# Report Electric Mobility Europe

## Electric Mobility As A Service
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## ^ 0 Report summary

The program has the goal to advance the adoption of electric mobility in Europe. The eMaaS project does this by combining innovative technology and new business models to create the conditions for a large-scale adoption of Electric Vehicles, which are becoming more and more cost competitive. We connect EV sharing services to other eco-friendly modes of mobility, such as electric public

transportation, with the aim to change the mobility mindset by optimizing the total mobility chain. The two key learnings are that standardized interfaces to an eMaaS platform are a must and that there is an opportunity to exploit mobility data by offering it as a valuable service to transportation operators and cities.

## ^ 1 Project Electric Mobility As A Service (eMaaS)

## ^ 1.1 Objective

The overall objective of eMaaS is to increase the adoption of electro mobility by making EV's price and performance comparative to ICEV's. To achieve this a combination of innovative technology and new business models have been developed to enable EV sharing. eMaaS will unite the fragmented market of eco-friendly mobility options such as e-car, e-bike and ride sharing, public transport and boost the uptake of e-mobility. We aim to do more than simply replacing fossil-fuelled cars by causing a paradigm shift to reduce the total number of cars and increase the usage of zero-emission mobility.

eMaaS aims to reduce GHG emissions and overcome congestion & parking problems and high e-mobility costs by offering 'electric mobility as a service'. It will enable others to easily become mobility providers by offering a comprehensive & cost-effective e-mobility solution encompassing various modalities. The disruptive innovation is to transform from individual asset ownership, e.g. an underutilized fleet of fossil-fuelled cars, into an almost "infinite" pool of shared electric mobility modalities within a larger community of fleet operators. "Sharing" becomes the underlying principle of e-mobility.

A main goal is to launch and evaluate a cloud-based open electro-mobility as a service (eMaaS) the eMaaS Back-Office Solution. The eMaas Back-Office Solution is a suite of management functions which both enables the shared usage of e-mobility, fleet management functions (routing & scheduling, maintenance management, billing etc) and integration of existing mobility applications. eMaaS Back-Office supports the entire mobility value chain, from e-cars and e-bikes to public e-transport. To achieve this, we will connect different existing and proven components from partners via the platform so that the mobility provider can deliver the shared e-mobility solution to their end users exploiting existing capability & investments and tailored for their local market conditions. eMaaS Back-Office will further support multi-modality capability by providing the information needed for a cost-effective, convenient, zero-emission journey. eMaaS will go further by being open and modular to be compliant with the EIP Open Urban Platforms memorandum e.g. the optimization of green energy usage and energy grid impact by providing charging point location and consumption data and the integration with billing solutions.

eMaaS will also offer a unique broker service for rich real-time data gathered from e-cars during the operation of the service to a wide range of actors throughout the e-mobility value chain incl. for instance insurance, smart grid, and navigation system providers.

eMaaS will:

- Deliver an eMaaS Back-Office Solution cloud service to be used by all 4 partners which provides:
    - EV operator profiling & matchmaking enabling sharing
    - EV telemetry tracking, analytics & reporting

- Billing of mobility usage
- Open API for data exchange & connection with partner systems and data brokerage with 3rd parties
- compliant with the EIP Open Urban Platforms memorandum

- Provide an eMaaS Toolkit to be disseminated to 3 SMES' per partner country. The eMaaS Toolkit will include all the components for a 'turnkey' Shared EV fleet startup including:
  - 'White labelled' Shar eMaaS Back-Office Solution.
  - 'White labelled' Shared EV fleet app template
  - Discounted pricing (utilizing bulk purchasing) for equipment & services including EV's charging equipment, telemetry devices, insurance etc.
  - National Go-to-Market plan
  - Social media strategy, marketing material and publications
  - eMaaS web-site including knowledge base of consortium experiences and lessons learnt.
  - Commercial exploitation strategy including business models that achieve positive RoI.
- Achieve the following targets in 2020:
  - Deploy 750 Shared EV's
  - That replace 6000 ICE's
  - And reduce CO2 by 18000 tonnes per annum

**Objective per country:**

Move About in Austria has currently 25 shared EV\'s. Until 2020 they aim to increase this number to 100. This would equal replacing up to 800 ICE\'s and an annual $CO_2$ reduction of 2400t.

Move About in Sweden has currently 100 shared EV\'s. Until 2020 they aim to increase this number to 400. This would equal replacing up to 3200 ICE\'s and an annual $CO_2$ reduction of 9600t.

eCARSHARE.nl in the Netherlands has currently 50 shared EV\'s. Until 2020 they aim to increase this number to 200. This would equal replacing up to 1600 ICE\'s and an annual $CO_2$ reduction of 4800t.

[ui!] in Hungary has currently 5 shared EV\'s. Until 2020 they aim to increase this number to 50. This would equal replacing up to 400 ICE\'s and an annual $CO_2$ reduction of 1200t.

This equals in total 180 shared EV\'s today which we aim to increase to 750 by 2020. This would equal placing 6000 ICE\'s and an annual $CO_2$ reduction of 18000t.

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|---|---|
| *Planned start date* | 2018-01-01 |
| *Actual start date* | 2018-01-01 |
| *Planned end date* | 2020-06-30 |
| *Actual end date* | 2020-06-30 |

## ^ 1.2 Result

**eMaaS Use Cases**

In order to grow in a sustainable manner towards our vision for eMaaS and accelerate the transition towards electric and shared mobility that is happening right now, we aimed to make several first steps that would help us to achieve this future vision. To that end, we analysed several potential business models against the eMaaS project goals.

In this analysis, two things stood out. First, using vehicles of any operator, also known as "roaming", from the app and environment of a single operator. Second, to use the data in the eMaaS ecosystem in a value-adding manner, of course without comprising end-user rights such as GDPR. In the end, we decided to split up both use cases in two sub-categories, resulting in four use cases for the developments in the project.

For roaming, this is addressing the technical challenges that come with national roaming (Use Case 1) and the perhaps more organisational challenges that occur for international roaming (Use Case 2). For data sharing, the focus is divided between supporting the businesses in the eMaaS ecosystem with handling their data (Use Case 3) and utilizing data to monitor and steer towards societal goals (Use Case 4).

**eMaaS Designs**

In order to establish an appropriate foundation for technical developments, various architecture representations have been created. A key development for an open eMaaS ecosystem that has been and still is supported in this project was the creation of the TOMP-API. This API has as goal to connect Transport Operators with MaaS Providers in a standardised manner. The open nature of the standard supports the notion of an open ecosystem. Further results realised in this project include for example a data connection between partners' systems, resulting in a data dashboard, which shows key eMaaS data.
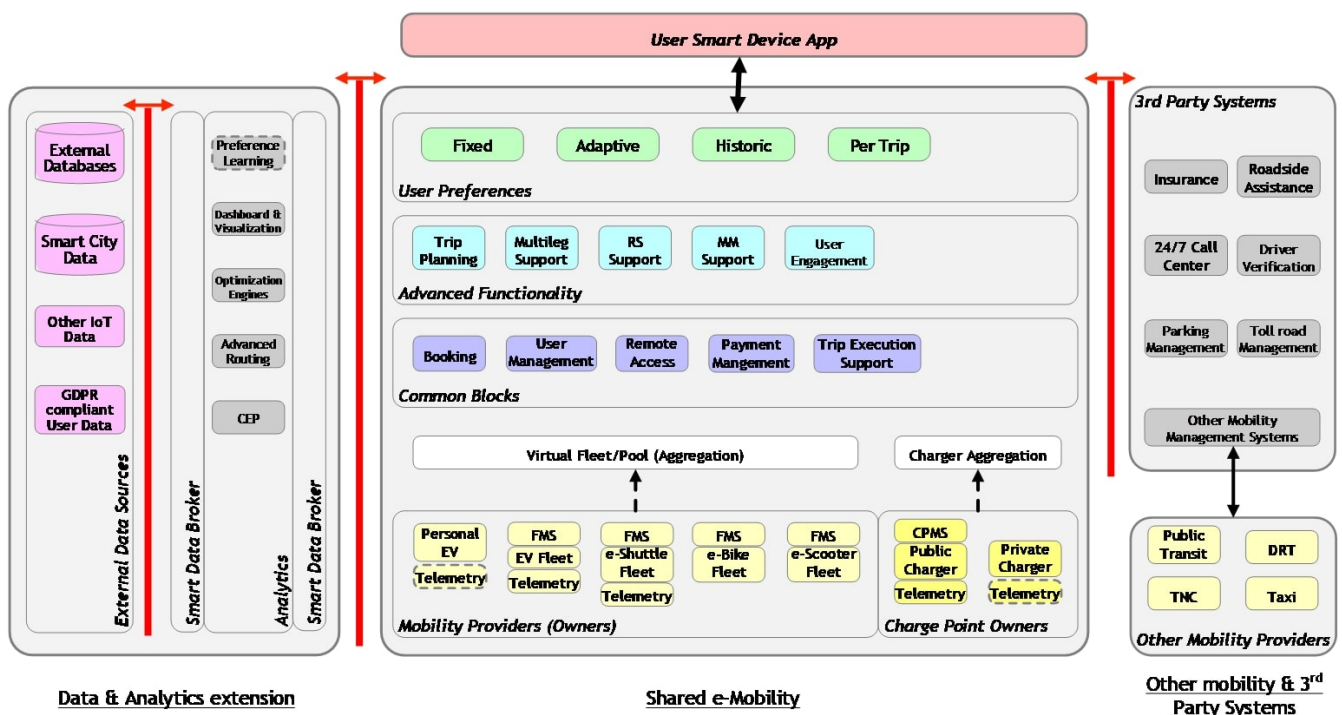


CEP: Complex Event Processing | CPMS: Charge Point Management System | DRT: Demand Responsive Transport | FMS: Fleet Management System | MM: Multi-Modal
RS: Ride Sharing | TNC: Transportation Network Company (e.g. Uber, Lyft)

## ^ 1.3 Conclusion

We see that there are not only technical lessons learned, but also organisational ones. On the topic of data sharing, we have learned that demonstrating the business value of visualisations is sometimes still hard to achieve but as more and more capabilities arise in this area, coupled with standardised ways of data sharing, this area could receive a huge boost too.

Implementing the TOMP-API for standardised communication still holds technical challenges, but even more organisational ones. There is also a chicken and egg problem. To the first parties, implementing the TOMP-API holds relatively little value, but as more and more parties join, the value can grow exponentially. Public authorities can play a role in this by setting use of standardised ways of communication and data exchange (such as provided by the TOMP-API) as a requirement in tenders or concessions.

## ^ 1.4 Recommendation

Through an extensive market assessment, we have concluded that current efforts in the market do not emphasize sustainable (and thus electric) mobility enough, nor do they have exclusive integrated offers of these types of mobility. This is somewhat surprising, as the sustainability proposition is one of the key pillars of the integrated mobility offer in MaaS. However, it is also understandable as electric mobility seemingly provides another entry barrier to the MaaS market. Nevertheless, through our experience and observations, the promise of electric and sustainable mobility can also be a very large motivator that actually propels the transition towards less ownership-based mobility.

## ^ 1.5 Evaluation

EMAAS FOR CONSUMERS

- For a consumer, (we refer to the user who wants to travel), ease of use is the key priority. A user does not want to get information overload by being presented with all alternatives that are available. A user wants a simple way to be informed that what is suggested is the best transport option aligned with his or her preferences. We want to convey that the best way to travel is electric. Therefore, we have to maximize all the advantages that electric transport provides.
- The integration of all available data in the way eMaaS is proposing, is therefore the necessary basis for creating the synergies between various electric mobility options, but from the user perspective, still further understanding is needed of what data and information is needed and what is required to make a better product and service in the future.
- As the power of habit is strong, and since many people are still used to own a car, the consumer needs a big "carrot" in terms of attractive benefits for using eMaaS, as well as a painful "stick" with clearly raised costs for owning an private car. Also, smaller benefits like free (and thus also *hassle*-free in terms of escaping the practicalities of paying a parking ticket) parking for shared electric cars could be an important contribution, as it psychologically makes the consumer feel like a winner.
- The adoption of shared e-bike services among consumers has been slow and requires more exploration and incentives. It seems many people prefer to own their own e-bikes, rather than sharing them, as it is viewed as more practical and the cost of owning an e-bike is much less than owning a car, which make e?bikes less prone to sharing. In Sweden, it was seen during the project that consumer usage of shared e-bikes is still very low, with no positive trend in

sight. We have learned that the end-result of a multi-modal integration, as we tested on a national level in the ZET.link programme in Austria, was appreciated. As a product it competes with large global players, like Google, which are trying to combine such services with commercial product promotions (advertising for sales of goods and services "along the way") which are regarded by many consumers as a rising nuisance.

EMAAS FOR COMPANIES

- Companies as part of their corporate responsibility strategies are increasingly accepting electric mobility. This means that the inclusion of electric vehicles is not only a superficial expression of environmental understanding, but becomes a part of the urgency to do something about the climate impact of corporate transportation, but also on understanding the bottom line impact.
- This means that the economic impacts and benefits of electric mobility have come more into the focus of corporate attention. The eMaaS approach of optimizing numerous electric transport options also within the company mobility demand, and the transparency the eMaaS project aims to achieve, are now seen as important drivers of such a trend.
- For companies, a proper and seamless integration of the information regarding multi-modal transport options, and how they can be accessed by the responsible persons in large companies, is important.
- We had discussions with several corporations who also asked if the same approach can be sued for optimizing the transport of goods, especially packages. They see that small goods transport is exploding and package delivery is beginning to clog streets, as well as heavily increasing the climate impact from delivery of the goods companies need as resource or want to deliver to their customers. As a result, some preliminary options of a similarly standardized approach for package delivery have been discussed by several member of the consortium.
- The experience in encouraging local companies or public authorities as well as operators to put more focus on electric mobility in the Hungarian case shows that we need "local champions" that can raise the in-house interest and excitement about the electric mobility models we propose in the eMaaS project.

## ^ 1.6 Impact

In order to facilitate integration between systems, especially those of Transport Operators (TO) and Mobility Providers (MP), we have implemented a Minimum Viable Product (MVP) version of the open TOMP-API (short for Transport Operator Mobility Provider) in the GoodMoovs platform. We also convinced a number of external partners to start (or intend to start) with the implementation of the TOMP-API within their systems as well.
We have had discussions with various partners about the application of the TOMP-API. From these conversations several possibilities have emerged. The first is a so-called roaming function, in which two Transport Operators open up their fleet to each other's users. This possibility is currently being implemented cross-border in cooperation between GoodMoovs and an external partner, Hub2Go. Another possibility is connecting MPs with TOs. GoodMoovs is in negotiation with three MaaS Providers in which the GoodMoovs fleet is opened to users of different MaaS apps.

With respect to the integration of charging services, we see possibilities to use the TOMP-API to facilitate smart charging. This application uses the API request on the availability of shared cars to determine when and how fast these cars should be charged, taking into account real-time data from the energy markets.
Multi-modal journey optimization still poses many challenges. Mainly because of the fact that the possible optimization is difficult as it entails a very large number of alternative combinations, requiring

a large amount of computing power. In recent years new machine learning approaches and increase data power makes such sequential optimization possible, which we have tried in the Austrian case. We learned that involving the local public transport provider is key. This means that the information flow to the city that controls the public transport is an important element to make eMaaS successful, which again underlines the need for standardization of information to do this efficiently. The TOMP-CDS efforts in this regard are very important.

## ^ 1.7 Dissemination Activities

EMEurope_Final Report_Dissemination Activities_Project eMaaS.docx

## *2 Progress per Milestone*

## ^ 2.1 Milestone 1

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| *Planned finish date* | 2018-06-30 |
| *Actual finish date* | 2019-02-22 |
| Status | |

Together with the European consortium partners (first and foremost GoodMoovs eCarshare, MoveAbout and University of Twente (UT)), own application cases (e.g. e-Carsharing, e-Bikesharing, integration of public transport) and the required, generalised functionalities were recorded. Subsequently, it was examined whether the existing components of the partners could already fully map these functionalities. Together with the University of Twente the systems of the partners (GoodMoovs eCarshare, MoveAbout and [ui!]) were analysed in detail. Necessary adaptations and extensions were recorded. In several technical workshops a (still) abstract future architecture was developed, which consists of the interaction of the components of [ui!], MoveAbout/Miveo and GoodMoovs eCarshare.

## Deliverables

| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
| 1.1 | *Requirement analysis & Architecture definitions completed, initial results* | *- With Milestone 1 the requirement for the eMaaS Back-Office Solution have been analysed, the architecture, the possible use cases assessed and everything documented. The documentation has been made available to the partners.* <br> *- Initial identification of services for solution definded.* <br> *- Aspects to monitor defined.* | *2018-06-30* | *2019-02-22* | *Based on partner experience and market analysis, baseline requirements fo eMaaS solution defined as well as identification of key services. Use cases collected from all partners have been shared and assessed. Baseline architecture of all partner systems analyzed and functional architecture defined and assessed/shared by all partners.* |

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| 2.3 | Reach out to market | Reach out to market completed and documented as specified in Task 2.3. | 2018-06-30 | 2019-02-22 | Market players in field of mobility in the Netherlands have been assessed.The presentation of the european perspectice is ongoing. |
| 2.3 | Initial results | - Stakeholders for eMaaS solution have been identified, - available partner system have been assessed and a long list created, - suitable external systems identified, - reach out to market launched. | 2018-06-30 | 2019-02-22 | Through the market analysis and partner experience, stakeholders have been identified. Partner systems have been evaluated for suitability for pilot. Competitive market analysis was completed to establish existing solutions. |
| 4.10 | Awareness campaign and Website launched, Explotation started | - Usage of social media channels for awarness campaign assessed and launched, development of free demo application started - Website created and launched - First intermediate results for the analysis and creation of commercial exploitation & expansion and new business models are documented. | 2018-06-30 | 2019-02-22 | Currently the project is in its design phase and this limits the amount of directly project related information that can be disseminated. Nevertheless, according to the project plan, we have started the dissemination activities with establishing the project website. (www.eMaaS.eu) and Conference presentations. |

| 4.9 | Setup of measurement instruments and protocol | Setup of measurement instruments and protocols completed as specified in Task 4.6. | 2018-06-30 | 2019-02-22 | Deliverable 4.9 concerns itself with the setup of measurement instruments and protocols as part of Task 4.6. Under Task 4.6, the University of Twente supports the continuous measurement and evaluation of the developments in the project. The results for this deliverable, which are described below, include a description of the intended measurement approach and the creation of a baseline for all partners in the project.<br><br>Therefore, an approach has been described , which can be found in the explanation. Next steps will be to execute the approach, by (i) creating the baseline, (ii) define project level Key success factors and strategies to measure these, (iii) write a generic pilot plan and (iv) identify, set-up and evaluate pilots. |
| 5.21 | Initial meeting and reporting | Initial (virtual) meeting of Project Board conducted and documented, requested reporting towards ERA-Net completed. Online archve created. | 2018-06-30 | 2019-02-22 | Online archive / shared working space for project documents and information has been created. Initial meeting has been conducted. |

## ^ 2.2 Milestone 2

*Planned finish date*  2018-12-31
*Actual finish date*  2019-02-22
Status
Under the leadership of UT, the scanario-based design has been linked to the national use cases in a mapping process. These results form the basis for the further development of the platform. Based on the results of milestone 1 the partners are still in the process of refining the detailed scope of the pilots. The dissemination of the project is in action. The monitoring concept has been established by UT and baseline overview has been created.

# Deliverables

| No. | Name | Description | Planned | Actual | Status |
|-----|------|-------------|---------|--------|--------|
| 2.4 | Intermediate results | - Have stakeholders committed for pilot. Signed commitments of stakeholders to host / participate in pilots are obtained.<br>- Well-known / industry standard ontologies have been assessed and identified as specified.<br>- Scenarios defined<br>- Intermediated results have been achieved with connecting short listed partner systems. | 2018-12-31 | 2019-02-22 | *Standard ontologies have not been assessed, however other standards have been assessed such as standardized MaaS APIs (where some of the partners are members/participants). Based on relevant use cases collected from all partners, baseline scenarios (The defined scenarios are illustrated using the use cases in Deliverable 1.1. ) have been defined. Preliminary evaluation of two key partner systems for connection to the base platform was undertaken based on defined technical requirements/specifications. These specs also included required interfaces. Implementation of the integration/connection with partner systems starts in March 2019.*<br>*Some pilot projects have been identified and some are still in negotiation.* |
| 3.6 | Stakeholders identfied | - Preparation of pilot completed<br>- Start with committed stakeholders for testing eMaaS Back-Office solution. | 2018-12-31 | 2019-02-22 | *will be submitted shortly* |
| 4.12 | First regular workshop | *First regular workshop will be conducted by Milestone 2.* | 2018-12-31 | 2019-02-22 | *will be submitted shortly* |
| 4.13 | Intermediate measurement results 1 | *Intermediate measurement results 1 documented as specified in Task 4.6.* | 2018-12-31 | 2019-02-22 | *Deliverable 4.13 concerns itself with a report on intermediate measurement results on the eMaaS pilots as part of Task 4.6. Under Task 4.6, the University of Twente supports the continuous measurement and evaluation of the developments in the project. The results for this deliverable comprise a description of the current status of task 4.6 in this project.*<br><br>*Currently, the project is still mostly in its design phase and pilots are being defined. This has as consequence that no intermediate results are available from specific pilots. However, further project wide preparations for pilot measurements have been ongoing.*<br><br>*The next steps are to finalize the generic pilot plan and continue identification of suitable pilots for eMaaS. During the preparation of these pilots, pilot specific monitoring plans will be developed.* |
| 5.22 | Intermediate meeting and reporting 1 | *(Virtual) meeting of Project board conducted and documented, requested reporting towards ERA-Net completed.* | 2018-12-31 | 2019-02-22 | *Intermediate meeting has been conducted.* |

# ^ 2.3 Milestone 3

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|---|---|
| *Planned finish date* | 2019-11-30 |
| *Actual finish date* | 2020-02-01 |

## Status
The milestones were achieved.

## Deliverables

| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
| 1.2 | Modules available in pilots, intermediate measurement results | - Task 1.2 to 1.6 have been completed and the respective services are available for the pilots.<br>- Intermediate measurement results documented | 2019-11-30 | 2020-01-17 | The eMaaS data platform is connected to the GoodMoovs system and enables the following analyses:<br>- various data of EV, their loacations and organizations<br>Further analyses are planned:<br>- charging process status<br>- door status<br>- soc and utilization<br>- range vs. charge<br>charging profiles<br><br>As of December 2019, three functional units were launched and tested in Pilots in Austria:<br>- A tool to evaluate and optimize the results of shared mobility<br>- A multi-modal transport tool to increase the use of electric vehicle use.<br>- An EV car sharing software front-end compatible with OTAkeys.<br><br>The University of Twente has supported the development and conception of the eMaaS solution in various ways. (1) An analysis of existing partners' operations was conducted and their current architectures were visualized. (2) An eMaaS architecture was developed in collaboration with the eMaaS project partners and visualized in various manners. (3) The University of Twente has delivered functional designs for crucial parts of this architecture, for example the communication between Maas Provider and Transport Operator in a standardized manner. (4) The University of Twente has an active role in the development and implementation of the standardized communication through a leading role in the (inter)national TO-MP API working group.<br><br>UI-HU: The Budapest pilot project has been started in 2019.<br>A simulation system is under development. It contains artificial data on different shared equipment (bicycle, scooter, car, roller, etc.). The generated data are among others the location of free equipment, and the realized trip. The data structure of the generated information fits the "Blueprint for an Application Programming Interface (API) from Transport Operator to MaaS Provider Version 1.1" recommendation.<br>Agreements with service providers are on legal control. They will deliver the basic information in different structure. To solve this problem our system will contain middleware solution to convert the provider's data into structure similar to the simulator's one.<br>Web access by mobile application for the integrated visualization of the service possibilities of different service providers run as planned. |
| 2.5 | Final results documented | Work package completed and final results documented | 2019-11-30 | | With respect to task 2.2, GoodMoovs started to integrate the Generic API (1.6) and connect with Beamrz to make MaaS possible in a pilot in Den Bosch: GoodMoovs provides access to shared vehicles, Beamrz to PT and ride-sharing. This also relates to task 3.4 – pilots in NL.<br>With respect to task 2.5, GoodMoovs delivered 2 Dutch use cases to contribute to an overarching design for eMaaS. Furthermore, all of the supplied use case by partners have been mapped into technical architecture requirements as well as business model canvasses by the UT and other partners. In the end, it has been chosen to simplify these use case in the four use case that are described above in the milestone status.<br>With respect to Use Case 2: International EV roaming, GoodMoovs has initiated the enabling the roaming of EVs between international partners by connecting the shared EV operators Hub2Go and GoodMoovs both organizationally and technically (through standardized APIs)<br>With respect to Use Case 3: Data sharing for fleet managers, GoodMoovs has enabling data sharing for visualization and analytics purposes by UI within the Urban Pulse platform. The shared data, visualizations and analytics focus on fleet managers, enabling them to monitor functionality and performance of their fleets.<br><br>Results for the Move About Sweden Objectives:<br>---<br>1.Expansive growth from 100 to 400 shared EVs during the project, in order to significantly reduce CO2 emissions and increase the availability of shared EVs in Sweden:<br>-> ACCOMPLISHED, 391 vehicles by 31/12 2019<br><br>2. Develop a more user-friendly booking system and app:<br>-> ACCOMPLISHED, new booking interface (www.moveabout.se) and new app (Move About) launched in 2019<br><br>3. Enhance functionality of the mobility service, with:<br>    a.) Develop e-bike sharing<br>        -> ACCOMPLISHED, launched in 2018<br>    b.) Introduce cargo-bikes<br>        -> ON TRACK, being launched in April-May 2020<br>    c.) Launch ridesharing<br>        -> ON TRACK, being launched in April-May 2020<br><br>4. Implement datalink to the eMaas Back-office solution<br>        -> ON TRACK, link to be established in March 2020<br><br>5. Implement pilot studies in existing cities in order to<br> a. Understand how a corporate-focused cluster around Gothenburg/The Westcoast can grow<br>        -> ACCOMPLISHED, corporate-focused cluster established and analysed during 2019<br><br> b. compare that with how a mixed cluster in the Stockholm region can grow<br>        -> ACCOMPLISHED, mixed cluster established and analysed during 2019<br><br> c. How a municipality-focused cluster of 6 towns and cities can validate & expand EV sharing.<br>        -> ACCOMPLISHED, municipality-focused cluster established and analysed during 2019 |

| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
| 3.7 | Localization of invoicing and cost sharing modules | - Localization of services completed as specified in Task 3.1.<br>- Connection with suitable existing traffic systems has been established as specified in Task 3.1. | 2019-06-30 | | GoodMoovs:<br>- In the past years, the GoodMoovs platform has been developed and implemented in dozens of organisations and vehicle providers. At the start of July 2019, there were 7000 GoodMoovs account holders, who regularly and virtually trouble-free made use of the 250 electric shared vehicles (cars and bicycles). Collectively, these users travel over more than 3 million CO2-free kilometres, whereby the emission of 420 tons of CO2 will be prevented. The number of account holders is growing with approximately 50 new account holders, weekly. Furthermore, important steps have been taken towards international growth in Germany (5 shared vehicles), Belgium (6 shared vehicles) and the United Kingdom (1 shared vehicle).<br>- The GoodMoovs proposition consists of the complete organisation of sustainable mobility and behavioural change regarding mobility: from advice about vehicles and charging infrastructure to instructions and guidance during usage. In 2014, the first pilots had started in Limburg and Brabant in the field of electric shared cars. These pilots were organised from the foundation Limburg Elektrisch and cooperatives in Brabant. The GoodMoovs' shareholders have also been initiators of founding the foundations Limburg Elektrisch and Brabant Elektrisch, as well as several cooperatives. From these entities, the market in Limburg and Brabant is developed in cooperation with local and regional governments. In 2017, it was decided to establish GoodMoovs, because the pilot projects showed that there was no proper platform for the sharing of electric vehicles. Therefore, GoodMoovs has invested in the technical development of this platform, so the foundations in Limburg and Brabant could make use of this for further market development. |
| 4.11 | Intermediate measurement results 2 | Intermediate measurement results documented as specified in Task 4.6. | 2019-11-30 | 2020-02-01 | In the course of the past year, the pilot implementation activities in the eMaaS project have taken a more technology oriented direction. Therefore, the the University of Twente devised a means to assess the Technical Level of Integration (TLI) of (e)MaaS Providers which can be used to monitor the advances in technological integration in the eMaaS ecosystem.<br>Furthermore, a more concrete pilot monitoring plan was delivered. |
| 4.14 | Intermediate results | - Intermediate results from awareness campaign doumented<br>- Website updtaed<br>- Intermediate results of creation of commercial exploitation & expansion and new business models is dodumented. This includes data analysis and explanation. | 2019-11-30 | 2020-02-01 | eMaaS Authors won the Best Paper Awards on the 32nd EVS Conference in Lyon France.<br>EVS (Electric Vehicles Symposium, www.evs32.org) is the leading international event to address the issues of sustainable mobility by exploring how electrification, connectivity and driverless vehicles will be used in future mobility, together with the related business models and issues surrounding social acceptability. |
| 4.15 | Second regluar workshop | Second regular workshop will be conducted will be conducted. | 2019-06-30 | 2020-02-01 | There were two workshop in Hungary.<br><br>Challanges of Urban Mobilty<br><br>Workshop<br><br>Visegrad , Hungary<br><br>Workshop and Exhibition, 19/09/2019<br>Presenting: eMaaS - Electric Mobility as a Service<br>Urban Institute Zrt, Hungary |
| 4.16 | Third regular workshop and creation of webinars | Third regular workshop will be conducted by Milestone 3. In addtion on the basis of the workshop e-learning webinars will be started to be created. The webinars will be part of an e-learning module. | 2019-11-30 | 2020-02-01 | Move About Austria arranged the third regular workshop in connection with the Transportation World Conference in Vienna, Dec 11-12. It allowed us to engage over 1000 international users into the discussions about EV sharing, and resulted in numerous deep insights. |
| 5.23 | Intermediate meeting and reporting 2 | (Virtual) meeting of Project Board conducted and documented, requested reporting towards ERA-Net completed. | 2019-11-30 | 2020-01-17 | Project board meeting in Berlin on 28.11.2019. |

## ^ 2.4 Milestone 4

*Planned finish date*      2020-03-31
*Actual finish date*      2020-03-31
Status
The milestones were achieved.

## Deliverables

| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
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| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
| 3.8 | Implementation and testing of eMaaS Back-Office Solution | eMaaS Back Office Solution tested and implemented in pilots. | 2019-11-30 | 2020-02-01 | *GoodMoovs:*<br>*GoodMoovs started to integrate the Generic API (1.6) and connect with Beamrz to make MaaS possible in a pilot in Den Bosch: GoodMoovs provides access to shared vehicles, Beamrz to PT and ride-sharing. This also relates to task 3.4 – pilots in NL.*<br><br>*GoodMoovs delivered 2 Dutch use cases to contribute to an overarching design for eMaaS. Furthermore, all of the supplied use case by partners have been mapped into technical architecture requirements as well as business model canvasses by the UT and other partners. In the end, it has been chosen to simplify these use case in the four use case that are described above in the milestone status.*<br><br>*GoodMoovs has initiated the enabling the roaming of EVs between international partners by connecting the shared EV operators Hub2Go and GoodMoovs both organizationally and technically (through standardized APIs)*<br><br>*UT:*<br>*From the perspective of the University of Twente, in an earlier stage of the project, prerequisites for monitoring the execution of pilots were established (see deliverable 4.9 and 4.13). Furthermore, the University of Twente devised a means to assess the Technical Level of Integration (TLI) of (e)MaaS Providers (reported on in more detail in deliverable 4.11). Finally the University of Twente and eMaaS partners have been co-developing a key part of the eMaaS Back-Office solution, being the TO-MP API. The Transport Operator – Maas Provider API. The development of this API has been reported on in more detail in deliverable 1.2.*<br><br>*The University of Twente has supported partners in implementation by proposing a MVP (Minimum Viable Product) variant of the full TO-MP API and discussed its implementation with all project members, and where needed their development partners. Three documents detailing the definition, analysis and requirements for the eMaaS MVP API are attached (2019_05_19_eMaaS MVP definition, 2019_08_07_eMaaS MVP Roaming API vs Open (MaaS) APIs, 2019_12_19_eMaaS MVP requirements).*<br><br>*UI HU:*<br>*The fleet optimization pilot in the City of Szeged was completed in Q2 2019. The overall report was sent to the vice mayor of the city. Regarding the participating (and municipality owned) companies, special recommendations and reports were sent to the chief executives. These reports included fleet and cost analysis and helped to get a better understanding about the operating car fleets.*<br><br>*For ui Hungary the first pilot was: Fleet operation optimization at a middle-sized municipality in Hungary with the municipality owned companies. That means we implemented the pilot in the City of Szeged.*<br><br>*The preparation of the pilot started in 2018, the majority of the development work has been carried out in 2018 and the results were transferred to the municipality owned companies in the first half of 2019.*<br><br>*The purpose of this fleet analysis toolkit was to get a more detailed picture of our customers problems on the field of mobility. If we do it right, we will be able to propose different technical and non-technical solutions that satisfy our customers' needs, lower their costs, or improve their level of services. The analysing steps are built on the data acquired from our partners and considers the limitations of the data collection process. The optimization process is aiming at to select those vehicles, which can be replaced by electrical one.* |
| 4.17 | Intermediate measurement results 3 | Intermediate measurement results 3 completed as specifid in Task 4.6. | 2020-03-31 | 2020-03-31 | *The University of Twente has continued to monitor and support all pilot developments of the consortium members and has started preparations to compile all of these results in a final public summary report. The report on this deliverable is somewhat limited as deliverable 4.19 contains the final results for this task.* |
| 4.18 | Devlopment of e-learning module | Intermediate results are documented in the development of an e-learning module. | 2020-03-31 | 2020-03-31 | *ZET developed a draft instruction and learning tool as a clickdummy demo that can be adapted to the various vehicles that the occasional user may not be familiar to use. The objective was to be able to test for one or two types of cars during the last period if the time allows. The basic structure and design should be presented for reviewd and the choice of vehicles will determine if it is regarded as useful by the end users.* |

## ^ 2.5 Milestone 5

*Planned finish date*          2020-06-30
*Actual finish date*          2020-06-30
Status
The milestones were achieved.

## Deliverables

| No. | Name | Description | Planned | Actual | Status |
|---|---|---|---|---|---|
| 4.19 | *Analysis of measurements, plus conclusions* | *Analysis of measurements completed  as well as conclusions documented as specified in Task 4.6.* | *2020-06-30* | *2020-06-30* | *A final public summary report was compiled to share the analysis of results both inside and outside of the consortium. The report contains a summary of the highlights of the project.* |

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| 4.20 | *Awarness campaign and commercial exploitation completed* | *- The awareness campain is completed and the results documented. Additional press releases have been published.*<br>*- Website has been updated.*<br>*- The creation of commercial exploitation & expansion and new business models is completed and documented.* | *2020-06-30* | *2020-06-25* | *During the last 12 months of the project (i.e. when the results and achievements of the eMaaS program could be referred to) the Consoritum members spoke at 8 conferences and 2 international symposia, participated in 3 workshops or pitch session focused on the eMaaS theme, had stands at 4 fairs and presented the eMaaS results at 3 meetings. In addition, many more meetings and dialogues were given, and eMaaS was referred to at various interviews and press briefings.* |
| 5.24 | *Final meeting and reporting* | *Final (virtual) meeting of Project Board conducted and documented, requested final reporting towards ERA-Net completed.* | *2020-06-30* | *2020-06-30* | *Final virtual board meeting on 17.06.2020* |

## *3 Deliverable per Workpackage*

## ^ 3.1 Research and Conception of eMaaS Solution

| No. | Name | File | Dissemination level | Explanation | Impact |
|---|---|---|---|---|---|

| | | | | | |
|---|---|---|---|---|---|
| 1.1 | *Requirement analysis & Architecture definitions completed, initial results* | *1.1_UC_Function_Mapping.xlsm* | *Restricted to specific group* | *Use cases based on the different requirements of the individual partners were defined. The resulting requirements were modelled on the underlying architecture model.*<br><br>*ui.HU: Requirement analysis has been made based on the discussion with the city representatives of the City of Szeged. Fleet analysis tools hve been created to simulate the potential introduction of EVs.*<br><br>*Note:*<br>*Since it was not possible to upload two separate documents, the document "1.1_UCs + mapping_2019_01_31", which is part of this deliverable, was linked to the uploaded deliverable for deliverable section 2.3.* | *'A common understanding of the basic requirements for an eMaaS back-office solution, based on the defined use cases, is achieved. This forms the basis for the development and implementation of further solutions.*<br><br>*ui.HU: The purpose of the fleet analysis toolkit is to get a more detailed picture of our (potential) customers problems in the field of mobility. During the following steps we want to understand the mind-set of our partners and to investigate their real needs. If we do it right, we will be able to propose different technical and non-technical solutions that satisfy our customers' needs, lower their costs, or improve their level of services. The analysing steps are built on the data acquired from our partner and considers the limitations of the data collection process.* |

| No. | Name | File | Dissemination level | Explanation | Impact |
|-----|------|------|---------------------|-------------|--------|
| 1.2 | Modules available in pilots, intermediate measurement results | eMaaS - 2. Transnational report - 1.2 - Blueprint for a TO-MP API v1.1.pdf | Restricted to call | In order to develop an applicable eMaaS architecture, the eMaaS team has approached the design of the architecture from various viewpoints. In developing the architecture, a functional, physical and quantification, contextual, business and operational viewpoint were taken. The identified functions were distributed over different roles (this distribution can differ per context). Between these roles, interfaces were identified. One of the key interfaces that has been identified is the interface between the Transport Operator (managing the vehicles) and the MaaS Provider (managing the customer). The communication between these roles has been further analysed using scenario's and user stories and mapped in a functional design following an operational flow. This has resulted in a blueprint for the so-called TO-MP API (Transport Operator – MaaS Provider Application Programming Interface). The TO-MP API is currently being further developed in a Dutch national working group with international members and a significant contribution to the efforts in this working group is from the eMaaS consortium, led by the University of Twente. It is the aim to implement this API in the project pilots where applicable.<br><br>Of particular interest in the pilot in Budapest is the regulatory framework. The city of Budapest intends to regulate the provision of sharing services. The first step will be to convert from a freeloating service to a station-based service. It remains to be seen how these adjustments will affect the use of the sharing services.<br><br>During 2019, in the Austrian pilot five OTAkeys units have been installed in vehicles in order to test and get feedback for improved user interaction. This piloting phase will be extended until mid-2020. | The University of Twente and the eMaaS project partners have made significant contributions to the development of an (inter)national open eco-system for eMaaS. The version 1.0 of the blueprint for this standardized communication through an API has been presented to the Dutch Minister of Transport during the ITS Europe 2019 event in Eindhoven. In the meantime, the blueprint has undergone several updates and the actual implementation of the API has started. The latest published version of the blueprint in 2019 is version 1.1. An overview of the status and ongoing developments can be found via https://github.com/maas-nl/TOMP-API.<br><br>The University of Twente has published an eMaaS architecture in both a Conference Paper (EVS 32) and a Journal Paper (World Electric Vehicle Journal). The paper was also presented at the EVS 32 vehicle symposium.<br><br>In the Austrian pilot the ease of the hardware installation, the possibility by the user groups to adapt the interface and its layout, and the lower coverall cost are the three main positive feedbacks we have received so far.<br><br>GoodMoovs has initiated the enabling of roaming of EVs between international partners by connecting the shared EV operators Hub2Go and GoodMoovs both organizationally and technically (through standardized APIs).<br><br>In the Hungarian pilot the presentation of the available vehicles across providers and vehicle types has the potential to directly influence user behaviour. In particular for users who have so far only used cars, the additional display of bicycles offers the possibility to do without cars for short distances.<br>For the city, the application offers the potential to analyse the needs of the users. Various applications are possible, e.g. for traffic planning, the determination of particularly suitable locations for mobile hubs or even the setting of incentives to cover areas that have not been connected or have only been connected to a limited extent. |

## ^ 3.2 National Adaption Trials

| No. | Name | File | Dissemination level | Explanation | Impact |
|-----|------|------|---------------------|-------------|--------|
| 2.3 | Reach out to market | 2.3_GoodMoovs_Reach out to market.pdf | Restricted to specific group | The specific requirements and needs of potential customer groups differ from industry to industry and from country to country.<br>While one application focuses on the best possible use of scarce parking space, another may focus on minimising the overall cost of mobility.<br><br>These different requirements are implicitly taken into account in the country-specific use cases. | 'The basic, cross-country and cross-industry requirements are defined and considered in the architecture of the eMaaS platform.<br>'Specific requirements and needs are taken into account in the design of use cases and pilots. |

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| 2.3 | Initial results | 2.3.Evaluation Telematic Solutions and Overview Corporate Carsharing Germany.pdf | Confidential | *The analysis of the existing telematics solutions on the market, as a central component of Carsharing and the good experiences of GoodMoovs with OTA keys have led to the focus on the OTA Keys solution in the eMaaS project. Alternative solutions will continue to be considered and market observations will be continued. GoodMoovs has worked with third party vendors on V2G solutions and has good contacts to Charge Point Operators in the Netherlands. GoodMoovs and MoveAbout have successfully implemented the integration of e-bike sharing.*<br><br>*As part of the Stekaholder analysis, an overview of corporate car sharing providers in Germany is provided. At present EV's share of the fleets of established corporate car sharing providers in Germany is still often very low.* | *'The selection of long-term reliable solutions on the one hand and the choice of partners who are open to innovations on the other is the basis for a sustainable development of the platform.* |
| 2.4 | Intermediate results | 2.4_University of Twente - Intermediate results & List of pilots.pdf | Restricted to specific group | *The Dutch partners are directly involved in the development of a standardized interface for eMaaS applications. The integration/connection with partner systems is based on the Open Urban Platforms reference architecture.*<br><br>*ui.HU: Pilot action preparation has been started. UI HU signed a cooperation agreement with the city of Szeged. The objective of the cooperation agreement is to reduce the annual cost of the city operation and to introduce sustainable mobility options.* | *Well-documented interfaces, an open API and the use of existing industry standards ensures the use of the platform in further applications and the extension by additional functionalities.*<br><br>*ui.HU: An important goal is that the city leaders spend less time on working and dealing with problems of the city operation. For the employee, benefits e.g. company cars should be provided.* |

| No. | Name | File | Dissemination level | Explanation | Impact |
|---|---|---|---|---|---|
| 2.5 | Final results documented | eMaaS - 2. Transnational report - 2.5 - ITS19_Eindhoven_Haveman_et_al_CreatingEffectiveMaaS-Systems.pdf | Restricted to call | A future connection with the Move About car-sharing system to the TO-MP API would be beneficial for both users, B2B-customers, cities and the environment. Seamless bookings between countries would create an ease of access that would increase interest in mobility-as-a-service and allow people to effortlessly use shared cars as they travel across Europe. This roaming would also improve air quality in cities as less (often fossil) taxi and rental cars would need to be used. Usage of existing pool-cars would also go up, leading to better resource utilization and economy, as our corporate customers benefit from a profit-sharing incentive in the private usage of the cars. Examples of project partners that would be suitable pilots for such a roaming integration are the UbiGo MaaS-provider in Stockholm which is already cooperating with Move About for car-sharing services, and Chalmers University of Technology which is a current Move About customer in Gothenburg with ambitions of opening the mobility services up for international users including exchange students that are generally extra open-minded to this kind of mobility services.

University of Twente: The created scenarios (1) and key success factors (2) have been reported earlier. However, the systems approach that ensures that needs and expectations of end users and all other stakeholders are taken into account have not been reported on earlier. In order to ensure that these needs were taken into account, the University of Twente has applied well known Systems Engineering and System Thinking methods to the project, tailored for the problem at hand. This process has also been explicitly described in a publication at the ITS Europe 2019 congress. Tools and techniques used included "System Thinking Tracks" and the use of context diagrams, key drivers, scenarios, functional modelling & analysis, the creation of N2 diagrams (to identify interfaces), interface specifications and finally modelling & simulation. | Possibly the first cross border TO-MP Implementation

University of Twente: The systemic approach offered by the University of Twente has supported the project partners and related stakeholders in clarifying the eMaaS solution for the full project. It has been explicitly described in a publication at ITS Europe 2019, titled "Creating effective MaaS systems - Using a systems engineering approach to design an open (e)MaaS architecture". |

# ^ 3.3 Commercial Pilots

| No. | Name | File | Dissemination level | Explanation | Impact |
|---|---|---|---|---|---|
| 3.6 | Stakeholders identfied | 4.12 Will be handed in shortly.docx | Confidential | will be submitted shortly | will be submitted shortly |
| 3.7 | Localization of invoicing and cost sharing modules | eMaaS - 2. Transnational report - 3.7 - Commercial pilots .pdf | Restricted to call | The three biggest clients of GoodMoovs are currently providers of electric vehicles, f.i. foundation Limburg Elektrisch, We Drive Solar and the foundation Brabant Elektrisch. These providers of electric vehicles are leasing the vehicles for their clients (governments, employers and project developers). GoodMoovs fully facilitates them by offering the sharing platform and supporting service (a.o. 24/7 call centre). Besides that, these providers of electric shared vehicles make use of the services of GoodMoovs to support clients (governments, big employers and project developers) in developing and executing a mobility strategy. The main goal of the electric vehicle providers is to maximale the utilisation by combining business and private use of the shared cars. | GoodMoovs has developed support for multiple languages, international timezones and measurements. Within eMaaS the GoodMoovs system has been tested in Germany and the UK. Cost sharing is a functionality which has been implemented in the form of subscriptions. A business subscription can be offered to companies, and simultaneously private users can use a private subscription. Invoices are automatically generated in the beginning of each month which include the subscription fee of the next month and the actual costs (extra costs and credits) of he past months. |

| No. | Name | File | | Explanation | |
|---|---|---|---|---|---|
| 3.8 | Implementation and testing of eMaaS Back-Office Solution | eMaaS - 2. Transnational report - 3.8 - Implementation and testing of eMaaS Back-Office Solution.pdf | Restricted to call | UMI:<br>*In the eMaaS Project, data originates from shared EV operators – specifically, from in-car telematics and from the booking system. The telematics provide data such as location, state of charge, vehicle mileage, moving/stationary, etc., and is connected to a specific vehicle (identified by its license plate, for example). This source inherently is not connected to a specific user/driver. The booking system includes data on when a car was booked, returned, extended the booking, the user/driver, etc. This source, obviously, includes data both on the vehicle ID and the driver ID. These data – telematics and booking – are then used by eMaaS platform to apply analytics and derive information and insights on how the vehicle was used, by whom, driving patterns, popular routes, charging patterns, popular charge points, etc., and thereby achieving the goals of both use cases.*<br><br>*The typical way of protecting PII is through data anonymization (or pseudonymization; the distinction is well explained in https://www.protegrity.com/blog/pseudonymization-vs-anonymization-help-gdpr). The PII data that the eMaaS platform collects can therefore be anonymized (or pseudonymized) by the operators before transfer to the platform. For example, the user's name or ID can be replaced by a random label (but the same label for the same user), with the mapping maintained and visible only by the operator. This technique could also be applied to the EV ID, if necessary. Location data can have "noise" added to it so that thereby "hiding" the exact location (although, in some cases, this may make the analysis less accurate). In other words, the eMaaS platform would never have access to PII.*<br><br>*The eMaaS platform is technically capable to maintain complete separation between datasets originating from different operators, so that Operator A can never access data ("raw" or analyzed) from Operator B, based on suitable authentication and authorization mechanisms. Commercial agreements/contracts ensure that the eMaaS platform operator is subject to data protection and usage clauses (including the maintenance of the "firewalls" between the different commercial entities. Such a contract would also exist for the City use case, where the city can view data from multiple operators but only for internal purposes (i.e., without sharing it with anyone else).* | 'UT:<br>*From the perspective of the University of Twente, the contribution to the TO-MP API developments have been instrumental in promoting standardisation in the (e)MaaS ecosystem. Internationally, this development is seen as the leading development in standardisation by for example the MaaS Alliance and the Nordic Mobility Innovation Platform. However, the API is still in its design and implementation phase and further steps are needed to solidify its place in an open (e)MaaS ecosystem. The experiences with implementation in the eMaaS project will move the TO-MP API forward significantly.*<br><br>UI HU:<br>*The results showed that the fleets are generally underutilized, so there is a great potential to increase the utilization level of the vehicles. Increaseing the utilization level means more annual milage that enables the owners to replace certain internal combustion engine vehicles by electric ones. This process can be supported by techincal and organizational actions which can be partly carried out with the help of the eMaaS project.* |

# ^ 3.4 Dissemination

| No. | Name | File | Dissemination level | Explanation | Impact |
|---|---|---|---|---|---|
| 4.10 | Awareness campaign and Website launched, Explotation started | 4.10_eMaaS_website.pdf | Public | | 'The website represents the basic channel for external communication for the project. |
| 4.11 | Intermediate measurement results 2 | eMaaS - 2. Transnational report - 4.11 - PMP and Proceedings.pdf | Restricted to call | *In order to assess the ongoing technical developments within the eMaaS solution, the University of Twente developed an assessment scheme. The assessment scheme draws inspiration from existing assessment schemes but focuses more on the technical integration. The assessment itself is based on the functional and modular structure of the TO-MP API. The overall process for the assessment of the technical functionalities of Mobility Service Providers (MSPs) following the TLI approach can be described in three simple steps. These steps are: 1) identify the interfaces used by the MSP, 2) determine which functions are integrated in the identified interface(s), and 3) assign the correspondent TLI to the MSP in accordance to the type and number of integrated functions in its interface(s). The assessment scheme has been applied to 128 mobility service providers currently active in the European market. This provides an excellent baseline to compare against developments within the eMaaS project.*<br>*The TLI assessment is used adjacent to the originally intended pilot monitoring plan which has been reported upon in earlier reporting periods. The current pilot monitoring plan has been attached as a PDF file.* | *The developed assessment scheme has been published as a conference paper for the 2nd International Conference on Mobility as a Service (icoMaaS 2019) and presented at this conference as well. The conference audience consisted of key MaaS players in Europe. The paper is titled "From Shared electric Mobility Providers (SeMPs) to electric Mobility as a Service (eMaaS) players – A first approach to assess the Technical Level of Integration of Mobility Service Providers' functionalities applied to the European (e)MaaS market".* |
| 4.12 | First regular workshop | 4.12 Will be handed in shortly.docx | Confidential | will be submitted shortly | will be submitted shortly |

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| 4.13 | *Intermediate measurement results 1* | [4.13_University of Twente.pdf](4.13_University of Twente.pdf) | *Confidential* | *Below is a summary and explanation of further activities towards presentation of the pilot monitoring.*<br><br>*Baseline Overviews were created (note: these are confidential) for each of the partners as A3 Architecture Overviews.*<br><br>*The key areas, (1) Cost of Shared Mobility, (2) User Experience in Shared Mobility, (3) User Experience in Electric Mobility, (4) Shift to Multi-Modal Transport Usage, (5) Replaced ICE Vehicles, (6) Reduction of GHG and Particulate Matter Emissions, (7) eMaaS Data Usage for Service Design and (8) Scalability of the eMaaS Solution, were mapped to various perspectives (user, business, technical, sustainability). The user perspective is addressed in key area 1,2,3 and 4. The business perspective is addressed in key area 1,4,5,7 and 8. The technical perspective is addressed in key area 7 and 8. Finally, the ecological / sustainability perspective is addressed in key area 5,7 & 8.*<br>*Within each of the key impact areas, various key success factors are identified. For example, for #2 - User Experience in Shared Mobility, the following key success factors can be measured to determine user satisfaction: number of downloads versus active users, intensity of use (number of trips / number of challenges & rewards achieved), reason for use/non- use (users who downloaded app), knowledge of challenges & rewards, reasons of non-use (potential users), user feedback / experiences - reasons for behavioural change.*<br><br>*A generic monitoring plan that can be adapted for each pilot is currently being finalized. It is intended as a blueprint to be adapted for each pilot. The generic monitoring contains templates for (1) overall pilot information description (pilot objectives, actors, context, description of potential user groups), (2) a pilot functional and technical description (modalities offered, functionalities, software architecture employed, etc.), (3) key success factor measurement approach (monitoring set-up & monitoring execution) and (4) pilot evaluation.*<br>*As an example, the key success factor measurement approach contains the following steps: (1) define the boundaries of the target group to be analyzed, (2) determine suitable KSFs in relevant impact areas - for example the impact area "the user perception of sharing economy", "Willingness to give up car ownership", "Trips made with shared vehicles", (3) determine a way to measure these factors, e.g. through a user questionnaire or direct data measurement, (4) perform a baseline measurement to determine the initial values, (5) perform additional measurements during and after pilots.* | *'The impact of this activity is mainly internal - in that a good an consistent pilot measurement approach is ensured. These measurements should ultimately be disseminated again to ensure that other project, initiatives and business can learn from these pilot results* |

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|---|---|---|---|---|---|
| 4.14 | Intermediate results | [eMaaS - 2. Transnational report - 4.14 - intermediate results.pdf](#) | | *Restricted to call* | *The following presentations and publications were made in 2019:*<br>*1. ERA-NET Cofund EMEurope R&I Projects Midterm Events*<br>*MaaS Electric mobility as a service*<br>*Olaf Bender*<br>*[ui!] urban institute*<br>*2. State of the art of electric Mobility as a Service (eMaaS):an overview of ecosystems and system architectures*<br>*J. Roberto Reyes García1,2, Gadi Lenz3, Steven Haveman2, G. Maarten Bonnema2,4*<br>*Vehicle Symposium (EVS32) Lyon, France,May19-22, 2019*<br>*3. Paper & presentation at ITS Europe Congress Brainport 2019 – S. Haveman (University of Twente) - Creating effective MaaS systems - Using a systems engineering approach to design an open (e)MaaS architecture*<br>*4. V1.0 of a blueprint for a Transport Operator – Maas Provider MaaS API. Developed by working group for this API governed by Ministry of Infrastructure & Water Management. Published by Ministry of Infrastructure & Water Management. Significant involvement of eMaaS consortium partners. Officially presented to and by Dutch Minister of Transport Cora van Nieuwenhuizen during the ITS Europe 2019 Brainport congress, see also this link.*<br>*5. eMaaS presentation pitch (2x) at the Holland Pavillion during EVS Lyon 2019 by Steven Haveman*<br>*6. Short,personal summary of the MaaS conference*<br>*J.RobertoReyesG.,UniveristyofTwente*<br>*MaaS Conference Rotterdam*<br>*7. New business models and market analysis towards electric Mobility as a Service(eMaaS)*<br>*J. Roberto Reyes G., Steven Haveman, Marlise Westerhof, G. Maarten BonnemaUniversity of Twente, Faculty of Engineering Technology. Department of Design, Production andManagement, Group of Multidisciplinary Systems Design*<br>*8. The rise of electro micromobility and the challange of interoperability*<br>*Dr. Ir.S.P Haveman, University of Twente . Hanover - May 2, 2019*<br>*9. th October, 2019 Roberto Reyes García from the University of Twente and Edward Bongers from GoodMoovs presenting eMaaS at the EcoMobiel Expo 2019 at the Brabanthallen in 's-Hertogenbosch, NL.*<br>*10. How can we motivate people in the Twente region to use more sustainable mobility options.*<br>*On the 18th and 19th of September, 2019, the eMaaS team from the University of Twente presented a case for the United Nations - Global Goals Jam (GGJ2019) in Enschede, NL. Roberto Reyes and Marlise Westerhof ,University of Twente*<br>*11. eMaaS at Arise Simposium-Sustainable living, 9 October 2019*<br>*s.haveman@utwente.nl*<br>*Department of Design, Production & Management*<br>*Faculty of Engineering Technology University of Twente*<br>*12. Introduction of the eMaaS project Challenges of Urban Mobility, Workshop, 13/09/2019*<br>*Visegrad, Hungary*<br>*Peter Bakonyi Ph.D*<br>*Urban Institute Zrt, Hungary*<br><br>*The following conferences and workshops were used to highlight the eMaas project in 2019:*<br>*A. The Ekotransport fair in Stockholm, Sweden*<br>*B. Power Circle Summit in Gothenburg, Sweden*<br>*C. Panel debate with profiles from industry & politics in Gothenburg, Sweden*<br>*D. The Scandinavian real-estate fair in Stockholm, Sweden* | *The eMaaS project through its publications getting well known in five countries: Germany, Netherland, Austria, Sweden, Hungary. It's important for the eMaaS project to get the Best Paper Award. We received many positive feedback.* |

| No. | Title | File | Level | Description | Impact |
|---|---|---|---|---|---|
| 4.15 | Second regluar workshop | eMaaS - 2. Transnational report - 4.15 - Smart_megoldasok_prezentacio.pdf | Restricted to call | (1) Visegrad Workshop<br><br>13/09/2019<br><br>The event was organised by<br><br>HUNGARIAN<br><br>SCIENTIFIC ASSOCIATION<br><br>FOR TRANSPORT<br><br>There were more than 50 participants.<br><br>It started with the following presentation :<br>Introduction of the eMaaS project<br>Peter Bakonyi Ph.D<br>Urban Institute Zrt, Hungary<br><br>The presentation gave an overview about the eMaaS project<br><br>and the Hungarian pilot solution.<br><br>After the presentation there was a discussion. .<br><br>The audience asked several questions about the details of the pilot solution. During the discussion turned out that this is the first e car sharing project in Hungary.<br><br>(2) Workshop and Exhibition, 19/09/2019, Budapest<br>Presenting: eMaaS - Electric Mobility as a Service<br>Gergely Gulyás<br>Urban Institute Zrt, Hungary<br><br>The 2019 E-mobility Forum provided a platform for decision-makers and market actors to connect and to advance the cause of urban e-mobility solutions. The Urban Institute Hungary presented the eMaas project at this event, gaining national and international interest for the Budapest Pilot project. | The organized two workshops provided marketing opportunities for the eMaaS project and the Hungarian solution.<br><br>Also the Visegrad workshop provided a forum to discuss the technical aspects of the Budapest car sharing pilot project.<br><br>It was an important result that the car sharing concept was introduced in Eastern Europe by two events.<br><br>The Urban Mobility Forum in Visegrad and the EMOBILTY FORUM in Budapest.<br><br>The introduction of the Budapest Car sharing project in the Mobility Forum has aroused considerable interest as a new direction of mobilty in Hungary. |
| 4.16 | Third regular workshop and creation of webinars | eMaaS - 2. Transnational report - 4.16 - MOBILITY PRESENTATION VIENNA DEC,2019.pdf | Restricted to call | The Vienna Conference was a great success. A follow up conference is being arranged in London in February (MOVE) and which eMaaS again has a position and Dr. Willums will run a workshop defining what acitivites and business opportunities can develop further out of the eMaaS results. | Over 1000 attendess at the conference were able to learn about eMaas and the results of the work so far, and many gave important feedback and input. These results were presented at a follow-up roundtable organzied by the Academy of Engineering sciences at the ETHZ in Zurich on January 30, 2020 in cooperation with academic and government representatives. |
| 4.17 | Intermediate measurement results 3 | 4.17_Intermediate measurement results 3.pdf | Public | | The impact of this task is limited as it was an intermediate result. The main impact of task 4.6 is described under the final deliverable for task 4.6, deliverable 4.19. |
| 4.18 | Devlopment of e-learning module | 4.18_Development_of_e-learning_module_ZET_Austria_Clickdummy_Architecture.pdf | Restricted to call | One major negative experience for occasional users of an EV is that the driver has often no experience with that specific vehicle – and some vehicles are being upgraded from time to time. So the idea was to prepare a Click-dummy and evaluate it by the ZET review team.<br>The review found the basic idea very appealing and helpful. A number of feedbacks raised some questions about the operational usefulness of the tool. Among other what languages should be used (local language or English only) and who should adapt it to the specific car (The local car sharing company or a central entity for may? if it can be adapted for all the various cars, who has the responsibility as many cars have different versions. ? | Based on the feedback and further evaluation, it was concluded that ZET should prepare a version that would be an option for local users to implement. Among other what languages should be used (local language or English only) and who should adapt it to the specific car (The local car sharing company or a central entity for may? if it can be adapted for all the various cars, who has the responsibility as many cars have different versions. . The question was also if the instruction should be automatically loaded when a specific car had been chosen by a customer –should it be in advance of going to the car, or only when the driver is in front of the vehicle. |
| 4.19 | Analysis of measurements, plus conclusions | 4.19_Analysis of measurements, plus conclusions.pdf | Public | | The report gives a great overview of the eMaaS project goals, activities, results and findings. It is a great resource for all interested stakeholders in the eMaaS domain with many useful designs, strategies and helpful visualizations. It will allow a wide variety of stakeholders, including the consortium members themselves, to capitalize on the results of the eMaaS project. |

| No. | Name | File | Dissemination level | Explanation | Impact |
|-----|------|------|---------------------|-------------|--------|
| 4.20 | Awarness campaign and commercial exploitation completed | 4.20_Awarness campaign and commercial exploitation completed.pdf | Public | | The awareness campaign was successfully completed through various academic and business presentations. The main awareness activities were generated by the various members speaking at national and international conferences. In addition, demonstration at exhibits and attending Electro-mobility Demo Events became good channels to have a direct dialogue with end customers. We obtained additional press coverage that have been referred to also at our and the member's websites. Participating in panel debates turned out to be the most efficient communication channel for more policy related messages, as they were being referenced by the press covering these events. The website has been updated regularly and has been a well visited site. The creation of commercial exploitation & expansion possibilities came in the form of proposal being developed by the Consortium members to promote individual aspects of the eMaaS project. An exemplary case was the submission of two projects under the urgent EIT Urban Mobility COVID-9 call (deadline May 30,2020) for two commercial business proposals , carrier by the Hungarian and the Dutch eMaaS Consortium partner on coordinating the efficient use of electric vehicle to help for transport of food and assist moving people under Corona conditions. |
| 4.9 | Setup of measurement instruments and protocol | 4.9_University_of_Twente_2019_01_30.pdf | Public | First a baseline overview is created for the whole project. Second, these overviews will be used to discuss and define Key Success Factors for the whole project and its partners. Third, a generic pilot monitoring plan will be set-up. Fourth, the monitoring of specific pilots will be prepared, executed and evaluated. Finally the whole project is evaluated, combining the initial baseline with the pilot outcomes. | 'The impact of this activity is mainly internal - in that a good and consistent pilot measurement approach is ensured. These measurements should ultimately be disseminated again to ensure that other project, initiatives and business can learn from these pilot results |

## ^ 3.5 Project Management

| No. | Name | File | Dissemination level | Explanation | Impact |
|-----|------|------|---------------------|-------------|--------|
| 5.21 | Initial meeting and reporting | 2018_02_26_eMaaS_Kickoff meeting - minutes .pdf | Restricted to specific group | It is stressed in the meeting that apart from the reporting towards EMEurope, the ERANet programme demands that each partner is responsible for their own communication with their national funding entities. As the funding is granted on national level, any kind of questions regarding expenses etc. cannot be answered by the coordinator. | Shard folder allows continuous access to project documents for the participants. |
| 5.22 | Intermediate meeting and reporting 1 | 2018_06_05_eMaaS_Intermediate Meeting - minutes.pdf | Restricted to specific group | The partners present the progress of their part of the project. The next steps are discussed and defined. | 'Meetings guarantee regular opportunities for direct communication between the project partners. |
| 5.23 | Intermediate meeting and reporting 2 | eMaaS - 2. Transnational report - 5.23 - board meeting.pdf | Confidential | Project board meeting in Berlin on 28.11.2019. | Project board meeting in Berlin on 28.11.2019. |
| 5.24 | Final meeting and reporting | 5.24_Final meeting and reporting_2020_06_17_eMaaS_Final_Project_Board_Meeting.pdf | Public | | Final virtual board meeting on 17.06.2020 |

## 4 Issue/Risk

## ^ 4.1 Procurement cycles for fleet replacement

Milestone
*Milestone 2*

Description
*The lead time for procurement and the lock to existing contracts or age of existing vehicles in for*

*some fleets could reduce the number of local public services and businesses able to take up our solution in a timely manner.*

Issue type
*Products & Markets*

Status
*Solved*

Solution
*Based on the existing network and the experience of the partners suitable stakeholders could be acquired for the pilots.*

## ^ 4.2 EV Demand Insufficient to prove technical and commercial solution at scale

Milestone
*Milestone 2*

Description
*The eMaaS concept is all about creating a fully commercial shared EV service which is competitive with ICEV and internationally scalable. To achieve this shares fleets of sufficient size will need to be operated in each partner country, in year 1 to fully validate the full commercial viability of TRL 8/9 in good time for the eMaaS Back-Office solution to be scaled and projected EV volumes achieved.*

Issue type
*Products & Markets*

Status
*Solved*

Solution
*Within the partner countries, different situations exist with regard to the demand for electric vehicles. Norway, Sweden and the Netherlands are leading the way in Europe when it comes to the adaptation of electric mobility. In Austria, registration figures for electric vehicles have tripled in the last three years.*
*In Hungary, the registration figures for electric vehicles show double-digit annual growth rates, partly due to government subsidies in the form of a purchase premium.*
*All in all, there is a clear positive trend, so that sufficient demand for electric mobility is guaranteed.*

## ^ 4.3 Commitment from external systems and mobility providers

Milestone
*Milestone 3*

Description
*One of the innovative aspects of eMaaS is the integration with external e-mobility systems and link to other modalities like public transport. It is necessary to get access to their system communication and get them committed to fully cooperate in the project.*

Issue type
*Products & Markets*

Status
*Solved*

Solution
*There are also major differences in this area depending on the sector and country. While in some countries / regions, for example, the connection to public transport with open interfaces is possible without problems, individual operators are reluctant as far as this is concerned. For the selected pilots, good cooperation with the relevant stakeholders is provided.*