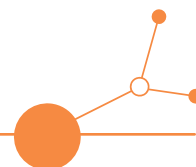


SUSTANCE

D.2.5.1. Long-term sustainability guidelines for solution n. 4. New ICT booking service of DRT in Emilia-Romagna Region



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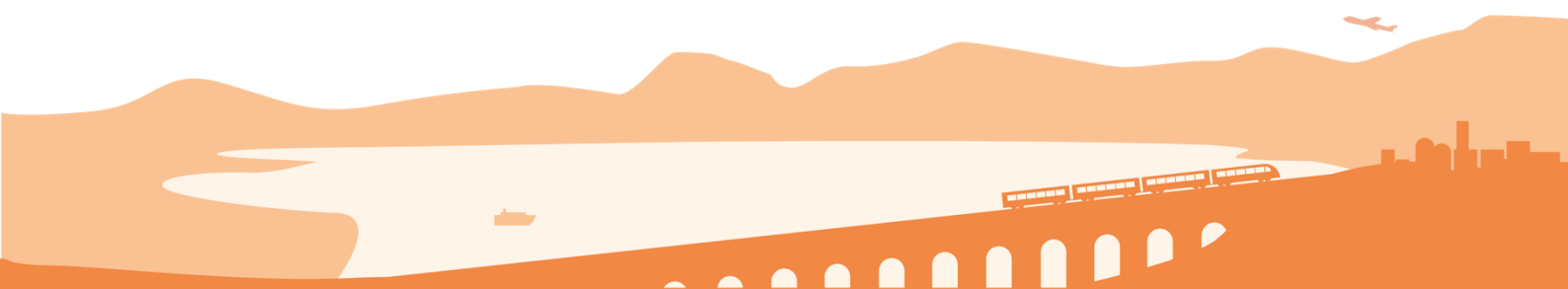




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Abbreviations

AF Application Form

WP Work Package

PT Public Transport



1 Overview

The key ambition of SUSTANCE Solution 4 is to provide an open-source, ICT-based framework for the digitalisation of Demand-Responsive Transport (DRT), offering a scalable and interoperable solution for planning, booking and managing flexible public transport services in rural and low-demand areas. The solution integrates digital booking, trip management and operational planning tools within a user-friendly platform, supporting public authorities and transport operators in delivering more efficient, accessible and sustainable mobility services. Pilot Action 4, implemented in the Emilia-Romagna Region, validated the practical applicability of the solution by testing the open-source web-based booking and management application under real operating conditions, demonstrating its technical feasibility, operational performance and potential for transfer and replication in other territories.

The goal was to reduce the DRT management costs for small rural municipalities interested in developing such solutions but with low budgets for developing and managing them.

The key expected impacts of the Pilot action in the tested territory were related to the users' point of view in an improvement in the access to these DRT services (nowadays managed only by phone calls and not allowing any kind of real-time notifications to final users if something is delayed and/or cancelled). In this sense, the Sustance web App intended to contribute to increasing the trust of users in this demand-responsive transport service and consequently increasing the quota of people using these flexible public transport solutions. From the public transport authority's point of view, the most important impact associated with the development of such a WebApp was related to the possibility of creating a more effective exchange of data about the daily use of these services. This is fundamental as the public transport authority has an obligation in terms of reporting of kilometres provided and the number of users using these services to cover the costs of these services. Thanks to the Sustance WebApp, this process can be simplified, allowing more reliable day-by-day data reporting activity and supporting better planning of the service.

2 The Sustance solution based on pilot SWOT analysis and technical measures adopted to overcome the main threats

In this paragraph, using a SWOT analysis methodology, the key strengths, weaknesses, opportunities and threat factors in the development, implementation and testing of the pilot action n. 4 are summarized. The Emilia-Romagna pilot action 4 is a relevant example on the technical and political aspects to be taken into account on the replication of the related Sustance solution described in the following paragraphs.

Strengths	Weaknesses
• Technical and political support. One of the key success factors was related to the design of the pilot action with the key stakeholders involved in the management of the existing DRT systems and in charge of developing the Emilia-Romagna regional MaaS.	• Exceptions in the DRT service daily management. The DRT services are complex services as they need to respond to several different needs of the local population. From a digital point of view it is not easy to tackle all these exceptions, due to the peculiar characteristics of the key



- **Start simple.** DRT services are complex in terms of management, in particular for new services. So in the digitalization of these DRT services and in their promotion, it was important to start simple, for example, avoiding real-time booking service and defining a limited geographical area with higher PT needs.
- **Open-source approach.** The open-source approach used in the development of the Pilot Action opened the opportunities for a full replicability of existing solutions in other contexts after the project end, guaranteeing a low-cost activation in other peripheral geographic areas with limited resources to allocate to such services.

users (mainly old people) and their specific needs.

- **MaaS is a complex system.** The regional Maas development is a very complex bureaucratic and technical challenge, involving several public and private stakeholders and many different “interests”. There are several opportunities for a dialogue between the Sustance App and these regional public transport scheme, but as several stakeholders are involved a long negotiation is needed and specific legal aspects have to be tackled.
- **DRT final users' attractiveness.** It is not easy to attract new DRT users and convince them to reduce their car use. So well-planned and systematic communication campaigns are needed, both in the traditional way (mainly for old people) and on Social Media (mainly for young people).

Opportunities

- **Synergies with other DRT projects.** The provision of public transport services in low-demand/peripheral areas is now a main topic at national and EU level. For this reason, there are many local, regional and EU projects working on the different aspects of how to provide these services in rural areas. The synergies with other projects, together with the capitalization of some existing solutions, were a fundamental opportunity in terms of successful activation of local DRT services.
- **NeTEx data.** The availability of public transport data in a common EU standard was an incredible opportunity in terms of the development of the DRT web App and in terms of its replicability in other contexts.
- **Local, regional and national funds.** There were different financial resources (ERDF ROP and National Maas resources) allocated by the Emilia-Romagna Region and the Italian

Threats

- **Public transport data availability.** Several public transport structured data are required to develop an effective DRT digital solution and a MaaS scheme including these flexible services. The data collection and harmonization is a complex (and sometime long!) activity, as not always all the existing databases were built to guarantee a correct interoperability among them. This data management complexity could bring difficulties in the correct re-routing of the single buses on the basis of the received user's booking.
- **Complexity of the governance schemes.** DRT services and even more a regional MaaS, including DRT services, required complex governance schemes with several stakeholders involved. This can slow down the dialogue for the development and adoption of a digital DRT App and its integration in a wider MaaS scheme.



Government for the improvement of the local public transport digitalization. Part of these interventions can have a potentially positive effect on the Sustance pilot action further development after the project conclusion.

- **Digital and analogic DRT booking.** The adoption of a digital/analogic (phone calls) combined booking system, particularly in areas with a high percentage of elderly residents, can lead to a greater use of the traditional phone booking system, even if a digital solution is also provided.

3 The solution's long-term sustainability goals and strategies

The solution developed by ITL in the Sustance project is related to the development of ICT tools for booking DRT such as an open-source WebApp for the digitalisation and management of two existing demand-responsive transport (DRT) services tested in the Emilia-Romagna territory.

Two long-term sustainability goals have been identified for the replication of this solution after the project conclusion:

- **Goal 1.** Utilisation of the Sustance WebApp after the project conclusion and replicability by other stakeholders.
- **Goal 2.** Improvement of the Sustance WebApp using an open-source approach.
- **Goals 3.** Scalability of the Sustance WebApp at the regional level.

The table below provides possible strategies to apply for achieving the stated goals and the expected impacts of the implemented strategies.

No.	Long-term sustainability goals	Proposed strategies for implementation of goals	Expected long-term impact
G1	Utilisation of the Sustance WebApp after the project conclusion and replicability by other stakeholders	• Signature of a letter of intent among the key local stakeholders for the utilization of the WebApp after the project conclusion. • Adoption of the EU and regional public transport data standards (NeTEx approach in particular) for an easy and effective update of the Sustance WebApp in the long-term perspective. • Promotion of the Sustance WebApp at the EU and regional levels to find new stakeholders interested in replicating the developed solution.	• Definition of a clear and effective governance scheme, with clear responsibilities and, if possible, with formal agreements/memorandum of understanding signed among the different stakeholders. • Long-term collaboration schemes among the key local and regional stakeholders. • Smoother and better data transfer among the public



No.	Long-term sustainability goals	Proposed strategies for implementation of goals	Expected long-term impact
			transport operators and the local transport agency, allowing a better planning of the public transport services in peripheral areas.
G2	Improvement of the Sustance WebApp using an open-source approach	• Publication online under the open-source license of the developed solution. • Publication of the technical guidelines for WebApp full replicability and modification/adaptation to the specific local needs. In this way, every interested stakeholder can replicate both the solution and the governance scheme in their specific territories. • Synergies with other EU and regional projects working on the same topics.	• Incremental improvements of the WebApp code thanks to other interested stakeholders using the same open-source license. • Creation of an EU-wide community interested in developing similar DRT management solutions.
G3	Scalability of the Sustance WebApp at the regional level.	• One of the biggest challenges is the integration of this Sustance solution in a regional MaaS scheme developed at regional and/or national levels. • Contacts with rural/mountain municipalities associations (Unioni dei Comuni) interested to the replication and scalability of the Sustance solution (Open source WebApp).	• Definition of a regional MaaS scheme including DRT solutions as an effective way for providing public transport services in peripheral areas. • Other rural communities using the solution (WebApp) for the provision of on-demand services. • Public-private schemes allowing private operators to provide targeted sustainable transport solutions (for example sportive associations, etc).

The key stakeholder to be involved in moving from a testing phase to a stable, long-term service is the public transport operator managing the DRT service. As it is the first beneficiary of the



developed solution, its full involvement since the beginning of the implementation phase is essential. The other relevant stakeholders to be involved are the local municipalities and the provincial/regional authorities in charge of planning the public transport services in the most rural and peripheral areas.

Based on the key results of the round tables conducted, all the involved public and private stakeholders, together with DRT users, were satisfied with the results reached. The DRT services increase the number of users during the pilot test and the public transport authorities said they appreciate the possibility to simplify the data collection and the management of these DRT services.

4 Financial indications related to the long-term sustainability of the solution

In relation to the future financial support for the solution developed in the Sustance project, there are different economic opportunities under evaluation. First of all, as already mentioned, there are different financing opportunities related to the improvement of the public transport service at the national and EU levels.

Moreover, in many places there are municipal/provincial contributions for this kind of service and it is also important to mention that it is also possible to consider the passenger fares for covering part of the costs (even if not enough for covering the DRT service costs).

So the key recommendation in terms of long-term financial sustainability of these digital solutions for more accessible and effective DRT services in rural areas is the support of the public authorities in charge to provide public transport services and the public transport operators' financial resources.

5 Recommended solution governance schemes

An effective and reliable governance scheme for a Demand Responsive Transport (DRT) service in a rural/peripheral area should be collaborative, multi-level, and data-driven, ensuring long-term sustainability, user responsiveness, and public accountability.

Based on the evidence collected during the Sustance project, these are the key suggestions for an effective and digitalised DRT service:

- **Identify a Lead Coordinating Authority**, a public body (e.g. regional transport agency or municipal consortium) that acts as the central coordinator. Its responsibilities have to be related to planning and integration with existing transport services, setting service standards, fares, and accessibility criteria, managing public funding (and also private if possible but this a more complicate option) and overseeing regulatory compliance.
- **Adopt a Public-Private Partnership (PPP) model**. The coordinating authority is often not the company directly managing these services, but it contracts private operators via competitive tenders or public service contracts. So it is important to define clear performance indicators (punctuality, coverage, satisfaction), risk-sharing agreements (e.g. revenue shortfalls, fuel costs) and incentives for adopting innovative solutions (e.g. green vehicles, app-based booking).



- **Direct involvement of the key local public and private stakeholders**, in particular municipalities, user groups (e.g. elderly, disabled, youth), community organizations, etc. It is important that their involvement in terms of co-design of service features (routes, booking methods), and user feedback collection ensures the service reflects local needs and values.

Based on these three elements, ITL is working on the definition of a Memorandum of Understanding among the different stakeholders where these different roles are described and the single signatories are asked to make clear the efforts they intend to adopt to guarantee the provision of the service after the project conclusion.

A last important topic to be considered is related to the ownership of the digital platform developed in the Sustance project. ITL is working on defining an open-source license where all the future development will be shared as open and free of charge to all interested users, guaranteeing constant development in the time of the defined solution.

6 Recommendation and suggestions for the mainstreaming of pilot lessons learned with solution for territories beyond the pilot action areas

The Solution provide an open-source web-based application for the digitalisation of small Demand Responsive Transport (DRT) services, tested in the Emilia-Romagna Region (Italy), it ensures a scalable and interoperable digital framework for planning, booking and managing flexible public transport services in rural and low-demand areas. The solution combines an open-source ICT platform with common European public transport data standards (NeTEx, SIRI and GTFS), enabling cost-effective deployment, interoperability with regional Mobility-as-a-Service (MaaS) ecosystems and seamless integration with existing public transport services.

Beyond the software itself, the solution includes a comprehensive governance and replication model based on multi-level cooperation between transport authorities, operators, municipalities and local stakeholders, supported by formal cooperation agreements, open-source licensing and technical replication guidelines. It promotes standardised data exchange, improved service monitoring, simplified operational reporting, enhanced accessibility for users, and evidence-based planning of flexible transport services.

Thanks to its modular architecture, low implementation costs and open-source approach, the solution offers a replicable blueprint for public authorities, mobility agencies and private operators across Central Europe seeking to digitalise small-scale DRT services, improve accessibility in peripheral and rural areas, strengthen multimodal public transport and accelerate the digital transition of sustainable mobility systems.

The Sustance solution tested in Emilia-Romagna Region has also provided valuable lessons for the successful digitalization, implementation, and scaling of a Demand Responsive Transport (DRT) services in rural and peripheral areas. One of the core insights is the importance of starting simple. DRT systems are inherently complex due to their need to respond to diverse mobility needs, particularly among elderly or digitally-excluded populations. Avoiding overly



sophisticated features like real-time bookings in early phases and focusing instead on limited, high-demand areas proved to be a strategic way to gain traction and test user responsiveness.

Stakeholder engagement emerged as a fundamental success factor. The early involvement of public transport operators, municipalities, and regional authorities allowed for shared ownership and smoother implementation. The pilot benefited from strong political and technical support, especially in aligning with a broader regional MaaS strategy. Nevertheless, the integration of the Sustance solution into regional systems posed bureaucratic and legal challenges, underlining the need for early, clear governance frameworks and written commitments, such as Memorandum of Understanding, to ensure clear and effective coordination among multiple stakeholders.

The open-source approach adopted in the Sustance solution was another major enabler for replicability. By developing the software using EU-standard data formats (e.g. NeTEx) and releasing it freely online, the pilot created conditions for cost-effective adoption in other regions with limited resources. However, for full effectiveness, replicating areas must ensure the availability and interoperability of public transport data, which was a persistent bottleneck during the pilot due to fragmented databases.

In terms of user uptake, attracting new riders and changing travel habits proved more difficult than expected. This highlighted the necessity of well-designed communication strategies tailored to different age groups, traditional methods for older users and digital outreach for younger ones. Lastly, the complexity of daily DRT management, especially handling user exceptions, showed the need for ongoing technical support and iterative development of the digital platform.

To support the Sustance solution reliability, the key recommendations for interested stakeholders are:

- Secure institutional support and define clear roles early.
- Use a modular, open-source digital solution built on shared standards.
- Design realistic pilot scopes and build incrementally.
- Plan comprehensive, audience-specific awareness campaigns.
- Ensure data governance and integration are addressed from the start.

As the public transport problems in the rural/low-demand areas are similar in all the EU territories, these lessons learnt from one of these rural areas form a robust foundation for other territories aiming to implement sustainable, user-centred DRT services in low-density contexts.

Finally, in order to be counted under the indicator, the developed solution should include indications of the actions needed for it to be taken up or to be up-scaled. This indicator implies the involvement of organisations from at least two participating countries in the drafting and design process of the solution. Solutions considered for this indicator should not have as their main focus administrative or legal frameworks. Innovative solutions can be procedures, instruments or tools (including physical objects, methods, concepts, or services etc.). To lead to the desired results, solutions have to be tailored to the needs of final users, also considering the respective framework conditions. Solutions should ideally be deployed in the project's lifetime and taken up by a large number of institutions.

7. Conclusion. Sustance jointly developed solution to be taken up and/or to be up-scaled



Sustance Solution 4: Open-Source DRT Web Application	
Solution typology	ICT Tool for booking DRT, with related replication manual
Final users/target groups	• Small municipalities • Mobility agencies in charge of managing one or more DRT services in rural and peripheral areas (the Sustance tool is not designed for the management of big services) • Regional/county authorities in the framework of the inclusion of a DRT service into a MaaS scheme. • Private stakeholders interested in providing specific on-demand transport services (football school in rural areas, association in charge of transporting old and/or disabled people).
Final user needs addressed	• Better ICT solution for better accessibility of existing demand-responsive public transport. • Easier accessibility to public transport information.
Co-design process (involved partners and country involved)	Solution 4 is co-designed and co-created during the three peer-review events held during the project life (see deliverable D.2.2.2). In particular, PP6-ITL collaborated in Solution 4 development with PP5-IDA and PP4-HZPP (Italy and Croatia).
Taken up strategy	Solution 4 is an open-source WebApp with all the code published online in a dedicated repository (to be finalised by the end of the project). Dedicated guidelines for its full replicability in other contexts will be published. Finally, the solution will be presented in EU and national levels to guarantee full replicability. Finally, thanks to the adoption of EU public transport data standards (NeTEx, SIRI, and GTFS standards), the solution is fully replicable at EU level and with other countries.
Up-scaling Strategy	The Sustance Solution 4 up-scaling strategy is related to the possibility of integrating this solution into the Emilia-Romagna Mobility as a Service scheme. Thanks to this potential integration, the use of the Sustance solution will be up-scaled on all the regional territories and replicated in other interested contexts. In relation to additional potential interested target groups, the Sustance solution can be replicated by private operators interested in providing targeted on-demand transport services (associations in charge of transporting old people in particular).