3.1.1. Report on the diversity of the transition processes at the Alpine scale

Work package 3. Transition Policy Recommendations

Activity 3.1. Defining transition pathways across the Alpine Space

Project acronym:	**TranStat**
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1 Introduction

This deliverable is part of Work Package 3 of the TranStat project and aims to analyse and compare the diverse transition processes currently unfolding in Alpine mountain resorts. It examines the development visions and transition pathways pursued in response to socio-economic, environmental, and governance challenges—particularly those linked to climate change and the growing vulnerability of winter tourism.

The analysis builds on two core pillars: a theoretical framework rooted in sustainability transitions and evolutionary economic geography, and empirical insights from nine Living Labs situated across different Alpine regions. These cases provide valuable examples of how mountain resorts respond to transition drivers and navigate systemic change. The urgency of this work is underscored by the fact that the Alps are warming at twice the global average (CIPRA, 2012; Frantzeskaki et al., 2019), putting snow-dependent economies at increasing risk.

The primary aim of this deliverable is to develop a shared conceptual and empirical understanding of sustainable transition in mountain resorts. It introduces key concepts such as transition processes, pathways, and systemic change, and proposes a typology tailored to Alpine contexts. In doing so, it also identifies common local challenges, institutional settings, and governance practices that influence the direction and pace of transition. Beyond its analytical role, the deliverable supports cross-border learning and coordination, offering a common reference point for project partners and stakeholders. It aims to facilitate the development of regionally adapted, forward-looking transition strategies.

The document outlines the theoretical foundations and defines key concepts relevant to sustainable transitions in mountain resorts. This is followed by the literature review of transition pathway typologies, including the Multi-Level Perspective and path development theory. It then presents a typology of transition pathways for Alpine resorts, developed through theoretical insights and project collaboration. Empirical findings from the nine Living Labs are presented, highlighting current transition processes, local challenges, and future visions. Finally, the document synthesises these insights, positions the Living Labs within the typology, and discusses shared challenges and implications for further action.

This deliverable contributes to the overarching goal of the TranStat project by laying the foundation for future outputs—including policy recommendations—and by supporting sustainable, climate-resilient transition processes in Alpine ski tourism and mountain development.

2 Theoretical perspectives on transition pathways

2.1 Key definitions: Sustainable transition and transition pathways

Sustainability transitions research emerged in response to the limitations of conventional policy approaches in addressing increasingly complex and persistent sustainability challenges within networked societies. These challenges are deeply embedded in individual lifestyles, societal perceptions, and long-standing institutional frameworks. Efforts to resolve sustainability challenges often produce unintended consequences, making them difficult to govern through markets or traditional mechanisms (Grin et al., 2010). By the late 1970s, scholars and policymakers began calling for fundamentally new governance models to address such "wicked problems" (Rittel and Webber, 1973). Incremental improvements proved insufficient, highlighting the need for radical innovations that involve not just technological advancements but also changes in user practices, regulatory systems, and infrastructures (Schlaile & Urmetzer, 2019). **Sustainable transition** thus refer to large-scale structural changes necessary for long-term sustainability (Feola, 2020), requiring not only new technologies but also profound shifts in socio-technical systems (Köhler et al., 2019).

A **sustainable transition** refers to a long-term, structural transformation of socio-technical systems—such as tourism, mobility, or energy—in order to address complex challenges like climate change, social and cultural changes, and environmental degradation. In the context of Alpine mountain resorts, it involves rethinking development models beyond snow-dependent tourism to ensure environmental resilience, economic viability, and social well-being.

A central concept in this field is **transition pathways**, which describe structured trajectories from existing societal arrangements toward more sustainable futures (Farla et al., 2012). Transition studies explore how systems evolve—across governance, society, culture, technology, and economy—to enable this transformation (Wigboldus et al., 2021). Given global trends such as climate change, resource depletion, and inequality, there is growing interest in systemic change in both academic and policy circles (Köhler et al., 2019).

Transition pathways are multidimensional and co-evolutionary, involving interlinked changes in technology, consumer behaviour, business models, governance, and policy (Geels et al., 2016). They bring about fundamental, long-term changes in production, consumption, and

lifestyles (Markard et al., 2012; Loorbach et al., 2017). Transition pathways provide a systemic perspective that helps policymakers, businesses, and regions envision and coordinate sustainable futures (Pinyol Alberich and Marton, 2025). Unlike strategies—specific plans for achieving goals—transition pathways define the scope and direction of systemic change, identifying key factors that shape decision-making. Each pathway represents a unique configuration of technologies, norms, values, economic logics, investment patterns, and infrastructures that together drive transformation (ibid.). These insights are particularly useful for identifying barriers and enablers of change in specific contexts, such as Alpine mountain resorts.

In many mountain regions, where climate change significantly impacts snow reliability and resort viability, transition pathways are crucial for guiding sustainable transformation in the ski tourism sector. Addressing challenges, faced by mountain resorts, requires a multifaceted approach: mitigation (e.g. reducing emissions), adaptation (e.g. enhancing climate resilience), structural change, and shifts in behaviour among residents, workers, and tourists (Frantzeskaki et al., 2019). Global trends such as declining snow cover and increasing inter-annual variability undermine the economic models of snow-dependent resorts (OECD, 2007), prompting re-evaluation of environmental management within sustainability transition frameworks (Hatt & Claeys, 2024).

Two dominant approaches to transition pathways in mountain resorts can be distinguished: one led by local authorities promoting top-down initiatives, and another driven by grassroots, citizen-led innovation (Pradels et al., 2022). Their coexistence reflects the complexity of transition processes in these regions, where diverse stakeholder interests must be aligned (Hatt & Claeys, 2024). Using transition pathways as a guiding tool, stakeholders can better navigate the challenges and harness opportunities for sustainable transformation in ski tourism and beyond.

A **transition pathway** is the structured trajectory a region follows from its current development model toward a more sustainable future. It reflects the scope and direction of change, ranging from less coordinated, partial adaptations to individual challenges, to broader governance-led systemic transformations. It is shaped by local governance, cultural norms, economic structures, and the engagement of stakeholders and local community.

2.2 The complexity of sustainable transition

Understanding sustainable transition of Alpine mountain resorts requires acknowledging the complexity of the systems in which these transitions occur. A natural science perspective on complex adaptive systems offers a valuable lens for interpreting the dynamics, uncertainties, and feedback mechanisms that shape long-term change processes. Although an in-depth discussion of systems theory lies beyond the scope of this deliverable, this section outlines key characteristics that are especially relevant for transitions in mountain regions.

Complex adaptive systems are marked by non-linearity, uncertainty and temporal dynamics, with constant tension between forces driving transition and those reinforcing stability. Transition paths within such systems are evolutionary and open-ended. They are shaped by experimentation, learning, adaptation, and trial-and-error (Jones et al., 2019). These characteristics give rise to unintended consequences, surprises, and path dependencies that reinforce existing trajectories (Köhler et al., 2019; de Roo, Gert & Hillier, Jean, 2012). As a result, the success or failure of transition pathways often hinges not only on technical feasibility but also on social interpretation, legitimacy, and public acceptance.

In the context of Alpine mountain resorts, these dynamics are particularly visible. Climate change has triggered a variety of local responses—from technological upgrades and infrastructure redesign to alternative forms of tourism and economic diversification. However, because transition pathways are non-linear and influenced by broader political and societal dynamics, it remains difficult to predict which approaches will succeed in the long term. Uncertainty is further intensified by risks of implementation failure, shifting policy priorities, and evolving stakeholder agendas. Changes in public values and perceptions of urgency also introduce new drivers or barriers over time (Köhler et al., 2019).

Importantly, transition processes are inherently political. They involve trade-offs, competing interests, and power struggles between actors with different visions and stakes in the current regime. Incumbent stakeholders—such as ski resort operators or landowners—may resist change due to economic interests or institutional inertia. Overcoming such resistance requires not only technical solutions but also broader shifts in governance structures, ethical norms, and the co-evolution of societal behaviours with technological innovation (European Environment Agency, 2018).

Transition processes emerge through the interaction of diverse actors, including businesses, consumers, scientists, policymakers, social movements, and advocacy groups. Each of these actors contributes to shaping the process and direction of change. Recognising this interplay, the concept of transition pathways has evolved from describing spontaneous system evolution to supporting intentional, guided transformation. Pathways are increasingly understood as

planned trajectories that steer societal systems from one configuration to another, in line with predefined sustainability goals (Wigboldus et al., 2021).

In mountain regions, where the environmental limitations, and socio-cultural and economic foundations are closely intertwined, sustainable transitions require governance that is adaptive, inclusive, and context-sensitive. Transition pathways must balance long-term structural change with local values, institutional capacities, and the goal of ensuring both liveability and sustainable economic development (Figure 1).

Figure 1: Sustainable transition between environmental ceiling and socio-economic foundations (adapted from European Environment Agency, 2018, 18).

The sustainable transition of mountain resorts is shaped by specific geographical, socio-economic, and temporal contexts, resulting in highly diverse and sometimes conflicting transition pathways, with different thematic priorities, as shown in Figure 2. These pathways reflect varying interests and visions for sustainable development, influenced by a constellation of environmental, social, and economic conditions. Decision-making involves multiple actors at local, regional, national, and international levels, that apply different policy interventions and instruments.

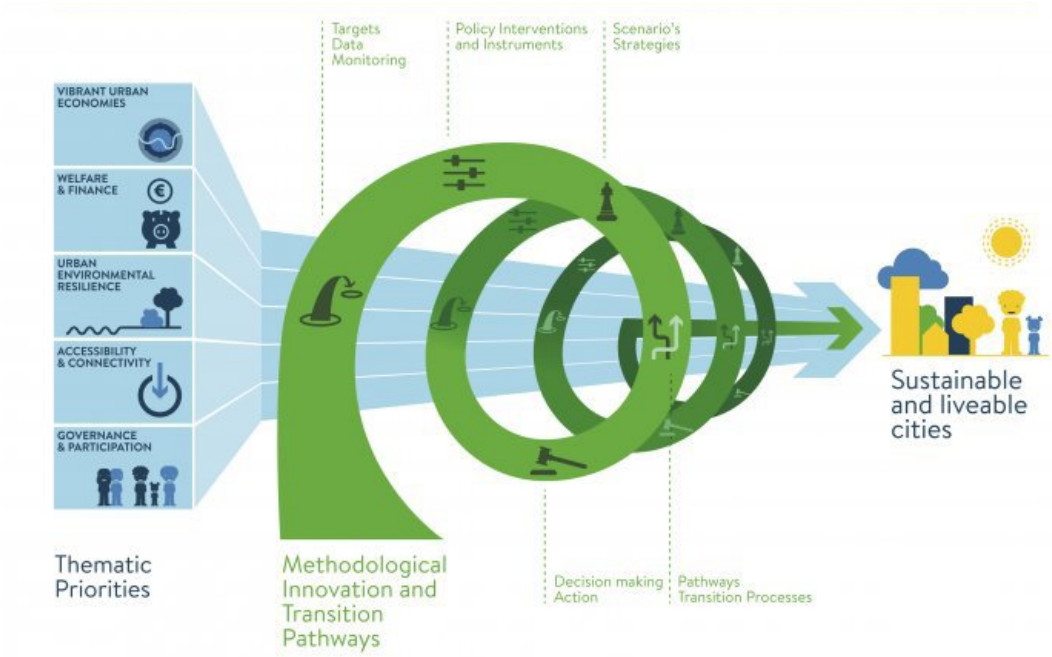

Figure 2: Sustainable transition towards liveable and sustainable futures of mountain resorts (JPI Urban Europe: Strategic Research and Innovation Agenda, 2015, 18).

Sustainable transitions are inherently multi-scalar and multi-actor processes. In mountain resort contexts, they require collaboration across governance levels, sectors, and social groups. Relevant sectors include spatial planning, mobility, environmental protection, cultural heritage, and agriculture, while key actors range from ski area operators and tourism providers to local residents. Institutional frameworks—differing across countries, regions, and municipalities—further shape the direction and feasibility of transitions.

To better understand these dynamics, the following section elaborates on key dimensions of sustainable transitions: the geography of transitions, their multi-scalarity, scope of transition processes, and their political nature, that is imbued with power relations and often contested.

2.2.1 Geography and contextuality of sustainable transition

Sustainable transition processes unfold differently across locations, shaped by place-based and contextual factors. The geography of sustainable transitions highlights how place, scale, and territorial embeddedness influence the drivers, barriers, and potential of different transition pathways. Growing attention is being paid to the spatially uneven outcomes of green innovation and structural change, especially in relation to regional inequalities (Binz et al., 2025).

Key contextual elements include institutional settings, local cultures, social networks, infrastructures, and resource endowments, all of which can enable or constrain the emergence

and evolution of transition pathways (Köhler et al., 2019). Path dependency also plays a crucial role, as historical trajectories shape current opportunities and limitations (Wigboldus et al., 2021). In mountain resorts, while many may aim for sustainable transition, the specific goals of transition pathways and approaches vary according to historical development paths, stakeholder configurations, and current challenges. As such, each transition pathway is embedded in a distinct local context—shaped by cultural norms, economic structures, and community preferences (ibid.).

2.2.2 Multi-scalarity and governance of transition

Governance integration is central to sustainable transition, especially in the face of global challenges such as climate change, which require coordinated action across multiple scales. Public policy plays a key role in shaping the directionality of transitions through regulations, taxes, subsidies, standards, and innovation policies—thereby embedding normative goals into transition processes (Köhler et al., 2019). While international institutions and agreements provide important frameworks, including incentives, monitoring, and reporting mechanisms, their success ultimately depends on localised implementation that reflects context-specific, social, and cultural conditions (European Environment Agency, 2018). In this regard, the local scale of mountain resorts is highly relevant—both as a contributor to global environmental change and as a potential site for innovative solutions.

A second perspective on scale is offered by Geels and Schot's (2007) Multi-Level Perspective, which integrates insights from evolutionary economics, innovation studies, and institutional theory. The multi-level perspective conceptualises transitions as interactions between three analytical levels:

- **niches** as spaces where innovations emerge, supported by small actor networks and future-oriented visions;
- **socio-technical regimes** as the dominant systems of practice, shaped by technology, policy, markets, culture, and user behaviour, often resistant to change due to institutional lock-in and path dependency; and
- **landscapes** as the broader exogenous environment, including global trends such as climate change, demographic shifts, and economic restructuring (Geels and Schot, 2007; European Environment Agency, 2018; Köhler et al., 2019).

In mountain resort contexts, landscape pressures—such as climate change and shifting labour markets—disrupt socio-technical regimes built around winter tourism. These pressures expose the limitations of dominant models, rooted in long-standing stakeholder networks, infrastructure, and strong cultural attachments to skiing. The success of niche innovations (e.g.

alternative tourism models, green infrastructure) depends on the opening of opportunity spaces, where external pressures create incentives for regime actors to adopt and scale alternative practices. Over time, such innovations may contribute to systemic transformation (Geels and Schot, 2007; European Environment Agency, 2018; Köhler et al., 2019).

However, the concept of multi-level perspective has faced criticism for oversimplifying transition dynamics, particularly its limited treatment of multi-scalar interactions (Binz et al., 2025). Transition outcomes are not only shaped by local-to-global flows but also by how global discourses and structures interact with regional and local contexts, and vice versa. Further research is needed to better understand the role of path dependencies, the influence of supra-regional forces on local transitions, and how local strategies can inform or reshape national and international policies.

2.2.3 Scope of transition pathways

Transitions can occur at multiple scales, including society-wide, system-wide, and sector-specific levels. While differing in scope and focus, these transitions are often interconnected and may include initiatives that diverge from dominant sustainability narratives, yet still contribute to broader transformation efforts (Wigboldus et al., 2021).

The scope of a transition may range from targeted, sectoral changes to large-scale systemic shifts. This is shaped by the most pressing local drivers, as perceived by stakeholders, who influence what areas and issues are prioritised. In mountain resort regions, transition pathways may address varied concerns—such as youth outmigration, biodiversity loss, or the decline of traditional agriculture—or focus instead on climate resilience, behavioural change, or the development of alternative economies.

Transition pathways also vary in scale, scope, and timeframe: some remain confined to specific communities or sectors, while others extend their influence to regional or national levels. The extent of change—whether incremental or transformative—depends on the contested nature of local issues, the rigidity of existing development trajectories, and the governance structures guiding transition processes (Wigboldus et al., 2021).

Choosing the most suitable pathway depends on system-specific conditions, stakeholder preferences, and available opportunities. Leveraging key points of influence—so-called leverage points—can help shape transition dynamics. When aligned with shared sustainability goals, even diverse pathways can contribute meaningfully to overarching transformation (Luederitz et al., 2017).

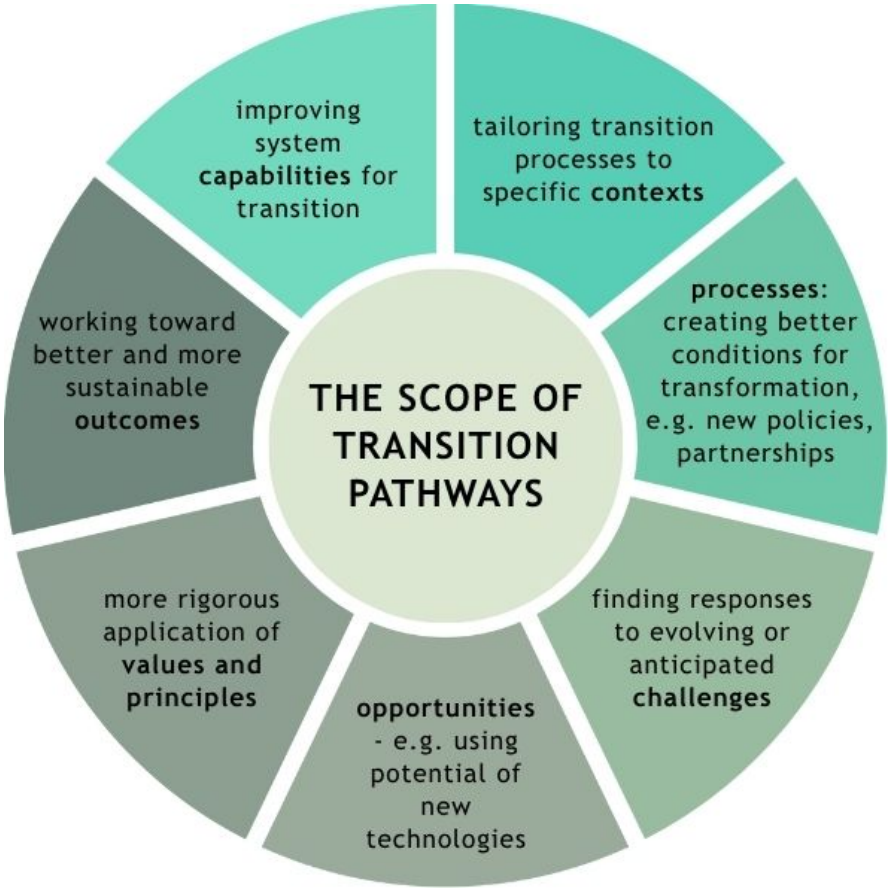

Figure 3: Scopes of transition pathways (adapted from Wigboldus et al., 2021).

2.2.4 Politics, power relations and conflicts in transition

Everyone wants sustainability, but what that means, what roads (pathways) will lead us to the aspired state of sustainability, and how we should be travelling that road, that is where we will be dealing with many different views and agendas" (Wigboldus et al., 2021).

Sustainable transitions are inherently political processes, shaped by underlying power relations, interests, and conflicts. These dynamics influence who defines the scope and direction of transition pathways, who selects the targets for change, and whose interests are prioritised. Failing to account for politics and power can lead to a dominance of techno-managerial approaches, which often neglect more transformative, socially inclusive alternatives (European Environment Agency, 2018).

Deliberate transitions involve systemic shifts—in institutions, infrastructures, policies, financial regimes, behaviours, and values—to address sustainability challenges (Pelling et al., 2015). As such, questions of who drives change, how decisions are made, and what trade-offs are deemed

acceptable are central. Greater attention is now paid to making visible the values and interests shaping transitions, including the political negotiations that determine what is considered feasible, desirable, or affordable (Pelling et al., 2015; Hafferty et al., 2025).

The political nature of transitions also lies in the contest over leadership: whether transitions are driven by markets, governments, or civil society actors, and how much space is given to dissenting voices (Wigboldus et al., 2021). Transition pathways often rest on normative assumptions, focusing on what needs to change while overlooking what remains unchallenged or becomes further entrenched.

Conflicts frequently emerge between incumbent actors, who may resist disruptive changes, and new entrants proposing alternative socio-technical systems (Madsen et al., 2022). This is especially evident in contested sectors like ski tourism, where powerful stakeholders may oppose changes that threaten their economic model. Divergent visions among social groups regarding which innovations or transition pathways are most desirable further complicate the process. Understanding and navigating these power dynamics, justice concerns, and conflicts is essential for fostering inclusive, equitable, and genuinely transformative sustainable transitions.

3 Transition pathway typologies

Transition pathways vary across geographies, drivers of change, thematic orientations, and desired outcomes. These differences reflect the influence of local conditions, stakeholder agendas, and historical trajectories. One of the most widely used typologies is based on the concept of the multi-level perspective by (Geels & Schot, 2007), which conceptualises transitions as the result of interactions between niche innovations, socio-technical regimes, and landscape-level pressures. In this framework, transitions represent a gradual reorientation of dominant regimes, shaped by external pressures, institutional shifts, and societal debates (Geels et al., 2016).

This **multi-level perspective typology** identifies six pathway types:

- **reproduction pathway**: a stable system with no significant landscape pressures;
- **transformation pathway:** moderate external pressure prompts adjustments within existing systems;
- **de-alignment and re-alignment pathway**: large, disruptive landscape changes destabilise the regime, enabling niche innovations to realign the system;
- **technological substitution pathway**: strong landscape shocks allow ready niche innovations to replace existing regimes;
- **reconfiguration pathway**: regimes adopt symbiotic niche innovations to address local problems, eventually leading to broader adjustments; and
- **sequential pathway:** a combination of pathways over time.

Pathways can also be categorised by **scope** (e.g. governance, business models, behavioural change), **outcomes** (e.g. climate resilience, sustainable economies), or **challenges addressed** (e.g. labour shortages, youth outmigration, climate risk) (Wigboldus et al., 2021).

While evolutionary economic geography (EEG) has focused largely on urban industrial transformation, its concepts—especially path development—also offer valuable insights for the transitions in mountain resort. Research has explored how regions diverge in their development despite similar historical and geographical contexts, with a growing emphasis on micro-level agency and local change actors (Grillitsch and Sotarauta, 2020; Isaksen et al., 2015; Jolly et al., 2020).

A key concept is path dependence, where historical development trajectories shape current capacities and constraints. Past industrial specialisation often continues to influence education systems, workforce skills, and cultural norms (Boschma & Frenken, 2006; Martin & Sunley, 2006). In smaller towns, deeply embedded economic and cultural traditions foster distinct ways of life passed across generations (Byrne, 2002; Eadson and Van Veelen, 2023). This is especially

true for mountain resorts, where winter tourism is strongly interwoven with local identities and cultural codes—creating fertile ground for path dependency and resistance to change, even under strong external pressures such as climate change.

Evolutionary economic geography literature identifies four main types of industrial path development (for example, Grillitsch et al., 2018; Tödtling and Trippl, 2018):

- **Path extension**: incremental innovations reinforce existing industries without major transformation (Isaksen et al., 2015).
- **Path upgrading**: introduction of new technologies, skills, or processes to improve competitiveness within established sectors (Grillitsch et al., 2018).
- **Path diversification**: leveraging existing capabilities to develop related activities and explore new markets (Tödtling & Trippl, 2018).
- **Path creation**: emergence of entirely new industries or sectors, often supported by scientific or technological assets, or external investment (Tödtling & Trippl, 2018).

While path extension and upgrading improve competitiveness, they rarely lead to systemic transformation. Diversification and creation offer greater transformative potential but require longer timelines, integration into value chains, and supportive institutional environments (Martin and Sunley, 2006; Isaksen et al., 2015).

In Alpine mountain resorts, where economic activities and cultural identity are closely linked to ski tourism, transitions often follow gradual pathways such as extension, upgrading, or related diversification (Bækkelund, 2021; Baumgartinger-Seiringer et al., 2021). However, this embeddedness also risks developmental lock-ins, where strong traditions and stakeholder networks hinder adaptation (Hassink et al., 2019).

In culturally rich regions, collective agency plays a dominant role, fostering gradual change within familiar economic structures. However, if change is constrained by tradition, economic decline or path downgrading may occur (Blažek et al., 2020). Conversely, in culturally thinner places or towns where traditional industries have weakened, individual agency may drive transitions. Such settings are more open to path creation or path importation (Grillitsch and Sotarauta, 2020; Binz et al., 2016). While this can facilitate transformative change, it may also lead to fragmented development, inequalities, or exclusion if driven solely by self-interest (Eriksen & Frivold, 2023).

Ultimately, both culturally embedded and culturally thin regions are vulnerable to lock-ins if lacking the right combination of agency, vision, resources, and institutional support (Binz et al., 2016). In mountain resort contexts, understanding these dynamics is crucial for identifying feasible and context-sensitive transition pathways.

Taken together, the multi-level perspective and evolutionary economic geography provide complementary insights for understanding transitions in Alpine mountain resorts. The MLP helps explain how external pressures, niche innovations, and regime stability interact to open or constrain windows for change, while EEG highlights the role of historical trajectories, local agency, and path-dependent dynamics in shaping feasible directions of transformation. Combining these perspectives makes it possible to identify not only the systemic pressures that drive change, but also the locally embedded capacities, constraints, and actor constellations that condition responses. This integrated view forms the basis for the typology developed in the following chapter, which adapts these theoretical concepts to the specific institutional, cultural, and economic realities of mountain resorts in the Alps.

4 Transition pathway typology for Alpine mountain resorts

Building on the theoretical foundations outlined above, we propose a typology of transition pathways specifically tailored to mountain resorts in the Alps, with a predominant focus on winter tourism. This typology draws primarily on concepts from evolutionary economic geography, particularly path development theory (Isaksen et al., 2015; Grillitsch et al., 2018; Tödtling and Trippl, 2018), particularly path development theory, which explains how historically rooted economic trajectories, institutional structures, and cultural practices shape current and future transition dynamics (Grillitsch et al., 2018; Tödtling & Trippl, 2018; Isaksen et al., 2019).

To capture the full complexity of transitions, this framework is complemented by concepts from the multi-level perspective on socio-technical change (Geels & Schot, 2007) and the literature on transition governance and political dimensions (Pelling et al., 2015; Loorbach et al., 2017; Wigboldus et al., 2021). These perspectives allow us to consider how transitions are shaped not only by local path dependencies but also by external pressures (e.g. climate change, demographic shifts), governance capacities, actor coalitions, and power dynamics.

The typology presented in this chapter should not be understood as a one-size-fits-all model, nor is its purpose to definitively position each living lab in a fixed category. Sustainable transition is a dynamic process, and mountain resorts may move from one pathway type to another as conditions evolve and new strategies are implemented. The figure included here therefore illustrates only the current positioning of the TranStat Living Labs at the time of the project. The typology functions above all as a heuristic tool: it provides a common analytical framework to understand the dynamics of change, identify governance needs, and support the formulation of context-sensitive goals for future sustainable development and transformation. In this sense, it enables policymakers and stakeholders to tailor governance arrangements, mobilise resources, and design transition pathways that reflect the unique challenges and opportunities of each Alpine region.

4.1 Structure of the typology

The proposed typology (Figure 4) is organised as a two-dimensional grid, defined by the following axes:

1. **Vertical axis, representing the level of governance support:** This axis captures the degree of political and institutional coordination involved in the transition process—ranging from uncoordinated, weakly supported efforts at the bottom to strong, multi-level and strategic governance support at the top.

2. **Horizontal axis, representing the scope of transition:** This axis reflects the breadth of transformation—ranging from sector-specific adaptation focused on sustaining the winter tourism model on the left, to broad-based transitions involving economic diversification, cross-sectoral integration, and societal change on the right.

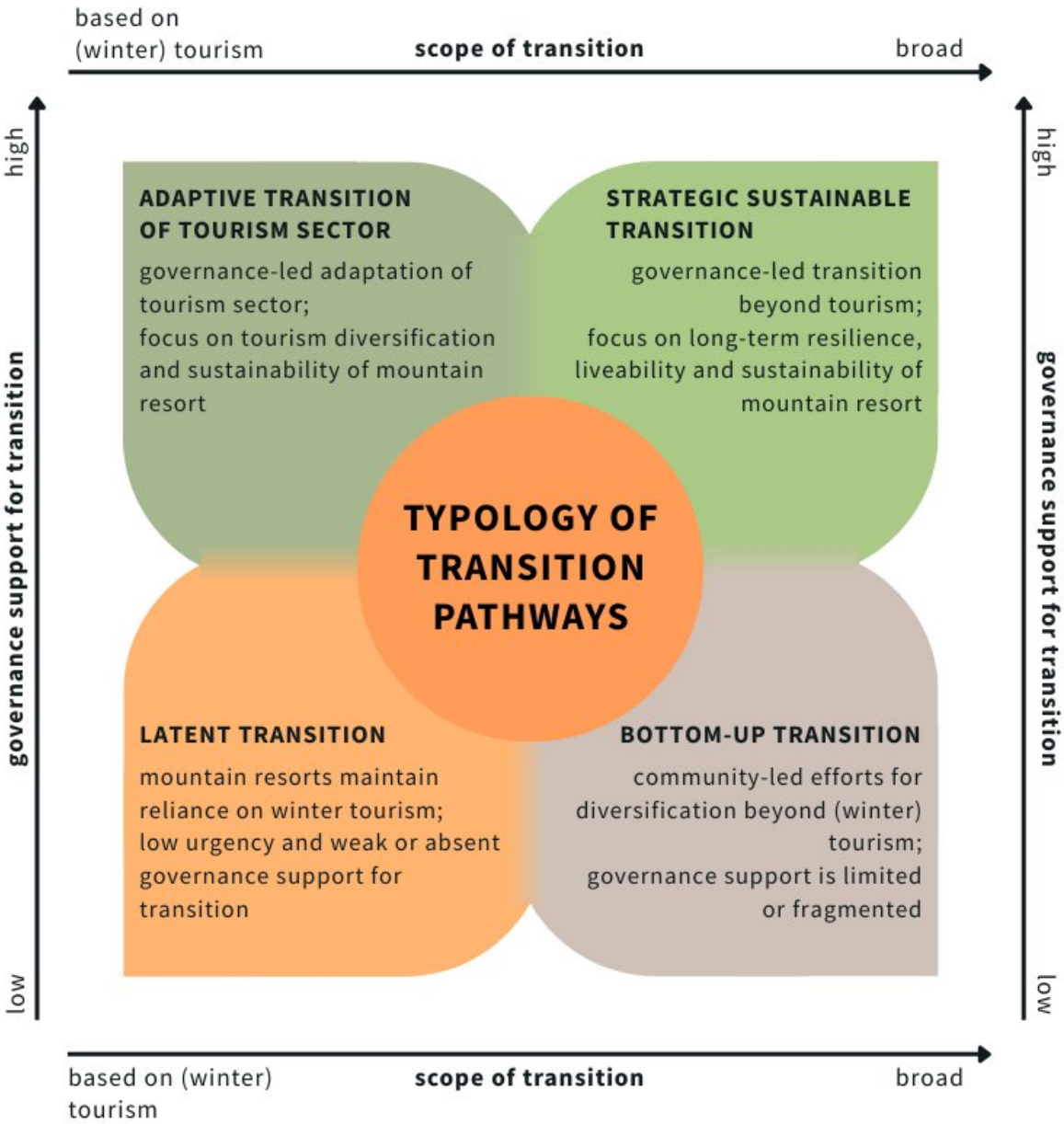

Figure 4: Typology of transition pathways for mountain resorts.

4.2 Transition pathway types

At the bottom-left side of the typology grid, we identify path extension or stagnation pathways, where mountain resorts maintain existing winter tourism models with little or no transformation. Mountain resorts in this category maintain existing winter tourism models with minimal change. They are shaped by strong path dependencies, entrenched cultural traditions, and weak or fragmented governance support, resulting in low pressure—or low perceived urgency—for transition. In some cases, these resorts simply do not see a need for change, as

the current tourism-based model remains economically viable and relatively unaffected by climate change. However, this reliance on historical trajectories can lead to institutional inertia and may obscure long-term vulnerabilities (Bækkelund, 2021; Hassink et al., 2019).

At the upper-right side of the typology grid, we identify pathways of broad-based sustainable transformation, where strong multi-level governance support interacts with proactive strategies for diversification and place-based renewal. These transitions build on coordinated policy frameworks, political leadership, and collective agency to mobilise local assets and pursue systemic change. They often reflect reconfiguration or de-alignment/re-alignment dynamics within the multi-level perspective (Geels & Schot, 2007; Geels et al., 2016), while in evolutionary economic geography terms they align with path diversification or path creation, where new trajectories emerge through innovation, institutional support, and external investment (Tödtling & Trippl, 2018; Grillitsch et al., 2018). Such pathways often extend beyond sectoral adaptation by rethinking the long-term role of mountain resorts as sustainable, liveable, and resilient places for residents, workers, and future generations (Binz et al., 2016; Grillitsch & Sotarauta, 2020).

1. **Latent transition (weak or no governance support for transition, narrow scope)**

Resorts in this category maintain existing winter tourism models with minimal change. They are shaped by strong path dependencies, entrenched cultural traditions, and fragmented or absent governance support for transition, or with low perceived urgency for transition. Mountain resorts of this type do not currently see the need to change, as their tourism-based model remains economically viable and relatively unaffected by climate change. However, this reliance on historical trajectories can result in institutional inertia and may obscure emerging vulnerabilities (Hassink et al., 2019; Bækkelund, 2021). This type aligns with the “reproduction pathway” in the multi-level perspective terms, where the regime remains stable, and landscape pressures are weak or ignored (Wigboldus et al., 2021).

2. **Bottom-up transition (weak governance support for transition, broad scope)**

This pathway is marked by the absence or lack of coordinated political or institutional support for sustainable transition, even as external pressures, such as demographic change, or climate variability, affect mountain resorts. While sustainable transition is not yet on the political agenda, local actors, entrepreneurs, and civil society groups are initiating small-scale diversification and transition efforts. These initiatives tend to be fragmented and unaligned with formal policy frameworks, which limits their systemic impact. This corresponds to weak

economic diversification (Grillitsch & Sotarauta, 2020), as well as early-stage niche experimentation without sufficient regime destabilisation or alignment mechanisms (Geels & Schot, 2007; Köhler et al., 2019).

3. **Adaptive transition of tourism sector (strong governance support for transition, narrow scope)**

Resorts in this category are undergoing incremental but coordinated adaptation within the broader tourism sector, extending beyond winter tourism alone. Supported by governance mechanisms—such as destination management organisations, regional tourism policies, or climate adaptation strategies—these resorts pursue technological improvements (e.g. snowmaking efficiency, renewable energy use), organisational innovations, and diversification into more sustainable and resilient tourism offers (e.g. wellness, cultural tourism, nature-based and off-season activities). These actions reflect a deliberate effort to enhance the environmental, economic, and social sustainability of the tourism sector without abandoning its central role in local development. The transition process remains sector-bound, but it is intentional, structured, and increasingly oriented toward sustainability goals.

This pathway corresponds to "transformation" or "reconfiguration" dynamics in the multi-level perspective (Wigboldus et al., 2021), where existing regimes adapt under landscape pressures. It also aligns with path upgrading or related diversification in evolutionary economic geography, where incremental change strengthens the resilience of dominant industries while gradually opening space for innovation (Grillitsch et al., 2018).

4. **Strategic sustainable transition (strong governance support for sustainable transition, broad scope)**

This pathway includes resorts engaged in a broad, strategic transformation that extends beyond winter tourism, supported by strong political leadership, coordinated policy efforts, and multi-sectoral governance mechanisms. Crucially, these transitions are not only about economic diversification—they also reflect a wider societal reorientation. The goal is to enhance the liveability, sustainability, and long-term resilience of mountain places by rethinking what makes them viable and attractive for residents, workers, and future generations. This often involves reconfiguring local governance, mobilising place-based assets, investing in social infrastructure, and addressing broader demographic and environmental challenges.

These transformations are already underway, driven by intentional planning frameworks, cross-sectoral funding instruments, and coalitions of public, private, and civic actors. They represent a shift from reactive adaptation to proactive territorial transformation. This trajectory aligns

with “reconfiguration” or “de-alignment/re-alignment” pathways in the multi-level perspective framework (Wigboldus et al., 2021), and with path creation in evolutionary economic geography (Byrne, 2002; Binz et al., 2016), where new development trajectories emerge through innovation, leadership, and place-based agency.

5 Positioning the TranStat Living Labs in the transition pathway typology

The future visions developed across the TranStat Living Labs reflect a shared commitment to sustainable development, yet vary in scope, ambition, and governance according to local contexts. Transition pathways span from deep, system-level transformation to more incremental or fragmented approaches shaped by existing dependencies, capacities, and political will.

1. Living Labs exhibiting latent transition

Megève is positioned within a latent transition pathway, as its vision for the future remains firmly rooted in winter tourism, which continues to define the resort's identity and economic orientation. Despite visible climate-related impacts—particularly at its low-altitude ski areas—ski resort operators show little interest in changing the prevailing operating model. Transition-oriented initiatives are instead emerging primarily within the municipalities, where concerns about ensuring residents' quality of life—such as access to basic services, affordable housing, and sustainable mobility—are gaining importance.

Demographic pressures, including rising housing costs and declining permanent population, are recognised concerns. Dialogue with secondary homeowners during the TranStat project revealed a strong attachment to the area and diverse perspectives on its future. Yet, while certain challenges—such as climate change, demographic shifts, and housing pressures—are increasingly recognised, they are not yet being addressed through a coordinated or future-oriented governance approach.

Maniva is currently positioned within a latent transition pathway. Some local actors and young residents drive initiatives that recognise the urgent need to rethink the existing winter tourism model in response to accelerating climate change. Yet, institutional support and the commitment of ski resort managers to foster a more sustainable and resilient local economy remains limited.

The envisioned future for Maniva pursues to reduce seasonality by promoting snow-independent, eco-sustainable tourism activities such as hiking, cycling, and nature-based experiences. It also includes the development of local food systems, the cultivation of innovative, high-quality crops, and the promotion of food and wine tourism. This vision integrates environmental sustainability with local economic development and social cohesion as a foundation for the resort's transformation.

Although still at an early stage, the vision of transition is holistic—environmentally responsible, economically viable, and socially embedded. It supports job creation, encourages younger generations to stay, and reinforces local identity. Maniva thus illustrates a community-driven transition centred on territorial revitalisation, even in the absence of strong institutional coordination.

Chiesa in Valmalenco reflects a hybrid transition pathway, combining latent transition and adaptive transition of tourism sector. While stakeholders aim to transform the area into an innovative local ecosystem, focused on energy independence, liveability, and tourism diversification, the future vision remains partially tied to technical, infrastructural adaptations that will ensure the continuation of winter tourism-dependent economic development model.

Key projects include the construction of artificial water reservoirs to support both energy production and artificial snowmaking, enabling the continuation of winter tourism despite climate variability. At the same time, the living lab envisions initiatives that move toward sustainability—such as the creation of a geological and nature park, the restoration of historic architecture, and the repurposing of abandoned ski infrastructure. These are intended to strengthen local identity, improve quality of life, and support year-round tourism.

While de-seasonalisation of tourism and revitalisation of local community are strategic goals, the persistence of ski tourism as a central economic pillar and the emphasis on technical solutions suggest that structural transformation remains limited. Valmalenco's pathway is marked by selective adaptation and partial diversification, with ambitions for change still constrained by existing dependencies.

2. Living Labs exhibiting adaptive transition of tourism sector

St. Corona am Wechsel is a small village on the eastern edge of the Alps, near Vienna. Due to the low altitude of the small-scale ski area (840-1039 m a.s.l.), it had become increasingly challenging to sustain ski slopes and economically impossible to produce enough artificial snow. While the low altitude is a disadvantage, the proximity to Vienna means there are numerous potential visitors. Therefore, it was clear that there was tourist potential, but that change was necessary. The federal development agency took ownership and, together with innovative lift operators, successfully implemented an adaptive transition of the local tourism sector led by governance.

The transition in St. Corona focused on the ski area. Some skiing infrastructure was abandoned and the development of touristic offers focused on a core area. The strategy targeted the year-round provision of a variety of activities. Lifts and conveyor belts are used both for skiing and mountain biking, which are the main economic pillars. Furthermore, families can enjoy summer

tobogganing, visit the motor skills park, explore the wooden marble run and follow a themed walking route.

There is a limited offer of guest beds in St. Corona, and stays tend to be rather short but frequent. Regardless of the snow situation, the destination aims to attract visitors, especially families, in the future, and has implemented a transition pathway to achieve this.

Kranjska Gora exhibit an adaptive transition pathway type due to its continued reliance on winter tourism and its growing, but still tourism-centred, sustainability efforts. The resort remains committed to ski tourism as long as snow conditions allow, reflecting a strong cultural and economic attachment to winter sports tradition.

However, climate-related risks and other uncertainties, linked to the private ownership of ski infrastructure have prompted stakeholders to explore new governance models, including more inclusive, cooperative management structures and the strategic use of tourism tax revenues. At the same time, the living lab is investing in alternative offers—such as cross-country skiing, hiking, and spa services—and addressing traffic issues through sustainable mobility initiatives.

While the tourism sector remains fragmented, efforts to diversify products, improve governance coordination, and integrate environmental and cultural protection are gaining ground. The living lab reflects a coordinated, tourism-focused adaptation that aims to sustain local development through incremental change and resilience-building.

Rogla is positioned within an adaptive transition pathway, as it continues to prioritise ski and spa tourism while gradually investing in diversification and climate adaptation. Although winter tourism remains central, recent infrastructure upgrades—such as the year-round Mašinžaga ski lift and water-efficient snowmaking—signal efforts to reduce dependency on snow conditions and extend the tourism season.

The integrated ownership of the Rogla ski resort and Zreče spa enables operational flexibility, particularly in workforce management, while sustainability practices are being introduced in tourism sector in general. Although the recent changes in the ownership structure introduce some uncertainty, past commitments to sustainability provide a strong foundation for future development. Efforts to improve sustainable mobility and expand public transport reflect growing attention to environmental pressures. Rogla represents a coordinated, tourism-focused transition, grounded in continuity but increasingly oriented toward long-term resilience.

Vals is best positioned within an adaptive transition pathway, where snow-reliable ski tourism remains a key pillar of the local economy. Due to its high altitude, the resort has not yet experienced the severe climate-related impacts faced by many other Alpine mountain resorts, allowing skiing to continue without major disruption. At the same time, local stakeholders are

addressing broader challenges, including workforce shortages, housing availability, and the need to strengthen the summer tourism offer. Backed by stable income from hydropower and the internationally renowned thermal bath, the municipality is gradually diversifying through investments in infrastructure, liveability, and tourism diversification activities.

While the long-term vision aspires to greater sustainability, the current trajectory reflects a tourism-anchored, governance-supported adaptation, with incremental shifts toward resilience and broader structural transformation.

3. Living Labs exhibiting strategic sustainable transition

Saint-Pierre-de-Chartreuse follows a strategic, governance-led transition pathway, marked by a coordinated downsizing of downhill skiing and a deliberate shift toward diversified, low-impact tourism. The dismantling of cable cars and retention of only drag lifts—some operated by associations—reflect a managed withdrawal from large-scale ski tourism. Although a second private operator has emerged, the overall direction points to a medium-term exit from winter tourism.

At the territorial level, tourism is embedded within a broader development model that promotes economic diversification, residential attractiveness, and territorial liveability. The living lab has built on an early tradition of year-round tourism and now supports a vision that prioritises quality over volume.

The transition is guided by inter-municipal strategies and participatory processes, initially focused on the ski area and now expanding to tourism and liveability themes. While transformation beyond skiing is still unfolding, the living labs articulates a coordinated and transformative approach, supported by strong public leadership, stakeholder engagement, and cross-sectoral planning.

Großes Walsertal represents one of the most mature and coordinated transition pathways within the TranStat project. The region has never depended on large-scale winter tourism, instead building a longstanding tradition of nature-based, low-impact tourism that aligns with ecological limits and supports local life. Skiing persists on a small, snow-reliable scale, particularly for youth and residents, with adaptive measures in place to extend its viability.

Looking forward, the living lab envisions consolidating its identity as a year-round destination, grounded in regional culture, ecological stewardship, and community well-being. The future model aligns with a “Regenerative Eco-Tourism” approach, where tourism is not only a sustainable economic activity but also a vehicle for revitalising landscapes, preserving biodiversity, and enhancing local culture. The living lab promotes sustainability not as a constraint, but as an opportunity—to reduce traffic impacts, expand renewable energy use,

support local food systems, and ensure economic resilience. Planning is supported by strong governance structures, including the biosphere reserve, e5, KLAR!, and KEM programmes. Through this integration of environmental, economic, and social dimensions, Großes Walsertal is actively transitioning toward a model in which residents are prioritised and guests are welcomed as temporary locals. The living lab's approach exemplifies a strategic, highly coordinated, and multi-dimensional transition pathway that serves as a model for meaningful, community-embedded tourism in the Alps.

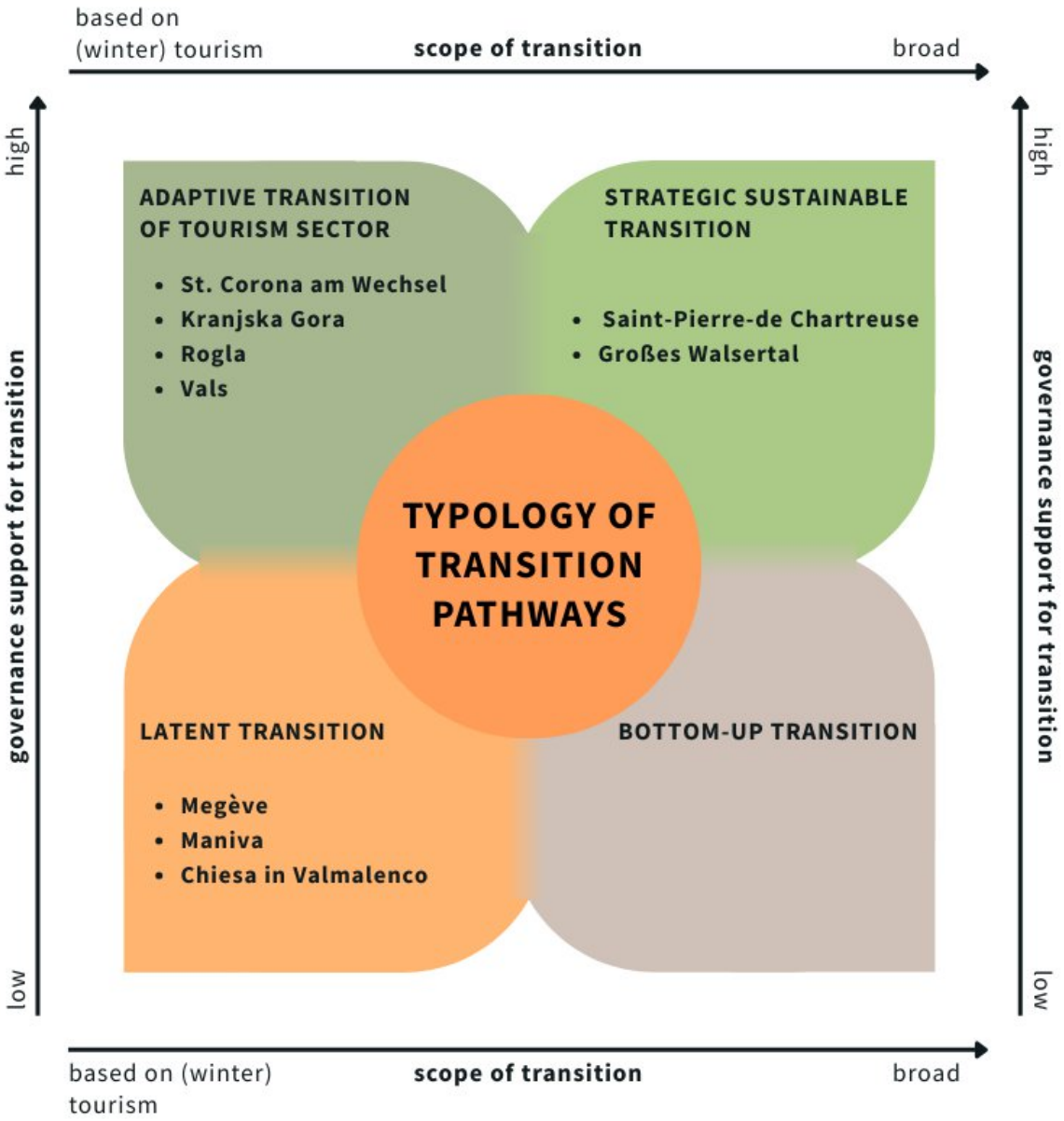

Figure 5: The position of the TranStat Living Labs within the typology.

The diversity of future visions across the TranStat living labs illustrates a wide range of transition trajectories unfolding in Alpine mountain resorts. While all living labs express some degree of commitment to sustainability, their pathways vary considerably in terms of governance coordination, strategic intent, and the scope of change—ranging from incremental adaptation within the tourism sector to more transformative, cross-sectoral reorientations. The figure presented above (Figure 5) positions each Living Lab within the transition pathway typology.

Some living labs, such as Saint-Pierre-de-Chartreuse and Großes Walsertal, exemplify strategic sustainable transitions, yet along very different trajectories. Saint-Pierre-de-Chartreuse, with its strong dependence on tourism, requires a more radical reorientation of its development model, while Großes Walsertal, rooted in diversified and low-impact tourism, follows a more incremental path. In the latent transition type, Italian living labs such as Maniva and Valmalenco focus on supporting local crafts, cultural and agricultural production, and diversifying tourism, whereas Megève faces particularly acute challenges in retaining a permanent population. Taken together, these examples show that even within the same transition type, paths vary greatly depending on local conditions and priorities. According to the research, no living lab is currently positioned in the bottom-up transition type.

The typology presented in this chapter offers more than a comparative overview of transition pathways across Alpine mountain resorts—it provides a practical framework to guide policy action. By identifying differences in governance coordination and the scope of change, the typology helps clarify where each Living Lab currently stands in its transition process. This understanding is essential for designing targeted, context-sensitive policies that respond to specific challenges, capacities, and development trajectories. Rather than applying uniform solutions, policies can be tailored to support strategic frontrunners with long-term investments, enable adaptive cases to strengthen coordination and resilience, or build capacity and awareness in areas where transitions are still latent or bottom-up. The typology also offers a basis for monitoring future progress, helping policymakers track how resorts evolve in their sustainability ambitions. These implications are further developed in the output of the TranStat project on policy recommendations.

6 Conclusions

This deliverable has provided a comprehensive analysis of how Alpine mountain resorts are navigating the complex challenges of sustainable transition, with a particular focus on the pressures posed by climate change and the limits of snow-dependent development models. The document is founded on theoretical insights and augmented by empirical material from nine Living Labs. It presents a typology of transition pathways that captures the diversity of current development visions, ranging from path-dependent continuity to transformative, cross-sectoral strategies.

By systematically analysing local development visions, governance practices, and transition dynamics, the document contributes to a deeper understanding of how mountain resorts in the Alps are responding to shared yet context-specific challenges. Rather than prescribing a uniform solution, the typology allows for a more differentiated and place-sensitive interpretation of transition processes, acknowledging that resorts differ significantly in their institutional settings, governance capacities, and economic dependencies.

The typology presented in this document should therefore not be understood as a one-size-fits-all model, nor is its purpose to definitively position each living lab in a fixed category. Sustainable transition is a dynamic process, and mountain resorts may shift from one pathway type to another as conditions evolve and new strategies are implemented. The figure included here illustrates only the current positioning of the TranStat Living Labs at the time of the project. The typology functions above all as a heuristic tool: it provides a common analytical framework to understand the dynamics of change, identify governance needs, and support the formulation of context-sensitive goals for future sustainable development and transformation.

In this manner, the present deliverable functions in two capacities: firstly, as an analytical foundation, and secondly, as a strategic reference point. These functions are relevant for partners, stakeholders, and policymakers engaged in advancing transitions in Alpine regions. The findings presented here will directly inform the upcoming output of the TranStat project on policy recommendations, ensuring that policy responses build on the diversity of pathways and are tailored to the specific trajectories and capacities of mountain resorts.

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