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DREAM_PACE

D1.2.3 Co-designed solutions blueprint of integrated DRT implemented /tested through pilot activities

Final Version

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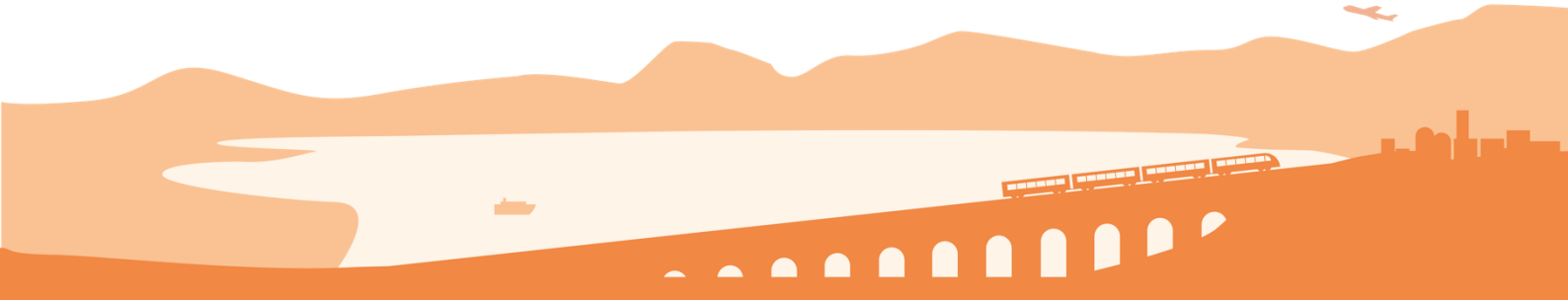

Authors and log change of the document

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2	Redmint	Gabriele Grea Anja Seyfert	Structure of the document, template for input collection	1
1	SRM	Marco Amadori Chiara Lepori Giuseppe Liguori Dario Marchini	Inputs solution components #1, 2, 3	2a
2	Redmint	Gabriele Grea Anja Seyfert	Inputs solution component #4	2b
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6	ATE	Florian Kressler	Review of the document	3a
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1	SRM	Chiara Lepori Giuseppe Liguori Dario Marchini	Edited approved version for official release	Final

Contents

1. Summary and structure of the blueprint

DREAM_PACE aims at developing innovative Demand Responsive Transport (DRT) concepts for peripheral and rural areas, complementing regional mobility networks to improve connectivity, sustainability, inclusiveness.

From the **governance and planning perspective**, two different context-based approaches have been defined:

- for territories where comprehensive governance and planning frameworks govern composite mobility networks from a top-down perspective, with the objective of enhancing efficiency and effectiveness through the integration of services with different nature in a MaaS (Mobility-as-a-Service) logic.
- for territories where services are being designed and implemented at different governance levels, often as expression of bottom-up approaches lead by local authorities to fulfil specific needs of the citizens, with the objective of better coordinating the composite framework of direct initiatives in an inclusive model.

This document describes activities carried out in with reference to the first approach, those related to the second approach are described in Delierable D1.2.4. Project Partners have jointly designed **a modular governance and planning model blueprint for integrated DRT-public transport in a MaaS logic**.

On this basis, the tools presented in this document are meant to support the conception, implementation and scaling up of a new generation of DRT services, designed as functional and integral part of regional mobility networks, enhancing accessibility for citizens, territorial cohesion and social inclusion.

The **governance and planning model** is composed by governance, planning, financial and procurement elements/modules, designed to support the decision-making process in efficiently and effectively integrated DRT services in the existing local and regional mobility networks.

The project will improve DRT planning and delivery capacities of public authorities and operators, also by promoting the presented tools through targeted actions to influence decision makers' attitude towards change.

The model blueprint is composed by the following elements/components:

1. **Strategic planning approach for DRT in Public Transport (PT)**: a strategic guideline for the integration of DRT services in Sustainable Urban Mobility Plans (SUMPs).
2. **Recommendations on the integration of DRT services in MaaS**: a set of requirements for the seamless and effective integration of a DRT into a MaaS framework.
3. **Recommendations on how to develop a PT tendering procedure integrating DRT services**: a set of indications and recommendations for building up a mockup simulating a PT tendering procedure that includes DRT services.
4. **Business planning tool for flexible management of DRT-PT**: a calculation tool to support the operational and financial planning phase of DRT services, providing comparisons between PT and four different DRT service models, and across three conceptual scenarios ("accessibility", "intermodality", "inclusiveness").
5. **Data driven approach to DRT service expansion**: a guidance document from a Public Transport Authority (PTA) perspective on how to transform a low demand line in DRT or to create a new one; it includes practical guidance on how to design, locate and regulate DRT stops.

6. **DRT dedicated tendering procedure in new areas and regulatory frameworks, DRT as a Service**; a guidance document for the tendering of new DRT services, where the "DRT as a Service" approach – fostering the collaboration between PTOs and digital providers – is proposed.

The figure below represents the framework of the solution components, highlighting their role in the planning process, from strategic to tactical.

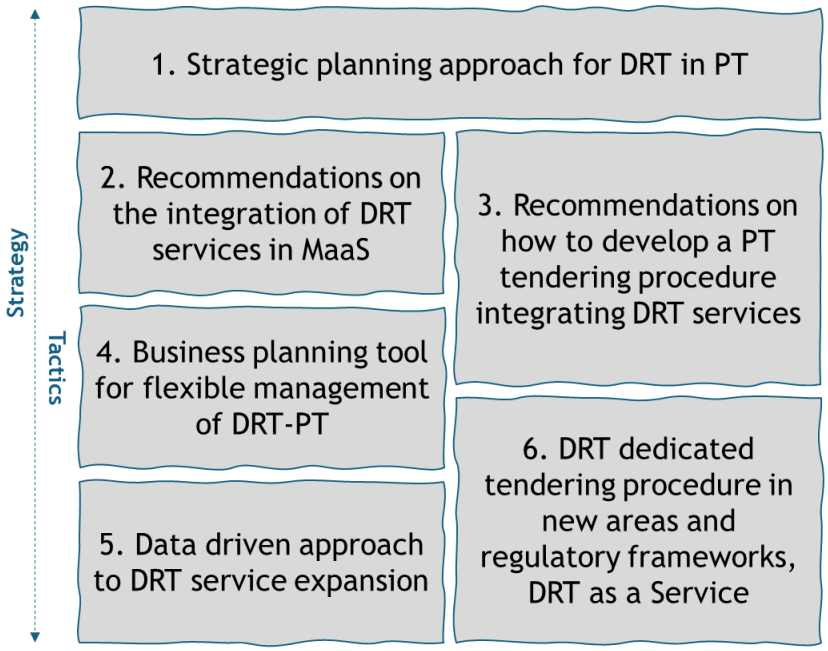

Figure 1: A modular governance and planning model blueprint for integrated DRT-public transport in a MaaS-logic

In the following chapters (2 to 7), the objectives, target groups and main functionalities of each solution component are presented.

Chapters 8 and 9 focus respectively on the expected change generated by the adoption of the described solution and on the transferability and replicability of the components, while chapter 10 highlights a set of planned targeted actions planned to influence decision makers' attitude towards change.

2. Component 1: Strategic planning approach for DRT in PT

2.1. Objective

This component, developed by SRM, consists of a strategic document for integrating DRT services in the Sustainable Urban Mobility Plan (SUMP) of the Bologna metropolitan area. For this it is necessary to identify opportunities and spaces for future implementation of DRT, ensuring that services are effectively incorporated into long-term mobility strategies and contribute to a seamless and inclusive PT ecosystem.

The core aim of this solution component is to support Public Authorities in planning and governing DRT services as a permanent part of the PT ecosystem. This involves recognizing DRT as both a tool to cover underserved and low demand areas and an instrument for achieving broader goals such as territorial cohesion, social inclusion, and sustainability.

This component directly addresses several key challenges identified by the DREAM_PACE project, in particular:

- The integration of DRT into existing PT networks, overcoming the fragmentation and "stand-alone" nature of current DRT solutions.
- Improving accessibility in low-demand or underserved areas by strategically identifying where DRT can complement traditional PT.
- Strengthening governance capacity of Local Authorities through structured planning tools, enabling better coordination of mobility services.

2.2. Target groups

The pilot 1.1 solution component no.1 “Strategic planning approach for DRT in PT”, that has the format of a strategic document composed with various contributions, lies on the following pilot actions:

- “b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level (in terms of geographic, socio-economic, temporal, and inter-territorial characteristics)”.
- “c -Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service”.
- “d - Study on potential integrations between demand assessment methodologies and parameters and city and metropolitan planning tools (i.e., SUMP)”.
- “g - Identification of potential weak demand areas by analysis and geographic visualization of the Origin / Destination (O/D) matrix starting from telephone SIM data”.

Among these actions, “d” is particularly relevant as it deals with the development of the strategic planning approach for DRT in PT: indeed, it is crucial for providing insights that directly inform and enhance the PT strategic planning process.

The provisions contained in the document **“d - Study on potential integrations between demand assessment methodologies and parameters and city and metropolitan planning tools”** can support different stakeholders, either directly or indirectly.

Direct beneficiaries include:

- Local and Regional Authorities, especially those involved in defining strategic mobility objectives and integrating flexible services into planning tools such as SUMPs. The study provides them with structured

criteria and methodologies to identify where and how DRT can complement existing networks, particularly in weak demand areas.

- Public Transport Authorities (PTAs), supporting them for including DRT in public service obligations.

Indirect beneficiaries include:

- Public Transport Operators (PTOs), not in terms of immediate operational design, but as recipients of clearer institutional guidelines and long-term service expectations.
- Users, especially those living in less densely populated or socio-economically fragile areas, who can benefit from enhanced mobility options and improved accessibility to essential services.

The **testing and validation** of the components and activities of the Bologna pilot directly involved the Living Lab (LL) stakeholder group[1]. Specifically, the validation of the results of pilot actions supporting the pilot 1.1 solution component no.1 were carried out as follows:

- The result of pilot action "g - Identification of potential weak demand areas by analysis and geographic visualization of the O/D matrix starting from telephone SIM data" was validated by SRM with the associated partner CMBO, confirming the zoning level.
- The studies collecting the results of pilot actions "b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level (in terms of geographic, socio-economic, temporal, and inter-territorial characteristics)" and "c -Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service" were validated were validated during the 4th and 5th Bologna Living Lab meetings, both held on 1 July 2025 at SRM's office in Bologna. Full details on them are available in the description of the pilot 1.1 solution component no.3.
- The contents of the study developed within the crucial pilot action "d - Study on potential integrations between demand assessment methodologies and parameters and city and metropolitan planning tools"" - were validated during the 6th Bologna Living Lab meetings, held online on 17 July 2025. In this specific 6th LL meeting, the composition of the stakeholder group was tailored to reflect the technical and planning-oriented nature of the activity. Indeed, in order to redesign local PT services in a hierarchical logic and integrate them effectively with DRT services, it is essential that strategic planning instruments, such as the SUMP, incorporate these directions. For this reason, the stakeholders invited to the 6th Living Lab meeting were the Local Authorities responsible for mobility planning in the Bologna metropolitan area, ensuring that the study's results and proposed guidelines could be directly discussed with, and absorbed by, the relevant planning bodies, i.e. CMBO (responsible for SUMP development and updating) and COBO.

2.3. Description and functionalities

The solution component no. 1 "Strategic planning approach for DRT in PT" builds particularly on Bologna **pilot action "d** - Study on potential integrations between demand assessment methodologies and parameters and city and metropolitan planning tools (i.e., SUMP)".

[1] The Bologna LL stakeholder group includes a broad and diverse range of stakeholders from multiple sectors and administrative levels, ensuring a comprehensive representation of the mobility ecosystem: Local Authorities, such as the Metropolitan city of Bologna (CMBO) and the Municipality of Bologna (COBO); Regional Authorities, namely Regione Emilia-Romagna (RER); National Authorities, such as Istat (Istituto Nazionale di Statistica); PTAs of the Emilia-Romagna Region; PTOs active in the Bologna metropolitan area; Enterprises and SMEs, in particular IT providers and players involved in the development and operation of DRT and MaaS solutions; General public representatives.

The purpose of this study (available as Annex "DREAM_PACE_Bologna pilot_action D_EN") is to explore the possible integrations between advanced mobility demand analysis methods and strategic planning tools, such as the SUMP of the Bologna metropolitan area. In particular, the study investigates how the results obtained through a multi-level demand estimation approach based on data-fusion techniques – that is described in detail in document "b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level" (available as Annex "DREAM_PACE_Bologna pilot_action B_EN") and applied in chapter 2 of study "d" - can effectively support the planning and restructuring of PT services, especially in low-demand areas, with a focus on the deployment of DRT services[2].

While chapter 3 of the document "d" shows the results of applying the methodology for identifying areas with weak demand, chapters 4 and 5 represent the key foundations of the pilot 1.1 solution component no. 1, as they provide respectively the hypotheses for operational models of DRT services based on the characteristics of mobility demand (chapter 4), and the hypotheses for a remuneration model for DRT services tailored to demand characteristics (chapter 5).

The objective of these chapters is to integrate the application of the methodology for identifying low-demand areas with the evidence gathered throughout the Bologna pilot actions, ultimately leading to a concrete proposal for the adoption of differentiated DRT service models. These models are designed to be consistent with territorial constraints while also meeting the criteria of effectiveness, equity, and sustainability.

In detail, chapter 4 targets the adaptation of DRT services to local specificities, in order to maximize operational efficiency and ensure adequate coverage of mobility needs in low-demand areas. To achieve this, it uses a classification logic, based on the integrated analysis of estimated demand (quantitative and qualitative) and the suitability of different DRT models with respect to the configuration of each area. The chapter proposes a structured logical framework developed for the Bologna metropolitan area, articulated as follows:

- Identification of four DRT operational models (chapter 4.1), each described in terms of its main functional characteristics and their suitability in different territorial, settlement, and organisational contexts - such as the level of integration with the existing PT system, particularly in relation to the metropolitan network envisaged in the SUMP. The four models are: (i) base-route service with fixed stops; (ii) base-route service with deviations and fixed stops; (iii) free-routing service between a predefined set of points; (iv) free-routing service between any set of points.
- Analysis of the mobility demand in the 23 areas (chapter 4.2) previously identified in chapter 3 through the application of the methodology. This section aims to define the key factors that influence the choice of appropriate DRT operational models. The analysis focuses on two main dimensions: the temporal structure of demand, and the spatial structure of demand. The intersection of these two dimensions supports the assignment of the most appropriate operational model to each low-demand area.
- Assignment of the DRT service model that best matches the specific characteristics of each area (chapter 4.3), ensuring contextual coherence and alignment with planning objectives.

Chapter 5 addresses the issue of DRT service remuneration, taking into account the demand characteristics that emerged from the analysis. The aim is to build a coherent framework that aligns operational models with appropriate contractual and remuneration schemes. Also, chapter 5 follows a structured logical framework, articulated as follows:

[2] It is noted that the document "d" directly addresses the recommendations of ART (Autorità di Regolazione dei Trasporti) Resolution no. 48/2017, particularly those included in Annex 1, Measure 3, which emphasize the need to match service models and levels of supply with the actual characteristics of demand in weak demand areas.

- Definition of a guide for selecting the most appropriate remuneration model for DRT services in each low-demand area (chapter 5.1). The analysis begins with a review of the main cost drivers in DRT services (detailed in document “c - Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service” – available as Annex “DREAM_PACE_Bologna pilot_action C_EN”), then summarizes alternative remuneration models compared to the standard approach, and outlines possible criteria for assigning remuneration schemes based on the four operational service models used in chapter 4.
- Characterization of demand levels in a way that allows for a clear and immediate understanding of the potential suitability of each area for PT services (chapter 5.2). This characterization serves as a criterion to coherently associate both the operational models and the related remuneration mechanisms with the real demand conditions observed in each area.
- Assignment of DRT remuneration models to the 23 low-demand areas identified in the Bologna metropolitan area (chapter 5.3). Based on the operational model previously identified for each area and the estimated potential demand, a remuneration model is proposed for every low-demand context. This ensures consistency between the level of service required, the operational configuration, and the economic sustainability of the solution.

3. Component 2: Recommendations on the integration of DRT services in MaaS

3.1. Objective

This component, developed by SRM, provides the requirements for the seamless integration of a DRT into a MaaS framework. The activities and studies were carried out in the DREAM_PACE Bologna pilot context and started from the specific case of a MaaS that could serve both urban and peripheral areas in the Metropolitan city of Bologna.

The recommendations ground on the analysis of the existing Emilia-Romagna regional MaaS ecosystem, and consider the technological, operational, and governance dimensions of the integration of a DRT service with/in it. Their aim is to ensure that DRT services become an effective, flexible, and sustainable component of the overall mobility offering in the Bologna metropolitan area, particularly in areas underserved by conventional public transport.

This component directly addresses several key challenges identified by the DREAM_PACE project, in particular:

- Territorial disparities in accessibility and mobility: by focusing on the integration of DRT into MaaS, the component supports the reduction of gaps in service availability between urban centres and rural or peripheral areas. It contributes to a more balanced and equitable mobility system.
- Lack of integration in DRT planning and operations: traditionally, DRT services have often been implemented as stand-alone solutions. This component seeks to overcome such fragmentation by aligning DRT governance, planning, and operation with the MaaS ecosystem.
- Need for scalable and innovative solutions: the integration of DRT into a MaaS environment enables scalable, data-driven, and user-focused services. This component supports the design of interoperable systems and governance models that allow DRT to evolve from pilot experiences into structural mobility solutions.

3.2. Target groups

The pilot 1.1 solution component no. 2 “Recommendations on the integration of DRT services in MaaS”, that has the format of a guideline/checklist, lies on a study on the integration of DRT services into the public transport supply and MaaS system. Within the DREAM_PACE project, this study corresponds to the Bologna pilot action **“a - Study on the integration of DRT services into the public transport supply and into a MaaS system”** (available as Annex “DREAM_PACE_Bologna pilot_action A_EN”).

The guidelines provided by the document can support a wide range of stakeholders throughout the integration process, including:

- Local and Regional Authorities, responsible for coordinating and supervising the integration of DRT services in the territories and setting reference standards.
- Public Transport Authorities (PTAs), for the definition and monitoring of public service contracts.
- Software manufacturers, for the development and management of platforms dedicated to the operation of DRT services.
- Public Transport Operators (PTOs), for the implementation and operational management of DRT services.

- MaaS operators, to ensure interoperability and data sharing by integrating platforms and trip booking functions.
- Users, who benefit from the integration of DRT services with other mobility solutions within a single MaaS platform, eliminating the need for multiple applications and improving clarity, usability, and convenience for a seamless travel experience.

The **testing and validation** of the components and activities of the Bologna pilot directly involved the Living Lab (LL) stakeholder group[3].

Specifically, the validation of the study developed as a result of Bologna pilot action "a" - corresponding to the solution component no.2 - was carried out during the 3rd Bologna LL meeting, held online on 4 April 2025. The composition of the stakeholder group for this meeting was deliberately shaped around the technical nature of the activity, with the goal of bringing together different expertise and perspectives. The stakeholders involved were:

- Local and Regional Authorities: CMBO, COBO and RER.
- PTAs (Mobility Agencies) of the Emilia-Romagna Region[4].
- PTOs active in the Bologna area.
- MaaS Integrator: Lepida, the in-house company of the RER responsible for managing digital infrastructures and services for the public administration. Its role is particularly relevant within the Bologna LL as it represents the Region's Regional Access Point (RAP) in the context of the MaaS4RER[5] initiative.
- IT players operating in the DRT and MaaS sectors[6].

3.3. Description and functionalities

The solution component no. 2 "Recommendations on the integration of DRT services in MaaS" lies on Bologna pilot action "a - Study on the integration of DRT services into the public transport supply and into a MaaS system".

The purpose of this study (available as Annex "DREAM_PACE_Bologna pilot_action A_EN") is to define an operational and technical framework for guaranteeing the interoperability of DRT services with the public transport and within the MaaS platforms, promoting the integration of mobility services in an interoperable ecosystem. The study offers an outline of operational protocols and functional and technical requirements, which guarantee operational cohesion and coordination between the various actors involved in the

[3] The Bologna LL stakeholder group includes a broad and diverse range of stakeholders from multiple sectors and administrative levels, ensuring a comprehensive representation of the mobility ecosystem: Local Authorities, such as the Metropolitan City of Bologna (CMBO) and the Municipality of Bologna (COBO); Regional Authorities, namely Regione Emilia-Romagna (RER); National Authorities, such as Istat (Istituto Nazionale di Statistica); PTAs of the Emilia-Romagna Region; PTOs active in the Bologna metropolitan area; Enterprises and SMEs, in particular IT providers and players involved in the development and operation of DRT and MaaS solutions; General public representatives.

[4] Tempi Agenzia Piacenza, S.M.T.P. - Società per la mobilità ed il trasporto pubblico di Parma, AMI - Agenzia Mobilità Impianti Ferrara, Agenzia Mobilità Reggio Emilia, aMo - Agenzia per la mobilità di Modena, and AMR - Agenzia Mobilità Romagnola.

[5] MaaS4RER (Mobility as a Service for Emilia-Romagna Region) project is part of the national MaaS4Italy initiative. It aims to integrate various transportation services into a single digital platform, allowing users to organize, book, and pay for their journeys through a dedicated app.

MaaS4RER: https://mobilita.regione.emilia-romagna.it/piani-programmi-progetti/maas

MaaS4Italy: https://innovazione.gov.it/progetti/mobility-as-a-service-for-italy/

[6] Padam Mobility, Instant System, My Cicero (Pluservice), SHOTL, Nemi, Ioki, VIA, Open Move, Optibus, and MAIOR

development of DRT systems, ensuring their interoperability, integration into the mobility network and accessibility in the MaaS system. It includes:

- An overview of the types of integration between DRT services and MaaS platforms, specifically addressing the use of Deep Link solutions and API-based integration approaches.
- An analysis of current critical issues and challenges, with a particular focus on the data standards required for successful DRT integration. Special attention is given to the GTFS-Flex standard.
- A final section dedicated to the protocols for the integration of DRT services into PT networks and MaaS platforms.

In particular, chapter 5 of the study is the core of this pilot component no.2, as it provides the guideline for the integration of DRT services in the public transport network and in the MaaS platforms. It contains an analysis of the various kinds of integrations, and the current critical issues and challenges to be addressed, and finally presents a protocol for the integration of DRT services in local PT networks and MaaS platforms, detailing the functional and operational requirements for such an integration in both cases:

- The integration of DRT into TPL is based on two main dimensions:
    - Functional requirements that define the essential rules and conditions for the DRT to coordinate with the LPT at the level of routes, interchange points, and complementarity with existing services.
    - Operational requirements that govern the management of the DRT service in terms of fares, reservation arrangements, resource optimization and performance monitoring.
- The integration of the DRT into MaaS has three levels:
    - Functional requirements, which define the conditions for the DRT to be accessible and usable within MaaS systems.
    - Technical requirements, establishing the standards for data exchange and interoperability between DRTs and platforms.
    - Operational requirements, which govern the management of the DRT service in relation to the MaaS platform, including how performance is booked, paid for, and monitored.

It is noted that, as part of the study, models for integrating DRT services into MaaS were investigated in depth, with the involvement of industry players and those active in implementing such solutions: the analysis showed that, currently, there are no established developments involving full integration of DRT systems into MaaS platforms. In the contexts in which DRT services have been implemented, their operation appears to be integrated into the operation of local public transport with an operational support role over specific geographic areas, and the management of interaction with users continues to be delegated to proprietary channels, such as dedicated applications reachable at most through deep links, without structural integration into MaaS models.

This highlights how the integration of DRT services into MaaS systems still represents an area of experimentation, lacking established benchmarks or established operational best practices. Therefore, this DREAM_PACE pilot 1.1 component no.2 introduces as innovative element the operational and technical framework that enables the structured integration of DRT services since their planning phase, ensuring compliance with applicable regulatory constraints.

4. Component 3: Recommendations on how to develop a PT tendering procedure integrating DRT services

4.1. Objective

This component, developed by SRM, consists of indications and recommendations for building up a mockup simulating a PT tendering procedure that includes DRT services. The activities and analyses were carried out within the context of DREAM_PACE Bologna pilot, taking as a reference the specific case of the tendering process at the Metropolitan city level, where DRT services are currently not included in the existing Contract of Service.

The main objective of this component is therefore to lay the groundwork for the formal integration of DRT services into future public transport tenders, thus also enabling their inclusion in the PT Contracts of Service.

This component directly addresses several key challenges identified by the DREAM_PACE project, in particular:

- The integration of DRT into existing PT networks, overcoming the fragmentation and the "stand-alone" nature of current DRT solutions.
- Enhanced connectivity in areas with low demand where traditional PT is not viable, promoting equitable access to mobility for all citizens.
- A more inclusive and resilient regional mobility system, which responds flexibly to diverse territorial needs.

4.2. Target groups

The pilot 1.1 solution component no.3 “Recommendations on how to develop a PT tendering procedure integrating DRT services” lies on the following pilot actions:

- “b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level (in terms of geographic, socio-economic, temporal, and inter-territorial characteristics)”.
- “c -Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service”.

These studies are particularly relevant as they represent the strategic documents in the construction of a tender for DRT services. In particular, they are crucial in providing the demand-side justification and cost-based feasibility essentials for drafting a realistic DRT tender.

The guidelines provided by the document **“b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level”** can address a wide range of stakeholders, either directly or indirectly.

The stakeholders directly addressed are:

- Local and Regional public authorities, responsible for defining service levels (including DRT) in weak demand areas, based on territorial, socio-demographic, and economic characteristics
- Public Transport Authorities (PTAs), for planning and contractual decisions, particularly when evaluating the inclusion of DRT services in the overall public transport offer.

The stakeholders indirectly addressed are:

- Public Transport Operators (PTOs), to better understand the demand potential in certain areas and to adjust their service strategies accordingly.
- Istat, IT providers and players involved in the development and operation of DRT, to collect valuable feedback and engage in a discussion on the methodology, with particular attention to local specificities.
- Users, especially those living in less densely populated or socio-economically fragile areas, who can benefit from enhanced mobility options and improved accessibility to essential services.

The indications provided by the study "**c - Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service**" can address a selected group of stakeholders, either directly or indirectly.

The stakeholders directly addressed are:

- Local and Regional public authorities, to rely on cost-related evidence to support the inclusion of DRT services in mobility planning and in defining financial resources.
- PTAs, to assess the financial feasibility and contractual implications of integrating DRT into the Contract of Service.
- PTOs, to better understand the cost framework for DRT and align their operational models with potential contractual opportunities.

The stakeholders indirectly addressed are the users, who can benefit from more cost-effective and accessible DRT services as a result of their efficient integration into the PT system.

The **testing and validation** of the components and activities of the Bologna pilot directly involved the Living Lab (LL) stakeholder group[7]. Specifically, the validation of the results of pilot actions supporting the pilot 1.1 solution component no.3 were carried out during the 4th and 5th Bologna Living Lab meetings, both held on 1 July 2025 in person at the SRM's office in Bologna. The 4th meeting was organized with the purpose of validating and testing the results of pilot action "c", while the 5th meeting focused on validating and discussing the outcomes of pilot action "b".

The composition of the stakeholder group for these meetings was shaped around the technical nature of the activity, with the goal of bringing together different expertise and perspectives.

The stakeholders involved in the 4th LL meeting were:

- Local and Regional public authorities: CMBO, COBO, and RER.
- PTAs (Mobility Agencies) of the Emilia-Romagna Region[8].
- PTOs active in the Bologna area.

The stakeholders involved in the 5th LL meeting were:

- Local public authorities: CMBO, COBO (Mobility Dept. and Statistics Dept.).

[7] The Bologna LL stakeholder group includes a broad and diverse range of stakeholders from multiple sectors and administrative levels, ensuring a comprehensive representation of the mobility ecosystem: Local public authorities, such as the Metropolitan city of Bologna (CMBO) and the Municipality of Bologna (COBO); Regional public authorities, namely Regione Emilia-Romagna (RER); National authorities, such as Istat (Istituto Nazionale di Statistica); PTAs of the Emilia-Romagna Region; PTOs active in the Bologna metropolitan area; Enterprises and SMEs, in particular IT providers and players involved in the development and operation of DRT and MaaS solutions; General public representatives.

[8] Tempi Agenzia Piacenza, S.M.T.P. - Società per la mobilità ed il trasporto pubblico di Parma, AMI - Agenzia Mobilità Impianti Ferrara, Agenzia Mobilità Reggio Emilia, aMo - Agenzia per la mobilità di Modena, and AMR - Agenzia Mobilità Romagnola.

- Regional public authorities: RER and ITL (Istituto sui Trasporti e la Logistica), the latter being a publicly supported Foundation which contribute to the development and promotion of the logistics and transport systems in the Emilia-Romagna region. Its involvement in the LL meeting was important as a provider of good practices and for offering valuable insights based on experiences from other European projects related to DRT and mobility demand.
- PTAs of the Emilia-Romagna Region.
- PTOs active in the Bologna area.
- IT players operating in the DRT and MaaS sectors[9].
- National public authority: Istat (Istituto Nazionale di Statistica), which is the public research institute responsible for producing and disseminating official statistics in Italy. Its involvement was particularly relevant, as Istat data sources were used in the methodology developed in the document "b".
- MaaS Integrator: Lepida, the in-house company of the RER responsible for managing digital infrastructures and services for the public administration. Its role is particularly relevant within the Bologna LL as it represents the Region's Regional Access Point (RAP) in the context of the MaaS4RER[10] initiative, and its involvement was due to their expertise in analyzing data from various sources, providing valuable feedback on the methodology used.

4.3. Description and functionalities

The pilot 1.1 solution component no. 3 "Recommendations on how to develop a PT tendering procedure integrating DRT services" builds particularly on Bologna pilot actions "b - Analysis of potential demand and definition of areas of weak demand at the metropolitan level" and "c - Study on DRT costs and the possibility of their inclusion in the Public Transport Contract of Service".

The purpose of the document resulting from **pilot action "b"** (available as Annex "DREAM_PACE_Bologna pilot_action B_EN") is to define, in a coherent and reasonable manner, the geographical and functional area where to plan and award local public transport services, while identifying the potential mobility demand to be met. In this perspective, the analysis goes beyond a simple description of observed mobility demand and includes latent needs as well as structural and socio-economic characteristics of the Metropolitan city of Bologna - such as morphology, urbanization, demographic profiles, and the local economic system.

The innovative methodology for analysing the potential demand and defining the areas of weak demand at the metropolitan level is built on four key pillars:

- A clear and operational objective, aimed at creating a transparent and replicable methodology.
- The integrated use of heterogeneous data sources, including:
    - A custom survey on residents' mobility patterns (developed for the update of the metropolitan SUMP).
    - Socio-demographic and employment data (from Istat and the metropolitan atlas).

[9] Padam Mobility, Instant System, My Cicero (Pluservice), SHOTL, Nemi, Ioki, VIA, Open Move, Optibus, and MAIOR

[10] MaaS4RER (Mobility as a Service for Emilia-Romagna Region) project is part of the national MaaS4Italy initiative. It aims to integrate various transportation services into a single digital platform, allowing users to organize, book, and pay for their journeys through a dedicated app.

MaaS4RER: https://mobilita.regione.emilia-romagna.it/piani-programmi-progetti/maas

MaaS4Italy: https://innovazione.gov.it/progetti/mobility-as-a-service-for-italy/

- Mobile phone SIM data.
- Floating Car Data (FCD).

- A data-fusion process that enhances the value of each source and enables the reconstruction of actual and potential mobility patterns in the area.
- A series of structured analytical steps, leading to the definition of appropriate service levels for weak demand areas, through the use of analytical zoning, of a socio-economic territorial model, and of the combined estimation of travel demand based on multiple data sources.

In particular, chapter 4 of the document "b" represents one of the key foundations of pilot solution component no. 3, as it provides a replicable methodology for the calculation of potential demand and for the definition of the service levels in low demand areas. Such a methodological and operational framework is developed for the identification of effective solutions for planning PT services (including DRT) within the Metropolitan city of Bologna, with specific focus on the organization of service areas and their structuring based on demand levels[11]. Indeed, chapter 4 integrates two complementary analyses:

1. The definition of a methodology for identifying 'low-demand' areas in accordance with Italian DM 157/2018, for identifying weak demand areas, i.e. portions of the territory that are less densely served or characterized by structurally fragile demand levels (chapter 4.1). In the specific pilot case, this analysis led to the identification of the municipalities in the Metropolitan city of Bologna that have a weak transport demand, thus enabling the configuration of transport services that are responsive to the specific characteristics of the identified mobility needs.
2. The definition of a methodology for calculating the potential demand and defining the service levels in areas with low demand, with the goal of understanding the spatial and temporal distribution of mobility needs (chapter 4.2). This methodology builds on the information provided in Chapter 3 of the document "b" (which reconstructs, through the data fusion process, the potential mobility demand - i.e. the set of travel needs that can be inferred from multiple data sources). The focus is specifically on weak demand areas. This methodology has been designed to be replicable in future planning, updating, or monitoring phases of DRT services.

The purpose of the document resulting from the **pilot action "c"** (available as Annex "DREAM_PACE_Bologna pilot_action C_EN") is to analyse the costs of DRT services, identifying criteria for a remuneration model consistent with the standard cost system and the operational specificities of this type of service[12]. The study also describes some useful elements to guide the inclusion of DRT services in PT Contracts of Service, analysing in particular economic sustainability and conditions of applicability - within the Italian context.

[11] It is noted that the activities carried out are aligned with the guidelines set by ART (Autorità di Regolazione dei Trasporti) with the Resolution no. 48/2017. It aims to provide elements consistent with the objectives of Measure 3, which requires the evaluation of the most suitable transport modes and configurations to meet low or weak demand, taking into account economic, environmental, and contextual variables, as well as principles of modal integration and sustainability.

[12] It is noted that the Ministerial Decree (DM) no. 157/2018 is used as a reference for the cost analysis, with the aim of evaluating methodologies applicable to DRT and identifying criteria for its framing within the industry's remuneration models. DM 157/2018 introduced the "standard cost" system for local and regional public transportation services, using specific methodologies for different modes of transportation:

- Linear regression method, applied to bus and railways.
- Analytical method of calculation, used for tramways and subways.

Although Art. 3(3) of DM 157/2018 provides for the use of the analytical method for services for which the regression method cannot be used, Art. 3(6) explicitly excludes on demand services, including DRT services, without defining an alternative economic method for their quantification.

This can be considered a useful starting point for the development of a coherent standard cost system applicable to DRT services, consistent with their operational characteristics and through a system that takes into account the specific processes and industrial activities related to their delivery. This consideration, therefore, introduces the need for an alternative method that is more adherent to the flexible nature of DRT and its operational variability.

The remuneration model proposed in the study aims to comply with the efficiency and cost-effectiveness criteria defined in Ministerial Decree (DM) no. 157/2018. In this framework, the study highlights how the direct application of the traditional per-km remuneration model presents several limitations when applied to DRT services, i.e.:

- The number of kilometres travelled may vary significantly from day to day, without necessarily indicating greater or lesser operational effort.
- The operator must guarantee vehicle availability regardless of actual demand, resulting in fixed costs even when the vehicle is not in use.
- A model based solely on distance travelled fails to incentivize efficient resource use, since an operator who optimizes routes to reduce travel may paradoxically receive lower remuneration.

Chapter 8 of the document “c” represents another key foundation of pilot 1.1 solution component no. 3, as it provides indications on the aspects to be taken into consideration for the smooth integration of DRT services into the PT Contracts of Service. The chapter 8 is structured around three main elements that must be considered for the integration, given their greater operational complexity:

- Priority aspects to ensure effective integration (chapter 8.1), including: coordination between DRT and traditional PT services; financial and fare sustainability; optimization and reduction of fixed costs; service monitoring and use of technological KPIs; compliance with staff contractual regulations; and optimization and reduction of variable costs.
- Possible integration strategies (chapter 8.2), comparing the main approaches and assessing their operational, institutional, and economic implications. The analysis identifies two contractual options: (i) direct inclusion of DRT within the main PT Contract of Service, (ii) separate contractual arrangements through standalone contracts, depending on the network design and the local priorities.
- Performance indicators (KPIs) to be included in the Contract of Service (chapter 8.3), covering: service quality; operational efficiency; economic sustainability; degree of integration with the overall PT system.

Based on the above, the innovative elements can be identified in its data-driven and replicable approach to service planning in weak demand areas, supported by a methodology based on advanced data-fusion techniques, and in the introduction of clear contractual strategies for the integration of DRT in the PT Contracts of Service, which enables the stakeholders to overcome the greater operational complexity typically associated with this type of service.

5. Component 4: Business planning tool for flexible management of DRT-PT

5.1. Objective

The **DREAM_PACE business planning tool for flexible management of DRT-PT** has been designed by Project Partners in order to support the operational and financial planning phase of DRT services, providing comparisons between PT and four different DRT service models, and across three conceptual scenarios ("accessibility", "intermodality", "inclusiveness"). The tool has been tested on different service options by the partners, in order to assess its usability and robustness under different territorial, demand and service hypotheses.

The tool provides an estimation of the main quantitative KPIs of a DRT service (passenger*km, vehicle*km, load factor, costs/km, revenues/costs ratio and public contribution needed to ensure the break even of services.

Results include the ex-ante calculation of public contribution for the services, estimated on the basis of the conversion of the parameters of the service offered into "equivalent vehicle kilometres", in order to assess the economic adequacy and efficiency of the public compensation.

5.2. Target groups

The business planning tool has been developed as a flexible instrument to support the planning and implementation of DRT services, that can be used ad different levels from the strategic to the tactical, and operational. Target groups addressed by the solution component are the following:

- Regional and local public authorities, interested in assessing the potential of a strategic approach to integrate DRT services in the existing network, can use the tool to better understand the complexity of the strategic choices, and to develop a regulatory and planning framework for planners in which mobility objectives, principles and priorities can be simulated, exemplary cases and a preliminary economic assessment of DRT adoption can be run.
- PTAs will be able to assess and discuss with stakeholders and operators the economic implications of DRT adoption, as well as preliminary assess its costs under different scenarios.
- PTOs can assess the economic implications of developing DRT services, use the re-assess the impact of DRT services once in place and modulate their adoption, e.g. adapting parameters and fine tuning or switching service models if desirable.
- IT players operating in the DRT and MaaS sectors can promote their activities with customers, by developing use cases and simulations highlighting the impact of alternative service models under different context conditions.
- Students and higher education institutions, as the tool can be adopted to design simulations and interactive exercised within sustainable mobility classes, to explain the complexity and dynamics behind the evolution from traditional to flexible mobility options.

5.3. Description and functionalities

The tool has been developed in excel format in its full version to be downloaded, and a light demo version will be implemented on a dedicated platform to explain the main purpose and functionalities by providing basic results to the users.

5.3.1. DRT service models and scenarios

The calculation tool is based on the following **DRT service models:**

- **Public Transit.** Traditional public transit service, with fixed route and stops, and fixed timetables defining the frequency.
- **DRT1 - Fixed route, booked stops.** Demand responsive service designed around a fixed route, where stops (all, or part of them) are activated only upon request of the passengers.
- **DRT2 - Fixed route with deviations**. Demand responsive service designed around a fixed route, where some of the stops representing a deviation on the main route are activated only upon request of the passengers.
- **DRT3 - Free route, predefined stops**. Demand responsive service with no fixed route. The trip is designed according to the booking of origin and destination stops by the passengers, from a predefined list.
- **DRT4 - Free route, free stops**. Demand responsive service with no fixed route nor fixed stops. The trip is designed according to the booking of origin and destination by the passengers, within the service area.

The results of the analysis are also presented taking into account three possible conceptual **scenarios**:

- **Scenario I - Accessibility**. The Scenario I "Accessibility" can be considered as the baseline, and responds to the aim of designing and implementing a DRT service to improve the accessibility of a defined area, in line with the general principles of the project. Under this scenario territorial accessibility is the key, and the service is designed to provide a sustainable mobility option to all citizens, without specific specialisation or dedicated target groups. The assumptions at the basis of the scenario are that different categories of users will benefit from the service, and the DRT service models are able to provide accessibility, with different levels of flexibility.
- **Scenario II - Intermodality**. The Scenario II "Intermodality" responds to the aim of exploiting the different DRT options to integrate the existing network, assuming that the new service will facilitate the access to the traditional lines (and to other networks such as regional railways), and will be used by a relevant share of citizens as "feeder" or first/last mile service. Under this scenario the capacity of being integrated in the existing mobility network is the key, and the service is expected to be accessed by commuters as well as occasional users in combination to others. In this case, the flexibility of DRT services responds to the need of citizens of being included in the network."
- **Scenario III - Inclusiveness**. The Scenario III "Inclusiveness" responds to the aim of including citizens at risk of marginalisation, by providing services especially (but not exclusively around their needs). Under this scenario the capacity of reaching all citizens is the key, and the service is expected to be accessed by citizens that need personalised and accessible options. In this case, the flexibility of DRT services responds to the need of citizens of being able to travel, condition not always guaranteed by traditional services. Although flexibility guarantees a higher satisfaction of citizens' needs, this might not be translated in a higher load factor."

5.3.2. Data input

A step-by-step guidance is provided here below for the users .

Step 1 - START

a) Fill in the data about the area where you want to implement a new service.

b) Define main assumptions for the service implementation.

c) Select the **PT-DRT model** you want to design.

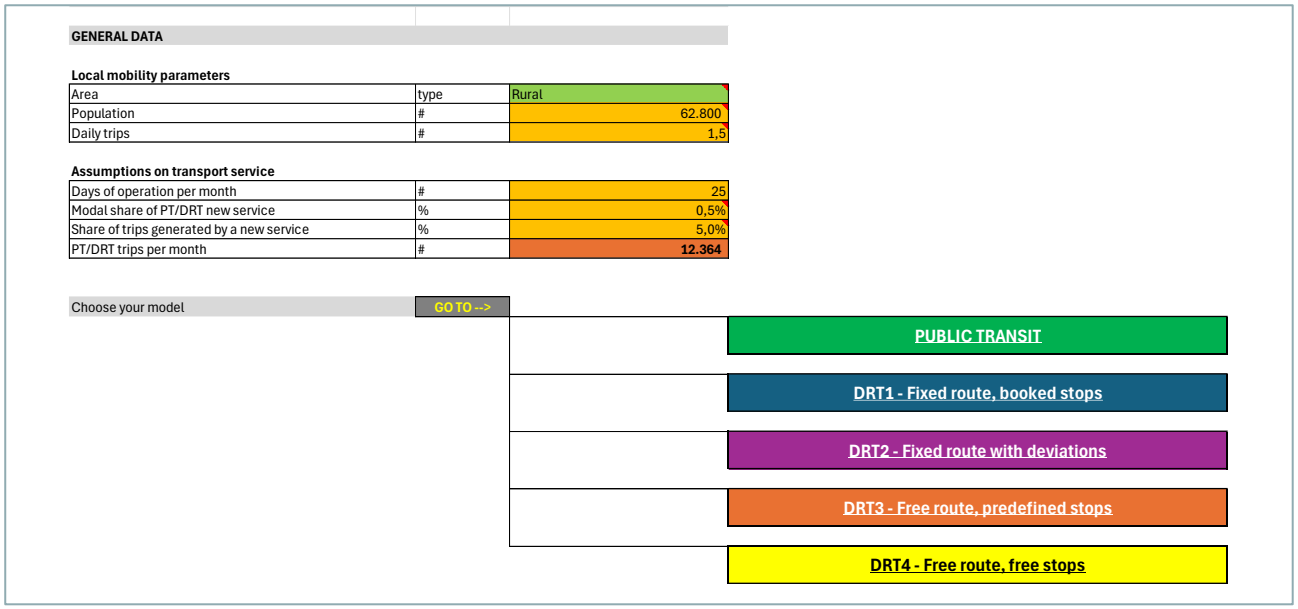

Figure 2: Example from the "START" page

Step 2 - DRT chosen model (PT, DRT1-2-3-4) input data

In the page corresponding to the chosen model (PT, DRT1-2-3-4) fill in the data on:

a) Passengers (average distance per passenger, average time per trip).

b) Service design (length of the line/network, hrs of operation per day, Length of the line/network, n. of trips per day, n. of vehicles, average commercial speed).

c) Costs (operational costs of running 1 vehicle proportional to time (hourly), operational costs of running 1 vehicle proportional to distance (km), capital cost of 1 dedicated vehicle, monthly cost of DRT software, average trip fare, depreciation period of dedicated vehicle).

d) GO TO the corresponding Results&Scenarios page, through the dedicated link (coloured button) in the page.

DRT3 (Free route, predefined stops)			Notes
Passengers (demand side)			
Average distance per passenger	Km	10	Suggestion for Rural: 10 km
Average time per trip	min	20	Average time needed to perform a trip
P*Km per month	P*Km	**123.638**	Passenger*Km performed per month
P*hrs per month	P*hrs	**4.121**	Passenger*hours performed per month
Service design			
Length of the line/network	Km	40	NB: in case of DRT, consider a hipothetical traditional line/network alternative/replaced
Hrs of operation per day	h	6	Daily hours of availability of the service
N. of trips per day	n	20	Number of trips (estimated) performed every day by the service
N of vehicles	n	3	Number of vehicles dedicated to the service
Average commercial speed	Km/h	30	Suggestion for Rural: 30 km/h
V*Km per month	V*km	**20.000,00**	Vehicle*Km produced per month
V*hrs per month	V*hrs	**450**	Hours of availability of the vehicles dedicated to the service per month
Load factor	P/V	**6,2**	Average number of passengers per km of service performed
Costs			
Operational costs of running 1 vehicle proportional to time (hourly)	€/hr	45	The hourly cost of running a single vehicle. Should include insurance, personnel, admin, etc.
Operational costs of running 1 vehicle proportional to distance (km)	€/km	1	The cost per km of running a single vehicle. Should include fuel, maintenance costs, etc.
Capital cost of 1 dedicated vehicle	€	100.000,00 €	Up-front capital investment required to purchase a vehicle
Monthly cost of DRT software	€	1.200,00 €	The monthly cost of running DRT technology
Average trip fare	€	2,60 €	The average fare estimated considering single/daily/weekly tickets, subscriptions and exemptions
Depreciation period of dedicated vehicle	years	15	Depreciation period of the vehicles according to the depreciation plan

GO TO --> Results&ScenariosDRT3

Figure 3: Example from the "DRT3" page

5.3.3. Results

The results page shows the performance of the different DRT service models, expressed through the main operational and economic KPIs. It allows to compare different models and their performance across three different scenarios.

Scenario I - Accessibility

		PT	DRT1	DRT2	DRT3	DRT4
P*Km per month	P*Km	123.637,5	123.637,5	123.637,5	123.637,5	123.637,5
P*hrs per month	P*hrs	4.121,3	4.121,3	4.121,3	4.121,3	4.121,3
V*Km per month	V*km	16.363,6	15.454,5	16.363,6	20.000,0	20.000,0
V*hrs per month	V*hrs	450,0	450,0	450,0	450,0	450,0
Avg km per hour	km/hr	36,4	34,3	36,4	44,4	44,4
Load factor	**P/V**	**7,56**	**8,00**	**7,56**	**6,18**	**6,18**

		PT	DRT1	DRT2	DRT3	DRT4
Costs of the service	€	38.280,30 €	38.571,21 €	37.455,30 €	41.091,67 €	41.091,67 €
Cost/km	**€/Km**	**2,34 €**	**2,50 €**	**2,29 €**	**2,05 €**	**2,05 €**
Revenues from fares	€	32.145,75 €	32.145,75 €	32.145,75 €	32.145,75 €	32.145,75 €
Break even (public contribution)	€	- 6.134,55 €	- 6.425,46 €	- 5.309,55 €	- 8.945,92 €	- 8.945,92 €
Public contribution per km	**€/Km**	**0,37 €**	**0,42 €**	**0,32 €**	**0,45 €**	**0,45 €**
Revenues/costs ratio	**%**	**84%**	**83%**	**86%**	**78%**	**78%**

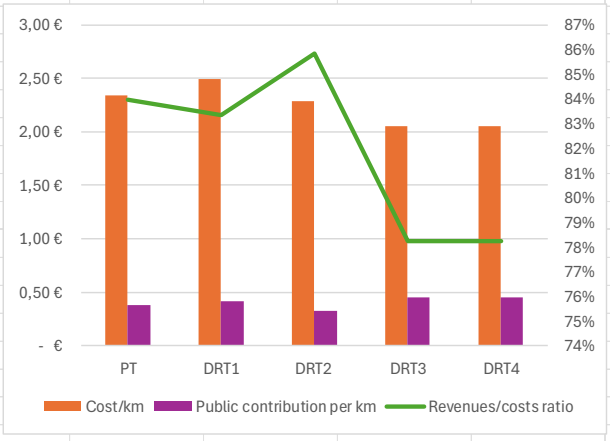

Figure 4: Example from the "Results&ScenariosDRT3" page - Accessibility scenario

Notes on how to read the results:

- The results of the process do not lead to the identification of "preferrable" DRT service model, but rather provide a comparison of the strengths and weaknesses of each alternative, expressed through a set of KPIs (visualised through charts).
- The overview provided by the KPIs is replicated for the three scenarios, depicting the main strategic objective (accessibility, intermodality, inclusiveness) for the design and implementation of a new service; the strategic objective may also be interpreted as the response of the demand to the implementation of a new service, where the most popular use of the flexible service determines its characteristics.
- Based on the data generated by the tool, the choice of a DRT service model might depend on the variables that are considered priority by the policymaker/planner/operator; e.g. maximising the load factor, minimising public contribution, but also taking into account other qualitative KPIs not included in the model.
- The tool can be used to build alternative business plans to be compared, and can be iterated many time in order to optimise the combination of production factors, and balance economic sustainability and increase of effectiveness and demand/responsiveness.

6. Component 5: Data driven approach to DRT service expansion

6.1. Objective

The main objective of the component is to optimize the design, location, and regulation of stops and routes for Demand Responsive Transport (DRT) and flexible DRT services in Budapest, complementing the conventional public transport network with adaptive, passenger-oriented solutions. This includes:

- Transforming traditional low-demand routes into DRT services.
- Introducing new DRT lines in underserved neighbourhoods.
- Upgrading existing DRT services to become more flexible and digitally supported.

In contributes to the project challenges by:

- Enhancing accessibility and mobility in peripheral and low-demand areas.
- Reducing unnecessary vehicle kilometres and environmental impacts.
- Integrating data-driven planning to improve operational efficiency and service sustainability.

6.2. Target groups

The tool, designed on the specific use case of Budapest PTA and mobility planner BKK, has been developed looking at the needs of the following stakeholder categories:

- Transport operators and urban mobility planners.
- Policymakers and municipal authorities responsible for strategic and operational mobility decisions.
- Research institutions and professional organizations analyzing DRT performance.

The application of the data driven approach, as demonstrated through the pilot action run in Budapest, benefits three main user groups:

- Residents in underserved or newly developed areas.
- Elderly or mobility-impaired passengers with limited access to conventional public transport.
- Car-dependent residents who can be encouraged to switch to public transport through DRT services.

6.3. Description and functionalities

The developed component applies to three main areas: transforming existing low-demand lines into DRT services, introducing new lines in underserved neighborhoods, and upgrading existing DRT lines to flexible, digitally supported operations.

Its main features include:

- Data-driven passenger monitoring, enabling precise understanding of ridership patterns.
- Multiple booking channels via mobile applications (BudapestGO), website, phone, or on-site request.
- Digital dispatching and onboard smart devices for real-time route optimization.

- Flexible stop and route structures to respond to demand fluctuations.

Innovative elements part of the solution component consist in the combination of fixed and demand-responsive route sections, the integration of digital tools for operational flexibility, and the implementation in complex urban environments where conventional buses are inefficient.

7. Component 6: A DRT dedicated tendering procedure in new areas and regulatory frameworks, DRT as a Service

7.1. Objective

This solution component has been implemented and tested starting from a specific territorial need within the Split-Dalmatia County, with the objective of creating a replicable and scalable procurement model to bring DRT on the territory withing the newly designed regulatory framework allowing these services to be developed on the territory.

The reference Annex "DREAM_PACE_DRT dedicated tendering procedure (greenfield)" describes the procedure and provides a detailed example of application of the "DRT as a Service" approach, where the tendering procedure fosters the collaboration between PTOs and IT providers in order to deliver flexible mobility options.

Objectives of the process was to develop a comprehensive, structured, and applicable document that will serve as a planning guideline. The document should provide a clear overview with defined instructions, technical requirements, selection criteria, and operational conditions for service providers, tailored to the needs of the area of application and the specific characteristics of the target region and/or area.

The document also addresses the key challenges identified for the design and implementation of such services, including:

- Lack of flexible and efficient transport options in the selected area.
- Geographical features of the area.
- Reference DRT models.
- The need for transparency and measurable criteria to ensure objective evaluation and fair selection of the most suitable bidder.

By developing this tendering document, the project provides a key tool for local and regional authorities, facilitating the procurement and implementation of DRT systems. This will ensure that potential service providers understand the expected operational, technical, and quality standards, thereby increasing the likelihood of successful implementation of a DRT system that is sustainable, user-friendly, and aligned with the mobility and social objectives of the community. Ultimately, the document should aim to contribute to the long-term improvement of public transport accessibility in a way that is cost-effective, scalable, and responsive to the real needs of users.

7.2. Target groups

The tendering procedure targets – directly and indirectly – the main relevant stakeholders engaged in the tactical planning and implementation of a DRT services on a territory. In particular:

- Regional and local public authorities, responsible for planning and funding DRT services.
- PTAs responsible for tendering, awarding and monitoring the implementation.
- PTOs interested in operating DRT.
- IT providers, collaborating with PTOs ion order to enhance the flexibility of the services.

7.3. Description and functionalities

The tendering procedure co-designed and tested primarily on the Split-Dalmatia County territory under the coordination of the DREAM_PACE Project Partners SDC and Dyvolve, and with the support of other experienced and technical partners, covers the main relevant elements to build an official tendering document for the procurement of new services, i.e.:

- **The DRT service.** This section describes the method of providing the DRT service, its duration, funding, the area where the service will be provided, and its organization. It includes specific qualitative parameters for the provision of the service, technical, operational and communication standards and reporting.
- **Software as support to the DRT service.** In this section the main elements of the software solution are displayed including the recommended functionalities for the backup, driver and user applications.
- **Equipment for vehicles.** The tender must specify the characteristics of the hardware to be provided and installed on the vehicles for the management of the services.
- **Selection criteria.** The tendering procedure document provides detailed information on the selection procedure.

8. Expected change

The solution component **Strategic planning approach for DRT in PT** is expected to **contribute to a future, desirable scenario in which DRT services are fully integrated into the PT system since the planning phase starting with the SUMP**. DRT will thus be recognized as both a solution for addressing underserved and low-demand areas, and a strategic instrument to advance broader objectives such as territorial cohesion, social inclusion, and environmental sustainability.

A tangible sign of this expected change is the planned use of the study by SRM. In collaboration with local authorities, the solution component can be considered as a reference for defining future mobility strategies - such as the introduction of new DRT services in the SUMP of the Bologna metropolitan area (the review of the existing SUMP is foreseen in 2026, while the future SUMP is scheduled for 2029) - and for preparing the tender for the next PT Contract of Service (scheduled for the 2028–2029 biennium).

In the long term, the incorporation of DRT into strategic planning tools will mark a significant advancement as it enables the flexibility and adaptability of DRT services to be systematically aligned with the institutional vision, coordination mechanisms, and long-term goals embedded in public mobility planning. This approach will enhance the strategic coherence of service design and also strengthens the capacity of local authorities to deliver user-oriented, efficient, and equitable mobility solutions.

The **Recommendations on the integration of DRT services in MaaS** will support the integration of DRT services into public transport systems and MaaS platforms, by providing technical and operational groundwork by defining integration protocols, service requirements, and responsibilities for both the main transport operator and the DRT operators.

A tangible example of this expected change is the planned use of the study by SRM as a reference document in the preparation of the next Contract of Service, scheduled for the 2028–2029 biennium.

In the long term, the future integration of DRT services into MaaS represents a key step forward, combining the flexibility of DRT with the advantages of an integrated mobility ecosystem. The adoption of standardized technical protocols and requirements can improve the user experience and also strengthen interoperability between operators, optimizes operational management and help to build more efficient, accessible, and inclusive mobility networks.

The **Recommendations on how to develop a PT tendering procedure integrating DRT services** will support the full integration process of DRT into the PT system and the related procurement processes, with clear responsibilities and service requirements for both the main transport operator and the DRT operator.

Local authorities will gain knowledge on how to assess demand levels, design an optimal public transport network for metropolitan-scale connections, and identify areas where DRT can be most effective. This lays the foundation for the targeted and data-driven integration of DRT services into PT networks. At the same time, the recommendations provide a basis for integrating DRT into long-term PT funding and contractual mechanisms, ensuring sustainable operation and financial viability.

A tangible sign of this expected change is the planned use of the studies at the basis of the solution compoent by SRM (in collaboration with Local public authorities) as reference documents in defining future mobility strategies - such as the introduction of new DRT services - and in the preparation of the next Contract of Service, scheduled for the 2028-2029 biennium.

In the long term, the full integration of DRT into the public transport system and its tendering procedures marks a significant step forward, as it combines the flexibility and user-oriented nature of DRT with the

stability, coordination, and accountability of structured PT planning. Also crucial is that this helps ensure that these services are provided at a fair and sustainable price for users.

The **Business planning tool for flexible management of DRT-PT** provides support the planning and implementation of DRT services and can be used ad different levels from the strategic to the tactical, and operational.

The adoption of this component as planning tool will change the approach with which the potential adoption of DRT service models is assessed by policymakers, and the way their performance can be monitored, and their implementation can be fine-tuned and continuously improved.

The tool can be used jointly by PTOs and PTAs to create a common ground for co-design of new services as well as transformation of existing ones, in order to identify optimal DRT set-up and funding schemes.

As practical application, Autoguidovie and Redmint will promote the adoption of the tool among PTOs and PTAs through associations, bilateral meetings, workshops and events, and elaborate on the outcomes of the model to develop in dept analysis and plans for further development of DRT services.

The **data driven approach to DRT service expansion** aims at increasing accessibility and mobility in peripheral and underserved areas, through higher public transport usage, and reduced reliance on private cars.

Operational efficiency improves through the reduction of unnecessary vehicle kilometers and optimized service allocation. Passengers benefit from more convenient, reliable, and predictable journeys. Long-term effects include improved network sustainability, and stronger acceptance of public transport among previously car-dependent populations.

The **DRT dedicated tendering procedure in new areas and regulatory frameworks, DRT as a Service**, is expected to have a positive impact especially in those areas where experimental DRT services are designed and implemented, fostering the participation and collaboration of different actors from the transport and IT sectors to the definition of solutions and networks.

Due to the nature of the contexts of application, the participation of certain stakeholders is fundamental, in particular development agencies and sustainability-focused organizations that will enable the introduction of DRT through their engagement and support the acceptance of flexible services.

9. Transferability and replicability

The blueprint and its solution components are designed to be easily transferable to other territorial contexts, offering a robust technical foundation for supporting the integrated planning of PT and DRT services at various levels and in different territorial contexts.

Concerning the **strategic planning**, a coherent and replicable methodological framework has been developed, capable of systematising the key dimensions of DRT service planning: demand, service levels and economic sustainability.

The **recommendations** on integrating DRT in MaaS and on how to develop a PT tendering procedure are highly transferable to other territories, especially those facing similar challenges such as integrating DRT into existing PT networks and MaaS ecosystems, as well as in service contracts.

The **business planning tool** is highly flexible and adaptable to different contexts depending on the DRT models allowed by regulatory frameworks, and to which ones are most desirable according to public objectives, and provides results according to different scenarios reflecting specific socioeconomic conditions and demand response.

The **data driven approach to DRT service expansion** can be transferred to other urban areas, cities, or countries facing similar challenges, and can be adapted to various transport modes and vehicle types.

The **DRT dedicated tendering procedure in new areas and regulatory frameworks, DRT as a Service**, is expected to have a positive impact especially in those areas where experimental DRT services are designed and implemented, fostering the participation and collaboration of different actors from the transport and IT sectors to the definition of solutions and networks.

10. Targeted actions to influence decision makers' attitude towards change

The testing and validation process of the solution components, structured through the involvement of key stakeholders in the LL meetings as well as through direct engagement, constitutes a targeted action aimed at establishing a virtuous exchange for the development of the component, which also influences the decision makers.

In the case of the components jointly developed and primarily tested in the Bologna Metropolitan Area (**strategic planning and recommendations**), given its institutional role as PTA for the Bologna metropolitan area, SRM has the autonomy and capacity to officially adopt and integrate the components in the strategic planning process, in close coordination with the relevant stakeholders and other policymakers.

In the case of the **Business Planning tool**, this not only will be adopted for the future planning and discussions on the development of DRT services in existing and new networks, but targeted actions conducted primarily by Redmint and Autoguidovie will ensure that decisionmakers among PTAs and PTOs understand the added value of considering different DRT models potential on an economic data driven basis as support to the redesign of networks.

With regard to the **data driven approach to DRT service expansion**, to influence decision-makers and promote adoption, BKK has presented the pilot results to municipal authorities, PTA, and PTO management. Stakeholder workshops, awareness campaigns, and conference presentations are organized to communicate the benefits of flexible DRT services. Visualizations, real-time data, and passenger counting results are provided to support informed decision-making, demonstrating operational efficiency, environmental benefits, and rapid public acceptance of the service.

The **DRT dedicated tendering procedure** will be promoted by SDC, Dyvolve and other partners as experimental approach to promote the uptake of specific DRT services, by fostering the collaboration between operators and IT providers. For this purpose, a seminar with IT providers will be organised in order to share the experience and foster their support to contribute to the change of attitude towards DRT and digital technologies by PTOs, PTAs and decision makers.

In the last period of the project, targeted events, dialogues with relevant institutions and communication actions will be organised in order to demonstrate the potential of the solution and of the specific components to public and private decision makers, in order to embark them in the promotion of flexible mobility options as integral part of existing mobility networks and exploit their mobility enhancement, environmental and socioeconomic potential.

The components of the blueprint will also be displayed on an interactive dedicated website developed by the partners, guiding decision makers to select the suitable modules and tools to support their planning process.

11. Conclusions

This deliverable, with its Annexes, summarizes and shows the work done by the DREAM_PACE consortium to co-design and test a modular governance and planning model blueprint, dedicated to the integration of Demand Responsive and Public Transport in a MaaS-logic.

The model – representing one of the outputs (solutions) of the project - is composed by governance and planning, financial and procurement elements, that have been validated and tested with the support of relevant stakeholders and – in some cases – with valuable inputs provided by the DREAM_PACE Business&Tech Community built around the project.

The co-designed and tested solution has been built to foster a substantial change of attitude of decision makers toward the potential of DRT in integrating and enhancing existing public transport networks, accompanying the planning process from the more strategic to the tactical level, across identification of strategic objectives, data processing, digital integration and economic evaluation.

The solution components are characterised by a high level of transferability and replicability thanks to the joint co-design process and to the modular nature of the solution blueprint itself.

On this basis, targeted actions are being put in place in order to influence decision makers' attitude towards change, by showcasing the solution components and their potential applications and promoting their adoption in the planning process.

12. References

1) DREAM_PACE Application Form, Version 3.0. 2025.
2) DREAM_PACE D1.1.1 “Report on governance and planning for public transport, mobility innovations and DRT in CE Regions”. 2023.
3) DREAM_PACE D1.1.2 “State of the art report on governance structures and planning processes for DRT in the pilot areas”. 2024.
4) DREAM_PACE D1.1.3 “Development scenarios for DRT innovative governance and planning approaches”. 2024.
5) DREAM_PACE D1.2.1 “Living labs preparation: stakeholder mapping, raising awareness and local engagement”. 2024.
6) DREAM_PACE D1.3.1 “Detailed workplan for pilot 1.1 local testing actions”. 2025.
7) DREAM_PACE D3.1.1 “Methodological background for the design of DRT integrated solutions”. 2023.
8) DREAM_PACE D3.1.2 “DRT strategy draft and setup of the consultation process”. 2024.
9) DREAM_PACE D3.2.1 “Action plan drafts in the six pilot regions”. 2025.
10) DREAM_PACE D3.3.1 “Report on set up and development of community and measures to animate the debate on DRT trends”. 2024.

13. Annexes

13.1. Annex 1: DREAM_PACE_Bologna pilot_action A_EN

Ref. solution components 1, 2 and 3

- A study on integrating DRT services in the public transport network within a MaaS system, which includes data exchange protocols to visualize information about the service and to make reservations

13.2. Annex 2: DREAM_PACE_Bologna pilot_action B_EN

Ref. solution components 1, 2 and 3

- Analysis of potential demand and definition of areas with low demand at metropolitan level (in terms of geographical, socio-eco-nomic, temporal characteristics and relationships between territories), with identification of a methodology and parameters to define the different degrees of de-mand and possible implementation/indication of tools to replicate this analysis at different times and in the future

13.3. Annex 3: DREAM_PACE_Bologna pilot_action C_EN

Ref. solution components 1, 2 and 3

- Study on DRT costs and the possibility of their inclusion in the Service Contract

13.4. Annex 4: DREAM_PACE_Bologna pilot_action D_EN

Ref. solution components 1, 2 and 3

- Study on potential integrations between demand assessment methodologies and parameters, and citizen and metropolitan planning tools

13.5. Annex 5: DREAM_PACE_BPmodel

Ref. solution component 4

- DREAM_PACE Business planning tool

13.6. Annex 6: DREAM_PACE_Data driven approach to DRT service expansion

Ref. solution component 5

- From Traditional Routes to Flexible Networks: A Strategic Approach to Demand Responsive Transport Development

13.7. Annex 7: DREAM_PACE_DRT dedicated tendering procedure (greenfield)

Ref. solution component 6

- DRT dedicated tendering procedure in new areas and regulatory frameworks, DRT as a Service