

# Technological and social innovation at the service of mountain regions and their resorts

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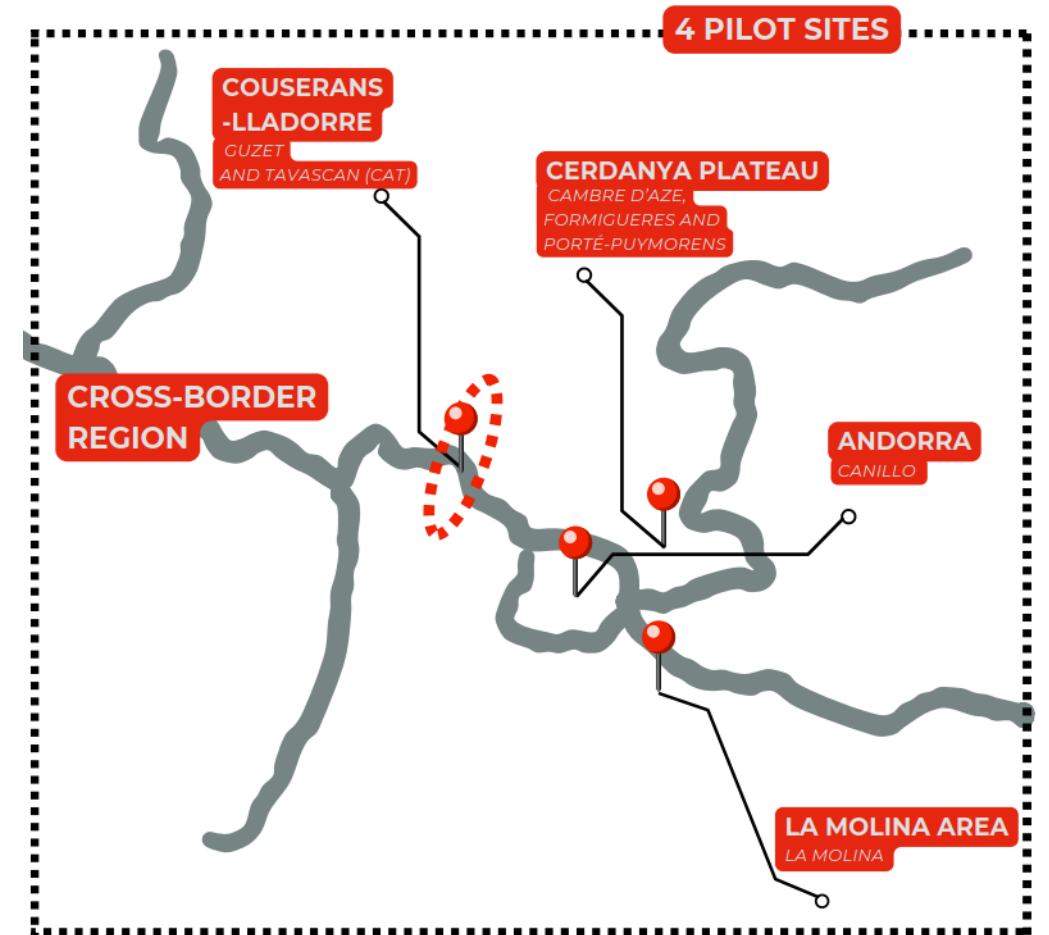
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## Introduction

Mountain regions are at the frontline of climate change, where environmental pressures intersect with evolving societal and economic dynamics. These impacts are critical in areas that rely heavily on tourism, such as mountain resort towns, which face increasing uncertainty regarding their long-term viability and development models. In this context, the PITON project (2024-2026), an initiative supported by the Interreg POCTEFA programme, aims to explore innovative pathways for adaptation and territorial transition across the Pyrenees. By integrating social and technological innovation, the project addresses the complex relationship between mountain resorts and their surrounding territorial stakeholders. PITON fosters participatory approaches rooted in social innovation to engage a broad range of local stakeholders, while also employing digital tools to convey and analyse environmental and socioeconomic data. Through a structured, three-stage methodology, PITON seeks to co-develop an approach that drives the generation of adaptive strategies fostering resilience and sustainable futures for mountain communities.

This approach is currently being tested and refined through cross-border coordination among French, Spanish and Andorran partners, and includes four representative pilot sites within the Pyrenean massif. The project will conclude with the dissemination and capitalization of its results through an online platform.



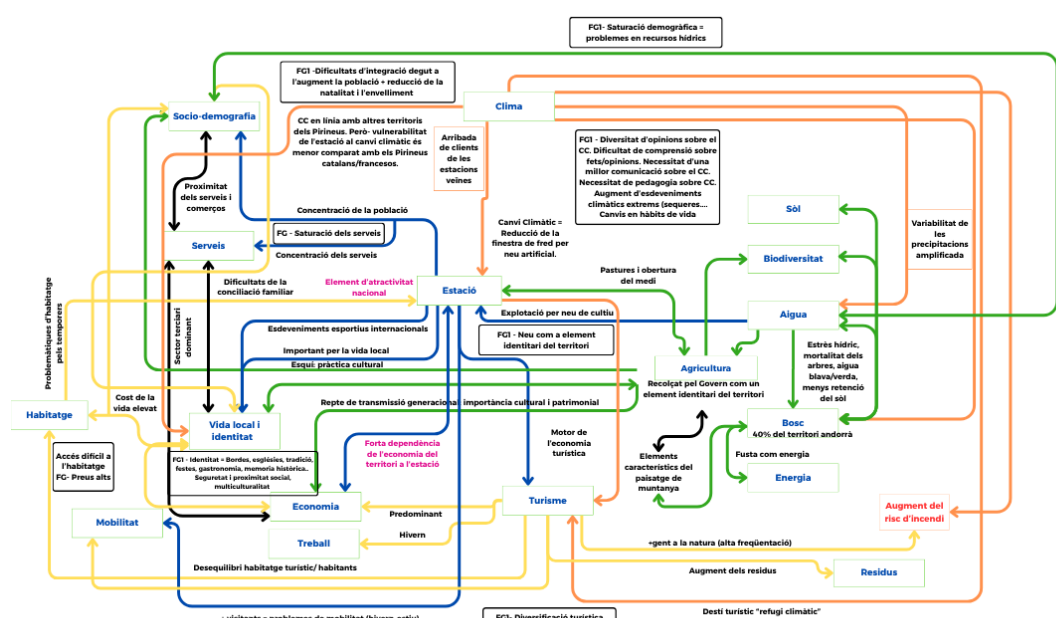
## The PITON approach

### 1 Data Collection and Local Perceptions

The process begins with a comprehensive data collection for each site, covering:

- Environmental indicators: climatic data, localised climate projections, water resources, energy systems, waste management, etc.
- Sociodemographic and cultural indicators: population structure, social vulnerabilities, number and types of local associations, cultural practices, etc.

Simultaneously, a **first focus group (FG1)** is conducted with local stakeholders (citizens, administration and private sector). This focus group explores stakeholder knowledge and perception across four analytical dimensions: (a) regional economic structures and drivers; (b) socio-demographic profiles, educational attainment, and labor market characteristics; (c) tangible and intangible components of natural and cultural heritage; and (d) the complex effects of climate change on territorial dynamics, human systems, and ecological processes.



\* For details on the references underlying the PITON approach, please consult the authors.

### 2

#### Systemic Mapping

#### Design Fiction

#### Initiatives

Following FG1, a systemic analysis is carried out. This involves identifying and mapping relationships (e.g. positive, negative, strong, weak) between key “hotspots” - crucial themes emerging from both the data collection and FG1. The result is a systemic map that captures the complex interconnections within the local context.

In the **second focus group (FG2)**, this systemic map is presented and validated with participants. Open discussions and structured group dynamics are used to examine and refine the links between key topics, explore the reasoning behind identified relationships, and integrate new information or perspectives from participants.

The second part of FG2 introduces a design fiction process, based on the validated systemic map. Hypothetical future tipping points (2040–2050) are introduced, derived from the systemic analysis and existing dynamics. These may relate to environmental thresholds, social dynamics, or economic shifts.

Participants work in subgroups to envision desirable futures in response to these tipping points and propose initiatives that could lead to or sustain such futures. FG2 concludes with a collection of diverse initiative proposals rooted in shared imaginaries and local relevance.

Between FG2 and FG3, regional teams analyse the proposed initiatives to extract their key components and feasibility.

In the **third focus group (FG3)**, these initiatives are evaluated by participants using a set of deliberative and reflective group exercises. The aim is to:

- Promote critical thinking on the applicability and transformative potential of each initiative.
- Select a small set of high-priority initiatives, supported by technical inputs from regional and academic stakeholders involved in the process. The objective is to avoid maladaptation and initiatives that could increase the territory's vulnerability.

### 3

#### Implementation Conditions and Replicability

The **fourth focus group (FG4)** focuses on preparing for implementation. Participants engage in structured activities to:

- Identify the enabling conditions needed to apply the selected initiatives, considering their systemic implications and associated tipping points.
- Maximise expected benefits while mitigating potential risks.

FG4 also includes a presentation of results and envisions evaluation tools for the final initiatives. Additionally, participants reflect on the replication potential of the method for future processes and contexts.



## Pilot sites: Early-stage results and engagement

### Canillo – Grandvalira (Sectors of Canillo, Tarter and Soldeu )

Participants highlighted challenges like housing pressures and rising living costs, with local identity tied to natural heritage and traditions. They recognized climate change and identified three hypothetical tipping points for 2040–2050 that could disrupt community balance. There was agreement on the need for seasonal tourism adjustments and varied views on addressing climate impacts. Five desirable futures were co-created to guide sustainable development, followed by initiatives focused on quality of life, water management, resident-tourist balance, primary sector support, and tourism strategy coordination among private and public stakeholders.



### Cerdanya - La Molina



Participants identified limited access to housing as a key issue with a high prevalence of second homes and heterogeneous population, including migrants, neo-rural settlers, temporary workers, and long-term residents. The lack of education and employment opportunities contributes to youth outmigration, resulting in a demographic profile dominated by retirees and minors. Seasonal economic fluctuations challenge labor recruitment, although the associative sector is growing (28 organizations) working together. Six desirable futures were co-created to guide sustainable territorial development. Key strategic objectives include:

- Stable Employment
- Diversified tourism
- Ecological territorial planning
- Sustainable mobility
- Housing Access

### Couserans - Guzet

Participants highlighted the central role of agriculture and forest in the territory's identity and development. They also mentioned the rich local cultural life and that tourism in Couserans is mainly based on outdoor activities. Focus Group participants underlined that Couserans territory needs an ambitious revitalisation project. Works bring out that Guzet mountain resort plays a patrimonial role for local population. The tipping points are based on these observations and are starting points to design desirable futures and initiatives. The PITON dynamic fosters the wish to establish cross-border bonds between the two neighbouring municipalities Ustou and Tavascan in Catalonia.



### Cerdanya Plateau - Trio Pyrenees



Cerdanya-Capcir's particularity is to be concerned by 5 mountain resorts (including the 3 managed by Trio Pyrénées). Participants underlined the major challenge of maintaining the region's habitability while ensuring economic activity and preserving the environment. They recognized the importance of tourism, building and health sectors in the economic structure and the key role of agriculture in the territory's identity. They imagined desirable futures based on tipping points such as sharing water resources, declining snowfall, reduced biodiversity, declining agriculture, or increase of demography.