

# SPINE – Smart Public Transport Initiatives for Climate-Neutral Cities in Europe

## Summary

SPINE's vision is to accelerate the progress towards climate neutrality by reinforcing PT systems through their smart integration with new mobility services, connected and automated mobility, sharing schemes, active transport modes, and micromobility.

Drivers of this transition will be the SPINE Living Labs (LL) engaged in the co-creation, development, uptake and the broad adoption of promising innovative mobility solutions.



Figure 1. SPINE European Living Labs.

SPINE takes place in 11 European Living Labs (LLs). LLs are innovative and collaborative ecosystems that serve as real-world testbeds for exploring, co-creating, and evaluating new technologies, products, services, and policies. They provide a unique environment where various stakeholders, including researchers, businesses, government agencies, and citizens, come together to tackle complex challenges and address societal needs.

LLs offer a space for experimentation, enabling the development and validation of novel solutions in authentic settings, such as cities, communities, or specific domains. A set of digital enablers will be developed and deployed to support the new LLs mobility services, building on existing TRL 4-9 assets from project partners.

The LLs will become exemplars of improved access to PT combined with advanced shared, inclusive, sustainable, and resilient mobility services, in turn leading changes in mobility patterns and behaviours, aimed at less car-centred urban mobility systems.

A network of collaborative LLs is developed to foster transferability, while an intersectional view of the transport system users is applied. Four Lead City LLs in Antwerp, Bologna, Tallin and Las Palmas are being established.

SPINE will foster the twinning, transferability and adaptation of the successful solutions of the four lead LLs in seven Twinning Cities - Barreiro, Valladolid, Zilina, Sibenik, Hrakleion, Gdynia and Rouen.

The SPINE twinning framework is based on collaboration and knowledge sharing between the SPINE LLs aiming at creating effective and impactful PT solutions compared to working in isolation. The logic behind the twinning framework is grounded in the understanding that collaboration, shared learning, and mutual support are fundamental drivers of innovation and progress.

The SPINE Living labs utilise an Equity Centered Design Thinking approach especially tailored for the SPINE project. It begins by empathising with the users of the solutions and then proceeds to define a plausible range of solutions. Key areas of emphasis include equity, accessibility, affordability, and inclusiveness. The next step involves ideating, where collective co-creation and refinement of the solutions take place. Prototyping follows, along with implementing, testing, and assessing the impact of the solutions.

Finally, successful solutions are amplified in cities across Europe. The focus of all solutions, whether push or pull measures, revolves around enhancing public transportation (PT) offerings, addressing the diverse needs of current and potential PT users.

SPINE has two main indicators that should be measured, monitored, and achieved in all SPINE cities:

- Increase of the **public transport share** in the modal split **by 30%** compared to the baseline.
- Increase of **user satisfaction** with public transport **by 25%** compared to the baseline.

The CERIS – IST research team is responsible for consolidating the lessons learned from lead Living Lab collecting generated knowledge, documenting the barriers to implementing non-qualified solutions and the challenges faced when implementing the Twinned innovations.

Additionally, will work on the impact evaluation process of SPINE which includes the definition of the indicators to be measured and monitored for each city to evaluate the impact of SPINE measures on different domains.

As part of SPINE, transport modelling activities are foreseen with the development of traffic simulation, activity-based and behavioural models to assess the impact of SPINE measures on transport and the potential behavioural change of people. CERIS – IST will be part of the modelling team, expecting to contribute for the development of an activity-based model for the Barreiro Living Lab.



## Project Reference

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## Leading Institution

Inlecom Innovation Astiki Mi Kerdoskopiki Etaireia (Greece)

## Partners

Stad Antwerpen (Belgium), Universiteit Antwerpen (Belgium), Tallinna Linn (Estonia), Ayuntamiento de Valladolid (Spain), Mesto Zilina (Slovakia), Municipio do Barreiro (Portugal), Grad Sibenik (Croatia), Heraklion Municipality (Greece), Miasto Gdynia (Poland), Ayuntamiento de Las Palmas de Gran Canaria (Spain), SRM – Societa Reti e Mobilita SRL (Italy), Autobuses Urbanos de Valladolid SA (Spain), Astiko Ktel Irakleiou Metaforiki Touristiki Anonymos Etaireia (Greece), Guaguas Municipales Sociedad Anonima (Spain), Panepistimio Aigaiou (Greece), Fundacio Centre D'Innovacio i Tecnologia de la UPC (Spain), Comune di Bologna (Italy), AIMSUN (Spain), Instant System (France), CIVINET Cy Ei Secretariat Astiki Mi Kerdoskopiki Etaireia (Greece), ODRAZ – Odrzivi Razvoj Zajednice (Croatia), Uniwersytet Gdanski (Poland), Cambiamo Sociedad Cooperativa Madrilena (Spain), MOBY X Software Limited (Cyprus), IST-ID – Associação do Instituto Superior Técnico para a Investigação e Desenvolvimento (Portugal), Zilinska Univerzita v Ziline (Slovakia), Sociedad Municipal de Aparcamientos de Las Palmas de Gran Canaria SA (Spain), Konnecta Systems Limited (Ireland), Hogskolan i Halmstad (Sweden), CINESI SL (Spain), Przedsiębiorstwo Komunikacji Autobusowej Spółka z o.o. (Poland), YUNEX GmbH (Germany), EURNEX e. V (Germany), European Integrated Project (Romania), Cityway SAS (France), PNO (Netherlands), Arcadis - IBI Group (Canada), Atom Mobility (Latvia)

The CERIS – IST research team is also responsible for acting as the local partner for the Barreiro Twining Living Lab, together with Barreiro’s Municipality and the local BUS operator TCB.

Barreiro is one of the main cities on the south bank of Tejo River in the Lisbon Metropolitan Area. Historically it has strong mobility patterns with the main Lisbon municipality as it was the main river crossing point for those who used public transport.

With already a significant urban density, Barreiro also serves as access point to PT from surrounding municipalities, such as Moita, Palmela, Seixal, Sesimbra and even Setubal.

This results in a high intensity of private car traffic, especially in peak hours, and severe parking problems, with informal park and ride land occupation very near the city center.

Figure 2 synthetizes the Barreiro SPINE Living Lab approach, with one main TCB Citizen App functioning as a unique interface and communication center with citizens and PT users where other solutions are integrated and linked to provide innovative tools to increase the TCB public transport quality.

- 1. TCB Citizen Mobility App** - Develop a TCB Citizen App as the main citizen interface to engage support and retrieve information about Barreiro Mobility System. Will serve as integrator of existing services and new solutions developed during SPINE to empower citizens to participate in the project.
- 2. Maas Journey Planner** - Develop and update existing journey planner app with multimodal MAAS functionalities and innovative user information, such real time position of TCB Buses, park and ride alternatives, bus occupancy level and parking availability.

- 3. BUS Passenger Analytics** - Measure real-time occupancy for a sample of 10 TCB buses through computer vision and AI, to enhance the visibility of the city's journey planner and increase user satisfaction, by providing real time information of occupancy through the Maas Journey Planner. As a secondary outcome an Origin Destination matrix estimation will be tested by tracking the passengers and record the entry stop and exit stop.

- 4. Smart Park & Ride Management** - Define a new location for Park & Ride in Barreiro to decrease the number of cars crossing the city center. Use 50 parking sensors to provide information to the visitors coming from the suburban areas of Barreiro to monitor the new P&R and create parking services leveraging public transport use.

A crucial aspect of equity-centered community design involves recognizing the systemic causes of inadequate public transport services and passenger dissatisfaction, leading to reduced accessibility not only to transportation but also necessary activities and unequal access to opportunities.

To ensure the successful development of such solutions, SPINE engages in a series of iterative, coordinated activities which aim to synchronise the efforts and progress of all LLs in the project and achieve horizontal fertilisation of activities, solutions and findings, with cross pollination from other Living Lab initiatives.

These innovations are aimed at increasing the demand for PT services, either by nudging users towards using PT more frequently or improving accessibility to public transport. It should also improve the convenience of public users, by identifying needs in a co creation process and engage active participation of citizens in all solutions developments.

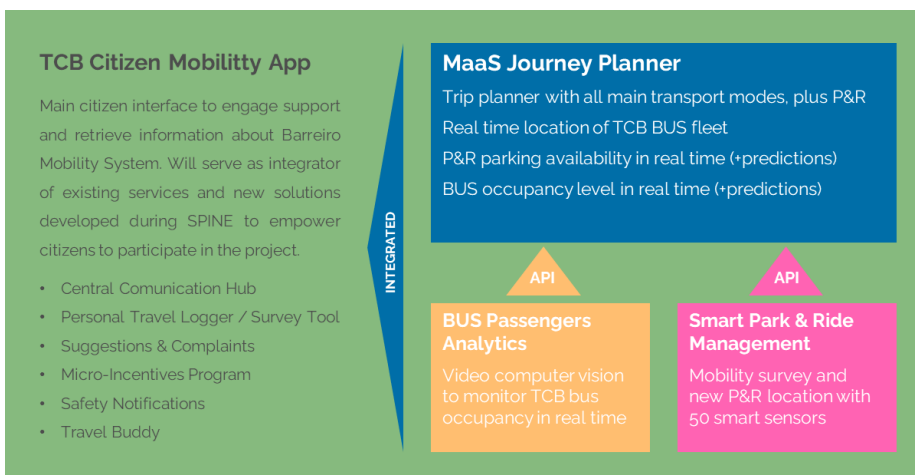


Figure 2. Barreiro’s SPINE Living Lab Solutions.

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**CERIS**

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**Project Website**

[www.spine-project.eu](http://www.spine-project.eu)