AmsTErdam BiLbao cItizen drivEn smaRt cities

# Deliverable 4.7: Monitoring facilities electromobility sharing hub

## WP4, Task 7.2

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[1] PU = Public
PP = Restricted to other programme participants (including the Commission Services)
RE = Restricted to a group specified by the consortium (including the Commission Services)
CO = Confidential, only for members of the consortium (including the Commission Services)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 864374.

## List of beneficiaries

| No | Name | Short name | Country |
|---|---|---|---|
| 1 | GEMEENTE AMSTERDAM | AMST | Netherlands |
| 2 | AYUNTAMIENTO DE BILBAO | City of Bilbao | Spain |
| 3 | FUNDACION TECNALIA RESEARCH & INNOVATION | Tecnalia | Spain |
| 4 | NEDERLANDSE ORGANISATIE VOOR TOEGEPAST NATUURWETENSCHAPPELIJK ONDERZOEK | TNO | Netherlands |
| 5 | FUNDACION CARTIF | CARTIF | Spain |
| 6 | STICHTING WAAG SOCIETY | Waag Society | Netherlands |
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| 25 | STICHTING WATERNET | WATNL | Netherlands |
| 26 | DNV NETHERLANDS B.V. | DNV | Netherlands |
| 27 | GROENE ENERGIE ADMINISTRATIE BV | Greenchoice | Netherlands |
| 28 | CIVIESCO SRL | CIVIESCO s.r.l. | Italy |
| 29 | ZABALA INNOVATION CONSULTING. S.A. | ZABALA | Spain |
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# Document History

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|---|---|---|---|
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| **Project Coordinator** | Frans Verspeek<br>ATELIER.EU@amsterdam.nl<br>City of Amsterdam | | |
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| **DoA** | Build, test and validate functioning of car sharing platforms. Including the governance and legal aspects of such platforms. The city of Amsterdam is planning an electromobility sharing hub in the PED. Discussions with operators are taking place. Expansion of the facility to include smart charging and/or vehicle to grid pilots are under consideration.This demo shows how the monitoring facilities enhance e.g. the optimization of the hub, the reduction of car-km in the city, possibilities of smart charging. | | |

| Date | Version | Author | Comment |
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# Contributions of Partners

The following **Fout! Verwijzingsbron niet gevonden.** depicts the main contributions from project partners in the development of this deliverable.

| Partner short name | Contributions |
|---|---|
| AMST | Overall content to all sections |

**Table 1. Contributions of Partners**

# Abbreviations and Acronyms

| Acronym | Description |
|---|---|
| eHUB | Name of the Interreg project on shared electromobility |
| SDG | Sustainable Development Goals |
| CDS-M | City Data Specification-Mobility |
| MaaS | Mobility as a Service |
| API | Application Program Interface |
| GDPR | General Data Protection Regulation |
| TOMP-API | Transport Operators and MaaS Providers-API |
| TO | Transport Operators |
| MP | MaaS Provider |
| MDS | Mobility Data Specification |
| OMF | Open Mobility Foundation |

**Table 2 Abbreviations and Acronyms**

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# 0. Executive Summary

This report assesses monitoring tools and possibilities for shared e-mobility. It will further assess and discuss the technical results like utilization overviews in Buiksloterham and possibly other hubs. This is based on the “e-hubs in Amsterdam” report of end 2022.

The following 3 objectives are identified:

- Development of a common “language” for communicating mobility information
- Set-up of an agreed information set that is shareable with Municipalities, respecting privacy issues for mobility users and business confidentiality for the operators
- Provision of some practical results in Amsterdam and more particular on the Buiksloterham shared e-mobility hub.

In the report, the basics of the City Data Specification – Mobility (CDS-M ) will be outlined which forms the foundation of the “Dashboarddeelmobiliteit”

The highlights of two years of monitoring shared mobility in Amsterdam results are presented.

Shared (electric) mobility shows a dynamic evolution in recent years. This is because of the rapid development of compact, high performance battery systems and the accompanying digitalization of society. A large majority of people uses a smartphone and apps of various providers show availability of vehicles and facilitate booking of vehicles on the spot.

In order for municipality urban planners and mobility specialists to have the insights in how these new forms of mobility contribute to the city goals it is important for them to have access to data. For that reason, Amsterdam has data sharing included as a condition for concessions since 2020.

Data privacy is an important element to deal with and several Dutch cities joined forces in the development of a “Dashboarddeelmobiliteit”. This is based on the municipal data needs and built upon the framework of CDS-M, ensuring personal data protection.The dashboard is user friendly but could be improved on details

Traditional vehicle sharing options, e.g. based on fossil fuel based vehicles, are still based on older concessions so the shared mobility report of Amsterdam of 2022 is composed of Excel data separately provided. A further reason for this is that at the time of reporting the dashboard was not yet mature enough. In the future, extension of concessions will also include the requirement of data sharing for the more traditional sectors.

Future outlook is to expand its possibilities to better assess whether shared mobility meets the goal of replacing fossil-fuel car trips by cleaner trips.

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# 1. Introduction

## 1.1. Purpose and Target Group

Positive Energy District projects are targeting neighborhoods and districts that deliver more energy than they consume. On a district level this is then comparable to an all-electric dwelling that produces on an annual basis more electricity (e.g. from solar PV panels) than it needs for its operation.

There are discussions going on when a district is truly positive energy. While it is important to know what we are exactly talking about, for example to assess how PED's contribute to the Paris climate agreement, this is not the purpose of this report. In the ATELIER PED calculations, the energy for transport and e.g. public facilities are kept out of the equation. But it is clear that in the future, mobility energy use will be more and more intertwined with the built environment through electric vehicles (EV) charging. This already affects grid capacity needs. For more information on this, the reader is referred to the ATELIER Deliverable D4.8.

This report addresses the developments in tools for monitoring (shared) e-mobility. This can be split in

- The foundation (Transport Operator Maas Provider Application Program Interface or TOMP-API)
- Standards
- Different tools
- Different monitoring goals

On the different tools, one can think of

- User surveys
- Technical tools for registration of e.g. number of trips, amounts of km traveled, modality used (e-bike, e-scooter, electric car….), e.g. the Dashboarddeelmobiliteit

The monitoring goals can be multiple. On one hand there are mobility patterns and utilization which are interesting for shared mobility operators for optimization of their fleet or e-hub composition in terms of availability of vehicles versus financial viability. But information on e.g. attractiveness of the booking system, ease of use and number of users that abstain from buying a private car or even stop having a private car, are more interesting for municipal planners. They can use the information to plan future space for parking.

Thus, there are several target groups:

- Mobility (MaaS) and Transport operators
- Municipal officials
- Electricity grid operators (in case of e-mobility)

User surveys and interviews are regarded as common techniques for getting qualitative and user experience type of information. In the following, the focus will be on technological developments in the field of mobility monitoring. A reference to a developed user survey is given too.

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# 2. Objectives and Expected Impact

*Introduction to the objectives of the WP/Del.; objectives reached with this deliverable, expected impact*

## 2.1. Objectives

The following 3 objectives are identified:

- Development of a common “language” for communicating mobility information
- Set-up of an agreed information set that is shareable with Municipalities, respecting privacy issues for mobility users and business confidentiality for the operators
- Provision of some practical results in Amsterdam and more particular on the Buiksloterham shared e-mobility hub.

## 2.2. Expected Impact

- Insight in the development process and results of mobility monitoring tools, as well as on the use of the tools.
- Clear insight in the shared e-mobility uptake and consequences for urban transport and possible consequences for electrical grid requirements. Because of the fact that the share of shared e-mobility in the total mobility mix is still small, the focus in this report is not so much on the impact on the grid but more on the actual data collection and sharing process that is compliant with the General Data Protection Regulation (GDPR) which is a piece of EU legislation targeting the protection of personal data.

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# 3. Overall Approach

The overall approach to the monitoring tools development is to embark on accepted standards and endorsement of their use. These standards are described in sections 3.1 and 3.2. Section 3.3 describes some tools. This is followed by a detailed analysis of the data of an individual shared mobility case to learn lessons and draw conclusions on the approach.

## 3.1 Development of a common mobility data standard

Digital access to shared vehicles is an important requirement to ensure a good user-experience and easy uptake of e-hubs. But the integration goes beyond that point. For municipalities, getting exact information about their transport infrastructure is key knowledge in order to make data-based decisions on future developments in the local mobility system.

Already in 2017, 130 representatives of Dutch cities, companies, and scientists delivered the Smart Cities Strategy to parliament. The strategy detailed an approach to deal with the issues that arise from the increase of populations of vehicles (private and shared).

Within the report, smart mobility was highlighted as one of the five main considerations for an improved future within the urban landscape.

It was recognized that within the landscape of Mobility as a Service (MaaS), standards for data exchange are required for reliable data traffic and app development. Already many standards existed, but it was clear that no single standard would fit all shared mobility use cases.

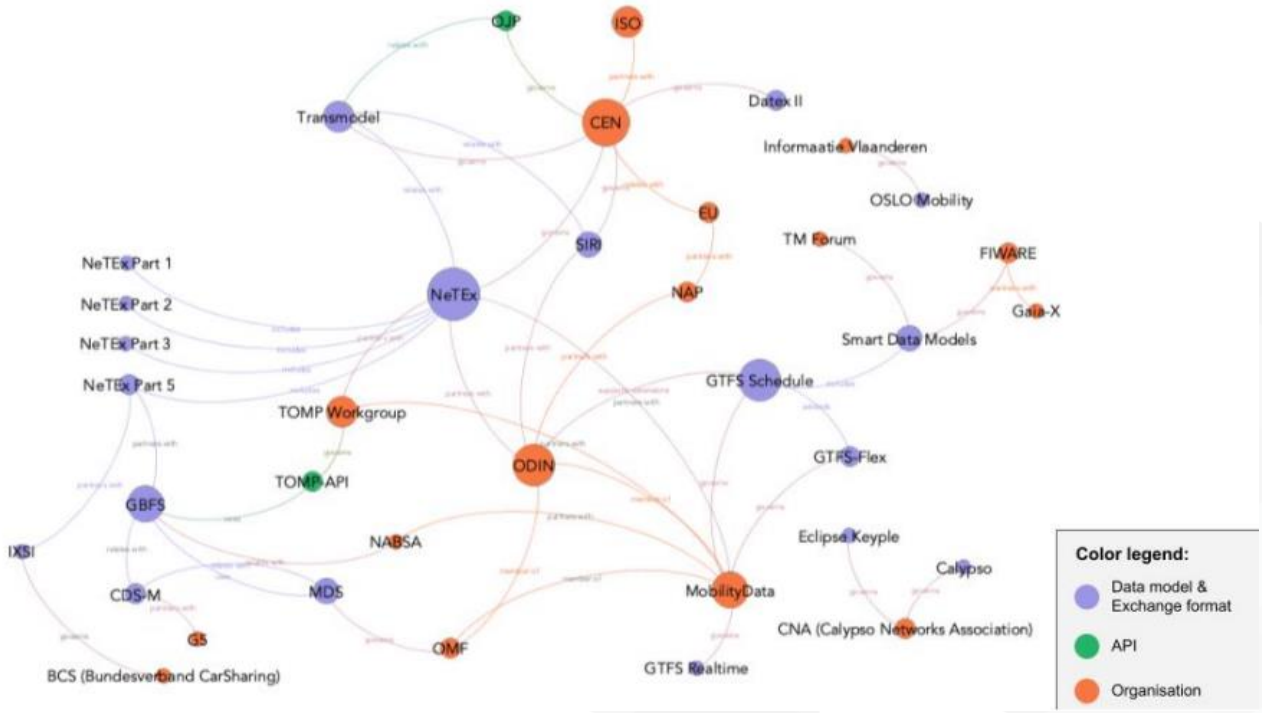


**Figure 3-1 Standards for mobility data**

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Within the eHUBS project, Amsterdam opted for the CDS-M (City Data Standards – Mobility) standard for various reasons:

- The aim is to work towards a single European data standard for mobility and strengthen cooperation among mobility operators and public authorities.
- A single CDS-M will clarify how data should be processed with a view to GDPR compliance and what type of information should be supplied for what use cases;
- This will make it easier for mobility providers to roll out their services in different areas;
- CDS-M enables municipalities and provinces to combine data and learn from each other;
- CDS-M provides a better understanding of the use and effects of shared mobility (e.g., accessibility and quality of life). CDS-M is a resource for improving and innovating policy.

The CDS-M (City Data Standards-Mobility) process is a data exchange standard that was created with a focus on the metrics that municipalities need and sets “must-haves” of data that a transport operator must share.

To exchange data securely and efficiently, the Cities of Amsterdam, Utrecht, Groningen, Eindhoven and Rotterdam, together with the Dutch Ministry of Infrastructure and Water Management, have developed a roadmap/manual that describes step by step the process for data exchange based on CDS-M.

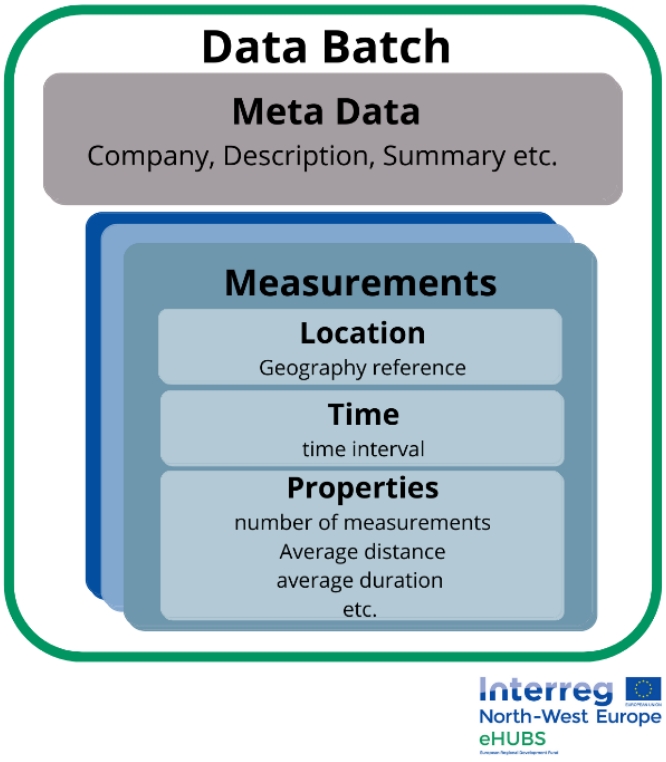


**Figure 3-2 The data structure of the CDS-M framework**

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The roadmap[2] includes handy links, documents and tools that enable employees to exchange data securely. These include a template for a DPIA (Data Protection Impact Assessment) and a Non Disclosure Agreement in case third parties are allowed to access data.

## 3.2 GDPR requirements

Three elements form the foundation for data protection in the GDPR. These are:

**1. Purpose limitation**

Purpose limitation comprises two elements: purposes should be well-defined, properly described and justified, and data must not be further processed in a manner that is incompatible with those purposes.

**2. Minimization of data processing**

Data should be processed only if they are adequate, relevant and limited to what is necessary for the purposes for which they are processed.

**3. Legitimacy, fairness and transparency**

There must be a lawful basis for processing personal data. In the case of CDS-M, this basis is usually 'in the general economic interest'. The processing of data must be fair, in other words necessary and proportional, and transparent. With a transparent processing the rights of the parties involved must be respected: the right of inspection, the right to be forgotten, right to rectification and addition, etc. The data subject must also be made aware of the processing.

For the purpose limitation requirement, CDS-M works with "Use Case Templates" that describe the purpose of a data exchange (what problem needs to be solved). The specification of which data are needed is necessary for data minimization.

Furthermore, one has to ensure

- Data security
- Data protection by design and by default

See also GDPR-info[3]. All this has been accounted for in implementing CDS-M.

## 3.3 Tools

### TOMP-API Development

The TOMP-API development is an ongoing process. In relation to monitoring it fits with the technical tools category and is useful for stakeholders TO's and MP's and municipalities. Background information can be found in Annex "MaaS Alliance and TOMP-API development".

[2] https://cds-m.com/
[3] https://gdpr.eu/what-is-gdpr/

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The TOMP-API is being developed by an open source working group, the TOMP-WG (Transport Operator, MaaS Provider – Working Group), with public and private stakeholders, aimed at facilitating the implementation of MaaS and the corresponding exchange of data. The TOMP-API describes a full MaaS journey, including operator information, planning, booking, support, payments and trip execution.

The following information of the different phases of the Transport Operator - MaaS Provider process can be identified:

- Planning phase
- Booking phase
- Trip execution phase – start
- Trip execution phase – on route
- Trip execution phase – end
- Operator information
- Payment

As shown in the picture below.

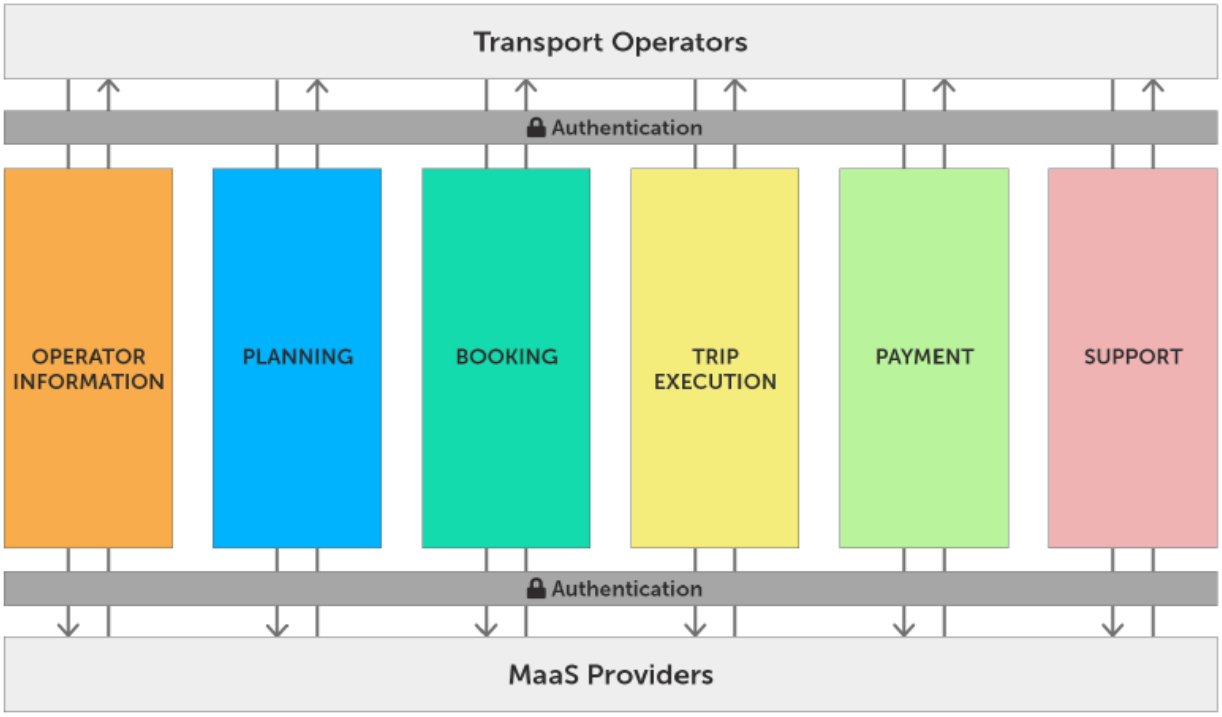


**Figure 3-3 Overview of TOMP-API**

As indicated in the Annex on the TOMP-API, the phase of trip execution is the most important when it comes about actual use of the MaaS options, but there are many others (as mentioned in section 1.1) that are relevant as indicators for the attractiveness of MaaS and therefore measures of the growth potential. As an example, the unlocking procedure of cars with the app of the original operator at the Buiksloterham Papaverweg hub was considered to be

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cumbersome and did not stimulate frequent use. Luckily this was solved quickly because a new service provider took over.

## Dashboard shared mobility

The Dashboard shared mobility (*dashboarddeelmobiliteit*) has been created by CROW (originally an acronym for "Centrum voor Regelgeving en Onderzoek in de Grond-, Water- en Wegenbouw en de Verkeerstechniek") is a Dutch foundation acting as a knowledge institute for infrastructure, public space, traffic and transport and employment and safety) on behalf of Dutch municipalities to help them to develop shared mobility policy based on data. The data provided are based on the processes that are described in the CDS-M. This means that it is not possible to trace back data to personal data of users. As such it ensures privacy by design.

Depending on authentication level of the user, it is possible to look at data on different levels. Users without an account have access to general data only, like the location of hubs and composition of the amount of shared vehicles at different locations. For more in-depth information one has to create an account and CROW will screen whether you are entitled to have one. Personnel e.g.at the V&OR programme shared mobility of the Municipality of Amsterdam have this access. There is even one person authorized to download raw data that even contain start and end coordinates of trips. A DPIA (Data Protection Impact Assessment) regulates what is allowed to do with such data and aggregation is necessary.

Currently (summer 2023), the dashboard does not yet include cars, providers of those are more conservative than those of scooters, e-bikes etc.

More information on the Dashboard shared mobility can be found in the Annex About the Shared Mobility Dashboard. A key element in the Annex is the remark about the amount of applications for data to providers. This is further treated in the chapter on lessons.

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## 3.4 Detailed quantitative monitoring of the Buiksloterham shared e-mobility hub

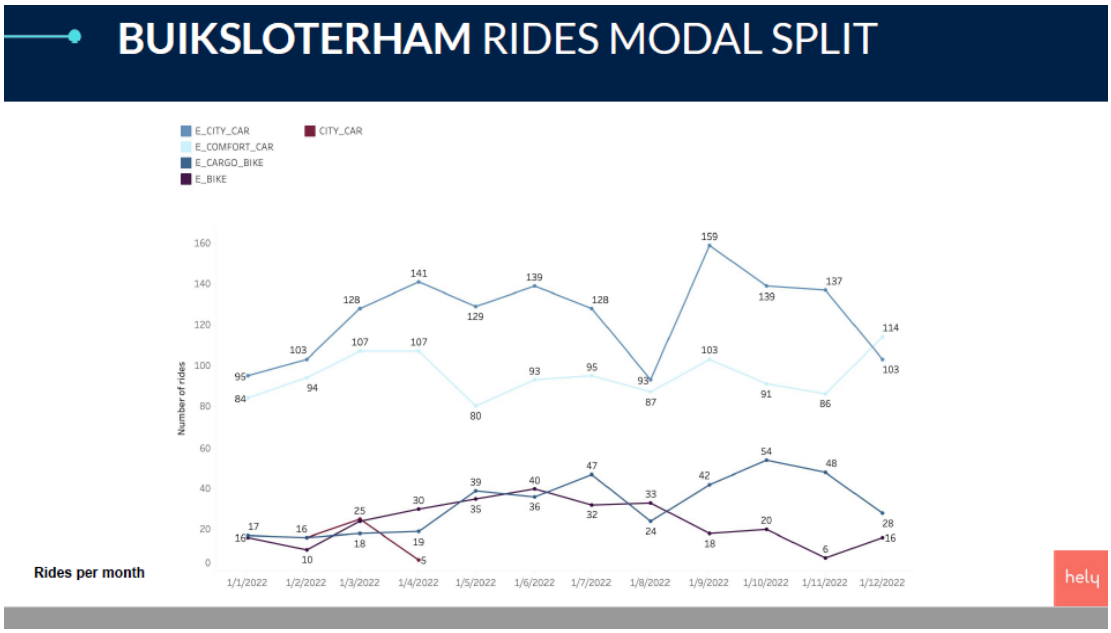


**Figure 3-4 Number of trips per month for the different mobility modes in 2022**

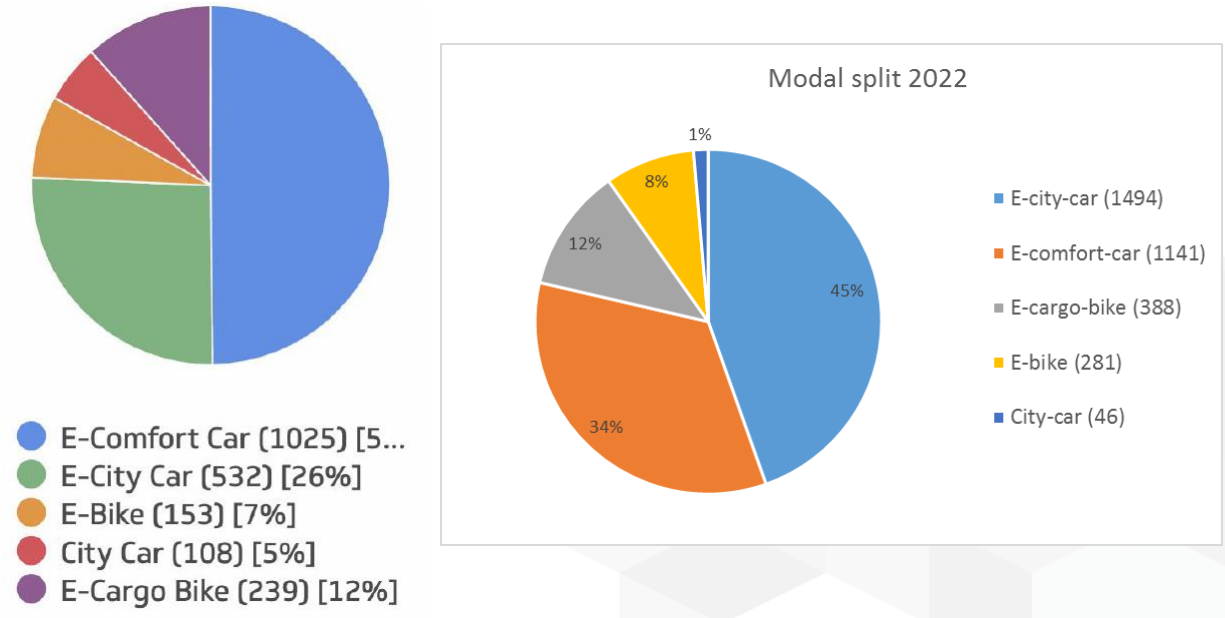


**Figure 3-5 Modal split of the Buiksloterham Papaverweg hub for 2021 (on the left) and for 2022**

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Above you see the modal split of the Buiksloterham Papaverweg hub for 2021 (on the left) and for 2022. It can be seen that the distribution over the various modes is quite stable. About three quarters of the trips is made by the electric cars and about half of the remaining trips is for the cargo bike. This does not come as a surprise. An important goal of this particular hub is a solution tot he mobility demand for the nearby floating community that has no access to nearby individual parking facilities for cars. They are expected to have their own bikes which fulfill basic needs for relatively nearby urban transport. It is likely the cargo bike rides that replace rides that would normally have been executed with a car (either fossil fueled or electric).

## 3.5 Monitoring two years of shared vehicles in Amsterdam

In 2020 the municipality of Amsterdam opened up the city for shared mobility vehicles (other than cars) by providing concessions so in 2022 two years of shared mobility had passed and a monitoring report has been prepared. An interim report was issued in 2021. Some results will be shown here, but as the report you are currently reading is about the tools for monitoring rather than on the actual results, the findings will not be extensively discussed. Rather, the focus will be on the usefulness of the various tools at disposal. Since 2020, part of the concession conditions is provision of monitoring data on number of trips over time, trip length, start/stop location etc. For more conventional car sharing with fixed car locations the concessions did not include the data sharing requirement. The monitoring is targeting the question how shared mobility contributes to the city objectives.

Indicators for the city objectives are:

- Improvement of the door to door trip quality
- Suitability of car replacement
- Less parked bicycles/mopeds in the public space
- Avoidance of pressure on the public space

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An example of a graphic result is shown here:

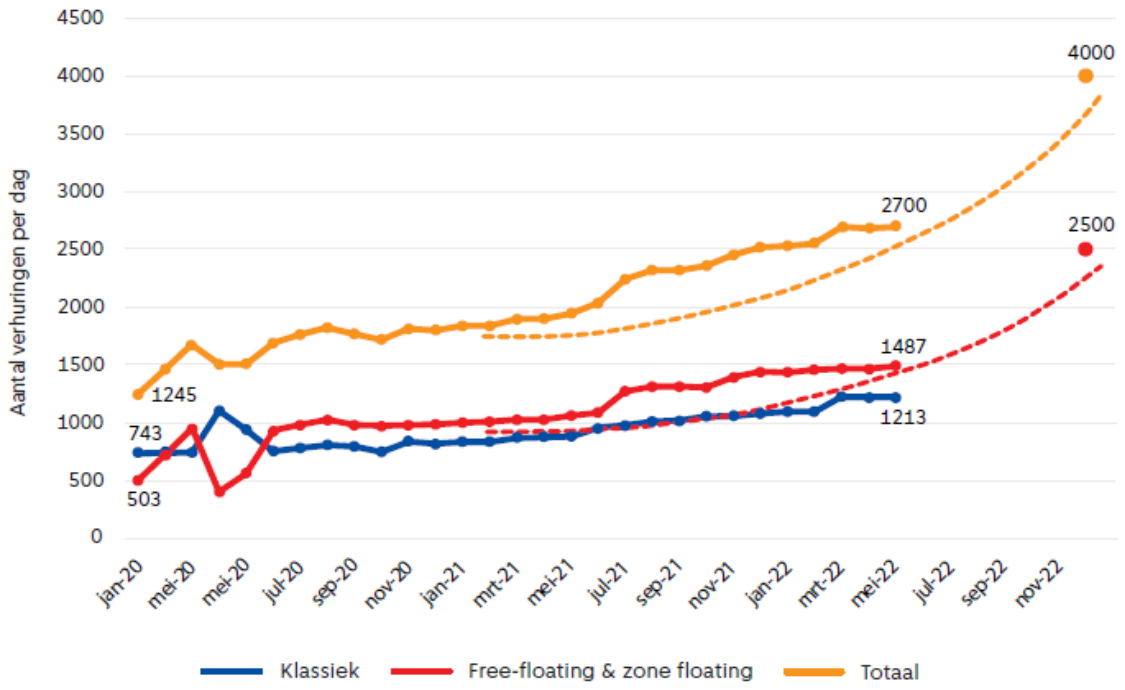


**Figure 3-6 Full report shared mobility 2022 [4], shared scooter, shared car, shared bike, shared cargobike. Development over time of shared cars rentals per day.**

For the shared mobility report, all these data were provided through Excel sheets as the Dashboard shared mobility was not yet fully mature. Clearly the dip in use because of the initial COVID lockdown in spring 2020 can be observed. Klassiek means fixed parking location type shared cars, these were more popular in this period.

[4] *Rapportage deelmobiliteit 2022 (openresearch.amsterdam)*

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# 4. Lessons on monitoring (tools) and evaluation

Similar to the approach in deliverable D4.6, the lessons are given in a separate chapter based on individual topics. The lessons apply to both the e-hubs monitoring as the tools used.

## 4.1 On evaluation and monitoring

### E-hubs

**An e-hubs process doesn't finish after putting the e-hubs in place. It is necessary to evaluate the performance of the stations and take action according to the results:** have we met our goals? What can be improved? How to tackle hubs that are not working as expected?

This report provides examples on how to measure the success and the impact of e-hubs and shared mobility fleets, what is needed in terms of tools and how to evaluate the results. The UN Sustainable Development Goals (SDGs) can serve as a guiding principle and backbone of a municipal mobility and sustainability strategy. In this vein, insights are provided as to how eHUBS can be beneficial in meeting the SDGs and how to assess this. For more details see ATELIER deliverable 4.6.

**In terms of performance evaluation, the quality aspect is considered an important factor; The underlying idea is to provide incentives to use shared mobility services or to offer services that are attractive to (potential) users.** That will in the long run, guarantee that the needs of users are better met, and new users are attracted. As Shared Mobility is still a rather new phenomenon in many places and potential users need to become acquainted with the functionalities of e-hubs, the threshold for their (first) use must be as low as possible and the user experience as hassle-free and pleasant as possible. Therefore, quality of services and user satisfaction are the driver of the hubs, and must be scrupulously monitored and continually improved. There are several service quality criteria that should be taken into account and assessed regularly:

### Use of CDS-M

As has become apparent from the section on the CDS-M process, it is quite an effort to get access to shared mobility data for case by case studies as it requires a research goal, plan, a DPIA (Data Protection Impact Assessment) and a Non Disclosure Agreement in case third parties are allowed to access data. This is all to comply with the GDPR. This has led to the development of the Dashboard shared mobility with the goal to provide insight and improve the use of shared mobility. It limits individual data requests from municipalities, as a lot of information is provided by the dashboard. The approach of data privacy by design eliminates the process of taking the mentioned steps, but it limits data access to those data previously determined acceptable to be shared. The good thing is that the dashboard is automatically fed with data on a 30-second basis.

The monitoring is for both short and long term. The high refresh ratio of data allows one to study the dynamics of availability and use, information that is useful for making the system more attractive. Improving the system relies on both short term and user experience information, while longer term info is important for attractive business cases for the operators.

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The dashboard is user friendly for day-to-day use, which is in part resulting from a limited set of functionalities (see the Annex on the dashboard) which has the benefit that users are not drowned in too many options that make the dashboard difficult to navigate. However, this means that for more thorough analysis, custom work is needed based on raw data. For an analysis that tries to reveal the purpose of the trip and whether it meets its goal of replacing a car trip, details like the duration of a trip, km travelled are needed. For new releases wishes like more explanatory graph headings and graphs related to unavailability of vehicles per day are on the list.

## 4.2 Availability of e-hubs vehicles

**In order for e-hubs to be a real alternative to private Cars, they need to be reliable and it is preferred to not have to plan trips ahead.** Therefore, the availability of the vehicles must be ensured.

## 4.3 Quality of e-hubs vehicles

**Make sure that the vehicles at your e-hubs are robust and yet ensure a pleasant travel experience.** If users find their ride to be too tedious, inconvenient or uncomfortable, they are very unlikely to return to an e-hub.

## 4.4 Cleanliness of e-hubs vehicles

**Especially in times of COVID-19 users have higher expectations towards cleanliness and hygiene.** Also, nobody would like to sit and ride around in another person's junk.

## 4.5 Safety of e-hubs vehicles

**Make sure that the vehicles are in a safe condition and that critical parts (brakes, lights, etc.) are regularly checked.**

## 4.6 Proximity of e-hubs/vehicles

**E-hubs can only be a real alternative to private cars if they serve specific travel needs, e.g. access to public transport modes. The location of the e-hubs should therefore be continuously monitored**

## 4.7 Easy Access

**The booking and payment process should be as transparent and hassle-free as possible to ensure a seamless travel experience.** The digital integration of the e-hubs transport modes in terms of Mobility-as-a-Service can play an important role here.

## 4.8 Facilitation of data collection

Most of the above-mentioned indicators are in the responsibility of the mobility service providers and should therefore be part of a service level agreement. However, it is advisable to regularly assess whether the current equipment of the e-hubs meets the needs and wishes of the users or whether certain transport modes should be added or replaced to promote the uptake of the e-hubs. This highlights the importance of data when evaluating the uptake of e-

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hubs. Intelligent transport systems such as e-hubs should therefore facilitate the collection of user data, to gain better knowledge of their mobility habits and therefore optimize decision-making for improving the quality of services. Thus, it is beneficial to work towards a collaborative data ecosystem between municipalities, mobility service providers and public transport operators as well as to establish API's to facilitate the exchange of relevant mobility data. (Such as was done in the development of CDS-M).

**Next to the data from the mobility service providers another data source to gain insights from could be user surveys.** Depending on the information you would like to gather they could either follow a quantitative or a qualitative approach. In general terms, quantitative surveys are more suitable if you would like to gain representative insights on user habits, qualitative surveys or interviews are more suitable if you want to learn more about the motives and barriers for (not) using e-hubs or shared mobility in general or if you want to gather detailed feedback on the experiences.

An example of survey results is given in the following eHUBS[5] report. A sample of questions related to attitudes toward shared mobility, car use and the environment is given in Annex "Questionnaire sample".

Interviews and panel surveys were conducted to get more qualitative data. Like look of the e-hub, whether people had heard of it, whether they knew what to do when they wanted to use it. When changes to a hub were made, the results in user experience and usage of the hub were compared with e-hubs where these changes were not implemented to understand the effect of the intervention.

## 4.9 Important Key Performance Indicators

- Data on number of vehicles of each kind, number of subscriptions were collected from the Mobility service providers.
- Amount of time the hub was used, number of trips, amount of km. Collection of these data was done by the Mobility Service Providers (obliged by the Service Level Agreement).
- User data of the e-hubs were used to adapt the transport modes and their quantity in various hubs to promote utilization.

It is mainly these KPI that can be determined by adhering to data interoperability standards of the digital monitoring tools , as described in section 3.1 and 3.2.

The modal split is traditionally assessed by conducting surveys among the population asking about mobility habits and preferences. In order to gain more detailed insights and to eliminate biases inherent to traditional surveys, it is also possible to use smartphone apps or other tracking devices. However, this approach can require expertise in Software Development, Data Science and entails high standards to Data Security and Data Protection. In any case, if the required expertise is not available in-house, it is advisable to seek collaboration with external experts such as research institutions. The eHUBS course[6] module 6 contains tools for monitoring and evaluation.

[5] https://www.nweurope.eu/media/14096/dt233_ehubs_draft-summary-report-of-aggregate-results_qs1-final.pdf
[6]https://www.nweurope.eu/projects/project-search/ehubs-smart-shared-green-mobility-hubs/news/the-ehubs-blueprint-a-digital-handbook-for-mobility-planners-to-create-shared-mobility-hubs/

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# 5. Conclusions

Shared (electric) mobility shows a dynamic evolution in recent years. This is because of the rapid development of compact, high performance battery systems and the accompanying digitalization of society. A large majority of people uses a smartphone and apps of various providers show availability of vehicles and facilitate booking of vehicles on the spot.

For municipality urban planners and mobility specialists to have the insights in how these new forms of mobility contribute to the city goals it is important for them to have access to data. For that reason, Amsterdam has data sharing included as a condition for concessions since 2020.

Data privacy is an important element to deal with and several Dutch cities joined forces in the development of a “Dashboard deelmobiliteit”. This is based on the municipal data needs and built upon the process framework of CDS-M, ensuring personal data protection. The dashboard is user friendly but could be improved on details.

Traditional vehicle sharing options, e.g. based on fossil fuel based vehicles, are still based on older concessions so the shared mobility report of Amsterdam of 2022 is composed of Excel data separately provided. A further reason for this is that at the time of reporting the dashboard was not yet mature enough. In the future, extension of concessions will also include the requirement of data sharing for the more traditional sectors.

Future outlook is to expand its possibilities to better assess whether shared mobility meets the goal of replacing fossil-fuel car trips by cleaner trips.

# 6. Outputs for Other WPs

The results of the Amsterdam shared e-mobility activities are specifically relevant to the e-mobility activities in Bilbao (task 5.4) and the municipal organizations of the fellow cities. For the latter, the results of the work could be presented in one of the activities targeting replication in WP6. The link to the on-line course on shared e-mobility has been shared with the ATELIER partners and is given below as well[7].

[7]https://www.nweurope.eu/projects/project-search/ehubs-smart-shared-green-mobility-hubs/news/the-ehubs-blueprint-a-digital-handbook-for-mobility-planners-to-create-shared-mobility-hubs/

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# Annex MaaS Alliance and TOMP-API

This Annex will cover information on the implementation of the TOMP-API, it is one of the different standards that has been mentioned by the MaaS Alliance position paper of November 2021 and adopted amongst others by the city of Amsterdam in their shared e-mobility project eHUBS, including the hub in the ATELIER project on Positive Energy Districts (PED.

While this proposed standard may require a reasonable level of development effort for TO's and MP's, the adoption of such a standard actually reduces the long term effort. The TOMP-API is already a very well-conceived standard and is considered one of the most realized standards relating to the communication between TO's and MP's to enable MaaS. This has been achieved in part by the wide contribution to date of many different parties across the EU and globally. It has also been the continued regularity of meetings over the last two years that has ensured it's steady development.

It has subsequently been adopted by the MaaS Alliance[8] as their technical specification for interoperability between TO's and M'Ps. The Friesland initiated OSLO standard is also moving to align with the TOMP-API definition. There is also communication with the relevant working parties within CEN to bring this forward as a proposal to make it a certified EU standard.

Due to the nature of the specification being open to all to contribute it means all stakeholders at various levels within the MaaS eco-system have the opportunity to contribute to the future development of the standard with their findings and desires. This means that the API definition is owned by all who use and contribute to the specification of the standard, while also being owned by no one.

The commercial benefit for this for TOs and MPs is an implement once, benefit many times approach. By having an agreed standard a TO or an MP can enter new markets with minimal additional development efforts. This is due to being able to quickly connect to their respective counterparts within the TO/MP framework.

At a city level, the TOMP-API gives absolute clarity for quality of service of interoperability between TO's and MP's. The only step a city needs to take to enable and ensure this, is to define the adoption and implementation of the TOMP-API as a requirement for TO's and MP's to gain a license of operation. By leading with this requirement, it also means that a city does not have to manage multiple standards for different parties.

The TOMP-API is already a required standard for the G5 MaaS Pilots in the Netherlands. With the OSLO standard also moving towards alignment with the TOMP-API this will soon include Belgium.

Within the eHUBS project, the participants considered that the backing of this already very realised API standard could reduce the risk of further standards, and avoid fragmentation and additional overheads for Cities, MP's, and TO's to implement and manage the data. As several parties, who are part of eHUBS project, are also regular contributors and attendees of the TOMP working Group, it is felt the project can continue to help grow TOMP-API.

[8] https://maas-alliance.eu/wp-content/uploads/2021/11/20211120-Def-Version-Interoperaability-for-Mobility.-Data-Models-and-API-_-FINAL.pdf

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For the purpose of monitoring the use of shared e-mobility hubs, the trip execution is the key phase described in section 3.3 that is used as it will provide:

- Trip start point
- Trip end point
- Modality (Bike, car, other,,,)
- Distance per modality
- Total distance
- Travel time

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# Annex About the Shared Mobility Dashboard

## General

The Sharing Mobility Dashboard is a web tool from and for governments that want to keep a close eye on developments in sharing mobility. How long and where are shared vehicles unused in the public space? How often are the shared vehicles rented out? In which neighborhoods and at what times are shared vehicles popular? Governments can use the information from the Sharing Mobility Dashboard to develop, evaluate and adjust their policy.

## How does it work?

The Shared Mobility Dashboard collects the position of more than 15,000 parked shared vehicles in the Netherlands every half minute (January 2022). Based on this information, the dashboard generates so-called parking events and rentals, which are stored in a central database. The dashboard offers a number of functionalities (maps, graphs and tables) to consult the database.

For analyzes that the dashboard does not provide, governments can download the raw data from the dashboard in order to make customized analyzes or have them made.

## Functionalities

The following functionalities have been developed in consultation with participating governments:

- A map with the range of shared vehicles available at a time of your choice. A color code also indicates how long the vehicle is available for rental.
- A map with rental of shared vehicles during a period of your choice. This concerns both the locations where leases have started and ended.
- Charts with developments in a period of your choice. This concerns both the development in the number of shared vehicles that are offered and the development in the number of rentals.
- Standard reports as Excel sheets can be downloaded.
  Governments only have access to information about shared vehicles in their own administrative area. The following screenshots show some examples of screens accessible to authenticated users.

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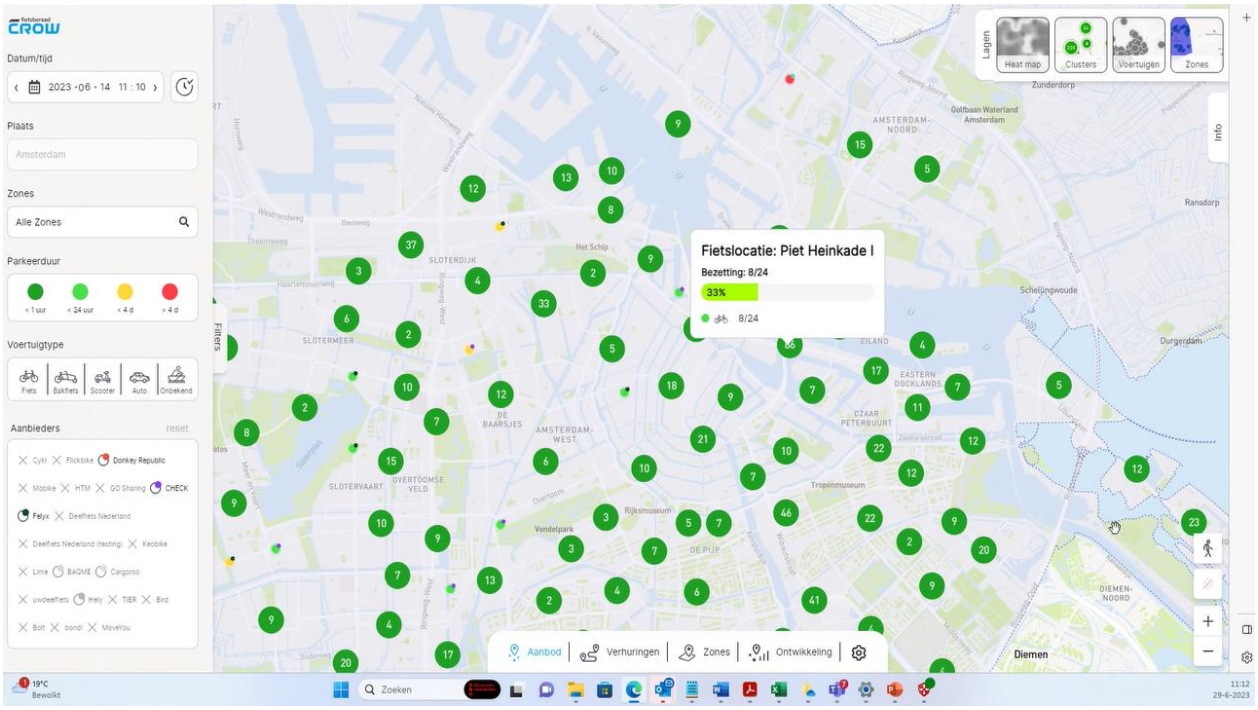
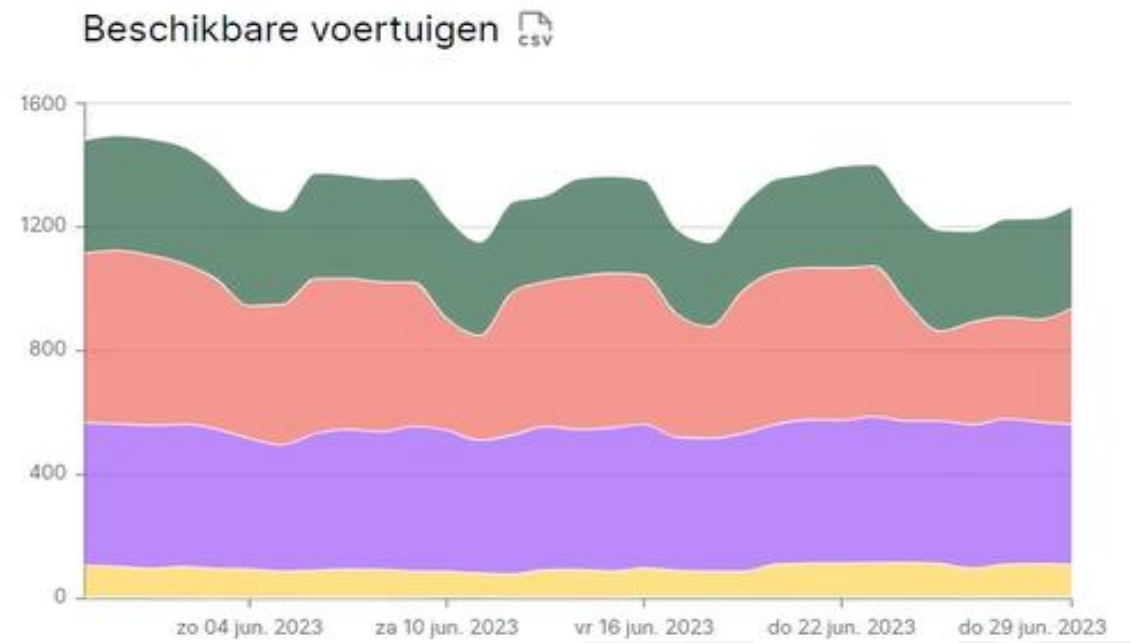



Overview of available vehicles per location. In pop-up maximum capacity and current availability also visible. Filtering is possible on e.g. time, modality, operator.




Overview of available vehicles per provider over a period of time on a specific location or aggregated. A similar graph is also available about the amount of rentals These overviews can be used to study the activity around hiring locations.

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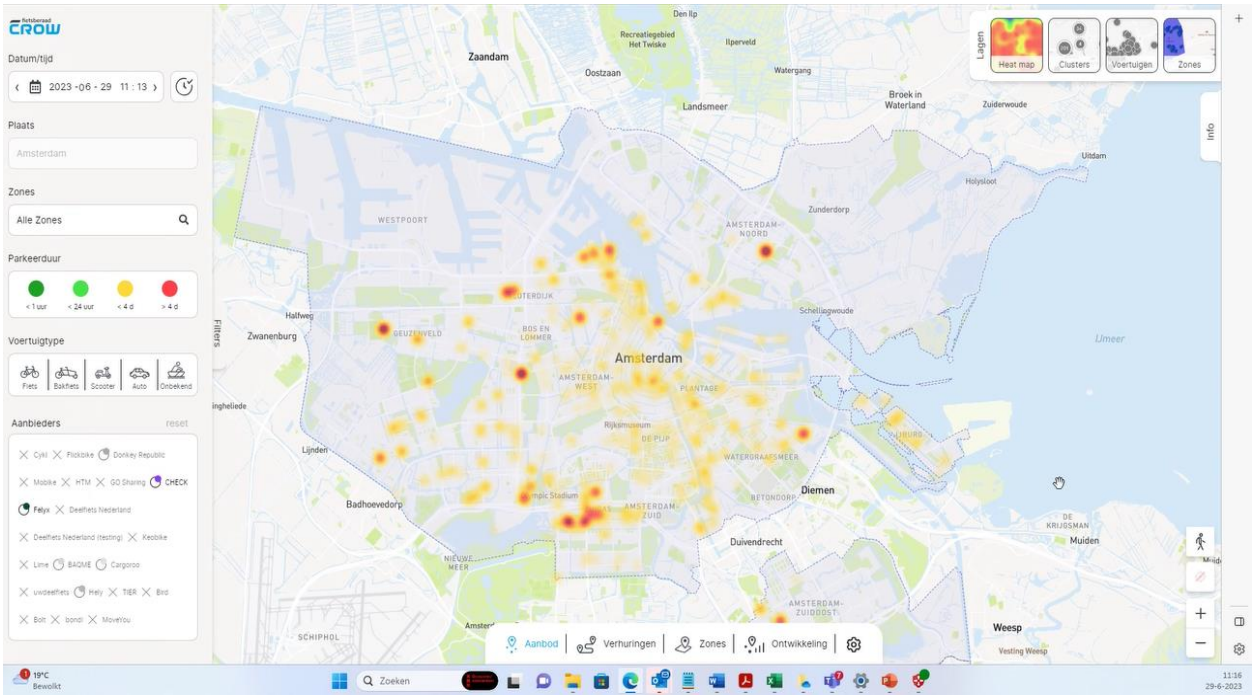
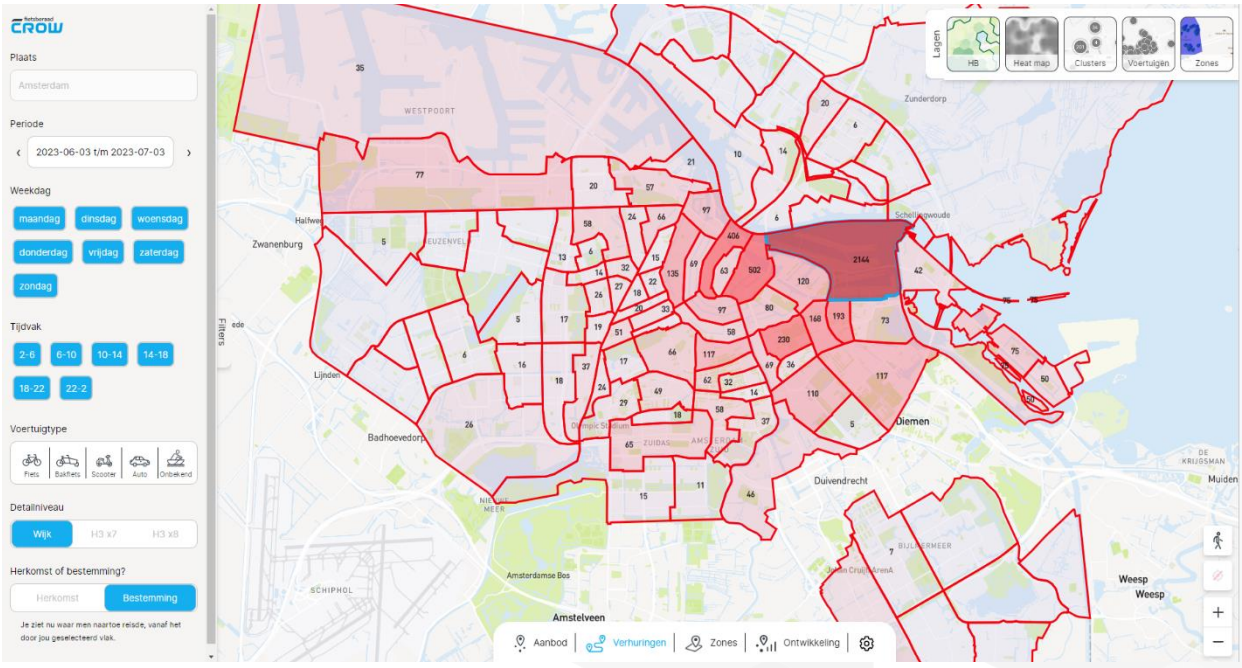



Distribution of available shared vehicles across the city. Provides insight into where high numbers of shared vehicles are located and can be a reason for additional measures in the public space, for example the realization of hubs.




Overview of trip final destination from the blue line starting location. The different zones provide the number of trips ending there. Filtering is on all shared vehicles, month June.

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## Benefits for municipalities

• faster access to data
• less inquiries to providers required (1 source with all data)
• no more conversion necessary: data from every provider has exactly the same data format
• development in consultation with the affiliated municipalities
• if desired, can be expanded by municipalities themselves (open source software)

## Benefits for providers

• fewer applications from municipalities
• no new data formats required due to use international data standards
• municipalities have better insight into the state of affairs
• providers have better insight

## How do I access the Dashboard?

You can request a login via the CROW or via info@dashboarddeelmobiliteit.nl. Depending on your task and the agreements about the data, you can then access the dashboard information for areas and/or providers. For example, municipal employees can generally gain access to the dashboard in their municipality. Bike-share providers can, of course, access all information about their bike-shares. For questions about the rights, please also contact the CROW or info@dashboarddeelmobiliteit.nl.

## Which data standards are supported?

Although the Sharing Mobility Dashboard supports various data standards, we prefer that providers provide their data in accordance with MDS (Mobility Data Specification), governed by the Open Mobility Foundation (OMF). This also gives the providers the greatest certainty that the link will function properly in the future. See details in the specification.

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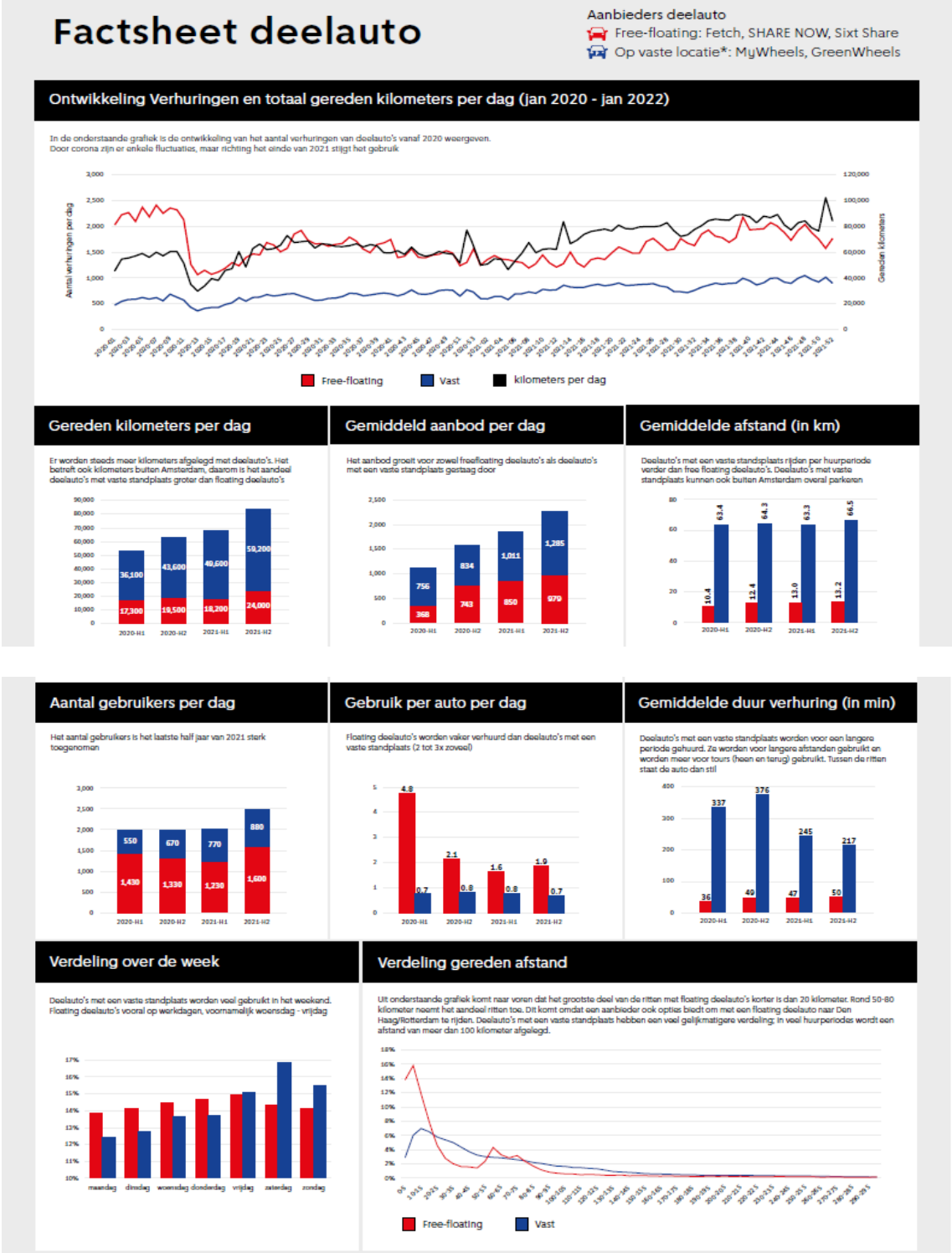
# Annex Factsheet Shared cars Jan 2020 - Dec 2021




Similar factsheets exist for the modalities shared scooter, cargo bike and electric bike.

This trips analysis together with the surveys and a parking study enabled the municipality to determine the effectiveness of shared mobility in achieving their goals.

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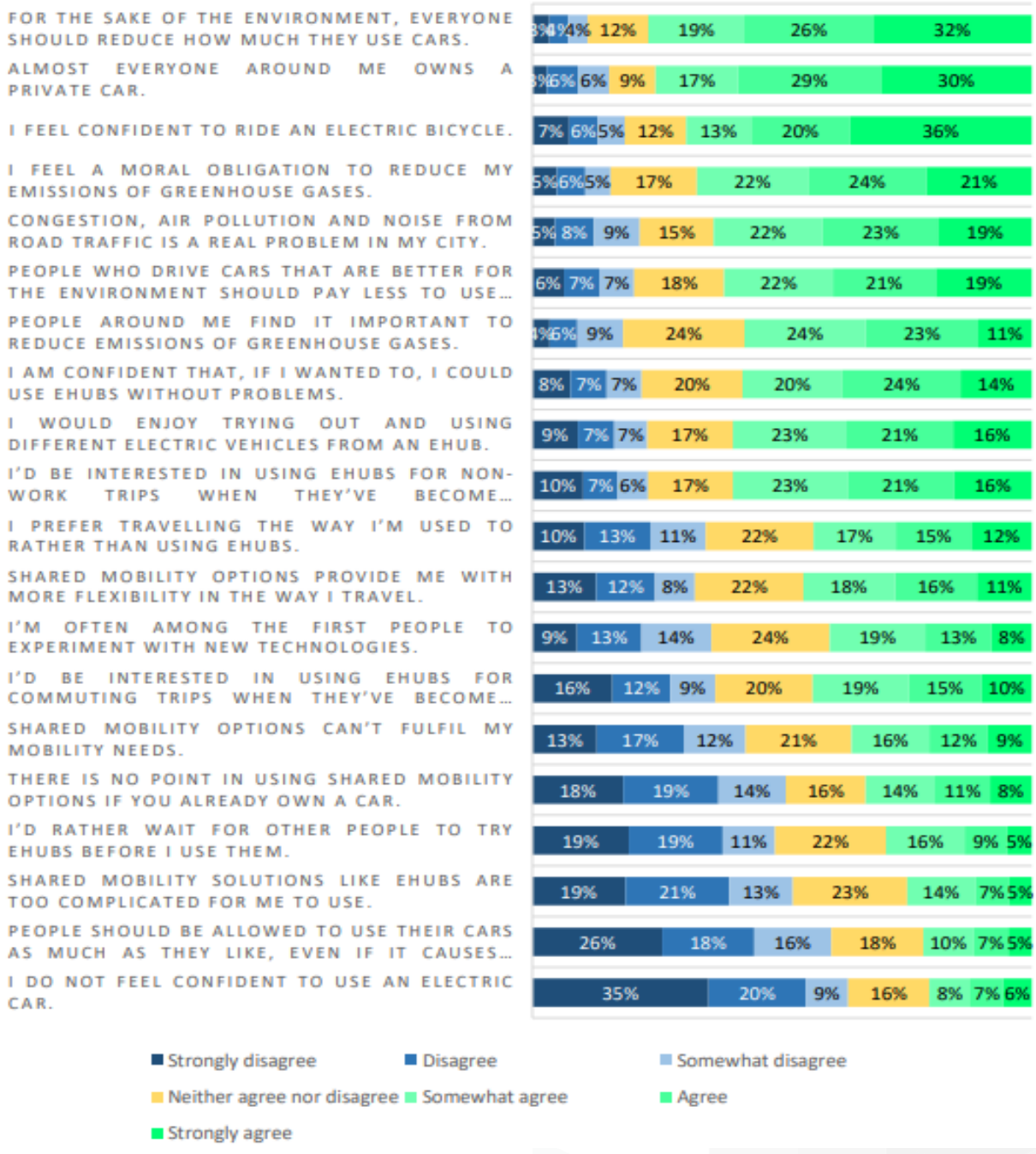
# Annex Questionnaire sample

## 7. ATTITUDES TOWARD SHARED MOBILITY, CAR USE AND THE ENVIRONMENT

In order to learn more about respondents' general attitudes towards shared mobility, car use and the environment, we challenged respondents with a series of twenty (20) pre-tested statements rated on a standard seven-point Likert-scale (Strongly disagree to Strongly agree). These statements along with the outcomes are displayed in **Figure 44**.

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