Deliverable D5.1
Results of demonstrations

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1. Executive Summary

The aim of this document is to summarize all activities in individual demos but also the overall coordination that was needed among demos. As can be seen from the document, this coordination contained many follow-up steps. Therefore, it required close cooperation not only within the demo teams, but also at the WP5 level or across WPs. This coordination was also very important because some demos took place in both IP4MaaS and Ride2Rail projects (in particular in Athens and Padua) in parallel, so it took a lot effort to synchronize all activities between these projects and at the same time cooperation with CFM side, which was responsible for proper integration into the IP4 ecosystem.
For this reason, this deliverable illustrates important phases of the demos life cycle, in particular:

- demo preparation,
- demo execution,
- demo evaluation.

This structure is used for each demo so that the reader is presented with the same content of the information, but at the same time can compare different approaches, e.g. within the user engagement strategy, number of demonstrated functionalities, number of testers, feedback from them, etc. All information is described in detail in individual reports.

The last chapter then tries to summarize all the activities, but above all to emphasize the differences in the individual demos.

Complete information is provided in individual report D5.2-5.7. These reports are published on the project website https://www.ip4maas.eu/.

2. Abbreviations and acronyms

Abbreviation / Acronym	Description
API	Application Programming Interface
CFM	Calls for Members
C-REL	Core Release
F-REL	Final Release
GA	Grant Agreement
GTFS	General Transit Feed Specification
H2020	Horizon 2020
IP4	Innovation Programme 4
IT	Information Technology
MaaS	Mobility as a Service
OC	Open Call
PT	Public Transport
PTO	Public Transport Operator
TC	Travel Companion
TSP	Travel Service Provider
USI	User Satisfaction Index
WD	Warsaw Demonstration
WP	Work Package
WPL	Work package leader

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5. Background

As mentioned, the present document constitutes the Deliverable D5.1 "Results of demonstrations" of the T5.1 "Coordination of demonstration executions" of the WP5 in the framework of the IP4MaaS project (GA 101015492, S2R-OC-IP4-01-2020) under the Innovation Programme 4 (IP4) of the Shift2Rail Joint Undertaking, executed in cooperation with Call for Members Consortia COHESIVE (GA 777599, S2R-CFM-IP4-02-2017), CONNECTIVE (GA 777522, S2R-CFM-IP4-01-2017) and ExtenSive (GA 101015462, S2R-CFM-IP4-01-2020) also being a part of the Shift2Rail Joint Undertaking and connected with the IP4MaaS Consortium by means of the Collaboration Agreement.

6. Objective

This deliverable has been prepared to provide a general overview technical and organisational coordination of all IP4MaaS demos at WP5 level but especially demo level. In particular, the deliverable summarizes all activities necessary for proper preparation, execution and evaluation of the demos and the outcomes in order to differentiate these demos.
The aim of the WP5 Demonstration Execution Support was the non-technical support of complementary IP4 projects (CFM) in the proper execution of demos. The IP4MaaS project covers a significant range of demos and stakeholders to utilise, operate and validate the IP4 technologies developed and integrated within IP4 ecosystem. When it comes to the demos, the following demonstration sites have been identified in IP4MaaS:

- Barcelona demonstration site,
- Padua demonstration site,
- Athens demonstration site,
- Osijek demonstration site,
- Liberec demonstration site together with Long-distance demo (additional demonstration activities carried out in a cross-border context between Liberec and Warsaw),
- Warsaw demonstration site.

The following figure shows the geographical arrangement of the IP4MaaS demos.

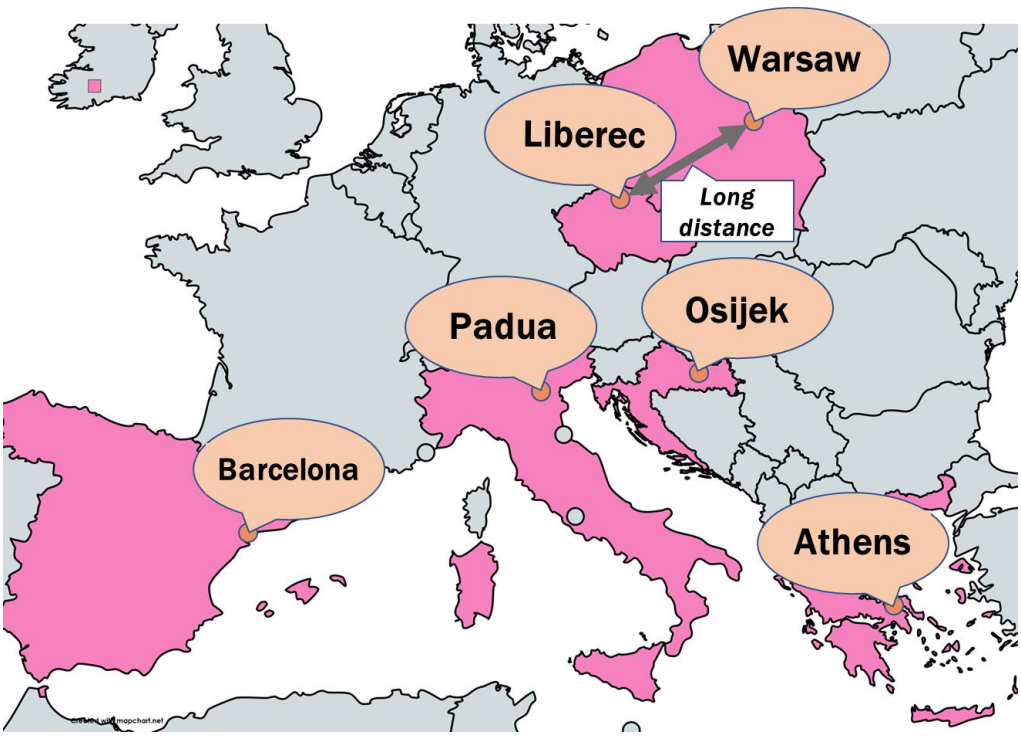

Figure 1: IP4MaaS demos

7. Coordination of demonstration executions

In order to ensure proper coordination between IP4Maas demos and CFMs in preparation of demos, when it was necessary to provide all necessary inputs from Travel Service Providers (TSP) for proper integration, a number of coordination calls were organized. These inputs were specifically interfaces and endpoints to TSPs services, GTFS data, support activities related to the integration, etc. The selected demos also included a number of projects supporters providing access to their data and services.

For proper coordination and monitoring of demos preparation progress, regular coordination calls have been set up since the beginning of the WP5. In the first months, there were coordination calls organized once a month with all demo leaders who reported the following information:

- **demo status**: general description of the current status of the demo
- **decisions taken**: decisions that have been taken, i.e. change of the demo's date, scope, etc.
- **new risks and mitigations actions**: description of the risk, current status, mitigation plan including deadline, etc.
- **next steps**: follow from the current status, decisions taken and the identified risk(s).

After many discussions within individual demos, at WP5 level, but also together with the Ride2Rail project and CFM side, the final version of the demos' timeline was determined (Figure 2).

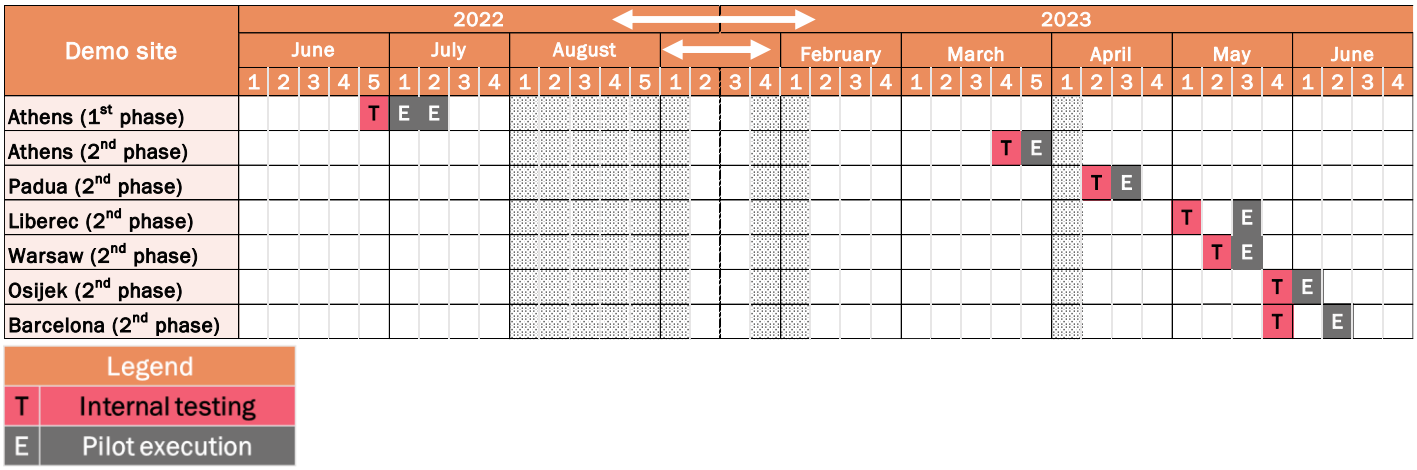

Figure 2: IP4MaaS demos' timeline

Subsequently, a list of steps for the proper preparation and execution of demos was also identified together with the responsibility assigned to each actor involved. The steps followed (and **the responsible partners**) are recapped below:

- To define final list of IP4 functionalities selected to be demonstrated -> **demo leader+CFM+demo WP leader**
- To define main steps and demo time frame (after demo date has been determined) -> **demo leader+demo WP leader**

- To define user engagement strategy -> **demo leader+demo WP leader**
  - To identify testers (type(s), number etc.)
  - To identify channels (universities, TSPs, local authorities, other communities of users, etc.) and tools (leaflet, social media, website, broadcasting etc.)
  - To identify demo-related costs (tickets etc.) + incentives (vouchers etc.)
- To define test cases -> **demo leader+CFM**
- To have pre-defined set of credentials to be distributed to testers for accessing the ecosystem (it was decided to produce a number of pre-defined credentials higher than the expected number of users, to cover a potential higher demand) -> **demo leader+CFM**
  - **e-mail: athens-01@ip4maas.eu; password: ip4maaS01** (example, just indicative)
- To have all materials for testers (TC user guide, Terms & conditions, how to install the app, user satisfaction survey etc.) -> **demo leader+CFM+demo WP leader+WP3 leader**
  - To customize the material and procedures according to demo conditions
  - To translate the material and the communication messages in local language
- To prepare the initial version of the check-list (same for all demo sites) -> **demo WP leader**
- To update the check-list according to progress in preparation and execution of demo + set up regular coordination calls -> **demo WP leader+demo leader**
- To create a demo contact list (to have a clear picture who is to communicate with whom) -> **demo WP leader+demo leader+CFM**
- To perform internal testing of TC -> **demo leader+CFM+demo WP leader**
  - Smartphones with Android (requirements provided by CFMs)
  - To implement issue log/insert issues arising into Mantis (access to Mantis granted by CFMs)
- To organize local demo events – testers training -> **demo leader+demo WP leader**
  - Online/in person (according to demo leader's decision) and/or prepare tuturial video (according to demo leader's decision) -> to familiarize testers with demo and TC
- To define the strategy for distrbuting surveys to testers and provide incentives -> **demo leader+demo WP leader+WP3 and WP6 leaders**
  - To create a general demo e-mail for communication with users: demolocation@ip4maas.domanin (example, just indicative)

The important role in the proper preparation of the demo played the IP4MaaS Integration Committee. The IP4MaaS Integration Committee, aiming to monitor the integration progress and facilitate the dissemination of information to all involved partners, compiled an IP4MaaS IP4 Functionalities Matrix, a document listing all functionalities used/to be used in all demos, along with their status. The Matrix was constantly updated, in accordance with the latest developments of the functionalities and the progress of each demo site's TSP and demo leader. Moreover, all necessary GTFS data, APIs, documentations, credentials were provided to the Integration Committee, which uploaded them into the Asset Manager, in order to facilitate the exchange of

information between the operators and the CFMs.

Separate coordination calls were set up for all demos starting from 6-8 weeks before the demo execution, in particular with each demo team separately and every week to monitor the demo progresses in details. For this purpose, a check-list was crated, and customized according to the demo conditions. During these weekly calls, it was updated. The check-list template can be seen below.

Check-list - "Demo execution"

	Task	Priority	Deadline	Status	Responsible partner	Comment
1	GPP GTFS data correction	High		Not started		
2	Integration of OTP (Shopping)	High		Not started		
3	Integration of Nextbike (Booking)	High		Not started		
4	To prepare test cases for CFMs	High		Not started		
5	To confirm the final list of functionalities to be demonstrated	High		Not started		
6	TC translation and multilanguage (Croatian)	High		Not started		
7	To determine the final version of user engagement strategy	High		Not started		
8	To have access to the Mantis (contact Matthias Walter matthias.walter@hacon.de)	Medium		Not started		
9	To have fake credentials for TC app	High		Not started		
10	To test registration of fake credentials in TC app	Medium		Not started		
11	To prepare materials for testers to ensure seamless pilot execution (short description of project(s), poster, tutorial video, instructions, …)	High		Not started		
12	To have final version of USI survey	High		Not started		
13	To have final version of TC user guide	High		Not started		
14	To have final version of Terms & Conditions	Medium		Not started		

Figure 3: Check-list template

The elements of the check-list, were:

- list of tasks to be fulfilled from the preparation to the demo follow up,
- priority level of each task,
- deadline of the specific task,
- status of task's realisation, i.e.:
  - not started,
  - ongoing,
  - pending,
  - not solved,
  - completed,
- responsible partner(s),
- description of the task/detailed information about the status.

The similar version of the check-list was also created for the coordination with CFM.

It is also essential to mention that after each demo execution, a dedicated call was organized to share experience and namely lessons learned with all other demo teams, in order to allow them to take advantage of the experiences developed in other contexts, understand the strengths and weaknesses and improve the processes to make them more fast and more effective.

8. Barcelona demonstration

The Barcelona demo site included the urban and suburban areas/municipalities of Barcelona Metropolitan Area. Barcelona Metropolitan Area is of special interest, to be considered as a

leading metropolis in Europe due to its apparent desire, reflected by its current policies regarding urban planning and sustainable mobility. The Barcelona Metropolitan Area is the public administration of the metropolitan area of Barcelona and encompasses 36 municipalities. The metropolitan area occupies a strategic position in southern Europe, in the middle of the Mediterranean corridor. This privileged position has allowed it to become the epicentre of the region Catalonia. In 2020 a population of 3,339,279 inhabitants resided, in such a way that it concentrated in a territory of 636 km2 (barely 2% of the surface of Catalonia) 42% of its population. Barcelona Metropolitan Area can be divided in 3 zones; each zone contains several Municipalities (Figure 4). The main characteristics of these zones are: i) Proximity, ii) Increasing regional integration, iii) Economic dependencies, iv) Growing cross boundary issues and v) More efficient labour and housing market interaction.

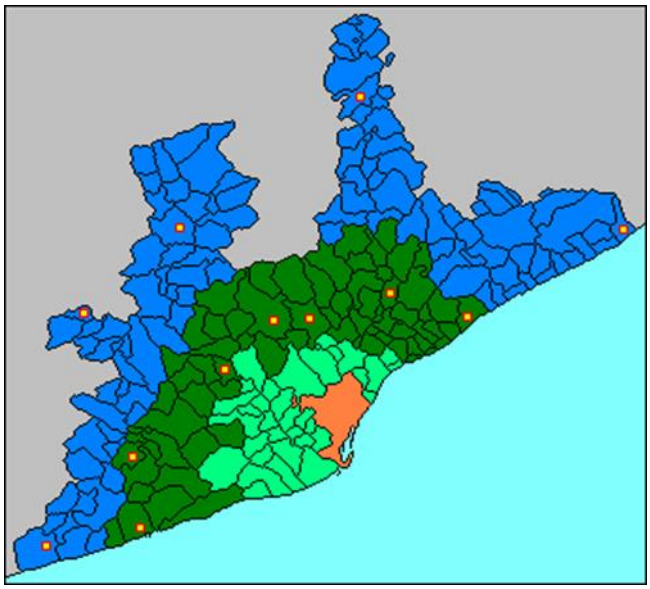

Figure 4: Barcelona demo – metropolitan area and its zones

Its transport network consists of different public transport modes such as metro, train, trams, buses etc operated by public and private entities (TSPs) and for the scope of IP4MaaS project the following four TSPs participated supported by two technical partners Sparsity Technologies and Mosaic Factor.

1. **Transports Metropolitans de Barcelona (TMB)** is the main public transit operator in Barcelona. It covers the entire Metropolitan area of Barcelona and consists of a comprehensive network of multiple PT means: Bus and Metro. Additionally, it handles the cable car of Barcelona and the tourist red buses. The Barcelona Metro network serves 125,4km with 183 trains and 165 stations to cover a demand of 278,24 million journeys. On the other hand, TMB's fleet of 1.135 buses serves a network of 839,21 km with its 106 lines and 2.653 stops, covering a demand 147,27 million journeys (based on the official statistics published at TMB's landing page). (Additional information and a visualization of

the public transport system is provided in section **Error! Reference source not found.** A ppendices).

2. **BUSUP** is a private transport on demand bus provider. More specifically, BUSUP is a mobility service provider that thanks to its technology and innovative business model offers efficient and flexible corporate commuting services. BUSUP operates fixed route shuttle networks that are often co-founded and shared by multiple organizations and populations of riders. Our operator agnostic approach gives shuttle clients the price transparency and service reliability they deserve. Being the #1 company in the EU and Latin America (Latam) and first company in the world to offer shared corporate shuttle services, BUSUP has disrupted a very traditional and low digitized sector, bringing efficiency and convenience to all its stakeholders: Passengers, Clients, Operators and Public Administration. Today BusUp attends more than 40.000 daily commuters and has more than 100 clients worldwide. Specifically in the Barcelona metropolitan area BUSUP has 5 different clients including Hospitals, Business parks and Factories offering them more than 900 services per month in 56 active routes.

3. **Flexitransport Catalunya** is a mobility solution created by the AMTU (Association of Municipalities for Mobility and Urban Transport), which adapts to your needs and facilitates your daily travel. Its flexible and adaptive system allows you to book your trip, indicating the origin and destination, but without depending on a fixed schedule and route, both in real time and with prior reservation. Currently, it is operating in specific areas of the second zone (e.g., Alella, Terrassa) either with taxis or shuttle buses and aims to expand to more municipalities in the following years.

4. **SocialCar** provides car sharing and car sharing services. It is important to note that SocialCar, as per amendment 1 of IP4MaaS, could not be integrated and participated to the demo supporting the demo leader in carrying out preparation and execution activities.

The main objective of Barcelona's demonstration was the orchestration of individual mobility offers and services in one seamless journey, including urban and peripheral areas.
Hence, the demo's fundamental goal was to incentivize multimodal travel and shared modes of transport, targeting:

i. commuters traveling from the same starting point to different destinations in Barcelona and
ii. commuters traveling from different starting points to the same destination in the suburban/rural area of Barcelona.

8.1. Demo preparation

Preparatory activities for the Barcelona execution were carried out according to the

Demonstration Execution Plan taking into account the lessons learned from the previous demos as Barcelona was the last demo site of the project based on the timeline generated by the CFMs. The activities in included are listed below:

1. Selection of functionalities to be demonstrated in Barcelona demo;
2. Modification of the selection based on the new timeline of the CFMs, the barriers posed by Social Car and the inclusion of AMTU/FlexiTransport[1]
3. Establishment of the demonstration timeline;
4. Creation of an engagement strategy;
5. Internal coordination;
6. Internal testing;
7. Conducting training sessions.

According to the aforementioned list, as a first step, a filtering process was carried out in order to determine which technologies would be finally demonstrated in Barcelona during the demo period. This filtering process considered several factors, namely IP4 available Technologies, TSP available services, scenarios, demo site goals, demonstration iterations, availabilities, and integration constraints from both the TSPs' and the CFMs' sides. Barcelona's team performed several iterations to meet the requirements of the different actors mentioned (CFMs and TSPs) as well as to meet the objectivities and timeline of the project.

To ensure that all selected functionalities were successfully integrated, the following actions were taken:

- Analysis and conclusion of the integration process.
    - for BusUP Issuing and Booking meetings were set between Indra and BUSUP facilitated by Sparsity and Hacon.
    - for TMB the integration of the journey planner was smooth there was no need of ad-hoc meetings
    - for FlexiTransport, several meetings were organized to solve some technical issues. After several exchanges taking into account the ecosystem limitations, the nature and characteristics of the services to be integrated, the tight timeline and the available resources, it was decided not to proceed with FlexiTransport integration.

Meanwhile, questionnaires regarding user satisfaction for both travellers and TSPs were created and translated into the local language (Spanish) by the demo leader Sparsity, for the travellers and

[1] As per Amendment 1, the role of Social Car was revised and AMTU - Associació de municipis per la Mobilitat i el Transport Urbà**,** an association of municipalities in Catalunya, working for improving the mobility and transport infrastructures in the region, providing technical, legal and administrative support mobility and infrastructural topics was involved in the project as new TSP and subcontractor of the demo leader Sparsity (AMTU developed the FlexiTransport service, on demand transport services in Catalunia).

TSPs to fill it. Even so, the English version was mostly used.

The User Engagement Strategy for Barcelona demo was mainly focused on the selection of the target groups of testers, defining communication channels and recruitment process as well as selecting proper incentives that would encourage active participation and delivering the filled in USI questionnaires.

Barcelona's engagement strategy can be considered as "threefold".

i) Volunteers attracted by social media announcements.
ii) Volunteers visiting UITP summit and final event of IP4MaaS
iii) Focus group organized for the Barcelona demo

To attract expert users/travellers, the demo team took advantage of the UITP Global Public Transport Summit, the biggest worldwide event dedicated to public transport. Finally, to have more detailed feedback a focus group was organized for testing the application with a restricted and more focused group of users.
The first and second group of volunteers was provided with an incentive of a T-casual ticket that includes 10 trips for the Barcelona area (zone 1) excluding the airport. The participants to the focus group were given a T-casual and additionally a 2-person entrance for the Telefèric (cable car) of Barcelona.

Furthermore, to establish an effective internal coordination during the demo activities, all involved entities were assigned specific roles and responsibilities. Once the planning got close to the actual demonstrations, the WP5 leader created check lists including several tasks that were completed before the execution of the demo.

Before launching the demo, internal testing of the application was conducted to address any issue arised. The issues encountered were reported to Mantis tool that facilitated the resolution process by the CFMs (for more information please refer to deliverable D5.2 section 6.4).

8.2. Demo execution

The demonstration in Barcelona took place between 5th and 9th June 2023. Over the course of these week, travellers had the opportunity to use the Travel Companion app during their journeys in real environment, and they were asked to fulfil a survey afterward, sharing their experiences. The app enabled the MaaS implementation for the selected high-level journeys and different user categories. The functionalities used were mostly the journey planning and only in case of BusUP the users could also use the booking and issuing functionalities. Despite the engagement strategy involved the recruitment of users during a specific IP4MaaS session organized during the "Innovation in the Spotlight Forum" at the UITP Global Transport Summit and the IP4MaaS Final Event organized in Barcelona on June 6th, particularly interesting and meaningful are results and feedback collected during the focus group organized at on the 8th of June at the premises of TMB. The 12 participants had the chance to directly interact with the CFMs, responsible for providing all technical details on the TC app and more in general on the IP4 ecosystem. Not only participants could report issues but also propose solutions and give ideas on how the IP4 solutions could be

improved for a better user experience.

8.3. Demo evaluation

Barcelona demo focused on the duly assessment of the TC performing an intensive 3hours focus group apart of the volunteers that downloaded the app during the demo period after its dissemination at the UITP Summit and at the social media of the partners. The reason of this approach was to complement the results of the other demos, as Barcelona was the last IP4MaaS demo properly cope with he defined timeline.

The feedback of the focus group was proven to be the most useful and the interaction proved to be beneficial, as the users understood the complexity of the system and the technical partners better understood the users' needs. The focus group objective was to explain the functionalities to be used in the demo, and then to test them in real environment. Each functionality was presented, and the participants could test it in a controlled environment, submitting to the technical partner the issues encountered. The focus group was a success as it allowed the testers to freely express their opinion and provide suggestions for the different functionalities presented, and promptly solve possible misunderstanding, with focused people committed to go in depth in all the testing phase. Finally, the testers do not only reported issues but also proposed improvements for the functionalities presented, contributing to inputs on usability improvement. The feedback provided by the testers is detailed in D5.2 and for the context of the current report the following sentence reflects the opinion of Barcelona's demo testers:

"This (IP4) solutions are a good idea, but the developers need to keep working on its maturity, and on increasing the user experience as the competition with other apps already available on the market is big".

9. Padua demonstration

The demo in Padua demo took place in a 40 km radius surrounding the urban centre of Padua (Italy) involving urban and regional mobility service providers in Veneto and concerning rail, road and bus. The province of Padua, with 928.280 inhabitants, it is the most populated province in the Veneto region. The modes involved in the demo were rail (operated by Trenitalia) and bus (operated by Busitalia).

The main outcome is the improvement of mobility planning and management services, encompassing but extending the MaaS paradigm and serving institutional customers with new services through the integration of IP4 technical features.

Since cities can sometimes become unliveable due to smog, traffic congestion and overcrowded public transport, the project and specifically the demo in Padua aimed to test the Travel Companion app in order to cope also with these problems. Padua demo, through the abovementioned application, pursued the following correlated objectives:

- Improving connections between urban and surrounding areas, in particular rural areas. Italy's rural areas, which account for more than 60% of Italy's land surface, are often in a condition of isolation, especially when it comes to availability of efficient transport services, so the project initiative intends to address at least part of this gap.

- To improve the efficiency of public transportation services: although most areas with transport infrastructures are well equipped, there is sometimes a lack of integration between different modes of transport, which makes travelling inconvenient.
- To reduce GHG emissions and traffic and parking congestions: bad travel habits, such as travelling alone or preferring private vehicles to public transport raise serious questions about the sustainability of these modes of travel.

9.1. Demo preparation

The Padua demo preparation phase consisted of the following main activities:

- Regular coordination calls/meetings, both internally both with project partners in order to organise the work to be undertaken;
- Task division between demo leader and TSPs to rationalise the workload among participants;
- Creation of a User Engagement Strategy;
- Cooperation in preparing and translation of the USI questionnaire;
- Selecting the Travel Companion functionalities to be tested in Padua;
- Translation of the Travel Companion app;
- Providing access to data sources necessary for proper functionalities' integration;
- Coordinating and supporting the integration process with the CFMs;
- Internal testing of the application before submitting it to the testers;
- Preparing materials and scenarios for trainings for the testers and conducting the online trainings.

9.2. Demo execution

In order to ensure the largest possible number of testers, a student engagement plan was structured through emails sent by university staff to students' mailboxes, including "Save the date" emails, reminders and an Engagement event on the Padua Demo TC app that took place on 14/04/2023. The engagement strategy was structured in collaboration with Ca' Foscari University professors who represented Padua demo team's intermediaries dealing with students, the demo target group. Although emails were sent to inform the target group, only 3 students attended the online training event. Nevertheless, in collaboration with university staff, reminders about the starting date of the demo have been sent, as well as all the training materials (presentation with the aims and objectives of the demo and applications, User guide) to incentivize participation in the demo as much as possible.
Below are provided the most relevant statistics regarding to the execution phase of the Padua demo.

- Number of app downloads: 77 downloads for the TC app.
- Clicks on distribution link: 77 clicks on TC distribution link for the TC app.
- Number of participants (travellers/drivers): 13 (9 travellers + 4 TSPs).
- Surveys completed: 13.
- Unique Users: 9.

- Number of all rides: 387.
- Functionalities tested: 9.
- Functionalities tested: 3 for TSP.
- 70% of respondents used Trenitalia and 30% of them used Busitalia.
- The usage percentage of each functionality for travellers is: Journey planning (85%), Booking (60%), Issuing (60%), Navigation (70%), Traveller's feedback (77%), Trip sharing (77%), Guest user (60%), Preferences and Profiles (70%), Collaborative space portal (85%).

9.3. Demo evaluation

The Travel Companion app, within the Shift2Rail IP4 technologies developed, integrates mobility options available throughout the Padua region into mobility packages centred around the specific requirements of citizens in the pursuit of their daily activities, allowing train and bus operators to leverage digitalisation for multiple mobility services, serving not only individual passengers but providing new mobility management services to city administrations, companies and universities. Padua demo has delivered 13 USI questionnaires for travellers and 4 USI questionnaires for TSPs to AITEC. The modification of the USI questionnaire providing a comment box after assessment of each selected functionality enabled a broader scope of the testers' feedback and resulted in some useful feedback.

The positive feedback from the testers regarded mainly:

- **Traveller's Feedback:** some people appreciated the functionality that permits to report to other travelers on the status of the modes of transportation involved, highlighting how it allows them to update and be updated, making the travel experience better.

Regarding the potential for improvement in the demo, some suggestions made by the testers may be useful for future developments of the application and similar projects:

- Some people had problems to use the application without being trained in it in advance. In fact, when using the application, it was difficult to find all the features that had been presented on the day of the training event. The app should be improved in order to be more self-explaining, reducing the need for a specific training (user guides were believed too technical in some cases, and only a good communication with the demo team allowed people to fully exploit it).
- Some people were discouraged from using the application because it had to be downloaded not from Google Play but from a download link shared by the demo team. Since it was necessary, to download the application, to go to a third-party site, the process was found to be cumbersome. Additionally, the app is Android only, and this prevented the vast community of non-Android devices users to be involved.

The execution of the demo in Padua made it possible to concretely test the developed technological solutions. The developed functionalities worked adequately during the days of the demo as testified by the absence of any bugs either on our part or on the part of the testers.

Unfortunately, the low number of testers partially inhibited the amount of feedback we were able to collect. The technological solutions need further development and improvement in order to meet the growing demands for multimodal mobility on an individual level. Through the demo, the aim was to improve the quality of the transport services offered as well as to provide rural areas with more options in terms of travel possibilities. In spite of the fact that these solutions were successful in the demo setting, they also demonstrate the importance of tackling MaaS issues in order to provide a competitive mobility service that meets user demands and increases accessibility.

10. Athens demonstration

The Greek demo site is located within the urban area of Athens, Attica. Attica is Greece's region with the highest inhabitancy rate, including the country's capital city, Athens. Attica's public transport network consists of five different public transport modes: metro, suburban railway, tramway line, buses, and trolleybuses, which are run by different operators. The Athens Metro network is composed of three lines with 67 stations, and a total length of 85.3 km, transferring around 1,400,000 passengers/day. Figure 5 below illustrates the Attica's subway lines, the suburban railway, tram route as well as the two municipalities participating in the Athens demo (Athens and Iraklio).

The Athens demo was the only one executed in two phases: July 2022 and March 2023.

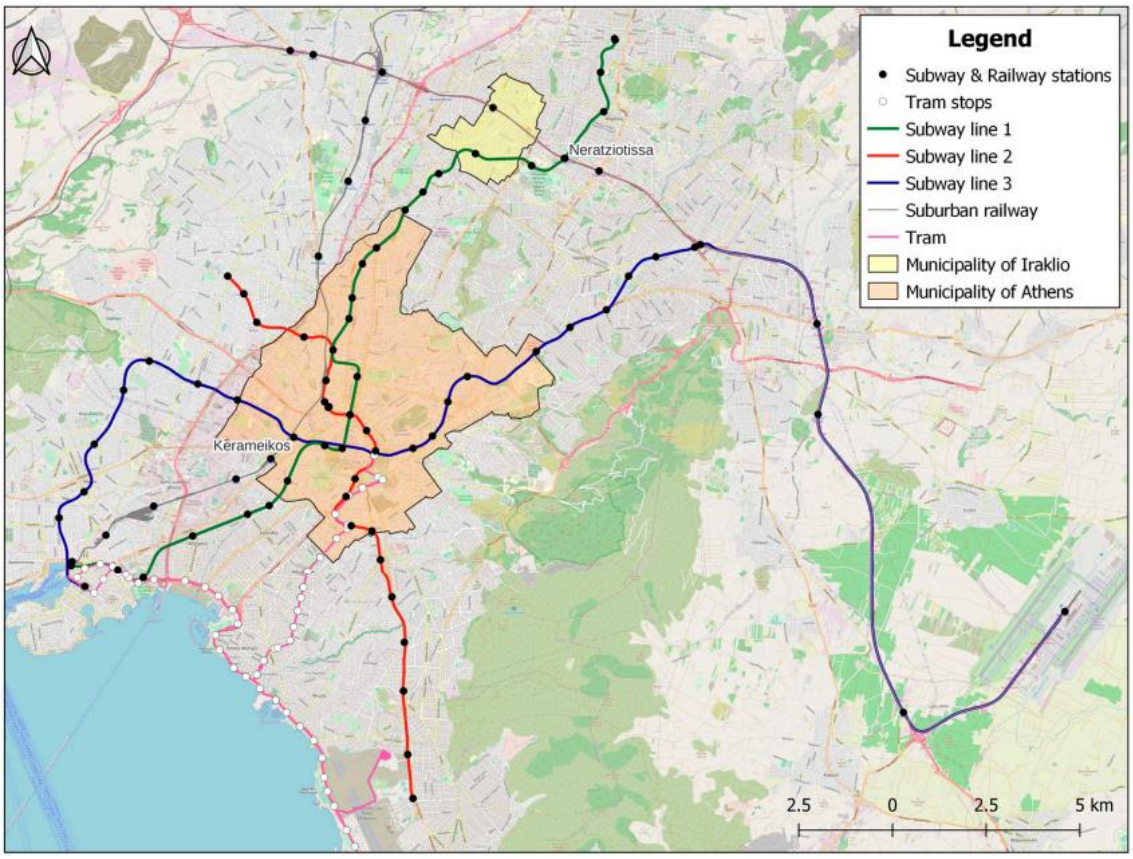

Figure 5: Athens demo – demo area

The journey planner demonstrated in Athens considers public transport, bike, pedestrian, and car routings to provide optimal means of traveling. Although multiple transport modes operate in the demo area, there is limited connectivity at the level of the networks and the services to support both daily commuters and tourists. The PTOs and TSPs involved in the demo are: the Public Urban Transport Organization of Athens (OASA), the Municipality of Iraklio (MIRAKLIO) acting as a local Public Transport Operator (PTO), Brainbox (bike-sharing operator) and Taxiway (ride-sharing operator).

The main objective of Athens demonstration scenario was to enhance multimodality by providing integrated services (planning and ticketing), including different TSPs, through a single application that can be used by tourists and commuters. In this context, three travel cases were planned: i) Multimodal work trip, ii) MaaS for tourists and iii) Interurban/urban interfaces. The parties having a vital role in the demo execution are the following:

1. **Demo leader** (CERTH) being responsible for monitoring all preparatory activities and facilitating communication between TSPs and CFMs. In parallel, demo leader was responsible to identify and resolve issues within demo sites as well as to handle issues related to users' registrations (e.g., send e-mails with materials and links to the app, terms and conditions, surveys etc.).
2. **WP4 leader** being responsible for monitoring the operation of Committees, participating in workshops, and keeping all plans up to date.
3. **WP5 leader** being responsible for coordinating the demo execution on a technical and organisational level as well as monitoring integration and testing tasks. Additionally, role of WP5 included undertaking troubleshooting issues and informing CFMs about TSPs' limitations.
4. **TSPs** being responsible for providing all necessary information and data as well as supporting the demonstration execution including participation in workshops and
5. **Data Committee** being responsible for handling data exchanges between TSPs and CFM and collecting data during demos to feed the assessment pillar.
6. **Integration Committee** being responsible for monitoring the progress of the technology integration plan in collaboration with CFM projects.
7. **Management Committee** being responsible for managing and coordinating the actions of the demos, acting on behalf of the project board for low-level decision actions.

10.1. Demo preparation

Preparatory activities for the Athens demo execution (Phase I in July 2022 and II in March 2023) were carried out according to the Demonstration Execution Plan and included:

1. Selection of functionalities to be demonstrated in Athens demo;
2. Establishment of the demonstration timeline;
3. Creation of an engagement strategy;
4. Internal coordination;

5. Internal testing;
6. Conducting training sessions.

According to the above list, as a first step a filtering process was conducted in both phases, in order to determine which technologies would be finally demonstrated in Athens during the demos. This filtering process considered several factors, namely IP4 available Technologies, TSP available services, scenarios, demo site goals, demonstration iterations, availabilities, and integration constraints from both the TSPs' and the CFMs' sides. As it is described in the next subsection, different functionalities were selected for the two demos.

Afterward, a concrete timeline was defined considering all necessary activities discussed with the Call for Member partners (CFMs). Indicatively, the timeline of Phase I is illustrated in Figure 6. Both demos' preparation considered the same 6 phases of activities to be performed as shown in the figure below.

Demo Site	Demo Phase	Duration	2021				2022																											
			December				January				February				March					April				May				June					July			
			1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4	1	2	3	4	1	2	3	4	5	1	2	3	4
Athens	Preparation phase	6 weeks																																		
	In-house development & Administrative tasks	11 weeks																																		
	Integration & Administrative tasks	8 weeks																																		
	Testing	4 weeks																																		
	Demo preparation	4 weeks																																		
	Demo execution	2 weeks																																		

Figure 6: Athens demo – Timeline of phase I (C-REL)

In order to verify that all selected functionalities were successfully integrated the following actions were taken:

- Analysis and conclusion of the integration process. According to the plan the integration process was concluded:
  - for Brainbox Issuing and Taxiway Booking, then Indra conducted the appropriate tests,
  - for OASA, Brainbox and Taxiway the shopping component's integration was concluded, then Indra conducted the tests for 2 weeks.
- Until the end of June 2022, the last tests were conducted from the CFMs' side and then OC tests (tests from the open calls) followed, prior to disseminating information and the final application to the engaged users.

Meanwhile, questionnaires regarding user satisfaction for both travellers and TSPs were created and translated into the local language (Greek) by the demo leader CERTH, for the travellers and TSPs to fill it. Appropriate quantifiable Key Performance Indicators (KPIs) were also introduced. Additionally, in order to reduce the probability and the impact of threats towards achieving demos' results, a list of identified risks, mitigation measures and contingency plans was created.

Regarding the user engagement strategy for Phase I, its objective was to engage local commuters and tourists into using the Travel Companion app and responding to the questionnaires. In this

context, the strategy included: i) distribution of brochures, ii) setting up of posters and banners (in English and Greek) in more than 10 stations including the airport and the port of Piraeus, iii) posts through the social media of all local partners, plus coordinator and S2R/ER pages, iv) posts at companies' websites and v) internal communication using emails of CERTH's employees. Finally, the users that participated at the demo and completed the survey, took part in a lottery giving out free tickets for public transport modes, up to 27€ for any destination, within the service area of OASA, by using all available transport modes.

As far as engagement strategy for Phase II is concerned, it took place only among the participating companies (CERTH, OASA, BRAINBOX, MIRAKLIO TAXIWAY and AETHON). Each demo member recruited users among employees not involved in the project (to preserve objectivity), friends, and family. Attempts were made to achieve a similar number of travellers answering the USI questionnaire per each functionality and TSP to allow fair comparisons of the Effectiveness among TSPs and functionalities. Similar as Phase I, demo leaders have promoted participation in the Athens demo by Provision of vouchers for 27 € as incentive. Travellers were initially selected randomly and afterward some specific profiles were encouraged to fill the USI to ensure a good representation for specific profiles:

- (r=2) Unemployed people, low-income people, retired people, and students.
- (r=3) Disabled or impaired people-people with physical or mental illnesses, a person on a wheelchair, a person with reduced mobility, a person with visual impairment, a person with hearing impairment, and an Elderly.
- (r=4) Elderly.
- (r=5) Women.

In order to establish an effective internal coordination during both demos all involved entities were assigned specific roles and responsibilities. Once the planning got close to the actual demonstrations, the WP5 leader created check lists including several tasks that were completed before the execution of the demo. The only difference between Phase I and II was that the list included steps and actions related to the functionalities to be tested during the 2nd Phase (much richer compared to Phase I). An example of these lists is shown in Figure 7.

Check-list - Athens demo site 27.03.-31.03.2023

	Task	Priority	Deadline	Status	Responsible partner	Comment
1	To prepare test cases for CFMs	High		Completed		
2	To confirm the final list of functionalities to be demonstrated	High		Completed		
3	TC translation and multilanguage (Greek)	High		Completed		
4	To determine the final version of user engagement strategy	High		Completed		at least 50 testers
5	To have access to the Mantis (contact Matthias Walter matthias.walter@hacon.de)	Medium		Completed		
6	To have fake credentials for TC app	High	17.03.2023	Completed	CFM (INDRA)	80 accounts and same structure as in 1st phase: Athens-01@
7	To test registration of fake credentials in TC app	Medium	20.03.2023	Ongoing	CERTH	
8	To prepare materials for testers to ensure seamless pilot execution (short description of project(s), poster, tutorial video, instructions, …)	High		Completed		
9	To have final version of USI survey	High		Completed		
10	To have final version of TC user guide	High	13.03.2023	Completed	CFM, OLT	to verify with CFM when OC get the final version
11	To have final version of Terms & Conditions	Medium		Completed		the same as for the first phase
12	To translate the USI survey and other documentation for testers (TC user guide, T & C TC, etc.)	Medium	21.03.2023	Completed	CERTH	AITEC provided the final version of USI survey
13	To have link for TC (Travel Companion) app	High	20.03.2023	Completed	CFM	TravelCompanion-r156-demo-regular-release
14	To perform the internal testing of TC app	High	20.03.2023	Ongoing	CERTH	to perfom LBE and CMMP training sessions (with CSGroup
15	To insert identified issues to the Mantis (if it is necessary)	High	20.03.2023	Ongoing	CERTH	
16	To close all recorded issues (Mantis)	High	24.03.2023	Not started	CERTH, CFM	

Figure 7: Athens demo – check-list 2nd phase

Before launching the demos, internal testing of the application was conducted to address any issue arise. During the preparation of Phase I limited technical issues derived from the integration requirements were encountered. These were solved in due time. A few of those concerned the integration with Brain box API for the bike sharing but the errors were fixed without major delays. However, most of the issues risen had to deal with the adaptation of the functional characteristics of the services, for example, how to handle no-show customers who have booked a taxi etc. Regarding the 2nd Phase, limited similar technical issues were encountered but also solved in due time.

Additionally, in the context of preparing both Phases, actions were taken to engage all the involved TSPs, namely OASA, Taxiway, Brainbox and MIRAKLIO. Multiple meetings with the CFMs were organised throughout the preparation phase, in order to provide information and demos of the Travel Companion app and the functionalities to be demonstrated during the F-REL demonstration. These meetings aimed at familiarising all involved entities with the solutions to be tested by them, utilize them properly, assess potential benefits and provide their feedback via the respective questionnaires for TSPs. Apart from internal meetings (amongst Athens demo partners), for collaboration and coordination purposes, several sessions with CFMs were also organized, in order to achieve the aforementioned goal. Regarding the 2nd Phase, the experience gained from the 1st Phase led to modification of engagement strategy-as previously mentioned- and training sessions adopting a 'softer' opening. Participants would not have to have any relation to the IP4MaaS project, in order to be even more objective and provide valuable feedback by answering the USI questionnaires aimed for travellers.

10.2. Demo execution

The first demo demonstration in Athens started on 11th of July 2022 and lasted for two weeks while the second demo started on 27th of March 2023 and lasted for one week. Over the course of these weeks, real travellers used the Travel Companion app during their journeys, and they were asked to fulfil a survey afterward, sharing their experiences. The app enabled the MaaS implementation for the selected high-level journeys and different user categories. Regarding the selected functionalities demonstrated in Athens, as it can be seen in Table 1 below, demo Phase II

included greater variety of functionalities offered to travellers.

Table 1: Athens demo – demonstrated functionalities in Phase I and Phase II

Athens Demo – phase I		Athens Demo – phase II	
For TSPs	***For travelers***	***For TSPs***	***For travelers***
1. Asset manager	**1**. Journey planning function	**1**. Asset manager	**1**. Journey Planner/Offer Builder (same as in 1st phase)
2. LBE editor	**2**. Booking function	**2**. LBE editor	**2**. Booking (same as in 1st phase)
	3. Issuing function	**3**. Contractual management marketplace	**3**. Issuing (additionally to the 1st phase, issuing of QR code-based tickets for taxis and OASA – not meant for on trip validation though)
	4. Location-based experience (LBE) function	**4**. Travellers Orchestration and supervision (new use case with taxi pick up)	**4**. Mobility packages (the user is able of purchasing 10+1 free OASA tickets plus 3 free taxi rides)
			5. Location-based experience (same as in 1st phase)
			6. Navigation
			7. Traveler's feedback
			8. Trip sharing
			9. Guest user
			10. Preferences and profiles
			11. Specific messages
			12. Smart locations
			13. Map content

10.3. Demo evaluation

Once the Phase I of the demo was officially launched, 140 users were initially registered to participate. Out of the 140 users, only 12 removed their consent. About 57% of testers were 25–44 years old and 43% were 45–64 years old, while 57% of all testers were female and 43% male. 32 of them registered as users of the BRAINBOX (bike sharing) app and 15 actually rented a bike (12%). Out of the 140 registered only 17 (12%) responded to the survey aiming to assess their satisfaction when using the TC.

During Phase II of Athens demo 79 users registered and used the application, while 33 of them

completed the survey, accounting to a response rate of 42%, much higher than the 12% achieved during the phase I despite the lower number of registered participants. Out of the 79 registered participants 37 rented a bike (47%). Table 2 presents the statistics of the two phases.

Table 2: Athens demo – statistics

Indicators	Athens-1st demo	Athens-2nd demo
Number of registered users	140	79
Number of users that removed consent	12	0
Responses (filled in questionnaires) received from TSPs	7	3
Responses (filled in questionnaires) received from travelers (Greek)	7	38
Responses (filled in Questionnaires) received from travelers (English)	10	N/A
Number of calls for taxi	3	31
Number of taxi rides fulfilled	0	
Number of bike coupons calls (via TC app)	49	23
Number Registered Users at the BRAINBOX app	32	16
Bike Rentals	15	37

Phase I of the Athens demonstration led to significant conclusions regarding the engagement strategy according to which soft opening adoption is more efficient. In more detail, it is suggested to carry out stress testing for 1 week-period involving a small group of users (10 users) and then a wider audience (between 20-40 users). Following these, 1 week of regular opening (demonstration) and 1 week of post-demo survey conduction are suggested. In order to ensure high level of users' engagement, ease of installation and usage of the application and its features and to avoid any possible frustrations from the side of the travellers, it is important to include all material in one download, thus via one single link. In addition, vacation periods should be avoided for the execution of demonstrations since users, but also key people may not be available.

As far as the application itself is concerned, it was suggested that preferably all apps/functionalities (in Athen's case, Travel Companion and Location Based Experiences) should be incorporated in one single download. That would be more user-friendly and thus more appealing to the travellers to try in future demonstrations. The Travel Companion app should also present clear routes to the bike users and inform them about which legs involve the bike and which are pedestrian trip legs, thus ensuring the safety of the traveller.

Regarding post-demo surveys it was suggested that the users should receive them right after the

end of the demonstration via e-mail. That way the mail would serve as a reminder. It was noticed that right after the dissemination of the respective e-mail numerous users would almost immediately access the survey and complete it, thus providing their valuable feedback for the assessment of the demonstration and the solutions tested during that time. Moreover, it came out that translating both the application but also the surveys may lead to an increase of user satisfaction and respond rate respectively.

Some of the lessons learned from Phase I were adopted during Phase II, such as the soft opening regarding engagement strategy. However, Phase II also led to important conclusions, especially in the design and preparation of the demo. As this Phase involved many more functionalities, a detailed design of procedures to use the mobility services is of great essence. The engagement of a variety of users (e.g., different characteristics, needs, routines etc.) ensures that all offered mobility services and features of the application may be covered and thus collect adequate feedback for most of the functionalities. Users that have experience of the transport network are preferred for such demonstrations. A well organised preparation of the procedure to provide the incentives to the users is essential, that way the satisfaction of the users, regarding their overall experience, may be maintained high.

Regarding post-demo surveys, it is suggested to be even more customized for each demo site. It is important to recheck and consult regularly with demo site partners (demo leader and TSPs) and CFMs, in order to ensure that functionalities demonstrated and the corresponding questions in the surveys are aligned. The incentives and how to claim them could be communicated clearly at the beginning of the survey as well, so the user may be immediately reminded of the process and thus proceed with confidence.

11. Osijek demonstration

Osijek demo site covered the area where the GPP Osijek public transport service/network is available and areas where bike sharing service is available. The covered area included the City of Osijek and its surrounding municipalities Antunovac, Čepin, and Erdut (Bijelo Brdo).

- **Demo site area:** the City of Osijek and surrounding municipalities with available PT
- **Execution period**: 29.05.2023 - 02.06.2023
- **Target groups:** students and PT users
- **Demo site leader:** Dyvolve
- **Number of TSPs integrated:** 2; GPP Osijek & partner Nextbike
- **Registered testers:** 43
- **Number of USI survey respondents:** 41
- **Functionalities tested:** 10

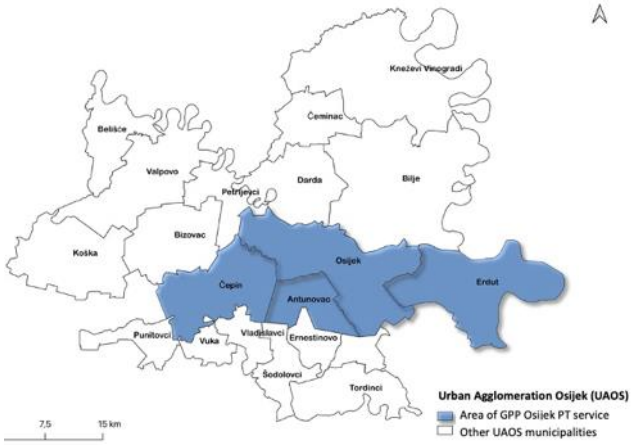

Figure 8: Osijek demo – characteristic

Osijek demo goals were:

- To test and demonstrate Shift2Rail IP4 functionalities by connecting different back-end systems (GPP & Nextbike APIs) and provide added value to public transport users,
- To explore the potentials of creating a MaaS ecosystem through multimodal trip planning by using Journey planning, My trips, Navigation, etc., and
- To test and demonstrate the integration of traditional modes of public transport (trams and buses) with innovative new services (e-bike & bike sharing).

11.1. Demo preparation

The Osijek demo **preparation phase consisted of the following activities:**

- Regular communication and coordination regarding the demo preparation,
- Creation of a demo time plan and task division between Dyvolve, GPP Osijek, and Nextbike,
- Preparation of multimodal test cases for the Osijek demo site,
- Preparation and translation of all the necessary documentation to Croatian language,
- Risk assessment and assigned mitigation measures,
- Fulfilling technical prerequisites for successful functionalities' integration,
- Selection of the TC functionalities to be tested in the Osijek demo based on technical feasibility,
- Preparation of user engagement strategy,
- Internal testing of the TC app and final selection of TC functionalities,
- Providing feedback to the CFM through the Mantis bug reporting tool,

- Preparing materials/PPT and scenarios for the training of the testers,
- Organisation of the onsite engagement event with testers in Osijek,
- Management and communication with demo testers via e-mails and social media.

Preparation of **user engagement strategy consisted of the following activities:**

- Internal communication via e-mails and phone calls between demo leader Dyvolve, GPP Osijek, Nextbike, City of Osijek, WPL, and CFM,
- GPP and the City of Osijek sent digital leaflets with a call and instructions for the TC app testing to specific educational facilities to find testers,
- Posts on social media:
    - GPP's Facebook post with demo testing invitation leaflet on May 18th and 22nd, 2023
    - GPP's Instagram post with demo testing invitation leaflet on May 18th, 2023,
- After registration, GPP sent (via e-mail) registered testers an invitation to the engagement event, a user manual (in Croatian), bike sharing vouchers and credentials for the TC app installation and usage,
- Engagement/visibility event with testers and other interested parties to introduce them to the demo and train them for testing (on May 26th, 2023),
- TC app testing was conducted during the week of 29.05.2023 - 02.06.2023,
- GPP sent e-mails to testers with the link to fill in USI questionnaires in Croatian and provide feedback about the app (on June 1st, 2023),
- Testers who completed USI surveys received a code from GPP to claim the reward (a free one-month GPP PT ticket).

The Osijek demo team organized the onsite **engagement/visibility event with testers** on May 26th, 2023, in Cultural Centre Osijek, in the City of Osijek. GPP Osijek and Dyvolve organized the event in cooperation with WP5 Leader. At the event, there were 12 participants in total. The aim of the event was to introduce participants to the IP4MaaS project and to prepare them for successful testing of the Osijek TC app in the upcoming week.

The **internal testing** for the Osijek demo took place between the 4th and 26th of May 2023. Testing activities included:

- Osijek demo team members downloaded and used the TC app on different mobile devices and Android operating systems, focusing on the functionalities selected for the Osijek demo.
- Dyvolve and TSP GPP provided feedback about the testing, including a description of the issues and screenshots through the Mantis bug reporting tool daily. Overall, 15 main issues were reported to CFM.
- Besides the Mantis bug reporting tool, team members discussed specific issues with CFM and WP5 Leader via e-mail and online calls.

11.2. Demo execution

Osijek demo execution took place **between 29th May and 2nd June 2023.** The targeted testers were mainly students and public transport users.

Following functionalities were successfully tested:

- Guest User,
- Journey Planner / Offer Builder,
- Journey Planning (New functionalities: Trip Planning Hierarchy, Improved Intermodal Travel, Improved Travel Shopping, Individual Last Mile),
- Navigation,
- Trip Sharing,
- Travel Arrangement,
- Traveller's Feedback,
- Preferences and Profiles,
- Group travelling/Group creation,
- Trip price overview (only informal purpose, no purchase option available).

The main communication channel of the Osijek demo team with registered testers during the execution was a dedicated e-mail address previously used for the tester's registration. TSP GPP Osijek provided feedback about testers' registrations to the demo leader Dyvolve, and distributed incentives (free monthly transport tickets) to engaged testers after they submitted USI surveys.

11.3. Demo evaluation

There were **43 registered testers** (reported by TSP GPP Osijek) in total. The testers could register through dedicated e-mail address: ip4maas@gpp-osijek.com.
After sending the code obtained by completing the survey, **12 testers** became entitled to **monthly incentives.** In the last week of demonstration period, partner AITEC reported the submission of **41 USI questionnaires.**

Demo results:

- Of 41 USI survey respondents, 34 % were females, and 66 % were males,
- 62% of testers used Journey Planner functionality,
- 60% of testers used Navigation functionality,
- Average number of modes involved in the journey per day: 2,
- Average number of shopped offers/routes planned: 2.277,
- 68% of testers were completely satisfied with the Journey Planner function, and
- 76% of testers were completely satisfied with the Navigation function.

Lessons learned:

- The TC app maturity level and usability are currently low. The feedback provided by the users is important for improving the app, making some steps further toward its utilization on a much larger commercial scale,
- Defining targeted groups of potential testers (students and PT users in the case of Osijek) is crucial for user engagement as it makes promoting the testing much better tailored in terms of channels of communication as well as content and provides better return.
- Promotion on social media is beneficial for user engagement to increase participation – Osijek demo team noted higher number of registrations after promotional publications on social media.
- Providing incentives as a reward for filled surveys is beneficial for user engagement because it motivates testers to participate and send feedback via completed USI questionnaires.
- The testers should be aware of the TC functionalities being tested and participation steps. It is crucial to inform testers that the application is still under development and that not all functionalities will work properly. Engagement events proved to be a good tool for communicating the abovementioned information and for promoting the demo testing.
- The translation of the application can be done more efficiently when the application is known to the translators. Otherwise, the lack of context creates the risk of the translation turning out confusing. It also needs to be tailored for each specific demo site in advance to avoid unnecessary translations.
- Better adaptation of the USI survey to the demo site could provide more relevant results.
- Although the "Traveller's Feedback" functionality was available for testing in Osijek, the testers did not provide additional comments. To acquire comprehensive feedback from the testers, they should be encouraged in advance to send comments and thoughts through the app.
- The most common issues during internal testing were login issues, long loading times, not accurately drawn routes on the map, and unknown public transport lines.

Impact:

The Travel Companion app could attract more people to use sustainable modes of transport and combine them, improving the efficiency of public and shared transportation, and reducing GHG emissions. However, scope of functionalities in such a service must be clearly defined based on the technical feasibility and be tailor-made for specific area and target groups.

The Osijek demo aimed to obtain the knowledge and experience of creating a MaaS ecosystem and give insight into the usefulness of certain MaaS-related technologies/functionalities, contributing to improved multimodal traveling.

Testing and demonstrating different S2R functionalities, i.e., Individual Last-mile, Navigation, My

Trips, added value to public transport users and made it possible for both the Osijek demo team and app users to explore the potential of establishing such a MaaS system.

Demo testing contributed to the successful integration of traditional modes of public transport, i.e., GPP's trams and buses with innovative e-bike & bike sharing services in Osijek. The service was offered through the Journey Planner function, which was used by more than 60% of the testers. The Journey Planner was the best solution demonstrating to the users how their multimodal trips could be eased and emphasizing the advantages of the synergy between bike sharing and public transport.

Many of the reported bugs and shortcomings were common within all demo sites. Therefore, the reported issues need to be refined and constantly upgraded in the following versions of the Travel Companion app.

12. Liberec demonstration

The Liberec region is located in the northern part of the Czech Republic and shares borders with Germany and Poland. It covers an area of 3.163 km^2, which represents approximately 4% of the Czech Republic territory. The region has a population of around 450 000 permanent residents. Administratively, the region is divided into 4 districts and 215 municipalities, of which 39 have the city status.

Figure 9: Liberec demo – region map

The main goals of demo were:

- Achieve better and smoother travelling within the region by enhancing transportation infrastructure and services;
- Improve the integration of all public transport modes, ensuring seamless connections and convenient transfers for passengers;
- Enhance the quality and comfort of services provided by transportation service providers (TSPs) to meet the expectations of passengers;
- Encourage a shift from private car transport to public transport by promoting its advantages in terms of convenience, sustainability, and reduced traffic congestion;
- Make public transport more available and flexible, adapting to the needs and preferences of passengers, including diverse schedules and route options;
- Disseminate knowledge about the IP4MaaS project across all sectors, fostering collaboration and understanding of the project's objectives and benefits.

12.1. Demo preparation

As a part of the preparation of the demo, it was necessary, as a first step, to fix the final list of functionalities that will be demonstrated.

Table 3: Liberec demo – demonstrated functionalities

Demonstrated functionalities	
Passive	**Active**
Travel Companion	Journey Planner/Offer Builder
Travel Companion Web-Portal	Improved Intermodal Travel/Individual Last Mile
Guest user	Smart Locations
Preferences and Profiles	Booking
Trip sharing	Issuing
Travel Arrangement	Validation and Inspection
Navigation	Trip tracking
Traveller's feedback	Alternatives calculation
	Asset manager

User engagement strategy

- **Central information source:** a website (www.ip4maas.cz) was prepared to which all other information channels from social networks and other websites were linked.
- **Use of social networks:** Facebook, Twitter, Instagram linked to the website.
- **Establishing the team for the demo:** The definition of responsible persons for individual streams.
- **Appropriately chosen incentive:** In order to obtain quality performance during testing and good feedback in the form of filled-in questionnaires, fixed-term agreements were concluded with precisely defined conditions for work performance and the corresponding reward upon their fulfilment.
- **Simple administration for participation in the testing:** In particular, filling out (from editable PDF) and concluding the fixed-term agreement picking up a tester card in the envelope at one of the KORID client centres.
- **Utilization of KORID customer centres in the regions:** For concluding agreements with testers, KORID has designated 3 contact points in the largest cities of the region, where it was possible to conclude a fixed-term agreements.
- **The exact rules for testing and payment of the reward:** The rules and also the conditions were specified in the agreement, i.e. fill out the questionnaires, making several multimodal trips with the Travel Companion app, etc. were the condition for the payment of the reward.
- **Chip travel cards for testers:** To ensure the clearing of fare revenue among TSPs, the testers were equipped with standard chip travel cards for check-in including a weekly network ticket valid for the whole region.

Internal coordination

The main tool for ensuring the coordination of Liberec demo partners were coordination calls through (via) available calling apps, such as Microsoft Teams, mail correspondence and check-list as a background. The coordination calls were undertaken every two weeks from the beginning of the demo preparation phase. Approximately 6 weeks before the Liberec demo, the frequency of coordination calls raised from biweekly calls to 1 - 2 times in a week, because more precise partners' organisation was needed.

Internal testing

The internal testing took two weeks before the demo execution. The testing was done by all demo partners. The internal testers utilised the Travel Companion app to explore and test its functionalities, which were scheduled to be tested in the Liberec demo. The primary objective of the internal testing was to uncover any bottlenecks and issues present in the Travel Companion app. All issues identified during the internal testing were documented in a shared Excel sheet titled "Internal testing Liberec", which was made available to all partners for references.

Training sessions

The training sessions took place online on **10/05/2023** and **11/05/2023** in the afternoon so that workers and students could also participate. The training was prepared with the cooperation of KORID, OLTIS and UNIZA in the form of a training presentation and videos. The „How to Install Travel Companion Mobile App", „Travel Companion Mobile App User Guide" and „Travel

Companion Website User Guide“ were provided for testers just prior to the date of training. In particular, 24 participants took part in the first run of the training and 32 participants in the second run. These training sessions resulted in 6 testers’ questions asked by e-mails and 8 testers’ questions asked by phone. The 1st and the 2nd training session were recorded with the permission of the participants. The 2nd recording was included on the website www.ip4maas.cz available for download .

12.2. Demo execution

The demo execution took place from **15/05/2023** 0:00 to **19/05/2023** 24:00. In particular, **100 agreements** were concluded with the testers and 99 testers filled out the USI survey. One tester didn’t complete the survey and for this reason the incentive wasn’t provided. In addition to the testers with the concluded agreements, another 24 testers participated in the demo execution, i.e. testing of the Travel Companion app and filling out the survey, without being awarded, e.g. employees not involved in IP4MaaS from KORID and other demo partners and they didn’t need a test card. As already mentioned above, in addition to the Travel Companion questionnaire, the testers also filled out a questionnaire on satisfaction with travelling by public transport in the Liberec region and with their requirements for MaaS elements. The questionnaires were filled out by **112 testers**. The testers were prompted to record their knowledge and experience in a table “FAQ sheet” to avoid duplication of feedback or uncertainty as to whether the error also occurs with others or whether there is an error in using the application. The FAQ sheet was also used by the members of the IP4MaaS team to communicate more general information (they created a question and then answered it). During testing, the Travel Companion app didn’t work for several hours. The testers were informed about it through information channels and the demo team was in touch with CFM to solve the problem as quickly as possible. Instructions for completing were published during the last day of the demo. On the same day, both questionnaires were made available. The deadline for filling them in was 26/05/2023. Subsequently, the incentives were paid out in the way the testers chose.

12.3. Demo evaluation

The demo execution was very successful, and it fulfilled the expectations of all involved partners. Even though there were several issues that arose during the testing phase (mainly on technical aspects regarding the app/ecosystem), however most of which were resolved prior to the actual launch of the demo. The testers with different levels of experience both with the transport system in the Liberec region and with the use of mobile apps have been recruited to have diverse feedback from testers.

The demo partners, especially those who had the first experience with the IP4 idea and the S2R IP4 projects, positively highlighted the idea of customer-first approach, new and inspirational functionalities and verification of abilities, procedures in recruiting testers and working with them and USI survey itself which enabled sophisticated system for receiving feedback from the testers. When it comes to the specific feedback from the testers, the following can be mentioned:

Positive:

- Complexity (a wide range of transport options);

- Great idea (suitable for future use);
- Support for modal split and multimodal mobility;
- Support for eco-friendly transport solutions.

Negative:

- Long-loading time;
- Strange, incomplete and nonsensical travel solutions;
- Instability, login issues.

If the main outputs from the preparation and implementation of the demo can be summarized, the IP4 idea itself was receive positively by the testers. They would appreciate the possibility of using such an application as the Travel Companion app in the future with all functionalities activated and well functioning. Considering that IP4 projects are research projects, it is obvious that the implementation of the Travel Companion app into real operation would require a certain amount of work, but it is precisely this type of project that makes it possible to come up with new ideas, and then testing with real testers with a wider range of experience makes it possible to verify the meaningfulness of these ideas.

12.4. Long-distance scenario

The purpose of the Long-distance demo was to test multimodal cross-border connections between 2 ongoing demonstrations in Liberec and Warsaw, which were realised with the usage of the Travel Companion app as a part of IP4 ecosystem. Another purpose was to test the multimodal itineraries across Europe.

12.4.1. Demo preparation

There were several services planned to be integrated: long-distance buses (integrated with the integration of AMS services) and trains in Poland (as Czech trains are integrated in CRWS service). After initial analysis solution of integration was proposed:

- Long-distance buses: integration of AMS (which is a reservation service for long-distance buses in the Czech Republic) with timetable data provided in GTFS format. This was fully implemented. Moreover, the Flixbus connections were also added to AMS (they are not available in AMS in standard conditions, several transborder and Polish inland connections were manually added to the test environment).

- Trains in Poland: OLTIS obtained access to Bilkom2 API test environment provided by PKP Informatyka (a subsidiary of PKP, which is a member of S2R/ER), but for capacity reasons it wasn't integrated: neither trip planning nor issuing. Instead of, timetable data was integrated from CRWS service.

The last mile connections were provided thanks to the already implemented integration in both demonstrations.

12.4.2. Demo execution

The Long-distance demo execution took place from **17/05/2023** to **18/05/2023** as a part of Liberec demo execution according to the specific travel scenario (see in Table 4).

Table 4: Long-distance demo – travel scenario

17. 05.2023			
From		**To**	
Liberec	08:35	Szklarska Poręba Górna	10:21
Szklarska Poręba Górna	10:36	Wrocław Główny	13:39
Wrocław Główny	15:09	Warszawa Centralna	19:49
18.05.2023			
From		**To**	
Warszawa,,dw.Zachodni PKS	12:30	Liberec,,aut.nádr	20:10

Apart from some technical issues with application during demo, the trip was calm and without major delays. The meeting with the Warsaw demo team took place on Thursday (18/05/2023) in Warsaw, where experiences of demos were shared. The tested functionalities were similar to those in the entire Liberec demo execution, including app version, functionalities, etc.

When it comes to the number of testers, 10 testers participated in the Long-distance demo. The testers were employees of Liberec demo partners not directly involved in the project, of whom testers were from UNIZA, 3 testers were from OLTIS and 3 participants were from KORID. All testers tested selected IP4MaaS functionalities in cross-border conditions as well as took part in the collaboration meeting with the Warsaw demo team during the execution. The USI survey was neither prepared nor collected because the group of 10 people were interviewed directly. Also, Liberec and Warsaw demo USIs were provide enough details about the usage of the application in the specific environments.

12.4.3. Demo evaluation

The long-distance demo proved, in general, that it is possible to create an app integrating different TSPs in different countries and provide unified information for travellers (all other IP4Maas demos were in local territory) on multi-modal international travel, with booking all of the needed tickets and other functionalities. The app itself provided a lot of different useful options all of which were also usable in the Long-distance demo.

13. Warsaw demonstration

13.1. Demo preparation

Preparation phase

The Warsaw demonstration preparation phase consisted of the following activities:

- Regular coordination calls/meetings
- Task division between demo leader and TSPs
- Creation of User Engagement Strategy
- Creation of task Check-list with assigned task owners and deadlines: **Check-list-Warsaw_demo_final.xlsx**
- Division of Warsaw demo team tasks into 6 substantial groups:
  - Management
  - USI
  - Recruitment
  - Promotion
  - Workshops
  - Application, and assigning task group owners
- Risk assessment with assigned mitigation measures
- Cooperation in preparing and translation of the USI questionnaire
- Selecting the Travel Companion functionalities to be tested in Warsaw
- Translation of the Travel Companion app
- Providing access to the necessary local journey planning web-service API
- Providing access to data sources necessary for proper functionalities' integration
- Coordinating the integration process with the CFMs
- Internal testing and providing feedback to the CFMs with the use of the Mantis bug reporting tool
- Preparing materials and scenarios for trainings for the testers and conducting the online trainings.

User engagement strategy

The User Engagement Strategy for the Warsaw Demo was mainly focused on the selection of the target groups of testers, defining communication channels and recruitment process as well as selecting proper incentives that would encourage active participation and delivering the filled in USI questionnaires.

The Warsaw Demo team decided to recruit testers among their employees not involved in the project (to ensure objective feedbacks) and their families, as well as among the students of relevant faculties of Warsaw universities.

Wireless headphones were selected as incentives.

The User Engagement Strategy for Warsaw demonstration consisted of:

- Internal communication using e-mails of ZTM, MZA, TW (messages sent on 3rd and 6th April 2023) and ZTM's, MZA's and TW's corporate intranets (publications on 3rd April and 17th April 2023),
- Posting information on ZTM website (starting from 3rd April 2023),
- Posting information on MZA webkiosks (19th April2023)
- Posting information on information boards at MZA bus depots (19th April 2023)
- Posting information on ZTM's, MZA's and TW's Facebook pages (26th April 2023),
- Cooperation with Warsaw universities (Faculty of Geography and Regional Studies University of Warsaw, Faculty of Transport – Warsaw University of Technology and The Institute of Infrastructure, Transport and Mobility, Warsaw School of Economics) - posted on their departments' websites (started from 3rd April 2023),
- Providing information about incentives - wireless headphones,
- Providing non-obligatory online trainings for testers with a choice of 3 different dates,
- The requirements for testing the application were: age above 18, a device with Android minimal version: 7.

Trainings for testers

Tester training activities for Warsaw Demo consisted **of 3 online training sessions for registered testers that took place on 11th, 12th and 16th May 2023**. The trainings were prepared and conducted by Aleksandra Puzyńska. The participation was not mandatory.

The attendance was very low: respectively **4, 3 and 6 people**.

Internal testing

The internal testing for the Warsaw demonstration took place **between 5th and 14th May 2023**. All Warsaw demonstration team members downloaded and used the application with special focus on the functionalities selected for Warsaw demonstration and provided feedback including description of the issues, screenshots and screen recordings to one contact person for the demo leader, was responsible for reporting all issues through the Mantis bug reporting tool and for communication with the respective CFM representatives.

The reporting of the issues was continued during the Warsaw demonstration execution as well as right after the demonstration, when final feedback was provided to the CFMs due to the fact that some of the testers provided additional feedback after the demonstration.
During the internal testing phase, 17 main issues were reported to the CFMs.

13.2. Demo execution

Dates of the Warsaw demonstration: between **15th and 19th May 2023**.

Table 5: Warsaw demo – demonstrated functionalities

List of Travel Companion functionalities planned for Warsaw demo	
Asset Manager (TSP)	The platform to provide and describe the services and facilities in the IP4 platform and identify the integration of these services in the IP4 ecosystem
Journey Planner	The function to find routes involving different modes of transport (metro, tram, bus…) in a journey from an origin to a destination
Navigation	The function to navigate to the correct metro or bus stop based on the user's position, including the interchanges among different means of transport
Traveller's Feedback	The function for submitting or providing feedback about delays, cleanness of stations, disruptions, and crowdedness in public transportation or road environment that might be helpful for other travellers
Trip Sharing	The function for sharing an ongoing trip and journey updates to other users
Travel Arrangement	The function for planning trips for other application users
Guest User	The function for using the application as a guest, i.e. without logging in, for quick trip planning including features such as navigation and shopping experience
Digital Onboarding	The function that allows the use of biometrics (fingerprint) to log in the Travel Companion app
Collaborative Space (travellers)	The function for the travellers for sharing their experiences such as the quality of transport services, delays, overcrowding, and security issues on stations or vehicles, and view other users' experiences

13.3. Demo evaluation

Overall, **244 testers registered** through dedicated e-mail address:
rekrutacjaip4maas@ztm.waw.pl
The submission of **204 USI questionnaires for travellers** have been reported by AITEC.
The submission of **7 USI questionnaires for TSPs** have been reported by AITEC.

Lessons learned

- The type and value of incentives is crucial for user engagement, because it provides motivation for participation as well as delivering completed USI questionnaires,
- The communication necessary for user engagement has to be repeated in different iterations in order to increase the participation – we noted waves of registrations after each publication,

- Defining targeted groups of potential testers is crucial for user engagement as it makes communication promoting the testing much better tailored in terms of channels of communication as well as content and provides better return,
- The translation of the application can only be performed properly when the application is known to the translators, otherwise the lack of context creates the risk of the translation turn out confusing,
- It is paramount to have an application duly translated in all its parts, in order to avoid any kind of confusion in the users,
- The TC app maturity level, as well as its usability, is low in comparison to a commonly used journey planning application available in Warsaw. This makes the TC good if its utilization is planned in the frame of a research project such as IP4MaaS, with a relatively low TRL level, and the feedback provided by the users is important for improving the app making some steps further towards its utilization on a much larger scale,
- It is important to adapt the USI survey to the potential spectrum of users (for example, identifying the best place where to put the box for written feedback, largely used by Warsaw demo participants).

Impact

The goal of the WD as part of the IP4MaaS project was to obtain and deliver feedback on the functioning and usefulness of selected functionalities of the TC application from its users, as well as their possible readiness to use some features for a fee.

The aim of the Warsaw Demo team was to get knowledge and experience necessary to contribute to Warsaw's MaaS readiness as well as understand better the process of implementing MaaS-related technologies.

Both the general goal of Warsaw Demo within the scope of the IP4MaaS project and the local goal of the City of Warsaw as the IP4MaaS consortium partner have been accomplished.

Warsaw's testers' feedback has been considered helpful by the CFMs and the Warsaw Demo team has been informed that some of the reported downfalls have already been refined in the following versions of the Travel Companion app, showing the importance of the iterative process and the "learning by doing" approach utilized in IP4MaaS.

The improved features regarded mainly the saved travels displaying mode, biometric login issues or photo/video feedback loading time in Collaboration Space for travelers.

14. Conclusions

In the first step, a unified procedure was created for the preparation, execution and validation of the demo. The goal was to give all demo teams instructions, i.e. what not to forget, based on experience from previous projects, especially the Shift2MaaS. On the other hand, the demo teams were left with freedom regarding approach to individual steps, e.g. user engagement strategy, etc., taking into account demo's objectives, conditions and scope of the demonstrated functionalities.

First of all, it is possible to evaluate that all demos followed the suggested step-by-step process. Most of the demos chose to use social media to recruit testers and it was evaluated as a useful lesson learned. The leaflets or short information messages were created for this purpose or directly linked to dedicated website (in the case of Liberec demo) or other portal (partners' websites, social media accounts, etc).

The second matter was the targeting of the testers and the engagement strategy. Some demos teams tried to recruit citizens or tourists and for this reason they adapted the tools used for engagement to the audience targeted. Other demo actors focused on recruiting testers form employees not directly involved in the project, , experts in transport, IT or given transport systems, students/professors communities, and also internally among their private contacts/word of mouth.

Another point to be mentioned involves the importance of the training sessions. Most of the demos decided to organize training session (mainly online) with voluntary, although recommended, participation. The training sessions proved to be very beneficial for those involved, as per feedback directly received by them. Despite this, in some cases, participation was low and for this reason, a lessons learned is to promote these trainings as mandatory and integral part of the demo, to be followed by all involved testers to better understand how to use the IP4 solutions and to ask questions, getting direct answers

As mentioned, the testers, except for one demo, were rewarded for their participation in testing and survey completion. In one case the testers signed agreement and thus received a reward. In another case, the testers were given a tangible incentive, in particular headphones. The rest of the demos motivated potential testers with tickets, both for individual trips and time tickets (up to one month). All demo leaders agreed that the incentives have to be attractive and with the greatest possible value, to keep the testers motivated to participate providing added value to the demo.

Regarding the number of testers, some demo leaders agreed that it is better to recruit testers as a small focus groups, with direct contact and the possibility to perform multiple iteration of the testing in a more focused way and with direct support from the demo team. The main reason is that the testers and the demo partners agreed that the Travel Companion app is still in the development phase and therefore it is better to conduct intensive testing in smaller groups, whose participants are more open to give their feedback (the involvement of at least a portion of expert testers can increase the quality of the feedback).

Regarding the demo preparation, the demo teams agreed that as part of the translation of the application texts into specific languages, it is necessary to have application in advance, familiarize with its behaviour and thus understand all its features. As well as within the lessons learned, they

recommended a better adaptation of USI survey due to individual demo conditions.
When it comes to the identified issues during the internal testing, all demos encountered similar issues. This allowed CFM side to react more quickly and find solutions to resolve them. The issues that appeared uniquely for individual demos (due to unique integrated services) required more effort and more intense communication and cooperation to solve them.
Overall, the demos can be evaluated as successful, as they enabled the Travel Companion app and more in general the IP4 developed solutions to be tested in various European areas, whether focused on urban or suburban. Above all, the demos made it possible to demonstrate the possibility of integrating services from different TSPs, possibility of adapting these services into the IP4 ecosystem. But most importantly, the testers appreciated the IP4 ideas and their potential, the possibility of using the Travel Companion app and its functionalities in everyday life, and recommended continuing development and implementation.

15. References

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