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Deliverable D5.5
Final report on Osijek demonstration execution

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Name	Beneficiary Short Name	Details of contribution
DYVOLVE Ltd.	DYV	Osijek demo leader - report preparation
OLTIS	OLT	Official Review
CERTH	CERTH	Official Review

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1. Executive Summary

The aim of the Deliverable 5.5 “Final report on Osijek Demonstration execution” is to present the timeline and details of the preparation and execution of Osijek Demonstration taking place in the framework of the IP4MaaS project within the Shift2Rail Joint Undertaking. The demonstrated technologies were selected functionalities of the Travel Companion application.

The demonstration consisted testing the Travel Companion application to a group of recruited users who were given a link to download and install the application, use it while travelling by means of GPP Osijek (buses and trams) and by shared bikes and e-bikes, and provide feedback regarding the selected functionalities. Testers provided feedback using the online User Satisfaction Index questionnaire form. The USI questionnaire was developed as part of the WP3, task T3.2 “User satisfaction with IP4 solutions”.

Major contribution of Osijek demo preparation and execution was the integration of public transport and bike sharing services in Osijek into the journey planning tool.

Deliverable 5.5 outlines the various activities that took place as part of coordination, preparation, and execution of the Osijek demonstration, reports the contribution of the Osijek demonstration team to technological integration, reports the internal testing of the integrated technology and the outcomes and findings of the Osijek demonstration activities.

2. Abbreviations and acronyms

Abbreviation / Acronym	Description
CFM	Calls for Members
DL	Demo leader
EU	European Union
FS	Financial Statement
GA	Grant Agreement
H2020	Horizon 2020
IP4	Innovation Programme 4
MaaS	Mobility As a Service
OC	Open Call
PC	Project coordinator
PM	Project manager
PMO	Project Management Office
PMT	Project Management Team
PO	Project Officer
PT	Public Transport
QAC	Quality Assurance Committee
S2R JU	Shift2Rail Joint Undertaking
TC	Travel Companion
TL	Technical leader
TSP	Transport Service Provider
WP	Work Package
WPL	Work package leader

3. Background

The present document constitutes the Deliverable D5.5 “Final report on Osijek demonstration execution” of the T5.5 “Osijek demonstration” of the WP5 in the framework of the IP4MaaS project (GA number 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.

The results and conclusions of the Osijek demo execution presented in this document also contribute to T5.1 of the IP4MaaS project – "Coordination of the demonstrations executions" and corresponding D5.1 "Results of the demonstrations". Results contribute to WP6 D6.2 "Performance assessment".

4. Objective/Aim

This document describes the preparation, execution, and results of the Osijek demo within task T5.5, “Osijek demonstration” of the WP5 “Demonstration Execution Support” of the IP4MaaS project.

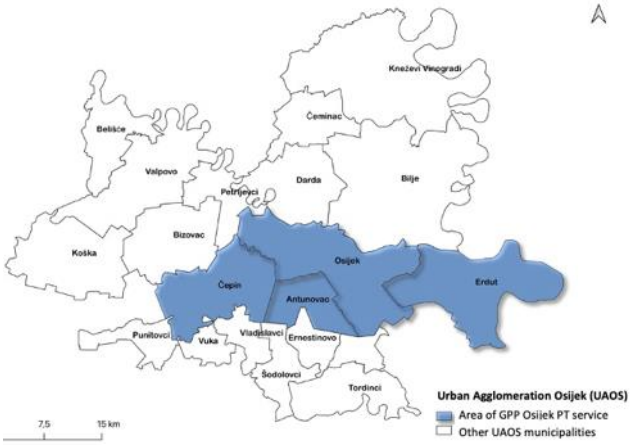
The IP4MaaS project aim is to promote the adoption of Mobility as a Service (MaaS) schemes by testing the technologies developed within the IP4 Shift2Rail through six demonstrations conducted in Europe: Athens, Barcelona, Liberec, **Osijek**, Padua, and Warsaw. The aim of the document is to describe:

- the Osijek demo objectives and purposes,
- the process and development of the Osijek demo through dedicated meetings and workshops aimed to coordinate and foster the demo preparation and execution,
- the demonstrated functionalities and selection process of the functionalities integrated for the Osijek demo,
- the development of the User Engagement Strategy that was designed and implemented by the Osijek demo team,
- the internal coordination and internal testing of the Travel Companion application,
- the training of the testers of the Travel Companion application (engagement event),
- the reporting of the issues regarding the Travel Companion application,
- the Osijek execution phase: the number of registered testers, used functionalities, structure, and satisfaction of testers with functionalities, the number of USI questionnaires delivered, etc., and
- the lessons learned.

5. General information about demonstration site

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



The Osijek demo site stakeholders that prepared, coordinated, and executed the demo were:

- **Dyvolve** (Osijek demo leader (DL)) represented by Mr. Domagoj Majcan, Mr. Božo Cicvarić, Mr. Gordan Topolovec, and Mr. Saša Bart,
- **Gradski prijevoz putnika d.o.o. Osijek (GPP Osijek)** (public tram and bus TSP) represented by Mr. Behar Rečica, Mr. Goran Pajnić, and
- **Nextbike** (e-bike and bike sharing service provider) represented Mr. Ante Gustin.

Osijek demo goals:

- 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).

Achievement of the goals mentioned above contributed to achieving the main goal: to gain the knowledge and experience of creating a MaaS ecosystem and ultimately speed up the future uptake of MaaS technologies.

6. Preparation phase

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

- Regular communication and coordination regarding the demo preparation (internal - between demo team members, and external - with WPL and with CFM),
- Creation of a demo time plan and task division between DL, GPP Osijek, and Nextbike,
- Creation and regular update of tasks checklist in Excel with assigned task owners,
- Preparation of multimodal test cases for the Osijek demo site,
- Preparation and translation of all the necessary documentation to Croatian language (*Travel Companion application* (TC app)*, Terms & conditions, TC user guide, USI survey*),
- Risk assessment and assigned mitigation measures mainly related to fulfilling the technical prerequisites for the demo (necessary data and APIs preparation),
- Fulfilling technical prerequisites for successful functionalities' integration:
    - Preparation and update of GPP Osijek's GTFS and GeoJSON files and providing access to data sources through API,
    - Established cooperation between GPP and Nextbike and fulfilment of technical prerequisites (API access) for the integration of bike-sharing service, and
    - Preparation of OTP Journey Planner for the integration by OLTIS (WPL),
- 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 based on the results,
- 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, and
- Management and communication with demo testers via e-mails and social media.

Pilot time frame												
OSIJEK DEMO SITE	2023											
	April				May				June			
	1	2	3	4	1	2	3	4	1	2	3	4
Addressing possible testers through the identified channels												
Selection of testers, distribution of initial instructions												
Internal testing of TC and other functionalities												
Training of testers and distributing bike sharing vouchers												
Pilot execution												
Distribution of USI questionnaires and incentives (free one-month PT ticket)												
Pilot evaluation												

Figure 1: Osijek demo time frame (green colour represents main preparation activities)

6.1. Demonstrated functionalities

The Travel Companion application version tested in Osijek was "TravelCcompanion-r156-demo-regular-release.apk". It was provided by CFMs partners to the demo leader/WP5 leader.

The initial set of Travel Companion functionalities [1] planned for Osijek demo included Journey Planning and Navigation, focusing on multimodal trip planning. However, after internal testing, the Osijek demo team decided to test other functionalities also available in the TC app. A comprehensive list of all tested functionalities in Osijek is shown in the Table 1 below. GPP supplied the functionalities with GTFS data and data acquired from bike-sharing service provider Nextbike (GPP and Nextbike APIs).

Table 1: List of Travel Companion functionalities planned for Osijek demo

List of Travel Companion functionalities planned for Osijek demo		
16	**Guest User**	The function for using the application as a guest, i.e. without logging in, which allows a TC user to use limited functionalities of the personal application, e.g., quick trip planning including features such as navigation.
1	**Journey Planner / Offer Builder**	Calculates multimodal routes from origin to destination, involving different traditional modes of transport (tram and bus) and innovative last mile services (e.g., e-bike and bike sharing).
A1-5-6-7	**Journey Planning - New functionalities: Trip Planning Hierarchy, Improved Intermodal Travel, Improved Travel Shopping, Individual Last Mile**	**Trip Planning Hierarchy** - Adding a hierarchy for the presentation of the increasing variety of results in intermodal trip planning (e.g., by transport mode or TSP) **Improved Intermodal Travel** - To improve intermodal travel solutions calculated by the Travel Shopping, it will enable private transport to be the main part (in the middle of) the travel solution. **Improved Travel Shopping** - Journey Planning will find trips and offers according to multiple criteria Pareto-optimization. **Individual Last Mile** - Individual trips of user will be enriched by the existing router for individual transport (walk, bike, car) to serve the first and last mile for an end-to-end travel experience. Improved Travel shopping
10	**Navigation**	Provides guidance on the traveller's trip. The

List of Travel Companion functionalities planned for Osijek demo		
		function to navigate to the correct tram or bus stop based on the user's position, including the interchanges among different means of transport (e.g., bike sharing and tram/bus stations).
12	**Trip Sharing**	The function for sharing an ongoing trip and journey updates to other users.
14	**Travel Arrangement**	The function for planning trips for other application users.
11	**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.
17	**Preferences and Profiles**	The function for customizing the application and setting different travel preferences such as payment method, special needs, favourite mode, seat selection, refund, and monitoring trip.
13	**Group travelling/Group creation**	Group Admin can set up a group and invite group members (without Group Ticket purchase option).
-	**Trip price overview**	The function for calculating trip price and informing a TC user about a ticket price for public transport on certain calculated routes. NOTE: Only informal purpose; no purchase option is available.

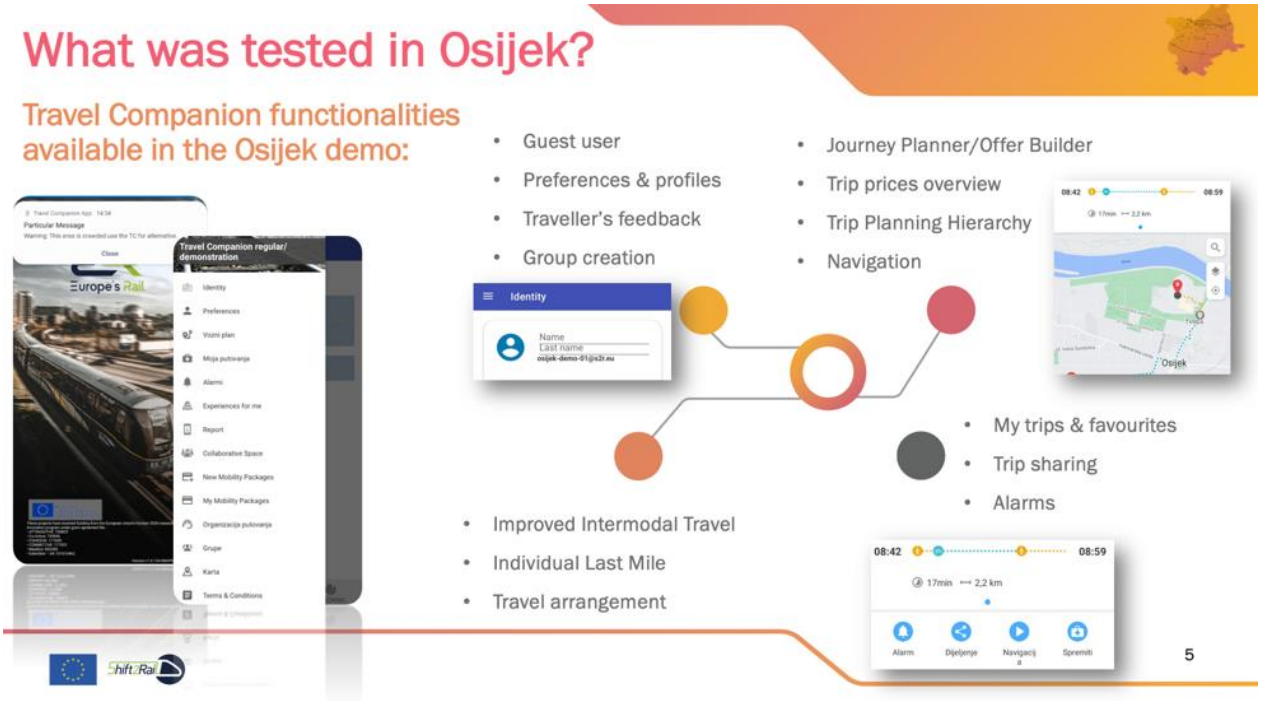


Figure 2: Illustration of tested functionalities in Osijek demo site

6.2. User engagement strategy

The User engagement strategy for the Osijek demo site consisted of the **following activities:**

1. Internal communication via e-mails and phone calls between demo leader Dyvolve, GPP Osijek, Nextbike, City of Osijek, WPL, and CFM.
2. 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 (students and existing public transport users).
3. Promotional campaign for Osijek demo - posts on social media:
    a. GPP's Facebook post with demo testing invitation leaflet on May 18th and 22nd, 2023
    b. GPP's Instagram post with demo testing invitation leaflet on May 18th, 2023.
4. 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.
5. GPP also provided information to testers about the reward (free one-month GPP PT ticket).
6. DL and GPP organized an engagement/visibility event (training session) with testers and other interested parties to introduce them to the demo (on May 26th, 2023).

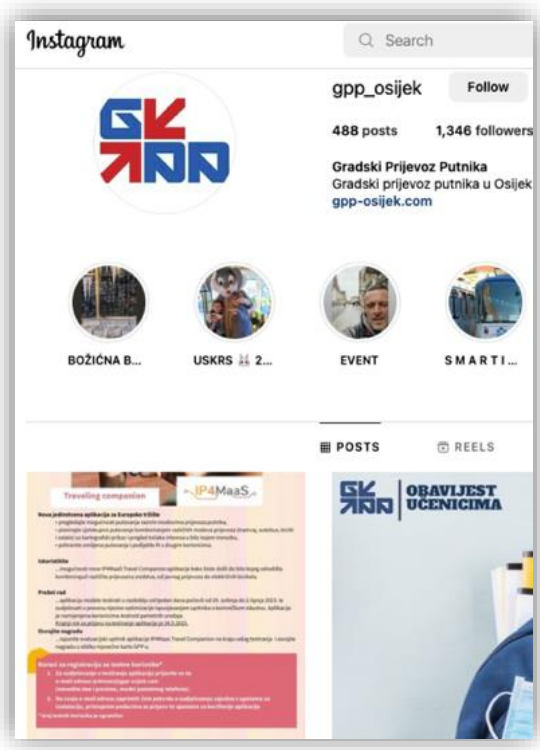


Figure 3: Screenshot of GPP's Instagram post about Osijek demo containing digital demo leaflet

Figure 4: Screenshot of GPP's Facebook post about Osijek demo containing digital demo leaflet

The figure below shows a digital leaflet that GPP Osijek and DL prepared to attract TC app testers.

Figure 5: Digital leaflet with a call and registration steps for TC app testing prepared by GPP Osijek in cooperation with demo leader Dyvolve

6.3. Internal coordination

Internal coordination was mainly done between Osijek demo team members and WPL. The coordination **included the following activities:**

- Participation of Osijek demo team members in monthly WP5 coordination online calls organized by WPL, from December 2021 to May 2023 (status checks for each demo site, WP5 updates, and discussion about risks and challenges),
- Regular weekly online calls between Osijek demo team members and WPL in April and May 2023 (updates on Osijek demo progress presented in the Excel checklist of tasks with assigned task owners, task priority, deadlines, completion status, and comments),
- Participation in meetings and workshops with the CFMs and the consortium,
- Regular and ad-hoc phone calls and online calls between Osijek demo team members,
- Regular correspondence via e-mail between Osijek demo team members, WPL, and all relevant parties in all matters regarding the IP4MaaS project and Osijek demo preparation.

Table 2: List of Osijek demo partners, their roles, and responsibilities

Demo partner	Role	Responsibilities
Dyvolve	Osijek demo leader	• Supervision and coordination of all Osijek demo preparatory activities, tasks, and deadlines, • Active participation in Osijek demo activities, • Status check reporting and cooperation with WPL and CFMs, • Preparation of all relevant project documents and reports, • Osijek demo risk management/mitigation, • Internal TC testing and issue reporting, and • Translations of all necessary documents/features into Croatian language.
GPP Osijek	TSP	• Support, feedback, and active participation in Osijek demo preparatory activities, • Support in the preparation of relevant project documents and reports, • Establishing technical prerequisites for the demo (preparation and update of necessary data (GTFS) and API for the demo, etc.), • Publishing information about the Osijek demo, and providing feedback about testers' registrations to Dyvolve, and • Distributing incentives to engaged testers.
Nextbike	Bike sharing TSP	• Providing data and access (API) for the integration of bike sharing service with other modes of transport, and • Providing vouchers for bike sharing services during demo testing.

6.4. Internal testing

The internal app testing for the Osijek demo took place **between the 4th and 26th of May** 2023. Osijek demo team members downloaded and used the TC application on different mobile devices and Android operating systems, focusing on the functionalities selected for the Osijek demo. DL and TSP GPP communicated with respective CFM representatives almost daily. They provided feedback about the testing, including a description of the issues and screenshots through the **Mantis bug reporting tool** [2]. Besides the Mantis bug reporting tool, team members discussed specific issues with CFM and WPL via e-mail and online calls.

During the internal testing phase several issues arose and were reported, which are listed in the table below:

Table 3: List of the Osijek demo TC app issues reported during the internal testing

	Osijek demo internal testing TC app issues reported			
No.	Issue	Description	Impact	Issue status
1	**Impossible TC login issue**	The TC app didn't open or respond even after a long waiting time (45 -120 seconds).	crash	Fixed – It was an issue with the authentication service.
2	**Slow TC app opening issue**	Starting the TC app sometimes took 5 - 15 seconds.	low	Fixed – It was a temporary issue. When there is a high load on the system, login may take longer. Otherwise, it takes only 2 seconds.
3	**Preferences - Update issue**	3.1. "Preferences" changes could not be remembered, with a screen message: "Preferences couldn't be saved." or the app crashed. 3.2. It took at least three trials to make the same changes for them to be remembered.	high	3.1. Fixed – CFM restarted the preferences module, so that the app could keep the changes. 3.2. To be improved – CFM cleaned up Cloud Wallet, but it still takes a few trials for the module to keep the changes.
4	**Preferences - Missing option issue**	In the "Preferences" menu, under the "Preferred carrier" submenu, GPP Osijek was not available as an option.	low	Suspended – This section was removed by CFM. Carrier preferences were used in the preceding project and no longer impact the trip search.
5	**Identity - Mission "Country" option issue**	The "Identity" feature had no option to select "Croatia" as a County.	low	Suspended – The issue/functionality had no impact on testing the app. A new Android library would be needed for Croatia to be listed, which would take too long and extend demo testing deadlines.
6	**Identity - User data save not possible issue**	When trying to save user data changes, a message appeared on the screen: "Form not valid".	low	Suspended – The functionality did not impact testing the app (Journey Planner, etc.). Since the users got credentials, including a username, they did not need to save additional

	Osijek demo internal testing TC app issues reported			
No.	Issue	Description	Impact	Issue status
				personal details. CFM needs to change module in the frontend.
7	**POIs - Bike sharing stations missing on the map issue**	The JP map showed only tram and bus stops as POIs. Bike sharing stations should have been added to the map.	high	Fixed – CFM successfully added Bike sharing stations as POIs to the map by using Excel file describing the stations. It improved trip planning.
8	**Journey Planner - Long connection search time issue**	After entering an origin and destination, in some cases, it took 40 - 60 seconds for s trip to be calculated.	low	No change required – System architecture is designed to support trip planning across the EU, unlike trip planners that cover only one city/country, so longer calculation time is necessary.
9	**Journey Planner - Non-logical walking route issue**	JP map showed a recommendation for walking to a tram station that was much longer than it should be.	medium	Unable to reproduce – First and list mile rides are calculated based on Open Street Map (OSM). It was a mistake in OSM (data source), so CFM couldn't fix it in the app. No other examples were reproduced, so the impact was low.
10	**Preferences & Journey Planner - Preactivated PRM options issue**	Sometimes, in the "PRM" (People with reduced mobility) menu, certain options (e.g., old person) were randomly, *a priori* activated instead of being manually activated by a user. These activations limited trip planning, e.g., bike sharing mode was unavailable in the JP.	high	Fixed – CFM has unchecked/"unactivated" PRM options from their side.
11	**Journey Planner - "Unkown lines" and wrong line numbers issue**	Sometimes, JP displayed an "unknown line" or incorrect line number/type on a screen instead of a defined, accurate tram or bus line. This issue was due to deviations between the requested data and stop coordinates data from GPP's GTFS file (which caused the inability to find a stop).	high	Partially fixed – CFM modified the requested departure time to 10 seconds earlier than the actual departure time so that there is enough time to walk from a slightly wrong coordinate to a correct coordinate of a stop. GPP's GTFS data contains unprecise data about line numbers and codes, which is an integration issue. It should be improved after the GTFS update in the future.
12	**Journey Planner - Not all tram lines displayed/offered**	For some calculated and displayed routes, tram lines that could be chosen in real life weren't offered/displayed in the app.	high	Suspended – This was not an app issue but an integration issue. Incorrect departure data is written in GPP's GTFS file. It should be improved after the GTFS update in the future.

	Osijek demo internal testing TC app issues reported			
No.	Issue	Description	Impact	Issue status
13	**Journey Planner - Remote bike sharing places issue**	In some cases, the bike sharing part of a trip was offered in remote places far away from bike sharing stations.	high	Partially fixed - Mode "allowKeepingRentedBicycleAtDestination" was disabled. Also, the "walkReluctant" mode was integrated into the app, which shortened long walks to the nearest bike station. To fully fix the issue, the geojson polygon of the existing bike sharing service area (which highly exceeds the bike station area) needs to be sized to a smaller area.
14	**Journey Planner - Tram and bus routes displayed as straight-line issue**	In some cases, the JP map displayed tram and bus lines only as straight polylines between stops ("cutting" houses where no straight street connects the subsequent stops).	high	Suspended – This is an integration issue, not an app issue. To be improved after the GPP's GTFS file update in the future.
15	**My Trips - Saved trips removal issue**	Saved trips couldn't be removed (deleted) from the list.	low	Suspended – Saved trips are read from the Cloud Wallet and displayed under “My Trips” but cannot be deleted by the user. This feature should be added in the future.

6.5. Training session

The Osijek demo team organized the **engagement/visibility event with testers** on **May 26th, 2023, in Cultural Centre Osijek** (address: Kulturni centar Osijek, Ul. Kneza Trpimira 2/A, Osijek). GPP Osijek and Dyvolve organized the event in cooperation with WPL. 12 users participated in total at the event.

The aim of the event was to introduce participants to the IP4MaaS project and to **prepare them for the successful testing of the Osijek TC app** in the upcoming week. At the event, participants were instructed on how to use TC functionalities available in Osijek demo. Osijek demo team also showed participants different multimodal trip planning examples/scenarios to better understand the "Trip planner" feature. Besides Osijek demo instructions, other topics were also presented at the event.

Topics that were presented at the event were:

- About TSP GPP Osijek (presented by Mr. Behar Rečica from GPP),
- Introduction to demo testing in Osijek (training) (presented by Mr. Božo Cicvarić and Gordan Topolovec from DL Dyvolve), and

- Experience from previous IP4MaaS demo sites (presented by Ms. Petra Juránková from WPL OLTIS).

Figure 6: Engagement event with testers in Osijek (1)

Figure 7: Engagement event with testers in Osijek (2)

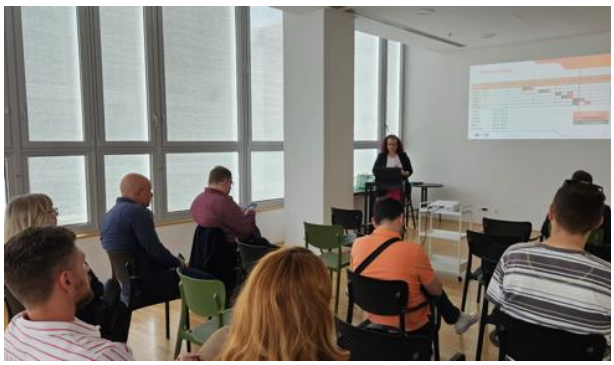


Figure 8: Engagement event with testers in Osijek (3)

Figure 9: Engagement event with testers in Osijek (4)

Both the User guide and TC app screenshots shown to participants at the engagement event turned out to be beneficial tools, since, during the internal training, the application crashed, was unresponsive, and it was sometimes difficult to demonstrate the use of specific selected functionalities in real time. The guide allowed people to understand how to use the app and how to behave in case of disruption. Inputs have been given to CFMs based on this internal testing, used for fixing the emerged issues when and if possible.

7. Demo execution

Testing period:
Osijek demo execution took place **between 29th May and 2nd June 2023.**

Functionalities tested:
All the functionalities that were planned for testing in preparation phase were successfully tested. The functionalities tested are displayed in a table in 6.1 “Demonstrated functionalities”.

Osijek demo coverage:
Demo testing took place in areas where GPP Osijek public transport service/network is available and in 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).

Testers:
The targeted testers were mainly students and public transport users.
There were **43 registered testers** (reported by TSP GPP Osijek).
On June 1st, 2023, GPP sent e-mails to testers with the link to fill in USI questionnaires in Croatian and provide feedback about the app. Partner AITEC reported the submission of **41 USI questionnaires**.
To attract demo users, GPP provided incentives in the form of a monthly transport ticket. By sending the code obtained after completing the survey, **12 testers** became **entitled to monthly incentives.**
USI surveys were opened to testers one week after the execution period to get more feedback from the testers.

Communication:
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: ip4maas@gpp-osijek.com.

8. Evaluation phase and results

Evaluation of Osijek demo and USI survey results [3]:

- Structure of testers:
  - Of 41 respondents, 34 % were females, and 66 % were males.
- Good response to **multimodal journey planning testing**, which was one of the main demo objectives:
  - 62% of testers used Journey Planner functionality,
  - 60% of testers used Navigation functionality,
  - Average number of modes involved in the journey per day: 2,
  - Total number of shopped offers/routes planned: 2.277.
- Satisfaction of respondents with the functionalities:
  - 68% of testers were completely satisfied with the Journey Planner function, and
  - 76% of testers were completely satisfied with the Navigation function.
- There was one reported login issue; one tester could not log in with credentials/accounts prepared for Osijek demo testers, even after many trials with different accounts prepared by CFM. The device that the tester used was Google Pixel 5.

Lessons learned:

- The TC application maturity level and usability are currently low. This makes the TC suitable if its utilization is planned in a research project such as IP4MaaS, where it can be improved with the "learn by doing" method. 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 the testing promotion more tailored (it is easier to define communication channels and get better results).
- Promotion on social media is beneficial for user engagement and to increase participation. Osijek demo team noted higher number of registrations after posting information about the demo on social media.
- Providing incentives as a reward for filled surveys is beneficial for user engagement because it motivates testers to participate in testing 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.
- The quality of certain app functionalities also depends on data provided by TSPs and data integration. More time and effort should be foreseen for the data integration phase of the project.
- 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 their comments and thoughts through the app.

9. Conclusions

Osijek was one of six demo sites in the IP4MaaS project where selected S2R IP4 functionalities were successfully tested and demonstrated.

The Osijek demo partners succeeded in obtaining the knowledge and experience of creating a MaaS ecosystem and gathering 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 tested 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.

The feedback from the users was acquired through completed USI questionnaires (41). The testers did not provide additional comments. To collect helpful feedback for the further optimization of the app, users need to be encouraged to provide feedback through different features.

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.

To briefly summarize users' opinion, the Travel Companion is an app with high potential as it 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. Also, the app development requires constant improvement and refinement based on feedback from demo teams and users, focusing on user experience. Promoting such services is also of great importance and should not be underestimated. Overall, it is very good to have this tool tested as a part of a research project, collecting inputs for refining the ecosystem.

As a conclusion, the technological solutions have a good potential, understood by users, but still need further development and improvement to meet the growing demands for multimodal mobility. 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. In the project all issues have been communicated to CFMs, who used the inputs collected to work when/if possible on the ecosystem and improving it for the following demo.

10. References

1. IP4MaaS - IP4 Functionalities and Matrix
2. HAFAS Internet Mantis Tool (https://mint.hafas.de)
3. IP4MaaS - T3.2 “User satisfaction with IP4 solutions”; data collected from AITEC (June 2023)

11. Appendices