Interreg CENTRAL EUROPE

Co-funded by the European Union

NUTSHELL@CE

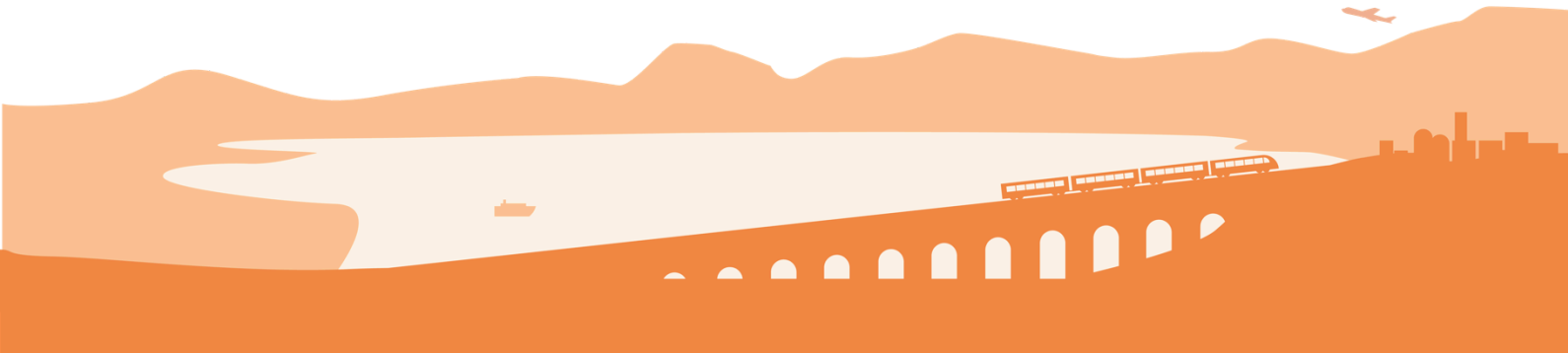
NUTSHELL@CE

WORK PACKAGE 2

VISION CO-CREATION BASED ON TRANSNATIONAL COOPERATION

DELIVERABLE D2.4.5: Regional / local action plan of Rzeszow (PL)

Version1
04/2026



INDEX

AUTHOR(S)	ORGANISATION
Marek Duda, Agnieszka Kojder-Walaszek, Piotr Stącel	PP 3 - Rzeszow Regional Development Agency
Łukasz Mikołaj Dziągwa, Żaneta Karbowska, Mirosław Rzeszutek, Mateusz Szarata	PP 11 - Public Transport Authority in Rzeszów
Ulrich Leth	PP 2 - Technische Universität Wien (TU Wien)

1. DELIVERABLE 2.4.5 overview

PROJECT TITLE	streNgthening pUblic TranSport to enHance accEssibility in ruraL centraL Europe
PROJECT ACRONYM	NUTSHELL@CE
PROJECT ID	CE0200933
PROGRAM SPECIFIC OBJECTIVE	SO3.1: Improving transport connections of rural and peripheral regions in central Europe
START DAY OF THE PROJECT	1 May 2024
DURATION	36 months
DELIVERABLE TITLE	D2.4.5 Regional / local action plan of Rzeszow (PL)
DUE DATE OF THE DELIVERABLE	30.04.2026
ORGANISATION RESPONSIBLE	PP 3 - Rzeszow Regional Development Agency PP 11 - Public Transport Authority in Rzeszów PP 2 - Technische Universität Wien (TU Wien)
PROGRAMME	Interreg CENTRAL EUROPE 2021-2027

2. DELIVERABLE 2.4.5 description

Deliverable 2.4.5 describes the Action Plan for Rzeszow with an extended introduction on the background, the vision and strategy.

3. DELIVERABLE 2.4.5: Regional / local action plan of Rzeszow (PL)

Background

Summary of existing goals from national/regional/local government documents

In **the Sustainable Urban Mobility Plan for the Rzeszów Functional Area** (SUMP for ROF), the integration of passenger information is a key element of the implementation of the vision of a coherent transport system for the 15 municipalities of the agglomeration.

These solutions are inscribed in the document through the following goals and actions:

- One common mobile application: One of the main operational tasks is to create an integrated tool for the entire ROF area, which will combine data on different transport services (ZTM buses, PKS, railways, micromobility) in one interface.
- Multimodality and interchanges: SUMP emphasizes the development and integration of interchanges (e.g. the construction of a metropolitan hub in Rzeszów). The passenger information system is intended to facilitate transfers between different modes of transport, providing real-time information about the waiting time for the next stage of the journey.
- Cooperation between operators: The document assumes closer integration of the systems of Rzeszów Urban Transport (RTM) with carriers such as PKS Rzeszów (Association of Municipalities "PKS") and railways, so that passengers moving between ROF municipalities receive consistent data.
- Retrofitting the infrastructure: The plan envisages retrofitting bus stops throughout the functional area with modern dynamic passenger information boards, which will unify the standard of service in Rzeszów and neighbouring municipalities.
- Strategic objective – Increasing accessibility: The integration of information serves the overarching objective of the SUMP: to make public transport more attractive to private cars, which is expected to lead to improved quality of life and reduced emissions in the ROF.

Passenger information integration is a key element of **the Strategic Transport Development Programme of the Podkarpackie Region until 2030 (PSRT WP 2030),** adopted at the beginning of 2024.

This solution fits into the region's strategy by:

- System and ticketing integration: One of the priorities of the PSRT WP 2030 is the organizational and tariff integration of various branches of transport (rail and bus). Common passenger information is the foundation for the planned integrated ticket throughout the Region.

- Support for the Subcarpathian Agglomeration Railway (PKA): The programme puts emphasis on the development of PKA as the transport backbone of the region. The integration of passenger information is aimed at seamlessly connecting rail services with local bus connections (e.g. the Association of Municipalities "PKS"), which is crucial for passengers commuting to Rzeszów.
- Digitization of transport (ITS): The strategy assumes the implementation of Intelligent Transport Systems (ITS), including modern real-time information systems, which increases the standard of service and competitiveness of public transport compared to private cars.
- Consistency with EU funds: These activities are directly linked to the European Funds for Podkarpacie 2021-2027 (FEP) programme, which finances, m.in, sustainable urban mobility and the integration of transport systems in functional areas (ITI).
- Improving the accessibility of the region: Integrated information is intended to eliminate transport exclusion, making it easier to plan trips from smaller towns to the region's service centers.

The integration of transport information within the ROF is a local implementation of a broader regional development vision. Both SUMP ROF and PSRT WP 2030 emphasise:

- multimodal coordination,
- reduction of mobility barriers,
- digitisation of public transport,
- enhanced accessibility for residents of peripheral municipalities, and
- alignment with sustainable development principles.

Description of the Status quo PTSQC analysis

Public transport services and regional context

In the Rzeszów region there are:

- international and interregional trains (IC, EX, RE, EIP, EIC),
- regional trains,
- express and long-distance buses,
- city and local buses.

Rail is **the highest capacity means of transport**, especially in long-distance and corridor relations. The highest frequencies (<10 min) occur mainly **in the center of Rzeszów** and **on the main railway lines**. Peripheral areas are among the lowest accessibility classes (often >60-120 min between trips).

Regionally, two key transport corridors dominate:

4. **Krakow - Przemyśl**,
5. **Rzeszów-Lublin**, which places Rzeszów as an important transit hub in eastern Poland.

Average course interval	Highest ranked transport means of the transport station			
	IC, EX, RE, EIP, EIC	Regional trains	Express and IC buses, local trains	Other buses including city buses
<10 min	I.	I.	II.	III.
10—20 min	I.	II.	III.	III.
20—30 min	II.	III.	IV.	IV.
30—60 min	III.	IV.	V.	V.
60—120 min	IV.	V.	VI.	VI.
120—180 min	V.	VI.	VII.	VII.
180—240 min		VII.	VIII.	VIII.
>240 min				

Table 1. PTSQC stop categories in the pilot area (PP3 and PP11)
Source: D1.5.1: Transnational report: Result of status-quo analysis with PTSQC methodology

Characteristics of the area and the location of stops

Rzeszów has the highest density of transport hubs and stops within the pilot area. Suburban networks are more dispersed, with lower service frequencies and reduced connectivity.

The spatial layout of rail infrastructure follows a parallel structure aligned with the main Kraków–Przemyśl corridor.

Bus transport provides the densest coverage within the city, confirming the dual structure of mobility in the area:

- regional mobility relies primarily on rail,

- urban mobility is largely bus-based.

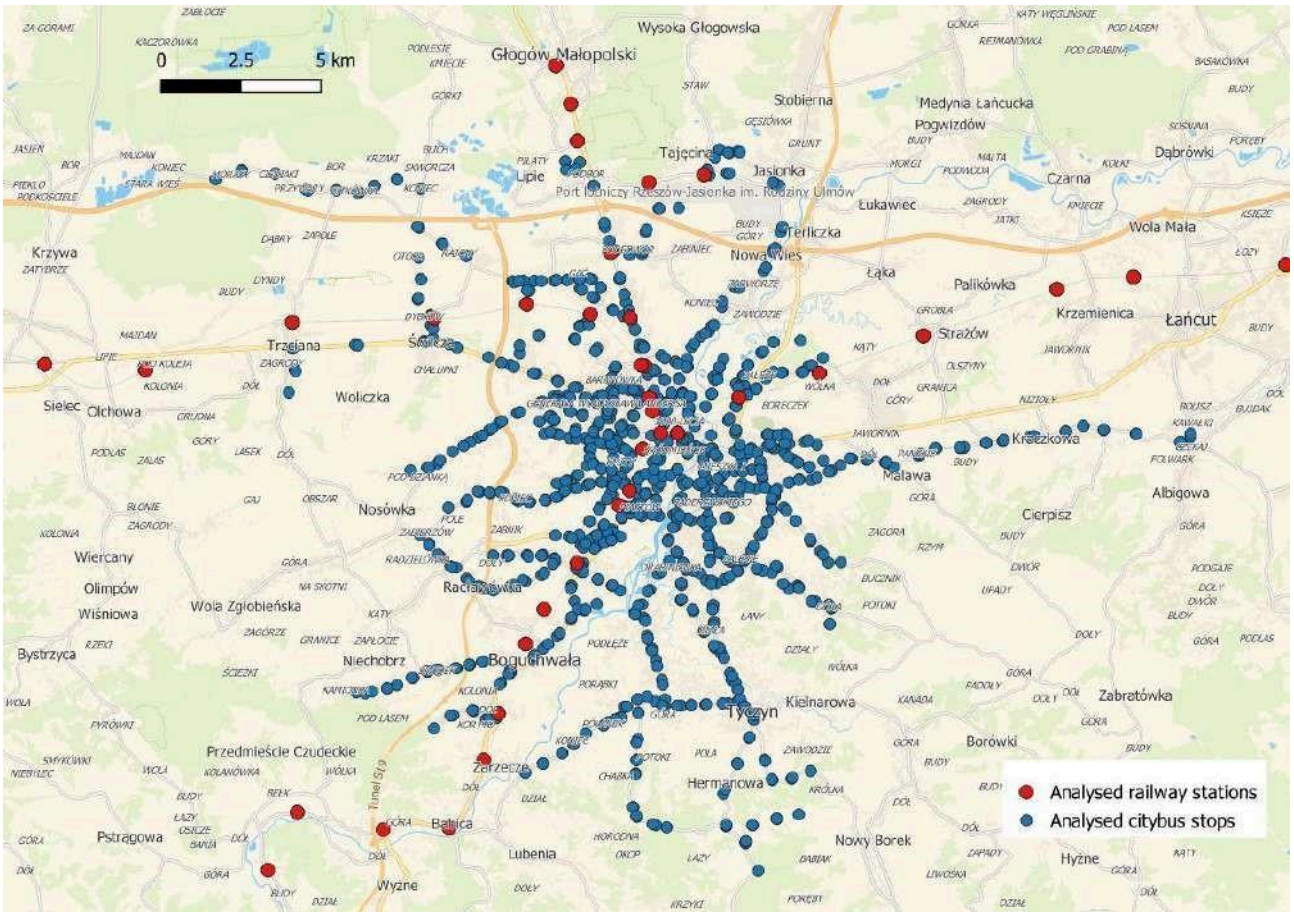


Figure 1. PT stops in the pilot area (PP3 and PP11) based on GTFS sources
Source: D1.5.1: Transnational report: Result of status-quo analysis with PTSQC methodology

Population distribution and access to transport

The settlement layout has a **structure of corridors and nodes** – the best accessibility is close to the center and main routes. Only the immediate surroundings of the Main Station have reached category **A**.

Number of inhabitants by category:

- **B: 101,074 (largest group)**
- **C: 57 790**
- **D: 23,724**
- **E: 20,975**
- **F: 14,934**
- **G: 10,304**
- **A: 4,468**
- **Unclassified: 15,291**

Conclusion: Most residents live within medium accessibility categories (B–D), reflecting the polycentric nature of the agglomeration and its dependence on core transport corridors. Only 6% of residents live outside areas classified by the PTSQC methodology.

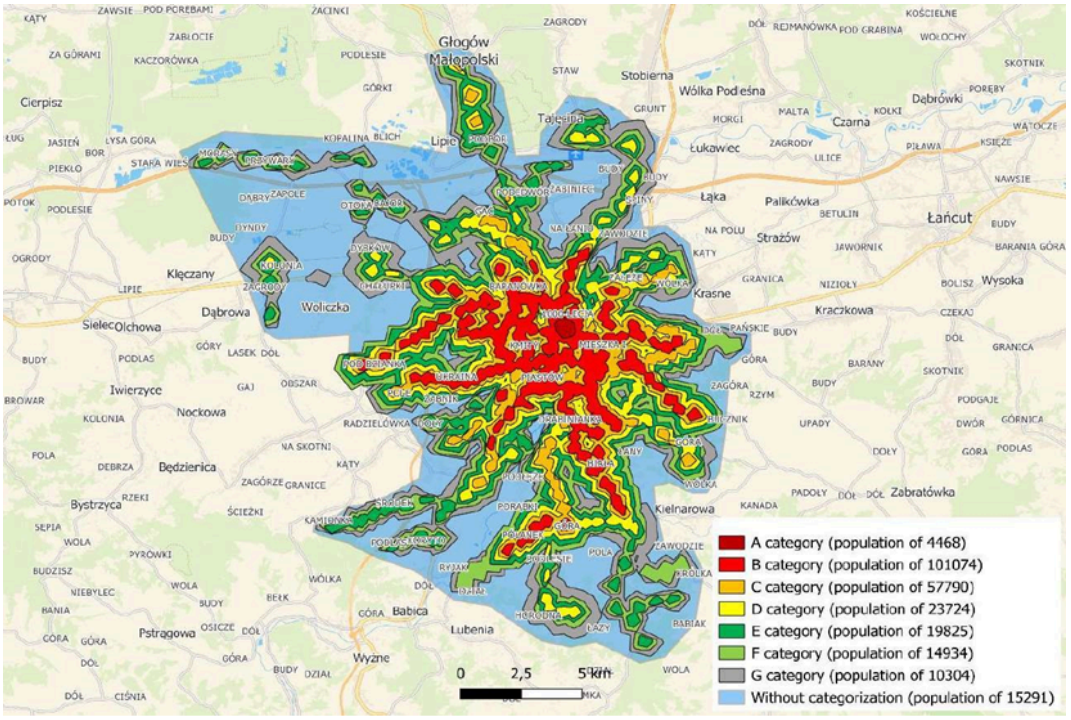


Figure 2. Population distribution of the pilot area (PP3 and PP11) based on PTSQC categories
Source: D1.5.1: Transnational report: Result of status-quo analysis with PTSQC methodology

Population density and transport availability

The highest population density occurs in Rzeszów and along the main axes of development. High accessibility categories (A–B) coincide with settlement ranges along:

- the Wisłok Valley,
- direction Tyczyn – Słocina – Boguchwała,
- exit routes from the city.

Lower categories are islands **of accessibility** in less populated areas and in hilly areas.

Accessibility of transport to industrial and service areas

The largest concentrations of industrial areas are:

- in the vicinity of the center of Rzeszów,
- in the north of the city,
- along the main transport routes.

Most of these areas are assigned to **the average availability categories (B-E).** No category A in industrial areas.

Upgrades required:

1. **Rogoźnica** – a large cluster in category **E**, requiring improved accessibility.
2. **The eastern part of the city (Rzeszów CHP Plant)** – categories **D-G**, frequency and communication improvements are needed.
3. **Boguchwała - industrial zone** – partly categories E-G, and in some places no classification.

Key Summary

- Rzeszów benefits from strong transport provision, particularly within city limits due to a dense bus network.
- Regional accessibility is dominated by two major railway corridors, which structure mobility across the area.
- The largest population group falls into category B, with limited areas of highest accessibility.
- Peripheral municipalities and certain industrial zones show substantial accessibility gaps, especially in service frequency and multimodal integration.
- The greatest development potential lies in densely populated but underserved suburban areas, where integrated passenger information and improved service coordination can significantly enhance mobility.

Vision & strategy

Local/regional Vision & principles

Guiding Principles

- Accessibility and equity – transport services should be available to all residents.
- Safety and reliability – journeys should be predictable and safe.
- Integration – coordination between operators and transport modes.
- Sustainability – development consistent with climate objectives.
- Digitalisation – use of modern technologies to improve passenger information.
- Territorial cohesion – strengthening connections between urban and rural areas.

Convergence of the pilot action with the main domains of the Transnational Strategy

The planned pilot action — integration of timetables of different transport operators at selected hubs — directly supports the objectives and activities defined in three domains of the transnational strategy for integrated transport and spatial planning within the NUTSHELL@CE project.

Domain 1 - Public transport services

Why is it part of the pilot project?

The integration of timetables is one of the central activities envisaged within this domain. It strengthens accessibility, operational coherence and usability of public transport services across the ROF.

Links to goals and activities:

Purpose/Action	How it supports the pilot project in ROF Rzeszów
Improving the accessibility and reliability of public transport	Integrated schedules (one database, compatible transfer times) will increase the real availability of services at selected ROF interchanges.
Development and synchronization of multimodal timetables (bus, rail)	Integration of timetables of urban, municipal, private and regional carriers, enabling multimodality.
Improving the user experience through digital tools	An integrated timetable is the foundation for: mobile applications, real-time information, timetables with QR codes, a common call finder.
Coordination of services across administrative boundaries	The ROF covers many municipalities - the integration of timetables is a key step in planning a common transport system in the city of Rzeszów and beyond.

Conclusion: Domain 1 is the direct "core" of the pilot.

Domain 3 - Regional economy

Why does the pilot fit into domain 3?

Integrated timetables facilitate mobility within the local labour market and support the movement of workers, businesses, students and tourists.

Links:

Purpose/Action	Link to the pilot
Strengthening the regional economy through sustainable mobility	Better transport coordination = easier commuting to work at selected ROF interchanges (industry, logistics, services).
Improving connections between rural areas, industrial zones and the city	The integration of timetables makes it possible to arrange consistent routes and transfers to economic zones, e.g. Jasionka.
Cooperation with employers	Integrated data will allow you to adjust courses to employee shifts and working hours in the future.
Supporting innovation (e-mobility, green technologies)	Common timetables are the basis for e-passenger information, planning of charging points, mobility centres, etc.

Conclusion: The pilot enhances labour market accessibility and contributes to regional competitiveness.

Domain 4 - Spatial Balance in Regions

Why does the pilot support it?

The ROF includes both urban and rural municipalities. Timetable integration helps reduce disparities in access to mobility services.

Links:

Purpose/Action	Link to the pilot
Ensuring equal access to mobility	Integrated schedules eliminate "white spots", allowing for an analysis of availability between municipalities.
Integrating strategies across administrative boundaries	The pilot is a cooperation of many ROF municipalities - it is a practical implementation of this assumption.
Supporting shared mobility	Consistent information about schedules is the foundation for carpooling, city bikes or multimodal commuting routes.
Monitoring of availability and quality of life	Data from the integration can be used for accessibility models (e.g. travel time to public services).

Conclusion: The pilot contributes to territorial cohesion by improving access to mobility across the entire ROF.

The pilot action — integrating timetables of multiple carriers and deploying QR-based virtual passenger information boards — is fully aligned with the strategic objectives of Domains 1, 3 and 4 of the NUTSHELL@CE framework. It strengthens multimodal coordination, expands access to mobility in peripheral areas, supports the regional economy and fosters spatial balance across the functional area.

Vision

The long-term vision for the Rzeszów Functional Area is to create a public transport system that is accessible, predictable and user-friendly for residents of both the city of Rzeszów and neighbouring municipalities.

In this vision, public transport operates as a coordinated and integrated network in which different transport operators and modes function together within a coherent system.

The development of such a system supports sustainable mobility, reduces dependence on private cars and strengthens regional economic development and territorial cohesion.

As part of the pilot, virtual passenger information boards based on QR codes will be deployed at selected strategic transport hubs. Each stop included in the project will be equipped with a QR code redirecting users to a dedicated webpage displaying real-time departure information for all available transport services. If real-time data is not available, the system will display timetable-based information.

The pilot program's idea of creating a unified, digital transport information system for the Regional Development Fund (ROF) aligns perfectly with the project's vision and will contribute to improving transport conditions in the area. This will provide residents and businesses with convenient, multimodal, and predictable mobility options.

The system will:

- improve access to transport services in ROF municipalities,
- support commuting to workplaces, schools and services,
- strengthen the regional economy and territorial cohesion,
- form the foundation for future flexible, shared and low-emission services.

Guiding principles for future development:

- digitisation,

- climate impact reduction,
- passenger safety and data reliability,
- increasing public transport ridership,
- green and energy-efficient solutions,
- territorial cohesion.

Summary of the vision and principles of project development

Implementing the vision of the Action Plan and the pilot project will make public transport in Rzeszów and selected neighboring municipalities more accessible, predictable, and user-friendly. Thanks to the chosen solution, virtual displays based on QR codes, each stop included in the pilot project—regardless of location—will become a smart information point, providing residents with instant access to current transport departure data. Passenger information will include, depending on service availability at a given node, urban, suburban, and rail transport. The system not only provides real-time information but also collects data on user behavior and mobility patterns, enabling better planning of transport services and paving the way for the future MaaS platform.

The realization of this vision is based on a set of key principles that set the direction for further development. The first is digitization, which is the foundation for the construction of modern transport services. The solution also aligns with climate goals by supporting greener forms of transport and reducing the need to use cars. The security and reliability of data is also crucial, as they strengthen user trust and the operational stability of the system.

The project also assumes a systematic increase in the number of passengers, achieved through better availability of information, convenience of using the application and communication coherence. In accordance with the principle of green solutions, the system remains lightweight, energy-efficient and does not require the installation of electronic infrastructure at each stop. The last overarching principle is territorial cohesion, ensuring that the solution is available to residents of the centre of Rzeszów as well as to peripheral municipalities – reducing transport exclusion and supporting the sustainable development of the region.

This vision and principles create a coherent strategic direction in which the project becomes an innovative, scalable and inclusive tool for the modernisation of public transport in the ROF area, and at the same time a platform for the further development of mobility services in the future.

Measurable targets & KPIs

OBJECTIVE 1 - Improve accessibility to public transport services - support commuting to workplaces, education and services

Description: Improving public transport conditions in a selected area

KPIs:

Increasing number of public transport passengers in a selected area: by 1% per year

OBJECTIVE 2 – Integration of data from different transport operators

Description: Installation of QR code plates at bus stops, after scanning the code, will ensure that the passenger is redirected to a dedicated page with information about the nearest departures from a given place. Passenger information should be included, depending on the availability of services in the junction – urban, suburban and rail transport.

KPIs:

Number of carriers included in the app

- min. 3 carriers (urban transport (PTAR), suburban (Union of Municipalities "PKS"), railway (Polregio).

OBJECTIVE 3 - Increase the number of stops covered by the virtual QR board system and implement experimental passenger presence monitoring based on Wi-Fi/BLE signals

Description: To cover as many strategic stops and hubs as possible in the pilot area, as well as to ensure their appropriate spatial distribution. Achieving this goal is crucial to increase the availability of passenger information, system visibility and multimodal travel planning capabilities.

KPIs:

Number of stops covered by the pilot:

- installation of 35 QR codes in 35 locations (virtual passenger board system)

- installation of 7 Sensors at 7 public transport stops (passenger presence monitoring system.

OBJECTIVE 4 – Ensuring high quality passenger information

KPIs:

- The number of data formats converted to the common GTFS standard.

Goal: at least 1 final format + min. 2 conversions from other formats.

OBJECTIVE 5 – Involvement of external actors

KPIs:

Number of approvals granted for the installation of QR codes and Sensors at stops.

- min. 3 (with municipalities or other entities).

Number of coordination meetings with external entities.

- min. 3 during the organisation and/or implementation of the pilot project.

OBJECTIVE 6 – Ensuring wide use of the application by ROF residents

KPIs:

Number of scans.

- Min. 500 scans in the first 6 months after system launch.

The defined set of objectives and KPIs reflects the comprehensive nature of the project and the direction of its development in terms of data integration, increasing the availability of information, inter-institutional cooperation and passenger engagement.

Under OBJECTIVE 1, activities will focus on improving accessibility to public transport services, supporting commuting to workplaces, education and services, which will contribute to improving passenger experience and reliability and, overall, improving the regional economy and territorial cohesion (for example, accessibility of industrial zones).

Under OBJECTIVE 2, the project focuses on creating an integrated platform that combines data from multiple carriers — rail, regional and urban. A key success indicator is the inclusion of a minimum of three operators, which enables the presentation of consistent multimodal information and facilitates trip planning.

OBJECTIVE 3 concerns increasing the number of stops covered by the QR system, which is the foundation for the wide availability of passenger information. The inclusion of 35

bus stop locations in the city of Rzeszów and selected municipalities in QR code plates will allow the solution to build recognition and create a basis for its future expansion. The implementation of experimental passenger presence monitoring based on Wi-Fi/BLE signals at 7 stops will be based on detecting and counting unique Wi-Fi and BLE signals emitted by the mobile devices of passengers waiting for the arrival of a means of transport, such as mobile phones, smartwatches and tablets.

OBJECTIVE 4 highlights the importance of high data quality. Converting data from different operators to a common GTFS format and developing at least two conversions from custom formats ensures the consistency and reliability of the information presented, and is a key element of technical success.

OBJECTIVE 5 emphasizes the need to involve institutional partners and carriers. Obtaining at least three approvals for the installation of QR codes and Sensors at stops and the implementation of at least three coordination meetings ensures proper operational cooperation and sustainability of the project.

OBJECTIVE 6 focuses on the real use of the system by the inhabitants of the ROF. The minimum threshold of 500 users within the first 6 months of the system's launch is a measure of social acceptance of the solution, its usefulness and information effectiveness.

Overall conclusion

Together, the objectives and KPIs form a coherent framework for evaluating the technical, organisational and social effectiveness of the pilot. They ensure:

- proper operation of the integrated system,
- high-quality and reliable timetable data,
- broad deployment of QR code infrastructure,
- active cooperation with institutions and carriers,
- measurable confirmation of passenger interest and use.

This structure creates a solid foundation for further development of integrated passenger information services and transport system improvements across the ROF.

Preferred scenario

During the co-creation workshop, several scenarios for improving passenger information and coordination of transport services were analysed.

The preferred strategic scenario identified by stakeholders is the integration of timetables and passenger information from different transport operators at key interchange hubs within the Rzeszów Functional Area. Integrated timetables allow better synchronisation of services, facilitate multimodal travel and significantly improve passenger experience.

Below **3 short, different scenarios** creating a system integrating timetables in the area of ROF Rzeszów. Each scenario is based on a different organizational, technological, and financial model. During the workshop, the following scenarios were evaluated together with the participants in accordance with their contribution to the principles of vision and goals set in the earlier part of the meeting and described in this document.

Scenario 1: Traditional static tables with distributions (without digitization)

Description

Passenger information is provided only through **printed timetable boards** placed at stops. Updates are done manually, and passengers do not have access to real-time data.

PROS

- low implementation costs,
- Simple maintenance.

Cons

- lack of information about delays, cancellations and route changes,
- the need to manually update data,
- no possibility of integration between operators,
- high susceptibility to errors and obsolescence,
- minimal support for the user in planning the trip.

Suitable only as a minimal solution, not supporting modern mobility.

Scenario 2: Electronic LED/LCD boards at bus stops (stationary infrastructure)

Description

Stationary electronic displays **are installed at the** stops, presenting departures in real time. Data is downloaded from the operators' systems and the equipment works around the clock.

PROS

- high visibility of information,
- the ability to show RT, messages and alerts,
- A proven solution in large cities.

Cons

- very high costs of purchase, installation and maintenance,
- the need to supply power and network infrastructure,
- uneconomical in locations with less passenger traffic,
- spatial limitations (small stops, poles, lack of space).

Good in large nodes, but not cost-effective for most of the ROF area.

Scenario 3: Virtual passenger information boards with QR codes (recommended by stakeholders during the meeting)

DescriptionIn connection with the desire to provide passengers with direct, fast, intuitive and universal access to information about the departures of public transport by scanning QR codes placed at 35 public transport stops in Rzeszów and its surroundings (the area of the Rzeszów Functional Area) using mobile devices, a QR system will be implemented as part of the pilot action, which will complement and extend the classic passenger information.

Scanning the code with a mobile device will redirect the user to a dedicated website presenting in real time the current departures of individual means of transport operated by different operators for a given location. In the absence of information from carriers about the location of vehicles in real time, information will be displayed based on the applicable timetable.

A dedicated web application will be developed, which will allow passengers to access current information about departures and integrate data from various transport operators. The application will m.in:

- obtain real-time data on the location of vehicles and their declared timetables (provided that online data is available from public transport),
- enable the configuration of stops covered by the system (adding and removing),
- offer an intuitive interface, clearly presenting the departure time, line number and direction and operator,
- be responsive, providing easy access to information on mobile devices.

At the same time, in order to provide an advanced passenger presence monitoring system, 7 sensors scanning Wi-Fi and Bluetooth Low Energy signals will also be installed at selected public transport stops. This system is aimed at collecting high-quality data

on the volume of passenger traffic at selected public transport stops in Rzeszów and its surroundings.

PROS

- full information in real time (RT + fallback to schedules),
- relatively low cost of implementation and maintenance,
- fast scalability in the city of Rzeszów and selected ROF communes,
- integration of data from different operators in one place,
- the ability to dynamically add stops and new data sources,
- compatible with the MaaS and SUMP concepts,
- Great flexibility and ease of upgrading.

Additional benefits

- high availability for users (phone = access tool),
- the ability to collect statistical data on traffic,
- the possibility of combining with passenger presence monitoring,
- easy integration with future mobility services (bicycles, carsharing, P&R).

Cons

- the possibility of devastation of a carrier with a QR code mounted on a post.

Choosing this scenario represents the best compromise between cost, functionality, flexibility and scalability.

Summary - Why is the "virtual QR whiteboards" scenario the best?

1. **Highest cost-effect ratio:**
   - QR codes allow you to deploy the system on a large scale without investing in infrastructure.
2. **Best flexibility and scalability:**
   - the system can be quickly expanded with new stops, nodes and operators.
3. **Real-time data in a single application:**
   - the integration of different operators is the key to MaaS, which is not possible in scenario 1 and very limited in scenario 2.
4. **Greatest development potential:**
   - the system can evolve into a trip planner, MaaS platform or analytical tool.

5. **Aligned with the EU and SUMP strategy:**
   - the solution supports the objectives of sustainable mobility, multimodality and emission reduction.
6. **Fastest implementation and lowest operational risk:**
   - technical requirements are minimal compared to stop electronics.

Action plan

The pilot action represents the first practical step towards implementing the broader strategic vision described above. The pilot focuses on improving passenger access to integrated timetable information through the deployment of digital passenger information tools.

As part of the pilot, QR-based virtual passenger information boards will be installed at selected transport stops. After scanning the code, passengers will gain access to a dedicated webpage displaying current departures for multiple transport operators.

In addition, a limited number of sensors will be installed at selected stops to analyse passenger presence and mobility patterns. The collected data will support future planning and improvements in transport services.

The pilot action implemented by the Polish Partners — the Rzeszów Regional Development Agency (PP3) and the Public Transport Authority of Rzeszów (PP11) — covers selected municipalities of the Rzeszów Functional Area (ROF). These municipalities maintain strong functional links with the core city of Rzeszów, particularly in terms of daily commuting and the organisation of the public transport system.

Rzeszów acts as the main node of the TEN-T core network; therefore, the focus of the pilot is to improve accessibility to the core city through modernised, integrated passenger information.

The pilot responds to the growing need for Mobility as a Service (MaaS) solutions, where integration of transport information — especially real-time data — enables more sustainable trip planning. By aggregating departure times from stops operated by different service providers, the pilot supports one of the key development priorities defined in the Sustainable Urban Mobility Plan for the ROF: improving transport

information to encourage residents to use public and shared mobility instead of private cars.

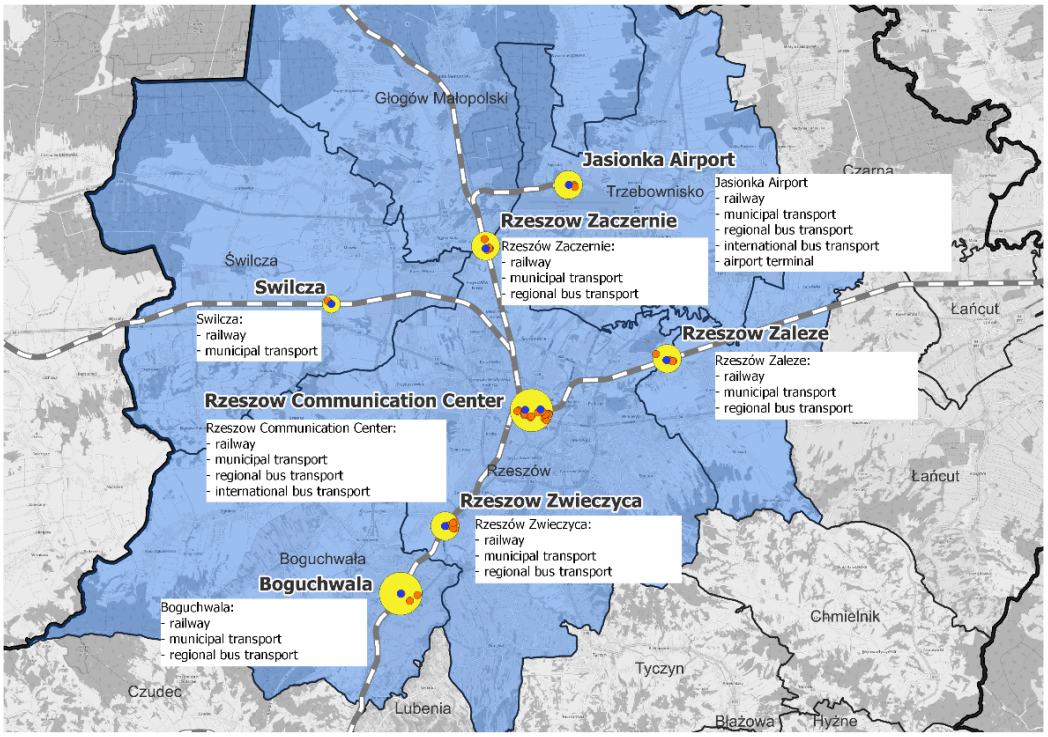


Fig. 3. Sample Locations of Transfer Hubs
Source: Municipality of Rzeszów - Public Transport Authority in Rzeszów

As part of the pilot action, 35 signs with QR codes will be installed at the stop locations indicated in the table below (depending on the stop, stickers may appear instead of plates). The locations were selected in a way that made it possible to obtain representative research data for different types of stops (m.in. interchanges, city stops, regional stops).

Lp.	Stop name	Commune	Object type
1	Boguchwała D. A. Grunwald 01	Boguchwała	Carport
2	Boguchwała Railway Station (railway)	Boguchwała	Carport
3	Boguchwała 95 nż	Boguchwała	Carport
4	Krasne Auchan 01	Beautiful	Carport
5	Beskid School 01 nż	Rzeszów	Carport
6	Architects 02	Rzeszów	Carport
7	Beskid School 02 nż	Rzeszów	Carport
8	Bl. Karolina Loop 09	Rzeszów	Carport
9	Budziwojska loop 22 nż	Rzeszów	Carport
10	Jarowa church 01 nż	Rzeszów	Carport
11	Krakowska Dworzysko 13 nż	Rzeszów	Carport
12	Krakow border 15 nż	Rzeszów	Carport

13	Kwiatkowskiego Dom Studenta 01 nż	Rzeszów	Carport
14	Langiewicza / Wita Stwosza 04	Rzeszów	Carport
15	Lubelska Hospital 02	Rzeszów	Carport
16	Lviv / Bałtycka 09 nż	Rzeszów	Carport
17	Łukasiewicza Loop 10	Rzeszów	Carport
18	Marszałkowska 02	Rzeszów	Carport
19	Miłocińska loop 01	Rzeszów	Carport
20	Paderewskiego church 08	Rzeszów	Carport
21	Piłsudskiego ZDZ 01 nż	Rzeszów	Carport
22	Podkarpacka church 07 nż	Rzeszów	Carport
23	Potockiego / Grafitowa 05 nż	Rzeszów	Carport
24	Potocki Loop 10	Rzeszów	Carport
25	Rejtana Kopisto 07	Rzeszów	Carport
26	Staroniwska loop 12 nż	Rzeszów	Carport
27	Warszawska / Myśliwska 09 nż	Rzeszów	Carport
28	Wita Stwosza / Langiewicza 02	Rzeszów	Carport
29	Liberation / By the Track 06 nż	Rzeszów	Post
30	Wyzwolenia / Ujejskiego 03 nż	Rzeszów	Post
31	Świlcza PKP 03 nż	Świlcza	Carport
32	Jasionka Airport	Trzebownisko	Carport
33	Kielnar Loop 07	Tyczyn	Carport
34	Tyczyn Orkana intersection 16	Tyczyn	Carport
35	Zaczernie 04 nż	Trzebownisko	Carport

Table 2. List of QR code installation locations

In addition to the indicated locations, reserve locations have also been selected, which will be used in the event of the inability to install QR code plates in any of the basic locations, in particular due to:

- technical
- formal and legal issues,
- infrastructure,
- organisational issues.

As part of the dissemination of the pilot action, posters promoting the indicated solution and the NUTSHELL@CE project will also be placed at selected stops. Leaflets and a promotional stamp will also be ordered, e.g. for a school with a QR code for a selected location. An information and communication message will be developed for publication on the https://rtm.erzeszow.pl/ website and for publication in social media. In addition, an information and communication message for broadcasting will also be developed in the form of slides on monitors located in public transport vehicles and at the Local Railway Station in Rzeszów.

In order to provide an advanced passenger presence monitoring system, 7 sensors scanning Wi-Fi and Bluetooth Low Energy signals will be installed at selected public transport stops. This system is aimed at collecting high-quality data on the volume of passenger traffic at selected public transport stops in Rzeszów and its surroundings.

The implementation of the system will enable continuous and automatic measurement of passenger attendance, real-time data transfer (230 V power supply) or at least once a day (in the case of battery power), archiving and further analysis. The project assumes that this data will be of a research nature and will be used to develop reports, forecasting models and tools supporting investment decisions in public transport.

The data collected by Sensory at the stops indicated in the table below will be used to analyse passenger flows and mobility patterns, and the results of these analyses will be used to formulate recommendations for the development of the transport system.

Lp.	Stop name	Commune	Object type
1	Boguchwała D. A. Grunwald 01	Boguchwała	Carport
2	Beskid School 01 nż	Rzeszów	Carport
3	Krasne Auchan 01	Beautiful	Carport
4	Lubelska Hospital 02	Rzeszów	Carport
5	Rejtana Kopisto 07	Rzeszów	Carport
6	Jasionka Airport	Trzebownisko	Carport
7	Zaczernie 04 nż	Trzebownisko	Carport

Table 3. List of sensor code installation locations

In addition to the indicated locations, reserve locations have also been selected, which will be used in the event that it is not possible to install the Sensors in any of the basic locations, in particular due to:

- technical
- formal and legal issues,
- infrastructure,
- organisational issues.

Status Quo and PTSQC Results for ROF Area

In the analysed area, the public transport system is served by rail and bus transport. Public bus transport is carried out by two main organizers: the Municipal Transport Authority in Rzeszów and the Association of Municipalities "Podkarpacka

Komunikacja Autobusowa". Public transport covers Rzeszów and regional connections with neighboring communes. Private bus transport focuses its activities on regional, domestic and international transport. However, not all municipalities in the vicinity of Rzeszów are within the range of their services (Figure 1). This applies to the town of Łańcut and the rural commune of Łańcut. The rural commune of Łańcut has concluded an agreement with Rzeszów to serve the villages of Kraczkowa and Albigowa with the RTM line (no. 46). In addition, thanks to the activities of the Łańcut district as part of the Bus Transport Development Fund (FRPA), the village of Cierpisz Dolny is served by the MKS line (no. 246). As a result, only part of the municipality uses public transport. The city of Łańcut, on the other hand, bases its public transport on private carriers and does not organize its own transport lines. In the Chmielnik commune, not all hamlets use public transport. Fragments of Chmielnik and Wola Rafałowska are served by private carriers, which causes partial disintegration of transport in the commune. A similar problem occurs in Zaborów (Czudec commune) and Dąbrówki (Czarna commune). Private carriers operate inter-municipal connections that are not part of the public transport system, such as connections between Czarna and Krzemienica (Łańcut commune), Malawa (Krasne commune) and Wola Rafałowska (Chmielnik commune) and Czarna and Medynia Łańcucka (Czarna commune).

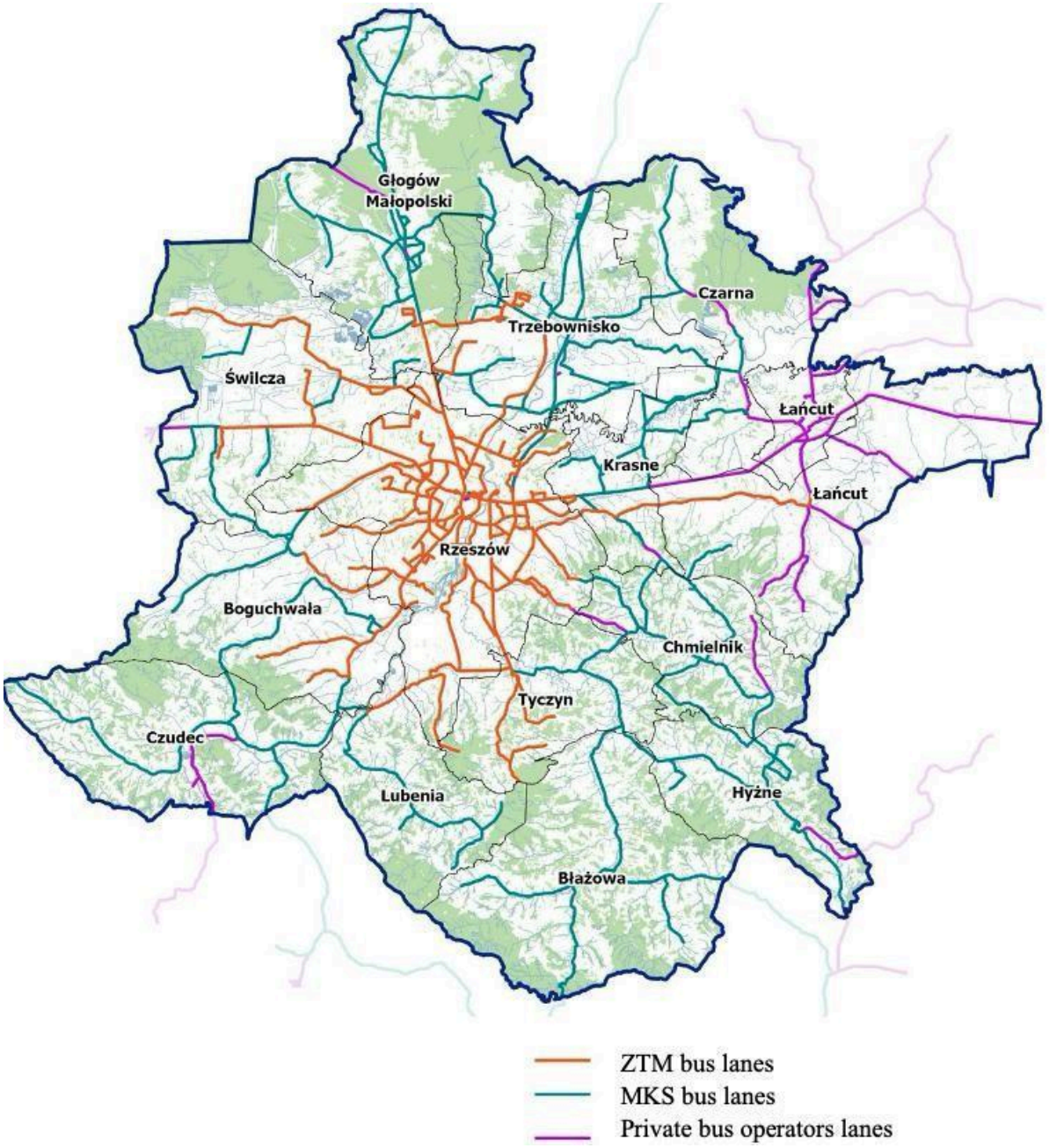


Fig 1. Coverage of Public Transport and Private Operators in the ROF Municipalities
Source: Diagnostic and Strategic Report on the Existing Situation – SUMP ROF.

One of the key organizational aspects affecting the convenience, intuitiveness and accessibility of public transport, especially for occasional passengers, is a consistent and legible system of visual identification and passenger information. Clear and uniform markings make it easier to find your way around, reduce the time it takes to find the right information and contribute to greater comfort for travelers.

A noticeable problem in the case of suburban transport is the large diversity of timetable plates and their legibility. There is a lack of a uniform format and consistent

rules for the graphical presentation of timetables, which is particularly evident in the case of various public carriers. Passengers often have to decipher differences in timetables on their own, which can lead to uncertainty and make it difficult to plan their journeys, especially for occasional or visiting transporters. An additional complication is the large number of variant courses, which vary depending on the day of the week, time of day or even the period of the schedule. Timetables often contain a lot of annotations, markings, and footnotes that can be difficult to understand for people who are not familiar with the system. This way of presenting can cause confusion, especially among passengers who do not regularly use public transport and do not know the routes of individual lines, especially those with variable mileage.

Fig 2. Different Formats of Bus Stop Signs among Organizers, Illustrated by Routes within the
RTM and MKS Networks
Source: Diagnostic and Strategic Report on the Existing Situation – SUMP ROF.

Technical Concept Description

Implementation of the Passenger Information System within the Pilot - schedule:

Stage No.	Task name	Deadline
1	Development of project documentation (functional and non-functional requirements, system architecture, data flow schemes)	03/2026
2	Development of a web application with virtual information boards based on QR codes	03/2026
3	Integration of data from different transport operators	04/2026
4	Initial functional tests of the QR system	05/2026
5	Comprehensive functional testing and optimization of the QR system	06/2026 - 09/2026

6	Collection of statistical data on the use of the QR system	**06/2026 - 12/2026**
7	Implementation of a passenger attendance monitoring system	**06/2026**

Summary

The Action Plan provides a structured approach to improving public transport accessibility and passenger information within the Rzeszów Functional Area. By combining strategic planning with practical pilot actions, the project creates a foundation for future development of integrated and user-oriented mobility services across the region.

The Action Plan presents a comprehensive and coordinated approach to implementing an integrated passenger information system within the Rzeszów Functional Area (ROF). Built on the principles of co-creation and stakeholder engagement, the plan outlines a structured set of activities designed to improve accessibility, travel planning and multimodal coordination across urban and suburban areas. The pilot action responds directly to the mobility challenges identified in strategic regional documents and aligns with the broader vision of developing sustainable, digital and user-centred public transport services.

At the core of the plan is the deployment of virtual passenger information boards based on QR codes, which will be installed at 35 strategically selected bus and rail stops across the ROF. By scanning these codes, passengers gain immediate access to a dedicated web application displaying real-time departure information, or — where real-time data is unavailable — up-to-date timetable information. This solution ensures uniformity, clarity and accessibility of passenger information, regardless of transport operator or stop location. The selected sites include major interchanges, city stops, regional nodes and suburban locations, allowing the pilot to generate representative data and support mobility across a variety of transport environments.

An innovative component of the Action Plan is the introduction of a passenger presence monitoring system in 7 key locations, using sensors that detect Wi-Fi and Bluetooth Low Energy (BLE) signals emitted by mobile devices. These sensors provide valuable insights into passenger volumes, waiting patterns and peak hours, contributing to more accurate modelling, forecasting and decision-making. The collected data will support future investment planning, enhance the understanding of mobility behaviour and improve the coordination of services across the ROF.

The Action Plan also includes a broad information and communication campaign, aimed at raising public awareness, promoting the pilot action and encouraging passengers to use digital mobility tools. Posters, leaflets, online messages, social media communications and announcements displayed on public transport screens contribute to

building system visibility, ensuring widespread understanding of how the QR-based solution works and strengthening trust among users.

A strong emphasis is placed on the integration of data provided by different transport operators. Through conversion to a common GTFS format, the pilot creates the technical basis for interoperable, multimodal passenger information systems. This work enables smoother coordination between urban, suburban and regional services and lays the groundwork for future MaaS-oriented developments, including real-time trip planners, integrated ticketing or expanded data analytics.

The plan's implementation schedule is structured to ensure a logical flow: preparation of system architecture, development of the web application, integration of operator data, testing of functionalities, deployment in the field and subsequent monitoring of system performance. This structured timeline enables early detection of potential issues, reduces operational risks and supports iterative improvements during the pilot phase.

Overall, the Local/regional vision & action plan goes beyond the simple introduction of new informational tools. It establishes a scalable, cost-efficient and future-oriented framework that modernises passenger information services and strengthens cooperation between municipal institutions and operators. The pilot serves as a foundation for long-term digital transformation of the ROF transport system and contributes to broader regional goals, including increased public transport attractiveness, reduced dependence on private cars, enhanced territorial cohesion and the development of environmentally sustainable mobility solutions.