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OPTI-UP

DELIVERABLE D.2.1.1 – PILOT ACTION REPORT MODENA AND GROSUPLJE PROJECT AREAS

A report on implementation DRT pilot solution in the Modena and Grosuplje project areas with guidance for future actions for sustainability of the pilot action

Version 2.0

March 2026

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Abbreviations

AF	Application form
DRT	Demand-responsive transport
KPI	Key Performance Indicator
PA	Pilot action
PT	Public transport

1. Introduction

The OPTI-UP project (*Optimizing and greening Public Transport networks through Integration with Urban Planning and data-driven approaches*) aims to optimise public transport (PT) in small and medium-sized cities in Central Europe through integration with urban planning and data-driven approaches. Tailored optimization solutions for PT have been tested on six pilot areas: Modena (Italy), Grosuplje (Slovenia), Osijek (Croatia), Paks (Hungary), Pécs (Hungary) and Český Krumlov (Czech Republic).

In the pilot areas have been implemented 6 pilot action optimization solutions in 3 thematic fields.

1. **Demand-responsive transport (DRT)** thematic field focuses on providing a flexible PT to low-demand areas to improve both PT service accessibility and financial viability. Different DRT pilot actions were tested in two pilot areas: PA1 in Modena (Italy) and in PA2 in Grosuplje (Slovenia).
2. **PT network optimisation** thematic field deals with adjusting routes and schedules of the existing PT system. Pilot solutions were tested within two pilot areas: PA3 in Osijek (Croatia) and PA4 in Paks (Hungary).
3. **Alternative fuel technologies** thematic field refers to testing impact using electric propulsion vehicles on energy efficiency and PT ridership through increased comfort levels, cleanness, both contributing to better sustainability. These solutions were tested in two pilot areas: PA5 in Pécs (Hungary) and PA6 in Český Krumlov (Czech Republic).

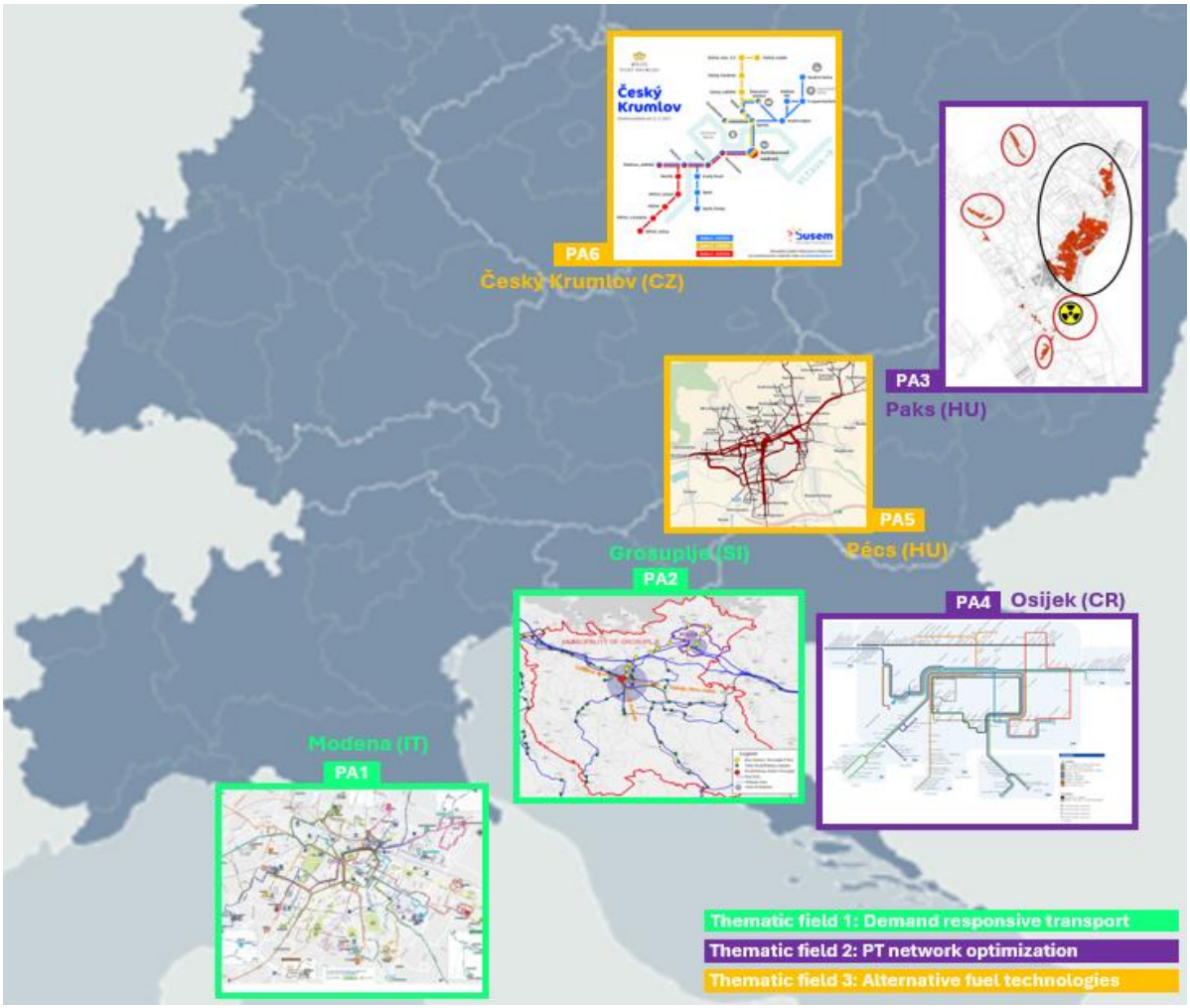

Figure 1: Locations of OPTI-UP pilot areas

This deliverable D.2.1.1 focuses on the Demand-responsive transport (DRT) thematic field. It aggregates and compiles the outcomes of DRT pilot action implementation in Modena (Italy) and in Grosuplje (Slovenia) and provides guidance for future actions to ensure sustainability of the implemented pilot solution. The outcomes and guidance for other two thematic fields are presented in separate deliverables:

- D.2.1.2: A report on implementation of PT network optimisation solution in the Paks and Osijek project areas with guidance for future actions and
- D.2.1.3: A report on implementation of alternative fuel technology solution in the Pécs and Český Krumlov project areas with guidance for future actions for sustainability of the pilot action.

Deliverable D.2.1.1 is compiled from the pilot action implementation reports prepared by the responsible project partners aMo (PP3: Modena) and PIL (PP6: Grosuplje). It is composed of:

- Reports on individual DRT pilot project, covering the implementation and outcomes of the two different DRT solutions tested in Modena (Italy) – PA1 and Grosuplje (Slovenia) – PA2. Each report is structured in seven sub-sections, covering:
    - Pilot action scope and objectives
    - Pilot action solution and end expected outcomes
    - Implementation of pilot action activities
    - Difficulties and deviations from the implementation plan
    - Analysis of pilot action implementation
    - Common conclusions
    - Guidance for future actions for pilot action sustainability.
- A comparison of the two pilot actions, which addresses common characteristics of the pilot activities, key differences between the implemented solutions, common findings, opportunities for improvements and conclusions.

2. Modena pilot project report

This chapter presents the report on DRT pilot action implementation in Modena (Italy) – PA1, detailing the implementation and outcomes of the tested solutions, as well as guidance for future actions.

2.1. Pilot action scope and objective

Key information about the pilot area is presented, including the main public transport challenges addressed and the desired outcomes to be achieved through the pilot action.

2.1.1. Description of pilot project area

The description of the pilot project area provides an overview of its geographical, demographic, and transport-related characteristics. Key features of the area are illustrated with numerical data and supporting maps.

Location

The city of Modena is a medium sized urban centre located in the Emilia-Romagna region and ranks among the principal cities of the Po Valley. With a population exceeding 180,000 inhabitants, it is also one of the most populous cities in the region. Its strategic location along the Via Emilia makes it an attractive destination from an industrial, employment, and tourism perspective.

Modena is intersected by the Mediterranean corridor of the Trans-European Transport Network (TEN-T) and lies in close proximity to both the Scandinavian-Mediterranean and Baltic-Adriatic corridors, which pass through Bologna—approximately 30 kilometres away—and to which it is connected via highways and high-speed rail.

The area selected for the pilot action of the OPTI-UP project is a zone where public transport services are primarily provided through Demand Responsive Transport (DRT), due to its considerable distance from the city centre. The city centre serves as the main hub, concentrating the majority of services and connections to destinations outside the province.

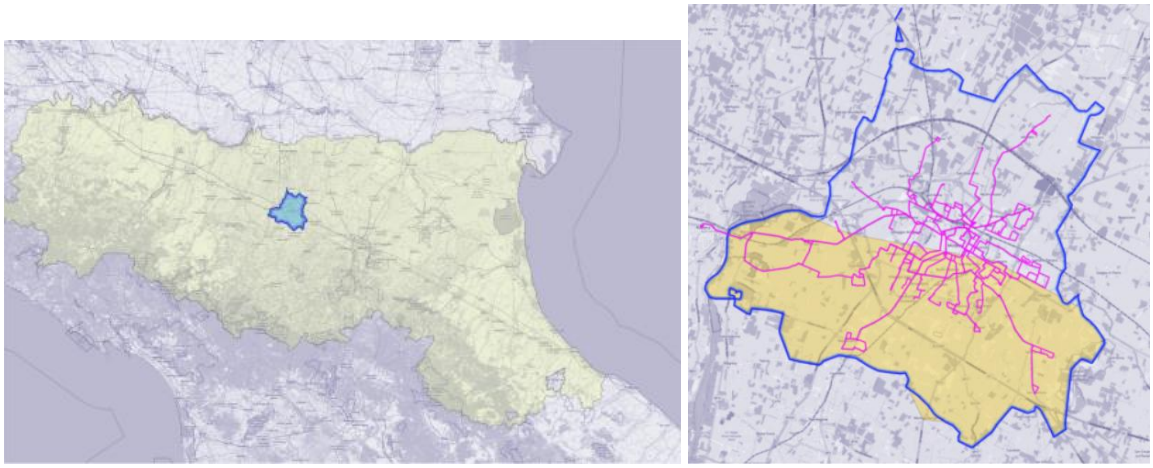

Figure 2: Left - General map showing a national/regional overview of the pilot area; right - Detailed map focusing on the specific pilot area (PT network)

Area characteristics

The area selected for the pilot project is predominantly flat, yet it has a lower population density compared to the city centre. This makes it economically unfeasible and unsustainable to serve the area with conventional urban public transport lines. Over the years, what were once primarily rural zones have gradually become inhabited due to lower housing costs, resulting in a portion of the population living far from essential services. This has created the need to develop an on-demand transport service capable of acting as a feeder to the main urban public transport network.

Within the designated area, there are also stops along the Modena–Sassuolo railway line, which provide residents with access to one of the province's key rail connections. Some parts of the area have expanded along major traffic routes, allowing for a minimal level of suburban bus service, particularly for home-to-school and home-to-work travel. However, these connections are largely inadequate during other times of the day.

Ultimately, the area under consideration can be classified as peripheral, as its relatively low population density—especially when compared to other parts of the city—has led to the absence of several essential services. Standard fixed-route public transport does not adequately serve this population, limiting their access to basic services.

2.1.2. Key issues & objectives of pilot action

This section presents the main PT and accessibility challenges in the pilot area and the objectives set to address them through the pilot action.

Key public transport issue(s) addressed and main causes

The distance between certain areas within the pilot zone and the nearest fixed-route public transport services represents a significant barrier to accessibility.

The unstructured and dispersed expansion of residential zones has made it particularly challenging to establish efficient transport connections without compromising the overall effectiveness and performance of the public transport system.

Moreover, the current DRT service often operates with only a single passenger on board, due to low demand and a steadily declining user base over the years.

The service also experiences a high rate of no-shows among booked rides, which creates a disadvantage for other users who would like to make a reservation but find availability limited.

Service optimization currently relies solely on the experience and intuition of the operator on duty, rather than on a system capable of identifying the most efficient connections.

Additionally, the current restrictions on which roads can be used for the service reduce the driver's flexibility, sometimes preventing them from choosing more advantageous routes that could better connect passengers' points of origin and destination.

Key objectives (future outlook)

The use of a mobile application for booking is expected to facilitate the identification of whether a user will be present at the stop, thanks to reminder notifications that can prompt users to cancel their reservation if necessary.

The introduction of new stop points increases the potential for integrating the service with the existing urban public transport network.

Expanding the number of authorized roads and implementing a routing algorithm may lead to improvements in managing multiple bookings simultaneously, thereby increasing the number of passengers on board.

This solution could prove particularly effective for young people without access to a private vehicle, especially those who already hold an urban transport pass—offered free of charge by the Emilia-Romagna Region.

2.2. Pilot action solution and expected outcomes

This section provides an overview of the pilot action, covering its expected outcomes, the stakeholders engaged in the implementation, and the potential risks identified prior to the start of the project.

2.2.1. Description of Pilot action solution

The implemented pilot action solution is described with a focus on its operational features and its contribution to improving accessibility, connectivity and overall system efficiency.

- Introduction of a new reservation app for DRT to give a more direct way to book ride
- Optimize routing, reducing no shows
- Add new stops to guarantee new connection between DRT and PT network
- Add new permitted roads to facilitate connection between bus stops

Addressing key objectives

- Increase number of PT Passengers
- Optimize operational cost
- Improve accessibility and connectivity of local transport

Expected outcomes/effects of Pilot Action

The service is currently used less than it was in the years prior to the COVID-19 pandemic, and one possible reason could be the current access method, which relies on a call centre. Introducing a mobile app could make the service more accessible and user-friendly for certain types of users.

Furthermore, in terms of the service's role as a feeder to the public transport network, the new app could also function as a travel planner, suggesting combinations of services and helping users coordinate connections for multimodal journeys. How does the pilot solution address the identified issues?

The use of an app capable of managing user requests and generating optimized itineraries can provide greater flexibility in accepting reservations, thereby improving the overall efficiency and utilization of the DRT service.

Moreover, the introduction of new stops near other of interest (POIs) in the area is expected to attract more users, including those traveling outside of peak hours.

The ability to access the service directly via smartphone may also encourage adoption among users who are less inclined to call a call centre, such as younger segments of the population.

For workers as well, the option to book rides through a mobile app can simplify reservation management and promote more consistent use of the service, helping to reduce missed pickups at stops.

2.2.2. Engagement of stakeholders

The table lists the key stakeholders involved in the pilot action, showing their roles, levels of involvement, importance, and influence during the preparation, implementation, and evaluation phases.

Table 1: List of stakeholders involved in pilot project implementation & impact assessment

Stakeholder	Type	Role	Importance	Influence
Emilia-Romagna Region	Local Authority	Main financier of the PT service	Very Important	High
Municipality of Modena	Local Authority	Provider of resources, impact on implementation of PT development actions	Very Important	Very High
SETA Spa	Public transport Operator		Very Important	Very High
Holacheck	Sub contractor of Public transport Operator	In charge to manage DRT service and reservation	Medium	Low
Saca Soc Coop.	Sub contractor of Public transport Operator	Actual operator of the DRT service	High	Low
Users Committee	Association of users	Used to have observations and suggestion in the planning and monitoring phases for relevant actions	Medium	Medium

2.2.3. Risk assessment

The table presents an assessment of potential risks related to the pilot action, showing their probability and impact, along with the measures identified to mitigate them.

Table 2: Identification of potential pilot action implementation risks

Risk	Probability	Impact	Countermeasure
Lack of buses needed	Low	High	Verify terms and conditions for accessing the service with PTO. No major increase in usage is expected
DRT service overlaps regular PT service	Medium	Medium	Verifying timetables and restrictions on DRT service

Risk	Probability	Impact	Countermeasure
Excessive increase in working hours for drivers	Medium	High	Redesigning operative area or restrictions to the service
Users not using the new app for reservations	Medium	High	Promoting app and service via different media
Shortage of programmed veh-km in the contract	Low	High	Forecast based on previous annual usage
Delay with tendering procedures	Medium	High	Accurate preparation of the scheduled time needed for tender procedures
App not compliant with our initial expectations	Medium	Medium	Adapt rules and restrictions to app possibilities
Insufficient funds or time for development of DRT registration and publishing application	Medium	High	Early preparation of F&T specifications and tendering of implementation
Difficulties to properly promote the new features to the potential users	High	Medium	Collaborate with PTO to promote the service via their means of communication

2.3. Pilot action implementation activities

The table presents the key activities carried out during the implementation of the pilot action, including a description of how each activity was carried out, along with timelines and monitoring arrangements before, during, and after the pilot period.

Table 3: PA monitoring table of implementation of activities and steps

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
Activity 1	**Pilot action planning**	Jan 2025	Jun 2025	Jan 2025	Draft of public procurement and analysis of the state of the art for DRT planning app
Activity 2	**Promotion of the pilot before launch**	June 2025	July 2025	June 2025	Mainly promoted via PTO means of communication (website, infomobility app for smartphones) and DRT Call centre. A more extended promotional campaign has been done in October
Activity 3	**Launch and execution of pilot action (4 months)**	July 2025	Oct 2025	23/6/2025-31/10/2025	Pilot action officially started on the 23rd of June
Activity 4	**Monitoring of performance parameters & stakeholders' feedback**	June 2025	Feb 2026	June 2025	The new tool is capable to monitor different kind of KPIs on a daily basis.
Activity 5	**Assessment of the pilot action implementation and report**	Oct 2025	Dec 2025	Feb 2026	Implementation of the pilot action results presented during stakeholder meeting
Activity 6	**Promotion of results of implemented pilot actions**	March 2026	April 2026	TBD	

2.3.1. PA promotional campaign

The table lists the communication and promotional activities implemented to support the pilot action and raise awareness among users and stakeholders.

Table 4: PA promotion campaign

Date	Purpose of publication	Publication location
Mid Jun 2025	Information activities by the call centre aimed at users already active in the DRT service	-
15 Sep 2025	Information at the main bus stops	-
15 Sep 2025	Info Point at the Gottardi terminal to provide information to users	-
Oct 2025	Publication on the aMo website to relaunch the service and provide initial usage data	The aMo website
Oct 2025	Promotional campaign on the PTO Seta website	PTO Seta website
Oct 2025	Publication of news on service performance in major local media (newspapers, online outlets, radio)	Local online newspaper websites

Figure 3: Gottardi Infopoint

Figure 4: PTO and aMo website


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Prontobus Modena Sud, boom di prenotazioni con lo smartphone

Sono sempre di più gli utenti che prenotano le corse del Prontobus con un click, direttamente dal proprio smartphone: oltre il 63% dei 2.000 viaggiatori registrati tra giugno 2025 e ottobre. Dal 20 giugno, giorno del lancio, le prenotazioni complessive sono aumentate del 50% rispetto allo stesso periodo 2024, per il Quadrante di Modena sud. La nuova App Prontobus Modena e Provincia, ideata da aMo nell'ambito del progetto Europeo di Interreg Central Europe Opti-up, ha reso infatti più semplice l'accesso al servizio e ottimizzato la pianificazione dei viaggi prenotati, attraverso un elaborato algoritmo. La nuova App è l'azione pilota del Progetto Europeo Opti up, di cui aMo è partner. E' stata sviluppata da VIA, leader mondiale nel settore di tecnologia per il trasporto, ed è disponibile gratuitamente negli store iOS e Android. Attualmente è attiva in forma sperimentale nel Quadrante sud di Modena. Al termine della fase di test, in base ai feedback degli utenti, sarà valutato se confermare ed estendere l'utilizzo dell'App al Quadrante Nord di Modena e gli altri tre Prontobus della provincia (Carpi, Pavullo e Castelfranco) . La scelta di aMo di creare una nuova applicazione, promossa dal Progetto Europeo è il risultato di uno studio dell'attuale funzionamento del servizio a chiamata, dal quale è emerso che una maggiore flessibilità nella gestione delle prenotazioni e dei percorsi a disposizione degli autisti poteva rendere il servizio più attrattivo ed efficiente, portando ad un incremento in termini di passeggeri trasportati e chilometri effettuati giornalmente. Il servizio è accessibile nel Quadrante sud di Modena da 120 fermate contrassegnate da apposita segnaletica. Ogni richiesta di trasporto viene gestita dal nuovo software, che combina le domande in arrivo e le gestisce offrendo ai passeggeri il viaggio più breve e funzionale per il proprio trasferimento. La nuova modalità di prenotazione si integra con quelle già esistenti, e le affianca. Restano disponibili infatti il call center al numero 840 001 100 e i messaggi Whatsapp al numero 334 2194058.

...ne. Anche le indennità per i turni ...gisti, ferme da vent'anni, restano ...utate: chi lavora nei reparti più ...plessi continuerà a farlo senza al... ...riconoscimento». L'unico «benefi... ...guarda gli straordinari degli infer... ...spiega Giulia Casamassima, re... ...sabile Sanità FP Cgil Modena – ...utto il resto del personale non è ...isto nulla. Il messaggio implicito ...aro: se vuoi guadagnare di più, la... ...di più. Ma questa non è valorizza... ..., è sfruttamento». ...l aumenti tuttavia Ferrara della Ci... ...mmenta: «Gli incrementi contrat... ...non hanno mai seguito l'inflazio... ...'ultimo contratto firmato da tutti, ...lo 2018-2021, arrivò con un'infla... ...a all'11% e un aumento medio del ...%, cioè 80 euro. Oggi le cifre so... ...iù che raddoppiate. La verità vin... ...mpre».

Figure 5: Local newspaper article on DRT service

2.4. Promotion of PA results

The results were initially shared on the aMo website and through a press release, which was also picked up by the main local media, both print and online. In addition, the results were presented to key stakeholders during the stakeholder meetings held throughout February, while awaiting a press release scheduled for the end of the month. Together with the presentation of the final results, the continuation of the pilot project for the coming year will be announced, as requested by the Associated Partner, the Municipality of Modena.

2.5. Difficulties and deviations from the plan

Difficulties and deviations encountered during the implementation of the pilot action are summarised in the list below.

Table 5: List of difficulties/deviations in implementation of the PA plan

Date	Brief description	Reason	Management/solution	Impact rating
26/06	Driver tablet overheating	Operation	Tablet shut down and driver helped by the call centre to complete scheduled rides	moderate
04/09	Booking App issues. The service did not allow bookings close to the end of the driver's shift.	Organisation	Urgent assistance from the provider and booking made only via Call Centre. Driver still able to use the app. The issue was resolved by adjusting the drivers' shift configuration parameters. Technical support delivered a solution within one hour of the support ticket being opened.	moderate
15/09	New drivers on the service and some troubles with app usage	Organisation	Need to train new drivers to have the app working properly	moderate
25/09	Bus unavailable	Operation	Due to a problem with the bus, the service has been suspended for all the morning. Then replaced in the afternoon	high
09/10	Bus stop unavailable due to works on the street	Organisation	Put 2 bus stops as inactive on the app so that users can't book ride from/to them. Users informed via app and call centre	Low
20/10	App server down	Organisation	Service managed just via call centre for 2 hours	moderate

2.6. SWOT analysis of implementation

Key internal and external factors influencing the implementation of the pilot action are summarised through a SWOT analysis, highlighting strengths, weaknesses, opportunities and threats.

Table 6: SWOT analysis of pilot action implementation

Strengths	Weaknesses
Existing infrastructure may be sufficient for basic transport needs. Service already in operation, meaning the required resources (e.g., vehicle and drivers) are already deployed Provides a new and simplified access method to the service Good coverage of the Municipality with current PT network Integration between urban, suburban and railway and new bus stop to enhances multimodal trips Automated routing to facilitate operations of the call centre Real-time fleet monitoring Greater control over certain limitations of the current service regarding the use of specific stops (now urban bus stops can't be used as both start and end stops, even if there is no bus service linking them)	Less opportunity for users to “negotiate” or influence their preferred service time Dependence on private cars due to cultural habits or lack of awareness. Lack of monitoring tools to better plan PT network Overall, a more rigid service configuration compared to the discretionary interpretation of a call centre operator Drivers or operators with insufficient training on the tool can compromise service reliability Some system input data, such as travel times, are not editable and may lead to planning inaccuracies Users cannot request an exact pickup time, requiring a change in habits for existing user
Opportunities	**Threats**
Introduction of eco-friendly solutions and integration with sharing mobility to enhance multimodal trips Collaboration with local businesses to support public transport use. New PT network redesign according to SUMP strategy Development of smart mobility apps for real-time information and route optimization. Less dependency from private car for younger generation A potentially scalable tool that can also be used for other on-demand services in the area Low driver wages and the resulting shortages can be mitigated through optimisation of PT operations, specifically by deploying more DRT services	Rising operational costs (fuel, maintenance, wages). Demographic challenges (aging population might need more accessible services). Economic downturns that could reduce public funding. Rising cost of life bring people to leave city centre

2.7. Pilot Action conclusions

The pilot action demonstrated the advantages of using a computerized system for managing and planning travel bookings for the Prontobus DRT service in the southern area of Modena. As a partner, we were very satisfied with the ability to successfully organize all the initial steps required to implement the new application within the planned timeframe, thanks to the effective cooperation of the stakeholders involved. The app proved to be very convenient both for backend management and for drivers, despite some issues that occasionally occurred in identifying the correct start and end of trips, an action necessary to enable the proper functioning of the app itself. The technical issues strictly related to the introduction of the app practically end here, while some other issues were related to the vehicle or its equipment, which will need to be upgraded over time.

From the operator and its drivers, the feedback was generally positive, although interacting with an app is not always immediately intuitive for drivers who are generally accustomed to working in close contact with their operations control centre.

As for the associated partner, the Municipality of Modena, it was positively impressed by the new system, which for the first time in the city provides a user-friendly tool for booking the Prontobus service, also capable of delivering real-time information on driver arrival times.

The positive outcomes of the pilot action in this regard convinced the municipality to move forward with the project, planning to extend its use to the DRT service in the northern area of Modena by 2026.

2.8. Guidance for future actions for pilot action sustainability

The table below provides guidance for future actions to support the long-term sustainability of the pilot solution, based on the lessons learned and highlighting key steps for continuation and potential scaling.

Table 7: List of activities for achieving sustainability of the implemented pilot solution

Action	Providers	Inputs/resources	Hints
Introduction of in-app payment to reduce fare evasion	PTA/PTO	Enhancement of the existing app	The new tool potentially allows adding payment-method information for individual users and, consequently, configuring payment directly through the application, both via smartphone and via the web-app version. This additional feature would reduce fare evasion to zero. However, since this is a low-usage system, the benefit may be modest, though it would still provide a way to verify that users hold a valid ticket.
Extend the use of DRT services, for example during evening hours	PTA/Municipality	Analysis of the least-used routes; studies on potential demand in currently unserved time slots	In the city of Modena, there is currently no evening urban bus service, as operations end at 9:30 p.m. Introducing a DRT service, that can reduce the operating costs associated with

			running traditional fixed-route urban lines, could increase the strategic value of this tool. The configuration of an evening service is fully feasible using the current app, which would only require appropriate adjustments to its configuration
Change the remuneration method	Municipality	Historical analysis of kilometres travelled, users, municipal funding	Leverage the ability to monitor KPIs related to the delivered service in order to make operator remuneration more closely tied to the quality provided, reducing the relevance of compensation based on kilometres driven. This is because, according to the current service contract, where the operator is paid partly on an hourly basis, to cover driver availability costs, and partly per travelled kilometre, the operator is not incentivized to optimizations whenever these result in a reduction in kilometres travelled.
Reach a wider user base through promotional campaigns or through participatory initiatives involving the administration and user groups.	PTO/Municipality	-	Increase awareness of the service offered through targeted promotional campaigns carried out by the operator. The municipality, however, currently provides limited coverage for the promotion of public transport whether through social media profiles or more institutional communications.
Use drivers with a standard B driving license	PTO	-	A way to better manage available driver resources given the current shortage
Enable real-time booking	PTA/Municipality	-	Service enhancement must also involve improving access, allowing real-time use and not only pre-planned trips

3. Grosuplje pilot project report

This chapter presents the report on DRT pilot action implementation in Grosuplje (Slovenija) - PA2, detailing the implementation and outcomes of the tested solutions, as well as guidance for future actions.

3.1. Pilot action scope and objective

Key information about the pilot area is presented, including the main public transport challenges addressed and the desired outcomes to be achieved through the pilot action.

3.1.1. Description of pilot project area

The description of the pilot project area provides an overview of its geographical, demographic, and transport-related characteristics. Key features of the area are illustrated with numerical data and supporting maps.

Location

The pilot area is located within the Municipality of Grosuplje, Slovenia, and encompasses the corridor along bus line 72, which connects the municipal centre of Grosuplje with the settlement of Polica.

The Municipality of Grosuplje is a medium-sized Slovenian municipality situated southeast of the capital, Ljubljana. It covers an area of 134 km² and has a population of 18,808. The municipality is known for its rich cultural and historical heritage, as well as its developed craft and industrial sectors. Grosuplje is conveniently accessible, lying just over a twenty-minute drive from Ljubljana via the motorway towards Zagreb (Croatia).

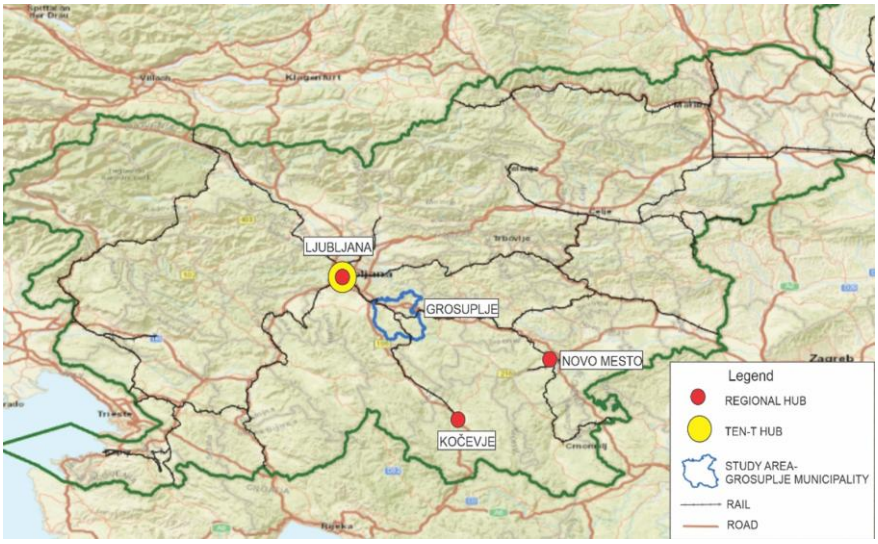

Figure 6: Map of Slovenia indicating the position of Grosuplje

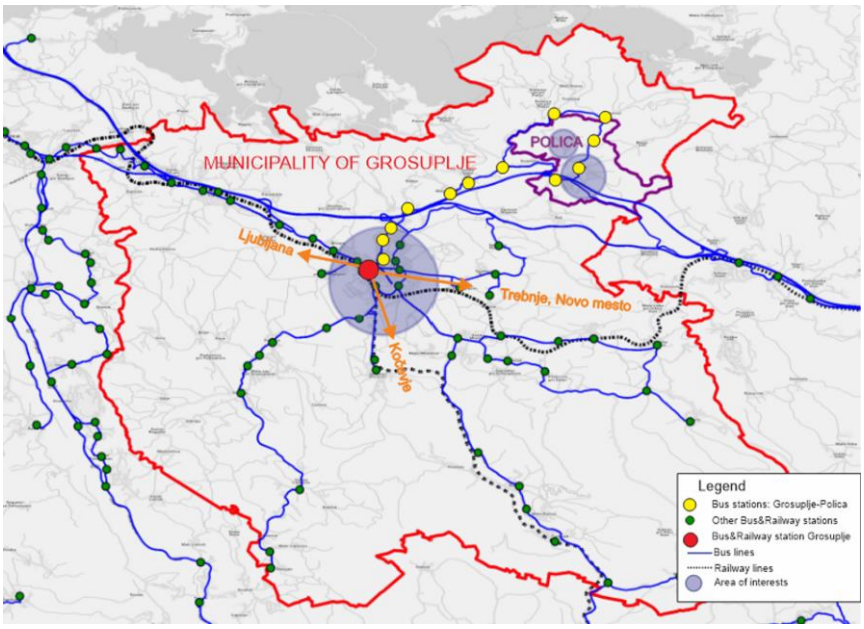

Figure 7: Map of Grosuplje municipality area and line of observation

Area characteristics

Grosuplje is a sub-regional administrative, economic, and transport centre composed of several settlements, including Polica in the northeastern part of the municipality, which serves as the location of the pilot action.

The Municipality of Grosuplje is predominantly hilly and characterised by numerous dispersed settlements surrounding the municipal centre, where most points of interest (PoIs) are concentrated. These include:

- a transport hub with the main bus station and a regional railway station providing connections to the regional centre, Ljubljana,
- administrative and healthcare services,
- shopping facilities and sports infrastructure.

Schools and additional sports facilities are likewise primarily located in or around the municipal centre.

3.1.2. Key issues & objectives of pilot action

This section presents the main PT and accessibility challenges in the pilot area and the objectives set to address them through the pilot action.

Key public transport issue(s) addressed and main causes

Public transport in Grosuplje, including municipal Line 72, experiences low ridership outside the morning and afternoon peak hours, when services are used mainly by primary school students. Large 50-seat diesel buses operate mostly under capacity, making the lines economically unsustainable and environmentally inefficient. Low ridership is further influenced by weak coordination with regional and national transport services, as local routes primarily function as feeders to Ljubljana.

Connections between surrounding settlements and the Grosuplje town centre are limited, train and bus timetables are poorly aligned, weekday train frequency is low, and no services operate on weekends.

Consequently, greater emphasis is needed on improving the reliability, punctuality, and affordability of regional bus and rail services.

Key objectives (future outlook)

A viable solution should reduce operating costs while maintaining an adequate level of service and ensuring environmental sustainability. This challenge has been addressed through a combined regular and demand responsive transport (DRT) bus system, in which selected trips operate only on demand when booked in advance via a call centre or mobile app, while all remaining trips continue to operate on a regular schedule using large 50seat diesel buses.

DRT services are provided with electric vans, helping to reduce empty runs, low occupancy rates, and overall environmental impact. This approach also mitigates the shortage of Dlicensed drivers, as conventional buses are supplemented or replaced by smaller vehicles operated by B-licensed drivers and the vehicles can be flexibly redeployed to expand or strengthen the public transport network where needed.

3.2. Pilot action solution and expected outcomes

This section provides an overview of the pilot action, covering its expected outcomes, the stakeholders engaged in the implementation, and the potential risks identified prior to the start of the project.

3.2.1. Description of Pilot action solution

The implemented pilot action is described with a focus on its operational features and its contribution to improving accessibility, connectivity, and overall system efficiency.

The pilot action in Grosuplje included the following core activities:

- **Redefinition of the regular bus service on the Grosuplje-Polica route (Line 72)** by transforming it into a combined regular/DRT model. Within this model, selected scheduled trips operate as DRT services, while the remaining trips continue as regular fixed-schedule services.
- **Adjustment of the new regular/DRT timetables** to ensure more convenient passenger access to key points of interest (Pols) and to improve connections with other public transport services.
- **Optimisation of the vehicle fleet** serving the pilot line (bus, car, and van). The aim is to deploy electric public transport vehicles (vans and cars) on DRT trips instead of large 50-seat diesel buses.
- **Optimisation of driver assignments** by sharing drivers across services. B-category drivers from the “Grosupeljčan” and “Zapeljivec” services were reassigned to operate electric vans and cars, reducing the reliance on D-category drivers required for bus operation.
- **Establishment of a DRT call centre**, integrated within the operator’s existing call centre infrastructure.
- **Provision of user information** on the DRT service through the municipal website and a digital display at the main bus station in Grosuplje.

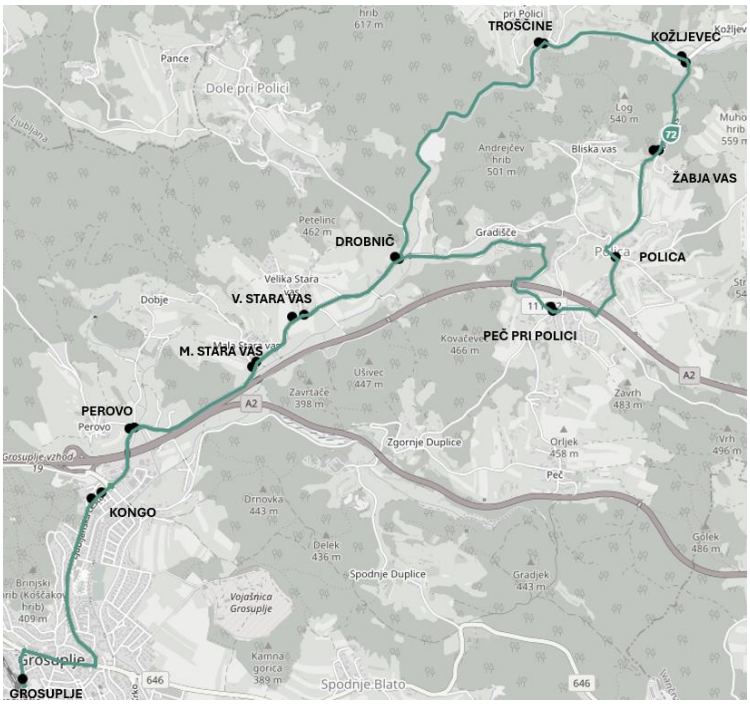

Figure 8: Layout of the pilot action line

Based on previous analyses, four pairs of daily trips were identified as having low profitability and low occupancy, while being operated with large buses that generate high levels of exhaust emissions. These trips were therefore designated to operate as DRT services. In the timetable, such trips are labelled **"DRT"**, whereas the remaining trips are marked as **"SCH"** (scheduled) or **"WORK"** for services predominantly used by workers. Regardless of whether the trip is DRT or scheduled, it operates according to the predefined timetable.

DRT trips are operated along the same route as regular services; however, some stops may be skipped for optimisation, as the driver knows all boarding and alighting points of the registered passengers (additional optimisation – route optimisation).

Table 8: Re-defined 72 line timetable: Grosuplje – Polica; DRT trips

72 LINE: GROSUPLJE - POLICA									
MAIN STOPS	WORK	SCH	SCH	**DRT**	SCH	SCH	**DRT**	**DRT**	**DRT**
\Trip num.	1	3	5	7	9	11	13	15	17
Grosuplje	05:30	06:50	07:40	11:20	13:20	14:05	15:35	16:30	20:35
Peč	05:45	-	-	11:35	13:38	14:19	15:52	-	-
Troščine	-	07:07	07:57	-	-	-	-	16:42	20:47
Polica	05:50	07:12	08:02	11:39	13:43	14:23	15:54	16:49	20:54
72 LINE: POLICA - GROSUPLJE									
\Trip num.	WORK	SCH	SCH	**DRT**	SCH	SCH	**DRT**	**DRT**	**DRT**
Main stops	2	4	6	8	10	12	14	16	18
Polica	05:50	07:12	08:02	11:40	13:43	14:23	15:54	16:50	20:55
Troščine	05:55	-	-	11:45	13:48	14:28	15:58	-	-
Peč	-	07:17	08:07	-	-	-	-	16:55	21:00
Grosuplje	06:10	07:30	08:20	11:59	14:00	14:40	16:13	17:05	21:15

DRT trips were operated only when a passenger request had been registered. Trip requests were handled through a call centre operated by the public transport operator (PTO), LPP. When registering a trip, DRT

passengers were required to provide their departure time as well as their boarding and alighting stops. Registration had to be completed within a predefined time window prior to departure. Based on the number of submitted requests, an appropriate vehicle type (bus, car or van) was assigned to the trip before its departure. The PTO created a dedicated database to manage call-centre requests. In the next development phase (after the completion of the OPTI-UP pilot), the call-centre system was planned to be complemented by a mobile application for submitting DRT trip requests.

DRT trips are by default operated with electric or otherwise environmentally friendly vehicles. Previously, all services on Line 72 were operated using large 50-seat diesel buses. To increase vehicle occupancy and reduce negative environmental impacts—particularly CO_2 emissions—the DRT trips were operated using electric vans.

Addressing key objectives

The Grosuplje pilot action will pursue the following key objective from the Local Plan (goals):

- G5: Improve efficiency of PT operations by DRT,
- G3: Reduce CO2 emissions,
- G4: promote digitization and smart mobility.

Expected outcomes/effects of Pilot Action

The pilot was designed to address low ridership, inefficient bus operations, and weak coordination between local public transport and regional services. Large buses frequently operated with very low occupancy, resulting in high operating costs, underutilised D-licensed drivers, and unnecessary environmental impacts.

The pilot solution tackles these challenges by replacing low-occupancy bus trips with on-demand electric vans, thereby reducing empty runs, operating costs, and emissions. The use of B-licensed drivers enables more flexible staffing and a more efficient allocation of D-licensed drivers where required. The DRT registration system ensures that trips are operated only when needed, aligning service supply with actual demand, while digital tools such as the call centre, mobile app, and web-based information platforms enhance accessibility, usability, and communication with passengers.

The expected outcomes of the pilot action include:

1. **Higher vehicle occupancy**, achieved through demand-responsive operations that minimise underutilised trips.
2. **Reduction of empty PT vehicle runs**, as DRT trips are dispatched only when requested.
3. **Lower operational costs**, due to the deployment of smaller and more energy-efficient vehicles on low-demand routes and better optimisation of fleet use.
4. **Reduction of polluting gas emissions**, primarily through the replacement of diesel buses with electric vans on selected trips.
5. **Improved accessibility and connectivity** to key points of interest and regional transport services, thanks to better timetable coordination and an on-demand mobility option.
6. **Reduction in the number of D-licensed drivers required**, enabled by shifting selected services to B-licensed vehicle operation.
7. **More efficient use of human resources**, through more flexible staff allocation across service types.
8. **Enhanced overall service quality**, with digital booking channels and adjustable capacity that allow a more user-oriented service.

9. **Improved system efficiency**, as transport supply becomes more closely aligned with real demand.

The implemented solution directly addresses the key challenges: it reduces inefficiencies, lowers both operational and environmental costs, better aligns transport supply with actual demand, and enhances service management. By combining on-demand services with smaller vehicles and flexible driver licensing, the pilot effectively balances cost efficiency, service quality, and long-term sustainability.

3.2.2. Engagement of stakeholders

The table lists the key stakeholders involved in the pilot action, showing their roles, levels of involvement, importance, and influence during the preparation, implementation, and evaluation phases.

Table 9: List of stakeholders involved in pilot project implementation & impact assessment

Stakeholder	Type	Role	Importance	Influence
Municipality of Grosuplje	Local authority	provider of resources (parking spaces, bus stops); co-financer of regional transport; provider of municipality transport demand; provider of local transport data; promotion of new PT services; impact on implementation of PT development actions	Very important	High
LPP	Bus public transport operator	operator of municipality and regional transport; provider of transport resources; timetable harmonisation; provider of PT operational data; impact/provider on implementation of PT development actions	Very important	Very High
DUJPP	National integrated public transport authority	provider of authority for PT; provider of concession financing; definition of timetable; timetable harmonisation; financial resources for pilot actions; impact/provider on implementation of PT development actions	Important	High
RRA LUR	Regional development agency	strategic planning of PT development in a region; promotion of new PT services; impact on implementation of PT development actions	Medium	Low
SŽ – Slovenian Railways	Railway public transport operator	operator of regional and sub-urban transport to the municipality; harmonisation of timetables; provider of PT operational data; impact/provider on implementation of PT development actions	Medium	Medium
MOPE – Ministry of the Environment,	National ministry	strategic/long-term planning of public transport	Very important	Very High

Stakeholder	Type	Role	Importance	Influence
Climate and Energy				
Ministry of Infrastructure	National ministry	financial investments and planning of railway and regional bus infrastructure	Very important	Very High

3.2.3. Risk assessment

The table presents an assessment of potential risks related to the pilot action, showing their probability and impact, along with the measures identified to mitigate them.

Table 10: Identification of potential pilot action implementation risks

Risk	Probability	Impact	Countermeasure
Late conclusion of agreements with LPP and DUJPP & late issue of permit for DRT service	Low		PIL prepared all documentation and is controlling the activities
Late upload of PA information & guidelines to the Municipality and LPP web pages	Medium		The extensive promotion campaign will reach all inhabitants using the pilot line 72.
Poor acceptance of new DRT service by older users	High		Focussed promotion campaign, relying on communication via classical access points (phone)

3.3. Pilot action implementation activities

The table presents the key activities carried out during the implementation of the pilot action, including a description of how each activity was carried out, along with timelines and monitoring arrangements before, during, and after the pilot period.

Table 11: PA monitoring table of implementation of activities and steps

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
Activity 1	**Pilot action planning**	**April 2025**	**Jun 2025**		
Desktop research	Planning operations and resources for implementation of PA and mode of agreement; negotiations with MOPE, DUJPP, LPP, Municipality of Grosuplje	Sep 2024	April 2025	Sep 2024 - April 2025	Analysis of timetables, circulation of vehicles, ridership data, available resources of operation of PT in Grosuplje, planning of PA implementation, costs and stakeholders, identifying benefits of PA for PTA, leading negotiations with PTA and PTO, preparation of contracts
Local plan	Elaboration of Local Plan – draft	April 2025	May 2025	27 May 2025	Draft has been prepared – only a chapter on transport modelling is missing
Agreement between LPP and PIL	Preparation and signing of agreement on operation and resources for PA between PIL and LPP	April 2025	May 2025	22 May 2025	Undersigned by both parties
Online Survey	A survey conducted among the residents of Polica to assess the usage and satisfaction with the bus service on line 72.		Before PA plan	October-November 2024	Gathering inputs for shaping of PA plan
Online Survey	Survey for the residents of Grosuplje on the use of and satisfaction with public transport services in the Municipality of Grosuplje.	April 2025	May 2025	April-May 2025	Gathering additional inputs for elaboration of Local plan
Application for approval at MOPE	Elaboration and filing application at Ministry (MOPE) for changing of operations on pilot bus line 72 in Grosuplje	April 2025	May 2025	26 May 2025	The application has been filed at MOPE

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
Annex to the PSO on line 72	Signature of Annex to the PSO contract between LPP and DUJPP	May 2025	June 2025		
Pilot action plan	Elaboration of Pilot Action Plan – implementation & monitoring (PA activities, KPI-s, reporting…)	Feb 2024	May 2025	27 May 2025	Draft has been prepared and shared as a model to other PPs
Elaboration of KPI data table	Elaboration of Excel data collection matrix from PTO to weekly report the operational data for KPI calculation	June 2025	June 2025	16 June 2025	Table has been shared and consolidated with PTO which confirmed availability of data each week
Activity 2	**Promotion of the pilot before launch**	**June 2025**	**July 2025**		
Promotion plan	Planning of PA promotion with AP (Municipality of Grosuplje and LPP)	May 2025	May 2025	29 May 2025	Promotional campaign plan is ready and consolidated with Municipality of Grosuplje and LPTT; schedule of publications, contents to be published on web sites and social media have been prepared
PA promotion	Publish information on pilot project operation in municipality gazette	June 2025	July 2025	17 June 2025	Published in municipality gazette "Grosupeljski odmevi"
PA promotion	Publish information on pilot project operation in social media	June 2025	July 2025	23 June 2025 24 June 2025	Published on Grosuplje Municipality FB profile Published on LPP FB and Instagram profile
Guidelines for passengers	Publication of the modified bus line 72 timetable and users' guidelines on Municipality and LPP web page			17 June 2025 24 June 2026	Published on web page "OBVESTILO ZA POTNIKE NA LINIJAH 71 in 72 - grosuplje.si" Information published on LPP website Poletne spremembe v mestnem in medkrajevnem prometu | Ljubljanski potniški promet

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
				21 August 2025 22 August 2025 28 August 2025	Preparation of information on continuation of PA and the new timetable Publication of timetable change in September by Municipality of Grosuplje on the web page OBVESTILO ZA POTNIKE NA LINIJAH 71 in 72: v obdobju od 1. septembra do 31. oktobra 2025 bomo nadaljevali s spremenjenim režimom izvajanja prevozov - grosuplje.si Publication of timetable change in September by LPP on the web page Spremembe s 1. 9. 2025 | Ljubljanski potniški promet
Activity 3	**Launch and execution of pilot action (4 months: 01/07/25 - 31/10/25)**	**July 2025**	**Nov 2025**		
Monitoring of PA implementation	Keeping contact with operational contact person at PTO (LPP) to check the operation of PA throughout its duration	01/07/2025	31/10/2025	1 July 2025 21 July 2025	Start monitoring activities – weekly data report from Call centre and on-field passenger counting – 3 DRT trips per day & constant communication on changes and adaptations of operations with LPP The operator removed electric van from the service and operated DRT departures by bus or electric car (when 4 or more passengers registered, the bus was used) Operator reported that the annex to PSO contract has only been agreed orally with

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
				18 August 2025 1 Sept 2025 4 Sept 2025 4 Sept 2025	PTA (signature is pending) but reporting on pilot line operation was not disputed by PTA (DUJPP). Change of DRT timetable: 4 DRT trips per day A request by the resident for a flexible operation of 2 DRT route variants was received and forwarded to LPP for a decision – LPP accepted flexibility PIL suggested to LPP some modifications of DRT organisation an operation after school year start: 1. operate trip if passengers are at starting station even if not registered 2. exclude one pair of trips from DRT service due to regular large request of passengers (more than 10) 3. switch from electric car to electric van to assure sufficient capacity on DRT trips
Registration of DRT line journeys - check	Registration of the journeys at a call centre for the purpose of the site visit (2.7.2025)	20/06/2025	31/10/2025	24 June 2025	Registration was smooth: operator asked about the line, direction, boarding bus stop, alighting bus stop, number of passengers and phone number of the caller
Activity 4	**Monitoring of performance parameters & stakeholders' feedback**	**July 2025**	**Feb 2026**		

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
Data collection & processing	Acquisition of operational data from PTO (LPP) on a weekly basis & calculation of weekly KPI-s trends	01/07/2025	15/11/2025	2 Sept 2025	Update of KPI calculation – taking into account empty runs for assuring turn-around (returning back to the main terminal in Grosuplje) – additional DRT lines may absorb unnecessary empty runs
PA monitoring report	PA monitoring & analysis report (KPI-s)	15/11/2025	19/12/2025	19 Dec 2025	Uploaded to the online OPTI-UP project drive
Users' satisfaction survey	Preparation & conduction of PA users' survey – satisfaction with PA implementation	01/07/2025	15/11/2025	2 Sept 2025 8 Oct 2025	Communication with LPP and Municipality of Grosuplje, announcing a users' satisfaction survey and discussion on how to implement it Online publication of Users' Satisfaction Survey and dissemination of the invitation on Municipality FB and website
Stakeholders' workshop	Presentations of PA results and getting feedback from stakeholders (recommendations: finances & upscaling of PA)	Jan 2026	07/02/2026	14 Jan 2026	Stakeholders meeting, organised by PIL, attended by MOPE, DUJPP, LPP, Municipality of Grosuplje
Activity 5	**Assessment of the pilot action implementation and report**	**June 2025**	**Dec 2025**		
Preparation of site visit in Grosuplje		June 2025	15/10/2025	18 June – 2 July 2025	Preparation of agenda, organisation of event and harmonisation with LPP and the Municipality, preparation of visual presentation of the pilot project co-financer and other documents for the visitors (TUW, EY)
On-site visit implementation	On-site visit in Grosuplje & check of LPP call centre operation	July 2025	15/10/2025	2 July 2025	Site visit in Grosuplje – TUV, EY, PIL (train: Ljubljana – Grosuplje – Ljubljana; Zapeljivček in Grosuplje, line 72 in Grosuplje) – DRT journey registered on 24.6.2025

PLAN				IMPLEMENTATION	
Pilot activity	**Brief description**	**Start**	**Deadline**	**When**	**Comment**
Intermediate PA implementation report	Preliminary draft report and presentation of intermediate results of Grosuplje PA at a technical meeting	Sept 2025	15/10/2025	29 Oct 2025	PPT presentation given at the OPTI-UP technical meeting in České Budejovice, organised as a milestone M2.
Final PA implementation report	Final report on Grosuplje PA implementation (intermediate results + issues, discrepancies and proposal for modifications)	Nov 2025	19/12/2025	19 Dec 2025	Completed PA report on Grosuplje uploaded to the online OPTI-UP project drive
Activity 6	**Promotion of results of implemented pilot actions**	**March 2026**	**April 2026**		
Conclusion of PA	Information for the users about conclusion of the DRT operation on line 72	31/10/2025	31/10/2025	28 Oct 2025	Announcement for users of the pilot transport service on Line 72 in Grosuplje regarding the conclusion of the pilot action - Municipality Facebook
Dissemination of results	Presentation of the results and outcomes to other municipalities of Ljubljana Urban Region (LUR)	March 2026	April 2026	TBD	
Publication of outcomes	Short publication of results of the pilot on web sites of LPP, Municipality of Grosuplje and LPP	March 2026	April 2026	August 2025	LinkedIn: https://www.linkedin.com/posts/opti-up_sustainabletransport-drt-publictransport-activity-7367178918988001281-sOSx?utm_source=share&utm_medium=member_desktop&rcm=ACoAAAcIrLcBcJwnif8F86KjPe6wxTn2R79EP7E

3.3.1. PA promotional campaign

The table lists the communication and promotional activities implemented to support the pilot action and raise awareness among users and stakeholders.

Table 12: PA promotion campaign

Date	Purpose of publication	Publication location
17 Jun 2025	Publication of timetable change in July by Municipality of Grosuplje	Municipality gazette: ”Grosupeljski odmevi”
17 Jun 2025	Publication of timetable change in July by Municipality of Grosuplje	The web site of the Municipality of Grosuplje
23 Jun 2025	Publication of timetable change in July by Municipality of Grosuplje	Facebook site of the Municipality of Grosuplje
24 Jun 2025	Publication of timetable change in July by LPP	The web site of the LPP
4 Jul 2025	Publication of video about Grosuplje by Municipality of Grosuplje	Facebook site of the Municipality of Grosuplje
28 Aug 2025	Publication of timetable change in September by LPP	The web site of the LPP
22 Aug 2025	Publication of timetable change in September by Municipality of Grosuplje	The web site of the Municipality of Grosuplje
26 Aug 2025	Publication of timetable change in September by Municipality of Grosuplje	Facebook site of the Municipality of Grosuplje
8 Aug 2025	Publication of invitation to participate in Users' Satisfaction Survey campaign	Facebook site of the Municipality of Grosuplje
8 Aug 2025	Publication of invitation to participate in Users' Satisfaction Survey campaign	The web site of the Municipality of Grosuplje
28 Aug 2025	Public announcement for users of the pilot transport service on Line 72 in Grosuplje regarding the conclusion of the pilot action	Facebook site of the Municipality of Grosuplje

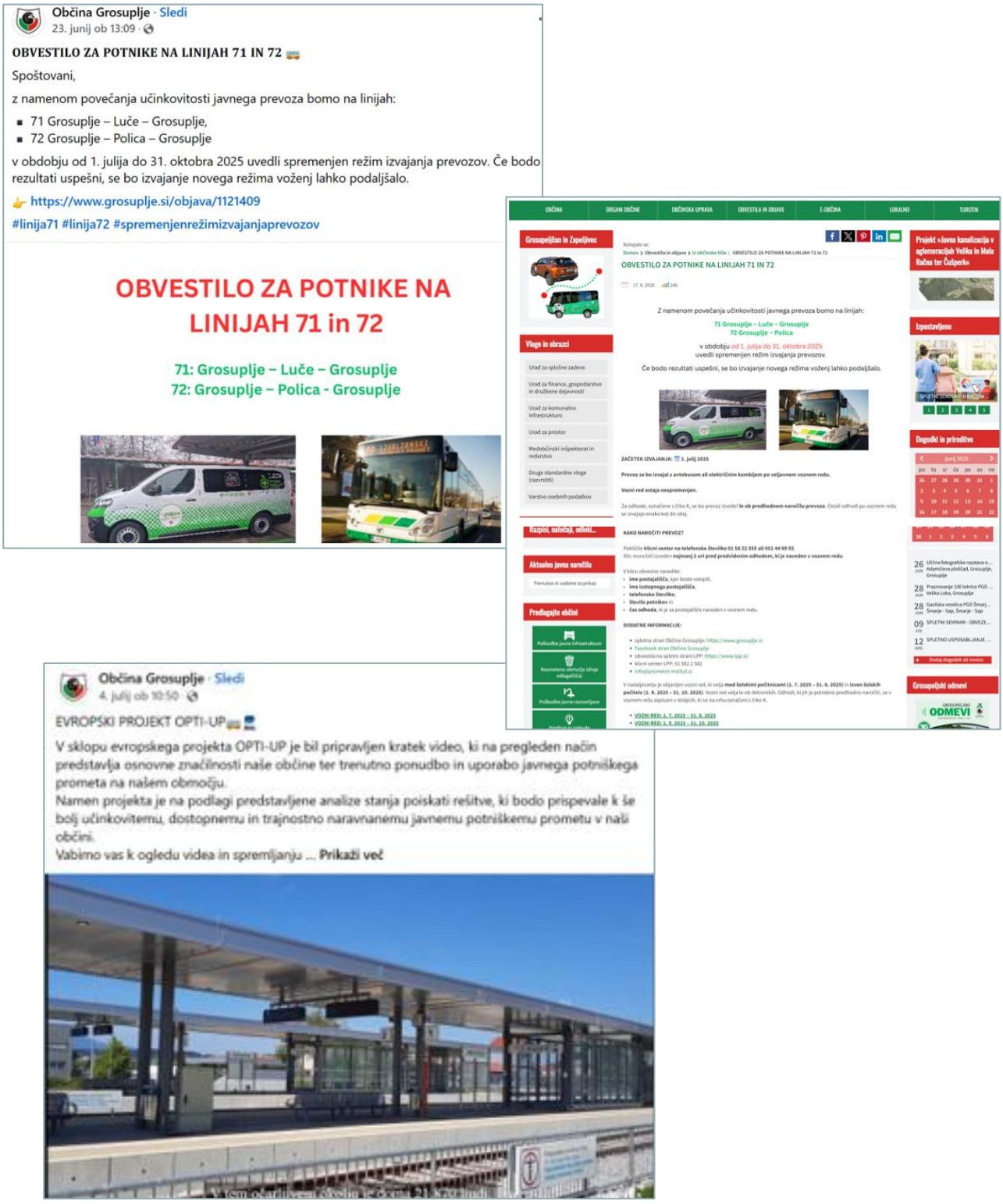

Figure 9: Communication and promotional materials

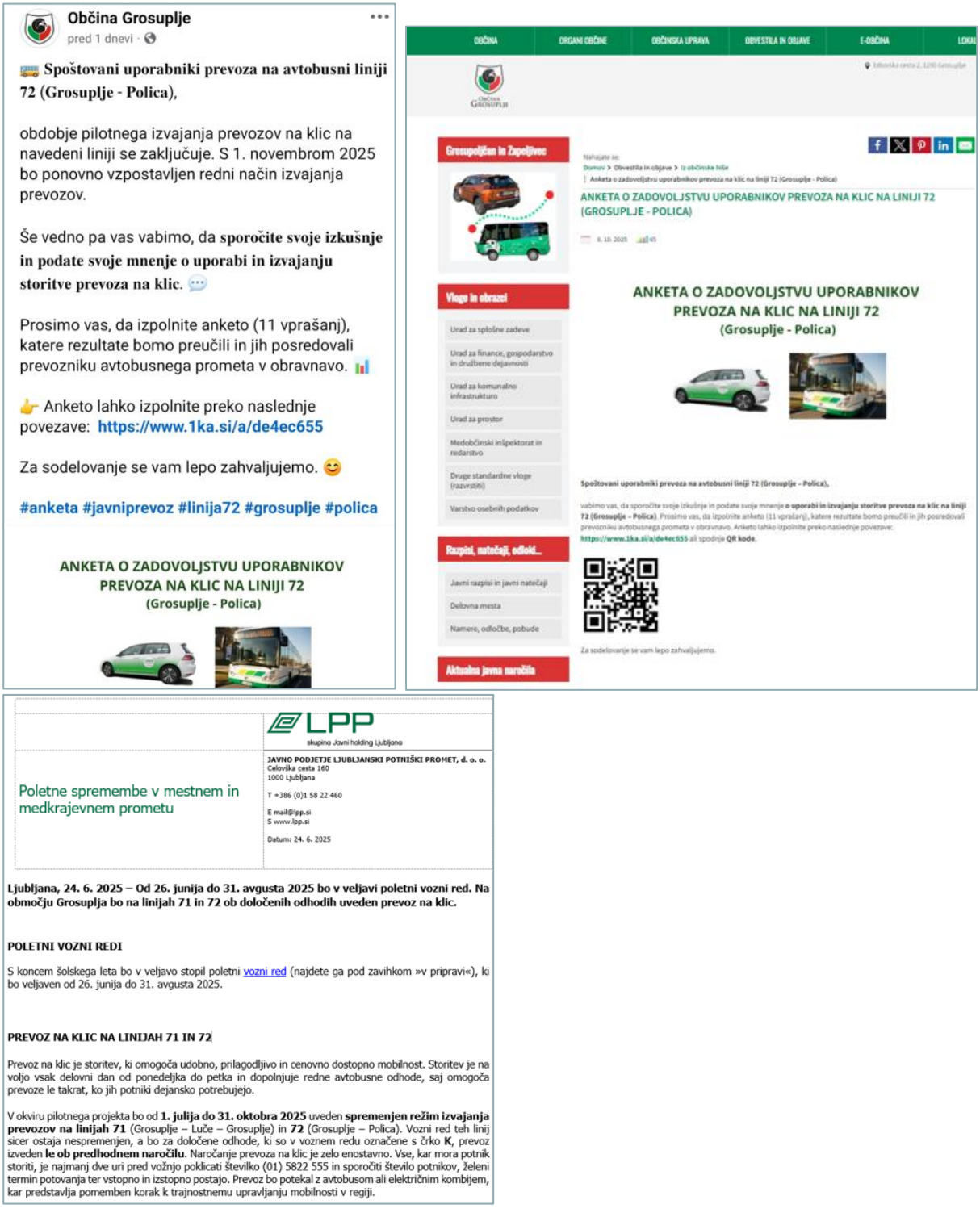

Figure 10: Communication and promotional materials

3.3.2. Promotion of PA results

The results of the DRT pilot action in Grosuplje were presented by PIL at a stakeholder meeting on 14 January 2026, attended by LPP, the Municipality of Grosuplje, MOPE, and DUJPP. The results will also be shared with other municipalities within the Transport Section of the Ljubljana Urban Region.

Figure 11: Stakeholder meeting

3.4. Difficulties and deviations from the implementation plan

Difficulties and deviations encountered during the implementation of the pilot action are summarised in the list below.

Table 13: List of difficulties/deviations in implementation of the PA plan

Date	Brief description	Reason	Management/solution	Impact rating
14 Jul 2025	Initial analyses indicated that the automatically collected data about vehicles used to operate the DRT service were not reliable, particularly when vehicles frequently switched between routes.	organisation	PTO started collecting data on passengers and vehicles in manual tabular records	low
21 Jul 2025	Electrical van was replaced by an electric car.	organisation	An electric passenger car fully replaced a van due to the low number of passenger registrations and the limited availability of the van. Some passengers noted that they would prefer to travel in a van.	low

Date	Brief description	Reason	Management/solution	Impact rating
22 Jul 2025	Electrical vehicle was not available	operation	An incident: a bus was operated due to a traffic accident elsewhere and the driver could not switch from the bus to the electrical vehicle in time	low
02 Sep 2025	The number of passengers on two scheduled departures (15:35 from Grosuplje and 15:54 from Polica) increased significantly and consistently, exceeding the capacity of the electric car, which made it necessary to introduce a bus.	operation	If an electric van had been available, its capacity would have been sufficient to transport the passengers. The introduction of a diesel bus has resulted in increased harmful emissions as well as a higher cost per kilometre.	high
03 Sep 2025	A passenger asked whether it would be possible, upon special request, for the evening departure—which typically has very few passengers—to operate on an alternative route that would pass her stop, even when a different route variant is scheduled.	organisation	It was agreed that the driver would consult the passengers at the departure stop to confirm their agreement with the alternative route.	moderate
03 Sep 2025	With the start of the school year, there were more younger users of the on-demand transport service who did not follow the instructions to register their rides through the call centre. It took some time for them to get used to the process.	end user	Given that most passengers travel between the first and last stops of the route, the operator allowed the ride to be operated if passengers were waiting at the first stop — even if the ride had not been registered in advance.	moderate
04 Sep 2025	As of September, passenger counts and vehicle type monitoring were performed by dispatchers rather than drivers, resulting in data being available only at the level of trip pairs, not for individual trips.	operation	We addressed this issue directly with the dispatchers and the issue was settled.	low
05 Sep 2025	Some passengers complained that they would rather see a van operating as DRT instead	end-user	Complaint passed to the PTO. In the long term they would buy additional electric vans for the service.	low

Date	Brief description	Reason	Management/solution	Impact rating
	of the car — better user experience.			
07 Oct 2025	One passenger complained about a non-accessible call centre.	end-user	Call centre operators are very helpful and committed; they accommodate wishes of the passengers; they call back if necessary.	low
08 Oct 2025	Some passengers are reluctant to use the DRT service, as they cannot accurately predict when they will arrive at the starting stop in Grosuplje and, consequently, which service they will be able to use	end-user	The call centre assured them that it is possible to call less than 2 hours prior to the scheduled ride.	low

Difficulties and deviations in implementation were regularly recorded, whether organisational, operational, or user-related.

Due to problems with automatic ticket-validation data collection, ridership monitoring had to be carried out manually by drivers. In July, the electric van was temporarily withdrawn from service due to its deployment elsewhere. Because the remaining car had insufficient capacity and the van was unavailable, a diesel bus had to be deployed on two daily trips.

The transport operator responded to passenger feedback—for example, by slightly adjusting the bus route during the pilot. Although many passengers preferred not to use the call centre, trips were still operated even when no booking had been registered if passengers were already waiting at the Grosuplje departure station.

Some operational issues in data collection occurred but were resolved promptly through mutual cooperation. Several passengers indicated that they preferred travelling in the van rather than the car, and this feedback was communicated to the operator. Younger users, in particular, expressed reluctance to use the call centre and showed a strong preference for a mobile app to register trips.

3.5. SWOT analysis of implementation

Key internal and external factors influencing the implementation of the pilot action are summarised through a SWOT analysis, highlighting strengths, weaknesses, opportunities and threats.

Table 14: SWOT analysis of pilot action implementation

Strengths	Weaknesses
With the introduction of on-demand request transport, the same timetable was maintained despite the required trip booking Improved efficiency of public transport operations through DRT (on-demand) service. Reduced CO_2 emissions due to fewer empty trips and use of electric vans. Optimized staffing using B-licensed drivers, freeing D-licensed drivers for other routes. Better alignment of service supply with actual passenger demand.	Poor planning of the electric vehicle fleet to ensure sufficient capacity. Smaller vehicles may reduce comfort compared to standard buses. Requires prior trip booking, which may be inconvenient for some passengers. Dependence on digital tools may be challenging for less tech-savvy passengers.
Opportunities	**Threats**
Strong political support at the local and national levels for the optimization PT through DRT services. Expand the on-demand service to other low-occupancy lines. Use data collected from DRT trips to optimize routes, schedules, and fleet planning. Promote smart mobility and digitalization of local public transport. Improve customer satisfaction through flexible, demand-responsive services. Potential cost savings for the transport operator due to reduced empty runs and optimized staffing.	Public transport users are sceptical about the introduction of DRT if it reduces their comfort Risk of low adoption if passengers are reluctant to pre-book trips. Insufficient communication or awareness of the new DRT service among passengers.

3.6. Pilot Action conclusions

Most deviations during implementation were minor—such as temporary vehicle unavailability or passengers choosing not to use the call centre—with only occasional high-impact issues, for example when vehicle capacity was exceeded.

The strengths of the pilot include improved operational efficiency, reduced CO_2 emissions, optimised staffing, and better alignment of service supply with actual demand. Weaknesses relate mainly to vehicle comfort (using a car instead of a van), the requirement for prior booking, and fleet-planning constraints that resulted in the continued use of a bus on certain departures.

Opportunities lie in expanding the service, using collected data for further optimisation, and promoting smart mobility solutions such as a mobile app for DRT bookings. Threats include potential low adoption among sceptical passengers (a highly likely impact) and insufficient communication with users.

Overall, the pilot successfully demonstrated the effectiveness of the applied solution and generated valuable insights to guide future improvements.

3.7. Guidance for future actions for pilot action sustainability

The table below provides guidance for future actions to support the long-term sustainability of the pilot solution, based on the lessons learned and highlighting key steps for continuation and potential scaling.

Table 15: List of activities for achieving sustainability of the implemented pilot solution

Action	Providers	Inputs/resources	Hints
Mandatory ticket validation for all passengers using public transport (JPP), or alternatively equipping all vehicles with automatic passenger-counting systems and ensuring proper data processing, would enable real-time monitoring of actual vehicle occupancy. With accurate occupancy data, resources—both vehicles and drivers—can be allocated more efficiently across different tasks, whether optimising existing lines or supporting network expansion.	PTO	Installation of passenger counters on the vehicles	An electronic ticket-validation system is already in place, so enforcing mandatory validation for every boarding is the most cost-effective and efficient measure for determining passenger numbers. Alternatively, installing passenger-counting sensors would also enable the detection of alightings..
Expansion of the demand-responsive transport (**DRT**) service to other PTO lines **that share resources** (drivers and vehicles), thereby optimizing resource utilization.	PTO, DUJPP	Permit of DUJPP for PTO to change contractually agreed operations	Optimisation reduces service costs, benefiting both PTO and DUJPP.
Introduction of **additional trips in the timetable**; these additional trips will be operated as DRT services.	PTO, DUJPP	Permit of DUJPP for PTO to change contractually agreed operations	Optimization improves passenger accessibility to public transport while ensuring operational

Action	Providers	Inputs/resources	Hints
			efficiency and cost-effectiveness.
Implementation of a **user mobile application** for registering and tracking DRT rides.	PTO	Existing open-source mobile apps	The availability of a user app would particularly appeal to digitally savvy young passengers and enable PTO to deliver more efficient services.
Testing (and use) of an information system for the dynamic assignment of trips to registered users. Trips are operated outside the fixed timetable, based on real-time user registrations. Departure times are generated according to all requests received within a specified time window, and passengers must confirm or decline the proposed trip.	PTO, DUJPP, MOPE	DUJPP and MOPE should provide **funding** for development and testing of the information system for dynamic assignment of trips	This solution could apply to specific time windows when no scheduled trips are available (e.g., late afternoon and evening).
Testing (and use) of an information system for dynamically generating the optimal route layout between stops where registered DRT passengers board and alight.	PTO, DUJPP, MOPE	DUJPP and MOPE should provide **funding** for development and testing of the information system for dynamic generation of an optimal route	This solution can further improve PTO's operational efficiency and cost-effectiveness, thereby delivering additional benefits to DUJPP.
Testing the feasibility of introducing autonomous, driverless vehicles for DRT services to further optimise driver allocation and reassign staff resources to regular, higher-demand lines.	PTO, DUJPP, MOPE	DUJPP and MOPE should provide **funding** for testing -Availability of good practice from EU[1]	This solution can further improve PTO's operational efficiency and cost-effectiveness, thereby delivering additional benefits to DUJPP.

[1] Autonomous On-Demand Public Transport Pilot; KIRA project launches Germany's first autonomous public transport shuttles - EU Urban Mobility Observatory

Autobus — Self-driving buses research project; https://www.toi.no/autobus/?utm_source=chatgpt.com

Sohjoa Last Mile driverless robotbus pilot in Kongsberg; https://www.metropolia.fi/en/about-us/news-and-events/driverless-robotbus-pilot-in-norway-opened-as-part-of-project-lead-by-metropolia-uas?utm_source=chatgpt.com

Oslo autonomous transport pilot (Ruter); https://ruter.no/en/projects-and-new-development/selvkjoringspiloten?utm_source=chatgpt.com

4. Comparison of DRT pilot solutions in Grosuplje and Modena

Within the OPTI-UP project, pilot activities introducing DRT were implemented in Grosuplje and Modena with the aim of improving accessibility, efficiency and sustainability of PT. Both pilots addressed a shared challenge: ensuring high-quality mobility in areas characterized by dispersed settlements or lower demand, where conventional fixed-route services are often neither economically nor operationally optimal.

Although both cities pursued the same overarching objectives—namely increasing PT usage, reducing dependence on private cars and optimizing operational costs—they adopted different organizational and technological approaches. This provides a valuable basis for comparing two distinct DRT implementation models and for identifying good practices, limitations and opportunities for transferring solutions to other contexts.

The following sections present the common characteristics of both pilots, their key differences, shared conclusions, and key considerations for replication and further improvement.

4.1. Common characteristics of the pilot activities

Both pilot activities introduced DRT as a complement to the existing PT system, with the aim of providing more flexible, user-friendly and cost-efficient mobility solutions.

In both cases:

- the service was adapted to actual user demand,
- local stakeholders (municipalities, operators and users) were actively involved,
- a pilot testing phase was carried out,
- promotional and informational activities were implemented,
- data on usage, user satisfaction and operational performance were collected.

The results of both pilots confirm that DRT represents an appropriate solution for areas with lower population density or limited passenger demand, where traditional fixed-route services are not efficient.

4.2. Key differences between the pilots

The most significant difference between the two pilots lies in the initial system design.

In Grosuplje, the DRT service was developed as an upgrade of an existing bus line. The service retained certain fixed elements (route, stops and partially fixed timetable), while allowing adjustments based on user requests. This represents a hybrid model combining elements of fixed-route and demand-responsive transport.

In the case of Modena, the DRT system was already in place, as its replacement with a fixed-route service had occurred in the past. However, the service was enhanced through the introduction of a new management platform capable of automating routing processes for individual trips and enabling users to book their ride via smartphone, providing an alternative to phone-based reservations.

This results in two conceptually different approaches:

- an evolutionary approach based on upgrading an existing system (Grosuplje),
- the establishment of a new, digitaly managed DRT system (Modena).

4.3. Common Findings

Based on the implementation of both pilot activities, the following shared findings can be identified:

- DRT effectively fills gaps in existing PT systems,
- it improves accessibility and service flexibility,
- it enables more efficient use of vehicles and resources,
- it requires intensive promotion and clear communication with the public,
- its success strongly depends on adaptation to local conditions.

A key success factor is the ease of use of the system and its integration with the existing PT offer.

4.4. Opportunities for Improvement

In Grosuplje, further development could focus on the gradual digitalisation of booking procedures, automated data collection and improved demand-based route optimisation to enhance efficiency and service quality.

In Modena, improvements could target better accessibility for vulnerable user groups and strengthened promotional activities to increase awareness and ridership.

For both cities, regular monitoring of key performance indicators, continuous user involvement in evaluation processes and gradual service expansion based on observed demand remain essential for long-term sustainability.

4.5. Common conclusion

Both pilot projects confirm that DRT is an effective and flexible solution for complementing PT systems and represents an important step towards more sustainable mobility. The comparison between Grosuplje and Modena clearly demonstrates that there is no single universal solution; instead, system success largely depends on adaptation to the local context.

The hybrid model based on upgrading existing routes allows for a gradual introduction of change with lower risk, while a standalone, digitally supported DRT system offers greater flexibility and operational efficiency. Both approaches represent viable models that can be adapted to the specific needs of other cities.

The experiences gained from both pilots therefore provide valuable guidance for the future deployment of DRT systems and make a meaningful contribution to the development of smart, accessible and sustainable mobility solutions.