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Transition Super-Labs' Lessons Learned

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Abstract

This deliverable provides a comprehensive analysis of the experiences, successes, challenges, and insights gained from the implementation of the Transition Super-Lab (TSL) approach in four European regions: Emilia-Romagna (Italy), Lower Silesia (Poland), Ruhr Area (Germany), and Western Macedonia (Greece). The goal is to share lessons learned to improve future TSL operations and to aid other regions interested in adopting the TSL approach for achieving transition towards climate neutrality.

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List of Acronyms

GHG	Greenhouse gas emissions
KPIs	Key Performance Indicators
MoU	Memorandum of Understanding
QRAFT	Quantitative Regional Assessment Framework for Transition Super-Labs
SSH CENTRE	SSH CENTRE (Social Sciences and Humanities for Climate, Energy aNd Transport Research Excellence)
TJTP Western Macedonia	Territorial Just Transition Plan - Western Macedonia
TSL	Transition Super-Lab

Executive Summary

This deliverable aims to provide a comprehensive analysis of the experiences, successes, challenges, and insights gained from the implementation of the Transition Super-Lab (TSL) approach in four European regions: Emilia-Romagna (Italy), Lower Silesia (Poland), Ruhr Area (Germany), and Western Macedonia (Greece). The goal is to share lessons learned to improve future TSL operations and to aid other regions interested in adopting the TSL approach for achieving transition towards climate neutrality.

This deliverable is developed within the WP3 ''Super-Lab development and pilots'' and more specifically Task 3.4 ''Monitoring and analysing success and failures in TSLs''. Through an internal process evaluation and experience exchange format, the task resulted in the development of the lessons learned along the four different phases of the transition process as elaborated in the Transition Super-Lab Roadmap analysing the enablers and barriers that influenced the set-up of the TSL and their cross-sectorial open innovation approach. Furthermore, lessons learned related to specific methodologies and tools that were tested in the TSL to facilitate exchange of knowledge and potential replication within the project and beyond are included in this deliverable.

After an introduction in Chapter 1 contextualizing the need for systemic transformation to achieve climate neutrality and highlighting the importance of collecting and documenting lessons learned, Chapter 2 outlines the TSL approach, emphasizing the use of enriched living lab methodologies to co-create regional transformation strategies. It also presents in detail the methodological approach of the post-facto method that was used to gather lessons learned. Chapter 3 is the core of the document focusing on the analysis of the activities and the lessons learned across the four phases of the Transition Super-Lab Roadmap. The lessons learned for each of the phases of the transition process as described in the Transition Super-Lab Roadmap are presented after the brief summaries of what is expected according to the roadmap and what have been done in practice by the four TSLs.

The final chapter summarises key lessons, including the need for continuous stakeholder engagement, flexible methodologies, and robust governance frameworks. Additionally, it suggests areas for further research and development, such as enhancing tools for monitoring and evaluating systemic transformations.

This deliverable of lessons learned based on the TSLs' experiences combined with the Transition Super-Lab Roadmap and the Deliverable D5.3 ''Best practices and recommendations for Super-Labs operation towards the region transition'' serves as a valuable resource for regions seeking to implement TSLs, offering practical insights and recommendations based on real-world experiences. It underscores the importance of adaptability, stakeholder collaboration, and a systemic approach to achieving climate neutrality goals.

1 Introduction

To tackle climate change, the Paris Agreement[1] and the European Green Deal[2] set out very ambitious goals that require an urgent and radical transformation of the EU economy. Reaching the goal of net-zero emissions by 2050 needs immediate action going beyond the level of fostering innovation and digitalisation in societal niches. It calls for an innovation path which sets out to design carbon neutral societal systems and focus investments in zero-carbon solutions.

The TRANSFORMER project takes up this challenge by designing long-term systemic transformation frameworks for European regions to accelerate the shift towards climate neutrality: the **Transition Super-Lab approach** (TSL)[3]. A TSL adapts and applies enriched **living lab methodologies** in order to develop (co-create) together with all relevant stakeholders from the quadruple helix a vision for a regional transformation and a **portfolio of large-scale systemic solutions** for climate neutrality, net-zero emissions and resilient future. The **systemic transformation** within TSL catalyzes large and diverse communities to innovate for systemic changes that accelerate transition at scale. The **systemic transformation** will be achieved by developing and implementing a portfolio of connected solutions ("e.g., Pilot use cases") which engage **multiple leverage points** at the **intersection of socio-technical regimes** simultaneously in order to achieve a rapid and more efficient transformation[4]. This approach is tested in four regions within TRANSFORMER project: Emilia-Romagna in Italy, Lower Silesia in Poland, the Ruhr Area in Germany and Western Macedonia in Greece as seen in Figure 1. Each region is faced with a unique set of challenges and socio-technical systems that will impact the TSL development and goals.
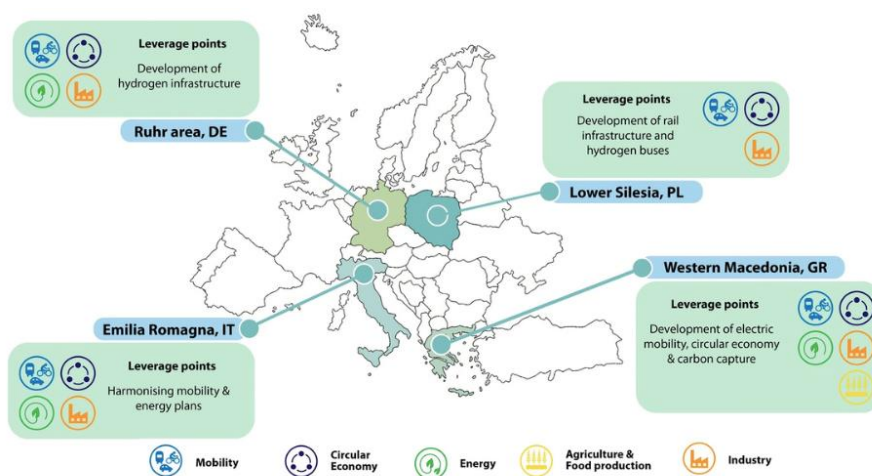

Figure 1: TSL regions[5]

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[1] United Nations (2015). Paris Agreement. Available at:
https://treaties.un.org/Pages/showDetails.aspx?objid=0800000280458f37&clang=_en

[2] European Commission (2019). The European Green Deal. Brussels. Available at: https://eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0002.02/DOC_1&format=PDF

[3] The definition and description of the TSL transition model in this chapter was discussed and written jointly by the members of the TRANSFORMER Project Consortium.

[4] For example, developing green hydrogen-solutions for simultaneously transforming the mobility and the industrial sector. For a more detailed explanation of leverage points ("levers of change") and the portfolio approach see: Deliverable D2.1, Available at: https://transformerknowledgehub.imet.gr/wp-content/uploads/2024/06/D2.1_Summary-of-data-collection-on-TSL-predecessors.pdf

[5] TRANSFORMER Project Proposal

The goal of this Deliverable 3.4 is to provide valuable insights on the lessons learned from the development and the testing of the TSL approach in the four TRANSFORMER regions. It aims specifically in documenting and analysing the experiences, successes, challenges, and insights gained during the project.

This deliverable is developed within the WP3 ''Super-Lab development and pilots'' and more specifically Task 3.4 ''Monitoring and analysing success and failures in TSLs''. Through an internal process evaluation and experience exchange format, the task resulted in the development of the lessons learned along the four different phases of the transition process as elaborated in the transition roadmap analyzing the enablers and barriers that influenced the set-up of the TSL and their cross-sectorial open innovation approach. Furthermore, lessons learned related to specific methodologies and tools that were tested in the TSL to facilitate exchange of knowledge and potential replication within the project and beyond are included in this deliverable.

The value of the present deliverable is high not only for TRANSFORMER TSLs but also for other regions that are interested in following the TSL approach to accelerate their transition toward climate neutrality. Gathering lessons learned in a TSL is crucial, as it provides valuable insights into what worked well and what didn't during the transition process. This is a continuous activity that provides to TSLs essential information for refining the different processes, improving methodologies and tools' usage, and ensuring that future projects benefit from past experiences. Understanding past challenges and mistakes helps in identifying potential risks and developing strategies to mitigate them in future projects. This proactive approach can prevent the recurrence of similar issues. Additionally, by learning from previous experiences, the TSLs can use their resources (time, money and human resources) more efficiently, ensuring that efforts are directed towards activities that yield the best outcomes.

Documenting lessons learned facilitates the sharing of knowledge among the involved stakeholders within the TSL but also between the TSLs. The sharing of this collective knowledge enhances collaboration and innovation while in parallel fosters a culture of accountability and transparency. It shows that the TSL is committed to reflecting on its performance and is open to learning and improvement. This can also strengthen relationships with the stakeholders and build trust as the TSL demonstrates that the stakeholders' feedback is valued and contributes to the TSL's development.

As the TSLs are complex and dynamic environments they can benefit from the lessons learned in terms of adaptability and respond effectively to emerging trends, challenges, and opportunities through strategic planning. Lessons learned offer evidence-based insights that can inform the TSL's direction, priorities, and decision-making processes. Additionally, combined with the monitoring of the impact KPIs during the impact assessment of the TSL process, the lessons learned can provide a basis for measuring success and understanding the broader implications of the TSL's activities on the community and environment.

The nature of lessons learned is retrospective and reflective and their aim is twofold: i) to contribute to understanding the activities that took place during the project and ii) to be used as a basis for the development of recommendations (Deliverable D5.3) for improving the operation of the future TSLs. Thus, the primary target groups are the project partners in the four TSL regions and the involved

stakeholders in those regions that are interested in learning about the successes and the failures of the process implementation so far, in order to leverage this collective experience for continuous learning and improvement. A third possible target group is the follower regions that are interested in implementing the TSL approach.

To meet these objectives, this deliverable is structured as follows: The subsequent Chapter 2 presents the methodological approach that was followed for gathering the lessons learned and the steps for collecting the required information. In Chapter 3, the lessons learned for each of the phases of the transition process as described in the roadmap are presented after the brief summaries of what is expected according to the roadmap and what have been done in practice by the four TSLs. Finally, Chapter 4 concludes with a reflection on the lessons learned and provides an outlook on further research needs.

2 Methodology and Approach

2.1 The TSL approach

A Transition Super-Lab is an ecosystem of actors organized to accelerate the transformation towards climate neutrality through innovation, and cross-sectorial synergies on a regional scale. It benefits from a collaborative governance, operates in accordance to systemic transformation principles and utilizes transition enabling methods and tools in order to create added value to cross-sectorial initiatives for economic transformation and to provide feasible solutions to complex regional transformation challenges.

TSL approach adapts and applies enriched living lab methodologies in order to develop (co-create) together with all stakeholders from the quadruple helix and society a vision for a regional transformation and a portfolio of large-scale systemic solutions for climate neutrality, net-zero emissions and resilient future. The systemic transformation within TSL catalyzes large and diverse communities to innovate for systemic changes that accelerate transition at scale.

The systemic transformation will be achieved by developing and implementing a portfolio of connected solutions ("e.g., Pilot use cases") which engage multiple leverage points at the intersection of socio-technical regimes simultaneously in order to achieve a rapid and more efficient transformation[6]. Therefore, the adaptation of Living Lab methodologies to a large-scale and with a focus on systemic transformation can be regarded as the core characteristics of a TSL (Figure 2):

1. Adaptation and application of enriched Living Lab methodologies (co-creation, experimentation and evaluation)
2. Aiming at large-scale systemic solutions for a rapid sustainable transformation
3. Applying a portfolio approach of measures (experiments) and using multiple leverage points for systemic change simultaneously

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[6] The definition and description of the TSL approach in this chapter was discussed and written jointly by the members of the TRANSFORMER Project Consortium. It is also included in Deliverable 2.2.
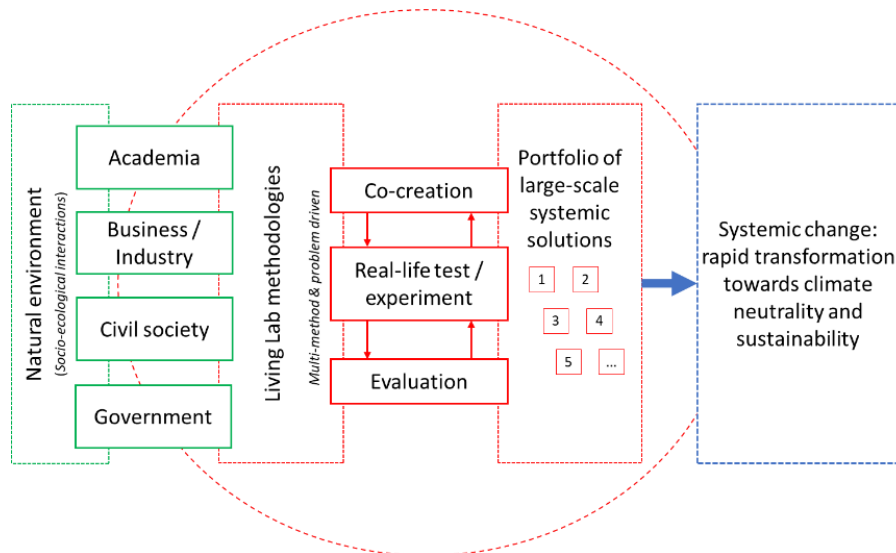
Figure 2: Elements of a Transition Super-Lab[7]

2.2 Methodological approach

The input from the TSLs was collected for each specific activity of the eleven steps of the Transition Super-Lab Roadmap (Deliverable 4.2). For each of the following activities of the roadmap TSLs and relevant partners that were involved in the different activities of the roadmap were asked to describe the lessons learned considering the following:

- Identification and analysis of transition enablers and opportunities that help them perform each activity accelerating the transition process. Specific methodologies and tools that were used towards this direction are also considered as transition enablers.
- Identification and analysis of the challenges and barriers that they encountered during each activity as well as the actions performed that help the TSLs overcome and/or mitigate these barriers.
- Key findings and insights: what were the key successes and failures for each activity? For each failure what could be done differently?

However, as not all the activities were performed during the project due to time limitations, the lessons learned are structured around the four phases of the Transition Super-Lab Roadmap rather than each activity separately.

For each phase, the objectives and what is expected based on the roadmap is summarised in the first section. The second sub-section of each phase presents a brief description to the reader of what each of the four TSLs did during the implementation of that phase in the project. At the end of each phase, the lessons learned are extracted.

The Task 3.4 is related to almost all the tasks of the project as it collects feedback for the different activities performed by the TSLs. In addition, some of the "lessons learned" of establishing a TSL in the four TRANSFORMER regions are included in the Deliverables D2.2, D2.3, D.3.1, D3.2, D3.3, and D4.2.

2.2.1 Lessons Learned Collection Method

There are several methods for collecting lessons learned (e.g. Integrated, post-facto)[8]. For the current deliverable, we used a post-facto approach as the different steps and activities are examined after their implementation. This approach requires a thorough examination of the transition processes post-facto. While more resource-intensive, this approach has the benefit of offering an extensive look into the operations, successes, and outcomes of the TSLs for those who are interested in replicating the TSL approach.

2.2.2 Methodological Steps

The basic steps that were followed for collecting the lessons learned and developing the current deliverable were the following:

1. *Definition of the aim of the process*
   This step identifies the need for lessons learned and establishes the mechanism and team responsible for collecting the lessons. It is critical to identify the precise need and the goal of the lessons learned and the target audience. The data collecting and analysis methodology, the process, the dissemination strategy, and any further activities that may be required are also identified in this first step.

2. *Collection of the required information*
   The collecting process entails the capture of information using structured and unstructured methods such as project critiques, written forms, and meetings. Lessons can be gathered from any source and activity performed within the project. Lessons learned can include both positive experiences that help the TRANSFORMER TSLs implement successfully an activity of the transition process and negative experiences that lead to delays or other undesirable consequences. A collaborative lesson-gathering method is crucial as it enhances the quality and effectiveness of the lessons learned, leading to better outcomes for future TSLs.

3. *Synthesis of the lessons learned*
   At this step the lessons learned are synthesized highlighting how the specific actions of the TSLs accelerate or hinder the transition activities presented in the roadmap.

4. *Dissemination of lessons learned*
   The final and most important step is the dissemination of lessons learned. The lessons learned are of high benefit if they are properly distributed and used by the target groups who will benefit from them. Dissemination can include the revision of a work process, training, and communication via a variety of communication media. Lessons can be "pushed," or automatically delivered to a user, or "pulled" in when a user must manually search for them.

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[8] White M. and Cohan A (2015). A Guide to Capturing Lessons Learned, *The Nature Conservancy.* Available at: https://www.conservationgateway.org/ConservationPlanning/partnering/cpc/Documents/Capturing_Lessons_Learned_Final.pdf

Table 1 outlines the methodical approach that we followed for capturing the lessons learned in a thorough manner at the end of a project.

Table 1: Step-by-step detailed process for capturing lessons learned post-facto

Definition of the aim of the process	
Step 1: Identify the need for lessons learned. Clarify the purpose and audience before proceeding.	The need: Analysis of the success and failures in the development and testing of the TSL approach The aim: Provision of valuable insights on the lessons learned from the development and the testing of the TSL approach in the four TRANSFORMER regions Audience: TRANSFORMER project partners in the four TSL regions, the involved stakeholders in the TSL regions and the follower regions that are interested in implementing the TSL approach.
Step 2: Identify the team that is responsible for collecting the lessons learned and the contributors	Although CERTH is the responsible partner for Deliverable 3.4, all the partners contributed to the collection of lessons learned from the project activities in which they were involved during the project.
Step 3: Agree to the data collection methodology and process, dissemination strategy, and other activities that will be needed.	A collaborative post-facto data collection method was used, as all the partners provided their lessons learned from the different activities of the transition process.
Step 4: Develop and implement a methodology if data will be collected from others.	A draft structure of the deliverable was developed based on the different activities of the roadmap and CERTH asked the relevant partners to provide their input.
Step 5: Design, refine, and agree to the data analysis process. Identify all the documents and partners that will provide the appropriate information.	The analysis process is based on the objectives and expectations for each phase of the roadmap, a brief description of what each of the four TSLs did during the implementation of the phase in the project, and the lessons learned are extracted at the end of each phase. Previous deliverables that could provide input to D3.4 were also identified.

Collection of the required information	
Step 6: Collect data from primary (e.g., partners' input) and secondary sources (e.g., documents, meeting minutes). Review project materials such as previously gathered lessons learned material and the reports gain insight into project issues and successes.	For the development of the lessons learned, feedback was collected from all tasks of the project and the various activities performed by the TSLs. The relevant partners provided input, and additionally previous and ongoing deliverables of the project were reviewed (e.g. D2.3, D3.3, D4.2).
Synthesis of the lessons learned	
Step 7: Summarise the data for the lessons learned in the agreed-upon lessons learned format and create a draft lesson learned document.	The deliverable of the lessons learned was prepared.
Step 8: Send the draft lessons learned document to the peer review team.	The deliverable of the lessons learned was reviewed by RUB, BMR and RC.
Step 9: Revise the draft and get the final version approved.	The comments of the reviewers were properly addressed and the final version of D3.4 was approved.
Dissemination of lessons learned	
Step 10: Finalise and implement the lessons learned dissemination strategy.	The dissemination of the lesson learned will continue beyond the end of the project.

3 Lessons learned per transition phase

3.1 Phase 1: Assess and Build the Transition capacities

The first phase of the roadmap signals the initiation of the TSL and paves the way for the succeeding stages of the TSL implementation, ensuring that the region follows a strategic approach to achieve its climate transition goals. In this phase, the TSL determines the transition framework, builds a coalition of stakeholders, and as soon as it co-defines a common vision with the stakeholders, it develops scenarios and transition pathways that will help achieve its vision.

3.1.1 Brief description of the activities of Phase 1

One of the main activities of this phase is *defining the scope of the TSL and assessing the regional transition needs and potentials*. To do so, the TSL can review existing policy documents and plans to identify gaps and barriers, and in parallel conduct interviews with key stakeholders to form a clear image of the regional needs and challenges that could be addressed through the TSL as well as about the strengths and the weaknesses that could guide its future activities.

The first ***evaluation of the region's transition needs and potentials*** should be conducted at this early stage to help the TSL define the most important "topics" (such as agriculture, energy, manufacturing, mobility, etc.) for becoming climate neutral. In the TRANSFORMER project, a methodology named ''Quantitative Regional Assessment Framework for Transition Super-Labs'' (QRAFT) was developed to define the transition needs and potentials of regions for reducing GHG emissions from a TSL perspective. The TSL perspective is a critical qualifying factor, since otherwise assessing the transition needs and potentials of regions is an immensely wide task with a long-standing list of possible pitfalls (e.g., high levels of abstraction which fail to represent the complexity of regional reality, subjectivity in the selection of data and indexes). It is important to note that QRAFT has three main criteria: i) the availability of data (using datasets covering all EU NUTS2 regions and selected data, such as GHG emissions, at the NUTS 3 level), ii) meaningfulness (indicators must be essential for assessing needs and potentials), and iii) usability (the methodology should be easy to use for our primary target group of potential TSL follower regions and easily understandable)[9] .

An overall SWOT could be performed at this stage while topic-based SWOT for the topics identified by the QRAFT can also complement the assessment of regional needs and potentials. Also, the TSL should get familiarised with the Methodology for Assessing the Efficiency and Success of the Transition Process towards climate neutrality based on the TRANSFORMER transition model. The methodology for Assessing the Efficiency and Success of the Transition Process towards climate neutrality is a four-phase process based on the achievement of specific milestones to be reached at the end of each transition step of TRANSFORMER cross-sectorial transition model in a suggested timeline[10]. At this stage this milestone achievement monitoring approach will provide to TSLs a clear overview of what should be monitored and assessed during the transition process paving the ground for the monitoring activities in the fourth phase of roadmap.

Along with the evaluation of the transition needs and potentials, the TSL should ***evaluate and define the capacities of the leading organisation(s)*** in terms of knowledge, skills and technology, set up working structures that will help them implement the TSL and assess the availability and accessibility of funding sources and financial capacities that could be leveraged through stakeholders' engagement. To ensure the long-term availability of financial resources and enhance its viability and sustainability, the TSL should ***gain political and institutional support.*** All these steps will help the TSL to develop a first ***conceptualization of the vision*** to serve as the basis for the definition of the TSL's vision in the next steps.

Building a stakeholders' coalition is one of the most important steps during the establishment and implementation of a TSL, as by definition a TSL is an ecosystem of actors organised to accelerate the transformation towards climate neutrality through innovation, and cross-sectorial synergies on a

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[9] For detailed information about QRAFT, its criteria, and limitations, see Deliverable D2.2. Quantitative mapping research report. Available at: https://transformerknowledgehub.imet.gr/wp-content/uploads/2024/06/D2.2_Quantitative-mapping-research-report.pdf

[10] For detailed information about the Methodology for Assessing the Efficiency and Success of the Transition Process towards climate neutrality, see Deliverable D5.1. Framework for Super-Labs Assessment. Available at: https://transformerknowledgehub.imet.gr/wp-content/uploads/2024/06/D5.1_Framework-for-Super-Labs-Assessment_public.pdf

regional scale. As it benefits from a collaborative governance it is critical to *identify the stakeholders* that will be involved and participate actively throughout the whole process. The stakeholders should represent all the parts of the quadruple helix, and key stakeholders as well as veto players should be identified at this stage. However, the identification of the stakeholders should be complemented by a *mapping* based on their interests and influence, which will facilitate the TSL in identifying the specific role that each stakeholder should play in the coalition a well as the value proposition for them. Indicative roles for stakeholders could include the following: providing transition-enabling tools and transition-related data, capacity for conflict solving, implementer, conditions creator. A *stakeholders' communication and engagement plan should be developed* considering different means of engagement and channels of communication for diverse stakeholders. The TSL has to identify a governance model that fits the region's institutional and socioeconomic conditions while encouraging cross-sector collaboration and conflict resolution among stakeholders. The *identification of the TSL governance* is critical at this very early stage of the TSL's establishment, as it contributes to the orchestration of the collaborative efforts, laying the foundations for cross-sectorial cooperation and efficient decision-making to achieve successful regional climate neutrality.

The *co-creation of a shared vision* is one of the first participatory and interactive processes of the TSL, as diverse stakeholders are asked to collaborate to develop a vision that reflects the regional needs, as well as the needs of local communities and the involved stakeholders. Therefore, it is crucial to combine top-down approaches (a strong role of governing bodies who ensure that the politically legitimized policies are reflected in the vision) with bottom-up approaches (an equally strong role of civil society and local authorities that ensure the diversity of the needs of different stakeholders and communities is reflected in the vision). The vision of a TSL should also be framed by *clear goals and objectives* that will channel the desired future of the region into specific and actionable directions.

The vision guides the next activities of *co-defining different scenarios, selecting the most suitable ones and the pathways* that could help the region to achieve its vision. The stakeholders should collaboratively discuss a set of different potential scenarios that take into account the regional context and are aligned with the TSL's vision and objectives. Through an assessment of the co-developed scenarios, the stakeholders select the most suitable one and co-design multiple pathways that lead to the chosen desirable scenario, examining a variety of tactics and approaches for obtaining the desired future. At this phase the TSL is able to use the *Transition Readiness Self-Assessment Tool* answering a set of mainly qualitative questions to calculate their transition readiness level and identify their weak points. The results analysis also allows for a comparative assessment with benchmarks and other region's transition readiness, highlighting areas of concern that fall below average performance and providing recommendations (linked to the transition model/roadmap) on how to speed up the transition towards climate neutrality.

Although the Transition readiness assessment is a useful step for the creation of possible pathways/scenarios in the beginning of the transition process, it is an iterative process allowing for adjustment of the transition pathways and the Pilot use cases. This continuous learning during the next phases of the transition process (e.g., Activity 11.4 of Transition Super-Lab Roadmap) is also crucial for adapting the strategies that were designed to accelerate a successful transition towards climate neutrality, ensuring that the region remains on course to achieve its desired outcomes and maximize the impact of its transition efforts through the Pilot use cases.

3.1.2   Activities executed by TRANSFORMER TSLs

Although the steps of this first phase didn't follow exactly the order as described in the roadmap, the majority of the activities were performed by the TSLs with minor deviations that can be explained by the different context of each TSL.

Defining the scope of the TSLs has already been taken place during the writing of the project proposal. However, in the first phase of the transition process, the TSLs identified and reviewed planning documents and existing strategies of the regional context in terms of transition. These documents for each region were also shared with project partners to familiarise them with the different regional contexts. Thus, the Pact for Work and Climate[11] and the 2020-2025 Regional Government Programme[12] were two of the strategic documents that Emilia-Romagna considered in this first step as they are the basis of the Regional Strategy 2030 Agenda[13]. Moreover, the PAIR 2030[14] (Regional Integrated Plan for Air Quality) was another important document that the TSL reviewed, as this plan promotes an integrated and multidisciplinary approach that aims to improve air quality. The main strategic documents that Lower Silesia and Western Macedonia TSLs based their scopes on are the ''Energy Strategy of Lower Silesia - directions of support for the energy sector"[15] and the ''2021 TJTP Territorial Just Transition Plan- TJTP Western Macedonia[16] respectively. Lastly, for the Ruhr Area, different documents were examined such as the ''Hydrogen Ranking 2020: Where does the Ruhr Area stand in a metropolitan comparison?''[17] and the ''Hydrogen roadmap of North Rhine-Westphalia''[18] among others.

Although the *analysis of the regional needs and potentials* using the QRAFT methodology should be done at an early stage to provide data-driven insights for discussing and defining the region's vision, scenarios, and potential Pilot use cases, this analysis for TRANSFORMER TSLs performed at a later stage when the vision and the Pilot use cases of the TSL have already been developed. So, in TRANSFORMER it was used as a useful tool to critically reassess the already chosen topics of a region.

[11] Regione Emilia-Romagna, Presidenza della Giunta (2020). Pact for Work and Climate. Available at:
https://www.regione.emilia-romagna.it/pattolavoroeclima/documenti/ese-patto-per-il-lavoro-17x24cm_en_web.pdf

[12] Regione Emilia-Romagna (2020). Programma di mandato della Giunta 2020-2025. Available at:
https://www.regione.emilia-romagna.it/presidente/programma-di-governo/programmadimandato20202025.pdf/@@download/file/13_Mandato_A4_web_singole.pdf

[13] Regione Emilia-Romagna (2021). Regional Strategy "2030 Agenda for Sustainable Development". Available at:
https://www.regione.emilia-romagna.it/agenda2030

[14] Regione Emilia-Romagna, Settore Tutela dell'Ambiente ed Economia Circolare - Area Qualità dell'Aria e Agenti fisici (2024). Piano Aria Integrato Regionale (PAIR 2030). Available at: https://ambiente.regione.emilia-romagna.it/it/aria/temi/pair-2030/pair-2030-pagina

[15] INSTITUTE FOR TERRITORIAL DEVELOPMENT (2022), Energy Strategy of Lower Silesia - directions of support for the energy sector.   Available   at:
https://umwd.dolnyslask.pl/fileadmin/user_upload/Gospodarka/SEWD/1_Strategia_Energetyczna_Dolnego_Slaska_-_wersja_do_pobrania.pdf

[16] Hellenic Ministry of Environment and Energy (2021). 2021 TJTP Territorial Just Transition Plan- TJTP Western Macedonia

[17] Institut der deutschen Wirtschaft Köln Consult GmbH (2020). Wasserstoffranking 2020: Wo steht das Ruhrgebiet im Metropolenvergleich? (Hydrogen Ranking 2020: Where does the Ruhr Area stand in a metropolitan comparison?).   Available   at:
https://www.iwconsult.de/fileadmin/user_upload/pdfs/2020/iw_nationales_wasserstoff-ranking_final.pdf

[18] Ministerium für Wirtschaft, Innovation, Digitalisierung und Energie des Landes Nordrhein-Westfalen (2020). Hydrogen roadmap   of   North   Rhine-Westphalia.   Available   at:
https://www.wirtschaft.nrw/sites/default/files/documents/mwide_br_wasserstoff-roadmap-nrw_eng_web.pdf

The QRAFT analysis for Western Macedonia showed that GHG emissions in the energy sector are extremely high in the region. This, combined with the very high CEI of the "Energy and Waste sector", highlights the need for a shift in energy policy, which has already been implemented by political decision-makers in Western Macedonia to accelerate the phasing-out of lignite[19]. This quantitative assessment clearly shows that the Western Macedonia TSL has identified one of the most crucial topics in the region and it can serve as an argument to convince possible veto players that the phase-out of lignite-based electricity and heating is of utmost importance to tackle climate change in that region.

In Lower Silesia, nearly half of the region´s GHG emissions originate from the power industry and fuel production[20]. The topic of energy-transition is also directly related to the transport sector, which contributes the second most to the region´s GHG emissions. Thus, QRAFT also confirms that the second Pilot use case – developing "convenient transport connections for the benefit of the environment" – addresses one of the most important topics.

The Pilot use cases of Emilia-Romagna TSL focus on the transport sector, which is also highlighted through QRAFT as a crucial sector for the region to achieve climate neutrality. Finally, the Ruhr Area – as one of the largest industrial areas in Europe – has by far the highest share of GHG emissions in manufacturing compared to the other TRANSFORMER TSL regions. As the regional potential for generating renewable energy is low, hydrogen is widely regarded as an essential topic, especially with regard to the climate-neutral steel production. This confirms the importance of one of the Pilot use cases ("Extension of the Rhine-Herne Canal into a ´Hydrogen River") that will address one of the main challenges in the region linking the Ruhr TSL to other regions with high H2-generation potential.

A workshop on ''coalition-building and vision development'' took place at the end of October 2022. In this workshop TSLs had a first brainstorming session on the ***conceptualization of their vision***, the stakeholders of the industry, government, academia, civil society and ''green'' society that could be involved in each TSL, and the strengths and weaknesses of the regions in a SWOT format.

The initial ***identification and mapping of the stakeholders*** to be involved in each TSL was complemented using a refined quadruple helix stakeholder mapping canvas through separate bilateral workshops with the TSLs organized by EnoLL and RUB in February 2023. Also, a first exercise for identifying civil society stakeholders was performed at the end of February 2023 using the influence-interest matrix. Thus, by this time all project partners developed a list of key stakeholders for their TSLs and conducted interviews with them to identify their needs and interests as well as their potential role in the transition process. These coalition-building processes for Emilia-Romagna, Lower Silesia,

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[19]   Enterprise   Greece   (2020).   Just   transition   development   plan   (SDMA).   Available   at: https://www.sdam.gr/sites/default/files/consultation/Master_Plan_Public_Consultation_ENG.p df

[20]   TRANSFORMER   Project   (2024)   Deliverable   2.2   Quantitative   mapping   research   report.   Available   at: https://transformerknowledgehub.imet.gr/wp-content/uploads/2024/06/D2.2_Quantitative-mapping-research-report.pdf

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the Ruhr Area, and Western Macedonia shared common characteristics related to implementation of collaborative and inclusive approaches. However, there were some specific differences based on the regional context that were considered for tailoring the coalition-building processes to each TSL, ensuring their effectiveness and relevancy to the region's challenges.

By aligning different specialized departments within the Emilia-Romagna Regional Authority, the Emilia-Romagna TSL started engaging different stakeholders from the quadruple helix in a participatory and co-creative process to define scenarios and pathways collaboratively. Similarly, the coalition-building process for the Lower Silesia TSL brought together local authorities, industry experts, community representatives, and other relevant parties to collectively address transportation and energy challenges. The TSL adopted a bottom-up approach through engaging with local authorities, conducting interviews, and fostering regular meetings and discussions. The Ruhr Area's TSL adopted a dynamic and flexible coalition-building process with the active participation of regional stakeholders. Similarly, the coalition-building process for the Western Macedonia TSL identified relevant stakeholders from government agencies, non-profit organizations, community groups, businesses, and academic institutions. Stakeholders were encouraged to actively participate through various engagement and outreach efforts. Building strong relationships, establishing open communication channels, and developing a shared vision were defined as common goals across all regions.

Emilia-Romagna engaged major municipalities in the TSL to ***ensure political and institutional support***. Similarly, Western Macedonia involved at a very early stage local and regional government officials and policymakers to secure their commitment to TSL development and Lower Silesia also established cooperation with authorities at various levels, both local and regional. Due to the specific situation of Ruhr Area TSL (for detailed information, see Deliverables 3.1, 3.2 and 3.3), securing the political and institutional support would be a very challenging task.

During the bilateral workshops in February 2023, a first attempt to ***identify the TSL governance*** was also performed. By using the Living Lab mapping canvas that was adapted for the TRANSFORMER project needs, the TSLs were asked to define their host organisation and the governance structure. This was a crucial step for the later refinement of the governance model. Although at this stage it was quite early for the TSLs to estimate the required budget for the TSLs' development and explore funding opportunities at local, regional, national and EU levels, the mapping exercise helped them to perform an initial ***evaluation of their capacities*** in terms of knowledge, skills and technology.

As discussed during the bilateral workshops, the roles of the team personnel will be specified at a later stage, although the Emilia-Romagna TSL is co-hosted by the ITL Foundation and the Emilia-Romagna Region. The team has no prior experience with the Living Lab methodology but has a well-established position in the region which will help attract stakeholders to the co-creative sessions. The governance structure of the Lower Silesia TSL is composed of the DFR (Lower Silesian Development Fund), Dumni z Lubina and University of Warsaw. The responsibilities of hosting the TSL are shared among them while personnel from the University of Warsaw and Dumni z Lubina will be responsible for the research-related activities and personnel from both the University of Warsaw and Dumni z Lubina are sharing the planning and implementation of the TSL activities.

The Business Metropole Ruhr (BMR) was suggested at this stage as the host organization of the Ruhr Area TSL while RUB is one of the key stakeholders of the TSL. The roles of Project Manager and Pilot Manager have been already defined for BMR staff. It has been noted that external support might be needed and that further internal roles will be defined. The Western Macedonia TSL will be coordinated by ANKO with the support of CERTH. The roles and responsibilities are therefore shared between the two organizations, with ANKO taking the leading role in engaging with the local stakeholders, while CERTH is overseeing the implementation of the Living Lab methodology as it has long experience with the Living Lab methodology through its Thessaloniki Smart Mobility Living Lab that is an EnoLL-certified Living Lab.

Although the TSLs didn't develop a concrete *communication and engagement plan* with a detailed workplan of workshops and other activities beforehand, all the TSLs followed a communication and engagement strategy tailored to their needs, organizing several workshops with stakeholders (e.g., Transitioncamps[21] co-organized by the TSLs and FIT) and using different channels to reach them. During these workshops, all the TSLs *discussed and refined their visions* with the stakeholders and *identified scenarios and pathways* to reach these visions, trying to follow a bottom-up approach, integrating stakeholders' needs and expectations. This process wasn't always easy for all the TSLs, as some of them, such as the Western Macedonia TSL team that participated as TRANSFORMER partners (meaning ANKO and CERTH), had already predefined some pathways according to the objectives and goals set by TJTP Territorial Just Transition Plan - TJTP Western Macedonia[22]. So, the Western Macedonia TSL presented and discussed the pathways with stakeholders and refined them based on their feedback following a combined top-down and bottom-up approach. On the other hand, Ruhr Area followed a more bottom-up approach as the pathways were mainly co-designed with the stakeholders (see detailed information about the vision development process in D3.2[23]).

Although the *Transition readiness assessment* could help the TSLs in identifying their weak points for effectively co-designing with the stakeholders the possible transition pathways in this phase, the relevant tool was developed after the TSLs had developed their pathways. Therefore, it was used later in July 2024, and the results will be used by the TSLs after the end of the project for adjustment of the transition pathways and the Pilot use cases if needed[24]. Also, it is suggested to be used in the future by the TSLs as an iterative reassessment process to ensure that the region remains on course to achieve its desired outcomes through effectively designed strategies to speed the transition towards climate neutrality.

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[21] For detailed information about Transitioncamp as a transition-enabling tool and its assessment within TRANSFORMER project, see Deliverable D4.3 Toolkits (incl. matchmaking system) for Transition Super-Lab Implementation (URL not available yet) and Deliverable D5.4 Guidelines for Super-Labs tools utilisation (URL not available yet)

[22] Hellenic Ministry of Environment and Energy (2021). 2021 TJTP Territorial Just Transition Plan- TJTP Western Macedonia

[23] TRANSFORMER Project (2024). Deliverable 3.2 Definition of Transition Super-Lab use cases (URL not available yet)

[24] For detailed information about the Transition Readiness Assessment and the TSLs' results, see Deliverable D5.2. (URL not available yet)

3.1.3 Lessons learned

In the table below the most important insights gained from the experience of the TSLs during the implementation of the first transition phase are presented.

1. By defining the geographical boundaries early in the process (in TRANSFORMER project we chose the regions to examine the TSL approach), the TSLs had a better understanding of the area where the scope of their TSL should focus on.

2. The collection of national, regional, and local data and their use for analysing the regional needs and potentials through QRAFT is regarded as very useful to get a data-driven understanding of the region and also as a benchmark with other regions. Simplifying the analysis is necessary to make the data tangible for stakeholders, particularly those who may not be well-informed.

3. By narrowing down the analysis to the most important sectors, we can conduct additional sector-specific quantitative analysis (using indicators from regional and national statistical offices) and qualitative assessments (transition readiness assessment, document analysis, expert interviews) were feasible. Also, this way, in-depth SWOT analyses were conducted in a resource-efficient manner.

4. The comprehensive desk research contributed to identifying local and regional initiatives that are already facilitating the transition towards climate neutrality.

5. The adoption of a combined top-down and bottom-up approach for developing the vision ensured the alignment of the TSLs visions with the broader regional policies and goals, and on the other hand the integration of the stakeholders' needs in the future TSL activities.

6. As developing a vision is a complex exercise, especially for broad topics like transition, some TSLs such as Western Macedonia and Emilia-Romagna developed sub-visions to illustrate the overall vision, making it more concrete.

7. The ''matching'' of TSLs' goals with specific stakeholders to be involved in their achievement helped the TSLs to maintain a balance between ambitious goals on the one hand and realistic goals on the other hand.

8. The collection of input from stakeholders through customised interviews and surveys helped the TSLs gather insights on their needs and interests to be clearly reflected in the vision development process. Dedicated workshops with diverse stakeholders facilitated in brainstorming ideas, discussing priorities, and identifying shared goals for the TSL.

9. The engagement of different municipalities and regional departments (in the case of Emilia Romagna TSL), authorities at various levels, both local and regional (in the case of Lower Silesia TSL), and regional government authorities and stakeholders from different sectors (in the case of Western Macedonia TSL) from the very beginning was the first step for ensuring political support for the future activities of the TSL.

10. During the coalition building processes, the identification and mapping of stakeholders from the quadruple helix emphasized inclusivity and active participation in the TSLs. The TSLs identified stakeholders from different sectors and with different backgrounds to

ensure the reflection of different opinions in the TSLs and avoid exclusivity. The monitoring of the stakeholders involved and the continuous update of the stakeholders' list during the project ensured that the most relevant stakeholders are involved in each activity.

11. Although the TSLs used different communication channels and engagement methods during the project, some activities could not be properly organized in advance. When the Transitioncamps were held, almost 100% of the participants were not aware of the presence of the matchmaking platform. During the Transitioncamps the matchmaking platform was highly appreciated. However, this appreciation didn't result in new registrations. The lack of a concrete communication and engagement plan will create difficulties in keeping the stakeholders engaged beyond the project. Setting up a proper communication strategy could mitigate this negative result.

12. The connection with other projects such as the SSH CENTRE (Social Sciences and Humanities for Climate, Energy aNd Transport Research Excellence) contributed to knowledge transfer among the regions across different projects. There are several topical (e.g. mobility, digitalisation, citizen engagement) or city-focused (e.g. smart cities and communities) projects that face the same challenges as the transition-focused projects. Therefore, this knowledge can be also beneficial for TSLs. However, a deeper collaboration could be foreseen, e.g. more joint events or publications with direct involvement of the TSLs. Cross-collaboration and cross-sharing should be included from the start as part of TSL capacity and awareness building.

13. During the co-creation of pathways, the TSLs developed realistic pathways to keep the stakeholders engaged. Also, some of the pathways were slightly adjusted for integrating the stakeholders' feedback as new information and needs emerged.

3.2 Phase 2: Gearing transition capacity

3.2.1 Brief description of the activities of Phase 2

Phase 2 aims to gear the transition capacity and continue the coalition-building activities, increasing the ecosystem capacity towards innovative sustainable solutions. By collaboratively defining Pilot use cases, their goals and targets, the TSL creates tangible value proposition for keeping the stakeholders engaged.

After the definition of the vision and the pathways to reach the vision in Phase 1, the stakeholders involved in the TSL *identify Pilot use cases* that could serve as real-life experiments, facilitating the achievement of the TSL vision and its objectives through practical implementations. According to the TRANSFORMER experience, the Pilot use cases should have the following characteristics:

- Contribution to the goal of climate neutrality (according to agreed visions and scenarios)
- Potential for systemic transformation
- Regional character beyond merely local solutions and expected value for the region
- Experimental and innovative approach (may refer to the Pilot use cases' content or the development process)

- Potential for co-creation during the development phase (beyond the initial phase of definition and selection)
- Cross-sectorial approach

Each Pilot use case should have ***clear goals, objectives and targets***. By setting well defined objectives, the stakeholders are aware of the outcomes and the impact they want to achieve through the Pilot use cases and the TSL can monitor and track the process more efficiently.

The next step is to examine the feasibility of the Pilot use cases. To do so, it is important to ***define a set of measurable indicators*** taking into account the available regional data. A set of standard indicators that can be used to measure the impact of an activity on achieving climate neutrality is suggested in TRANSFORMER Evidence-Based use case Impact Assessment Methodology[25]. Also, additional indicators for each Pilot use case based on its specific context can be further defined and included in the Action Plans that will be developed in the next phase.

Once the Pilot use cases have been defined, their ***feasibility should be evaluated***. The feasibility assessment should take into account not only technical issues such as the availability of required technology, infrastructure requirements, data availability, compatibility with existing systems, but also economic, social, and environmental aspects. Along with the technical issues, the operational feasibility of the Pilot use case should be assessed, including the availability of trained staff and the organization's preparedness for change. Potential technological obstacles and restrictions (e.g., legal/regulatory) should be identified at this stage. The TSL can use different methods during the feasibility assessment of the Pilot use case such as cost-benefit analyses, multi-criteria analyses, etc.

For strengthening the stakeholders' engagement in the last step of this phase it is critical to ***refine coalitions for each specific use case*** as not all the stakeholders that are involved in the TSL's activities have similar needs and interests. This can be done by using methodologies such as the influence/interest matrix. Relevance of stakeholders can be defined further by their potential role in the Pilot use case as following: stakeholders important to secure feasibility, stakeholders involved at the implementation, veto stakeholders, stakeholders impacted by the implementation, stakeholders that operate as transition facilitators. ***Value proposition for each group of stakeholders should be created*** and communicated clearly. At the same time, the TSL should identify potential conflicts of interests among the stakeholders and use the appropriate ***conflict resolution mechanisms*** to address them constructively.

At the end of this phase, the TSL should ***refine its governance model*** to ensure that the objectives, indicators, and targets of the Pilot use cases can be supported. The TSL should further enhance the cross-sectorial potential of its governance model and at the same time customise it to the evolving needs of the ecosystem, ensuring the viability and sustainability of the TSL.

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[25] For detailed information about the Evidence-Based use case Impact Assessment Methodology, see Deliverable D5.1. Framework for Super-Labs Assessment. Available at: https://transformerknowledgehub.imet.gr/wp-content/uploads/2024/06/D5.1_Framework-for-Super-Labs-Assessment_public.pdf

3.2.2 Activities executed by TRANSFORMER TSLs

During this phase the TSLs proceed with the *identification of the Pilot use cases* with the stakeholders. The Pilot use case development process follows a similar approach of co-designing with the stakeholders. However, each TSL customized the process to its specific context.

Emilia-Romagna focused on harmonizing existing mobility and energy initiatives through stakeholder collaboration, technology utilization, and integrated planning. Lower Silesia prioritized convenient and environmentally friendly transport connections and development of a framework for integrating public participation methods in energy-related decision-making using a Discrete Choice Experiment method (DCE) to collect feedback from the citizens. The Ruhr Area, being aware of the critical role that H2 will play for the region in different sectors, followed an inclusive approach, engaging key stakeholders in workshops and feedback sessions to co-develop innovative Pilot use cases related to the transfer of H2 to be used in the industry, the heating of the neighborhoods and the alignment of existing H2 initiatives. Western Macedonia identified specific needs through stakeholder input and expert consultations and collaboratively designed with them cross-sectorial Pilot use cases focused on energy and mobility, agriculture and circular economy, and the creation of a transition Living lab and dataspace in the city of Kozani. All the Pilot use cases of the TSLs were aligned with the characteristics mentioned in the previous section. The TSLs *defined clear goals, objectives and targets* for each Pilot use case, and they are clearly described in their Action Plans.

Through an interactive session that took place at the consortium meeting in Lower Silesia in September 2023, the TSLs discussed the expected impacts of each Pilot use case and which of the *impact indicators* that were suggested in the TRANSFORMER Evidence-based use case Impact Assessment Methodology could be used to measure this impact. However, it is noted once again by all TSLs that the lack of regional datasets in different sectors related to climate neutrality might pose difficulties in the evaluation of some of the suggested indicators. Along with these indicators, the TSLs defined more Pilot use case-specific indicators during the elaboration of their Action Plans in D3.3 which were completed in May 2024.

Feasibility studies for the Pilot use cases were performed in Western Macedonia from an external consultant including the examination of technical and operational feasibility aspects, cost-benefit analyses and risk assessment among others. However, the elaboration of feasibility studies is a demanding task that requires time and human resources as well as the availability of different kinds of datasets. Due to these limitations, not all the TSLs were able to elaborate feasibility studies for their Pilot use cases.

The TSLs *refined the coalitions of stakeholders*, trying to identify the most appropriate ones for each specific Pilot use case. Although the TSLs kept the stakeholders engaged throughout the entire project duration through workshops and communication of the TSLs activities, no clear *value proposition for each group of stakeholders was created* and communicated clearly. Additionally, the TSLs didn't report any conflict of interest among the stakeholders involved in the different activities and therefore no *conflict resolution mechanisms* were used.

Based on the experience in the four TRANSFORMER regions, a concept for a TSL governance arrangement was developed in the project (see Deliverable D2.3[26] for detailed description), helping the TSLs to *refine their governance schemes*. This concept aims at establishing coordination and management mechanisms and co-creation processes on two highly connected governance levels, TSL level and Pilot use case level, to ensure that regional transition needs, and specific project needs (portfolio approach for systemic transformation) are aligned. Thus, at the TSL level, a "TSL Coordination and Management team" that coordinates and manages the entire TSL is suggested to be created. The main responsibility of this team is to consider the transition needs and potentials of the entire region, as well as the specific Pilot use cases. It monitors the progress of the TSLs actions, tasks and milestones and designs and implements the stakeholders' engagement strategy and management, including the strategical management of the veto players. This team is responsible for the decision making at TSL level. However, it collaborates with the Pilot use cases coordinating team for decision making at Pilot use case level as the "TSL Coordination and Management team" may not necessarily consist of the same stakeholders as the Pilot use cases.

In addition, a TSL needs a "Reflexive monitoring board" to monitor whether actions taken in the TSL as a whole align with regional transition goals. Additionally, the "Reflexive monitoring board" monitors TSL processes, advises the "TSL Coordination and Management team" on transition-related content, as well as TSL coordination and management issues (e.g., suggesting streamlining of management and coordination processes; continuously reflecting on whether all necessary stakeholders are represented in the TSL management team). Finally, it provides scientific and technical expertise on different fields, policy analysis, economic development and innovation management among others.

The supporting stakeholders of a TSL are involved in the generation of ideas and innovations, supporting TSL goals (not just Pilot use case goals) and are actively participating in the generation and provision of data. The opposing stakeholders of a TSL (especially veto players) are identified and strategically managed by the "TSL Coordination and Management team".

At Pilot use case level, a project-specific form of governance that may significantly differ from the overall TSL governance is required. However, every Pilot use case needs to have at least one responsible organization/person (Pilot use case coordinator/manager) that interacts with the TSL Coordination and Management team. Following this concept, the four TRANSFORMER TSLs defined specific authorities and organizations that could be included in their Coordination and Management teams and their Reflexive monitoring boards.

The TSL Coordinator and Management team of Emilia-Romagna TSL should be composed of a representative of each department of the regional authority (e.g. Territorial and environmental care, Sustainable Mobility, Transport and Logistics, Tourism, Productive activities). The Regional Authority should lead the TSL Coordinator group, promoting the cross-sectorial character of the TSL to serve as a regional governance mechanism and helping drive the local ecosystem towards climate neutrality. The Reflexive monitoring board of Emilia-Romagna TSL is necessary for monitoring whether actions are in line with regional transition goals, overseeing TSL processes, and providing guidance to the TSL

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[26] TRANSFORMER Project (2024). Deliverable 2.3 Regional SWOT analyses as feasibility studies to be used as evidence base in decision-making for Action plan development (URL not available yet)

Coordinator and Management team on transition-related matters, as well as on coordination and management issues.

For the Ruhr Area TSL, due to the complex regional context, there is no role model to follow. Thus, although different stakeholders have an important role in the region and could contribute to implementing the TSL in practice, it is still difficult to define a specific Coordination and Management and Reflexive monitoring board.

In the Western Macedonia TSL, the Regional Authority of Western Macedonia, ANKO and CERTH constitute the TSL Coordination and Management team, considering the transition needs and potentials of the entire region, as well as the specific Pilot use cases. They will undertake the control of the TSL actions (milestones and tasks), the TSL stakeholder engagement and management (including the veto players) and the TSL decision making (partially depending on Pilot use case decisions). Additionally, this team will be responsible for developing and following a TSL business plan, identifying human and financial resources, implementing conflict resolution mechanisms for cross-sectorial stakeholders and applying mitigation measures in case of risks to ensure the long-term sustainability and viability of the TSL. Representatives of each party of the TSL Coordination and Management team (Regional Authority of Western Macedonia, ANKO and CERTH) will form the TSL Daily Working Group (or "TSL Operational Team"). Moreover, an important role in the Reflexive monitoring board of the TSL of Western Macedonia should be undertaken by regional key stakeholders who could provide scientific and technical expertise on different fields including sustainable development towards climate neutrality and systems thinking, policy analysis, stakeholder engagement and social inclusion, spatial and regional planning, economic development and innovation management, data analysis and interpretation, evaluation methodologies and risk assessment among others. Thus, the University of Western Macedonia and the Institute of Energy Development and Transition to the Post-Lignite Era could participate in the Reflexive monitoring board of the TSL sharing valuable knowledge and expertise on the transition. Representatives from the Regional Authority and CERTH will also be members of the Reflexive monitoring board to ensure the alignment between the scheme and the Coordination and Management team.

In Lower Silesia the managing entity should be selected to maximize the likelihood of success for specific TSL tasks. Depending on the Pilot use cases, these should be stakeholders from academic institutions, business, etc. In most cases, there should be someone representing local authorities. Detailed descriptions on the governance schemes of the TSLs are included in D3.3[27].

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[27] TRANSFORMER Project (2024). Deliverable 3.3 Transition Super-Lab Action Plan (URL not available yet)

3.2.3 Lessons learned

In the table below the most important insights gained from the experience of the TSLs during the implementation of the second transition phase are presented.

1. The identification of specific characteristics that the Pilot use cases should have in order to be aligned with the TSLs approach helped the TSLs during the development process of the Pilot use cases. Thus, all the TSLs respected the common elements while in parallel integrating regional needs to ensure that the unique priorities and challenges of the region are reflected in the Pilot use cases.

2. Despite the numerous ideas, all the TSLs developed between 2 and 4 Pilot use cases. Although transition is a broad topic, the small number of use cases helps TSLs to keep their efforts focused on the important topics of the region—at least in the initial phases of TSL.

3. The coalition building processes involved key stakeholders initially and gradually expanded to include specific regional actors crucial for successful use case design and implementation. The stakeholders were selected based on factors such as level of influence, interest in Pilot use case and potential impact. This process emphasized the bottom-up approach, benefiting from the knowledge and experience of stakeholders and ensuring the continuous improvement and responsiveness to evolving needs.

4. The TSLs maintained communication channels with stakeholders throughout the Pilot use case development to gather feedback and adapt the Pilot use cases if needed.

5. All the TSLs faced difficulties in engaging civil society. This means that the needs of civil society may not be reflected in the vision and the Pilot use cases of the TSL.

6. The identification of specific goals for the Pilot use cases helped the TSLs to better assign each goal to specific stakeholders who will be responsible for reaching it. This creates a sense of ownership at an early stage.

7. For examining the feasibility of the Pilot use cases, the TSLs defined SMART indicators (Specific, Measurable, Achievable, Relevant, and Time-bound) to ensure they are clear, actionable, and trackable.

8. As the elaboration of the feasibility studies for the Pilot use cases is a demanding task that required time and human resources, the TSLs didn't manage to complete it during the project. Western Macedonia completed the pre-feasibility studies of its Pilot use cases by employing an external expert.

3.3 Phase 3: Accelerating transition through innovation

3.3.1 Brief description of the activities of Phase 3

The third phase of the transition roadmap signals the operational start of the TSL and lays the foundations for the implementation phase that will take place from Phase 3 onwards. This phase is critical for the next steps of the TSL as it examines aspects related to the funding and financial scheme as well as the Action Plan of the TSL.

At this stage, and as the local capacities have already been explored in the previous phases, the TSLs can *identify international innovative solutions* that could be adopted and adjusted to local context, helping them to accelerate the transition to climate neutrality. This identification promotes collaborative problem solving, and the transfer of expertise and joint research and development activities. Moreover, the definition of ''quick wins'' is a vital milestone in this step to provide stakeholders with an early insight into the positive outcome that can be achieved through the TSL activities. Positive outcomes swiftly boost confidence among all parties involved, making it more likely that they will actively participate and contribute to the successful implementation of the Pilot use cases. In long-term use cases, ''quick wins'' are milestones that take minimum time and resources and can be achieved without substantial planning. Additionally, ''quick wins'' can be used as feedback for the Pilot use cases, as areas for improvement can be identified. Through this iterative process, the Pilot use cases can be continuously refined, increasing the likelihood of long-term success[28].

The *preparation of detailed Action Plans* for the Pilot use cases is crucial for the implementation of the Pilot use cases as they can operate as a guidance to manage the complexities of a Transition Super-Lab by providing clear direction, resource management, risk mitigation, and improved communication and accountability, ensuring that the Pilot use cases contribute to a smooth, efficient, and successful transition to climate neutrality. The Action Plans of the Pilot use cases, inspired by the TSL's vision, main goals and objectives, should provide a clear roadmap of actions, sub-actions and measures in a specific timeline as part of the Pilot Use Case implementation. This will help the TSL to define what needs to be accomplished, by whom, and by when, ensuring everyone involved understands their roles and responsibilities. As an Action Plan usually includes numerous actions to be performed, a prioritization of the activities should be done, ensuring that the most critical tasks are addressed first, and resources are not spread aimlessly. Finally, a well-structured Action Plan allows for adaptability. As the transition progresses, new challenges and opportunities may arise. Thus, the Action Plans of the Pilot use cases can be updated to reflect these changes, ensuring the TSL remains flexible and responsive.

Additionally, the Action Plans include indicators that should be monitored for the impact assessment of the Pilot use cases. So, along with the development of the Action Plans for the Pilot use cases, it is vital to *define an assessment framework* that will be followed by the TSL at a later stage for the impact evaluation of the Pilot use cases. The proposed methodology developed in TRANSFORMER project for the preparation of the assessment plan follows the Evidence-Based use case Impact Assessment Methodology.

Engaging stakeholders effectively is vital for the success of a TSL. The Action Plans of the TSLs should be informed by the previous phases and outline how and when stakeholders will be involved, ensuring their input is considered and they are kept informed of progress. By assigning specific tasks and responsibilities to stakeholders, the TSL enhances the accountability of the Action Plans ensuring that

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[28] Bakker, Stefan; Haq, Gary; Peet, Karl; Gota, Sudhir; Medimorec, Nikola; Yiu, Alice; Jennings, Gail; Rogers, John (2019). Low-Carbon Quick Wins: Integrating Short-Term Sustainable Transport Options in Climate Policy in Low-Income Countries. Sustainability. 11. 4369. 10.3390/su11164369

everyone knows what is expected of them and can be held accountable for their contributions. Furthermore, the Action Plans should consider well-structured communication strategies to ensure that everyone is on the same page regarding objectives, timelines, and responsibilities, reducing misunderstandings and improving collaboration. Towards this direction, *fact sheets are recommended to be developed* as living documents for each Pilot Use Case to provide an overview of all the required information.

Additionally, the TSL identifies the financing and funding options that are available and can be used efficiently. This will be the basis for the next step of *preparing investments plans* including the financial measurements for the monitoring of the financial plan. As the transition to climate neutrality is a process that is often fraught with uncertainties and potential risks, the Action Plans of the Pilot use cases should identify potential risks early on, and outline measures to mitigate them.

3.3.2 Activities executed by TRANSFORMER TSLs

In this phase the four TSLs *prepared detailed Action Plans* for the Pilot use cases. They specified the goals and specific targets of each Pilot Use Case highlighting in parallel the connectivity among the different Pilot use cases. The TSLs outlined the actions needed to implement the Action Plans and the measures to put these actions into practice. Additionally, they set the respective timelines for implementation, including the different project phases, and highlight the milestone as well as the roles and responsibilities of the different stakeholders. After addressing risk assessment and mitigation, the partners from the four TSLs focused on financing and funding options for the implementation of the Pilot use cases. Finally, ideas for impact assessment and for monitoring and evaluation of the Pilot use cases' Action Plans were considered.

Regarding the agreement on priorities and responsibilities, in the Emilia-Romagna TSL, regular meetings among the Emilia-Romagna Regional Authority departments helped to reach consensus on priorities and plan for more complex goals that require different competences and the coordination among different actors. The regular involvement of stakeholders beyond the Emilia-Romagna Regional Authority allowed for a regular feedback loop, which strengthened bottom-up planning and built consensus for the adoption of policies and solutions. Roles and accountabilities have been formally established through a regional law. This allows for, on the one hand, to structure the coordination mechanisms and foster coordination among the Emilia-Romagna Regional Authority departments; on the other hand, it supports the clear attribution of roles and responsibilities among stakeholders, leading to more efficient cooperation. For the Western Macedonia TSL, the responsibilities of the different stakeholders of the TSL will be defined in the Memorandum of Understanding (MoU) that is foreseen to be signed in the following months.

The TSLs also defined funding sources during the elaboration of their Action Plans. In the Emilia-Romagna TSL, for the implementation of the Pilot use cases on sustainable mobility, the coordination among different RER's Departments allows for optimized planning and use of funds. Additionally, the collaboration among stakeholders creates ability for robust financial planning. Improved knowledge of the activities carried out by each RER's Departments, as well as by the stakeholders involved, helps creating improved understanding on sustainable mobility issues and its centrality for the process of decarbonization. However, the identification of other funding avenues and mechanisms beyond

regional funds to promote sustainable mobility and improved cooperation among stakeholders to create greater opportunities for the efficient use of funds is needed.

In Western Macedonia as the Action Plan is directly linked with the Just Transition Development Programme 2021-2027 of the Region, this will be the main financial instrument to focus on for all the Pilot use cases. However, other sources of funding with lower (i.e. Regional Operational Plan of Western Macedonia 2021-2027) or higher (i.e Recovery and Resilience Facility/Recovery and Resilience Plan "Greece 2.0") financial opportunities will be examined.

The TSLs have to elaborate further on the funding sources defined in their Action Plans and proceed with the preparation of investments plans, the identification of financial indicators, the definition of assessment frameworks to evaluate the impact of the Pilot use cases and the definition of fact sheets for each Pilot use case. However, these activities weren't completed within the project duration due to time limitations.

3.3.3 Lessons learned

In the table below the most important insights gained from the experience of the TSLs during the implementation of the third transition phase are presented.

1. Although quick wins weren't defined by the TSLs, some specific actions helped the TSLs to maintain the stakeholders' enthusiasm. For example, the Lower Silesia TSL published specific actions of the TSL in social media, as the stakeholders (especially those representing local authorities) appreciated when the results of their work could be showcased. Such actions provided significant added value for stakeholders in Lower Silesia.

2. The Action Plans for the TSLs didn't follow the common structure of an Action Plan as usually developed in many other European projects. As a TSL is an entirely new concept and the Action Plans were developed for the first time, there was no role model to follow.

3. The Action Plans of the TSLs focused on the Pilot use cases and described in detail sub-actions, measures and activities to be implemented within a defined period of time. Additionally, they refer to responsibilities to be assumed by actors, timelines to be respected among others, and funding options. This structure will guide the TSLs at a later stage for the implementation of the Pilot use cases.

4. Although the Action Plans of the TSLs follow a similar structure, the differences between the regions had a direct impact on their development. The differences derived from the diverse political and administrative nature of the region, as well as other aspects related to political influence, and access to decision-making procedures and resources. Furthermore, the differences can be explained by the fact that each TSL has different topics and priorities that should be covered. For example, some of them such as the Western Macedonia TSL faced the challenge of designing solutions that can be implemented within a very short time frame (starting even during the project's lifetime), whereas others, such as the Ruhr Area TSL, are designing Action Plans with a longer-term implementation horizon. Consequently, some Action Plans are more concrete than others, providing detailed information on immediate actions.

3.4 Phase 4: Scaling-up the transition

3.4.1 Brief description of the activities of Phase 4

The last phase of the roadmap, ''Scaling up transition'' focuses on monitoring and assessing the regional transition and maximising the impact. To do so, the **implementation and testing with the Pilot use cases** should take place following the Action Plans that were developed in the previous phase. During the **monitoring and assessment of results and impacts**, both the impact of the TSL approach and the impact of the Pilot use cases should be monitored and assessed. A set of milestones that are suggested by the Methodology of Assessing the Efficiency and Success of Transition Process towards climate neutrality (see D5.2) should be used to monitor the results of the transition process and its impact. The TSL should collect data at each step of the transition process to quantify the suggested milestones. This should be a continuous activity as the results of this assessment will help the TSL to track the progress of the transition process and examine if an adjustment of goals, objectives and targets is needed. For the impact assessment of the Pilot use cases, the Evidence-based use case Impact Assessment Methodology as developed in TRANSFORMER project is suggested to be used.

Gathering lessons learned is a vital practice for the TSLs to enhance their effectiveness and ensure sustainable progress in their initiatives. Learning from their previous experiences, the TSLs can continuously improve their processes and optimise their operations. Using the gathered lessons learned the TSL can identify and explore new opportunities. This involves exploring various areas where innovation, collaboration, and strategic initiatives can drive sustainable change and development (e.g. technological innovations, policy innovations etc). By doing this, the TSLs remain adaptable, continuously engage with stakeholders, and leverage emerging trends and technologies.

Defining emblematic innovative transition projects in this last phase of the transition process is crucial for enhancing the visibility, impact, and strategic alignment of the TSL. These projects serve as powerful examples of what the TSL can achieve, driving innovation, engagement, and sustainable systemic change. Emblematic projects act as flagship initiatives that showcase the TSL's capabilities and innovation capacity can attract the attention of stakeholders, including funders. Additionally, emblematic projects generate valuable insights and lessons that can inform future initiatives within the TSL and beyond supporting scalability and replicability aspects. They serve as case studies for knowledge sharing, helping to spread best practices and innovative approaches. These projects often serve as testbeds for new ideas and approaches, allowing the TSL to experiment and innovate in a visible way.

Finally, it is important for a TSL to **re-assess the transition readiness of the region.** At this stage the results of the transition readiness assessment can be combined with the results of the assessment of the efficiency and success of the transition process and the evidence-based use case impact assessment. This will provide the TSL with a clear overview of whether the different activities performed within the transition process have improved the regional conditions, increased the regional capacity of adopting innovation and contributed to the achievement of the goal for climate neutrality.

3.4.2 Activities executed by TRANSFORMER TSLs

Due to time limitations, the TSLs didn't have the opportunity to implement any of the activities of this last phase. However, it is suggested to continue with this phase beyond the end of the project.

Conclusions and Outlook

The experiences gathered from the implementation of the TSL approach in the four regions—Emilia-Romagna, Lower Silesia, Ruhr Area, and Western Macedonia—provide valuable insights into the successes, challenges, and lessons learned throughout the process. This section synthesizes the key conclusions and outlook for future endeavours based on the gathered lessons.

One of the fundamental aspects of the TSL approach is **the extensive engagement and collaboration with a wide range of stakeholders**, including industry, government, academia, and civil society. This inclusivity ensures that diverse perspectives and needs are considered, fostering a more holistic approach to achieving climate neutrality. The stakeholder coalition built during the early phases provided a solid foundation for subsequent activities, ensuring sustained engagement and support throughout the project.

The TSL approach demonstrated that **adaptability and flexibility** are crucial in addressing the unique regional contexts and challenges. Each region tailored its Action Plans and activities to align with local priorities, political landscapes, and socio-economic conditions. This adaptability allowed for more effective and context-specific solutions, highlighting the importance of a flexible approach that can be customized to meet regional needs. Additionally, **continuous monitoring and assessment** of the TSLs' activities were essential in tracking progress, measuring impact, and identifying areas for improvement. The use of specific indicators and metrics will enable the TSLs to evaluate their performance and make data-driven adjustments to their strategies. This evidence-based approach ensured that the TSLs remained aligned with their objectives and responsive to emerging trends and challenges.

The **identification of innovative solutions** was central to the TSLs' success. By leveraging technological advancements, policy innovations, and cross-sectorial synergies, the TSLs were able to develop Pilot use cases that addressed critical regional challenges. The implementation of these Pilot use cases in a later stage can not only accelerate the transition process towards climate neutrality but also serve as models for broader application and scalability.

Despite the successes, the TSLs encountered several challenges and barriers. Engaging civil society proved difficult in all regions, impacting the inclusivity of the transition process. Additionally, the lack of a concrete communication and engagement plan sometimes hindered the effective dissemination of information and stakeholder involvement. Addressing these challenges requires ongoing efforts to refine communication strategies and enhance stakeholder engagement mechanisms.

The experiences and lessons learned from the TSLs provide a valuable foundation for scaling up and replicating the approach in other regions. Additionally, future projects can benefit from the insights gained. The lessons learned based on the TSLs' experiences combined with the Transition Super-Lab

Roadmap and the Deliverable D5.3 ''Best practices and recommendations for Super-Labs operation towards the region transition'' can facilitate the replication of the TSL approach and support other regions in their transition efforts.

However, future TSL initiatives should place a greater emphasis on engaging civil society and ensuring that their needs and perspectives are adequately represented. Developing more effective communication and engagement plans, leveraging digital platforms, and fostering a culture of transparency and accountability can strengthen relationships with stakeholders and enhance their active participation in the transition process. Future TSLs should prioritize building strong relationships with policymakers and aligning their activities with broader regional and national goals. This will help them securing political and institutional support which is critical for the long-term sustainability and impact of TSL initiatives. Additionally, exploring diverse funding sources and developing comprehensive investment plans can ensure the financial viability of TSL activities.

The dynamic nature of the transition towards climate neutrality necessitates a continuous focus on innovation and learning. Future TSLs should remain open to experimenting with new ideas, technologies, and approaches. Establishing mechanisms for regular reflection, feedback, and learning can help TSLs stay responsive to evolving transition challenges and opportunities. Finally, implementing robust evaluation and impact assessment frameworks is essential for understanding the broader implications of TSL activities on the community and environment. Future TSLs should incorporate comprehensive evaluation methodologies that go beyond immediate outputs and assess the long-term impacts of their initiatives on achieving climate neutrality.

In conclusion, the Transition Super-Labs have demonstrated significant potential in driving regional transitions towards climate neutrality. The collaborative, adaptable, and innovative nature of the TSL approach provides a strong foundation for future initiatives. By building on the lessons learned and addressing the identified challenges, future TSLs can enhance their effectiveness, scalability, and impact, contributing to the overarching goal of achieving a sustainable and climate-neutral future.

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