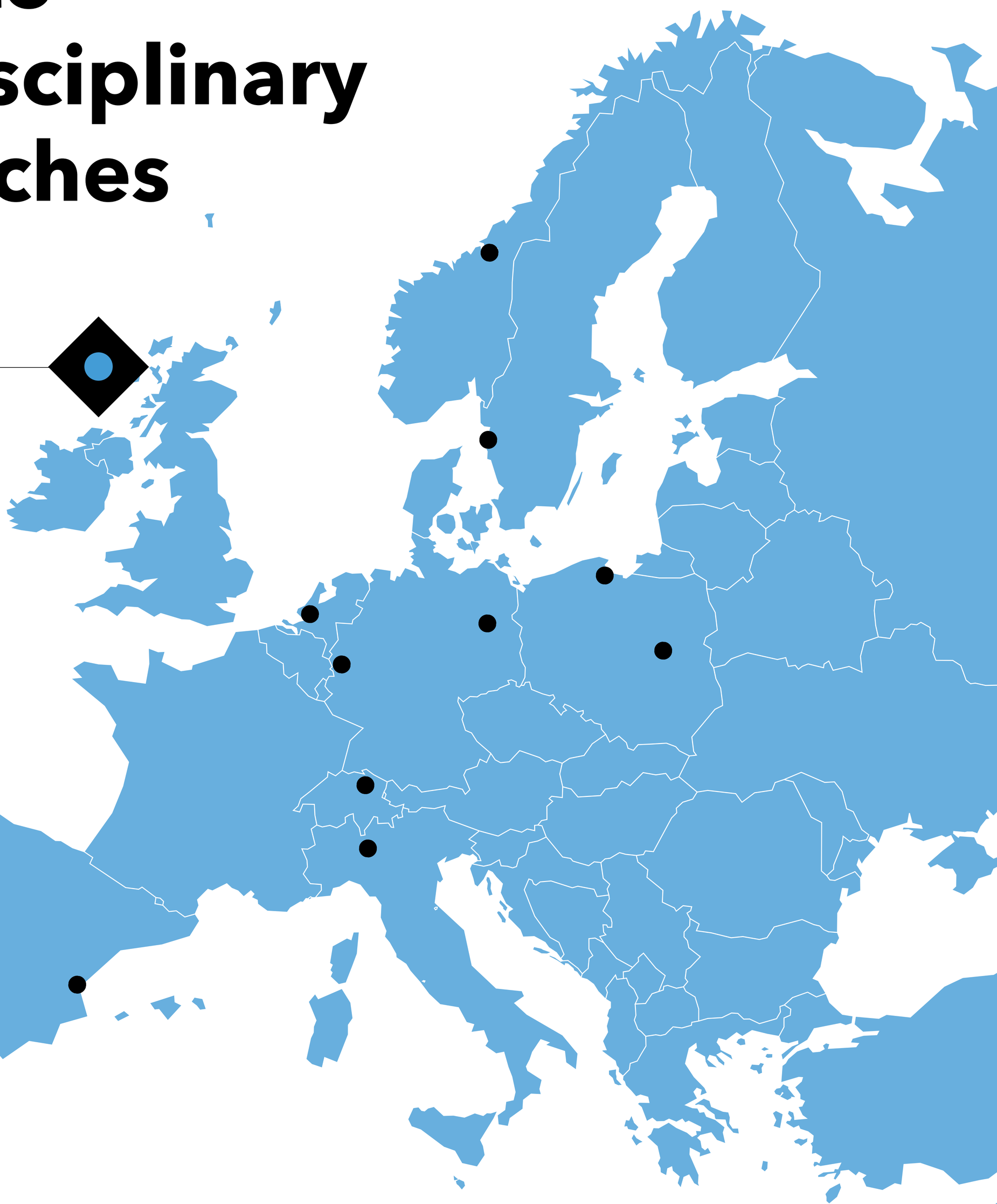
ENHANCE+

# Portfolio of practice-based and co-creative methods and tools to facilitate transdisciplinary approaches

## TOOLKIT



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## 1. EXECUTIVE SUMMARY

This portfolio on practice-based methods and co-creative tools that facilitate transdisciplinary approaches at the ENHANCE member universities is developed within the framework of ENHANCE+ WP6, the Transdisciplinary Lab for Societal Transformation. As an interdisciplinary collaboration between researchers and science managers, it provides an overview of current and ongoing transdisciplinary initiatives across the university arenas of strategy, research and education. It contains recommendations for developing the right environment to support transdisciplinary approaches and therefore promotes organisational learning or the institutionalisation of transdisciplinarity. The main objective of this portfolio is to address the establishment of a long-term foundation of societal transformation through raising awareness and visibility for a permanent knowledge exchange between science and society, and to build strategies to enable and enact transdisciplinary research and education at the ENHANCE member universities in a sustainable way. Therefore, the portfolio addresses the need to establish transdisciplinarity as university culture and as a recognised mode of research beyond disciplinary and interdisciplinary approaches.

Contributing to the common European Education Area and providing synergies among the member universities for advancing the gradual institutionalisation, the work was developed in co-creation in WP6 – as a mutual learning environment. Institutional learning was stimulated by the generation of a shared understanding and vision of transdisciplinarity, and by co-producing joint formats, concepts and services. To this end, mapping, toolkitting and assessment are used here as principal integrative methodologies to bring all ENHANCE members to a common level of understanding and to build pathways to better stimulate, support and promote transdisciplinary practices in research and education at the ENHANCE universities. These approaches were conducted by discussing good practice examples and suitable operational instruments for implementing transdisciplinary research and teaching in the Alliance and making them accessible and applicable for testing.

In short, this portfolio - the ENHANCE toolbox on organisational learning - represents **three toolboxes** which have been built on each other and which contain specific information:

- The **Transformation Toolbox for institutionalising transdisciplinarity** as an underlying result of the ENHANCERIA project (see Annex Chapter 9.b. Two tables with tools from strategy-led initiatives and project-led initiatives in research and education related to theoretical assumptions of institutionalising transdisciplinarity)
- The **Toolbox of validated ENHANCE good practices** regarding the institutional impacts of sustainability, awareness, novelty, inclusiveness and agency, including selected tools with a character of transferability (see Chapter 5a) and
- The **Toolbox of highlighted institutional-practice based tools** considering the constraints and chances for institutionalisation (see Chapter 5c), which offer specific information about their capability for linking research and education practice to university strategy building. These operational instruments are recommended for testing and evaluation in the WP6 Transdisciplinary labs to foster organisational learning in the ENHANCE alliance.

The portfolio is addressed to researchers, policymakers and science facilitators and contains learnings to test, transfer, adapt and communicate transdisciplinary good practice examples and tools in universities and therefore to provide an agenda-setting framework for a culture of permanent knowledge exchange between science and society.

## 2. OBJECTIVES, TASKS AND UNDERLYING RESULTS

### 2.a. Objectives

This portfolio of methods and tools facilitating transdisciplinary approaches is developed within the context of the ENHANCE+ Work Package 6, the Transdisciplinary Lab for Societal Transformation whose overarching goals are:

- to strengthen the role of ENHANCE universities as drivers of responsible societal transformation, through transdisciplinary collaborations between science and society, and
- to contribute to ENHANCE Key Goal 2: European University for the Future of Europe by enabling transdisciplinary approaches that can support sustainable societal transformation primarily through the ENHANCE key topics and via building knowledge-creating teams.

The portfolio specifically addresses the following two WP6 objectives, related to the development of institutional strategies for supporting transdisciplinary initiatives in research and teaching and building long-term cooperations between science and society:

1. O6.1 To implement pathways, pilots and partnerships across four topics and several ENHANCE universities. Through summer schools and co-creative workshop formats, we will implement different transdisciplinary methods and tools to test their practical implementation and their transferability.
2. O6.4 To establish a long-term foundation for societal transformation through transdisciplinary practices, via trainings and other tools that promote organisational learning and develop skills that prepare individuals for a post-transition, climate neutral future.

Anchoring transdisciplinarity as a research mode in the university practice of the ENHANCE Alliance is a focus which is embedded in the EU's science funding policy. It mirrors a paradigm shift towards more citizen-centred research, an emphasis on the Sustainable Development Goals and a mission-oriented approach. As an alliance of technical universities, the ENHANCE members have extensive experience of cross-sectoral co-operation on challenges with industrial and societal relevance, though there are significant differences in cooperation approaches, methods and structures within and between the institutions. Building synergies and approaches for a gradual institutionalisation of transdisciplinarity is key to permanently empower universities as drivers of sustainable development and societal transformation. As an explicit goal in WP6 (O.4), we aim to leverage the potential of the ENHANCE alliance to strategically develop knowledge transfer and open up universities for increased cooperation with societal partners. In order to achieve this goal, the institutional implementation of transdisciplinary practices in research and education in the Alliance is being pursued.

Institutionalisation is understood as to implement transdisciplinarity in the regular university system as a recognised and accepted mode of research beyond disciplinary and interdisciplinary research principles. It refers to organisational learning (O.4) towards the development of more and better collaborative scientific cultures, continuous operational structures and binding university strategies to promote collaboration with societal actors. In ENHANCE+ we aim to develop shared knowledge to support transdisciplinary research and education projects. In WP6 we discussed, why it is necessary to develop strategies to facilitate transdisciplinary approaches. This also includes the perspective of establishing outcomes with long-term and sustainable impact for our institutions and beyond and thus, contribute to creating a common European Education Area, by generating problem solutions for a post-transition, climate-neutral future. Tackling this challenge, and approaching practical pathways on how to do this, were the basis for discussions in the WP6 working group towards creating a long-term sustainable impact. This led to the following assumptions regarding the implementation of transdisciplinarity:

The need to:

- offer transdisciplinary knowledge archives and develop new integrated knowledge (between science and society)
- build long-term (societal + scientific) impact to tackle grand transformation challenges

- establish a university culture towards transdisciplinary, inclusionary and participatory research to increase capacity supporting transdisciplinary projects
- build effective communication to raise more awareness and promote funding
- develop promotion criteria to support young researchers/scientific careers
- establish diverse, inclusive and long-term relationships between science and society to enact transdisciplinary projects in research and education
- provide trainings to extend expertise in transdisciplinarity
- pool learnings from transdisciplinary projects (inclusive Living Labs) to promote long-term sustainable impact.

To create a common understanding and considering the diverse university approaches to create synergies, ENHANCE+ WP6 aims to further develop a mutual learning environment including the implementation of strategic and project-related practices of transdisciplinarity.

## 2.b. Tasks

This agenda-setting framework will be established in ENHANCE+ for institutional strengthening of transdisciplinary research and education in the Alliance as a strategic guideline and will be complementary to existing disciplinary and interdisciplinary modes of research. It is connected to the four transdisciplinary labs in WP6, which are conducted as contextualised test fields of transdisciplinary research and teaching with specific ENHANCE members. Regarding the different topics – smart city development, underrepresented perspectives, gender-responsive research and innovation in STEM and human-oriented artificial intelligence – different participatory methods and tools will be used in relation to the topic, available scientists, and societal stakeholders and governance structures. It is planned to include a reflection of the long-term institutional, scientific and societal impact when evaluating the labs.

This portfolio was co-produced under the framework of the following WP6 tasks:

Task 1. Informed by the results of T6.1, we will first map and cluster formats and practices for knowledge exchange and co-creation with science and society.

Task 2. We will then assess across partners how these formats and practices can be adjusted to their different local environments. The result will be a portfolio of methods and tools that can be applied across the ENHANCE Alliance and beyond. The formats and practices we will map and assess include living labs, sandboxes, STEAM Teams, Experts in Teamwork, think/do tanks, story-building and storytelling, reflection workshops and transition arenas.

The foundation for this work is the common understanding and vision established within WP6. It is accumulated in a shared broad ENHANCE definition of transdisciplinarity: "Transdisciplinary research refers to the interaction between various academic disciplines and non-academic stakeholders with the goal of generating new knowledge between science and society to tackle sustainable development challenges and bring about societal transformation"(see ENHANCERIA D3.2 Catalogue of joint advisory for supporting transdisciplinary research).

Further contributions are the good-practice transdisciplinary initiatives and tools identified during the co-creation process. Additional analysis and clustering of formats and practices for knowledge exchange and co-creation with science and society have been conducted within the ENHANCE+ project led by the Transversal Group.

## 2.c. Transversal Group

The Transversal working group was established in October 2024 to promote cross-linking between the labs regarding methodological approaches and to develop ways of advancing the institutionalisation of transdisciplinarity in ENHANCE. The Transversal Group also aims to integrate the results from the ENHANCERIA project, most of all the Transformation Toolbox on the institutionalisation of transdisciplinarity. Therefore, it primarily follows Objective O.4 to improve organisational learning in the Alliance. Initial partners of the working

group are Christian Jungnickel (TU Gdansk), Kathrin Wieck (TUB), Bianca Vienni-Baptista (ETH Zurich), and Aitana Bilinski Torres (TU Delft). The Transversal Group has two main objectives:

1) to extend and consolidate the ENHANCE Transformation Toolbox for institutionalising transdisciplinarity through further toolkitting. The toolkitting integrates the methods tested in ENHANCERIA: mapping of transdisciplinary initiatives, selecting proven examples of ENHANCE good practice, and identifying specific tools with potential for transferability.

2) to quantitatively assess the transdisciplinary activities at the ENHANCE universities in relation to uptake and engagement, and

3) to qualitatively assess the four transdisciplinary labs on potentials for long-term institutional, scientific and societal impact.

Since April 2025, the Transversal Group held monthly meetings to discuss the process and tasks to proceed with the institutionalisation of transdisciplinarity in ENHANCE in different steps, organises workshops, surveys and publications. The group provides ideas for qualitative and quantitative evaluation of labs and tools regarding institutional impact. The work also includes an assessment across members on how these formats and practices can be adjusted to their different local environments. The result is this portfolio of methods and tools in terms of three toolboxes:

- The **Transformation Toolbox for institutionalising transdisciplinarity** as an underlying result of the ENHANCERIA project (see Annex Chapter 9.b. Two tables with tools from strategy-led initiatives and project-led initiatives in research and education related to theoretical assumptions of institutionalising transdisciplinarity)
- The **Toolbox of validated ENHANCE good practices** regarding the institutional impacts of sustainability, awareness, novelty, inclusiveness and agency including selected tools with a character of transferability (see Chapter 5a) and
- The **Toolbox of highlighted institutional-practice based tools** considering the constraints and chances for institutionalisation (see Chapter 5c), which offer specific information about their capability for linking research and education practice to university strategy building.

The Transversal Group argues that by developing methods and formats for supporting knowledge transfer to society, university alliances such as ENHANCE can have a strengthening effect on long-term strategic work at universities. Methods and formats can bring about institutional change, such as the creation of a common knowledge base, the preparation of structural changes by trainings and consultancy, and the formation of coalitions through research management, researchers, and social actors. With a catalytic effect, they create systemic and interactive networks between researchers, strategies, individual initiatives, research topics, science management and curricula, and thus contribute to a long-term impact for organisational learning. Therefore, the aim of the Transversal Group is to facilitate and support ongoing mutual learning environments.

## 3. FRAMING THE CONTENT: STATE OF THE ART

Transdisciplinarity as a research mode for sustainable development, and the involvement of stakeholders in research activities to tackle complex transformation challenges has been a growing topic in policies, funding lines, research, and education (Leurs et al. 2024, Dedeurwaerdere 2023, Lawrence et al. 2022, Lorenz 2022, Bergmann et al. 2021, Lang et al. 2012). The scientific literature on the field of methodology in transdisciplinary research has also grown in line with the requirements for shaping sustainable development, particularly concerning the processes, the actors, the instruments, and the social and scientific impacts (Studer and Pohl 2023, Schäfer et al. 2021, Lam et al. 2021, Defila and Di Gulio 2018, Bergmann et al. 2012, Lang et al. 2012, Jahn et al. 2012). Implementing transdisciplinarity as a research mode and practice at universities and other

academic institutions is still an emerging relevant issue in scientific debate and literature. The scientific system faces the challenge of creating space and structures for transdisciplinary and participatory research and institutionalising it for a broad field of application. This also includes counteracting the fragmentation of isolated higher education strategic initiatives and/or single transdisciplinary research projects. and education activities. For universities to be able to align their research activities with society, funding structures must also be more closely aligned with research policy.

The institutionalisation of transdisciplinarity, understood as a broadly existing support and anchoring at the universities' content and structural level, is not yet fully developed or widely explicit. Although various methods and instruments for conducting transdisciplinary research and education are already in existence, there remains a need to create more reliable and established structures that promote transdisciplinary research at universities. There is also a need to facilitate critical discourse. Various authors mention that there is still a need to establish transdisciplinary research and education as a regular part of the scientific system in academic institutions (Williams et al., 2024; Vienni-Baptista & Klein, 2022; Ahrend & Podann, 2021; Bammer et al., 2020). This includes, e.g., initiating transdisciplinary projects more effectively in terms of their social and scientific impact, supporting them with advisory capacities and networking them in research and teaching, as well as enabling long-term cooperation between research and society (Wieck et al., 2025). Anchoring and implementing transdisciplinarity as a research principle within academic institutions faces many challenges - alongside disciplinary and interdisciplinary research (Williams et al. 2024, Bammer 2020). On three different levels it includes recognition as an equivalent research mode, the anchoring in scientific reputation system and in teaching, and the promotion of networking and exchange of good-practice examples (Podann et al., 2025). This not only tackles the structural and methodological challenges, but also the constraints determined by higher education policy and administration, such as funding opportunities, enabling infrastructures and services, capacities and skill resources, time and space. Implementing institutional strategies for transdisciplinary and participatory research is an ambitious goal in many respects: it strives to create participatory and application-oriented scientific cultures, continuous operational structures and committed university strategies that bring together the knowledge, actors and methods of joint knowledge production between science and society, in the long-term. Its goal is to address the socio-ecological transformation challenges of the present in a solution-oriented and design-oriented approach.

On the other hand, the complexity of the topic of institutionalisation is represented by various authors. Multiple authors address it as a topic of institutional transformation and institutionalisation of transdisciplinary and participatory research, as well as institutional governance on inter- and transdisciplinarity, knowledge co-production and cooperations in sustainability research (Williams et al. 2024, Dedeurwaerdere 2023, Vienni-Baptista and Klein 2022, Bammer 2020, Klein 2010). The discussions address structural, cultural, value-oriented, and methodological components of the university systems. There are engagements at several universities to enact transdisciplinary policies but also challenges and barriers to this becoming a widespread practice. The discussions also focus on promoting the institutionalisation of participatory research and transdisciplinarity to create long-term coalitions between academic and non-academic stakeholders, generate joint knowledge archives, and embed science in social life in the long term (Vienni-Baptista and Klein, 2022, Leurs et al. 2024). It is also mentioned that the landscape of existing toolkits is fragmented and therefore limited in accessibility for researchers (Laursen et al., 2025). Formats are needed to include pluralistic methodological approaches and systematic development of processes for the institutionalisation of transdisciplinarity to facilitate and promote participatory work and provide more targeted support. This also includes creating a shared knowledge base, preparing structurally effective processes, and forming coalitions of research management, researchers, and social actors (Bammer et al. 2020).

# 4. THE INTEGRATIVE METHODOLOGY

## 4.a. Building on the ENHANCE transformation toolbox for institutionalising transdisciplinarity

Based on the vision of WP6, the compilation of this portfolio is essentially related to the integrated processes and results of the ENHANCERIA project, focus area 1/work package 3 *Sustainable development through transdisciplinary research*. It addressed two ENHANCE programme-specific dimensions: creating a common understanding and considering the diverse university approaches to transdisciplinary activities, thereby generating productive synergy effects for transformation. Most of all, the 'Transformation toolbox for the institutionalisation of transdisciplinarity' has been used as a basis for further development in WP6 and, in particular, for this portfolio of methods and tools. The toolbox includes both programme-specific dimensions: joint formats, research and services and transferable tools from identified ENHANCE good practices, which can provide support for transdisciplinary research and education projects.

In summary, the ENHANCE tools in this Transformation Toolbox refer to the establishment and facilitation of processes and products for the long-term knowledge exchange between research and society (https://enhanceuniversity.eu/enhanceria/sustainable-development/). A central concern is to ensure that institutional change for promoting transdisciplinarity is not carried out at individual universities but as a joint project of the ENHANCE Alliance to create synergies. The tools thus include conceptual ideas and experiences, transdisciplinary initiatives, methods and approaches in the form of various formats such as living labs and workshop formats, various newly created facilities and offerings such as the transformation toolbox, as well as jointly produced research results in the form of publications, reports and the Walk & Talk format. The joint working tools include mappings, concept workshops and Miro board as a joint working platform, joint paper writing and publishing, the ENHANCE Walk & Talk Format, the ENHANCE definition on transdisciplinarity, the ENHANCE glossary as a living document, the ENHANCE good practices, the ENHANCE platform on transdisciplinarity in terms of the sub webpage https://enhanceuniversity.eu/enhanceria/sustainable-development/ and the temporary te. ma science communication channel on transdisciplinarity).

The transformation toolbox offers a broad potential for development work in WP6, both for the portfolio of methods and formats presented here (D6.1) and for stimulating the four topic-related transdisciplinary labs (D6.2). The compilation of tools for institutionalising transdisciplinarity in the ENHANCE Alliance are available in the Annex Chapter 9.b.1 and 2).

- First, with its categories, the Transformation Toolbox serves as a mapping matrix for identifying various impacts, tools, project/action types of transdisciplinary activities, etc. This can be used as a search window to better filter the different (often hidden) active transdisciplinary initiatives at the ENHANCE universities. The toolbox was also used as the basis for the further inventory of transdisciplinary initiatives at the 10 ENHANCE universities (see Chapter 5).

- The Transformation Toolbox can also be used for internal communication processes, in particular, better connecting university strategy-building services and the field of science management to scientists who are conducting transdisciplinary research and teaching projects at the departments and faculties.

- The Transformation Toolbox can also be used to externally promote the tools for operationally linking the strategy level to the project level of transdisciplinarity to other networks, such as FOREU4All, EU Living Lab Hub, ITD Alliance, as well as to discuss the necessity to create regular supporting structures for guarantee the long-term knowledge exchange between science and society.

## 4b. Working with three main practices

The ENHANCE Alliance takes an integrative methodological approach that emphasises the significance of diverse perspectives in advancing scientific knowledge and practices of transdisciplinarity, by drawing on the unique insights of each team member and their respective ENHANCE institution. The ENHANCE+ WP6 members form a diverse working group with an interdisciplinary nature and researchers from different university levels, including science management and research departments. In the course of the project, this

has led to a gathering and triangulation of data by multiple researchers from different institutions and with different disciplinary and administrative backgrounds, and also with the input of non-scientific advisors. In general, the method and tools presented in this portfolio are based on an interdisciplinary, empirical, discursive and reflexive approach that combines a normative setting, shared concepts and tools with data analysis from empirical research. Mapping, Toolkitting and Iteration are the three main practices represented here to frame the jointly developed methodology for a strategy-building procedure:

01_**Mapping** was conducted as an intense and systematic process in WP6. This includes desk research, surveys, in-depth interviews with experts, and Walk & Talk excursions to representative transdisciplinary projects at the ENHANCE institutions. The data are collected in a catalogue of 158 mapped transdisciplinary initiatives and analysed as part of empirical research which is related to a literature review on the topic of institutionalising transdisciplinarity (see Chapter 4c).

02_**Toolkitting** is a concept that grew in the ITD alliance working group on methods and tools for inter- and transdisciplinarity. Based on intense research and an inventory of toolkits, it argues for toolkitting as a creative and linking practice for creation, use, maintenance and study of toolkits (see Laursen et al. 2024, ITD Alliance, 2023). In the development of this portfolio, it was used as an approach for a concept workshop to emphasise the mutual learning environment, to generate a shared mindset and thereby to foster the organisational learning for a long-term foundation for societal transformation through transdisciplinary practices. To point out also the strategic perspective, toolkitting in ENHANCE aims to activate the mapped transdisciplinary initiatives by linking specific strategies for supporting transdisciplinarity with participatory project practices. Therefore, also operational measurements are set up to offer space, time, and possibilities for debates, co-creation, and building networks (inside ENHANCE and beyond, between academic and non-academic actors, between science management and researchers), knowledge, and perspectives. This included also the development of joint working tools, e.g. concept of good practices, the Walk&Talk format), and the set-up of the Transversal Group. A parallel and complimentary quantitative assessment methodology approach to assessment of the initiatives was also conducted by Gdansk Tech as part of the integrative methodology approach to assessment of stakeholders (see Chapter 5b).

03_ An **iterative process of mapping, toolkitting, feedback and learning** as a general working principle is undertaken in the WP6 group, aiming to co-create shared impact and to further establish the mutual learning environment in ENHANCE (also as a long-term impact for future cooperation). For this D6.1 portfolio, reflections on aims, alignments, and concepts are made jointly in discussions and workshops, and analytically by investigating the collected data, building criteria for selecting good practices, and extracting tools with a capability to contribute to organisational learning.

## 4.c. Mapping

The mapping process in WP6 used to compile this D6.1 portfolio extends the mapping of the existing ENHANCE Transformation Toolbox for institutionalising transdisciplinarity. A **survey** (see Annex Chapter 9.a.) was prepared and specified primarily to map the three newer ENHANCE members (Gdańsk Tech, TU Delft, ETH Zurich) that have not yet been involved, with their transdisciplinary initiatives in the areas of strategy, research and teaching. The questionnaire was also used to identify further transdisciplinary projects at all ENHANCE universities, as the institutional and disciplinary affiliations of the WP6 members have changed (in comparison to the ENHANCERIA working group). The survey aimed to identify further institutional strategies enabling long-term knowledge exchange between science and society, as well as transdisciplinary practices of conducting cross-sectoral knowledge transfer across various institutions in research and education projects. The main goal of this mapping was to identify ENHANCE good practice examples, such as pathways, pilots, partnerships, cooperation models, services, transformation ecosystems and projects, to foster long-term knowledge exchange between science and society across different institutions (see survey in Annex Chapter 9.a.).

In total, and including the mapping rounds in ENHANCERIA, **158 transdisciplinary initiatives** from all 10 ENHANCE members have been mapped. They contain information about:

- the ENHANCE institution
- the title and the type of the transdisciplinary initiative
- an assignment to the university area of strategy, research, and education (or a mix of them)
- the sustainability focus
- the funding
- the methodologies
- the disciplines and external partners involved
- the levels of engagement
- the societal impact
- the rewards structure
- contact information
- an opinion on why it is a good practice example
- optionally to describe or highlight a tool for institutionalising

First examples for identifying transdisciplinary initiatives as good-practice and selecting tools for strengthening institutional implementation were gathered from the authors of the cases. These examples followed the initial idea of highlighting innovative, creative and adaptable methods for bridging the gap between strategies and practices of transdisciplinary research and education and fostering gradual institutionalisation of transdisciplinarity as a research mode in ENHANCE.

This compilation of the 158 transdisciplinary initiatives at the university fields of strategy, research and education forms the common ground for qualifying further ENHANCE good practice examples and specifying transferable tools (see Chapter 5.a.) and highlighted institutional-practice based tools (see Chapter 5.c.) for stimulating and promoting transdisciplinarity at the ENHANCE universities.

Beyond this, further mapping activities will be realised during the entire ENHANCE+ reporting period. This is:

- the mapping through Walk & Talks. The Walk & Talk is a format developed and tested in ENHANCERIA. These are curated excursions to the ENHANCE universities to strengthen the knowledge exchange about relevant transdisciplinary projects (most are living labs), to get to know the relevant involved academic and societal actors and to make the knowledge archives of these projects experienceable, tangible and easier to transfer and communicate (see 'Recommendations for piloting a transformation toolbox', https://enhanceuniversity.eu/enhanceria/sustainable-development/). In the ENHANCERIA reporting period from 2022 to 2024, seven Walk and Talks have been conducted at each partner university. In ENHANCE+, a second Walk & Talk at RWTH Aachen took place in February 2025 as part of the WP6 Smart City Lab (see report by Stefan John and Robin Chang). A further Walk & Talk was conducted at TU Gdansk on 9-10 September 2025.
- a further mapping of transdisciplinary projects through the activities of the four transdisciplinary labs and
- an extension of joint working tools for creating a mutual learning environment (see report: 'Recommendations for piloting a transformation toolbox', https://enhanceuniversity.eu/enhanceria/sustainable-development/).

An additional mapping was pursued through the Lab underrepresented perspectives and will be detailed in the upcoming Lab report (D6.2).

### 4.d. Toolkitting and Evaluating

Reflecting the mapping, a conceptual workshop on Toolkitting was made for specifying the qualification process of good practice examples and identifying tools for organisational learning (institutionalisation). It was conducted as a hybrid workshop in two parts - on toolkitting and evaluating - at WUT Warsaw during our WP6 yearly meeting on 22 May 2025. The workshop was initiated and moderated by Kathrin Wieck (TU Berlin) and Christian Jungnickel (Gdansk Tech).

An introduction was given about the objectives and processes of the workshop and selected highlighted good practice examples from ENHANCERIA were represented, explaining why they were chosen and why these examples could work to be implemented in institutional strategy-building practice.

In the first part (the Toolkitting workshop) we discussed and approached coherence for selecting good practice examples of transdisciplinarity in ENHANCE and identifying capable tools for operational learning/institutionalising transdisciplinarity. We jointly worked on a Miro board to gather and discuss ideas from all participants. The workshop intended to learn from each other's experiences and exchange, to reflect and discuss criteria for selecting ENHANCE good practice examples and to co-create and think about what could be characterised as a tool for institutionalisation.

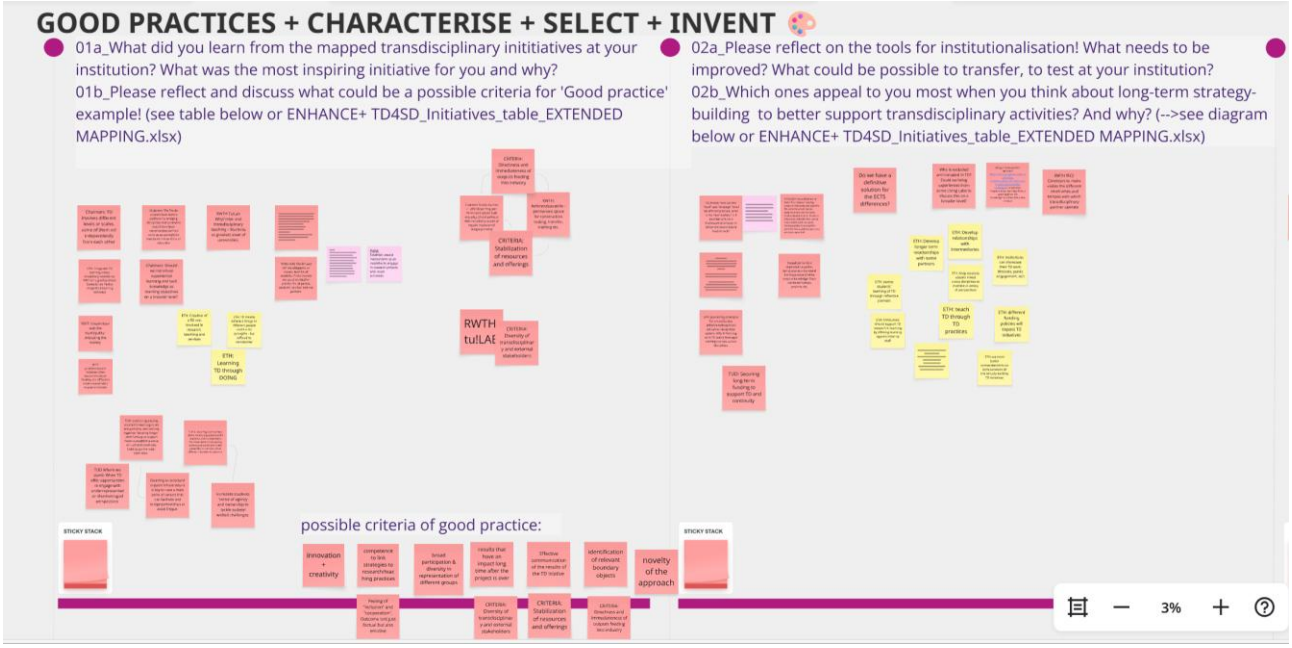


***Figure 01*** *Toolkitting Workshop with comment function for criteria-building of ENHANCE good practices and tools, Screenshot from the Miro board'*

The Toolkitting workshop focused on the following questions in different steps and by reflecting on the mapping activities:

- What did you learn from the mapped transdisciplinary initiatives at your institution? What was the most inspiring initiative for you and why?
- Please reflect and discuss what could be a possible criterion for a 'Good practice' example'.
- Please reflect on the tools for institutionalisation. What needs to be improved? What could be possible to transfer to test at your institution?
- Which ones appeal to you most when you think about long-term strategy-building to support transdisciplinary activities better? And why?
- Please select 2-3 transdisciplinary initiatives from your university and characterise them as ENHANCE good practice.
- Please add a note to characterise a tool /method/format/exemplary process that would be of interest to other ENHANCE members and explain why.

The second part (the Evaluation workshop) addressed the issue of creating a comparable and evidence-based index of how transdisciplinarity is implemented across ENHANCE Alliance universities. It aimed to allow for benchmarking, finding barriers to the implementation of transdisciplinarity and eventually institutionalise it.

### 4.e. Iterative process: Reflection and Analysis

Reflection and analysis were conducted iteratively: individually, tested in the Transversal Group and for co-creation in the whole WP6 working group. The outcomes from the Toolkitting Workshop were reflected on to inform further proceedings in the Transversal Group and to analyse and cluster the information provided by the ENHANCE members. This includes individual investigation related to scientific discussions on institutionalising transdisciplinarity (e.g. based on Vienni-Baptista and Klein, 2022, Williams et al., 2024, Leurs et al, 2024; GTPF 2025, Wieck, 2025). As a result, a clustering was prepared to categorise the workshop ideas into five selection criteria for ENHANCE good practice, two from a more strategic-driven (top-down) perspective and three from a more practice and project-based (bottom-up) perspective, and titled related to expected institutional impact with: **Sustainability, Awareness, Novelty, Inclusivity and Agency** (see Chapter 5). As a second step, they were discussed and tested in the Transversal Group, utilising the already defined ENHANCE good practices (as outlined in the transdisciplinary initiative table, which includes all 158 mapped cases). Based on the feedback, we prepared a template to disseminate and request that WP6 members validate four transdisciplinary initiatives from their university as good practices, categorise them, and provide a brief explanation for their assignment. The template also integrates a box to formulate a tool (for organisational learning), from which we can learn for our institutions and what might be possible to transfer (see Figure 04).

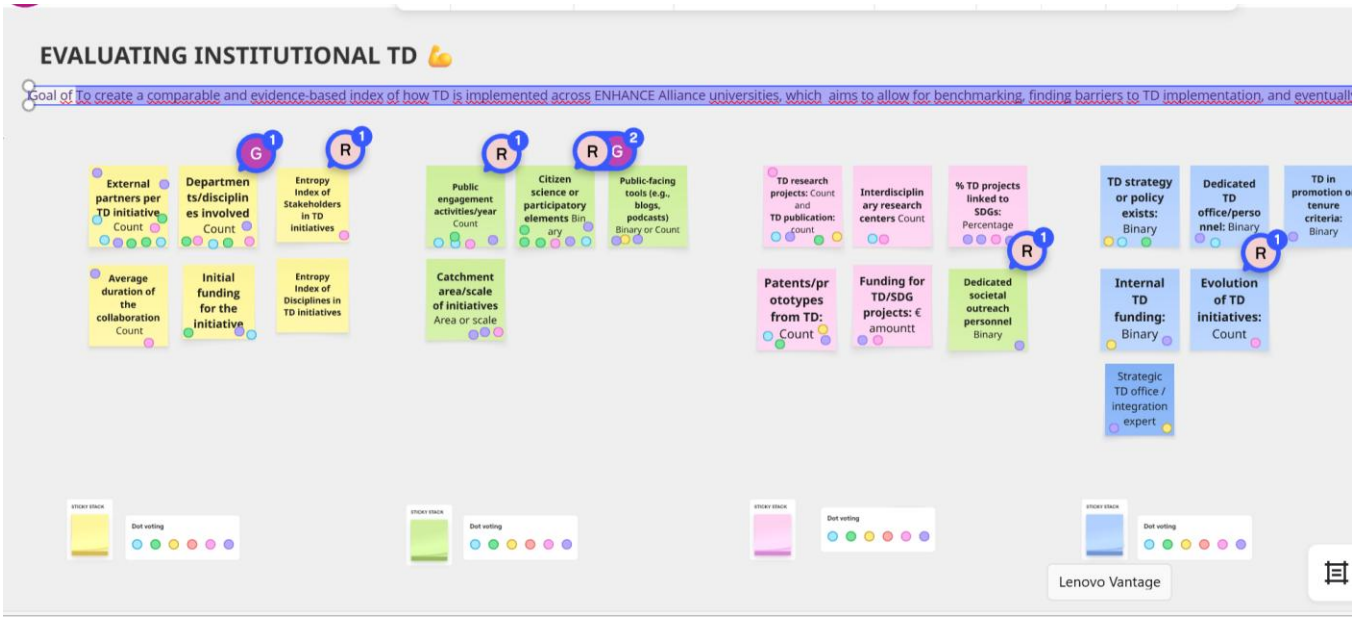


***Figure 02*** *Evaluation workshop with voting function, Screenshot from the Miro board'*

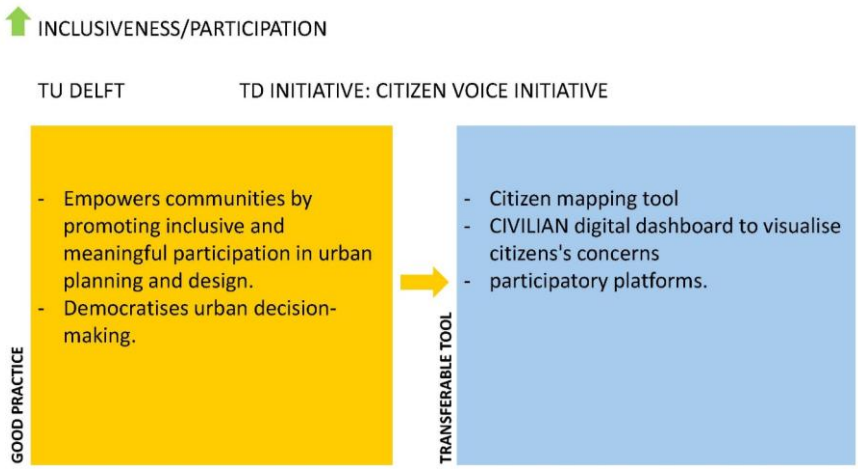


***Figure 03*** *Extract from template, selecting and valuing ENHANCE good practices and tools*

As a next step, all submitted good practice examples and tools from the WP6 members have been evaluated and visualised in the Transversal Group for this D6.1 portfolio and future steps (see Chapter 5). The Transversal Group identified relevant insights for specifying the institutional impact from key stakeholders in the process of building the toolbox and by data analysis, also informed by a complimentary quantitative assessment with regard to stakeholders and cross-departmental teams, funding models, recognition mechanisms and replication potential. Furthermore, in a co-creation process in WP6 we identified specific tools as possible operational instruments to adjust in local universities environments. Discussing **the potential to address constraints and contribute to the strategic approach on transdisciplinarity** we finally selected institutional-practice-based tools as concrete operational instruments that have the capacity to activate organisational learning at the ENHANCE universities and for testing in other universities environments. In general, they serve as key messages for a future action plan to foster the institutionalisation of transdisciplinarity.

# 5. RESULTS: GOOD PRACTICES, TOOLS AND INSTITUTIONAL IMPACT

## 5. a. ENHANCE Good Practices and possible transferable tools

The Toolbox on ENHANCE good practices and possible transferable tools provides a structured framework to institutionalise transdisciplinarity at universities by capturing and disseminating effective initiatives based on a set of ENHANCE good practices. Its main impact is related to the grounded nature of the practices, and the exchanges and tests done by the member universities and reflected by the Transversal Group. The Toolbox in total contains the Transformation Toolbox on institutionalisation from ENHANCERIA see Annex Chapter 9.b.), and this Toolbox resp. Portfolio on methods and tools (see Chapter 5a and 5c).

Initiated by TU Berlin 158 transdisciplinary initiatives across ENHANCE member universities were analysed in a co-creation process of the WP6 working group. Based on the Transformation Toolbox from ENHANCERIA, all mapped initiatives were basically assigned across university domains: Strategy, Research, and Education to decode the top-down (institutional) level of strategies supporting transdisciplinarity and the bottom-up (individual researchers) level of transdisciplinary research and education projects, and to differentiate the synergies.

For this portfolio, validated in the Toolkitting workshop from the WP6 group and analysed by the Transversal group, **40 transdisciplinary initiatives** were qualified as "ENHANCE good practices" summarised in five criteria as having specific capacity for stimulating an institutional impact: **Sustainability, Awareness, Novelty, Inclusivity, and Agency.** The categories also link interactively the institutional level of strategies and the individual level of TD practices in research and education projects. The criteria of Sustainability and Awareness are rather characterising the strategy-driven initiatives, meanwhile the criteria Novelty, Inclusiveness and Agency describe characteristics of research and education projects.

For selection and assignment of good practice examples, a qualitative review process by the WP6 members has been conducted. Every ENHANCE member assigned the selected transdisciplinary initiative to the categories and gave further explanation for the associated institutional impact. Each WP6 member also characterises a possible transferable tool for institutionalising transdisciplinarity at the ENHANCE universities extracted from the good practice example (see Table 01a-01e).

As navigation to the institutional impact, the five categories are defined as follows, underlined with assigned ENHANCE good practice examples of transdisciplinary initiatives and extracted possible transferable tools in the alliance, see Table 01a-01e):

**SUSTAINABILITY**

- The TD initiative develops strategies, facilities, infrastructures, and frameworks to establish stable and regulatory rules that embed transdisciplinarity in institutional practice.
- The TD initiative provides measurements like resources, offers and services for consulting, capacity building, knowledge archives, formats and methods, partnerships and cooperations for a long-term impact and knowledge exchange between science and society.
- The TD initiative supports organisation of regular institutional funding for transdisciplinary projects in research and teaching.

***Table 01a*** *ENHANCE good practices and possible transferable tools fostering sustainability*

| **SUSTAINABILITY** | | | |
|---|---|---|---|
| **UNIVERSITY** | **TD INITIATIVE** | **GOOD PRACTICE FOR INSTITUTIONAL IMPACT** | **POSSIBLE TRANSFERABLE TOOL** |
| NTNU | **Smart Sustainable Cities**<br><br>https://www.ntnu.edu/smartcities | NTNU Smart Sustainable Cities is a cross-disciplinary knowledge cluster of architects, planners, designers, artists, engineering, ICT, social and economic sciences. Together, we offer open urban innovation, co-creation and decision support for people-centric smart sustainable cities, supporting public and private sector as well as civic society with a unique merger of transformative, technological, artistic and practice-based research.<br>Supports climate-neutral and inclusive urban transformation aligned with EU missions like the New European Bauhaus. | Stakeholder Mapping & Engagement Tools<br>Techniques for identifying and involving diverse stakeholders in urban transformation.<br>Vision-Driven Communication Strategies<br>Use of narrative frameworks to align with institutional missions.<br>Transdisciplinary Education Modules<br>Learning activities bring together students and professionals from different fields.<br>Adaptable for master's programs, summer schools, or continuing education.<br>Urban living labs, public-private partnership, CrAFtCookbook, and Domino Game for stakeholder engagement.<br>Impact Model is trying to foster collaborative governance and holistic sustainability |
| TU BERLIN | **Stadt-manufaktur**<br><br>https://stadtmanufaktur.info/en/ | Living lab platform for long-term cooperation between science and society | Set up of transformation ecosystem, cooperation model<br>Matches scientific questions, methods, and data with practical know-how and actors<br>Bundling of existing living labs in Berlin,<br>Transdisciplinary research for complex urban transformation processes through cooperation between science, business, civil society and politics<br>Long-term monitoring of projects and opening up experimental spaces |
| TU BERLIN | **Office for Science and Society** | Centralised structural establishment for the institutionalisation of | Consulting + building inter-and transdisciplinary partnerships /cooperations |

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| | **(Stabsstelle)**<br><br>https://www.tu.berlin/en/science-and-society/about | transdisciplinary research projects<br>Central service and knowledge base providing knowledge exchange of science and society on various levels and by hosting various platforms, services and transdisciplinary projects | Developing and testing of pilot projects<br>Accumulating TU services of support on transdisciplinarity, matchmaking<br>Long term cooperations between science and society and process development for institutionlisation of transdisciplinarity |
| CHALMERS | **HSB Living Lab**<br><br>https://www.chalmers.se/en/infrastructure/hll/ | A collaboration project between Chalmers, HSB (cooperative association for housing in Sweden), and other partners, developing new ways to build and shape the housing of the future. This lab was created in 2016 in the context the EU Climate-KIC and its flagship programme Building Technologies Accelerator, in the Johanneberg's Campus of Chalmers, to host a student residence and research. The tenants of the house live in a constantly changing and evaluated environment while the research is ongoing. | Set up of a living lab experimentation format in cooperation with business partners and with tenants. Features:<br>Cooperation with a range of companies covering the entire building industry (engineering, building, product supply, energy suppliers<br>Research projects on sustainable living<br>Concrete products (e.g. low-energy refreshing cabinet from Electrolux),<br>Prototyping: some start-up company testing products, e.g. testing materials for facades<br>Behavioural analysis e.g. on energy consumption |
| POLIMI | **POLISOCIAL Programme**<br><br>http://www.polisocial.polimi.it/en/home-en/<br><br>http://www.polisocial.polimi.it/it/off-campus/ | POLISOCIAL is an academic social responsibility programme at Politecnico di Milano, designed to expand the university's mission to include societal needs at both local and global levels. It promotes OFF CAMPUS, a network of urban hubs that strengthen the university's presence in the city and support community engagement. Currently, four hubs are active across Milan. The programme aims to train researchers and professionals to generate social change and responsibly serve their communities. It also supports institutional funding for transdisciplinary research, notably through the annual POLISOCIAL award | Develop and implement comprehensive institutional programmes (e.g., social responsibility frameworks) aimed at connecting the university's mission to both local contexts and global societal challenges.<br>Establish physical spaces (e.g., community hubs or urban labs) designed for hands-on experimentation and innovation, both of which promote co-design efforts, participatory research, and enduring alliances between academia and local communities.<br>Create institutional funding mechanisms that incentivise socially impactful and transdisciplinary research. |
| UPV | **UPV Living Lab** | Hosts activities focused on creating sustainable impact, | Set up of test-bed/sandboxes for campus development: creating an |

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| | https://www.upv.es/entidades/vcampus/en/en-living-lab/ | the seed of a great pact of collaboration with societal sectors for a green city. | experimentation environment for open innovation through iterative processes in the Vera campus that will be replicable in Valencian neighbourhoods. |
| **SUSTAINABILITY (+ AWARENESS)** | | | |
| TU BERLIN | **TD-LAB Laboratory for transdisciplinary research (Berlin University Alliance)**<br><br>https://www.berlin-university-alliance.de/en/commitments/knowledge-exchange/td-lab/index.html | The Laboratory for Transdisciplinary Research is a structure-building measure within Objective 2, 'Fostering Knowledge Exchange,' as part of the excellent Berlin University Alliance. With the programmatic perspective 'Upgrade your Science,' the TD-Lab aims to promote transdisciplinarity as a complementary research mode to disciplinary, multi- and interdisciplinary research approaches within the Berlin University Alliance. The TD-Lab develops and offers methods for knowledge exchange between researchers and non-scientific actors addressing complex societal challenges. Additionally, the TD-Lab professionalises transdisciplinary research by equipping researchers with theory-based, methodologically sound skills for collaborating with non-scientific actors. | Format development for transdisciplinary research development: The TD-Lab has developed methods, tools and formats for enabling scientific and non-scientific actors to explore joint research topics, to define joint research questions and to co-design research projects (e.g. thematic workshops Urban Health, TransImproWorkshops, Trialogues a.o.).<br>Funding structures: The TD-Lab Funding Program offers researchers at different career stages at the BUA material resources of up to €10,000 to make their own research more participatory.<br>Training and Consulting: The TD-Lab offers researchers at the Berlin University Alliance and beyond training services on various topics related to participatory and transdisciplinary research (e.g. Breakfast Talks or tow-day training on how to write a proposal for a transdisciplinary research project). It also offers researchers support with transdisciplinary research design when applying for third-party funding projects. |
| **SUSTAINABILITY (+ NOVELTY)** | | | |
| WUT | WaterSense (ASIR)<br><br>https://watersense.pl/pl/asir/ | Integration of environmental sensing, machine learning, and alert systems in one operational pipeline. Field-deployable prototypes are tested under real-world hydrological conditions, enabling continuous data collection without the need for manual sampling. Collaboration with regulators and environmental agencies ensures compliance with the EU Water Framework Directive (WFD) monitoring requirements. | The River Digital Twin concept - combining IoT sensing, data analytics, and predictive modelling into an integrated monitoring approach. The framework can inspire similar environmental projects seeking to build real-time digital representations of ecosystems. Supports evidence-based environmental management, strengthens collaboration between research and public authorities, and contributes to sustainable water governance. |
| **SUSTAINABILITY (+ AGENCY)** | | | |
| TU DELFT | **Even groene vrienden** | The Learning communities are connected and there is a platform that enables them to be | Co-creation sessions with all the stakeholders as a working tool. There is a facilitator for each learning community |

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| | www.evengroenevrienden.nl | integrated. Even though there are separate funding streams, it provides a good business case (i.e. for companies it is useful to be close to the knowledge producers.) that ensures some funding even though it is external. Agency. Students are encouraged to formulate own learning goals. | that oversees the organization of these sessions ensuring safe-guarded and reciprocal sessions. |

**AWARENESS**

- The TD initiative raises awareness of the relevance and impact of transdisciplinary research and teaching, and extends internal and external communication via different formats, channels, events, and awards a.o.
- The TD initiative provides measurements for recognition and reward mechanisms to establish incentives for social engagement in research and teaching.
- The TD initiative extends the visibility of transdisciplinary activities, showcases their impacts and promotes tangible experiences.

***Table 01b*** *ENHANCE good practices and possible transferable tools fostering awareness*

| **AWARENESS** | | | |
|---|---|---|---|
| **UNIVERSITY** | **TD INITIATIVE** | **GOOD PRACTICE FOR INSTITUTIONAL IMPACT** | **POSSIBLE TRANSFERABLE TOOL** |
| CHALMERS | **Genie Action Toolbox**<br><br>https://genie-action-toolbox.chalmers.se/ | Online interactive tool based on open AI acts as a catalyser of multiple sources of information around a topic which is transversal per se<br>Genie Action Toolbox was initiated by the Gender Initiative for Excellence, Genie at Chalmers to find a way to share knowledge and know-how in the field and change management and academic culture. The main disciplines involved are Computer science, HCI, Interaction Design.<br>It works as an educational and knowledge cluster, with the intention to become cooperation model in the future. | The tool raises the importance of a transdisciplinary process design, using co-design methods, scenarios, interviews, testing. While the development has involved mainly internal stakeholders at Chalmers, except the international advisory board in Genie, the societal impact could be measured by addressing societal challenges and co-creation of prototypes/pilots by raising awareness in society for co-designing problem solutions. |
| NTNU | **HolE-LIB**<br><br>https://www.ntnu.edu/sustainability/holelib | HolE-LIB (Holistic Ecosystem for Sustainable Repurposing and/or Recycling of Lithium-ion Batteries) is an interdisciplinary research project at NTNU focused on creating sustainable solutions for the entire lifecycle of lithium-ion | Establish institutional award schemes to recognize and valorise socially engaged research.<br>Promote visibility and internal recognition of research projects with high societal relevance to cultivate a shared institutional culture of social |

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| | | batteries (LIBs), especially those used in electric vehicles.<br>Raises awareness of circular economy challenges and introduces novel interdisciplinary methods for sustainable resource use. | responsibility.<br>Create institutional funding mechanisms that consolidate existing partnership and foster bottom-up initiatives. |
| ETH ZURICH | **ETH Zurich TD INITIATIVE: Learning & teaching journal for lecturers**<br>https://www.elgaronline.com/edcollchap-oa/book/9781035309870/book-part-9781035309870-17.xml | Develop an iterative and reflexive process that includes the actions of individual reflections on integration from different knowledge backgrounds and research cultures, collective discussions, and continuous adaptations of the course that lecturers perform when collaborating in a teaching and learning environment. | 4 dimensions to support the learning process of lecturers:<br>Integration: What did we learn on integrative teaching?<br>Challenges experienced at the cognitive, social, and emotional levels?<br>Competences needed, lacking or still to be developed.<br>Meta-reflection to help (re)structure the course for the next edition? |
| POLIMI | **POLISOCIAL AWARD**<br><br>https://www.polimi.it/en/sustainable-development/polisocial-award | The POLISOCIAL Award is an annual institutional initiative by Politecnico di Milano that rewards the university's best research projects with a clear social purpose and measurable societal impact. It is designed to raise awareness and foster recognition of socially engaged research. | Establish institutional award schemes to recognize and valorise socially engaged research.<br>Promote visibility and internal recognition of research projects with high societal relevance to cultivate a shared institutional culture of social responsibility.<br>Create institutional funding mechanisms that consolidate existing partnership and foster bottom-up initiatives. |
| WUT | **PvSTATEM - Serology-Guided Malaria Control**<br><br>https://ww2.mini.pw.edu.pl/projekty/ | Close collaboration between laboratory scientists, field researchers, and modellers ensures that new diagnostic markers are both scientifically validated and operationally relevant. Data-driven analyses help identify populations at risk of Plasmodium vivax relapse and guide targeted control strategies. | The project's evidence-based workflow linking serological data with modelling and decision-making illustrates how quantitative tools can inform public-health policies. The<br>approach can be adapted to other infectious-disease contexts that require monitoring of hidden or recurrent infections. |
| **AWARENESS (+ SUSTAINABILITY)** | | | |
| UPV | **SIRVE**<br><br>https://www.upv.es/contenidos/upv_sirve/en/upv_sustainable/ | Strategic plan for 2023 to 2027 with five goals (sustainable, international, relevant, vital, excellent) to be achieved through 16 strategic objectives<br>The strategy seeks to achieve carbon neutrality by 2030, to | University agenda setting through formulation of universities mission, main goals and objectives on different levels |

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| | | promote TD collaborations as part of its vision, and has sustainability as one of its 5 goals*.<br>*SIRVE Plan: UPV_Sustainable, International, Relevant, Vital and Excellent | |
| GDANSK TECH | **BIOSOL Farm**<br><br>https://www.biosolfarm.eu/ | BIOSOLFarm (Interreg South Baltic) aims to empower small farmers and farm associations in the South Baltic region to integrate hybrid renewable energy systems (solar, wind, biomass), improving energy autonomy, resilience, and circular resource flows at the farm level.<br>It provides a decision-support toolbox that helps farms evaluate energy efficiency improvements, potential for production, storage, and hybridization, making technical innovation accessible<br>It establishes a thematic platform for green energy, ensuring knowledge sharing, community driven initiatives, and policy recommendations that are contextualized across multiple countries. | Farm Energy Decision-Support guides farmers through assessing energy efficiency, resource potentials (biomass, solar, wind), estimating benefits of integrating/combining renewables, and helping decide among options. Other regions/farms can adapt it to their resource profile and regulatory context<br>Thematic Green Energy Platform brings together farmers, associations, experts, and policymakers to share best practices, pilot results, policy advice, and coordinate cross-border learning. This model can be replicated to sustain impact beyond project duration.<br>Interactive thematic platform + replicable toolkit for farm-scale renewable deployment |
| **AWARENESS (+ AGENCY)** | | | |
| GDANSK TECH | **NICE - Innovative and enhanced nature-based solutions for sustainable urban water cycle**<br><br>https://nice-nbs.eu/ | The NICE project develops and tests nature-based solutions like green roofs, rain gardens, hybrid wetlands, enhanced with bioaugmentation and reactive media, through lab work and Urban Real Labs across multiple cities (including Gdańsk), to close urban water loops and make water management more circular and resilient.<br>It integrates scientific research, real-world pilots, stakeholder and citizen co-creation, modelling tools, and open-source software (NICER), which supports both ecological effectiveness and governance/acceptance.<br>It produces replicable and scalable decision-support tools and frameworks (e.g. for design, regulatory & investment obstacles, | NICER modelling software / decision-support, guides, allows municipalities or planners to simulate, compare and prioritize different nature-based water solutions under varying land cover, pollutant loads, climate or spatial constraints; helps make evidence-based choices.<br>Urban Real Labs + Co-creation Pilot implementation (in real urban settings), stakeholder & citizen engagement, and monitoring; this model fosters ownership, context-adaptation, and replicability.<br>NICER is a transferable decision-support tool. |

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| | | standards, guidelines) that can be transferred across cities and contexts. | |
| **AWARENESS (+ INCLUSIVENESS)** | | | |
| RWTH AACHEN | **REVIERa**<br><br>https://www.reviera.rwth-aachen.de/cms/~ogiyr/reviera/ | The REVIERa platform facilitates and fosters knowledge exchange and collaboration among stakeholders in the Rhenish Region by:<br>Working across faculties and disciplines through seven fields of innovation<br>Dedicates constructive and societal change to parallel the structural and socio-ecological transformation of the Rhenish mining area towards sustainability | Set-up of dialogue-oriented processes for regional structural change, providing a new culture of knowledge, innovation and communication, aiming to create collaborative structures for the model region for the medium and the long term<br>co-create and test methods and formats of exchange to shape and master the highly interconnected transformation activities |
| RWTH AACHEN | **Human Technology Centre**<br><br>https://www.humtec.rwth-aachen.de/cms/~pttk/humtec/ | HumTec is an inter- and transdisciplinary research platform that serves as a strategy for collaborative technological development. It develops competencies in problem-oriented, holistic thinking and respectful interdisciplinary collaboration. Their work includes interdisciplinary teaching, collaborative research and engagement in social responsibility. | Network and collaboration strategy<br>Integrated research methods and Leonardo as an interdisciplinary teaching platform are also part of this exemplary tool.<br>Leonardo project focuses on four principles for the design of teaching and learning formats: Interdisciplinarity, interaction, responsibility, and participation |
| RWTH AACHEN | **RWTH Walk & Talk**<br><br>https://www.pt.rwth-aachen.de/cms/pt/der-lehrstuhl/aktuelle-meldungen/~blarfo/call-for-registration-2025-enhance-eve/?lidx=1 | The RWTH Walk & Talk events from 2025 and 2023 are event-based formats combining classic presentations embodied and sensorial methods such as site-visit and conceptual mapping involving citizens, practitioners, students, and scholars. Not only is this a means for exposing both locals and visitors to emerging and ongoing projects, it encourages them to focus on area-specific challenges for which applied solutions could be created together. | (Bi)Annual event-based formats including activities promoting learning through embodied and sensorial experiences through movement and interaction that promote bi-directional learning. |

**NOVELTY (INNOVATION)**

- The TD initiative generates new knowledge for societal transformation, encompassing changes in practice, new research questions and methods, and outcomes that facilitate sustainable spatial transformations on different scales.
- The TD initiative works with boundary objects and specific formats, increasing the capacity for long-term knowledge integration among various stakeholders from science and society.
- The TD initiative operates through innovative experiments and experiential learning, testing and reflecting on synergies, problem solutions, and scenarios.
- The TD initiative co-creates innovative products, prototypes, pilots that are feeding in industry.

***Table 01c*** *ENHANCE good practices and possible transferable tools fostering novelty*

| **NOVELTY** | | | |
|---|---|---|---|
| **UNIVERSITY** | **TD INITIATIVE** | **GOOD PRACTICE FOR INSTITUTIONAL IMPACT** | **POSSIBLE TRANSFERABLE TOOL** |
| TU BERLIN | **Natural Building Lab**<br><br>https://www.nbl.berlin/ | Constructive Design & Climate-Adaptive Architecture. NBL is part of a transdisciplinary network undertaking projects that produce knowledge and built prototypes for a post-fossil society.<br>Set up of real-world laboratories in construction sector,<br>Research-based construction practice | Applying research in the building practice and including teaching formats, e.g. Living lab b-ware, a pilot project on circular timber |
| POLIMI | **POLIFACTORY**<br><br>https://www.polifactory.polimi.it/en/ | POLIFACTORY is a hybrid research and innovation lab at Politecnico di Milano that combines formal academic transdisciplinarity with informal grassroots networks. It originated from the integration of a multidisciplinary team of designers and engineers with bottom-up communities, creating a unique collaborative ecosystem. Through experimental methods, prototyping, and experiential learning, POLIFACTORY enables the development of product-service solutions that merge design and technology. It collaborates with enterprises, institutions, and user communities to co-develop prototypes, demonstrators, and pilot projects, fostering innovation at multiple scales and promoting long-term knowledge integration between academia and society. | Hybrid collaboration models that connect formal academic teams with informal grassroots actors, as well as public and private stakeholders. Transdisciplinary spaces that act as innovation incubators for talents and ideas.<br>Living lab approaches that integrate user communities and industry in co-creation processes and pilot testing, enabling the translation of academic knowledge into applied innovation that addresses societal challenges. |

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| CHALMERS | **TRACKS educational initiative**<br><br>https://student.portal.chalmers.se/en/chalmersstudies/tracks/Pages/Tracks.aspx | Tracks is a unique educational initiative between different programmes in the form of elective courses, where the choices are guided by personal interest. The framework of Tracks provides opportunities for individualised study and collaboration between students, industry, the community and academia. The initiative reduces the time required to offer new educational content, in collaboration with academia, industry and society. Tracks courses are held in close collaboration with representatives from industry, society and cutting edge of research.<br>Participants collaborate across program boundaries to learn by exploring societal and scientific challenges together. The initiative helps the university to be agile and adaptable to continue to be relevant. | Set up of interdisciplinary competences under the framework of elective courses and through cooperation with industry and communities<br>Tracks courses are elective and don't belong to any specific programme or department. They give students the opportunity to develop their interdisciplinary competence.<br>The Tracks courses have been a platform for bridging disciplines that otherwise would have been disconnected and can serve as an example for how to introduce TD in all education. |
| ETH ZURICH | **ETH Zurich TD INITIATIVE: To disentangle understandings of ITD**<br><br>https://journals.sagepub.com/doi/10.1177/01622439231216789 | Societal actors have divergent conceptions, definitions, and practices of ID and TD.<br>Enable fruitful dialogues to implement successful projects and programs.<br>Can be applied to different cultural settings and used by different societal actors as administrators, teachers, policymakers and researchers. | The tool is open access |
| **NOVELTY (+SUSTAINABILITY)** | | | |
| NTNU | **Autoferry Project**<br><br>https://www.ntnu.edu/autoferry | The NTNU Autoferry Project is a research initiative by the Norwegian University of Science and Technology (NTNU) focused on developing autonomous ferrysystems. Its goal is to create ferries that can operate without human intervention, improving:<br>Efficiency in short-distance maritime transport<br>Safety through automation and real-time decision-making<br>Sustainability by optimizing energy use and reducing | Public-Private Collaboration Models<br>Partnership frameworks between academia, industry, and municipalities.<br>Regulatory & Ethical Integration<br>Early-stage consideration of legal, ethical, and societal impacts.<br>Communication model with wide dissemination and real-world deployment. |

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| | | emissions<br>Promotes zero-emission urban mobility and pioneers' new maritime technologies with strong public engagement. | |
| **NOVELTY (+INCLUSIVENESS)** | | | |
| TU DELFT | **City Deal Kennis Maken Delft**<br><br>https://www.tudelft.nl/wijstad<br><br>www.tudelft.nl/wijstad for a collection of stories**.** | Students are required to have a boundary object by the end and something tangible and accessible to give back to the community (e.g. photo voice, photo exhibition).<br>(All challenges come from conversations with society (community members), using knowledge brokers, going to community events to tap in an existing networks to identify what the initiative can bring to them with humility. Challenges are then adapted to be education fit.) | Thematic triangles (ie. Talks between a non-academic expert, academic expert, and knowledge broker to figure out what scope is appropriate for TD in their particular course or modules)<br>Role creation: Knowledge brokers to bring in challenges from the city and also liaise between knowledge institutions<br>10 steps/considerations for including authentic challenges in courses (booklet)<br>Hackathon formats |

**INCLUSIVENESS(PARTICIPATION)**

- The TD initiative represents broad participation and diversity in stakeholder groups and academic groups.
- The TD initiative generates a sense of belonging and inclusiveness among all participating actor groups.
- The TD initiative enables, fosters and stabilizes long-term cooperation between scientific and societal actors.
- The TD initiative provides spaces, formats and time to integrate underrepresented and disadvantaged perspectives.

***Table 01d*** *ENHANCE good practices and possible transferable tools fostering Inclusiveness*

| **INCLUSIVENESS** | | | |
|---|---|---|---|
| **UNIVERSITY** | **TD INITIATIVE** | **GOOD PRACTICE FOR INSTITUTIONAL IMPACT** | **POSSIBLE TRANSFERABLE TOOL** |
| TU DELFT | **Where We Stand**<br>https://www.tudelft.nl/en/2025/bk/open-book-where-we-stand-exploring-inequalities-in-climate-change- | Offers the opportunity to engage with residents from Rotterdam facing housing vulnerability in disadvantaged neighbourhoods. | The collective introspection exercise is a reflective method in participatory action research. |

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| | adaptation-policies | | |
| TU DELFT | **Citizen Voice Initiative**<br><br>https://citizenvoice.tudelft.nl/ | Empowers communities by promoting inclusive and meaningful participation in urban planning and design.<br>Democratises urban decision-making. | Citizen mapping tool,<br>CIVILIAN digital dashboard to visualise citizens' concerns,<br>participatory platforms. |
| UPV | **DONES DE CIENCIA**<br><br>https://donesdeciencia.webs.upv.es/es/ | Naves of the City Council of Valencia, in collaboration of the Spanish Foundation for Science and Technology of the Ministry of Science and Innovation.<br>Most of the murals are in educational centres. Dones de ciència offers a unique route in our country, which gives visibility to pioneering women who broke barriers and have been/are references, strong commitment to gender equality<br>Highlights leading women in their fields and raises awareness of the impact of gender inequality on scientific vocations and women's career progression. | Set up of science communication/dissemination model in cooperation with city. |
| ETH ZURICH | **ETH Zurich TD INITIATIVE: Joint problem framing**<br><br>https://zenodo.org/records/11236722 | This method allows researchers, lecturers and/or practitioners to align their interests or questions before beginning a project or a programme.<br>Reaching mutual understanding of the codesign process is a necessary first step to understand what the project aims to coproduce, with which stakeholders, and when in the project timeline. | 3 phases:<br>Develop mutual understanding of the problem and project boundaries.<br>Coproduce solution-oriented knowledge that addresses the problem framing defined in phase 1.<br>Integrate and apply the coproduced knowledge into scientific practices.<br>The method and its phases are published in this report. |
| GDANSK TECH | **AICOSERV - AI Technologies for Sustainable Public Service Co-Creation**<br><br>https://zie.pg.edu.pl/en/news/2024-11/ai-technologies- | AICOSERV is a transnational interdisciplinary Master's programme under Erasmus+ designed to equip students with skills in AI, ethics, evidence-based policymaking, and citizen co-creation for more responsive, sustainable public services. It fills a gap in graduate education by integrating AI, ethics, co-creation, and sustainability in public service, | Human-Centered Co-Creation Lab Model for workshops/labs where citizens, public officials, and AI experts collaborate through the full lifecycle, ensuring the AI services are aligned with citizen values, ethical norms, and local context.<br>Joint, Ethics-Integrated AI Curriculum which is a Master programme that includes AI technical modules with ethics, trustworthiness, evidence-based policy, sustainability, multilingual delivery, joint |

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| | sustainable-public-service-co-creation-new-project-faculty-management-and-economics | rather than treating them separately. It uses citizen engagement labs/workshops and co-creation across multiple countries, which helps ensure the public service innovations are grounded in real societal needs and diverse contexts. | admission and QA across partner institutions. |
| **INCLUSIVENESS (+AGENCY)** | | | |
| TU BERLIN | **COLLOC Workshop series**<br><br>https://collocworkshop.com/<br><br>https://www.tu.berlin/science-and-society/projekte-und-forschung/colloc | Real world experiments in urban self-organised occupations in Brazil, collaborative hands-on research activities with underrepresented actors of local communities in transdisciplinary international cooperation<br>Trainings programme for transdisciplinary research and teaching addressed to international alumni | Development of a transdisciplinary Dual Design strategy (interventions + systemic scenarios in real world experiments with vulnerable communities<br>Collaboratively defining the problem for societal transformation<br>Co-production of systemic scenarios and 1:1 intervention through collaborative planning, designing and building of problem solutions<br>Collaboratively reflecting the societal and scientific impact and transferability |
| **INCLUSIVENESS (+ AWARENESS)** | | | |
| WUT | **CoMobility: Co-designing Inclusive Mobility**<br><br>https://comobility.edu.pl/en/about-the-project/ | Structured co-creation among pupils, parents, students, teachers, and neighbourhood stakeholders. The project combines participatory mapping, mobility surveys, and urban interventions to identify barriers to active travel and promote evidence-based discussions with local authorities. | The project's school-area co-creation model — integrating observation, community feedback, and small-scale interventions — demonstrates how participatory research can inform city mobility planning. It offers a replicable process rather than a formal toolkit. CoMobility raises awareness of sustainable travel choices among children and families, and fosters dialogue between schools, communities, and city authorities. It supports more inclusive and evidence-based approaches to local mobility planning. |

**AGENCY**

- The TD initiative offers possibilities of integrated learnings for students, teaching staff, societal stakeholders and other actors and thus creates a sense of common ownership on processes, methods and outcomes.
- The TD initiative provides and fosters students flexible pathways for career development.
- The TD initiative offers possibilities to work interdisciplinary and to build linkages between disciplines.
- The TD initiative opens and creates spaces for building interactive relations between TD projects, initiatives, approaches.

***Table 01e*** *ENHANCE good practices and possible transferable tools fostering agency*

| **AGENCY** | | | |
|---|---|---|---|
| **UNIVERSITY** | **TD INITIATIVE** | **GOOD PRACTICE FOR INSTITUTIONAL IMPACT** | **POSSIBLE TRANSFERABLE TOOL** |
| UPV | **UPV Minor Program, TD educational pathways**<br>https://www.upv.es/entidades/vpec/en/2024/07/03/minor-in-sustainability-and-circular-economy/ | UPV_Minor programs: structured curriculum packages of 15-30 ECTS that combine subjects across disciplinary boundaries. This structure promotes flexibility and can be adopted by other institutions. | Service-learning methodology: Community identified needs. |
| **AGENCY (+INCLUSIVENESS)** | | | |
| CHALMERS | **Hammerskullen Lab (CHALMERS facilities)**<br>https://link.springer.com/chapter/10.1007/978-3-030-80415-2_15<br>https://research.chalmers.se/en/publication/511204 | Chalmers has physical premises in suburban Gothenburg which have been used as an educational (for Master's courses) and research hub through the years. In total, around 100 stakeholders have been engaged during several years. This shows that continuity and trust are fundamental to achieve objectives like participation that are essential in TD, beyond a single project. | Local Community Long-Term Anchoring/Trust. The neighbourhood has a strong network within the community and the university has managed with long-term activity to create trust and a way of working with them. The students work with experiential learning and practice-based approach. Both research and teaching have been based on a trust development that has required several years. The involvement of civil society and strong network of citizens has been a characteristic of the so-called Hammarkullen model.<br>Co-creation methodology, processes with local stakeholders and communities, learning in/with local contexts, by being exposed to local challenges and working with real cases/demands/needs. |
| NTNU | **Experts in teamwork**<br>https://www.ntnu.edu/eit | Experts in Teamwork (EiT) is a signature, mandatory course at NTNU for master's students, designed to develop inter-disciplinary collaboration and teamwork skills through experiential learning. Empowers students to engage in real-world challenges, fostering inclusiveness and agency through experiential learning. Interdisciplinary teamwork in "villages", action teaching and public dissemination. | Interdisciplinary "Village" Model<br>Structured groupings of students from different disciplines working on real-world challenges.<br>Can be replicated in project-based courses or innovation labs to simulate cross-sector collaboration.<br>Experience-Based Learning Framework<br>Learning through doing, reflection, and feedback rather than traditional lectures. |

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| ETH ZURICH | **ETH Zurich TD INITIATIVE: Institutionalization of ITD**<br>https://i2insights.org/2023/07/18/transforming-academia-framework/ | Rethink or imagine how ITD initiatives are (or will be) embedded in institutions and with which purposes.<br>Can be applied to different cultural settings and used by different societal actors as administrators, teachers and researchers. | Consider 4 practical dimensions:<br>Epistemic: cognitive aspects of ITD<br>Cultural: meanings, discourses, communities and practices<br>Organisational: the structural context in which institutionalizing processes take place<br>Strategic: insights and successful aspects that can be implemented to promote inter- and transdisciplinarity in future scenarios. |
| GDANSK TECH | **Europe 4.0 Digital Citizens**<br>https://europe40digitalcitizens.eu/ | The Europe 4.0 Digital Citizens project seeks to upskill adult learners across Europe by developing a curriculum, e-learning course (in 7 languages), and micro-credential system focused on advanced digital skills (AI, IoT, cybersecurity, etc.), to improve employability and bridge the digital divide.<br>It provides transferable, inclusive, multilingual access to advanced digital education for adults who may have low existing digital skills.<br>It uses micro-credentials & personalized learning paths so learners' progress is verifiable and tailored, which enhances motivation and real-world applicability. | Micro-credentialed digital education toolset for adult learners<br>Digital Curriculum Framework which can be adapted by other institutions to design courses that match the evolving "digital age" skills demand.<br>Micro-credential Certification System giving formal recognition of acquired skills; this tool helps learners prove skills to employers and supports stacking toward larger qualifications. |
| **AGENCY (+ NOVELTY)** | | | |
| WUT | **XLUNGS - Explainable AI for Chest CT**<br>https://ww2.mini.pw.edu.pl/projekty/ | The project applies an explainable artificial intelligence-XAI approach in which clinicians are directly involved in model development and validation. By using visual explanation maps and transparent diagnostic pathways, radiologists can review and interpret model outcomes. This interaction between AI and clinicians enhances trust, interpretability, and clinical relevance. | The clinician-in-the-loop workflow - a structured collaboration model between AI developers and medical professionals. It includes iterative data validation, model evaluation, and interpretability testing steps that can be adapted to other medical AI contexts. |
| **AGENCY (+ INCLUSIVENESS/SUSTAINABILITY/NOVELTY)** | | | |
| RWTH AACHEN | **tu!LAB for the Build and Lived Environment** | tu!LAB is a collaborative and pedagogical living lab experiment that brings students, practitioners, and researchers together through studio-or lab-based creation of | This multidisciplinary and transdisciplinary education experiment is being integrated as a permanent format that integrates |

| | | | |
|---|---|---|---|
| | https://www.pt.rwth-aachen.de/cms/pt/der-lehrstuhl/aktuelle-meldungen/~bmomgd/tu-lab-fuer-die-gebaute-und-gelebte-mitw/?lidx=1 | interventions and impacts in the real-world environment. | sustainability as a part of its interest areas. |

### 5.b. Specification of institutional impact by a quantitative assessment

Additionally and jointly reflected, the Transversal Group identified the following relevant insights for specifying the institutional impact from key stakeholders in the process of building the toolbox:

**Stakeholders and cross-departmental teams:** Successful initiatives consistently involve multiple departments and diverse actors, ensuring broad institutional buy-in.

**Funding models:** Dedicated and flexible funding mechanisms are critical for sustaining interdisciplinary and transdisciplinary efforts over time.

**Recognition mechanisms:** Formal acknowledgment of participants' contributions fosters engagement and promotes long-term commitment.

**Replication potential:** Common enablers identified across case synopses indicate that these practices are adaptable and scalable across different institutional contexts.

A parallel and complimentary quantitative assessment methodology approach to assessment of the initiatives was also conducted by Gdansk Tech as part of the integrative methodology approach to assessment of stakeholders.

Distribution of ENHANCE good-practice initiatives across institutional areas and transdisciplinary criteria. The heatmap visualises how the 33 validated cases cluster by their dominant criterion (Sustainability, Awareness, Novelty, Inclusiveness, Agency) and institutional focus (Strategy, Research, Education). Darker cells indicate higher concentrations of initiatives. The figure illustrates that most transdisciplinary activity within the Alliance is research-driven, while strategic embedding and educational integration remain comparatively limited (see Figure 04).

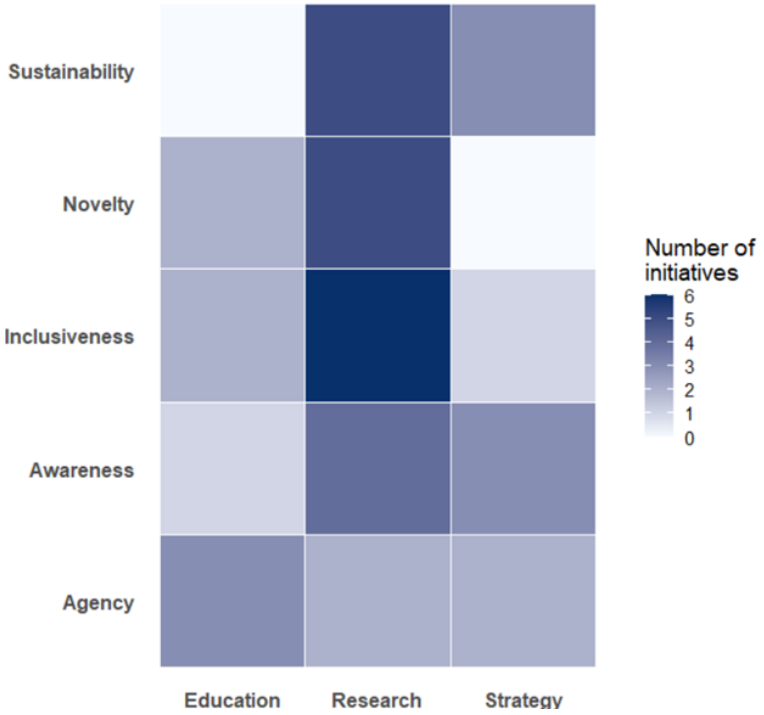


***Figure 04*** *visualises how the validated good-practice cases distribute across institutional areas and transdisciplinary criteria, revealing dominant zones of activity within the Alliance.*

The concentration of darker cells within the research axis indicates that most TD activity remains research centred. Strategic and educational integration appear comparatively nascent, pointing to uneven institutional embedding. This pattern suggests that TD is still treated mainly as an experimental or project-level mode rather than a systemic institutional function. The relative scarcity of strategy- and education-anchored good practices points to the need for structural mechanisms linking research outcomes to curricula and policy.

To quantify this distributional imbalance, entropy analysis was applied to measure the diversity of each criterion across institutional areas. Entropy analysis shows diversity across institutional areas as shown in Figure 05.

***Table 02*** Entropy analysis shows diversity across institutional areas

| Criterion | H | Normalized |
|---|---|---|
| Agency | 1.08 | 0.982 |
| Awareness | 0.974 | 0.887 |
| Inclusiveness | 0.849 | 0.773 |
| Novelty | 0.593 | 0.545 |
| Sustainability | 0.662 | 0.602 |

Entropy of transdisciplinary criteria across institutional areas (Education, Research, Strategy), shows the Shannon entropy (*H*) for each criterion, calculated from the proportional distribution of good-practice initiatives across the three institutional areas using the formula. $H = -\sum_i p_i \ln(p_i)$ is the share of initiatives in area *i*. Higher *H* values indicate greater diversity of institutional practices, while lower values reflect concentration in a single area. Because the theoretical maximum for three categories is ln(3) ≈ 1.10, the Normalised column expresses each value as *H*/ln(3), yielding a 0–1 scale that allows direct comparison across criteria. Values close to 1 indicate a balanced presence across education, research, and strategy, whereas values near 0 indicate a strong focus in one domain.

Agency and Awareness display near-maximal entropy (≈ 1), indicating broad integration across domains. Inclusiveness shows moderate balance, while Novelty and Sustainability remain localised—mostly within research. This shows that visibility and empowerment mechanisms (Awareness and Agency) are spreading across institutional domains. In contrast, initiatives linked to Novelty and Sustainability remain more localised, often relying on project-level "champions" rather than systemic structures.

While the previous analysis measured distributional balance, the heatmaps (Figure 06) reveal which enabling factors support the good practices.

Heatmaps of good practice enablers (Stakeholders, Cross-departmental Teams, Funding Models, Recognition) across institutional areas and criteria. Each heatmap visualises the frequency of enabler presence within mapped area × criterion cells, using colour intensity to indicate the number of good-practice cases in which a given enabler appears. Data were derived from the validated good-practice table in the ENHANCE WP6 mapping dataset. Presence values (1 = present, 0 = absent) were aggregated by area. Darker shades represent higher occurrence of the respective enabler, highlighting where particular institutional mechanisms most strongly support transdisciplinarity.

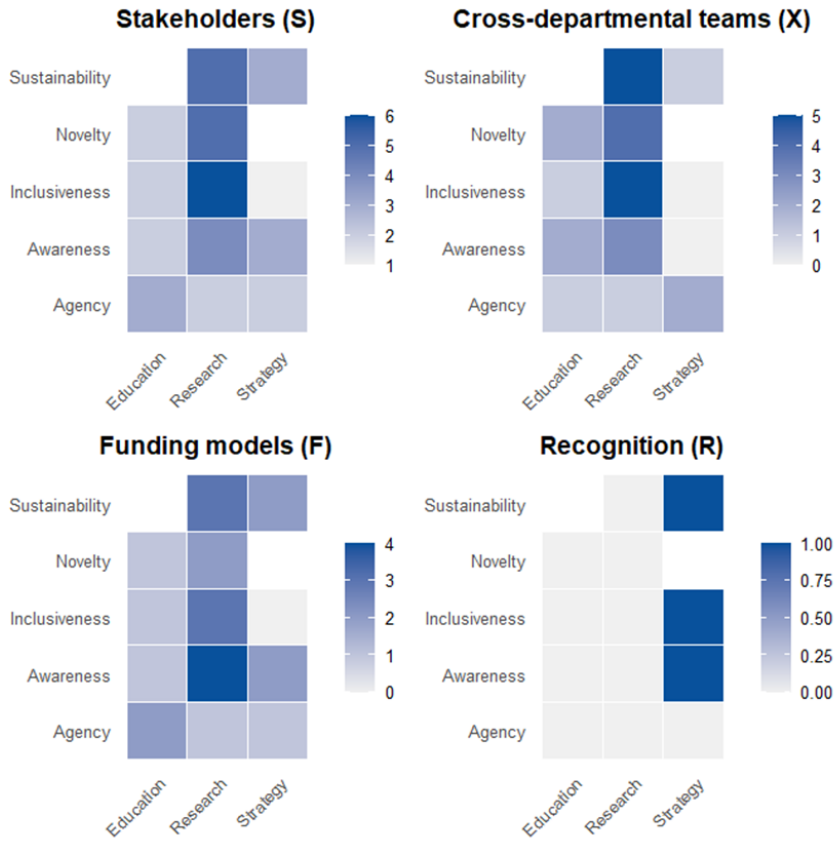


***Figure 06*** *Heatmaps of good practice enablers*

Stakeholders (S) and Cross-departmental Teams (X) show the highest frequencies across the criteria, highlighting collaboration as the driver of TD for good practices. Funding Models (F) appear unevenly embedded, strongest in research; Recognition (R) is sporadic, reflecting institutional inertia in reward systems. This asymmetry explains why high-entropy criteria such as Agency and Awareness depend heavily on interpersonal rather than structural enablers. These results inform the subsequent identification of operational tools that translate high-entropy criteria- particularly Agency and Awareness into long-term organisational learning mechanisms.

## 5.c. Institutional practice-based tools for organisational learning

The institutional-practice-based tools represented here more in detail are operational instruments that have the capacity to activate organisational learning at the ENHANCE universities and create a concrete institutional output. In general, these operational instruments could be read as learning tools to implement in different institutional settings of the ENHANCE universities. On different university levels they provide frameworks for

embedding transdisciplinarity as a research and education mode in a long-term perspective in terms of addressing complex societal challenges, building coalitions between science and society with identified partners and to foster knowledge-integration for ENHANCE key-topics in a more regular system. Based on the classification of ENHANCE good practice examples decoding the long-term institutional impact (see Chapter 5a), this section represents a table with the highlighted tools from each university which could be adjusted to their local environments by discussing **the potential to address constraints and contribute to the strategic approach on transdisciplinarity**. This compilation highlights the tools with advice for more detailed information about possible implementation.

***Table 03*** *Highlighted institutional-practice based tools for organisational learning*

| CHALMERS – Selected tool from research practice | |
|---|---|
| Hammarkullen Lab model/Co-creation Framework | This **Lab model** that continuity and trust are strategically fundamental to achieve objectives like participation that are essential in TD, beyond a single project. The relationship of the Lab with real needs-bearers or real projects happening in real areas supports the strategic need for funding. Moreover, the anchoring of the Lab into the teaching activities also helps to tackle the funding question. The location in an area which has become famous for a citizen-driven model of sustaining neighbourhood's needs (Hammarkullen model) has proven to be strategic. In fact, Chalmers has physical premises in suburban Gothenburg which have been used as an educational (for Master's courses) and research hub through the years. In total, around 100 stakeholders have been engaged during several years. The network and the reputation, together with a stable coordination, have contributed to the success of the Hammarkullen Lab. A co-creation framework within the Community Architecture and Urban Design Master's course has been also continuously used by students, with some iterations to improve it, but ensuring consistency over the years. |
| ETH ZURICH – Selected tool from research practice | |
| Institutionalisation of TD https://i2insights.org/2023/07/18/transforming-academia-framework/ | This **framework** offers 4 key practical considerations that directly contribute to a strategic approach to the institutionalisation of TD:<br>**Epistemic:** institutional and individual understandings and practical experiences of TD processes are crucial. This dimension highlights the need to consider the cognitive, conceptual, and theoretical dimensions and dynamics of TD to address the lack of prior experience in TD.<br>**Cultural:** TD approaches must be adapted to local and contextual conditions, spaces and timeframes. Paying attention to existing institutional systems of meanings and discourses can show how they structure practices and provide opportunities to implement changes to overcome the embedded culture of disciplinarity and rigid, traditional cultures. These cultures constitute important social and structural barriers to TD that must be addressed to surmount the lack of recognition and incentives.<br>**Organisational:** it is necessary to identify the wider institutional context such as strategies, governance, policies, fundings, and other types of institutional arrangements, which are themselves constrained or enabled by national and international policies, funding agencies and governments. These factors influence funding challenges, lack of prior experience in TD and the embedded culture of disciplinarity and rigid, traditional cultures.<br>**Strategic**: this dimension refers to the utilisation of existing insights, models, approaches and factors relevant to the implementation of change in higher education. These factors may relate to the direction and level of desired change, identification of previous successful change strategies and practices, the potential role |

| | |
|---|---|
| | of students, early career researchers and stakeholders. This dimension takes into account the epistemic, cultural and organizational dimensions in order to contextualise approaches to change. Considering such a strategic approach to change has the potential to help address issues of funding challenges, lack of recognition and incentives, lack of prior experience in TD and the embedded culture of disciplinarity and rigid, traditional cultures. |
| GDANSK TECH – Selected tool from education practice | |
| Digital Citizens – Europe 4.0 Platform for Civic Competences | The Europe 4.0 initiative shows how TD education can move from isolated projects into **regular university practice**. Its modular, micro-credential system directly tackles the lack of recognition and incentives by giving students and staff visible credit for TD engagement. The course design, which brings together lecturers from multiple Faculties, helps overcome the embedded culture of disciplinarity and builds a common language across fields. Because the learning environment is digital and reusable, it also reduces the resource burden of building and maintaining stakeholder relationships and can be shared among ENHANCE partners. By offering ready-made modules and clear guidance, it addresses the lack of prior TD experience. |
| NTNU – Selected tool from education practice | |
| Experts in Teamwork Masters Course | The Experts in Teamwork demonstrates the development of a **strategic and institutionalised approach to transdisciplinary education** at university level. The Experts in Teamwork (EiT) course is a mandatory inter-faculty course on interdisciplinary cooperation for master students. These courses provide co-creation practices for all parties; students, teachers, and external partners. The NTNU EIT course is an institute-wide, funded, structured and supported pedagogical TD activity which connects society and students and introduces students to transdisciplinary practices through collaborative 'learning-by –doing' project-based work. This addresses the challenge and barrier of lack of recognition or incentives at individual, departmental or institutional level by having a cross cutting transdisciplinary course as the basis of every master's programme at the University. By introducing students in the first year of all Masters courses the mandatory course builds experience in transdisciplinarity at a practice level for students at the start of their higher education journey and brings this institutionalised learning experience to a wider audience of families and peers. By doing so the immediate siloing of student interests and study focus is challenged by TD activities disrupting embedded cultures of disciplinarity and rigid, traditional subject and faculty approaches, epistemologically and methodologically. Based around the concept of the 'village' the students are introduced to transdisciplinary concepts by collaborative innovation challenges and co-creative actions rather than just theoretical didactics. The course is fully funded by the university which facilities time and resources to build quality relationships with societal stakeholders. This includes cross cutting university initiatives such as University City Trondheim 3.0 and Smart Sustainable Cities Knowledge Cluster. These are long term strategic navigation tools and knowledge cluster initiatives, which aim to embed transdisciplinary practices as fundamental to better educational, societal and environmental outcomes. The course is a signature aspect of education at NTNU making introducing transdisciplinary education less vulnerable to the constraints and limitations of small-scale, one-off projects or specialist staff changes. The course is mandatory which builds staff knowledge capacity and competence and a culture of understanding around the value and impact of transdisciplinary teaching and knowledge creation. |

| POLIMI – Selected tool from strategies (Hubs) | |
|---|---|
| Establish physical spaces (e.g., community hubs or urban labs) designed for hands-on experimentation and innovation, which promote co-design efforts, participatory research, and enduring alliances between academia and local communities. | (Based on Polimi POLISOCIAL Programme, which promotes the OFF CAMPUS network of urban hubs).<br>This tool provides a strategic response to several constraints while contributing to the purpose of institutionalizing Transdisciplinarity (TD). Firstly, by establishing such **dedicated spaces, specifically aimed at co-design and participatory research,** these hubs represent a valuable strategy for universities to apply to reality their commitment to connecting their mission with societal needs and local contexts. This provides a stable ground for building trust, shifting ad-hoc projects to sustained partnership. In addition, these hubs have the potential to become living labs for practical experimentation, creating new interdisciplinary methodologies and a common language that challenges traditional academic boundaries. In the end, physical spaces grounded in comprehensive institutional programs, like POLISOCIAL, create visibility for socially relevant TD work. They contribute to the institutionalization of the importance of community engagement, making it a visible part of the university's mission and supporting strategic goals on sustainability and social responsibility. |
| RWTH – Selected tool from strategies, research and education practice | |
| Establish a regular (i.e. biennial) RWTH Walk & Talk method workshops followed by report back and reflection sessions. | Regular integration of the **Walk & Talk method in combination with other events and reflection techniques** are effective ways to inject interaction and shared experiential exchange that may benefit both education and research. While the method is a great way to introduce or integrate transdisciplinary collaboration and relationship building into education and research practice, it does require resources and supportive relationships to set the method up. The advantages it offers is direct access to the concerns and experiences of civic or non-academic partners. But authentically hearing and understanding these voices also requires less academic and more accessible communication and flexibility in work hours in addition to a commitment to community priorities and not just institutional agendas. When set-up effectively, this tool can facilitate coordination and strategic navigation of stakeholder and participant selection. In the case where there are many non-academic partners, proponents may also run into challenges with the need to limit the number of collaborations. A different constraint, if proponents of this method has limited flexibility and personnel resources, building relationships and trust may be demanding or non-academic partners may become to fatigued from over engagement and become resistant to collaboration. This tool, however, can be tailored through two approaches or in combination with other activities of which one is less demanding and the other is more enriching. A novice and less time-intensive approach to the Walk & Talk method as a tool could be to feature non-academic partners and their projects as presentations or via site-visits. Building upon this, more developed approached could integrate non-academic partner as well as their concerns into interactive activities. The justifications or demonstrations for how this may eventually be of mutual benefit must be made clear and effectively delivered. |

| TU BERLIN – Selected tool from strategies | |
|---|---|
| TD-Lab (BUA) 'Upgrade your science' | With the programmatic perspective 'Upgrade your Science,' the TD-Lab aims to systematically promote transdisciplinarity as a complementary research mode to disciplinary, multi- and interdisciplinary research approaches within the alliance. The TD-Lab offers formats in which researchers can work together with non-scientific actors on complex societal challenges. At the same time, the TD-Lab professionalises transdisciplinary research by providing researchers with theory-based and methodologically sound skills for collaborating with non-scientific actors. The services are suitable for all status groups (students, doctoral candidates, postdocs, professors). The offers are graded according to the level of experience in participatory and transdisciplinary research.<br>**Format development** for transdisciplinary research development: The TD-Lab has developed methods, tools and formats for enabling scientific and non-scientific actors to explore joint research topics, to define joint research questions and to co-design research projects (e.g. thematic workshops Urban Health, TransImproWorkshops, Trialogues a.o.).<br>**Funding structures**: The TD-Lab Funding Program offers researchers at different career stages at the BUA material resources of up to €10,000 to make their own research more participatory.<br>**Training and Consulting**: The TD-Lab offers researchers at the Berlin University Alliance and beyond training services on various topics related to participatory and transdisciplinary research (e.g. Breakfast Talks or tow-day training on how to write a proposal for a transdisciplinary research project). It also offers researchers support with transdisciplinary research design when applying for third-party funding projects.<br>**Network building**: Inter-institutional exchange and awareness of transdisciplinary research will be strengthened through the topic-focused development of networks (e.g. on water research or urban health) as well as through public panel discussions (e.g. on excellence in science). |
| TU DELFT– Selected tool from education practice | |
| Booklet: Putting the Puzzle Pieces Together From Course to Challenge From City Deal Kennis Maken project | This booklet helps realise the collaboration between local community stakeholders and students. It provides 10 crucial pieces from the process of introducing a local challenge into a course. It is aimed at educators who want to engage with local stakeholders and move from a 'traditional' course to a challenge-based course. By breaking down each step of the collaboration process, the booklet makes transdisciplinary engagement more accessible to those without prior experience. It provides useful considerations and concrete guidance on aspects such as creating durable relationships with external partners, managing expectations and redefining your role as educator. It supports educators and students in building confidence and familiarity with transdisciplinary approaches. Thus, the booklet directly helps address the constraint of a l**ack of prior experience in transdisciplinarity** by functioning as both a practical guide and a learning resource for developing these skills. |

| UPV – Selected tool from education practice | |
|---|---|
| Set up of test-bed/sandboxes for campus development: creating an experimentation environment for open innovation through iterative processes that are oriented to create sustainable impact (UPV Living Lab) | This initiative serves as a strategic mechanism to overcome several institutional and cultural barriers. As a **shared and permanent infrastructure**, it offers a structured environment for sustained collaboration with societal stakeholders, addressing the current lack of resources and coordination in engagement activities. By centralising stakeholder interaction and fostering iterative co-creation processes, the Lab enhances strategic alignment and reduces fragmentation across initiatives. It's integrative model (linking research, education, and innovation) contributes to capacity building in transdisciplinary methods and provides tangible outputs that can be recognised within institutional evaluation and incentive systems. Moreover, by creating a visible, active community around experimentation and co-creation, the Lab normalizes transdisciplinary practice and makes it part of the UPV's identity, gradually shifting to a more collaborative, mission-oriented, and impact-driven institutional culture. |
| WUT – Selected tool from research practice | |
| Local Mobility Co-creation Practice: CoMobility | This research practice demonstrates how universities can embed **transdisciplinary collaboration in existing community settings**, such as schools and neighbourhoods. By leveraging these everyday institutions instead of creating new formal partnerships, it helps overcome the lack of resources to build quality relationships with societal stakeholders. The model provides a reproducible framework for low-cost, trust-based collaboration supporting universities in developing long-term, community-anchored transdisciplinary engagement. It also contributes to addressing coordination challenges in stakeholder selection by offering a structured yet flexible framework for participatory research. |

These selected institutional practice-based tools for organisational learning (see Table 03) are mostly from educational and research practice, with some developed from institutional strategy building (hubs, agenda setting and Walk & Talk). They have a specific institutional impact:

- for fostering a culture of collaboration, and collective responsibility between different scientific and societal partners through e.g. a collaboration model in community settings, and as a practical guide for building collaborations.
- for actionable guidance and facing the challenges of recognition through practical considerations for institutionalising, a shared infrastructure and a digital platform providing TD education for a regular university practice
- for efficient replication, co-creation of new integrated knowledge and upscaling a model character of labs, and the establishing of physical hubs in the city to become living labs for practical experimentation
- for testing in the WP6 Transdisciplinary Labs: an agenda setting through consultancy for transdisciplinary research and the Walk & Talk format developed in ENHANCE for mapping, communication and transfer.

As next steps, the four WP6 topic-related Transdisciplinary Labs can serve as testing ground for either trying out the implementation of these tools or developing new tools to support the transdisciplinary knowledge-creating teams with a long-term perspective and within this university alliance. The Walk & Talk format has been tested and extended in the Smart City Living Lab and the approach of 'Upgrading your science' from TD-Lab will be integrated for the development of a young researcher group in the Lab on Human-oriented Artificial Intelligence. This will be elaborated in the deliverable D6.2 and D6.3.

## 5.d. Impacts for strategy building

The ENHANCE Alliance advances the institutionalisation of transdisciplinarity not through isolated local initiatives, but by fostering collective, strategic processes that create shared understanding and coordinated action across member universities. By developing common frameworks, governance models, and evaluation tools—such as the shared broad definition on transdisciplinarity, the co-production of joint formats (e.g. Walk & Talk), joint concepts (e.g. ENHANCE good practices), joint services (e.g. Transformation Toolbox on institutionalising TD) and standardised assessment schemes—ENHANCE enables universities to align their strategies, prioritise initiatives, and embed interdisciplinary and transdisciplinary practices into institutional structures. Central to this process is the mutual learning environment, which empowers WP6 members to collaboratively identify challenges, share good practices and visions, and co-design methodologic solutions. Activities such as conceptual workshops, Walk & Talks, and mapping exercises facilitate dialogue, generate common language, and build joint decision-making capacity. By engaging stakeholders across disciplines and institutions, these exercises transform knowledge from isolated expertise into shared institutional insight, allowing universities and the alliance to collectively advance a common understanding of transdisciplinarity and make strategic, evidence-based decisions that strengthen it at multiple levels. The first outcomes of this process could be reported at the end of the funding period.

Out of this process, institutional impacts from the toolbox are oriented to the categories of Sustainability, Awareness, Novelty, Inclusiveness and Agency (see Chapter 5a) and summarised and detailed below. It is important to highlight the innovative aspect of this toolbox, which entails the challenge of synthesising practices and strategies from all member universities:

**Stakeholders and cross-departmental teams Impact:** The toolbox provides a shared reference for stakeholders—including faculty, department heads, and administrators—highlighting initiatives that successfully integrate multiple departments and diverse actors. By showcasing effective collaboration models, the toolbox helps teams identify potential partners, align goals across units, and secure institutional buy-in, fostering a culture of cooperation and collective responsibility for interdisciplinary and transdisciplinary initiatives.

**Funding models Impact:** For university leadership and research administrators, the toolbox clarifies which funding mechanisms have proven effective in sustaining interdisciplinary efforts. By documenting examples of dedicated and flexible funding structures, the toolbox supports informed decision-making, allowing funders to allocate resources strategically, mitigate financial risks, and ensure long-term viability of collaborative projects.

**Recognition mechanisms Impact:** For faculty, researchers, and students, the toolbox demonstrates how formal recognition—through awards, career incentives, or institutional acknowledgment—can increase motivation, engagement, and retention in interdisciplinary or transdisciplinary initiatives. By highlighting validated practices, the toolbox encourages institutions to implement recognition systems that reinforce contributions, enhance visibility, and promote sustained commitment to collaborative work.

**Replication potential Impact:** For policymakers, institutional leaders, and academic developers, the toolbox provides a blueprint for scaling successful initiatives. By identifying common enablers across diverse case studies, it offers actionable guidance for adapting proven practices to different departments, disciplines, or university contexts. This ensures that innovations in interdisciplinarity and transdisciplinarity can be replicated efficiently, accelerating institutional learning and fostering consistent, high-impact outcomes across the university ecosystem.

By combining structured evaluation with illustrative case synopses, the toolbox supports universities in embedding interdisciplinarity and transdisciplinarity into institutional strategies, research, and education practices. It serves as both a reference and a catalyst for action, supporting knowledge sharing, innovation, and sustainable institutional change. Through systematic reflection on what works—and why—universities are

better equipped to foster collaborative, inclusive, and high-impact interdisciplinary ecosystems that respond to complex societal challenges.

## 6. DISCUSSION OF FINAL OUTCOMES

This portfolio on practice-based methods and co-creative tools for facilitating transdisciplinary approaches – summarised as the **ENHANCE toolbox for organisational learning** - is a result of a participatory strategy building process for creating institutional impact in ENHANCE. It mirrors the ENHANCE position in WP6 that transdisciplinarity including building long-term coalitions between science and society should become an established mode of research and education in the Alliance and beyond. The ENHANCE toolbox for organisational learning offers opportunities to face the challenges and the constraints for implementing transdisciplinarity in the regular university systems.

Different levels of constraints influence the immediate success of establishing methodological pathways to better support long-term knowledge exchange with society. Ranging from university culture, governance structures and strategies (macro level) to individual engagement of scientists on transdisciplinary projects, experiences and possibilities for transdisciplinary research and teaching (micro level). It is worth mentioning that together both levels of constraint have direct and indirect effects on the institutional impact and the ability to create the right environment for transdisciplinary approaches. Strategic work, such as providing these pathways for research with society, requires, above all, long-term perspectives. In different mappings we identified the hindering factors by touching on both structural and normative barriers. These are, e.g. lack of resources to build quality relationships with societal stakeholders, lack of coordination and strategic navigation during project stakeholder or participant selection, funding challenges, lack of recognition and incentives at individual, departmental or institutional level, lack of prior experience in transdisciplinarity

These constraints build barriers which hinder the creation of the right institutional supportive environment for long-term research with society in general, regarding normative, but also financial and human resources for transdisciplinarity across the university. Without focused strategic work for building regular structures supporting transdisciplinarity, which includes developing long-term exchange formats with society, further training opportunities, suggestions for changes to regulatory structures, and the initiation of discourses in universities, transdisciplinary activities can often remain more small-scale or disjointed, and learning opportunities can be missed.

In WP6, we tried to adapt to the institutional constraints through the following steps:

- Creating a mutual learning environment through joint activities like generating a shared vision on transdisciplinarity, mapping of transdisciplinary initiatives, conceptual workshops with toolkitting and evaluating for the institutionalisation of transdisciplinarity, Walk & Talks as a joint format for knowledge exchange and extended mapping tool, the establishment of the Transversal Group.
- Validating ENHANCE Good practice examples for providing orientation and advice for researchers, institutional leaders and strategy developers. We specified operational instruments in 3 toolboxes, which might be possible to transfer, to adapt and to test at other ENHANCE partner universities. In total, the ENHANCE good practices and tools provide an opportunity to institutionally learn from each other with practical and concrete knowledge from transdisciplinary projects or strategic initiatives.
- Specifying and reflecting on institutional impact by quantifying assessment for building science and society teams, for funding models, for recognition mechanisms, and for replication potentials
- Approaching the WP6 transdisciplinary labs as test fields for using and adapting these tools or for creating new tools and formats based on contextualised university conditions and situated knowledge.

In total, the D6.1 ENHANCE Toolbox for organisational learning holds various building blocks that build on each other with more specific information:

- The **Transformation Toolbox** for institutionalising transdisciplinarity as an underlying result of the ENHANCERIA project (see two tables with tools from strategy-led initiatives and project-led initiatives in research and education in (Annex 9.b.) - this toolbox gives a conceptual overview related to theoretical assumptions of institutionalising transdisciplinarity
- The **Toolbox of validate ENHANCE good practices** regarding the institutional impacts of sustainability, awareness, novelty, inclusiveness and agency with specified tools and a character of transferability (see Chapter 5a and Table 01a - 01e) and
- The **Toolbox of selected institutional-practice based tools** considering the constraints and chances for institutionalisation (Table 03), which offer specific information capability for linking research and education practice to university strategy building.

The latter, the institutional-practice based tools (Table 03), represents highlighted tools to foster organisational learning most of all through differentiated impacts in terms of stakeholder engagement, recognition and replication impacts. Some of them, e.g. the Walk & Talk format and the programme 'Upgrade your science' are currently tested in two WP6 Transdisciplinary Labs.

## 7. CONCLUSIONS AND NEXT STEPS

WP6 systematically explores strategic approaches to stimulate, reflect, test, and consolidate jointly developed and transferable tools for implementing transdisciplinarity as a research and education mode in institutional practice. Therefore, it combines the method development for Objective O6.1 and Objective O6.4 by developing pathways to implement different tools facilitating transdisciplinarity in research and education, to reflect on their practical institutional implementation and to promote organisational learning for a long-term foundation for societal transformation. The mutual learning environment – established throughout the different ENHANCE Alliance project periods so far (ENHANCE, ENHANCERIA, ENHANCE+) – forms the basis for collectively advancing the organisational learning for facilitating transdisciplinary approaches in the Alliance. And vice versa, the Alliance and the WP6 group is used as a strong cooperation between different university stakeholders from research, education and science management to synthesise knowledge and methodologic approaches for better supporting and promoting transdisciplinarity as a regular university practice beyond disciplinary and interdisciplinary approaches.

The outcome is the **ENHANCE toolbox on organisational learning** in three toolboxes as D6.1 Portfolio of practice-based tools to facilitate transdisciplinary approaches in the ENHANCE alliance and to foster organisational learning for supporting transdisciplinary research and education at the ENHANCE universities. They provide guidance to researchers, policymakers, to researchers, policy makers and science managers. It contains collaboratively generated knowledge for activating and supporting and promoting transdisciplinary research and education practices. Therefore, this portfolio is to be read as practical recommendations and concrete operational instruments to test, replicate, to translate and adapt and to communicate at the universities. As outlined in Chapter 5c, participatory strategy building is a step-by-step-process using the strong network of the ENHANCE Alliance, the different competencies and knowledges of researchers, institutional leaders and capacity developers.

Collectively developing the strategy for implementing transdisciplinarity in ENHANCE is also characterised by a step-by-step integrative process of building a common language and objectives, sharing the relevant and impact-related knowledge across university sectors and generating collaborative concrete outcomes. In this process, integration experts in WP6 play a crucial role to communicate, operationalise and evaluate the approaches and tools. They are engaged in the Transversal Group and in networking, research and capacity building also in other communities for inter- and transdisciplinarity (ITD Alliance, GTPF, ELLH e.g.).

As next steps, the ENHANCE good practice examples and the specific extracted tools provide concrete outcomes to learn from each other and to test their implementation and transferability adapted to local university governance. The four Transdisciplinary Labs serve as an experimentation field for either the application of tools and formats by testing a long-term institutional impact, or as a contextualised arena for exploring new and combined methods of transdisciplinary research and teaching in practice. In this sense, the aim is to either explore the adaptive implementation of these tools or develop new tools to support the transdisciplinary knowledge-creating teams with a long-term perspective and within this university alliance. Concrete steps are:

- The Walk & Talk format is tested and extended in the Smart City Living Lab.
- The 'Upgrade your science' approach for transdisciplinary research of TD-Lab, TU Berlin/BUA is foreseen for the development of a young researcher group in the Lab on Human-oriented Artificial Intelligence. This will be elaborated in the deliverable D6.2 and D6.3.

This toolbox for organisational learning will also provide broader navigation for researchers, students, institutional leaders, policymakers, and academic developers. Therefore, in short-term, some of them will be evaluated in WP6 transdisciplinary Labs (D6.2) and further developed in terms of capacity building and awareness raising for the mutual learning environment ecosystem in ENHANCE (D6.3). The ENHANCE good practice examples and tools for organisational learning facilitating transdisciplinarity as well as the evaluations will be used for developing learning skills in terms of training material, training programmes and workshop formats for capacity building at the ENHANCE universities (D6.3). In mid-term, it is aimed to integrate the tools, the trainings and the ENHANCE mutual learning ecosystem for institutional learning in an active engagement in international institutional networks on inter- and transdisciplinarity such as ITD-alliance and European Living Lab Hub. This could also support joint funding applications, e.g. to build future cooperation partnerships for co-designing societal transformation. From this groundwork, further joint transdisciplinary activities adapting these tools in different contexts such as summer schools and living labs, trialogues will be developed on the practical level. For a long-term perspective, the operational measurements for the gradual institutionalisation of transdisciplinarity can serve as catalysts and conduits to anchor transfer strategies or other strategies for providing societal transformation at the ENHANCE member universities. Furthermore, they can promote the engagement and the impact of integration experts and to change university culture with strong awareness raising towards long-term partnerships between science and society aiming to situate scientific knowledge in a way which can drive and enable responsible societal transformation.

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# 9. ANNEX

## 9.a. Survey

## 9.b. List of Tools in Transformation Toolbox (ENHANCERIA)

D3.4 APPENDIX 1 TOOLS from selected TD initiatives strategies_revision

D3.4 APPENDIX 2 TOOLS from selected TD initiatives projects_revision

## 9.c. Translations of Executive Summary (ENHANCE languages)

**ENHANCE+ WP6 TRANSDISCIPLINARY LAB FOR SOCIETAL TRANSFORMATION**

# MAPPING TRANSDISCIPLINARY INITIATIVES IN STRATEGY, RESEARCH AND EDUCATION

## // ABOUT

ENHANCE+ WP6 Transdisciplinary Lab for societal transformation aims to strengthen the ENHANCE universities as drivers of responsible societal transformation, through transdisciplinary collaborations between science and society. In doing so we build upon the results of the research and innovation-driven ENHANCERIA project (SwafS 2020-2024), in which approaches, methods and formats for the institutionalization of transdisciplinarity to foster sustainable development at the ENHANCE universities has been identified and developed. This includes strategies and structures supporting transdisciplinary research and education as well as transdisciplinary practices in research and education projects. In ENHANCE+ over four key phases we collectively further develop transdisciplinary practices and formats and establish a sustainable foundation to support organisations in applying these to research challenges. WP6 contributes to ENHANCE Key Goal 2; European University for the Future of Europe. We help make the knowledge square (education, research, innovation, and service to society) a reality by enabling transdisciplinary approaches that can support sustainable societal transformation, including across ENHANCE priority topics and to contribute to the ambitions of the Horizon Europe Mission on Climate-Neutral and Smart Cities, the New European Bauhaus and the Green Deal, amongst other European initiatives.

More specifically, with this survey, ENHANCE+ seeks to extend the ENHANCE transformation toolbox for the institutionalization of transdisciplinarity in the fields of strategy, research and education. It aims to further identify institutional strategies enabling long-term knowledge exchange between science and society and transdisciplinary practices of conducting cross-sectorial knowledge transfer from the various institutions in research and education projects. The main goal of this mapping is to identify ENHANCE good practice examples as pathways, pilots, partnerships, cooperation models, services, transformation ecosystems, projects among others to foster long-term knowledge exchange between science and society across different institutions.

This survey is part of the mapping activities to accomplish this goal. The data collected will be used to develop methods and formats for regulatory rules for better enabling, supporting and fostering transdisciplinary research and education at the ENHANCE universities. ENHANCE+ intends to provide the universities and initiatives with an extended portfolio of practice-based and co-creative methods and tools to facilitate transdisciplinary approaches institutionally. By mapping these initiatives, ENHANCE+ will contribute to collaboration between the ENHANCE universities by connecting various transdisciplinary research projects.

## // USE, AVAILABILITY AND PROCESSING OF DATA

The use and availability of data are related to the ENHANCE+ Joint Controllership Agreement (JCA). As a general rule, collected data, such as results from survey, will be openly available for ENHANCE universities. More specifically, the content of this survey will be deposited in the ENHANCE+-internal TUB Cloud area, which is only accessible to ENHANCE+ staff. The survey and other collected data, such as interviews and public information, such as websites, will only be used for research purposes within ENHANCE+. For example, with the collected data, ENHANCE+ will create the portfolio of practice-based and co-creative methods and formats as extension of the ENHANCE transformation toolbox for the institutionalization of transdisciplinarity.

The collected data and research results will be used for publications, such as journals articles and white papers, where relevant. The collected data and research results will also be publicly available on the ENHANCE website www.enhanceuniversity.eu and the European Commissions' platform for project results and accessible upon request to the Coordinator. Therefore, participants will be allowed to review any document before publication on a public platform.

## // STATEMENT OF CONSENT

I have read the preceding information, or it has been read to me. I consent voluntarily to participate in this study and consent to the use of data for research and publications. I understand that I will be allowed to review any statements about my project before publication. I understand that I can request insight into data collected from me and the project I am involved in at any time and can revoke consent without providing reasons.

Date day/month/year _____

Print Name of Participant _____

Signature of Participant _____

// SURVEY

With this survey we seek to extend the ENHANCE transformation toolbox for the institutionalization of transdisciplinarity in strategy development, research and education (Transformation-toolbox-for-the-institutionalisation-of-transdisciplinarity_FINAL_incl-appendix.pdf). Please identify possible transdisciplinary initiatives from your university on the strategic (top-down) level and/or the practice based (bottom-up) level of transdisciplinary projects in research and education. Please fill in as much information as possible. However, it is fine if you can't answer all questions. If you have any questions, please contact: kathrin.wieck@tu-berlin.de.

| **Questions** | **Answers** |
|---|---|
| What is the **title** of your transdisciplinary initiative? | |
| How would you mainly categorize the transdisciplinary initiative, in the field of **strategy, research, education**? (Is the project Top-down and Bottom-up or a combination of both?) | [multiple answers are possible] |
| How would you mainly characterize the transdisciplinary project, as what **type of initiative** (keywords)? (research center, education programme, cooperation model, knowledge cluster, strategic platform, laboratory…among others, please see the table) | [Please select one or more methodological approaches or fill in your own classification] |
| How is the concept of **sustainable development** addressed in your transdisciplinary initiative? | |
| How is this transdisciplinary initiative **funded**? | |
| Which formats/**methods/tools** do you use/develop in your transdisciplinary initiative? | |

| | |
|---|---|
| What are the **methodological approaches** of your project? For example, testing, transfer, pathways, scenarios, co-design, co-production, training labs, data management, collaboration, knowledge transfer, knowledge exchange | [Please select one or more methodological approaches or fill in your own classification] |
| Who are the main **academic disciplines/departments** in this transdisciplinary initiative? And who initiated the initiative? | |
| Who are the main (non-academic) **stakeholders/external partners** in this transdisciplinary project? | |
| How are these **stakeholders involved** in the project? What is their **level of engagement** (e.g. informing, consulting, collaborating, co-creating)? | |
| Are you assessing/ trying to measure the **social impacts** of your initiative? If so, what are your findings? (If you are not measuring impacts of transdisciplinarity systematically, how would you describe the social impact?) | [can be achieved as added value through:<br>a transdisciplinary process design, by enabling long-term knowledge exchange for td research and education processes, by addressing societal challenges and co-creation of prototypes/pilots etc., by raising awareness in society for co-designing problem solutions…please select or fill in your own findings?] |
| Could you name a **reward/recognition** for the transdisciplinary initiative at your university? | |
| Does the project have a **website**, and whom could we contact for more information? | |

| | |
|---|---|
| Would you characterize the transdisciplinary initiative as '**ENHANCE good practice** example' in terms of creativity, innovation and capacity to mutually link strategic and practice-based components? Please describe, why? | |
| Could you extract a specific **tool** from your transdisciplinary initiative aiming to facilitate transdisciplinary approaches institutionally? (tools for the institutionalization of transdisciplinarity) (e.g. set up of participatory processes, prototype-development, inter- and transdisciplinary agenda-setting, set up of long term funding, co-creation of representation model, building of transdisciplinary research teams, set up of course based cooperation science-society etc.) | [Please select one or more methodological approaches or fill in your own classification] |

| DIMENSION / LITERATURE | TD INITIATIVE / ENHANCE UNIVERSITY | MAIN CHARACTERISTICS / METHODODOLOGY | EXCTRACTED FORMATS / METHODS / TOOLS |
|---|---|---|---|
| 01 Strategic research areas | | Promote innovative thinking, long-term vision and addresses complex societal challenges | |
| STRATEGY + RESEARCH /EDUCATION<br><br>Interdepartmental level (Leurs et al., 2023)<br><br>Macro-level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Organisational value (Willimas et. al., 2024) | **Long term cooperation. UNIVERSITYCITY TRD3.0 NTNU + TRONDHEIM** https://i.ntnu.no/wiki/-/wiki/Norsk/Universitetskommune | - Partnership agreement to jointly develop a University City (since 2018)<br>- A national pilot based on five thematic focus areas; Education and Early development, Health and Welfare, Urban development, Innovation and Smart City<br>- project-organized, with a duration of a total of eight years, which builds on a long-term collaboration between Trondheim municipality and NTNU | **Set up of an innovative pilot project for a long-term cooperation model**<br>- moving the collaboration "one step up" towards a more holistic approach to education, research and innovation through the joint university – city project<br>- Building stone to develop a model for innovation and restructuring in the public sector through research, innovation, education and participation in development projects of strategic importance to the public sector.<br>- Document the model through research-based evaluation |
| 02 Institutional strategy/Strategic plan/university guidelines | | Setting of core strategic guidelines, defines strategic goals, values and fiels of action | |
| STRATEGY<br><br>University level (Leurs et al., 2023) | **UPV SIRVE** https://www.upv.es/contenidos/upv_sirve/en/home/ | - a strategic plan for 2023 to 2027 with five strategic goals (sustainable, international, relevant, vital, excellent) to be achieved through 16 strategic objectives | **University agenda setting through formulation of universities mission, main goals and objectives on different levels** |



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| | | | |
|---|---|---|---|
| Macro-level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Organisational value (Willimas et. al., 2024, 7-8) | | - The strategy seeks to achieve carbon neutrality by 2030, seeks to promote TD collaboration as part of its vision, and has sustainability as one of its 5 goals<br>- Includes plans and programs approved at the Strategie Development Committee (SDC), among others: **UPV Sustainable goal**, to position the UPV so that its three campuses achieve carbon neutrality by 2030, **UPV-International, UPV-relevant** to e.g. consolidate the reputation and leadership of the UPV in social transformation; to foster the transdisciplinary nature of research, innovation and transfer activities, promoting their permeability towards teaching; **UPV-Excellent, UPV-Vital** | - support to create internal university structures and framework conditions that allow further extension of academic cooperation and networked research at the highest level<br>- Responding to the needs of society<br>- Includes diverse programmes on infrastructure, energy effiiency, living labs, source of fundings, international exchange programmes, promotion<br>- Strengthen alliances<br>- Impacts on knowledge production<br>- Consolidate reputation and leadership<br>- To foster research, innovation and transfer activities through teaching |
| 03 Strategic unit/facility | | Specific strategic units at universities represent areas of special strategic importance | |
| STRATEGY<br><br>University level (Leurs et al., 2023)<br><br>Connects macro- and micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen) | **TUB Central OFFICE FOR SCIENCE AND SOCIETY**<br>**https://www.tu.berlin/science-and-society** | - strategic and operative work to systematically develop new ways of knowledge exchange at the TU Berlin in cooperation with science communication and knowledge and technology<br>- developing strategic goals implementing pilot projects with high value for TUB<br>- linking existing transdisciplinary projects, centres and services by providing an innovation ecosystem (connecting top-down and bottom-up levels) | **Centralised structural establishment for the institutionalisation of transdisciplinary research**<br>- including consulting + building inter- and transdisciplinary partnerships/cooperations + devloping and testing of pilot projects<br>- central unit and knowledge base providing knowledge exchange of science and society on various levels and by hosting various platforms, services and transdisciplinary projects of TU Berlin |



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| | | | |
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| organizational structure + leadership (Williams et. al., 2024, 7-8) | | | - accumulating TU services of support on transdisciplinarity, matchmaking and long term cooperations between science and society and process development for institutionlisation of transdisciplinarity |
| 04 Funding Scheme/ Programme (diverse levels) | | Funding scheme for business models, strategic ecosystem partnerships | |
| STRATEGY<br><br>University level (Leurs et al., 2023)<br><br>Connects macro- and micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + funding (Williams et. al., 2024, 7-8) | **RWTH Excellence Initiative, LIVING LAB INCUBATOR** https://www.rwth-aachen.de/cms/root/Die-RWTH/Exzellenzinitiative/~eob/Exzellenzinitiative/?lidx=1 | - structure building under the framework of measurement 5 „Collaborate in Living Labs“ in Excellence strategy (2019-2026)<br>- supports interdisciplinary collaboration and transdisciplinary approaches to knowledge and value creation at the core of the RWTH's aim to become an Integrated Interdisciplinary University for Science and Technology<br>- | **Inter- and transdisciplinary agenda-setting and cooperation model**<br>- support for different research initiatives on inter- and transdiciplinarity<br>- specialised in networking, accompanying research and research-related teaching on the subject of real-world laboratories |
| STRATEGY-EDUCATION-<br><br>University level (Leurs et al., 2023) | **WUT Programme. Broad business model programme WUT ACCELERATOR** https://cziitt.pw.edu.pl/dla-pracownikow-pw/przedsiebiorczosc- | - to support the initiation, incubation, and acceleration of start-up companies, which are created as a result of scientific and research activities of WUT employees and students and operate in their environment in the spin-off or spin-out formula | **Built up an acceleration framework, (operational and development support, including fundraising)** through:<br>- acceleration programme,<br>- acceleration process,<br>- mentors network |



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| | | | |
|---|---|---|---|
| Connects macro- and micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>organizational structure + funding(Williams et. al., 2024, 7-8) | startupy-oraz-spolki-spin-off-i-spin-out/akcelerator-pw/ | - looking for project teams that want to create companies based on technology commercialisation and that technology should be at the centre of that business model (could be an outcome of student projects)<br>- to increase the readiness of business teams in three dimensions:<br>1. market readiness, understood as increasing the supported business teams' awareness of customers, competition, possible business models, etc.;<br>2. Team readiness - understood as increasing the level of organisation of supported business teams in the area of management, go-to-market market schedules, business modelling etc.;<br>3. Formal readiness - understood as building a spin-off/spin-out company model of functioning with other stakeholders. | |
| STRATEGY, RESEARCH, INNOVATION<br><br>University level (Leurs et al., 2023)<br><br>Macro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck | **CHALMERS Strategic thematic platforms, AREAS OF ADVANCE** https://www.chalmers.se/en/collaborate-with-us/collaborate-in-research-and-innovation/ | - 7 thematic areas platforms for strategy and long-term collaboration (Energy, ICT, Health Engineering, Material Sciences, Nanotechnology, Production and Transport).<br>- Funding to initiate research projects, educational activities and other initiatives, e.g., with external partners<br>- often directly relevant to industry and society, offer common access to cutting-edge research infrastructures and several targeted centres | **Prototype-development**<br>- co-design, co-creation of prototypes,<br>- pilots for research-based partnerships with companies<br>- joint (transdisciplinary) projects on research and innovation,<br>- joint educational activities |



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| et al. 2025 foreseen)<br><br>Inter-organizational collaboration + funding (Williams et. al., 2024, 7-8) | | - research-based partnerships with companies.<br>- informing (hosting competence centres), collaborating (strategic partners involved in developing new courses), signed partnership agreements<br>- hosting the competence centres and the strategic partners.<br>- Representatives from the strategic partners might be involved in developing new courses and the strategic research agenda. | |
| STRATEGY (RESEARCH, EDUCATION)<br><br>University level + project-level(Leurs et al., 2023)<br><br>Macro + micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + funding + training (Williams et. al., 2024, 7-8) | **POLISOCIAL PROGRAMME + OFF CAMPUS (University hubs in the city) + POLISOCIAL AWARD**<br>http://www.polisocial.polimi.it/it/off-campus/<br>https://www.polimi.it/en/sustainable-development/polisocial-award | Social engegament partnerships, teaching, research and co-design with communities (part of POLISOCIAL) - Polisocial is an academic social responsibility programme launched in 2012<br>- POLISOCIAL programme launched in 2012 at POLIMI, aimed at expanding the university's mission to include societal issues and needs that arise at both a local and global level<br>- to create new areas of expertise<br>- training professionals and researchers capable of producing social change and contributing responsibly to the communities in which they operate<br>-<br>- promotes and encourages a new multidisciplinary approach to projects in the university, including through the Off Campus initiative, whereby university hubs are established in the city of Milan to facilitate the joint development of innovative teaching activities, in collaboration with local | **Fostering research, education and social engagement through a programme line and funding**<br>- The 2024 edition is dedicated to "Proximity and Innovation" and is designed in close relationship with the OFF CAMPUS University project, with the aim of activating innovation-through-proximity processes in the city of Milan<br>- co-research and co-design paths through the construction of long-lasting alliances between the University, local actors and other stakeholders<br>- **two funding lines**: activation of new research projects; consolidation of existing research projects connected with the Off Campus initiative. |



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| | | communitiesUniversity hubs are established in the city of Milan to facilitate the joint development of innovative research, teaching and social responsibility activities, in collaboration with local communities<br>- Partners implement and strengthen own activities in collaboration with Polimi<br>- Polimi researchers from the involved Departments develop innovative research projects (community-based, living labs) | |
| 05 Strategic cooperation model / Partnerships/alliances | | organizational formation to achieve organizational objectives better through collaboration | |
| STRATEGY<br><br>University level (Leurs et al., 2023)<br><br>Connects macro- and micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + funding (Williams et. al., 2024, 7-8) | **RWTH Living lab incubator** https://www.humtec.rwth-aachen.de/cms/HUMTEC/Forschung/~mgveq/Living-Labs-Incubator/?lidx=1 | - collects information on projects and institutions to support networking and exchange experience.<br>- developing indicators for characterising transdisciplinary knowledge production and evaluation in and through real-world labs (RWL) and testing them in participatory | **Set-up of participation model, knowledge exchange, mapping, evaluation, transfer of living labs**<br>- providing knowledge production and experimentation,<br>- providing research, methods, information,<br>- through living labs and innovation ecosystems stimulates topic-specific or method-specific collaborations and innovation |



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| 06 (Strategic) Platforms/Hubs | | Space for knowledge exchange, distribution of ideas, networking | |
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| STRATEGY, RESEARCH<br><br>Interdepartmental level (Leurs et al., 2023)<br><br>Connects macro- and micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **TUB Strategic platform living labs. STADTMANUFAKTUR** https://stadtmanufaktur.info/en/ | - providing, testing and evaluating social transformations, transformation research and transformation knowledge<br>- role of co-producers and co-production<br>- Focus on sustainable development and urban transformation (e.g. focus areas: Energy and mobility transistion, Climate resilience, transformation knowledge, circular economy)<br>- Joint development of concepts and strategies by relevant solutions applied directly in urban areas<br>- developing of pilot projects, cooperation between TU Berlin and city administration (e.g. ClimateHood) | **Set up of transformation ecosystem, process-development and cooperation model** through<br>- matches scientific questions, methods, tactics and data with practical know-how and actors<br>- bundling of existing living labs in Berlin,<br>- providing circular exchange between science and society<br>- Long-term partnerships for complex urban transformation processes<br>- Transdisciplinary research and implementation through cooperation between science, business, civil society and politics<br>- Transformation knowledge in dealing with city administration stakeholders, long-term monitoring of projects and opening up experimental spaces<br>- Utilizing and implementing findings and innovations from science and real-world laboratory work for complex urban challenges<br>- Cross-linking the transformation topics |
| STRATEGY<br><br>Interdepartmental level (Leurs et al., 2023) | **RWTH PLATFORM on structural change REVIERa** https://www.reviera.rwth-aachen.de/cms/~ogiyr/reviera/?lidx=1 | - Platform for structural change for knowledge exchange and collaboration among stakeholders in the Rhenish Region<br>- works across faculties and disciplines on the long-term perspectives of structural change in the Rhenish mining area | **Set-up of dialogue-oriented processes for regional structural change**, providing a new culture of knowledge, innovation and communication, aiming to create **collaborative structures for the model region** for the medium and the long term |



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| Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | | - Various methods and formats to enhance multi-lateral communication and collaboration, Formats facilitating ongoing dialogue between all groups and stakeholders involved in and affected by the transformation<br>- Provide impetus for innovation (seven fields of innovation) in the Rhenish mining area to help shape the socio-ecological transformation towards sustainability together with a wide range of stakeholder groups in the region | - co-create and test methods and formats of exchange to shape and master the highly interconnected transformation activities<br>- e.g. the tu! Hambach (temporary university Hambach, i.e. several days of lectures, workshops, exhibitions, etc. right at the edge of an open lignite mine); or the "future synthesizer" method to collect and structure impulses from various stakeholders towards a shared desired goal<br>- |
| University level (Leurs et al., 2023)<br><br>Macro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + funding (Williams et. al., 2024, 7-8) | **CHALMERS Strategic thematic platforms, AREAS OF ADVANCE** https://www.chalmers.se/en/collaborate-with-us/collaborate-in-research-and-innovation/ | See above | |



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| 07 Laboratory/Labs/Network/Strategic Projects | | for the pooling of research potential and design methods with participatory approaches to science and innovation, e.g. also workshop spaces (L iving labs, FabLabs) in which people work collaboratively or sharing resources | |
| STRATEGY, EDUCATION<br><br>Project level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **NTNU 1 of 9 Digital Transformation Initiative. AUTOFERRY PROJECT** https://www.ntnu.edu/autoferry | - aims to develop new concepts and methods that will enable the development of small autonomous passenger ferries for urban water transport technology *spin-off Zeabuz* was founded by the university faculty involved in the project and now has 25-30 employees<br>- collaboration between societal initiative on individual level (Veteran Boat society), Business (when it comes to the commercialisation and scalability of the project), Trondheim Harbour Authority, Trondheim Municipality and the University City TRD3.0 as partners | **Prototype development from student project to a main experimental platform + communication model**<br>- In 2022 approximately 100 **dissemination activities** and **tours** were given to guests and visitors, ranging from students to government ministers and royals.<br>- results are communicated through a range of **channels, such as popular science conferences, Op-eds, scientific publications and other media**.<br>- **Transfer**: the concept, based on technology from a NTNU spinoff is now operational in Stockholm, Sweden: MF Estelle. |
| RESEARCH, STRATEGY<br><br>University level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen) | **TUB Living lab Campus Park. CLIMATEHOOD** https://stadtmanufaktur.info/en/living-labs/climatehood_campuspark-charlottenburg/CLIMATEHOOD | - Model partnership ClimateHOOD between urban and university stakeholders (District Administration Charlottenburg, TU Berlin and UdK, WerkStadtForum Charlottenburg)<br>- Climate-relevant open space development is interlinked with research and teaching as a real laboratory in the urban space, ClimateLABs on the campus, in the neighborhood<br>- Innovative management and operator models are conceptually developed and | **Set up of transformation alliances for campus development by spatial experimentation and implementations on transformation knowledge (climate-adaptation measures)**<br>- Building measures to design a climate-neutral campus as a real-world laboratory<br>- Long-term partnerships for complex urban transformation processes<br>- Co-production of knowledge with citizens, other partners and stakeholders |



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| Inter-organizational collaboration (Williams et. al., 2024, 7-8) | | tested with the transdisciplinary stakeholder networks involved Climate_ALLIANCES | - Transformation knowledge in dealing with city administration stakeholders, long-term monitoring of projects and opening up experimental spaces<br>- Utilizing and implementing findings and innovations from science and real-world laboratory work for complex urban challenges |
| RESEARCH, STRATEGY<br><br>University and Interdepartmental level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **CHALMERS Living lab in cooperation with companies from the building industry. HSB LIVING LABS** https://www.chalmers.se/en/areas-of-advance/energy/joint_initiatives/HSB-Living-Lab/Pages/default.aspx | - arena where new ways were developed to build and shape the housing of the future.<br>- Cooperation with a range of companies covering the entire building industry (engineering, building, product supply, energy suppliers<br>- Research projects on sustainable living<br>- Concrete products (e.g. low-energy refreshing cabinet from Electrolux),<br>- Prototyping: some start-up company testing products (prototyping) e.g. testing materials for facades<br>- Behavioural analysis e.g. on energy consumption | **Set up of a living lab experimentation format in cooperation with business partners and with tenants**<br>- Research with tenants of the house, live in a constantly changing and evaluated environment, all while the research is ongoing |



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| RESEARCH, STRATEGY<br><br>University and Interdepartmental level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **POLIMI Interdepartmental Research Lab / University Makerspace. POLIFACTORY**<br>**polifactory@polimi.it** | - explores the relationship between design and new digital manufacturing processes,<br>- investigate the possible future manufacturing scenarios: distributed design and production models, urban scale manufacturing, design and prototyping of smart product-service systems, and open design and hardware of technical systems,<br>- Polifactory has been created hybridising a formal academic model of Transdisciplinarity (a top-down, multidisciplinary group made by designers and engineers (mechanics, computer science, ...) with an informal transdisciplinary network provided by a grassroots movement (Makers Movement and Fab Lab Networks, community-based on transdisciplinary collaboration, connected to STEM culture, to open and citizen science) | **Set up of a makerspace with 4 pillars of activities**<br>- 1) competitive research; we can collaborate with public and private stakeholders in this field.<br>- 2) consultancy with local, national and international stakeholders such as large-scale companies, SMEs, foundations and various associations.<br>- 3) preincubation of talents and ideas.<br>- 4) concerns cultural initiatives. |



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| DIMENSION / LITERATURE | TD INITIATIEVE ENHANCE UNIVERSITY | MAIN CHARACTERISTICS / METHODODOLOGY | EXCTRACTED FORMATS / METHODS / TOOLS |
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| 01 Research center / Knowledge cluster | | Research center for doing research, disciplinary, interdisciplinary and transdisciplinary, knowledge cluster are local innovation systems with high internal and external networking and knowledge sharing capabilities | |
| RESEARCH<br><br>University level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **NTNU NTRANS (FME) research center conducts research on the role of energy system in the transition to zero-emission society**<br>**https://www.ntnu.no/ntrans** | Research topics:<br>- energy system in the decarbonization of sectors such as energy, transport, industry, and buildings, as well as our everyday lives.<br>- New practices, increased citizen engagement, and changes in behaviour are vital in order to stimulate demand for low-carbon solutions, to create political legitimacy, and to mobilize the resources needed for the transition.<br>Research focus:<br>- How can the scope of the transition be widened to include citizens and their interaction with technologies and systems?<br>- How can the scope of the transition be deepened (i.e. how can a fundamental society-wide change be implemented through the logics of production, distribution, | **Long term funding model**<br>- The social science related FME research centre is part of the Norwegian Research Council's scheme for **long-term research**<br>- research at a high international standard, aiming to tackle energy-related challenge |



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| | | consumption, and coupling of economic sectors)? And<br>- How can the transition be accelerated to achieve emission reductions at the intersection of energy, climate, and sustainability? | |
| RESEARCH, INNOVATION, EDUCATION<br><br>Departmental and interdepartmental level (Leurs et al., 2023)<br><br>Macro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **NTNU Cross-disciplinary knowledge cluster.**<br>**SMART SUSTAINABLE CITIES**<br>**Faculty of Architecture and Design**<br>**Department of Architecture and Planning**<br>**https://www.ntnu.edu/smartcities** | - cross-disciplinary knowledge cluster of architects, planners, designers, artists, engineering, ICT, social and economic sciences<br>- With urban living labs, public-private partnerships and integrated design thinking, the initiative supports cities in their ambition to truly become cities for people, cities of culture, green cities, digital cities and learning cities – in short, truly smart and sustainable.<br>- NTNU is a partner of the European Commission's New European Bauhaus initiative | **Cookbook – as model for publication and representation of transdiciplinary topic-related activities and formats like pilots, living labs**<br>1. How to PED. The +CityxChange Cookbook: Experiences and Guidelines on Positive Energy Districts (https://cityxchange.eu/knowledge-base/how-to-ped-cookbook/)<br>2. The CrAFt Cookbook: A Recipe for Climate-Positive Cities and Communities (https://craft-cities.eu/craft-cookbook/)<br>- Content of the cookbooks are area-based initiatives for sustainability transformations in cross-sectoral collaborations, in-depth stakeholder involvement, innovation and experimentation<br>- Pilots and urban living labs for long-term transformations in strucures, cultures and practices, experiments for effective public participation<br>- Cookbooks represent the involvement of stakeholders in |



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| | | | decision-making and co-realisation for impactful solutions<br>- First CrAFt cookbook includes seven stages of development for New European Bauhaus from vision to implementation, documentation and replication |
| 02 Research programme / Research teams | | Network of scientists and professionals, developing their programs of research, building interdisciplinary networks and working with decision-makers to maximize research impact | |
| RESEARCH<br><br>Interdepartmental level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **UPV Research programme INBIO / POLISABIO (discontinued) / UNISALUT (the one that replaced it), Valencia universities + regional hospitals**<br>https://www.inbio.es/<br>https://www.polisabio.es/index.php/es/<br>https://unisalut.uji.es/ | Apart from INBIO, there used to be also the POLISABIO programme (UPV and regional hospitals) , then converted into UNISALUT (all the universities from the Valencia region and regional hospitals).<br>- Various initiatives with the aim of fostering alliances between researchers/professionals from these institutions and promoting the implementation of coordinated research or innovation projects leading to new biomedical technologies.<br>- The UPV - HUP/IIS La Fe collaboration programme implements, through INBIO, different initiatives with the aim of fostering alliances between researchers/professionals from these institutions and promoting the implementation of coordinated research or innovation projects that | **Research project development in collaboration of research teams**<br>- Ideas submitted by researchers and professionals from both institutions will be available for consultation<br>- Once the new ideas have been validated and published, the innovation technicians of both entities will look for partners in the other institution and will contact them in order to form the team<br>- Call for aid |



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| | | give rise to new biomedical technologies. | |
| RESEARCH, EDUCATION<br><br>Interdepartmental level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **UPV Research teams. Polimundus network**<br>**ISALAB**<br>https://headconf.org/wp-content/uploads/pdfs/8395.pdf | - to create a collaborative network on transdisciplinary research, with a focus on ENHANCE key topics,<br>- has launched two and three transdisciplinary projects coordinated with local stakeholders for joint MAster's thesis or PhDs-<br>- the research teams project is co-designed by professors of different Universities and executed through the collaboration and co-creation of students/professors/supervisors<br>- building interaction with stakeholders, society, and the environment<br>- reflection on the results and the research process itself<br>- the key result is the problem-solving actions | **Building of transdisciplinary research teams**<br>- coordinates transdisciplinary research teams via collaborative action research workshops for transdisciplinary sustainability science,<br>- joint research project-development and inter-and transdisciplinary research process with problem-solving |
| EDUCATION<br><br>Course level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck | **NTNU**<br>**Cooperation model + education teams.**<br>**EXPERTS IN TEAMWORK (EiT)**<br>https://www.ntnu.edu/eit | - A compulsory masters course that facilitates interdisciplinary student teams to work on real life challenges<br>- interdisciplinary skills are taught in a practical setting via experience-based learning.<br>- ongoing dialogue with partners (various industry and public sector) throughout the programme encourages students to consider | **Set up of course-based cooperation model science and industries/public sector incl train-the trainer programme** which ensures addressing societal problems and experience-based learning<br><br>- a whole system and framework to teach so many students each year<br>- a book for teaching staff including exercises to support interdisciplinary collaboration, |



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| et al. 2025 foreseen)<br><br>Teaching and curriculum and training (Williams et. al., 2024, 7-8) | | societal perspectives in their work, and external partners benefit from an interdisciplinary perspective on their project.<br>- Many external partners have implemented the results from EiT projects in their businesses. Students also have to report on how the project contributes to society. | - train-the-trainer programme to prepare and train teaching staff for the upcoming teaching semester of the EiT course<br>- raise the educators' competences on interdisciplinary collaboration. |
| 03 Research projects/labs | | Research on specific topics linked to practice and addressing societal problems in life world context | |
| INNOVATION, RESEARCH<br><br>Project level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Organizational value and institutional culture (Williams et. al., 2024, 7-8) | **WUT Project.**<br>**DIGITAL AGORA PROJECT**<br>https://www.sciencedirect.com/science/article/pii/S0264837721003379?via%3Dihub | The process of transforming spatial data into spatial knowledge using the Digital Agora conceptual model<br>- The Digital Agora concept was applied both in Płock and Warsaw to define the problems of urban space development by the local community and to develop a concept of socially acceptable solutions using spatial data mining methods.<br>- The analysis carried out in Płock and related to the concept of modernization of the pedestrian boulevard in this city also enabled the city authorities to make adjustments to the revitalization plan for this part of the city.<br>- The effects of scientific work on the functioning of "Mordor" in Warsaw are currently being analyzed by the district authorities. | **Open science and society model**<br>- a model of a social and geodatabase platform – a place for virtual debates and supports the development of the open information society |



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| RESEARCH, STRATEGY<br><br>Project level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Organizational value and institutional culture (Williams et. al., 2024, 7-8) | **UPV**<br>**Research initiative with City Council of Valencia**<br>**DONES DE SCIENCIA**<br>https://donesdeciencia.webs.upv.es/es/ | Science, gender and art come together in this project of the Universitat Politècnica de València (UPV) and the innovation centre Las Naves of the City Council of Valencia, with the collaboration of the Spanish Foundation for Science and Technology (FECYT) of the Ministry of Science and Innovation.<br>- to make visible and pay tribute to women of reference in their respective areas and to denounce the consequences of gender inequality, both in the construction of scientific and research vocations and in the development of women's professional careers in these areas.<br>- Most of the murals are located in educational centres. With them, Dones de ciència offers a unique route in our country, which gives visibility to pioneering women who broke barriers and have been and are references | **Science communication/dissemination model in cooperation with city**<br>- visibility to pioneering women who broke barriers and have been and are references, always through the eyes of outstanding artists in the field of urban mural painting. |
| 04 Living labs | | innovative experimentation format to initiate transformation processes and facilitates collaboration between researchers and societal actors in a real-life context | |
| RESEARCH<br><br>Project level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein | **RWTH Living lab.**<br>**Reallabor Theaterplatz**<br>https://www.humtec.rwth-aachen.de/cms/HUMTEC/Forschung/Living-Labs-Incubator/LLI-Netzwerk/Steckbrief-Datenbank/~tolhr/Reallabor-Theaterplatz/ | an experimental space for the future transformation of Theaterplatz starting in 2020<br>- transformation process initiated throughe various temporary interventions and actions aiming to start an open process and a dialogue | **Generation of a transformation process through experimentation and dialogue**<br>- Gain insights for the future design of a central urban space and create images of the future<br>- Create a shared space for experience and learning |



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| 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | | with local citizens about possible futures for the theatre square.<br>- aim is to test new perspectives and create a shared space for experience and learning<br>- experiences, ideas and suggestions from this test phase were analysed and incorporated into the further planning process | - Create connectivity and effectiveness: experiences, ideas and suggestions as stimulation of future planning process |
| RESEARCH, EDUCATION<br><br>Interdepartmental level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **UPV On campus laboratory.**<br>**UPV living lab**<br>**https://www.upv.es/entidades/vcampus/en/en-living-lab/** | an on-campus laboratory aiming to accelerate the path towards carbon neutrality of the Universitat Politecnica de Valencia and the city.<br>- 'sandbox' environment for testing, prototyping, scaling, teaching and learning. Used existing tools such as teaching content, internships, degrees and master projects, mobility programs, spaces for debate and reflection,<br>- real test bed and experimentation environment where the university community, users and producers can co-create, explore, experiment and evaluate innovations<br>- innovation environment where UPV provides facilities and resources and acts as intermediary for anyone (business, academia, citizen, students, public administration) trying to create sustainable impact | **Set up of test beds/sandboxes for campus development**<br>- creating an experimentation environment for open innovation through iterative processes, implementation of innovative projects and test benches (sandbox) in the Vera campus that will be replicable in the neighborhoods of Valencia |


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| | | through innovation, co-creation, rapid prototyping, testing and scaling of solutions | |
| RESEARCH, EDUCATION<br><br>Interdepartmental level and project level (Leurs et al., 2023)<br><br>Meso level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration (Williams et. al., 2024, 7-8) | **TUB**<br>**Living lab experiment. Hands-on research**<br>**COLLOC WORKSHOP SERIES**<br>**https://colloc2019.wixsite.com/colloc2019/about-the-workshop** | joint transdisciplinary research project in a living lab experimentation format – an international workshopseries with hands-on research since 2018 in a self organised occupation Brasil<br>COLLOC – Collaborative production of transformation knowledge in self-organzed occupations<br>- cooperation between science and society, between different institutions in Germany and Brasil and alumni worldwide and between different academic fields, collaborations with national social movement for housing rights MNLM, with socio-technological initiatives and the dwellers<br>- Main principles:<br>01_team of co-researchers in existing network of scientists students, alumni, residents, activists, socio-technical initiatives, and nature processes.<br>02_collaborative and interactive knowledge production with different types of knowledges (academic, technical, everyday, traditional, nature competences) | **Development of a transdisciplinary Dual Design strategy and creation of common ground in workshop with vulnerable communities**<br>- collaboratively defining the problem for transformation with topics for sustainable development and resilience (e.g. food system, housing and collective open space, water system)<br>- knowledge integration and development work: co-production of systemic scenarios and the materialization of transformation knowledge through collaborative planning, negotiating, designing and building of problem solutions<br>- Development of short term and long term solutions through different formats of knowledge integration<br>- Collaboratively reflecting the societal and scientific impact and transferability |



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| | | 03_Dual Design Strategy: collaborative development of systemic scenarios + spatial interventions | |
| 05 Master courses/programmes/projects | | Area of education and curricula | |
| EDUCATION<br><br>Interdepartmental level and project level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + Teaching and curriculum (Williams et. al., 2024, 7-8) | **RWTH Educational project. LEONARDO**<br>https://www.leonardo.rwth-aachen.de/en/homepage/ | Interdisciplinary educational project/ concept launched by RWTH in 2008<br>- Lecturers from different academic cultures offer a course focussing on a social challenge and aimed at students from all faculties<br>- Aiming to discuss a key topic in an interdisciplinary way<br>- In addition, student initiatives have also the opportunity to help organise a "Leonardo" event<br>- courses have been offered on topics such as energy, climate change, world population and health, flight and migration, culture, medical technology, sustainable development goals, human animal studies and fake news.<br>- "Thinking the Future" – this motto is also taken up by Projekt "Leonardo". Our goal is to identify global challenges and to search for solutions.<br>- made a central pillar in the Human Technology Center, which is a platform for shaping an integrated | **Set up of interdisciplinary teaching modules**<br>- In addition to lecture series, the project now also offers more workshops that enable more interaction and interdisciplinary collaboration in smaller groups. The "Leonardo" project focuses on four principles for the design of teaching and learning formats: Interdisciplinarity, interaction, responsibility, and participation.<br>- Current courses summer etrm 2024: Social justice, Rethinking resources, Sustainability and Transformation, Temporary University Hambach among others |



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| | | interdisciplinary scientific culture at RWTH Aachen University. | |
| EDUCATION<br><br>Interdepartmental level and project level (Leurs et al., 2023)<br><br>Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Inter-organizational collaboration + Teaching and curriculum (Williams et. al., 2024, 7-8) | **CHALMERS**<br>**TRACKS educational initiative**<br>https://www.chalmers.se/en/education/study-at-chalmers/why-chalmers/tracks-a-unique-educational-initiative/ | Tracks is a unique educational initiative between different programmes in the form of elective courses, where the choices are guided by personal interest. The framework of Tracks provides opportunities for individualised study and collaboration between students, industry, the community and academia.<br>- The initiative reduces the time required to offer new educational content, in collaboration with academia, industry and society.<br>- Tracks courses are held in close collaboration with representatives from industry, society and cutting edge of research.<br>- Participants collaborate across program boundaries to learn by exploring societal and scientific challenges together. The initiative helps the university to be agile and adaptable to continue to be relevant. | **Set up of interdisciplinary competences under the framework of elective courses and through cooperation with industry and communities**<br>- Tracks courses are elective and don't belong to any specific programme or department.<br>- They give students the opportunity to develop their interdisciplinary competence. |
| EDUCATION<br><br>Course level (Leurs et al., 2023) | **CHALMERS Collaboration between architects and engineers working on a project in partnership (e.g. Gothenburg City).**<br>**MASTER'S COURSES**<br>**Dare 2 Build** | a set of interlinked courses which focus on societal aspects of architecture and urban design, collaboration with local stakeholders, and taking a practice-oriented approach to learning, includes studios such as Dare2Build, Design and Planning for Social Inclusion, and | **Set up of a parkour as a playful training method** combining physical activity, sport challenges, training and fun-gathering moments<br>- fosters and promotes more community creativity |



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| Micro level (Baptista & Klein 2022; Williams et al, 2024, 5, Wieck et al. 2025 foreseen)<br><br>Teaching and curriculum (Williams et. al., 2024, 7-8) | https://play.chalmers.se/media/Parkourius+2021+-+Forest+Parkour/0_ccc4325w<br>**Design and Planning for Social Inclusion Studio** | Reality, as well as the Master's thesis direction on Design Activism<br>- DARE to Build" is a design-and-build focused summer course at Chalmers University of Technology, offered to civil engineering and architecture masters students. It aims to offer the students a common and experimental learning platform and at the same time address and contribute to positive local development.<br>- concept was within a master course in architecture "Design and Planning for Social Inclusion" and in a co-creation process together with the local community and youth from Bergsjön | - help make parkour part of the local identity<br>- stimulate social engagement and interaction |



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**9.c. Translations of Executive Summary (ENHANCE languages)**
*Translated with DeepL*

## EXECUTIVE SUMMARY: SWEDISH TRANSLATION

Denna portfölj om praktikbaserade metoder och samskapande verktyg som underlättar tvärvetenskapliga tillvägagångssätt vid ENHANCE-medlemsuniversiteten har utvecklats inom ramen för ENHANCE+ WP6, Transdisciplinary Lab for Societal Transformation. Som ett tvärvetenskapligt samarbete mellan forskare och forskningschefer ger den en översikt över aktuella och pågående tvärvetenskapliga initiativ inom universitetsvärldens områden strategi, forskning och utbildning. Den innehåller rekommendationer för att utveckla rätt miljö för att stödja tvärvetenskapliga tillvägagångssätt och främjar därmed organisatoriskt lärande eller institutionalisering av tvärvetenskaplighet. Huvudsyftet med denna portfölj är att ta itu med etableringen av en långsiktig grund för samhällelig transformation genom att öka medvetenheten och synligheten för ett permanent kunskapsutbyte mellan vetenskap och samhälle, samt att bygga strategier för att möjliggöra och genomföra tvärvetenskaplig forskning och utbildning vid ENHANCE-medlemsuniversiteten på ett hållbart sätt. Portföljen tar därför upp behovet av att etablera tvärvetenskaplighet som universitetskultur och som en erkänd forskningsmetod bortom disciplinära och tvärvetenskapliga tillvägagångssätt.

Arbetet bidrog till det gemensamma europeiska utbildningsområdet och skapade synergier mellan medlemsuniversiteten för att främja en gradvis institutionalisering. Det utvecklades i samarbete inom WP6 – som en miljö för ömsesidigt lärande. Institutionellt lärande stimulerades genom att man skapade en gemensam förståelse och vision av transdisciplinaritet och genom att man tillsammans tog fram gemensamma format, koncept och tjänster. För detta ändamål används kartläggning, verktygslådor och utvärdering här som huvudsakliga integrerande metoder för att få alla ENHANCE-medlemmar att nå en gemensam förståelse och för att skapa vägar för att bättre stimulera, stödja och främja tvärvetenskapliga metoder inom forskning och utbildning vid ENHANCE-universiteten. Dessa metoder genomfördes genom att diskutera exempel på god praxis och lämpliga operativa instrument för att genomföra tvärvetenskaplig forskning och undervisning inom alliansen och göra dem tillgängliga och tillämpliga för testning.

Kort sagt representerar denna portfölj – ENHANCE-verktygslådan för organisatoriskt lärande – tre verktygslådor som har byggts på varandra och som innehåller specifik information:

- Verktygslådan för institutionalisering av transdisciplinaritet som ett underliggande resultat av ENHANCERIA-projektet (se bilaga kapitel 9.b. Två tabeller med verktyg från strategiledda initiativ och projektledda initiativ inom forskning och utbildning relaterade till teoretiska antaganden om institutionalisering av transdisciplinaritet)
- Verktygslådan med validerade ENHANCE-exempel på god praxis avseende institutionella effekter av hållbarhet, medvetenhet, nyhet, inkludering och handlingskraft, inklusive utvalda verktyg med överförbar karaktär (se kapitel 5a) och
- Verktygslådan med utvalda verktyg baserade på institutionell praxis som beaktar begränsningar och möjligheter för institutionalisering (se kapitel 5c), som erbjuder specifik information om deras förmåga att koppla samman forsknings- och utbildningspraxis med universitetsstrategibyggande. Dessa operativa instrument rekommenderas för testning och utvärdering i WP6 Transdisciplinära laboratorier för att främja organisatoriskt lärande i ENHANCE-alliansen.

Portföljen riktar sig till forskare, beslutsfattare och vetenskapsförmedlare och innehåller lärdomar för att testa, överföra, anpassa och kommunicera transdisciplinära exempel på god praxis och verktyg vid universitet och därmed tillhandahålla ett ramverk för att sätta agendan för en kultur av permanent kunskapsutbyte mellan vetenskap och samhälle.

## EXECUTIVE SUMMARY: POLISH TRANSLATION

Niniejsze portfolio dotyczące metod opartych na praktyce i narzędzi współtwórczych, które ułatwiają stosowanie podejść transdyscyplinarnych na uniwersytetach członkowskich ENHANCE, zostało opracowane w ramach ENHANCE+ WP6, Transdyscyplinarnego Laboratorium Transformacji Społecznej. Jako interdyscyplinarna współpraca między naukowcami i menedżerami nauki, zapewnia przegląd aktualnych i trwających inicjatyw transdyscyplinarnych w obszarach strategii, badań i edukacji na uniwersytetach. Zawiera zalecenia dotyczące tworzenia odpowiedniego środowiska wspierającego podejścia transdyscyplinarne, a tym samym promuje uczenie się organizacyjne lub instytucjonalizację transdyscyplinarności. Głównym celem tego portfolio jest stworzenie długoterminowych podstaw transformacji społecznej poprzez podnoszenie świadomości i widoczności stałej wymiany wiedzy między nauką a społeczeństwem oraz opracowanie strategii umożliwiających i wdrażających badania i edukację transdyscyplinarną na uniwersytetach członkowskich ENHANCE w sposób zrównoważony. W związku z tym portfolio odpowiada na potrzebę ustanowienia transdyscyplinarności jako kultury uniwersyteckiej i uznanego sposobu prowadzenia badań wykraczającego poza podejścia dyscyplinarne i interdyscyplinarne.

W ramach wkładu w tworzenie wspólnej europejskiej przestrzeni edukacyjnej i zapewniania synergii między uczelniami członkowskimi w celu stopniowej instytucjonalizacji, prace były prowadzone w ramach współtworzenia w WP6 – jako środowisko wzajemnego uczenia się. Uczenie się instytucjonalne było stymulowane poprzez tworzenie wspólnego zrozumienia i wizji transdyscyplinarności oraz poprzez współtworzenie wspólnych formatów, koncepcji i usług. W tym celu wykorzystano mapowanie, zestaw narzędzi i ocenę jako główne metody integracyjne, aby doprowadzić wszystkich członków ENHANCE do wspólnego poziomu zrozumienia i stworzyć ścieżki umożliwiające lepsze stymulowanie, wspieranie i promowanie praktyk transdyscyplinarnych w badaniach i edukacji na uniwersytetach ENHANCE. Podejścia te zostały wdrożone poprzez omówienie przykładów dobrych praktyk i odpowiednich instrumentów operacyjnych służących do wdrażania badań i nauczania transdyscyplinarnego w ramach sojuszu oraz zapewnienie ich dostępności i możliwości zastosowania do testowania.

Krótko mówiąc, niniejsze portfolio – zestaw narzędzi ENHANCE dotyczących uczenia się organizacyjnego – stanowi trzy zestawy narzędzi, które zostały zbudowane w oparciu o siebie nawzajem i zawierają konkretne informacje:

- Zestaw narzędzi transformacyjnych służących instytucjonalizacji transdyscyplinarności jako podstawowy wynik projektu ENHANCERIA (patrz załącznik, rozdział 9.b. Dwie tabele zawierające narzędzia z inicjatyw strategicznych i projektowych w dziedzinie badań i edukacji związanych z teoretycznymi założeniami instytucjonalizacji transdyscyplinarności)
- Zestaw sprawdzonych dobrych praktyk ENHANCE dotyczących instytucjonalnego wpływu zrównoważonego rozwoju, świadomości, nowatorskości, inkluzywności i sprawczości, w tym wybrane narzędzia o charakterze przenośnym (patrz rozdział 5a) oraz
- Zestaw wyróżnionych narzędzi opartych na praktykach instytucjonalnych, uwzględniających ograniczenia i szanse związane z instytucjonalizacją (patrz rozdział 5c), które zawierają szczegółowe informacje na temat ich zdolności do łączenia praktyki badawczej i edukacyjnej z budowaniem strategii uniwersyteckiej. Te instrumenty operacyjne są zalecane do testowania i oceny w laboratoriach transdyscyplinarnych WP6 w celu wspierania uczenia się organizacyjnego w sojuszu ENHANCE.

Portfolio jest skierowane do naukowców, decydentów i osób zajmujących się popularyzacją nauki i zawiera informacje na temat testowania, transferu, adaptacji i komunikowania przykładów dobrych praktyk transdyscyplinarnych oraz narzędzi na uniwersytetach, a tym samym zapewnia ramy ustalania programu działań na rzecz kultury stałej wymiany wiedzy między nauką a społeczeństwem.

## EXECUTIVE SUMMARY: NORWEGIAN TRANSLATION

Denne porteføljen om praksisbaserte metoder og samskapende verktøy som legger til rette for tverrfaglige tilnærminger ved ENHANCE-medlemsuniversitetene, er utviklet innenfor rammen av ENHANCE+ WP6, det tverrfaglige laboratoriet for samfunnstransformasjon. Som et tverrfaglig samarbeid mellom forskere og vitenskapsledere gir den en oversikt over aktuelle og pågående tverrfaglige initiativer på universitetsområdet innen strategi, forskning og utdanning. Den inneholder anbefalinger for å utvikle det rette miljøet for å støtte tverrfaglige tilnærminger og fremmer derfor organisatorisk læring eller institusjonalisering av tverrfaglighet. Hovedmålet med denne porteføljen er å etablere et langsiktig fundament for samfunnsmessig transformasjon gjennom å øke bevisstheten og synligheten for en permanent kunnskapsutveksling mellom vitenskap og samfunn, og å utvikle strategier for å muliggjøre og gjennomføre tverrfaglig forskning og utdanning ved ENHANCE-medlemsuniversitetene på en bærekraftig måte. Porteføljen tar derfor for seg behovet for å etablere tverrfaglighet som universitetskultur og som en anerkjent forskningsform utover disiplinære og tverrfaglige tilnærminger.

Arbeidet bidro til det felles europeiske utdanningsområdet og skapte synergier mellom medlemsuniversitetene for å fremme gradvis institusjonalisering, og ble utviklet i samarbeid i WP6 – som et gjensidig læringsmiljø. Institusjonell læring ble stimulert ved å skape en felles forståelse og visjon om tverrfaglighet, og ved å samarbeide om å utvikle felles formater, konsepter og tjenester. For dette formålet brukes kartlegging, verktøysett og vurdering som de viktigste integrerende metodene for å bringe alle ENHANCE-medlemmer til et felles forståelsesnivå og for å bygge veier for å bedre stimulere, støtte og fremme tverrfaglige praksiser innen forskning og utdanning ved ENHANCE-universitetene. Disse tilnærmingene ble gjennomført ved å diskutere eksempler på god praksis og egnede operative instrumenter for å implementere tverrfaglig forskning og undervisning i alliansen og gjøre dem tilgjengelige og anvendbare for testing.

Kort sagt representerer denne porteføljen – ENHANCE-verktøykassen for organisasjonslæring – tre verktøykasser som er bygget på hverandre og som inneholder spesifikk informasjon:

- Transformasjonsverktøykassen for institusjonalisering av tverrfaglighet som et underliggende resultat av ENHANCERIA-prosjektet (se vedlegg kapittel 9.b. To tabeller med verktøy fra strategiledede initiativer og prosjektledede initiativer innen forskning og utdanning relatert til teoretiske antagelser om institusjonalisering av tverrfaglighet)
- Verktøykassen med validerte ENHANCE-godpraksiser vedrørende institusjonelle virkninger av bærekraft, bevissthet, nyhet, inkludering og handlekraft, inkludert utvalgte verktøy med overførbar karakter (se kapittel 5a) og
- Verktøykassen med utvalgte institusjonsbaserte verktøy som tar hensyn til begrensninger og muligheter for institusjonalisering (se kapittel 5c), som gir spesifikk informasjon om deres evne til å knytte forskning og utdanningspraksis til universitetsstrategiutvikling. Disse operative instrumentene anbefales for testing og evaluering i WP6 Transdisiplinære laboratorier for å fremme organisasjonslæring i ENHANCE-alliansen.

Porteføljen er rettet mot forskere, beslutningstakere og vitenskapsformidlere og inneholder lærdommer for å teste, overføre, tilpasse og kommunisere tverrfaglige eksempler på god praksis og verktøy ved universiteter, og dermed gi et rammeverk for å sette agendaen for en kultur med permanent kunnskapsutveksling mellom vitenskap og samfunn.

## EXECUTIVE SUMMARY: ITALIAN TRANSLATION

Questo portfolio sui metodi basati sulla pratica e sugli strumenti co-creativi che facilitano gli approcci transdisciplinari nelle università membri di ENHANCE è stato sviluppato nell'ambito del WP6 di ENHANCE+, il Laboratorio transdisciplinare per la trasformazione sociale. Come collaborazione interdisciplinare tra ricercatori e responsabili scientifici, fornisce una panoramica delle iniziative transdisciplinari attuali e in corso nei settori universitari della strategia, della ricerca e dell'istruzione. Contiene raccomandazioni per lo sviluppo dell'ambiente giusto a sostegno degli approcci transdisciplinari e promuove quindi l'apprendimento organizzativo o l'istituzionalizzazione della transdisciplinarità. L'obiettivo principale di questo portfolio è quello di affrontare la creazione di una base a lungo termine per la trasformazione sociale attraverso la sensibilizzazione e la visibilità per uno scambio permanente di conoscenze tra scienza e società, e di costruire strategie per consentire e attuare la ricerca e l'istruzione transdisciplinari nelle università membri di ENHANCE in modo sostenibile. Pertanto, il portfolio affronta la necessità di stabilire la transdisciplinarità come cultura universitaria e come modalità di ricerca riconosciuta al di là degli approcci disciplinari e interdisciplinari.

Contribuendo allo spazio europeo comune dell'istruzione e creando sinergie tra le università membri per promuovere la graduale istituzionalizzazione, il lavoro è stato sviluppato in co-creazione nel WP6, come ambiente di apprendimento reciproco. L'apprendimento istituzionale è stato stimolato dalla creazione di una comprensione e una visione condivise della transdisciplinarità e dalla co-produzione di formati, concetti e servizi comuni. A tal fine, la mappatura, la creazione di strumenti e la valutazione sono utilizzate qui come principali metodologie integrative per portare tutti i membri di ENHANCE a un livello comune di comprensione e per costruire percorsi per stimolare, sostenere e promuovere meglio le pratiche transdisciplinari nella ricerca e nell'istruzione nelle università ENHANCE. Questi approcci sono stati condotti discutendo esempi di buone pratiche e strumenti operativi adeguati per implementare la ricerca e l'insegnamento transdisciplinari nell'Alleanza e rendendoli accessibili e applicabili per la sperimentazione.

In breve, questo portfolio - il toolbox ENHANCE sull'apprendimento organizzativo - rappresenta tre toolbox che sono stati costruiti l'uno sull'altro e che contengono informazioni specifiche:

- Il Toolbox della trasformazione per istituzionalizzare la transdisciplinarità come risultato fondamentale del progetto ENHANCERIA (vedi Allegato Capitolo 9.b. Due tabelle con strumenti provenienti da iniziative strategiche e iniziative progettuali nel campo della ricerca e dell'istruzione relative alle ipotesi teoriche dell'istituzionalizzazione della transdisciplinarità)
- Il Toolbox delle buone pratiche ENHANCE validate relative agli impatti istituzionali della sostenibilità, della consapevolezza, della novità, dell'inclusività e dell'agenzia, compresi strumenti selezionati con carattere di trasferibilità (vedi capitolo 5a) e
- Il Toolbox degli strumenti basati sulla pratica istituzionale evidenziati che considerano i vincoli e le opportunità di istituzionalizzazione (vedi capitolo 5c), che offrono informazioni specifiche sulla loro capacità di collegare la pratica della ricerca e dell'istruzione alla costruzione della strategia universitaria. Questi strumenti operativi sono raccomandati per la sperimentazione e la valutazione nei laboratori transdisciplinari del WP6 al fine di promuovere l'apprendimento organizzativo nell'alleanza ENHANCE.

Il portfolio è rivolto a ricercatori, responsabili politici e facilitatori scientifici e contiene insegnamenti per testare, trasferire, adattare e comunicare esempi di buone pratiche e strumenti transdisciplinari nelle università e quindi fornire un quadro di riferimento per una cultura di scambio permanente di conoscenze tra scienza e società.

## EXECUTIVE SUMMARY: GERMAN TRANSLATION

Dieses Portfolio zu praxisorientierten Methoden und ko-kreativen Instrumenten, die transdisziplinäre Ansätze an den ENHANCE-Mitgliedsuniversitäten erleichtern, wurde im Rahmen von ENHANCE+ WP6, dem Transdisciplinary Lab for Societal Transformation, entwickelt. Als interdisziplinäre Zusammenarbeit zwischen Forschern und Wissenschaftsmanagern bietet es einen Überblick über aktuelle und laufende transdisziplinäre Initiativen in den Bereichen Strategie, Forschung und Bildung an Universitäten. Es enthält Empfehlungen für die Entwicklung eines geeigneten Umfelds zur Unterstützung transdisziplinärer Ansätze und fördert somit das organisatorische Lernen oder die Institutionalisierung von Transdisziplinarität. Das Hauptziel dieses Portfolios ist es, durch Sensibilisierung und Sichtbarmachung für einen permanenten Wissensaustausch zwischen Wissenschaft und Gesellschaft eine langfristige Grundlage für gesellschaftlichee Transformation zu schaffen und Strategien zu entwickeln, um transdisziplinäre Forschung und Lehre an den ENHANCE-Mitgliedsuniversitäten nachhaltig zu ermöglichen und umzusetzen. So befasst sich das Portfolio auch mit der Notwendigkeit, Transdisziplinarität als Universitätskultur und als anerkannte Forschungsmethode jenseits disziplinärer und interdisziplinärer Ansätze zu etablieren.

Als Beitrag zum gemeinsamen europäischen Bildungsraum und zur Schaffung von Synergien zwischen den Mitgliedsuniversitäten für die schrittweise Institutionalisierung wurde die Arbeit im WP6 gemeinsam entwickelt – als Umgebung für gegenseitiges Lernen. Das institutionelle Lernen wurde durch die Schaffung eines gemeinsamen Verständnisses und einer gemeinsamen Vision von Transdisziplinarität sowie durch die Entwicklung gemeinsamer Formate, Konzepte und Dienstleistungen gefördert. Zu diesem Zweck werden hier Mapping, Toolkitting und Bewertung als wichtigste integrative Methoden eingesetzt, um alle ENHANCE-Mitglieder auf einen gemeinsamen Wissensstand zu bringen und Wege zu finden, um transdisziplinäre Praktiken in Forschung und Lehre an den ENHANCE-Universitäten besser anzuregen, zu unterstützen und zu fördern. Diese Ansätze wurden durch die Diskussion von Beispielen für good practices und geeigneten operativen Instrumenten zur Umsetzung transdisziplinärer Forschung und Lehre in der Allianz und deren Zugänglichmachung und Anwendbarkeit für Tests umgesetzt.

Kurz gesagt, dieses Portfolio – die ENHANCE-Toolbox zum institutionellen Lernen – umfasst drei aufeinander aufbauende Toolboxen, die spezifische Informationen enthalten:

- Die Transformation Toolbox zur Institutionalisierung von Transdisziplinarität als grundlegendes Ergebnis des ENHANCERIA-Projekts (siehe Anhang Kapitel 9.b. Zwei Tabellen mit Instrumenten aus strategieorientierten Initiativen und projektorientierten Initiativen in Forschung und Lehre im Zusammenhang mit theoretischen Ansätzen zur Institutionalisierung von Transdisziplinarität)
- Die Toolbox mit validierten ENHANCE good practices zur Schaffung von institutioneller Wirkung wie Nachhaltigkeit, Aufmerksamkeit, Neuartigkeit, Inklusivität und Agency, einschließlich ausgewählter Instrumente mit Transfercharakter (siehe Kapitel 5a) und
- Die Toolbox mit hervorgehobenen institutionsgebundenen Instrumenten, die die Einschränkungen und Chancen der Institutionalisierung berücksichtigen (siehe Kapitel 5c) und spezifische Informationen über ihre Fähigkeit bieten, Forschung und Bildungspraxis mit der Strategieentwicklung von Hochschulen zu verknüpfen. Diese operativen Instrumente werden für Tests und Evaluierungen in den transdisziplinären Labs des WP6 empfohlen, um das institutionelle Lernen in der ENHANCE-Allianz zu fördern.

Das Portfolio richtet sich an Forschende, politische Entscheidungstragende und Wissenschaftsmanager*innen und enthält Erkenntnisse zum Testen, Transferieren, Anpassen und Kommunizieren transdisziplinärer bewährter Verfahren und Instrumente an Universitäten und bietet somit die Rahmensetzung zur Schaffung einer Kultur des permanenten Wissensaustauschs zwischen Wissenschaft und Gesellschaft.

## EXECUTIVE SUMMARY: DUTCH TRANSLATION

Deze portfolio over praktijkgerichte methoden en co-creatieve instrumenten die transdisciplinaire benaderingen bij de ENHANCE-liduniversiteiten faciliteren, is ontwikkeld in het kader van ENHANCE+ WP6, het Transdisciplinair Lab voor Maatschappelijke Transformatie. Als interdisciplinaire samenwerking tussen onderzoekers en wetenschapsmanagers biedt het een overzicht van huidige en lopende transdisciplinaire initiatieven op het gebied van strategie, onderzoek en onderwijs aan universiteiten. Het bevat aanbevelingen voor het ontwikkelen van de juiste omgeving om transdisciplinaire benaderingen te ondersteunen en bevordert daarmee organisatorisch leren of de institutionalisering van transdisciplinariteit. Het belangrijkste doel van dit portfolio is het leggen van een langetermijnbasis voor maatschappelijke transformatie door het bewustzijn en de zichtbaarheid van een permanente kennisuitwisseling tussen wetenschap en samenleving te vergroten, en strategieën te ontwikkelen om transdisciplinair onderzoek en onderwijs aan de ENHANCE-liduniversiteiten op een duurzame manier mogelijk te maken en uit te voeren. Daarom richt het portfolio zich op de noodzaak om transdisciplinariteit te verankeren als universiteitscultuur en als een erkende onderzoeksmethode die verder gaat dan disciplinaire en interdisciplinaire benaderingen.

Om bij te dragen aan de gemeenschappelijke Europese onderwijsruimte en synergieën tussen de aangesloten universiteiten te creëren voor een geleidelijke institutionalisering, werd het werk ontwikkeld in co-creatie in WP6 – als een omgeving voor wederzijds leren. Institutioneel leren werd gestimuleerd door het creëren van een gedeeld begrip en een gedeelde visie op transdisciplinariteit, en door het gezamenlijk ontwikkelen van gezamenlijke formats, concepten en diensten. Daartoe worden mapping, toolkitting en beoordeling hier gebruikt als belangrijkste integratieve methodologieën om alle ENHANCE-leden op een gemeenschappelijk begripsniveau te brengen en wegen te banen om transdisciplinaire praktijken in onderzoek en onderwijs aan de ENHANCE-universiteiten beter te stimuleren, te ondersteunen en te bevorderen. Deze benaderingen werden uitgevoerd door goede praktijkvoorbeelden en geschikte operationele instrumenten voor de implementatie van transdisciplinair onderzoek en onderwijs in de alliantie te bespreken en deze toegankelijk en toepasbaar te maken voor tests.

Kortom, deze portfolio – de ENHANCE-toolbox voor organisatorisch leren – bestaat uit drie op elkaar voortbouwende toolboxen die specifieke informatie bevatten:

- De transformatietoolbox voor het institutionaliseren van transdisciplinariteit als een onderliggend resultaat van het ENHANCERIA-project (zie bijlage hoofdstuk 9.b. Twee tabellen met tools uit strategiegeleide initiatieven en projectgeleide initiatieven in onderzoek en onderwijs met betrekking tot theoretische aannames van het institutionaliseren van transdisciplinariteit)
- De toolbox met gevalideerde ENHANCE-goedepraktijken met betrekking tot de institutionele effecten van duurzaamheid, bewustwording, vernieuwing, inclusiviteit en zeggenschap, met inbegrip van geselecteerde tools die overdraagbaar zijn (zie hoofdstuk 5a) en
- De toolbox met uitgelichte, op institutionele praktijken gebaseerde tools, rekening houdend met de beperkingen en kansen voor institutionalisering (zie hoofdstuk 5c), die specifieke informatie bieden over hun vermogen om onderzoek en onderwijspraktijken te koppelen aan de strategieontwikkeling van universiteiten. Deze operationele instrumenten worden aanbevolen voor testen en evaluatie in de WP6 Transdisciplinaire laboratoria om organisatorisch leren in de ENHANCE-alliantie te bevorderen.

De portfolio is bedoeld voor onderzoekers, beleidsmakers en wetenschapsfacilitators en bevat lessen om transdisciplinaire voorbeelden van goede praktijken en tools in universiteiten te testen, over te dragen, aan te passen en te communiceren, en daarmee een agenda-bepalend kader te bieden voor een cultuur van permanente kennisuitwisseling tussen wetenschap en samenleving.

## EXECUTIVE SUMMARY: SPANISH TRANSLATION

Esta cartera de métodos basados en la práctica y herramientas co-creativas que facilitan los enfoques transdisciplinarios en las universidades miembros de ENHANCE se ha desarrollado en el marco del WP6 de ENHANCE+, el Laboratorio Transdisciplinario para la Transformación Social. Como colaboración interdisciplinaria entre investigadores y gestores científicos, ofrece una visión general de las iniciativas transdisciplinarias actuales y en curso en los ámbitos universitarios de la estrategia, la investigación y la educación. Contiene recomendaciones para desarrollar el entorno adecuado que favorezca los enfoques transdisciplinarios y, por lo tanto, promueve el aprendizaje organizativo o la institucionalización de la transdisciplinariedad. El objetivo principal de esta cartera es abordar el establecimiento de una base a largo plazo para la transformación social mediante la sensibilización y la visibilidad de un intercambio permanente de conocimientos entre la ciencia y la sociedad, y elaborar estrategias que permitan y promuevan la investigación y la educación transdisciplinarias en las universidades miembros de ENHANCE de forma sostenible. Por lo tanto, la cartera aborda la necesidad de establecer la transdisciplinariedad como cultura universitaria y como modo reconocido de investigación más allá de los enfoques disciplinarios e interdisciplinarios.

Con el fin de contribuir al Espacio Europeo de Educación y proporcionar sinergias entre las universidades miembros para avanzar en la institucionalización gradual, el trabajo se desarrolló en co-creación en el WP6, como un entorno de aprendizaje mutuo. El aprendizaje institucional se estimuló mediante la generación de un entendimiento y una visión compartidos de la transdisciplinariedad, y mediante la coproducción de formatos, conceptos y servicios conjuntos. Con este fin, se utilizan aquí el mapeo, la creación de herramientas y la evaluación como principales metodologías integradoras para llevar a todos los miembros de ENHANCE a un nivel común de comprensión y construir vías para estimular, apoyar y promover mejor las prácticas transdisciplinarias en la investigación y la educación en las universidades de ENHANCE. Estos enfoques se llevaron a cabo mediante el debate de ejemplos de buenas prácticas e instrumentos operativos adecuados para implementar la investigación y la enseñanza transdisciplinarias en la Alianza y hacerlos accesibles y aplicables para su prueba.

En resumen, esta cartera —la caja de herramientas de ENHANCE sobre el aprendizaje organizativo— representa tres cajas de herramientas que se han construido unas sobre otras y que contienen información específica:

- La caja de herramientas de transformación para institucionalizar la transdisciplinariedad como resultado subyacente del proyecto ENHANCERIA (véase el anexo, capítulo 9.b. Dos tablas con herramientas de iniciativas basadas en estrategias e iniciativas basadas en proyectos en investigación y educación relacionadas con supuestos teóricos de institucionalización de la transdisciplinariedad).
- La caja de herramientas de buenas prácticas ENHANCE validadas en relación con los impactos institucionales de la sostenibilidad, la concienciación, la novedad, la inclusividad y la agencia, que incluye herramientas seleccionadas con carácter de transferibilidad (véase el capítulo 5a) y
- La caja de herramientas destacadas basadas en prácticas institucionales que tienen en cuenta las limitaciones y oportunidades de la institucionalización (véase el capítulo 5c), que ofrecen información específica sobre su capacidad para vincular la investigación y la práctica educativa con la elaboración de estrategias universitarias. Se recomienda probar y evaluar estos instrumentos operativos en los laboratorios transdisciplinarios del WP6 para fomentar el aprendizaje organizativo en la alianza ENHANCE.

La cartera está dirigida a investigadores, responsables políticos y facilitadores científicos y contiene aprendizajes para probar, transferir, adaptar y comunicar ejemplos y herramientas de buenas prácticas transdisciplinarias en las universidades y, por lo tanto, proporcionar un marco para establecer una agenda para una cultura de intercambio permanente de conocimientos entre la ciencia y la sociedad.