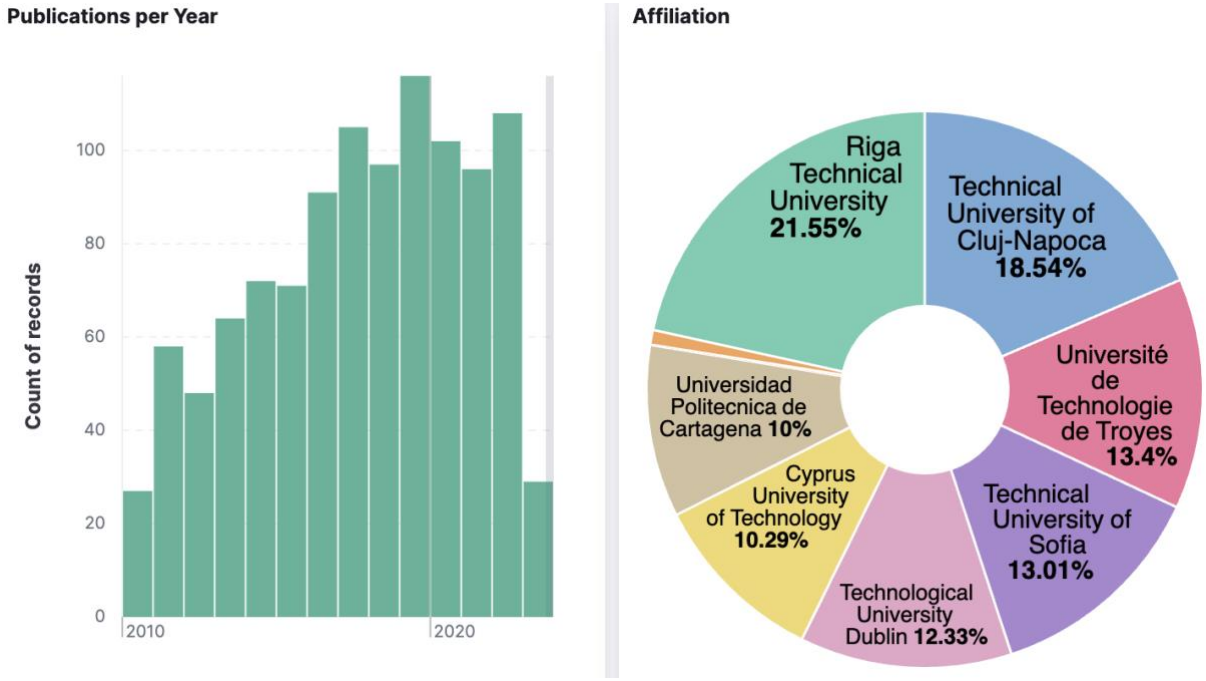
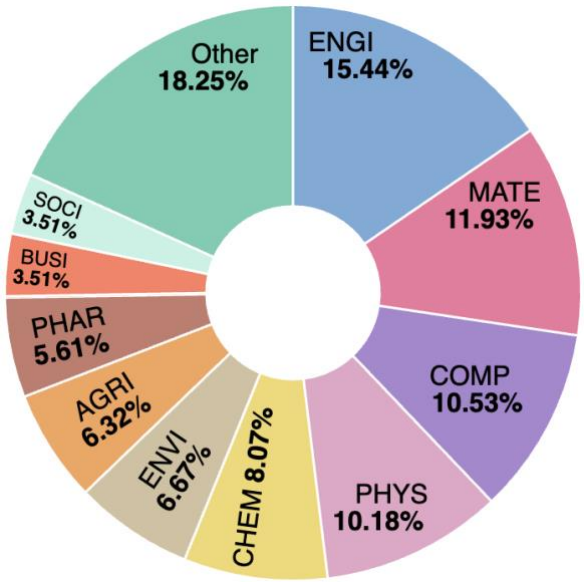



*Figure 8: Publications per year and per EUt+ partner related to the scope of EUTINN*

Despite the well-defined scope of EUTINN, we see in Figure 9 that nanomaterials and nanotechnology is a multidisciplinary field spanning a variety of subject areas, including engineering, materials, computer science, chemistry, etc.




Co-funded by the European Union

*Figure 9: Publications per subject area for EUTINN's research fields*

### 1.2.4 The relevance of EUTINN to the UN-SDGs

In Figure 10 it is shown the relevance of EUTINN's scope with the UN-SDGs as deduced by the scientific publications in the fields of nanomaterial and nanotechnology co-authored by the EUt+ researchers. The SDG 3 (Good Health and Well-being) appears again to be the most relevant goal (mainly due to the fact that it is by far the SDG with the highest publication activity worldwide) with the SDG 7 (Affordable and Clean Energy) to be also highly relevant followed by SDG 9 (Industry, Innovation and Infrastructure).

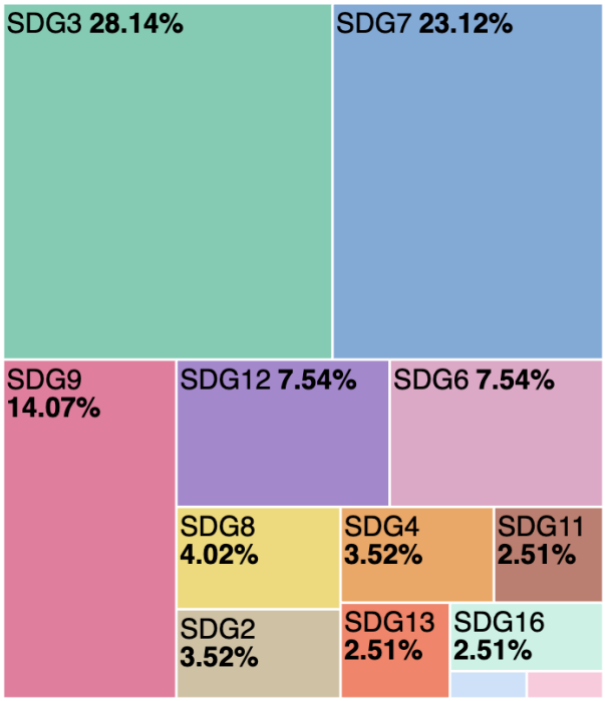



*Figure 10: The relevance of EUTINN's scope with the UN-SDGs based on the EUt+ publications.*

## 1.3 European Sustainability Science Laboratory

### 1.3.1 Datasheet

*Tittle:* 2.3 European Sustainability Science Laboratory

*Acronym: ESLab+*

*# EUt+ participants (universities)*: Eight

Co-funded by the European Union

*# founding members (researchers)*: -

*Mission*: ESLab+ aims at fostering research helping understanding the evolution of our world, especially related to technological changes. "*It is our essential human ability to express, think and understand the world through artefacts.*". Therefore, the first mission is on the production of scientific knowledge aiming to better understand the role of technology in the sustainable transformation of our societies. It is because technology and humans co-evolve that it is crucial to explore technology in the frame of sustainable ways of life (assumption 1). Technology shapes human understanding of issues, as the same time as humans design technical systems. Sustainability transitions assume that technological production needs to change of paradigm to decrease the pressure on the Earth System while insuring well-being to the majority of human societies - not only a minority. Sustainability issues are thus 'wicked problems', that must be tackled with multi-level perspectives.

*Research topics*:

- Produce knowledge on sustainability
- Reduce the time taken to transfer knowledge from researchers to non-researchers
- Explore the ways to practice research in a more sustainable way

Co-funded by the European Union


*Figure 11: The wordcloud of European Sustainability Science Laboratory as deduced by analysing its missions and key objectives.*

*Keyword wordcloud*:

The wordcloud of ESLab+ as deduced by analyzing (automatically) its missions and objectives is shown in Figure 11. We can see that ESLab+'s scope is formed around the idea of "production of sustainable knowledge and technology".

### 1.3.2 Key topics of ESLab+

The ESLab+is a thematic network with a rather broad scope. However, by analyzing its mission and key objectives we can formulate two key topics summarized in the Table below:

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|

| | | |
|---|---|---|
| Knowledge production and society | knowledge: 0.025, production: 0.022, society: 0.021, research: 0.019, process: 0.018, sustainable: 0.015, understand: 0.015, needs: 0.012, stakeholder: 0.012, close: 0.012 | 705 |
| Human sustainable technology | human: 0.029, sustainable: 0.027, technology: 0.026, * knowledge: 0.025, society: 0.022, system: 0.020, needs: 0.016, production: 0.015, understand: 0.014 | 1335 |

*Table 4: Topics and key terms of the European Sustainability Laboratory*

### 1.3.3 Publication activity at EUt+ related to ESLab+'s key topics

As shown in Figures 12 & 13, the publication activity, relevant to ESL's key topics is well- balanced across the EUt+ partners and shows a great potential for collaboration in a variety of sub-fields.

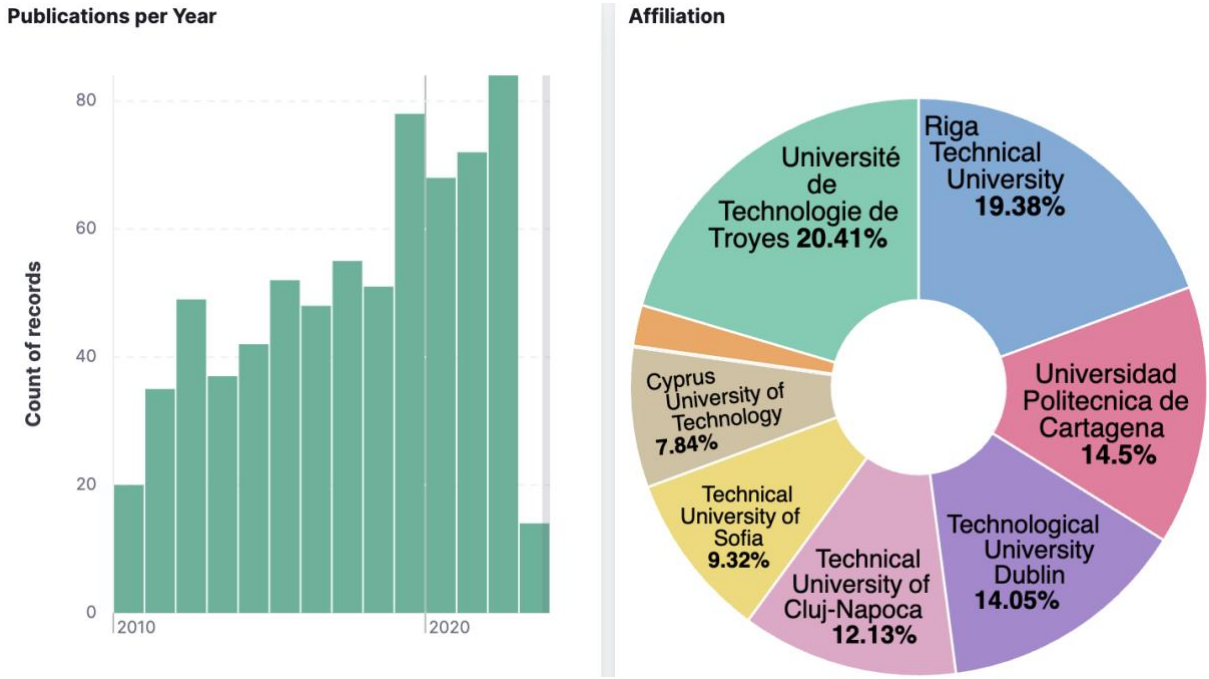



*Figure 12: Publications per year and per EUt+ partner related to "knowledge production and society" (first key topic of ESLab+)*

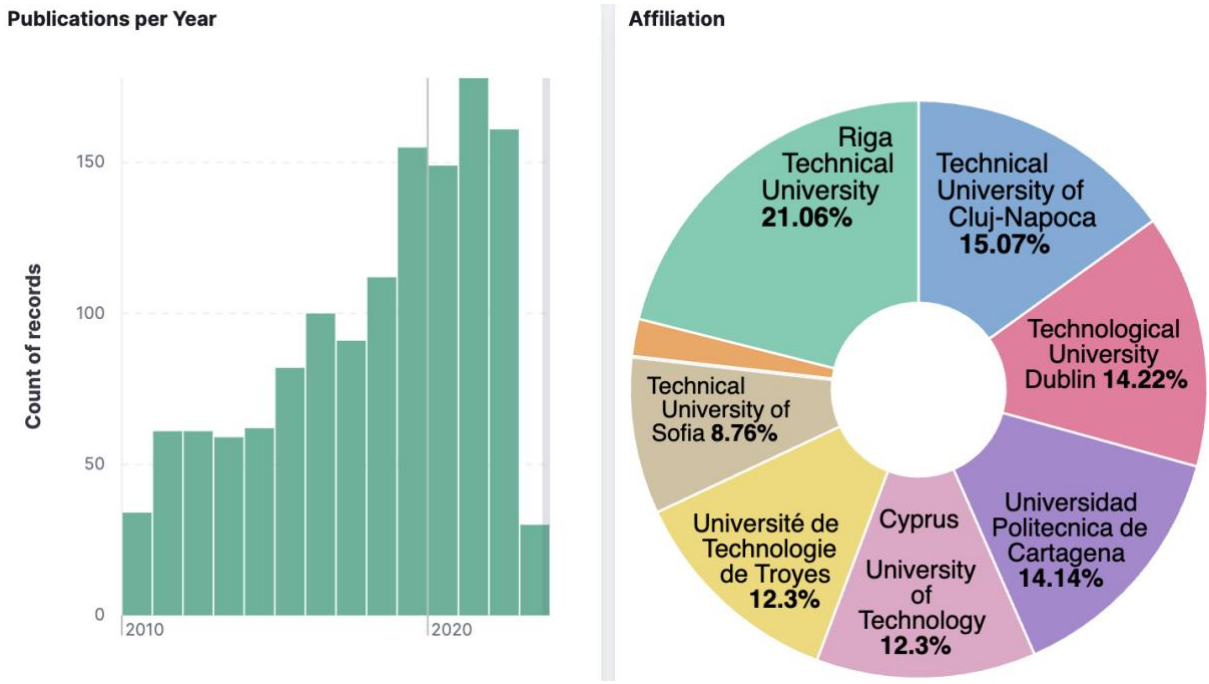
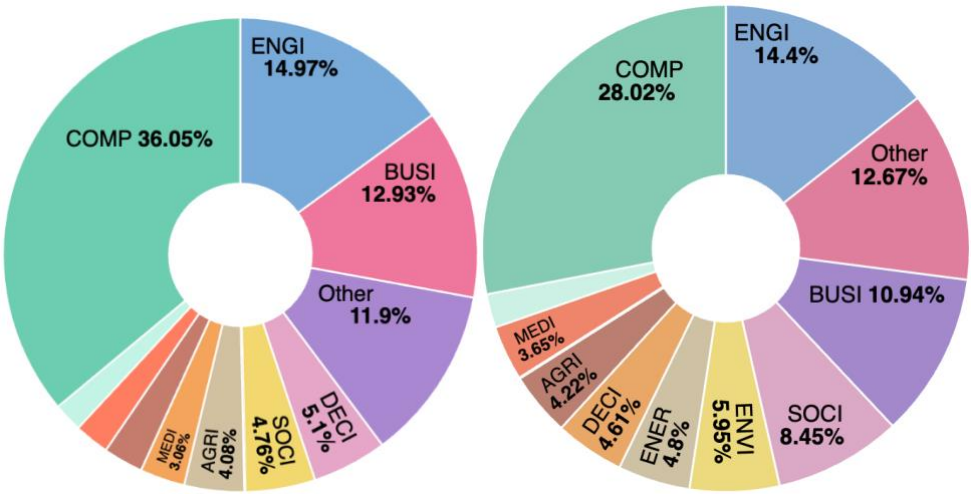



*Figure 13: Publications per year and per EUt+ partner related to "human sustainable technology" (second key topic of ESL)*

The broad scope of ESLab+ reflects on publication activity in a variety of subject areas as shown in Figure 14. While most publications in both topics are classified under computer science, engineering and business, social science and environmental science are also notably present.




Co-funded by the European Union

*Figure 14: Publications per subject area for key topic 1 (left) and topic 2 (right) of the ESLab+*

### 1.3.4 The relevance of ESLab+ key topics to the UN-SDGs

As expected the key topics of ESLab+ span a variety of SDGs (see Figure 15) including SDG 3 (Good Health and Well-being), SDG 9 (Industry, Innovation and Infrastructure), SDG 7 (Affordable and Clean Energy), SDG 12 (Responsible Consumption and Production) and SDG 8 (Decent Work and Economic Growth).

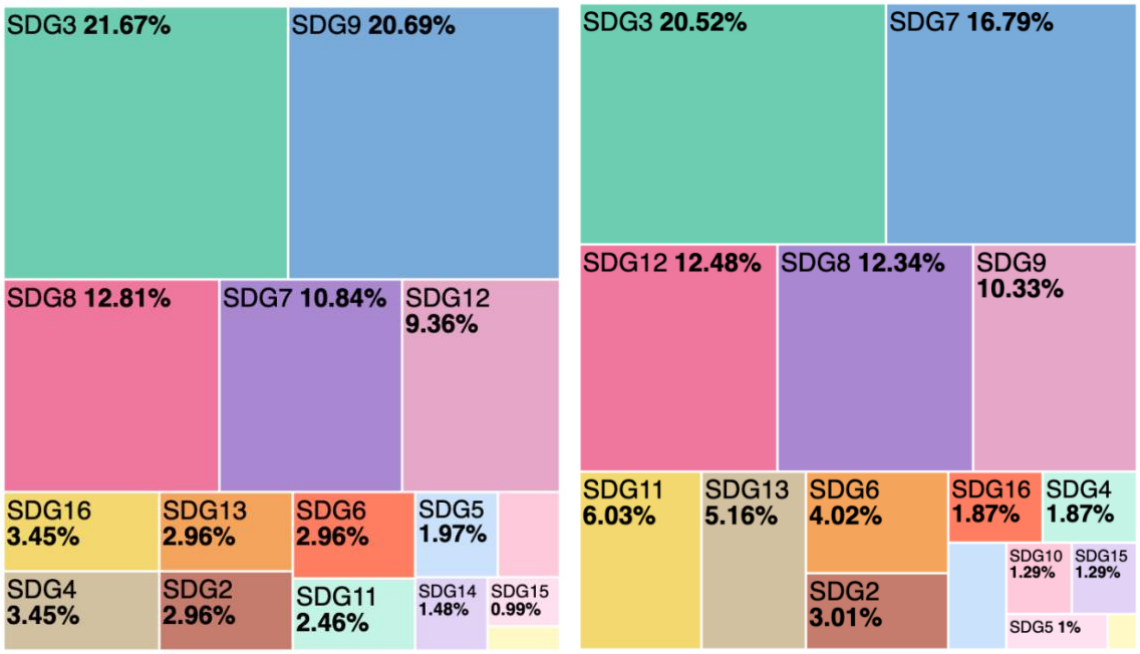



*Figure 15: The relevance of ESLab+ key topics with the UN-SDGs. To the left is the topic "knowledge production and society" and to the right the topic "human sustainable technology"*

## 1.4 Data Science Institute

### 1.4.1 Datasheet

*Tittle:* Data Science Institute

*Acronym*: DSI

*# EUt+ participants (universities)*: Eight

*# founding members (researchers)*:

Co-funded by the European Union

*Mission*: The Data Science Institute will provide an unprecedented opportunity for an efficient academic collaboration and know-how exchanging between EUt+ research teams in this multi-disciplinary domain. In a competitive European landscape, the objective of this institute is to support outstanding and ambitious scientific projects with a distinguished signature contributing to sustainable and trusted technologies, in line with the EUt+ human centric principles.

*Research topics*:

- Advanced data processing techniques
- Distributed Data Processing and Big Data
- Optimization and mobile technologies
- Communications and Networks
- Computer Vision, Imaging Modalities and related Data Analysis
- Natural Language Processing
- Micro-Nano Technologies and cyber-physical systems
- Economics and financial data processing
- Trusted and Explainable Technologies
- Data Platforms

*Keyword wordcloud*:

The wordcloud of DSI as deduced by analyzing its mission and objectives can be summarized with three words: “Data”, “processing” and “technologies” (see Figure 16). This is very interesting given the broad scope of the Data Science field.

Co-funded by the European Union


*Figure 16: The wordcloud of Data Science Institute as deduced by analysing its mission and key objectives.*

### 1.4.2 Key topics of DSI

Despite the broad scope of Data Science Institute, its scope can be captured with a single topic shown in Table 5:

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|
| Data processing technologies | data: 0.067, technologies: 0.036, processing: 0.032, trusted: 0.021, research: 0.021, academic: 0.020, science: 0.018, scientific: 0.018, covers: 0.016, fast: 0.016, level: 0.016 | 813 |

*Table 5: Topics and key terms of the Data Science Institute*

### 1.4.3 Publication activity at EUt+ related to the DSI scope

In Figure 17 it is shown the publication activity, relevant to the DSI scope, across the EUt+ alliance. All eight partners conduct research in the corresponding fields which

Co-funded by the European Union

are further detailed in Figure 18. As expected, due to the explosion of deep learning technology, the most prominent subfield is data mining.

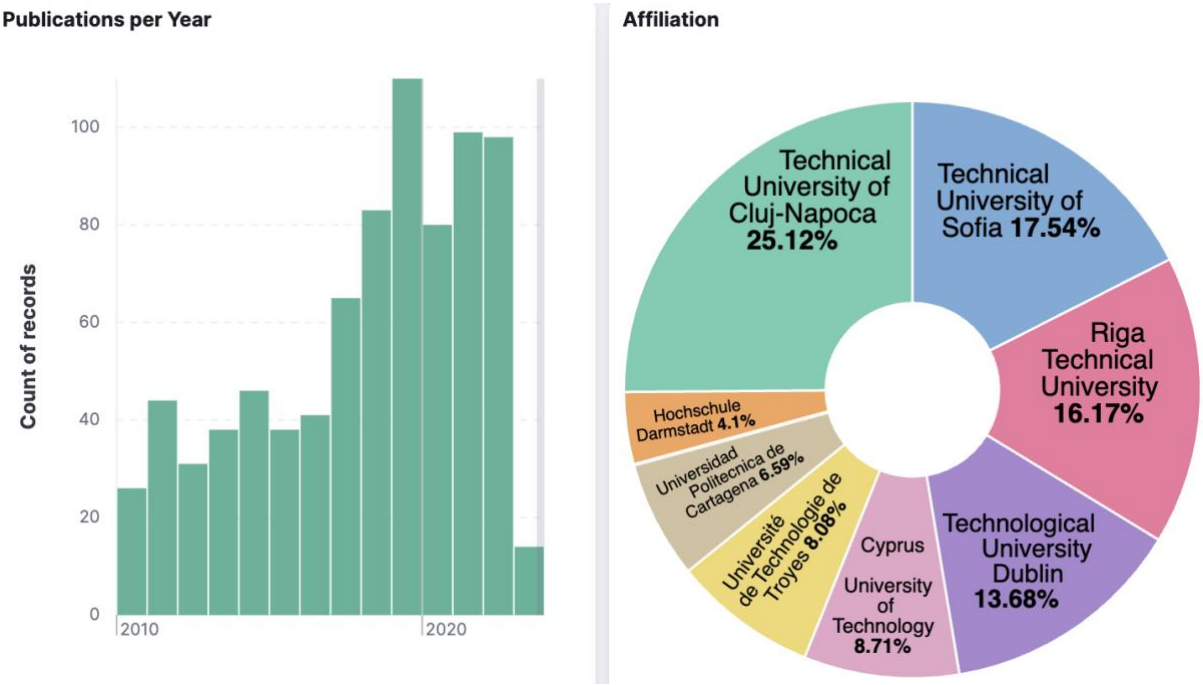



*Figure 17: Publications per year and per EUt+ partner related to the scope of DSI*


*Figure 18: Data Science subfields within the EUt+ research community*

As shown in Figure 19, within the EUt+ researcher community, data science is a clearly computer science field. Almost half of the scientific publication, indexed by Scopus, of the EUt+ researchers are classified under the computer science subject area. Engineering and mathematics are also present but with much less volumes.

Co-funded by the European Union

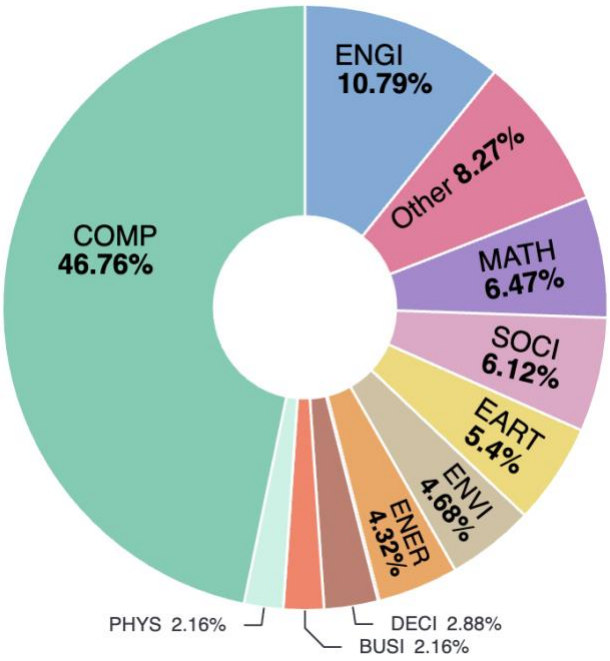



*Figure 19: Publications per subject area for DSI's research fields*

### 1.4.4 The relevance of DSI to the UN-SDGs

In Figure 20 it is shown the relevance of ESL's scope with the UN-SDGs as deduced by the scientific publications in the field of data processing technologies co-authored by the EUt+ researchers. The SDG 7 (Affordable and Clean Energy), SDG 3 (Good Health and Well-being) and SDG 9 (Industry, Innovation and Infrastructure) appear to be highly relevant while SDG 11 (Sustainable Cities and Communities) follows.

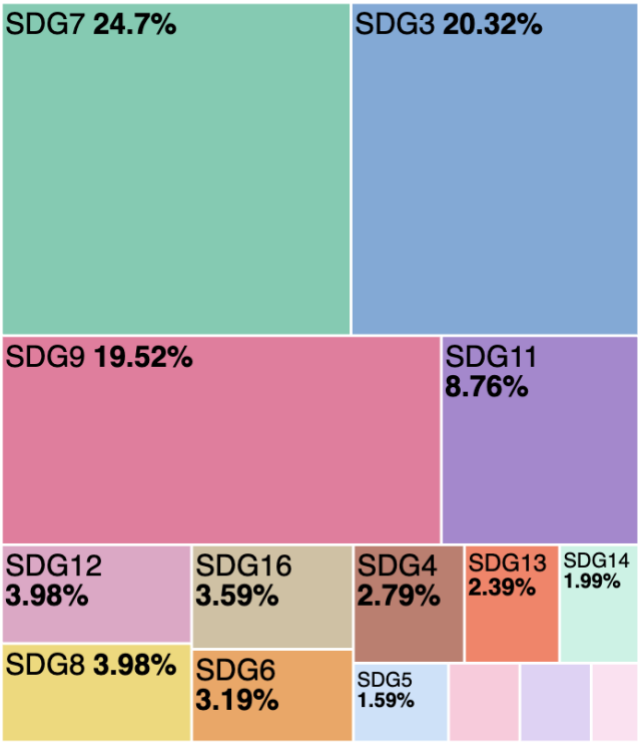



*Figure 20: The relevance of DSI's scope with the UN-SDGs based on the EUt+ publications.*

## 1.5 The European Laboratory for Pedagogical Action – Research and Student-Centered Learning

### 1.5.1 Datasheet

*Tittle:* The European Laboratory for Pedagogical Action – Research and Student-Centred Learning

*Acronym*: ELaRA

*# EUt+ participants (universities)*: Eight

*# founding members (researchers)*: 29

*Mission*: The European Laboratory for Pedagogical Action – Research and Student-Centred Learning aims at creating a learning environment that will provide scientific knowledge in an open, inclusive, equitable manner that encourages critical thinking,

Co-funded by the European Union

creativity and innovation through effective understanding and communication within, between, and beyond disciplines, supporting cultural resilience and promoting a diverse approach to co-create and disseminate knowledge. Students, academics and researchers will collaborate to co-create, reimagine, and challenge existing educational models. Teaching, learning and research are all part of a whole University life. Learning environment should strive to gain new insights into multicultural, intercultural, transnational and transcultural competencies that help to broaden our learners' lifelong learning journey.

*Research topics*:

- Design innovative student-centered pedagogies to promote self directed, lifelong learning in technological Education that develop the learner as a person by promoting intellectual development, creativity, problem solving and cultural awareness framed by the Universal Design for Learning (UDL) principles.
- Change in higher Education, changing epistemologies and teaching practice, smart educator development and methods to facilitate evolution.
- Educating students, teachers and researchers to become smart educators with regard to the role of technology in society including ethics and professional development.
- Broadening participation in technology education by increasing minority participation and recruiting from a broader spectrum of society to embed equity, diversity, inclusion and belonging in our University and in so doing transform society.
- Identify and integrate critical competencies and/or skills to create value, change and impact as part of the teaching, learning and research process to enable Education for Sustainable Development

Co-funded by the European Union

*Keyword wordcloud*:

The wordcloud of ELaRA as deduced by analyzing its mission and key objectives is shown in Figure 21. We can see that ELaRA's scope can be stated as "learning and education development".


*Figure 21: The wordcloud of the European Laboratory for Pedagogical Action – Research and Student-Centred Learning as deduced by analysing its mission and key objectives.*

### 1.5.2 Key topics of ELaRA

The ELaRA is a thematic network with quite specific scope. By analyzing its mission and key objectives we can formulate two key topics summarized in Table 6.

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|

| | | |
|---|---|---|
| Society learning & development | Learning: 0.025, society: 0.021, development: 0.019, * create: 0.018, education: 0.018 promote: 0.016, participation: 0.015, technology:0.015, knowledge: 0.013, critical: 0.013 | 576 |
| Change education – create student learning | change: 0.020, education: 0.019, create: 0.018, learning: 0.018, student: 0.017, development: 0.017 teaching: 0.016, researcher: 0.014 | 657 |

*Table 6: Topics and key terms of the European Laboratory for Pedagogical Action – Research and Student-Centred Learning*

### 1.5.3 Publication activity at EUt+ related to ELaRA's key topics

As shown in Figures 22 & 23, the publication activity, relevant to ELaRA's key topics is well- balanced across six of the EUt+ partners (h_da and UTT present low research activity in the specific field) and shows a high potential for effective collaboration. Publications per year increase steadily for both topics.

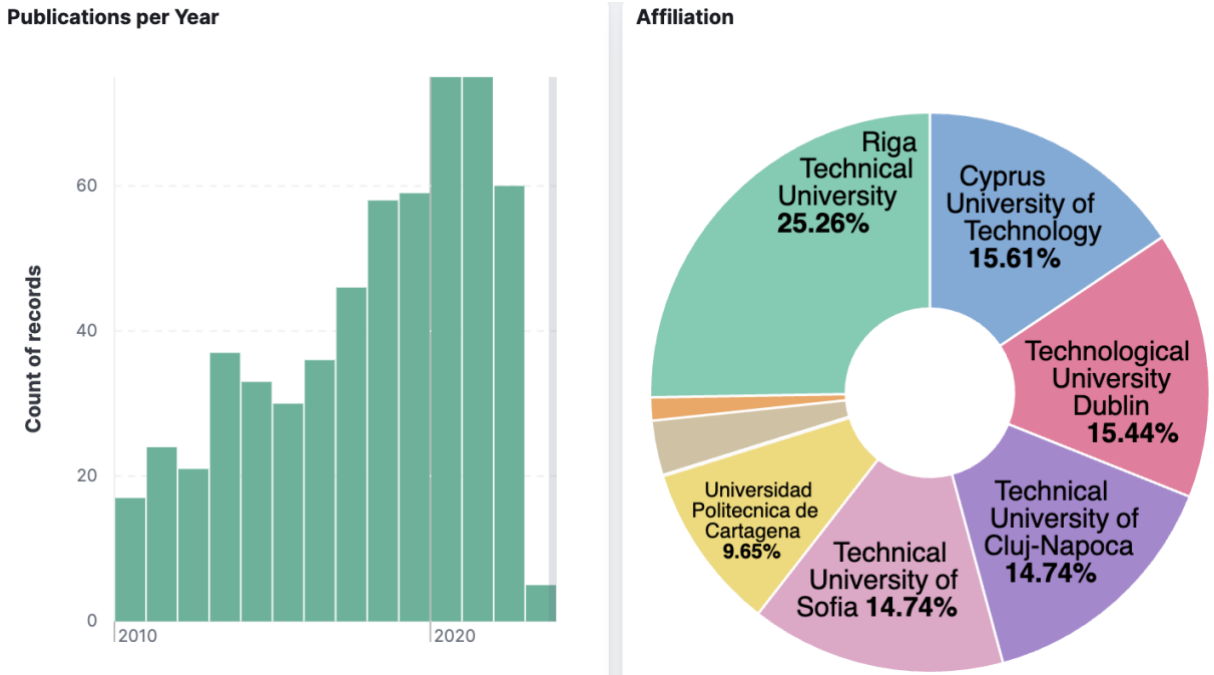



*Figure 22: Publications per year and per EUt+ partner related to "Society learning & development" (first key topic of ELaRA)*

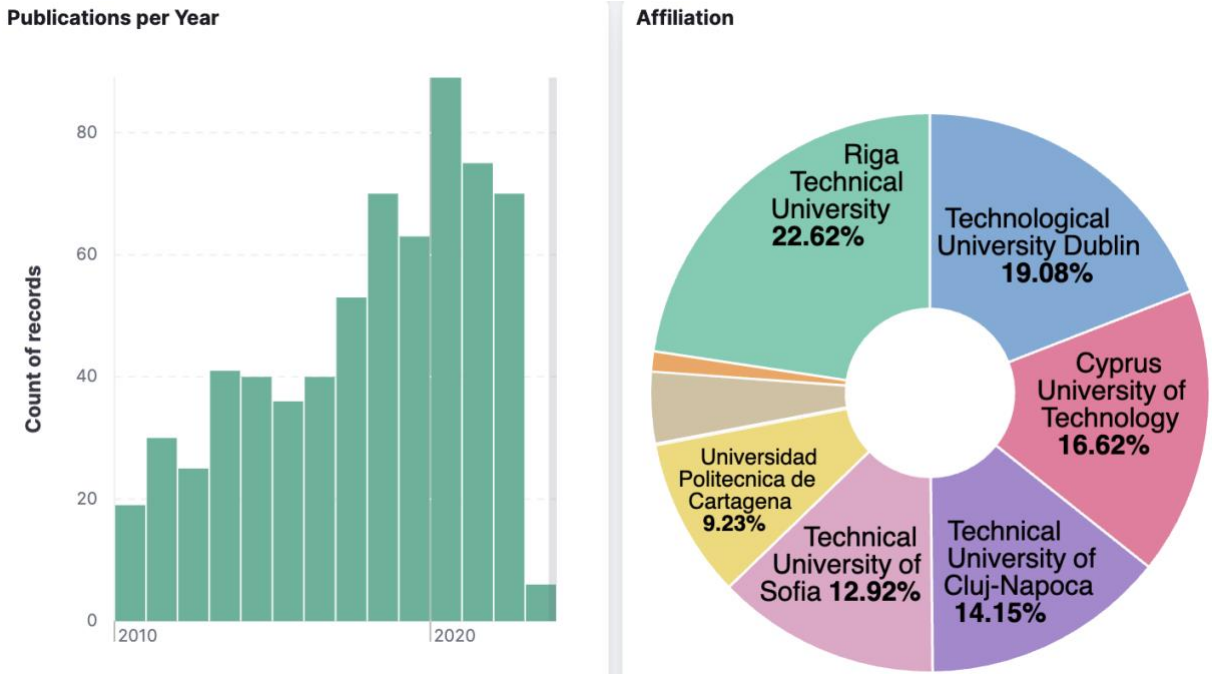



*Figure 23: Publications per year and per EUt+ partner related to "Change education – create student learning" (second key topic of ELaRA)*

The main body of research conducted in EUt+ for both key topics of ELaRA are classified under the computer science subject area. Engineering and social science are also subject areas with strong presence.

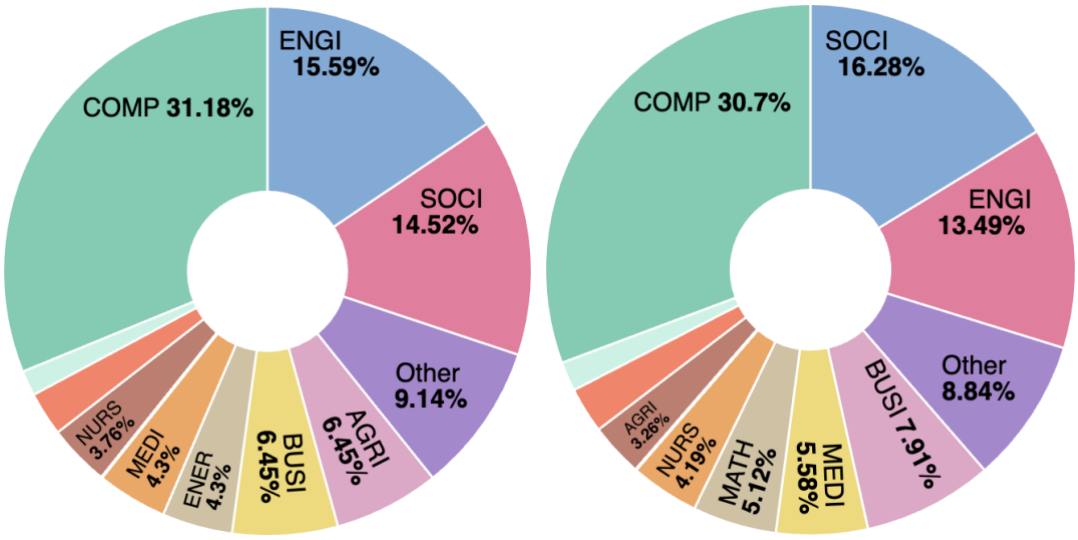



*Figure 24: Publications per subject area for key topic 1 (left) and topic 2 (right) of the ELaRA*

Co-funded by the European Union

### 1.5.4 The relevance of ELaRA's key topics to the UN-SDGs

As expected, the most relevant SDG for both key topics of ELaRA is SDG 4 (Quality Education). SDG 3 (Good Health and Well-being), SDG 9 (Industry, Innovation and Infrastructure) and SDG 8 (Decent Work and Economic Growth) are also highly relevant as it can be seen in Figure 25.

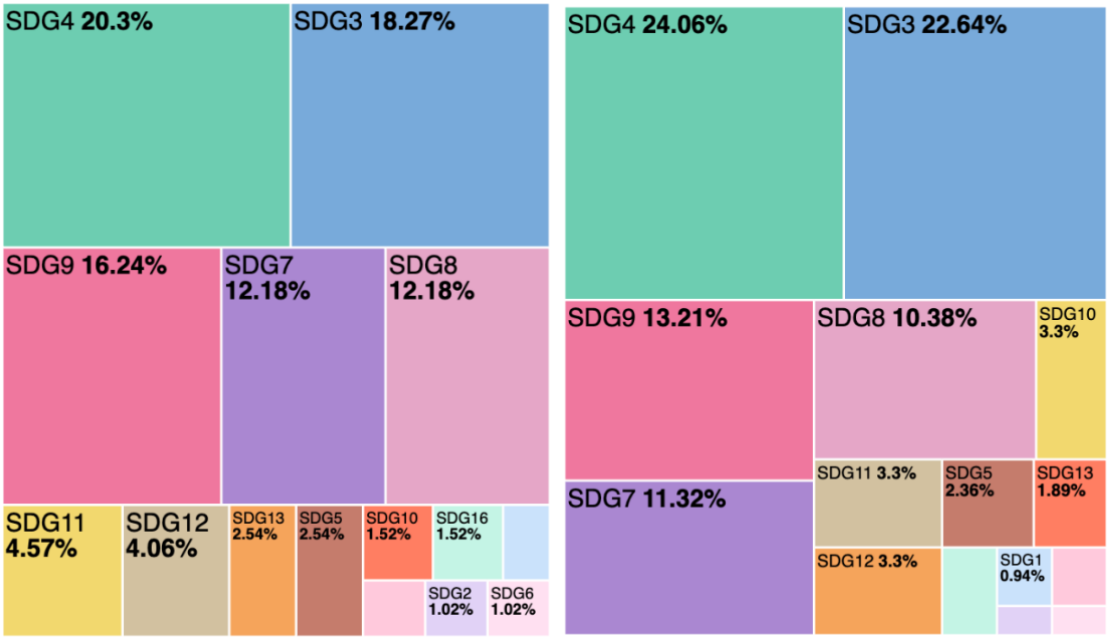



*Figure 25: The relevance of ELaRA's key topics with the UN-SDGs. To the left is the topic "Society learning & development" and to the right the topic "Change education – create student learning"*

## 1.6 People Oriented Smart Technologies Lab

### 1.6.1 Datasheet

*Tittle:* People Oriented Smart Technologies Lab

*Acronym*: POSTLab

*# EUt+ participants (universities)*: Four

*# founding members (researchers)*: 20

*Mission*: POSTLab will bring together its members' expertise in the areas of telematics, internet of things, embedded systems, environmental monitoring, geospatial data, and standardisation to deliver on a socio-technical change programme of work. POSTLab members bring together the required expertise and capacity to develop and deploy smart responsive technology frameworks on land, in both urban and remote environments, indoor and outdoor, as well as on and or below water.


*Figure 26: The wordcloud of People Oriented Smart Technologies Lab as deduced by analysing its mission and key objectives.*

*Research topics*:

- Develop and deploy several pilot studies demonstrating the power of smart technologies to address people-oriented, environmental and societal

challenges. For example, POSTLab members have ongoing projects in areas such as air quality monitoring of harbours. Members also have active research agendas in the area of technology-augmented physical spaces solutions that provide value for people; i.e., platforms for creative responsivity (such as responsive wellness spaces or outdoor responsive exhibitions for digital cultural heritage) as well as assistive technologies.

- Provide technological platforms and solutions, based on smart technologies to enable stakeholders to address and monitor SDG goals and indicators. For example, managing complex city infrastructures and services to meet sustainable development goals requires data and the realisation of smart cities. Smart cities need to be instrumented with responsive and connected smart technologies. However, this is not enough. Sensed data needs to be interconnected to complex analytical and modelling engines such as Digital Twins.
- Contribute to the development of solutions to fully realise interoperable and integrated, unified Digital Twin infrastructures, such as Digital Twin Earth. The real potential of the smart technologies lies in facilitating largescale sharing of high-quality context-rich information through systems-of-systems, rather than systems that operate as isolated technology silos.

*Keyword wordcloud*:

The wordcloud of POSTLab as deduced by analysing its mission and key objectives is shown in Figure 26. It can be summarized with the phrase “smart and responsive digital technologies”.

### 1.6.2 Key topics of POSTLab

By analyzing the mission and key objectives of POSTLab we can identify three main topics shown in Table 7.

Co-funded by the European Union

| *Topic title (suggested)* | *Key terms and weights* | *# Publications by the EUt+ research community (2010-)* |
|---|---|---|
| Responsive smart solutions | responsive: 0.026, smart: 0.021, solutions: 0.020, technologies: 0.019, platforms: 0.019, provide: 0.018, spaces: 0.018, outdoor: 0.018 | 634 |
| Smart system technologies | smart: 0.043, systems: 0.031, technologies: 0.030, environmental: 0.018, cities: 0.015, people: 0.014, responsive: 0.013, develop: 0.013, * data: 0.013, needs: 0.013 | 1038 |
| Digital twin data systems | digital: 0.033, twin: 0.023, data: 0.022, development: 0.017, systems: 0.017, complex: 0.017, infrastructure: 0.015, realise: 0.015, bring: 0.014, integrated: 0.014 | 1236 |

*Table 7: Topics and key terms of the People Oriented Smart Technologies Lab*

### 1.6.3 Publication activity at EUt+ related to the POSTLab topics

Figures 27-29 present in summary the publication activity, relevant to the POSTLab key topics, undertaken within the EUt+ research community since 2010. Publications of the EUt+ research community related to key topics of POSTLab increase steadily the last 13 years and relevant research activity is reported in all eight EUt+ partners. This shows a great potential for collaboration among all EUt+ partners and not only those currently participating in POSTLab.

Figure 30 shows the main subjects (as classified by Scopus) of the publications per key topic of the POSTLab scope. We observe that for key topics 1 and 2 the main subject areas are computer science and engineering. Key topic 1 related publications are also classified into the energy systems subject area while key topic 2 related publications are also classified in the environmental science subject area. Key topic 3 related publications are mostly classified into the computer subject area while engineering is also present.

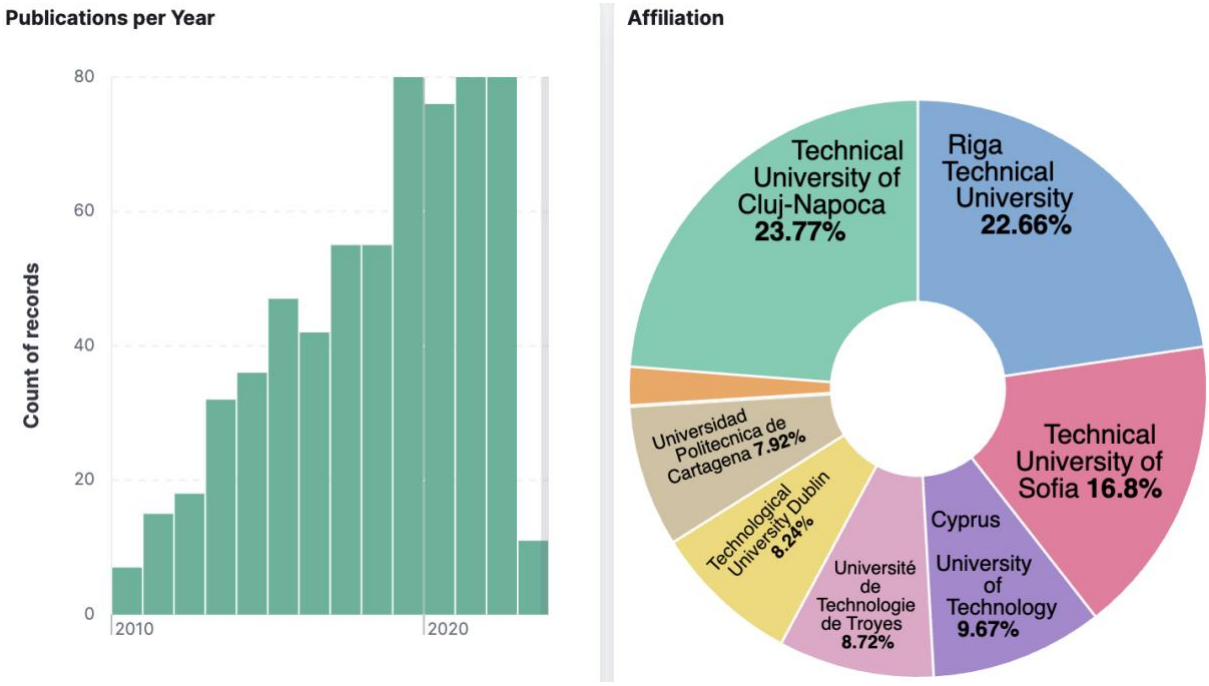



*Figure 27: Publications per year and per EUt+ partner related to "responsive smart solutions" (the first key topic of POSTLab)*

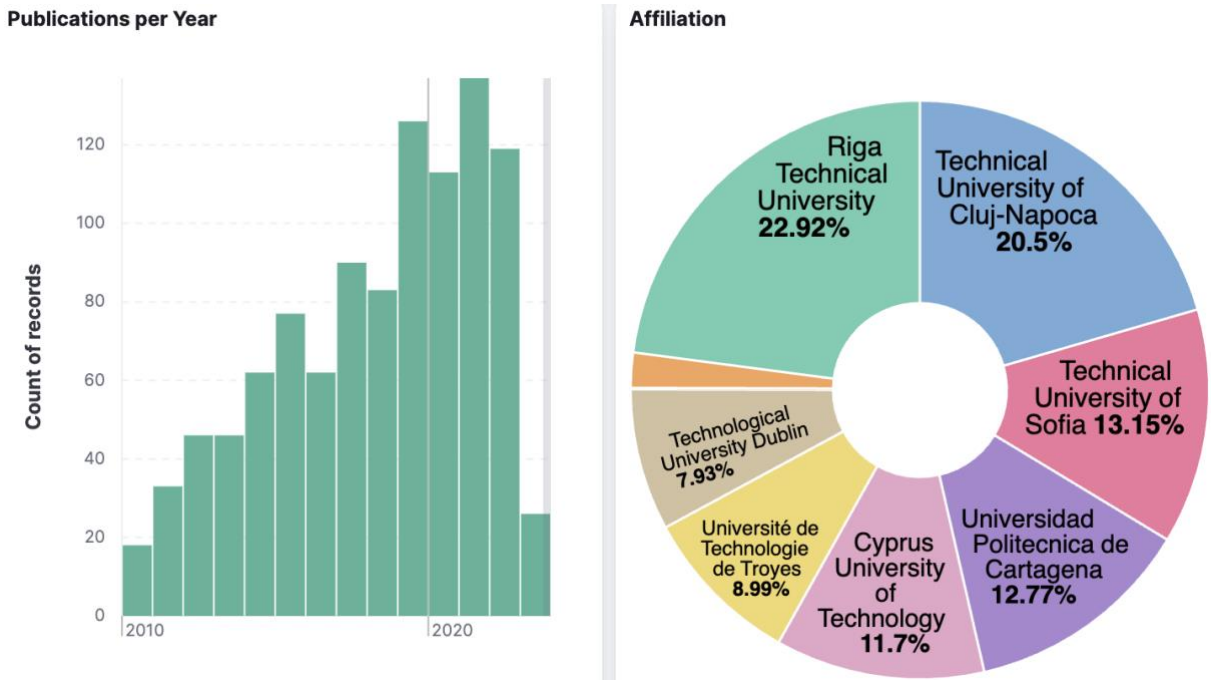
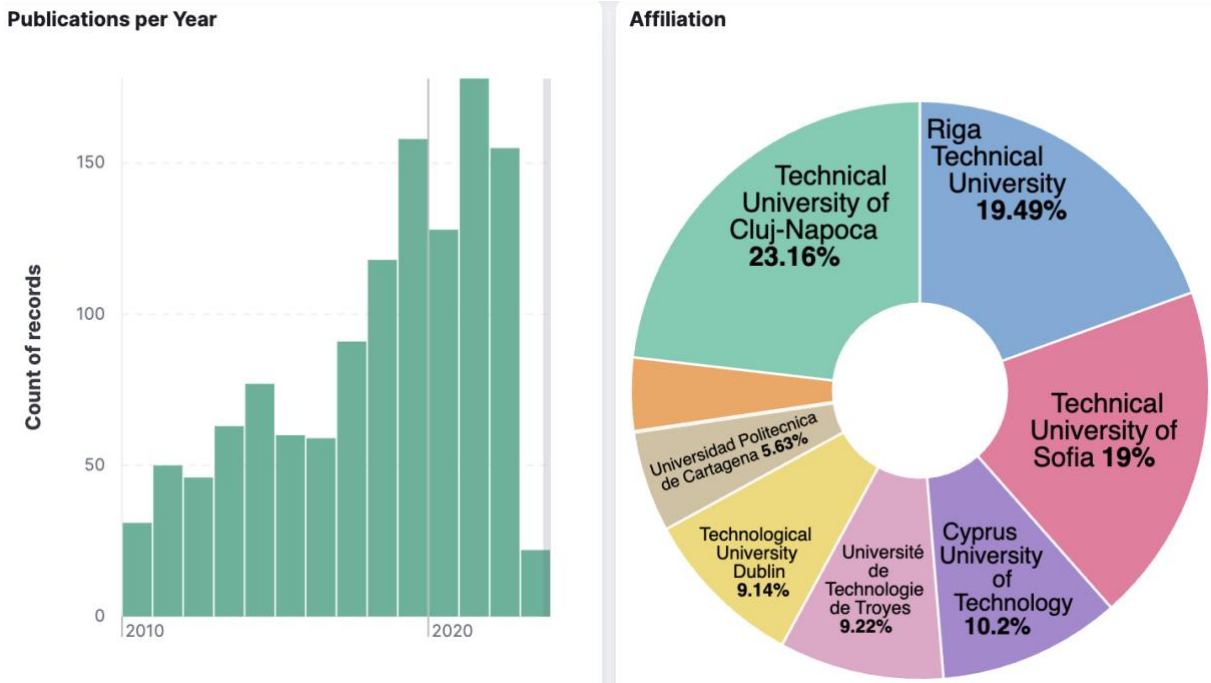



*Figure 28: Publications per year and per EUt+ partner related to the "smart system technologies" (the second key topic of POSTLab)*




Co-funded by the European Union

*Figure 29: Publications per year and per EUt+ partner related to the "digital twin data systems" (the third key topic of POSTLab)*

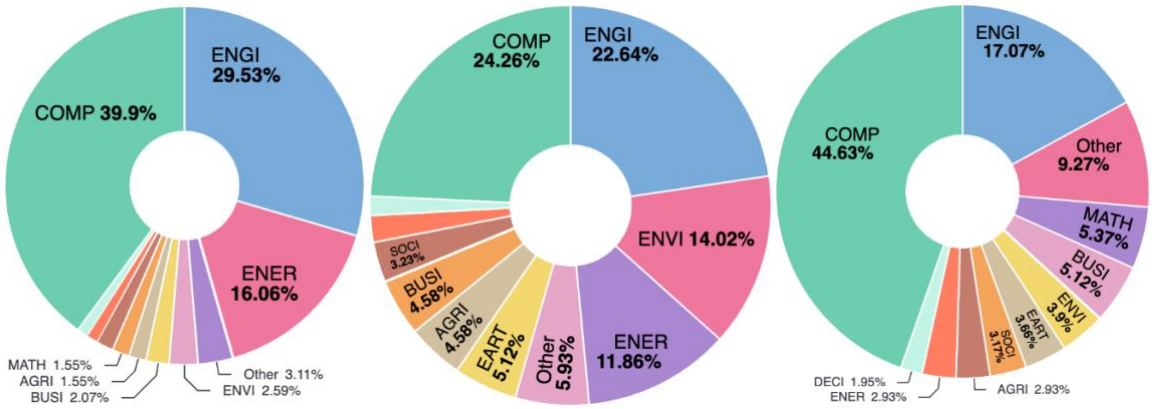



*Figure 30: Publications per subject area for key topic 1 (left), topic 2 (center) and topic 3 (right) of the POSTLab*

### 1.6.4 The relevance of POSTLab to the UN-SDGs

We see in Figure 31 that topics 1 and 2 are more relevant to SDG 7 (Affordable and Clean Energy) while topic 2 is equally relevant to SDG 3 (Good Health and Well-being) and SDG 7. SDG 11 (Sustainable cities and communities) and SDG 9 (Industry, Innovation and Infrastructure) are relevant to all three topics while SDG 12 (Responsible consumption and production) is highly related to key topic 2.

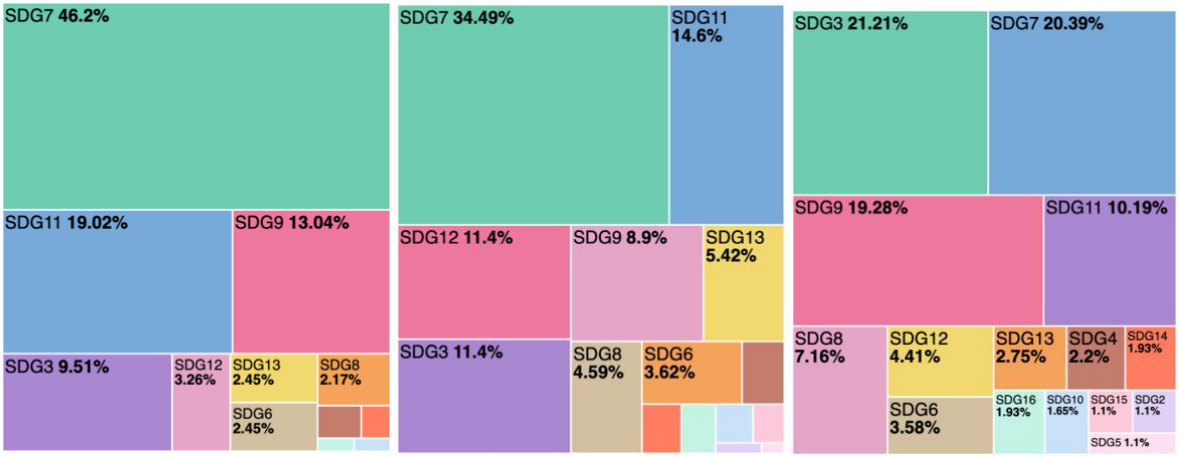



*Figure 31: The relevance of key topic 1 (left), key topic 2 (center) and key topic 3 (right) of POSTLab with the UN-SDGs based on the EUt+ publications.*

Co-funded by the European Union

## 2. Towards the EUt+ Research Institutes

As indicated in the description of Task 4.5, the thematic networks are prefiguring the establishment of research institutes. Thus, in parallel to the creation of thematic networks, motivated by the EUt+ community of researchers and developed in a bottom-up manner, the EUt+ alliance followed a top-down process to define the policy for founding the EUt+ research institutes. In November 2021, the partners of the European University of Technology (EUt+) Alliance signed a Memorandum of Agreement (MoA) to enable the founding of EUt+ European Research Institutes (ERIs). In addition, the EUt+ alliance established a number of bodies and units to facilitate the operation of the EUt+ Research Institutes and let them achieve their goals. Among those bodies, the *Research Committee* plays an important role as the body recommending to the Board of Rectors the creation (or not) of a research institute based on a set of criteria covering the research performance, ability to secure research grants and financial sustainability.

On March 2023, the Research Committee recommended to the Rectors Board the creation of the European Culture and Technology Laboratory (ECT Lab+) which became the first EUt+ Research Institute. On July 2023, the Research Committee examined the proposals of two of the thematic networks (EUTINN, DSI) to elevate to the status of EUt+ Research Institute. The financial sustainability plans of those proposals and/or the broadness of their scope did not convince the Research Committee so at to recommend them positively to the Rectors Board. Instead, a convergence period of two years was given to those thematic networks to prove their ability to work together, not only in basic research but also in securing research grants, that will allow them to support their financial sustainability plans. In October 2023, ESLab+ was acknowledged by the Research Committee as a research group, with the ambition to become an ERI in the following months.

Co-funded by the European Union

## Conclusion

The establishment of several EUt+ thematic networks was achieved before the deadline set in the Convergence Plan[6] (July 2022) and showed the willingness of the EUt+ community of researchers to work together. These thematic networks were created in a bottom-up and self-organized manner enhancing the "ownership" feeling of the EUt+ researchers. All but one of the thematic networks established include all eight EUt+ universities; this indicates that the scopes of those thematic networks are relevant across the EUt+ alliance. The activities of those thematic networks cover a broad spectrum and include scientific publications, organization of workshops, seminars and conferences, applications for research grants, and efforts to establish links with the local (at each university) research ecosystem [1].

## References

The analyses presented in this Deliverable are part of the research cited below.

[1] E. Kouzaridi, H. Partaourides, N. Tsapatsoulis, C. Djouvas (2023): **Assessing the importance of key terms in UN *SDGs* through Citizens Labs**, *Proceedings of the 21st IEEE International Conference on Pervasive Intelligence and Computing (PiCom 2023)*, November 2023, Abu Dhabi, UAE.

[2] H. Partaourides, E. Kouzaridi, N. Tsapatsoulis, and C. Djouvas (2023): **Thematic Modeling of UN Sustainable Development Goals: A Comparative Meta-based Approach**, *Proceedings of the 19th International Conference on Artificial Intelligence Applications and Innovations (AIAI 2023)*, pp. 557-568, June 2023, Leon, Spain.

[3] H. Partaourides, E. Kouzaridi, N. Tsapatsoulis, C. Djouvas (2023): **On the identification of Influential Topics in the Social Sciences using Citation Analysis**, *Proceedings of the 21st IEEE International Conference on Pervasive Intelligence and Computing (PiCom 2023)*, November 2023, Abu Dhabi, UAE.

[6] D4.18: Convergence Plan towards common research units and institutes

[4] N. Tsapatsoulis (2020): **Classification of Instagram photos: topic modelling vs transfer learning**, *Proceedings of the 12th Conference on Artificial Intelligence (SETN 2022)*, September 2022, Corfu, Greece. https://doi.org/10.1145/3549737.3549759

[5] N. Tsapatsoulis, H. Partaourides, C. Christodoulou, C. Djouvas (2022): **Quo Vadis Computer Science? The topics of the influential papers during the period 2014-2021**, *Proceedings of the 20th IEEE International Conference on Pervasive Intelligence and Computing (PICom 2022)*, pp. 1-8, September 2022, Calabria, Italy.

Co-funded by the European Union