

User-friendly Information

Tool on Urban and Regional Access Regulations Schemes

Contract: MOVE/B4/SER/2019-498/SI2.832125

Deliverable 3.1 – Demonstration of UVAR data access in trip planning and navigation services

Consortium:





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Administrative section

Document bios

Document file name	Work package	Tasks
UVARBox_WP3_Deliverable3.1_09_2022_1.0	WP3	3.1

Version history

Version	Date	Description of changes	Author	Partner
0.1	25-02-2022	Draft table of contents	WP3	MAPtm
0.2	07-04-2022	Drafting contents		
0.3	13-08-2022	Drafting contents	Sónia Soares	ARMIS
0.4	30-08-2022	Draft for revision	WP3	MAPtm
0.5	31-08-2022	General revision	Sónia Soares	ARMIS
0.6	05-09-2022	Review	Manon Coyne	POLIS
1.0	06-09-2022	Frist release	WP3	MAPtm

Disclaimer

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Detailed work

1 Introduction

Once available the Urban Vehicle Access Regulation (UVAR) DATEX II data has the potential to become a valuable asset for policy makers, road authorities and service providers (SP), but only if it is fully exploited. This depends on how easily accessible the data is, and how valuable the information is perceived by service providers, as well as on how this data will be incorporated into their information and navigation services that deliver the UVAR information to the road users.

The key aspect of Work package 3 is to demonstrate and showcase how UVAR DATEX II data can be accessed via the network of European National Access Points (NAPs), to be used by service providers for provision of UVAR information on navigation and information services.

This deliverable firstly reviews the current European framework and related initiatives for provision of Real Time Traffic Information (RTTI) and UVAR data. This covers the provision of UVAR data via the network of NAPs as well as the provision of UVAR data through the Single Digital Gateway (SDG) initiative. Secondly, it describes the UVAR data value chain to illustrate the role each stakeholder has, and in particular how different implementation of NAPs can reflect on the UVAR data access and provisioning. After this, a description is provided of the engagement with UVAR data users, like information and navigation service providers and the SDG initiative, to gather current practices and needs on collection, access, and usage of UVAR data in their end user services.

The collection of insights and lessons learned from the work performed for this deliverable will further help the development of recommendations to future improvement of UVAR data access and usage that will follow from the UVAR Box project.

2 Approach

In the proposed process for UVAR data access and UVAR information provisioning, two main stakeholder groups are involved: the network of National Access Points and information and navigation service providers.

The NAPCORE initiative was consulted aiming to collect information on the availability of UVAR data and the business requirements from the NAPs hosting it on their platform, and also, to identify the main organisational, functional, and technical challenges that are being faced.

A series of interactions and consultations were held with different groups of service providers, starting with an initial group of multinational organisations mainly to collect initial feedback on the UVAR DATEX II data model. Further contacts have been held, also with a broader number of national service providers, in order to introduce and discuss (1) the UVAR Box project and the EC proposed approach on the access of UVAR data, (2) collect information on functional and business requirements for access and usage of UVAR data, and (3) explore opportunities to demonstrate the integration of UVAR DATEX II data in their information and navigation services



to road users, either through participation in the UVAR Box Hackathon, or through adoption and integration of the new UVAR data as part of own service development activities.

Despite the great efforts made by the project partners developing and promoting the UVAR Box Hackathon, no official participants submitted solutions. Nevertheless, further contacts were made with service providers inviting them to experiment and demonstrate the integration of the produced UVAR data in their services. NDW, the Dutch RTTI NAP, and the service provider Be-Mobile responded by presenting the Low Emission Zones information services developed and delivered as part of the Dutch VM-IVRA program during the “UVAR experience project” at the EU ITS European Congress. The analysis of these services served as basis for showcasing the use of the UVAR DATEX II data in two pre-trip and navigation information services.

Furthermore, and in addition to the explanatory meetings, workshops, and interviews with several service providers, a survey was also disseminated through international service providers by the consortium in order to promote the project and retrieve experiences and requirements from the service providers that are involved in the production, management and delivery of UVAR information to road users.

3 EU proposed process for UVAR data access via NAP and SDG

3.1 UVAR in the context of EU ITS Directive and Delegated Regulations

In the framework of the European ITS Directive 2010/40/EU, the Commission has updated the requirements on the provision of Real-Time Traffic Information (RTTI) services with Delegated Regulation 2022/670. Its goal is to continue to support the provision of ITS services across the Union, by making mobility data in machine-readable format and accessible via a single point of access, the National Access Points.

The new regulation includes both a new definition of “crucial types of data on regulations and restrictions” and a broader geographical scope, which includes the UVAR in scope of UVAR Box. It also prescribes the DATEX II format as one of the two standardised machine-to-machine formats for digitisation. It also continues to specify that this data should be made accessible via the European NAPs with a minimum quality requirement (to be defined by Member States), and provided to data consumers within a time-frame fitting to the reliable and effective use of the data in real time traffic information services.

Data derived from the UVAR digitisation process can be accommodated by the NAPs with the aim of increasing its accessibility to data consumers and significantly contribute to improving the quality and availability of real-time traffic information services. Thus, navigation service providers will be able to provide up-to-date routing services to road users. Moreover, given that the policies included in the UVAR framework can be applied in a dynamic context, the organisations responsible for the enforcement of UVARs can also make use of valuable information from real-time traffic information published in the NAPs. In this respect, the in-depth analysis of data requirements for supporting the real-world application of UVARs is also being addressed in the EU initiative NAPCORE, as a future application area of NAPs.



3.2 Single Digital Gateway

The Single Digital Gateway provides online access to accurate and up-to-date information which facilitates interactions between citizens, businesses, and competent authorities by providing access to online solutions, facilitating day-to-day activities, and minimising the obstacles encountered in the internal market. Following a distinct approach from the NAPs, the information provided for the web-based gateway is aimed at human readers on the web, to inform themselves in advance of travelling. Thus, and since data exchange is not directly made on a machine-to-machine basis, some treatment must be carried out to assure that the UVAR data produced meets the SDG IT architecture, business, functional and technical requirements. The liaison with Your Europe has ensured such convergence, and the UVAR data digitised during the project is suitable for their needs. Section 5.4.1 will provide the results of the collaboration between the UVAR Box and Your Europe.

3.3 UVAR data value chain reference model

The EU requirements for the provision and access to UVAR data need to be addressed both in the context of current and planned RTTI data chains in Europe, taking into consideration existing or planned UVAR data chains as well. The UVAR data chain model shown in Figure 1 was used as reference for the analysis of the distribution of roles and responsibilities within the 5 pilot member states.

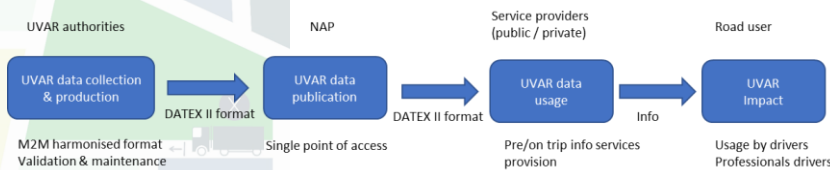


Figure 1 – UVAR data value chain reference model

3.3.1 UVAR data collection and production

The first stage of this chain refers to the processes and tools applied to collect and digitise UVARs into machine-to-machine (M2M) readable format. These processes aim at facilitating UVAR data availability for usage in digital information services. UVARs are currently available in several formats (e.g., paper, pdf, word) and locations (e.g., physical and digital archives, or public websites). DATEX II is one of the data standards prescribed by the European Commission and already widely applied in Europe for exchange of data feeding real time traffic information services.

The value and expected use of the UVAR data by service providers is very much related to its quality (management), reflected by characteristics such as accuracy, completeness, timeliness and validity. These quality requirements, to be defined by Member States (MS) in cooperation with relevant stakeholders (DG Article 9), should be addressed from the first steps of collection and production (digitisation) of UVAR data.



UVAR authorities determine the infrastructure, policy, regulations, and restrictions for access to the urban area. Therefore, they should be entitled as “data owner/holders” of the UVAR data source and consequently the best positioned and mandated to produce and keep this data up-to-date, (DG Article 9). Furthermore, this makes them the most suitable organisations to be responsible for the digitisation and maintenance of the digital UVAR data. This can also mean to be able to store and make digitally available the outcomes of the digitisation. Nevertheless, not all UVAR authorities, in particular smaller cities, have the resources and/or the expertise to perform these tasks. Therefore, different approaches and architectures should be able to provide flexible solutions where these tasks can be delegated by a UVAR authority (cities) to other public or private organisations. Such solutions should allow to support different local situations all over Europe regarding a lack of resources or expertise for UVAR digital data production and accessibility.

Both the UVAR Box Tool and the UVAR DATEX II data model are instruments that are made available to cities and service providers to develop these solutions for cities. In task 2.3 different options for using the UVAR Box Tool in the creation of UVAR data have been developed: manually via the graphical user interface or importing semi-structured UVAR data already available at the cities. Furthermore, the UVAR DATEX II data model can also be integrated in other existing or new tools supporting the creation of harmonised UVAR DATEX II data. WP2 addressed these options in the context of the 5 pilot MS, and WP4 analysed it in more detail from a sustainability and future perspective.

3.3.2 UVAR data publication and access

UVAR data accessibility should be facilitated through a single point of access per country, using the European network of NAPs. The update of the Delegated Regulation on RTTI refers to crucial data types, which include UVARs. The revised Delegated Regulation foresees to make data collection and creation mandatory for this type of data (called availability).

The current implementations of the RTTI NAPs in Europe have different technical and functional architectures which can be described into two different types: NAP as a “data platform”, where data providers use the NAP to provide data and data services to data consumers. This could be via download, APIs, or other transfer channels configured directly from the NAP, involving data usage contracts under pre specified terms and conditions. In the second type, NAP as a “data directory”, data providers use NAPs to register metadata (description of datasets and data sources in a predefined way). This type of NAP is not actively involved in the data exchange process between data providers and data consumers. So, both for the collaboration with data providers and with data consumers, different mechanisms and methods are applied concerning provision and access to data.

It is up to each MS and NAP to assess the potential impact of the updated EU RTTI requirements to its technical, functional, and business features and adjust it accordingly. An example of new requirements for UVAR data publication at the NAPs, is that datasets need to be registered with metadata information, DATEX II format description, and when applicable, respective terms and conditions for re-use if defined by UVAR data holders/owners. Furthermore, additional information must be included on the quality requirements, for example concerning updates of



the data. These allow potential data consumers to discover, interpret, give value, and use the datasets in their services.

3.3.3 *UVAR data usage*

Public and private service providers collect UVAR data from NAPs and translate (use) this data into pre- and on-trip information services to road users, like drivers or professional drivers. These services are delivered through digital applications, public or private information websites, planning and navigation information services and tools.

3.3.4 *UVAR impact*

The integration of UVAR information into end user services increases the adherence of drivers and road users to the UVARs they encounter on their routes, and thus contributes to the authorities' goals of reducing traffic, congestion, and emissions in their cities.

For this impact to be sustainable for the future, and for end user service providers to use the UVAR information, this information needs to be up-to-date and of high quality. This means that after the process of UVAR information publication, a feedback loop needs to be in place where the owner of the information needs to update the digital information together with the analog/written information and on street information. The information owner is responsible for correct provision of the information. The end user service providers use the documentation and material to correctly use the information available.

4 **UVAR data accessibility and availability via NAPs**

4.1 *Current practices in the 5 pilot member states*

The objective of the National Access Points, as described by the ITS Directive, is to provide service providers, and consequently end-users, of traffic and travel data, with easy access and reliable quality. Within the UVAR Box project the RTTI NAPs from the UVAR Box pilot countries have been analysed in their current organisational approaches and implementation status, and what their role is or could be in the accessibility and availability of UVAR data.

All 5 Member States have operational RTTI NAPs, with some different implementations and methods of collaborating with data providers and data users however. While Germany and the Netherlands NAPs provide direct access to RTTI data via a "data platform", Austria and Belgium have set up their RTTI NAP as a "data directory" where data providers register metadata (descriptions of datasets and data sources in a predefined manner) supporting the search of data but not actively involved in the data exchange process.

On RTTI data quality management, none of the studied NAPs provide a clear set of data quality requirements and the publication or validation of those are normally delegated to the data providers as a facultative requirement before publication at the NAP.

The following analysis per each pilot country focuses on current practices for RTTI and also first indications for UVAR data when it is made available.



4.1.1 Austria NAP

The Austrian RTTI NAP is accessible via <https://mobilitydata.gv.at> and is mostly a data (provider) catalogue supporting the findability of data and putting data providers in contact with data users.

In order to publish data at the NAP, publishers need to meet the following criteria:

- Proposed data is about Austria road network.
- Data is relevant within the EC Delegated regulations.

Datasets are also validated by the administrator including a data description. Data users will need to register to be able to access data, and will get access only after approval by the administrator.

Figure 2 represents the relationships of the Austrian NAP projected to the context of the UVAR data value chain.

> NAP register ("yellow pages")

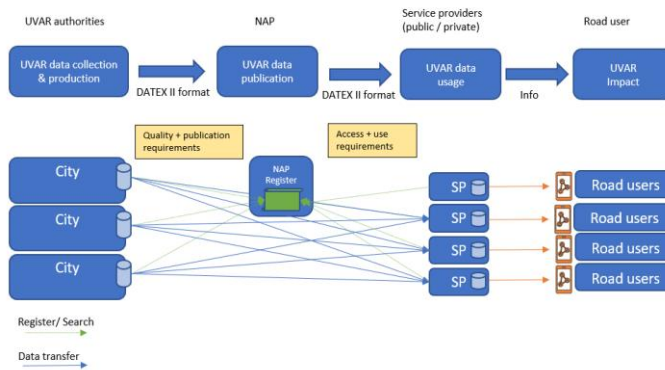


Figure 2 – Austrian and Belgium NAP relationships.

UVAR data is planned to be published on the NAP by ASFINAG, once the DATEX II version 3.3 data conversion is completed.

4.1.2 Belgium NAP

Belgium has currently one general NAP for information on "Intelligent Transport Systems" which is accessible via <https://transportdata.be/>. It is first and foremost a metadata catalogue aiming at supporting data providers to find data sets, their descriptions and access conditions, and establish contact with data users. As data provider, it is necessary to register as user and organisation, but as a data consumer there is no need to register in order to browse, consult data providers information, or to download some datasets and get access to URL links to be able to collect datasets at the data providers' sites. These datasets might only be accessible through licensing and payment to the data providers (information available in the metadata). The transport data



team has no direct involvement in the establishment of terms and conditions that enable offered data to be consumed and used by data users.

Currently, there is no defined quality framework to systematically evaluate the quality of the datasets registered on the NAP. There was a control body assigned in 2021, who evaluated some of the registered datasets (random selection) to see if they fulfilled the requirements of the Delegated Regulation (2017/1926) MMTIS (Multimodal Travel Information Services).

Figure 2 above also represents the relationships of the Belgian NAP projected to the context of the UVAR data value chain.

Based on current architecture and supported processes for accessibility, publication and use of RTTI data from Belgium NAP, the UVAR authorities manage the UVAR data based on own quality management and accessibility requirements. UVAR authorities willing to make UVAR data accessible via the NAP will need to:

1. Register as a user and create (or join) an organisation, also in compliance with the EC Delegated Regulation "actors". For RTTI: Road Authority, Road Operator, Service Provider or Digital MAP producer.
2. Register UVAR datasets, providing related metadata and licensing information, using the provided template in line with the "Co-ordinated European profile". This metadata will be added to the register ("yellow pages") together with an URL location where UVAR datasets are hosted and can be accessed. Smaller organisations that do not have the capabilities to host datasets themselves have the opportunity to upload these datasets directly on the NAP Intelligent Transport Systems.
3. Fill in and submit a Declaration of Compliance following the template available at the NAP.

Belgium NAP ITS is working in collaboration with NAPCORE on further development of harmonised accessibility features, including facilitating machine-to-machine communication directly from website.

4.1.3 Germany NAP

The German NAP - Mobilithek - is accessible via <https://mobilithek.info> and, besides the data search feature, also provides a data brokering interface to facilitate contractual agreements between owners and users of data. Moreover, it provides a set of terms and conditions including regulations regarding:

- 1) The obligations and responsibilities of the Mobilithek platform operator, of the data supplier, and of the data client.
- 2) The copyrights as regards the platform contents.
- 3) Data privacy laws.

More generally, the Mobilithek allows the following data to be entered for a publication: general information, information on the content, information on temporal relevance, information on local



relevance, information on responsibilities, reference files, sample files, details of content data, information on the terms of use, and declarations of the data provider and of the data offer.

Concerning quality management, the German NAP provides a voluntary metadata field “quality information” that can be filled by the data provider for each data set. However, this field is not much used yet and there are currently no data providers that actually provide any quality information so far.

Figure 3 represents the relationships of the German NAP projected to the context of the UVAR data value chain.

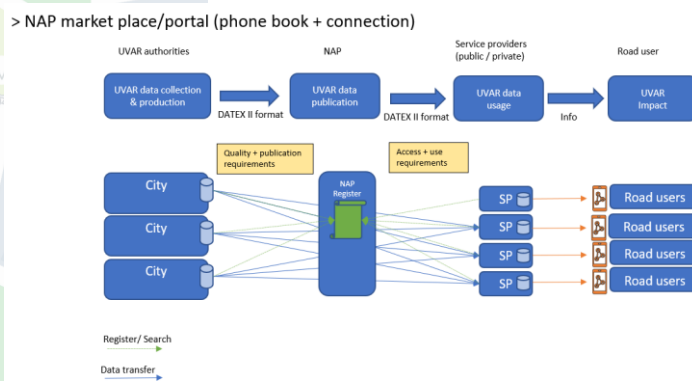


Figure 3 – German NAP relationships.

Regarding the publication of the UVAR data on the NAP, the project team and the Bundesanstalt für Straßenwesen (BAST), as the provider of the NAP in Germany, have agreed, that PRISMA Solutions will publish the UVAR data of Germany on the Mobilitekh on behalf of the project.

4.1.4 Italy NAP

The CCISS (Centro de Coordinamento Informazioni Sulla Sicurezza Stradale) (<https://www.cciss.it/web/cciss/homepage>), as a National Access Point, provides data to users in accordance with 2010/40/EU Directive and EU Delegated Regulations 885/2013, 886/2013, 962/2015, 1926/2017. When it comes to gathering and providing data, the CCISS homepage currently offers static road data, dynamic road status data and traffic data, presented in a map layer for specific areas in the Italy roadwork. No specific information is provided concerning to potential UVAR related data access.

4.1.5 The Netherlands NAP

The current RTTI NAP in the Netherlands is implemented and operated by NDW – National Road Traffic Data Portal and accessible via <https://nt.ndw.nu/#/home>. The site provides a register of public and private data, with links and contacts to the data providers publication site. Information



on the quality (if available), terms and conditions, and the available data exchange protocols, are also provided on the website. On behalf of national, regional, and local road directors, NDW also collects, hosts and publishes some types of road traffic information like real time (and historic) road speeds, traffic volumes, travel times, road works and traffic management information. This information can be accessed via the open data website or the data portal.

For specific RTTI type of data, like average traffic volumes and travel time, frequent data quality monitoring checks are performed on pre-defined criteria like availability/completeness, and usability/accuracy.

Figure 4 represents the current relationships of the Dutch NAP projected to the context of the UVAR data value chain.

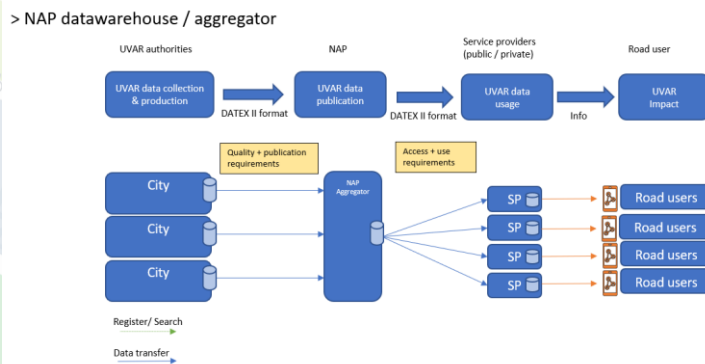


Figure 4 Dutch NAP relationships

The NDW also publishes on its open portal the UVAR DATEX II Low Emission Zones (LEZ) for all cities in The Netherlands since the beginning of 2022. The data is produced and manually validated by the VM-IVRA program in collaboration with the Ministry of Infrastructure and Waterworks and all the 14 Dutch cities with LEZs. The data is available at <http://opendata.ndw.nu/milieuzones.xml> and is free to be used by anyone (see Figure 5). The data is currently being used by navigation service providers under the VM-IVRA program (see detailed description ahead in the document).



ndw

Open Data Portaal

Real-time data

Name	Last modified	Size
OS2_Levering_NDW_Shapefiles_20220429.zip	2022-04-29 12:11	26M
actuele_statusberichten.xml.gz	2022-05-29 12:53	398K
brugoppeningen.xml.gz	2022-05-29 12:53	57K
DRIPS.xml.gz	2022-05-29 12:53	427K
gebeurtenisinfo.xml.gz	2022-05-29 12:53	6.4K
incidents.xml.gz	2022-05-29 12:50	3.4K
LocatietabelDRIPS.xml.gz	2022-05-28 14:16	52K
Matrissignaalinformatie.xml.gz	2022-05-29 12:53	904K
MaximumSnelhedenHWN.zip	2022-05-29 12:00	89M
MaximumSnelhedenOWN.zip	2022-05-04 05:00	848M
measurement.xml.gz	2022-05-24 13:30	12M
measurement_current.xml.gz	2022-05-25 13:30	12M
milieuzones.xml	2022-05-19 21:05	191K
NDW_MRM_MSL_Shapes_April_2022.zip	2022-04-28 14:27	2.3M

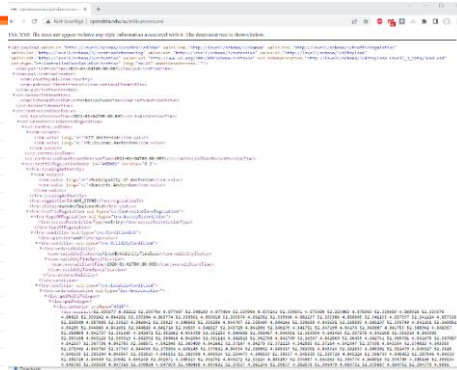


Figure 5– UVAR DATEX II LEZ data available at NDW



The Dutch Ministry and NDW have recently launched “Nationaal Toegangspunt mobiliteitsdata” (<https://ntm.ndw.nu/>), the new National Access Point for mobility data, which plans to provide access, quality monitoring, and use of all public mobility data. These will be also in line with the collaboration with NAPCORE on further development of harmonised accessibility features, including facilitating machine-to-machine communication directly from website.

4.2 Recommendations for interaction with NAPs

The different implemented NAP models and processes for RTTI data access can be seen as a barrier for alignment and engagement of service providers at European level. In that framework, the NAPCORE program that started in 2021, is aiming to harmonise and promote the NAPs interoperability and use all over Europe. Joint work being developed within this initiative should deliver a clear harmonised process for access of data by service providers in all Member States, and with that convince service providers of the value and benefits of using the European Network of NAPs and the single point of access for each country. In that context, the following recommendations can be undertaken:

- Deliver/present the results of UVAR Box to NAPCORE. UVAR data accessibility via NAP is within the scope of NAPCORE WG4.
- Add UVAR specific related metadata to the data registration template in line with the “Co-ordinated European profile”
- Further work on data quality management should include:
 - 1) Harmonised definition of quality characteristics regarding coverage, completeness, accuracy, and validation, to be included in publication requirements.
 - 2) Implementation of governance models, with distribution of roles and allocation of tasks, according to each type of NAP architecture and offered functionalities.
- Further work on harmonised terms and conditions for use of UVAR data, as much as possible in accordance with national conditions.



5 UVAR data in information services

5.1 UVAR service providers consultation

As previously described, the provision of UVAR information to road users through digital information services follows a UVAR data chain which has the potential to become a valuable asset for policy makers, road authorities and service providers. But this depends on how easily accessible the data is, and how valuable the information is perceived by service providers, as well as on how this data will be further handled and incorporated into their information and navigation services that deliver the UVAR information to the road users.

In order to understand and collect current practices on access, usage of UVAR data and translation into end user services, a series of interactions and consultations were held with different groups of service providers, with potential impact towards the UVAR Box project objectives either at national or multinational level.

The following types of service providers were considered in the consultations:

- 1) Organisation providing digitisation services for UVAR authorities.
- 2) Organisation performing data management for UVAR authorities.
- 3) UVAR data publication organisation.
- 4) Organisation integrating UVAR data into information services/apps.
- 5) Organisation provisioning UVAR information into end-user services (professional drivers, fleet managers etc.).

5.1.1 Multinational service providers consultation

From the beginning of UVAR Box, a group of international service providers was engaged through several meetings and workshops to introduce and collect feedback on the project objectives. This consultation group was also asked to provide feedback on preliminary project results (DATEX II data model) and invited to experiment project results as soon as they were made available.

The main reactions to the project objectives - harmonised M2M readable format and using of NAP network for data access - were mostly positive and constructive, nevertheless the engagement of service providers to either the UVAR Hackathon or the demonstration of integration of UVAR data in pre-trip or navigation services was not so successful. This was mostly due to the challenge to commit resources and the mismatch with the UVAR Box project planning.

The group of international service providers was consulted in this phase was:

- HERE Technologies
- TomTom
- INRIX
- Be-Mobile
- Google
- BMW



The results of these several meetings along the project is that service providers are aware and positive on the project results, such as the M2M UVAR DATEX II data and UVAR Box Tool. They are also either already engaged or have showed interest to be part of follow up initiatives (e.g., NAPCORE) that will work on further developments or scale up the UVAR Box results to new Members States.

5.1.2 Service providers questionnaire

A broader consultation was also setup through a questionnaire aimed at a large group of service providers active in Europe that provide UVAR related services. The aim was to collect current practices for collecting, accessing, or using UVAR data, to assess the knowledge and use of DATEX II and the network of NAP, and collect challenges experienced, as well opportunities for improvement from their business and practices perspective.

From the service providers that have been reached out to, 14 have returned a filled in questionnaire. Of these service providers, 3 mentioned they do digitisation for UVAR authorities; 1 does data management for UVAR authorities; 3 mentioned they are a UVAR data publication service provider; 9 do data integration into information services/apps; and 4 do provision of information to end users. A complete overview of the organisations that have returned the questionnaire is provided in Annex 1.

Although some of the service providers of end user information services collect UVAR information or data from intermediary UVAR data collectors, most of the contacted service providers collect their information by directly dealing with the public (road) authorities. The general experience is that this information is available in very fragmented formats, not standardised, and often not machine-readable.

5.2 Challenges and opportunities identified by service providers

To structure the challenges that service providers currently experience in the provision of UVAR related services, they were categorised in three different groups: (1) Organisational challenges, (2) Functional challenges, and (3) Technical challenges.

5.2.1 Organisational challenges

The reported organisational challenges are mostly related to the effective identification and contact with the correct responsible authority to retrieve the UVAR information. Respondents experience a high number of authorities involved when it comes to some UVARs: public authorities (regional, local), road authorities (regional, local); and if the correct authority is identified, they claim a lack of resources in order to be able to provide the correct information, especially when this is not already available via an existing open data portal.

It is also challenging for service providers to translate the UVAR information from the available formats to a machine-readable format in order to use them in end-user services. The process currently needs to allow to consume all different formats of information, where the translation into the digital format frequently needs customised work.



5.2.2 Functional challenges

The stated functional challenges are mainly the unavailability of UVAR (digital) data from the authorities. It is a challenge for service providers to gain access to the correct source of the UVAR, including the legal confirmation of its validity. When the data is available, there is also room for multiple interpretations or understanding of the local law, which can differ from one organisation to the other. If a service provider is “not familiar” with the region where the service will be provided, the interpretation of the local law can be even more challenging, if the data is not provided in a standardised format. If an UVAR has been implemented and/or digitised, it is also challenging for the service provider to be informed updates of the UVAR information.

5.2.3 Technical challenges

Most of the service providers mention that geographical codification of locations/geofences is a challenge (e.g., when there are certain exemptions in a polygon where certain roads are not affected by the UVAR). Moreover, the translation of varying formats in which the UVARs are delivered/presented is also an obstacle.

5.3 NAP implementation

All the service providers are in favour of the proposed situation where the UVAR-related data is available through a NAP. Again, the challenges associated to this scenario are categorised in the three categories: (1) Organisational challenges, (2) Functional challenges, and (3) Technical challenges.

5.3.1 Organisational challenges

For this scenario to be implemented, the most raised organisational issue is the standardisation of the data that must be in place. If the data standard is largely adopted, it increases the scalability of use cases that use the data. Making use of a mandatory data standard for providing UVAR data can cover this aspect. Furthermore, the use of the data should be free of charge, and the digitisation costs should be covered by public authorities since there is not necessarily a willingness for the end user to pay for this information, but there is a societal business case.

When the data is provided to a NAP it is also a challenge to make sure the quality of the information is guaranteed, i.e., the correctness of the data. There should be a single truth, and a data quality assessment process must be in place to assure to service providers that the data they provide to their users is accurate. Within the same lines, it will be a challenge to update the digital information as soon as the UVAR regulation is being updated (timeliness), and service providers need to be informed about any changes or have a process in place to regularly check for these updates.

5.3.2 Functional challenges

Regarding functional aspects related to the collection of UVAR data at the NAP, the need for data management and handling tools provided with the data standard is pointed out. For



example, this could include tooling that enables data consumers to configure the format of the data collection by switching between certain data standards. Also, it should be avoided that over time different versions of the same UVAR scheme are applied by service providers through the NAP. This could be avoided by either informing on updates, or supporting appropriate data pull/push protocols with the service providers. Also, in line with previous comments, there is a need for qualification of the data at the NAP in order to inform service providers on what to expect in terms of quality.

To ensure an EU wide adoption of UVAR information, it is also a challenge to make sure that there is a diverse range of UVAR types that will be digitised, and UVAR information should be translated into multiple languages.

5.3.3 Technical challenges

A challenge is raised when it comes to decide on the use of a specific DATEX II version, which can be seen in the questionnaire results, when asking which DATEX II version service providers were familiar with. Out of the 14 service providers that responded, 4 were not familiar with DATEX II, and the other 9 make use of different versions of the standard. There is also a clear difference of knowledge and usage of DATEX II between service providers offering traffic information and navigation services for the general consumer market, and service providers specialised in the logistic sector. Besides the survey answers, and as an example of this situation, an online ad-hoc consultation of the community service providers participating in the “Logistics digitalization program” in the Netherlands revealed that , none of the (more than 10) organisations had any experience with DATEX II.

Other technical challenges mentioned are the connectivity between the NAP platforms, reliable uptime of ideally over 99.9%, and information requests that should be quickly responded.

5.4 Demonstration of UVAR data in information services

Besides the awareness and consultation activities, each service provider was invited to explore opportunities for demonstration of UVAR DATEX II data integrated in their information and navigation services to road users. The project proposed to either present demonstrations through the participation in the UVAR Box Hackathon, or by own service development activities that could be facilitated by the project with UVAR data and close collaborations.

Although great efforts were made by the project partners developing and promoting the UVAR Box Hackathon, no official participants submitted solutions. Also, the availability of service providers for integration in their services was scarce, mainly due to capacity or planning reasons. Nevertheless, further contacts were made with service providers and with parallel initiatives already (or planning to) using UVAR data and they were able to share with us their experiences and concepts, like demonstrations of current and upcoming services using UVAR data.

That was the case of the VM-IVRA program from the Dutch road director Rijkswaterstaat, where the Low Emission Zones information services were developed and delivered in a collaboration



between the road authorities, the Dutch NAP and three pre-trip and navigation information service providers. The analysis of these services served as basis for showcasing the use of the UVAR DATEX II data in two pre-trip and navigation information services.

Furthermore, the project also engaged with representatives of the Single Digital Gateway (SDG) to explore the link between SDG and the use of UVAR Box results. The analysis and related recommendations for integration of UVAR data in SDG compliant information services are also reported below.

5.4.1 *Single Digital Gateway*

5.4.1.1 *The SDG framework*

Searching for information can be a very complex and time-consuming process. Moreover, the results can lack of quality since different sources provide different information and there is no guarantee of quality or reliability. Also, there is still information which is not yet on a digital form. This is a concern and, to try to mitigate it, in 2018, the European Commission and national administrations started to develop a network of national portals to provide information on how rules are applied in each European country. In that framework, on December 2020, the EC launched the Single Digital Gateway (SDG) with the objective of making it easier for citizens and businesses to move within the European Union. The SDG is an online platform compiling a wide range of information on the rights and duties of citizens, including legal procedures to be followed when living, studying, or working in the European Union. Information related to travel, work & retirement, running a business, consumers, taxation, and product requirements can be assessed through the portal. The SDG is also known as the “Your Europe” portal to provide information on the services available on the national websites of each country. The content available at this platform is growing, and by 2023, the EC expects to have all essential content and services available online for all cross-border citizens who live in or visit other Member States.

The Regulation (EU) 2018/1724 of the European Parliament and of the Council of 2 October 2018 brings the gateway into effect, requiring that some administrative procedures may be performed online, by users in their own country and cross-border users. Its implementation should be completed in December 2023, following its implementation roadmap. Moreover, the regulation forces each Member State to appoint a national coordinator, who should act as a contact point for their respective administrations for all matters relating to the gateway. Thus, stakeholders are not directly linked to the portal, and if needed, they should contact the national coordinator that is responsible for supervising compliance with the quality and security criteria and address any problems that may arise.

5.4.1.2 *The link between the SDG and the UVAR Box*

While several activities of the UVAR Box focused on digitising and extracting UVAR data in a machine-readable format, the cooperation with the SDG national coordinators performs the promotion of the human-readable version. UVARs, and in particular the absence of knowledge about local implementations of UVAR schemes, may represent a barrier going against the basic principle inscribed in the regulation which rely on enabling citizens from all over EU to have free access to information. However, the Consortium has been in discussion with Your Europe to



ensure convergence between the developed software tools and the SDG IT architecture, the business, functional and technical requirements. Due to time and resource implications, for the project lifetime, data will not all be made available on the portal, yet, based upon the mapping of content and tools assessment, a mock-up was developed to show a possibility of integration of UVAR data on this portal.

5.4.1.3 *How to incorporate the generated UVAR data on the SDG*

By making sure that data will be harmonized (all information will be created in the same format and follow the same structure), from the technical point of view, the process for data integration on the SDG gets easier.

Data generated under the UVAR Box Tool comes out in two possible distinct formats: XML conforming to the "DATEX II Model For UVAR" scheme created by WP1, or WFS for UVAR Geometries and caption. The SDG does not have any use case available yet, where pictures or geometries could be exposed. However, the XML content can be easily transformed into a content-compatible file which can be imported by the SDG.

Having the technical requirements granted, Your Europe started working on a mock-up to show how UVAR data could be presented in their portal. The Amsterdam LEZ digitised in the UVAR Box Tool was used as a basis for creating the mock-up content. For better understanding of our process for "creating UVARs", and to unlock possible misunderstandings of the XML file, SDG was granted an access to our tool in a "read-only" mode. This cooperation, aligned with some individual work from the Your Europe technical Team, resulted in the following screenshots (Figures 6 to 9). The mock-up is elementary, nevertheless, adjustments can be made in a posterior phase, allowing to extend the page to more fields.

As can be seen in Figure 6, the page starts with an introductory section, making a connection with the EU legal framework. Information will be available in almost 30 languages to ensure inclusion (Error! Reference source not found. 7). Moreover, UVAR information can be searched by country and by vehicle type (Figure 8). Going for a specific UVAR (e.g., the Amsterdam LEZ), the following information, imported from the UVAR Box Tool XML file can be found (Figure 9 9):

- Link to the UVAR boundaries.
- Vehicles with restricted access.
- Where to get a permit.
- Special conditions/exceptions.
- Website for having more information.



English EN



Search

Your Europe > Citizens > Travel > Driving abroad > Urban vehicle access rules in the EU

Doing business >

- Home
- Travel ▾
- Work & Retirement ▾
- Vehicles ▾
- Residence formalities ▾
- Education & Youth ▾
- Health ▾
- Family ▾
- Consumers ▾

Last checked: 04/08/2022

Urban vehicle access rules in the EU

Додомора ЄС України ▾

EU assistance to Ukraine ▾

Urban mobility, including any access regulations, is the responsibility of local authorities supported by an overarching EU legal framework. Each EU country has its own specific urban vehicle access regulations and schemes that may cover low emission zones, parking regulations, congestion charging schemes, limited traffic zones and pedestrian zones. Access is usually dependant on your vehicle type, emission class and payment of tolls or fees.

Find specific information on access rules and restrictions and any penalties that apply in the EU country you are visiting or transiting.

Please note the information is displayed as provided by the local authorities, and it may not be available in your preferred language.

Choose country: ▾

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European Central Bank

European Court of Auditors

European External Action Service

European Economic and Social Committee

European Committee of the Regions

European Investment Bank

European Ombudsman

European Data Protection Supervisor

European Data Protection Board

European Personnel Selection Office

Publications Office of the European Union

Agencies

Figure 6 – SDG (UVAR): front page



Choose country:

Austria	France	Malta
Belgium	Germany	Netherlands
Bulgaria	Greece	Poland
Croatia	Hungary	Portugal
Cyprus	Ireland	Romania
Czechia	Italy	Slovakia
Denmark	Latvia	Slovenia
Estonia	Lithuania	Spain
Finland	Luxembourg	Sweden

Still have questions?

Search here

Figure 7 – SDG (UVAR): languages available

Netherlands - Urban vehicle access rules in the EU

ON THIS PAGE

Amsterdam

LEZ Amsterdam

Access restrictions centre Amsterdam

Arnhem

LEZ Arnhem

Access restrictions centre Arnhem

Den Haag

LEZ Den Haag

Access restrictions centre Den Haag

Допомога ЄС Україні

EU assistance to Ukraine

Select your type of vehicle and see what cities have restricted access.

- [diesel cars](#)
- [commercial vehicles](#)
- [taxis](#)
- [buses](#)
- [mopeds](#)
- [motorcycles](#)
- [lorries](#)

These are the cities that have restricted access in the Netherlands. Click on a title for more details.

Amsterdam

LEZ Amsterdam

Access restrictions centre Amsterdam

Arnhem

LEZ Arnhem

Access restrictions centre Arnhem

Den Haag

LEZ Den Haag

Access restrictions centre Den Haag

Figure 8 - SDG (UVAR): UVARssearch.



Last checked: 04/08/2022

Netherlands - Urban vehicle access rules in the EU

ON THIS PAGE

- Amsterdam
 - LEZ Amsterdam
 - Access restrictions centre Amsterdam
- Arnhem
 - LEZ Arnhem
 - Access restrictions centre Arnhem
- Den Haag
 - LEZ Den Haag
 - Access restrictions centre Den Haag

Домовина ЄС України

EU assistance to Ukraine

Select your type of vehicle and see what cities have restricted access.

- [diesel cars](#)
- [commercial vehicles](#)
- [taxis](#)
- [buses](#)
- [mopeds](#)
- [motorcycles](#)
- [lorries](#)

These are the cities that have restricted access in the Netherlands. Click on a title for more details.

Amsterdam

LEZ Amsterdam ^

These areas have restricted access: [View map](#)

These vehicles have restricted access: diesel cars, commercial vehicles, taxis, buses, mopeds, motorcycles and lorries

Where to get a permit? Read more here: <https://ontheflittingen.amsterdam.nl/publiek/>

Special conditions/exceptions: When you have ordered a zero emission vehicle that is not delivered yet, you can apply for a temporary permit for entering the LEZ for the duration until the delivery date plus 1 month, with a maximum of 12 months. Conditions: your current vehicle has no access; the vehicle procured is zero emission. If the vehicle involved is a leased vehicle, the period should be at least 12 months

Read more here: [Milieuzones Nederland](#)

Access restrictions centre Amsterdam v

Arnhem

LEZ Arnhem v

Access restrictions centre Arnhem v

Den Haag

LEZ Den Haag v

Access restrictions centre Den Haag v

Figure 9 – SDG (UVAR): information provided (Amsterdam LEZ example).



5.4.1.4 *Conclusions and next steps*

Accurate UVAR information is valuable not only for the citizens of a specific country but also for all cross-border citizens who live in or visit other Member States. As from 2023, the EC expects to have all essential content and services available online in the Single Digital Gateway. UVAR information should not be an exception. The UVAR Box project has established the bridge between UVAR data and Your Europe, which will allow this goal to be accomplished.

By using the harmonised UVAR DATEX II data, Your Europe will be capable of defining an automatised procedure for providing this kind of information on their website. Via all existing channels (NAPCORE, SDG national coordinators, etc.) the SDG plans to use this format to be promoted in municipalities across the EU.

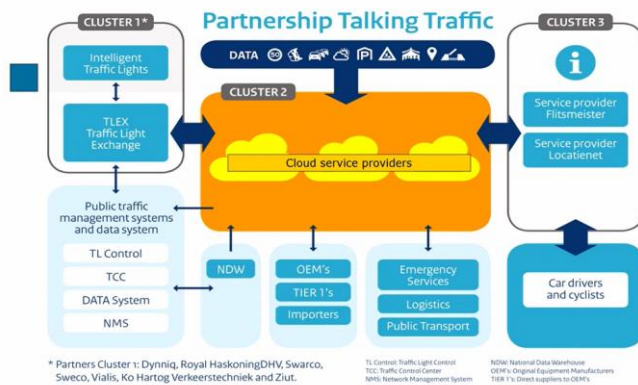
Of course, a challenge will be to have direct access to the most up-to-date UVAR data, especially after the project ends. Ideally, municipal data should be stored directly in, or uploaded instantaneously to a central repository. Such a central repository would serve as a hub between the municipalities and the SDG and, once available, Your Europe would use these data to display up-to-date UVAR information. The plans for publishing the UVAR data are still under discussion and more detailed information will be provided under the scope of the sustainability plans developed by WP4 (see WP4 deliverables).

Besides that, it can be concluded that the liaison between the UVAR Box and the SDG was successful. The SDG IT architecture, the business, functional and technical requirements were met for the provision of UVAR information based on the data created by the UVAR Box Tool. Still, future initiatives should take place to improve the completeness/quality of the interface, to overpass the repository issue, and to realize/conclude the proposed task to make the EU UVAR up-to-date information available via SDG.

5.4.2 *VM-IVRA program: Flitsmeister & Onderweg mobile / in-vehicle navigation service*

5.4.2.1 *“VM-IVRA” Traffic Management – Information & Route Guidance*

The Dutch program “VM-IVRA” Traffic Management – Information & Route Guidance is a joint initiative from Rijkswaterstaat (Dutch National Road Authority) and the Dutch Ministry of Infrastructure where road authorities and service providers work together on getting traffic management information into in-vehicle navigation services. The VM-IVRA goal matches with the Dutch policy on making use of digital capabilities and private information services to inform road users and enhance the traffic management performance, towards a robust road network. The VM-IVRA program is one of the Partnership Talking Traffic (Figure 10) follow up initiatives making use of the developed public-private ecosystem for traffic management.



Commented [SS1]: Mention the figure in the main text and add caption

Figure 10- Partnership Talking Traffic

- Demonstration of Low Emission Zones UVAR DATEX II data within VM-IVRA initiative

One of the VM-IVRA use cases is the integration of "Low Emission Zones regulations" as information in navigation services. Service providers Be-mobile and Locatienet collaborate in VM-IVRA for the integration of LEZ in their navigation applications, "Flitsmeister" and "Onderweg" respectively. The goal of the LEZ use case is to inform and (re)route road users through their navigation application, taking into consideration the 14 Low Emission Zones when planning a trip or using the navigation services.

In the agreed scenario for LEZ information in navigation services, there is a trigger when a road user approaches an environmental zone, or enters a destination where the route runs through an environmental zone. Because the service provider has information about environmental zones, it can inform the road user about this and/or provide a route that does not pass through the zone, possibly stating the reason for the modified route.

The level of detail of the information given to the road user depends on the information that a service provider has about the vehicle (emission characteristics), and possibly whether the vehicle or vehicle owner has an exemption to enter the environmental zone. All necessary legal information is shared, along with the boundaries of the environmental zone (e.g., the permitted/forbidden emission standards and limits).

The information is distributed in DATEX II, according to the information profile prescribed by UVAR Box: LEZ UVAR DATEX II.

The development and deployment of the VM-IVRA data chain and services took place in 2021 and since January 2022 the LEZ UVAR data information is integrated in the navigation service and being presented to the application users.

- UVAR data collection and production



UVAR data collection and production within VM-IVRA is built up on the work developed by the "Digitaliseren logistiek" (Digitalization of logistics) program from the Ministry of Infrastructure, where a digitisation service provider (Matrixian) collected and produced several types of regulations like LEZs, window times, and preferred routes for freight logistics. This initial digitisation work was then extended for all road users and validated (quality check) by VM-IVRA.

The data model used is the OpenTripmodel¹, a national open standard aimed at logistics service providers and use cases. VM-IVRA, together with NDW, acknowledge the need and value for service providers in using an EU harmonised framework such as the UVAR DATEX II data model developed by the UVAR Box to produce and deliver Low Emission Zones in machine-readable format.

The UVAR data validation process is managed by VM-IVRA and NDW and is currently done through manual updates of the rules and visual checks by the responsible cities' authorities supported by the web data platform: "Data voor Logistiek platform (powered by Matrixian)"², represented on Figure 11.

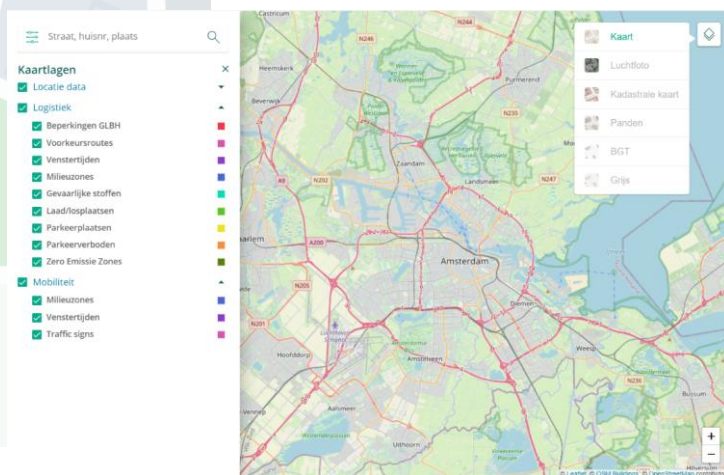


Figure 11– Matrixian web data platform: "Data voor Logistiek platform"

- UVAR data publication and access

The LEZ UVAR DATEX II data is published at the NDW open data portal (and is publicly accessible and free for reuse). Service providers can also register at the NDW central information system in order to automatically receive data updates (Figure 12).

¹ <https://www.opentripmodel.org/page/about>

² <https://dutchmobilityinnovations.com/spaces/1145/data-voor-logistiek/dataplatform>



ndw

Open Data Portaal

Real-time data

Name	Last modified	Size
082_Levering_NDW_Shapefiles_20220429.zip	2022-04-29 12:11	26M
actuele_statusberichten.xml.gz	2022-05-29 12:53	398K
brugopeningen.xml.gz	2022-05-29 12:53	57K
DRIPS.xml.gz	2022-05-29 12:53	427K
gebeurtenisinfo.xml.gz	2022-05-29 12:53	6.4K
incidents.xml.gz	2022-05-29 12:50	3.4K
LocatietabelDRIPS.xml.gz	2022-05-28 14:16	52K
Matrivijsaalinformatie.xml.gz	2022-05-29 12:53	904K
MaximumSnelhedenHWN.zip	2022-05-29 12:00	81M
MaximumSnelhedenOWN.zip	2022-05-04 05:00	848M
measurement.xml.gz	2022-05-24 13:30	12M
measurement_current.xml.gz	2022-05-25 13:30	12M
milieuzones.xml	2022-05-19 21:05	199K
NDW_MRM_MIS_Shapes_April_2022.zip	2022-04-28 14:27	2.3M

Figure 12- NDW open data portal extract

- UVAR data usage by service providers

The LEZ UVAR DATEX II data is currently being used by 3 navigation and information service providers in a proof-of-concept period: Be-Mobile with their Flitsmeister mobile application; Locatienet with their Onderweg mobile application; and TripService through the Waze mobile application. The proof of concept is still in operation and detailed evaluation results are expected at the end of 2022. Below, a description of the integration process of LEZ UVAR DATEX II data in the Flitsmeister (FM) and Onderweg mobile applications is provided.

5.4.2.2 Low Emission Zones information in Flitsmeister navigation application

The Flitsmeister (FM) information and navigation mobile application is used by more than 2,2 million monthly active users in The Netherlands. The FM app provides pre-trip information, navigation turn-by-turn and on-trip information (location based). Visuals of their service are provided in Figure 13.

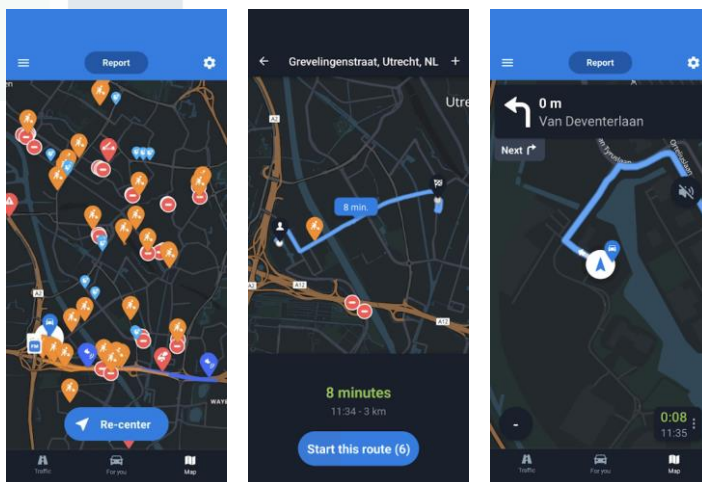


Figure 13- Snapshots of Flitsmeister app



- **UVAR LEZ Data integration process**

In collaboration with Be-Mobile, the LEZ UVAR DATEX II data is collected at the NDW open data portal and integrated in the application into a pre-trip warning to FM users planning a trip with the destination in a city with a Low Emission Zone. A (manual) quality check and validation is performed on the data before the “map layer” is updated. This is then retrieved by the FM application for delivering real-time advice. The process is displayed in Figure 14.

Before the information provided by the NAP is incorporated, Be-Mobile performs a quality assessment of the retrieved data in order to determine the quality of the information. They check the data on 5 different aspects:

- 1) Is it possible to retrieve the information from the API in a uniform way, and are there differences between the information provided by different road authorities?
- 2) How many cities are incorporated in the feed, and how many are still missing compared to Open Street Map (OSM)?
- 3) Are the polygons able to be plotted on the map and do we see any visual errors?
- 4) Do we see errors/differences compared to the polygons of OSM?
- 5) Are we able to use the information based on these findings in our services to road users?

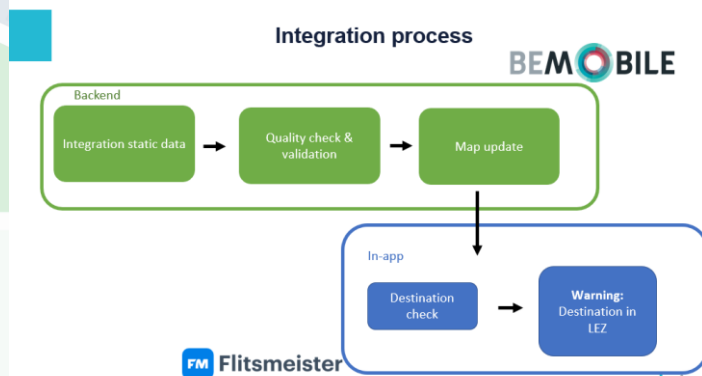


Figure 14- Be-mobile UVAR LEZ Data integration process

A relevant user configuration in the FM application to receive correct Low Emission Zones information is the choice for the type of vehicle that is being used by the user. The FM application currently provides the user with 4 options for the type of vehicle: car (passenger car), electric car, truck, and motorcycle – see Figure 15.

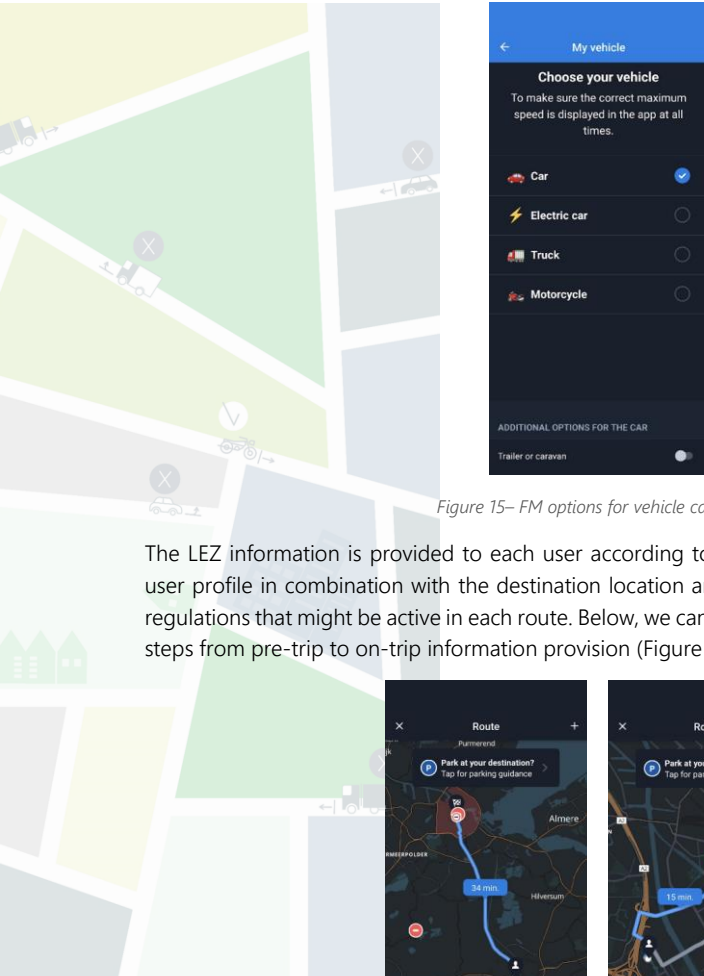


Figure 15– FM options for vehicle category.

The LEZ information is provided to each user according to the FM interpretation of the given user profile in combination with the destination location and the respective vehicle restrictions regulations that might be active in each route. Below, we can see some snapshots on the different steps from pre-trip to on-trip information provision (Figure 16).

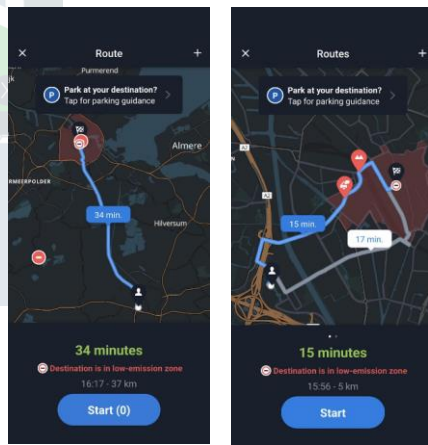


Figure 16–Examples of FM Pre trip LEZ information.

This FM service is available since January 2022 in 12 cities in the Netherlands. In four of these cities – Amsterdam, Arnhem, Den Haag and Utrecht – the LEZ applies to diesel-powered passenger cars and vans. In the other cities, the LEZs apply to trucks and coaches, as can be seen in Figure 17.



Figure 17– LEZ applications in different Dutch cities.

The FM service has been providing pre-trip warning messages to all FM users traveling to these cities. In May 2022, BE-Mobile provided general figures on the number of messages presented to the users of the application in the above mentioned four cities between January and May 2022. Results are shown in Figure 18.

Low Emission Zones warnings in FM (only car)

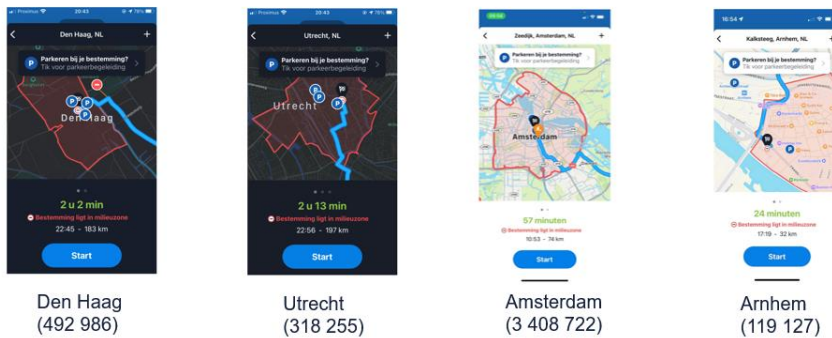


Figure 18– Number of messages presented to the users of FM between January and May 2022

5.4.2.3 Low Emission Zones information in Onderweg navigation application

The Locatienet smartphone app Onderweg provides on-trip traffic and road information to its users. The information is delivered as an overlay on the user preferred navigation app. Onderweg also warns its users about speed cameras, traffic jams, accidents, road works, and more recently (in 2022) on approaching and entering Low Emission Zones in the Netherlands. The app is shown in Figure 19.

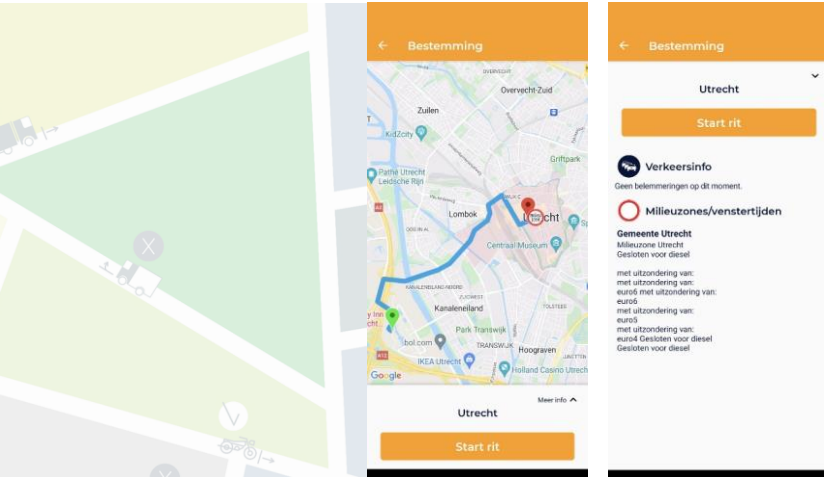


Figure 19– Snapshot of Onderweg application

Within the VM-IVRA proof of concept activities, Locatienet retrieves (pull) the Low Emission Zone information from NDW central system information. The DATEX II file is decoded by Locatienet and then translated to a more compact message format and published on a Locatienet server, where the information is retrieved regularly by the smartphone app Onderweg.

The information is decoded in the app and presented to the end user in a map. When the smartphone moves towards a Low emission Zone, the app presents a warning to the end user, but only when the zone restrictions apply to the vehicle type selected by the end user. Figure 20 shows the user interface for the end user.

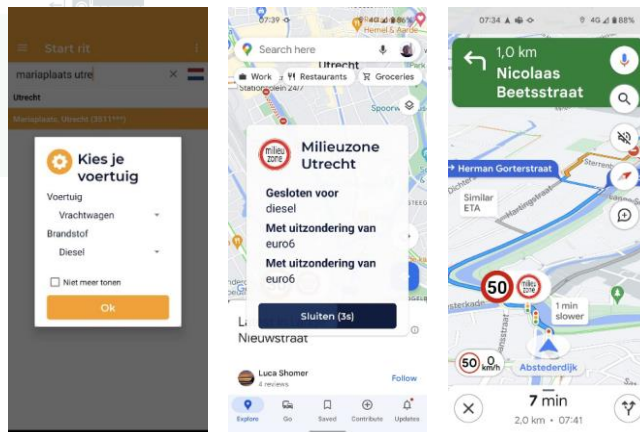


Figure 20- Snapshot of Onderweg application when approaching a LEZ



5.4.2.4 *Upcoming developments on VM-IVRA and LEZ in The Netherlands*

By 2025 Zero Emission zones (ZEZs) will be implemented in the Netherlands. The preliminary zones are already known and digitised complying with the UVAR DATEX II standard for information towards services providers.

Future challenges are related to the quality maintenance (actuality) of the data. It is also expected that some of the current regulations will evolve to more dynamic conditions, for example based on current emission and congestion levels. These will require an adequate provision of digital infrastructure supporting more frequent updates and publications, as well as data connection uptimes for timely access and usage of data.

5.5 *Plans and concepts for UVAR data usage in information services*

Following the consultation with service providers and introduction to the UVAR Box objectives and results, several organisations reacted positively on the use of the proposed process for access to LEZ UVAR data, and developed plans and concepts for future use and integration of the UVAR data into their end user services.

Some of the collected examples describing the planned use cases of UVAR LEZ data, and feedbacks from initial developments, are presented below.

5.5.1 *Clearly*

Clearly³ is a service provider in the logistic sector offering fleet managers/operators/owners a comprehensive picture of policies and regulations affecting their operations (e.g., financial, corporate, transport). At trip/route level, Clearly is able to ingest data from client's third party "routing" and "trip planners" to identify TCFD (Task Force on Climate-Related Financial Disclosures) risks & opportunities. A screenshot of the Clearly interface is provided in Figure 21.

LEZ route use case

Route data is ingested in the Clearly platform, using well established standards/formats such as GPX, and a checking exercise is performed across all the LEZs that could affect these routes (now or in the coming months/years). Clearly offers clients a much-needed environment to test "scenarios" of how different types of vehicles, routes, payloads, LEZ, costs, etc., interact to identify optimal decarbonisation plans (also called Quick Wins that offer high return on investment, Low Risk and High Impact).

³ <https://clearly.earth/>

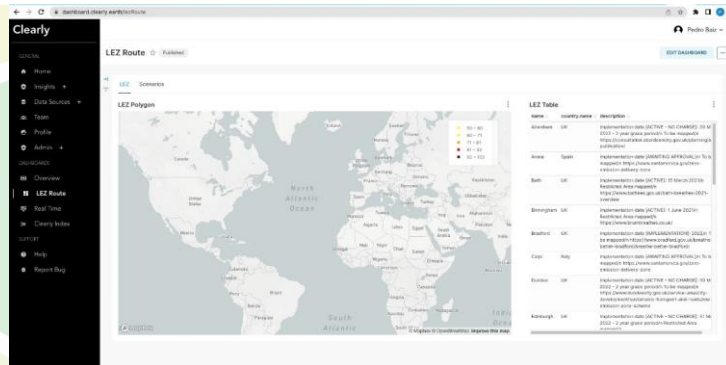


Figure 21 – Clearly platform – LEZ route use case.

Planned use of UVAR DATEX II data

The work that UVAR Box has done with DATEX II is seen as invaluable by Clearly in supporting the decarbonisation plans of many types of organisations (e.g., national government, multinationals) not just in the EU but across the world. Clearly is working with the finance and strategy teams that plan net zero fleets across the world, and having information such as LEZs is critical to develop optimal decarbonisation plans. The complex multi-objective optimisation tasks supported by Clearly benefit from the UVAR Box results as it requires an “automated” or “machine-to-machine” approach to ingest data in order to achieve their multinational client's goals and objectives.

5.5.2 Campy

Campy is a camping and campground locator (web) application offering detailed camping information to caravan and motorhome owners in the EU and UK. Campy is freely available at IOS and Android with community based content. The Campy app is depicted in Figure 22.

LEZ info use case

Campy LEZ info use case focuses initially on being able to show UVARs on the map layer, next to campsite locations. Users can tap on an area to see more details about the UVAR. Later, the advanced use case would be to connect the UVAR data with build-in camper navigation and provide the user with warnings based on their camper (vehicle) type and characteristics, and provide re-routing advice in case of non-compliance with the UVAR.

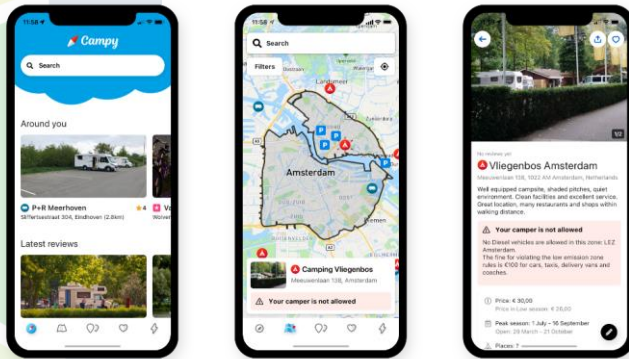


Figure 22 – Campy Application.

Planned use of UVAR DATEX II data

UVAR LEZ data is highly relevant because almost all campers and motorhomes are diesel vehicles. The number of UVAR LEZ zones in the EU for these vehicles are increasing. Preventing people from driving to a campsite within these zones is very important. It is something Campy users ask for as well.

In order to add UVAR data to the app, the coverage of UVAR zones in the EU should be (almost) 100%. If users rely on the Campy app to help them avoid UVARs, they should trust that the data covers all UVARs.

Furthermore, the descriptions of the data should be made available in all main European languages, with a minimum of: EN, DE, FR, IT, ES, NL.

5.5.3 UVAR mobile enforcement

IN Groupe is the technology partner supporting the French Ministry for Ecology in the implementation of "Crit'Air" air quality certificate service "Certificat qualité de l'air" (air quality certificate). "Crit'Air" classifies vehicles according to their air pollutant emissions and provides vehicle holders/owners with a corresponding "sticker". This colourful sticker needs to be placed and visible in the vehicle when entering large French urban conurbations where LEZs are in place. The UVAR mobile concept is depicted in Figure 23.

EU wide LEZ Enforcement use case

The UVAR mobile enforcement service is a concept being developed by IN Groupe within the scope of the UVAR Exchange pilot study, where a "Verifiable Digital Credential" based solution is being considered that can facilitate cross-border LEZ UVAR enforcement.



Figure 23 - Snapshots IN GROUPE UVAR mobile enforcement service.

Planned use of UVAR DATEX II data

The UVAR mobile solution requires EU cities to digitise, and provide access to their UVAR data, including local white list of exemptions related to all vehicles and users. The IN Groupe solution proposes to deploy a European central repository with all up to date EU UVARs and white lists. This will allow the UVAR enforcement central service to perform automatic verifications of the vehicles technical and holder characteristics conditions against the rules.

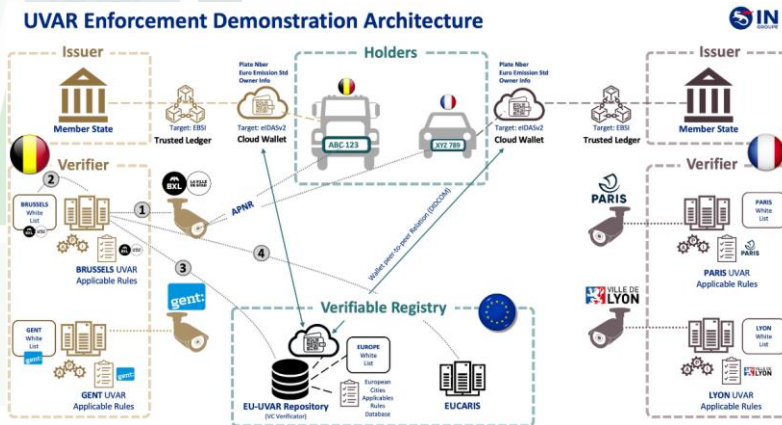


Figure 24 - IN GROUPE description of VC based solution architecture.

5.5.4 C-ITS UVAR Exchange

The UVAR Exchange project is piloting the use of C-ITS technology for provision of UVAR information to vehicles. The goal is a proof of concept that C-ITS technology is ready for distributing dynamic and static UVAR information via infrastructure to vehicle information messages (IVIM).

LEZ info use case

The project is planning to test 2 use cases using UVAR through live demonstrations in different partner cities: Vienna via a Zero Emission Zone UVAR in IVIM, Helmond, and Milano. The first use case of UVAR data is to provide the vehicle and the driver a warning when approaching a Zero



Emission Zone, on time to re-route if necessary. The second use case is to trigger a hybrid vehicle to automatically change to electric mode by means of geofencing, and without any additional intervention by the driver, when entering a zero emission zone. Both use cases require to access up to date data form all EU cities via a central C-ITS server which can translate UVAR data into the C-ITS data format and distribute it to the C-ITS roadside and in vehicle stations when relevant and required.

6 Recommendations and next steps

In order to achieve the goal of correct use of UVAR information in navigation and information services, it is necessary to manage the quality of data through the UVAR data chain (from UVAR authority to NAP), and to provide service providers with access to UVAR data with high quality and value for it to become the main (or only) source of UVAR information to be integrated in their end user services.

The recent revision of the EU Delegated Regulation classifies UVAR data within the RTTI data category and as such, besides the use of machine-to-machine data format, it specifies the use of the NAP for UVAR data access. In that sense, the current (or future) RTTI NAPs, in all their deployments types (Data portal or Data directory) and relations with both data providers and data consumers, should take appropriate actions to accommodate the access to this new type of data. Based on the gathered knowledge and feedback from service providers and NAPs, the following recommendations can be set:

- The NAPCORE initiative, which is developing a harmonised and interoperable network of NAPs, is the most suitable initiative to take into consideration the specific characteristics of UVAR information. The initiative could work on a harmonised process for data provision through Europe, including a data quality framework. The harmonisation of the process, together with a solid data quality framework, will increase the trust that users of navigation services can have. They need to be able to rely 100% on the service that they get their information from, as the user will likely use that as one of their sources.
- DATEX II knowledge should be promoted for wider use. In the survey responses, it became clear that there are still service providers that are not familiar with DATEX II. If all UVAR data will be published according to this standard at the NAPs, it is essential that the organisations disseminating this information to the road users are familiar with DATEX II and know how to incorporate this information in their services. This will increase the potential uptake of the UVAR data.
- Harmonised data quality criteria on, for example, an appropriate location referencing method, and information timeliness need to be (further) developed. And when these criteria are set, there should be a process in place to verify the data quality. This will increase the level in which the service providers can assume that the data is technically a correct representation of the real life situation. If the location referencing is off, or when information is not provided/updated timely, the data could be considered useless for integration in navigation services.

Commented [SS2]: Is this the final chapter? I would name it "Recommendations and next steps" probably it should be more complete (some sentences summing the content of the deliverable)



From the different discussions that took place with service providers, there are a few observations that are worth mentioning:

- UVAR information is perceived as complex information. Thus, since it comprises a lot of complex categories, such as a lot of exemptions, for different time periods, for different vehicle owners, with local nuances, UVAR information is generally seen as vulnerable to interpretation errors.
- In the current situation, access to the right source of UVAR information is difficult due to the different governance structures by public authorities in Member States. A lot of one-on-one relationships are necessary. Moreover, a lot of resources are necessary to implement UVAR information in end-user services. Therefore, the proposed structure where NAPs publish UVAR information is seen as really valuable. Conditions for this are that the UVAR information is available in a standardised format and data quality needs to be guaranteed.



Glossary

Term	Definition
APIs	Application Programming Interfaces
CCB/CCs	Country Coaches Board/Country Coaches
CEN/TS 16157	European standard for Intelligent Transport Systems – DATEX II data exchange specifications for traffic management and information.
CEN/TS 17268	European standard for Intelligent transport systems. ITS spatial data. Data exchange on changes in road attributes.
CLARS	Charging, Low emission zones, Access Regulation Schemes – most complete platform currently identifying UVARs in Europe
CS	Congestion charging Scheme
CZ	Controlled Zones
D#.#	Deliverable with the number of the WP
DATEX II	Electronic language used in Europe for the exchange of traffic information and traffic data
DCAT-AP	DCAT Application Profile for data portals in Europe is a specification based on W3C's Data Catalogue vocabulary (DCAT) for describing public sector datasets in Europe.
DR	Delegated Regulation
EMERG	Emergency scheme
EN 16157	European standard for Intelligent transport systems. DATEX II data exchange specifications for traffic management and information.
EU	European Union
FOSS	Free and open-source software
GIP	Graph Integration Platform
GIS	Geographic Information System
GitHub	Is a web-based Git or version control repository and internet hosting service which is mostly used for code.
ITS	Intelligent Transport Systems
ITS Directive	Directive 2010/40/EU of the European Parliament and of the Council of 7 July 2010 on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
IVIM	Information via infrastructure to vehicle information messages
LEZ	Low Emission Zone
LTZ	Limited Traffic Zone (ZTLA in Italy)
M2M	Machine-to-machine
MDM	Mobility Data Marketplace
MIMS	MIMS Ministero delle Infrastrutture e della Mobilità Sostenibili – Italian Ministry of infrastructure and sustainable mobility



MS	Member States
NAP	National Access Point
NAPCORE	National Access Point Coordination Organisation for Europe – project reference MOVE/B4-2020-123
NDW	National Road Data Portal
PARK	Parking Regulation
PED	Pedestrian Zone
PSA	Programme Support Action
PSI	Public Sector Information
RTTI	Real-time traffic information services
SDG	European Unique portal to access information, procedures and assistance on EU and national rules and rights related the Single Market
SHP	Shapefile format – is a popular geospatial vector data format for geographic information system (GIS) software. Esri shapefile is a zip archive that contains at least the shp, shx and dbf files.
SUMP	Sustainable Urban Mobility Plan
TISPs	Traveller information service providers
TN-ITS	Transport Network – Intelligent Transport Systems
TRA	Transport Research Arena Conference
TRO	Traffic Regulation Order
UBA	Umweltbundesamt - German Environment Agency
UVAR	Urban Vehicle Access Regulation
UVAR Box Tool	Tool enabling the digitisation of UVARs
UVAR DATEX II data	UVAR data following the DATEX II model created under the UVAR Box project
WP	Work package
XML	Extensible Markup Language – is a markup language that defines a set of rules for encoding documents in a format that is both human-readable and machine-readable. The design goals of XML emphasize simplicity, generality and usability across the Internet.
ZEZ	Zero Emission Zone



7 Annex

7.1 Service provider survey respondents

Name
HERE Technologies
IRU
Matrixian
Municipia SpA
Umweltzone App
Locatienet
ÖAMTC
Campy App
TomTom
INRIX
ASFINAG
SIMACAN
Be-Mobile
Clearly

7.2 Service provider survey

Service provision in UVAR information	
Question	Answer
Which type of services does the organisation provide in UVAR data chain?	<input type="checkbox"/> Digitisation for UVAR authorities: Yes? Could you provide a weblink or description <input type="checkbox"/> Data management for UVAR authorities: Yes? Could you provide a weblink or description <input type="checkbox"/> UVAR Data Publication: Yes? Could you provide a weblink or description <input type="checkbox"/> UVAR Data Integration in info services/apps: Yes? Could you provide a weblink or description <input type="checkbox"/> Provision UVAR info to End Users (drivers/professional drivers / fleet managers): Yes? Could you provide a weblink or description
Could you describe in general terms your current process from UVAR data collection to UVAR info provision	
Could you please indicate the countries	



that your services cover	
--------------------------	--

Current challenges for provision of UVAR related service	
Organizational	<input type="checkbox"/> Identification and contact with the responsible/mandated UVAR authority <input type="checkbox"/> other, please describe (also if different per country)
Functional	<input type="checkbox"/> Unavailability of UVAR (digital) data from authorities contacted <input type="checkbox"/> Access to the correct and legal source of the UVAR <input type="checkbox"/> Interpretation and or understanding of local law <input type="checkbox"/> Digitalization (translation) to a data model <input type="checkbox"/> Different parameters defining the UVAR <input type="checkbox"/> Validation and certification of digital UVAR <input type="checkbox"/> Information on UVAR data updates <input type="checkbox"/> other, please describe (also if different per country)
Technical	<input type="checkbox"/> Geographical codification of locations / geofences <input type="checkbox"/> varying formats <input type="checkbox"/> other, please describe (also if different per country)



UVAR data in DATEXII and available via NAP	
The ultimate aim of the EU is to collect and digitize UVAR data following the DATEX II standard and make it available as open data via EU National Access Points (NAP) network	
Would you be in favour of this scenario for collection and publication of UVAR data and information?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> this is not ideal, but we would use it to get the data If not, could you indicate the main reasons, and suggest alternatives
Which organizational and business aspects should be addressed in order to achieve this aimed scenario for collection and digitization of UVAR data?	For example; Data quality management or Data accessibility: which processes and responsible organizations.
Which functional aspects should be addressed in order to achieve this?	For example; Data quality standardization: agreeing which data parameters should be controlled and validated towards a norm.
Which technical aspects should be addressed in order to achieve this?	For example; compliance with which data accessibility and communication technologies
Use of DATEX II standard for UVAR data	
Are you familiar and user of DATEXII?	<input type="checkbox"/> No <input type="checkbox"/> Yes as a publisher <input type="checkbox"/> Yes as a producer <input type="checkbox"/> Other, please describe
If you are using DATEX datasets which DATEX version are you using?	<input type="checkbox"/> Version 3.3 <input type="checkbox"/> Version 3.2 <input type="checkbox"/> Version 3.1 <input type="checkbox"/> Version 3.0 <input type="checkbox"/> Version 2.3 <input type="checkbox"/> Version 2.2 <input type="checkbox"/> Version 2.1 <input type="checkbox"/> Version 2.0



	<input type="checkbox"/> Other:
If you are not using DATEX, what are the reasons or obstacles not to use it	<input type="checkbox"/> We do not have the tools inside our organisation to use it <input type="checkbox"/> The use cases for DATEX are too limited <input type="checkbox"/> Other, please explain
Use of NAP to publish UVAR data as a single point of publishing per country	
Are you familiar to, or a user of, Real Time Traffic Information (RTTI) from NAPs?	<input type="checkbox"/> Yes in all countries <input type="checkbox"/> Yes in the following countries <input type="checkbox"/> No If you have any comments, please explain
Which organizational and business aspects should be addressed in order for you to collect (or deliver) UVAR data to NAP?	
Which functional aspects should be addressed in order for you to collect (or deliver) UVAR data to NAP?	
Which technical aspects should be addressed in order for you to collect (or deliver) UVAR data to NAP?	



Uvar Box results and Hackathon	
Uvar DATEX II data model templates	<input type="checkbox"/> Yes, I am interested to receive this including description documents and or instructions for deployment <input type="checkbox"/> No I am not interested in receiving DATEX II model templates
Uvar Box tool supporting digitalization of Uvar	<input type="checkbox"/> Yes, I am interested to use the Uvar Box tool including instructions for deployment <input type="checkbox"/> No I am not interested in using a digitalisation tool
Uvar DATEX II data for Low Emission zones in Austria, Belgium, Germany Italy and The Netherlands	<input type="checkbox"/> Yes, I am interested to receive this <input type="checkbox"/> No, I am not interested to receive this
Participation in Hackathon and demonstration at ITS Europe Toulouse (30 may – 1 June)	<input type="checkbox"/> Yes, I am interested to participate <input type="checkbox"/> No, I am not interested to participate

7.3 NAP survey

Topic	Question	Answer
Providing Uvar information	Which type of services does the NAP provide when it comes to Uvar data management?	<input type="checkbox"/> Hosting Uvar data on the NAP: Yes? link or description <input type="checkbox"/> Have an API to the Uvar data: Yes? link or description <input type="checkbox"/> Provision Uvar info to End Users (drivers/fleet managers): Yes? link or description
	Could you describe in general terms your current process from Uvar data collection to Uvar info provision	<input type="checkbox"/> We have no Uvar data or facility on our NAP (if possible, detail why if possible:
Current challenges for provision of Uvar related data management	Organizational	<input type="checkbox"/> Identification and contact with the responsible/mandated Uvar authority <input type="checkbox"/> no request for / prioritisation of this given by the national authorities governing the NAP <input type="checkbox"/> lack of resources <input type="checkbox"/> lack of expertise <input type="checkbox"/> other, please describe
	Functional	<input type="checkbox"/> Access to the correct and legal source of the Uvar <input type="checkbox"/> Interpretation and or understanding of local law <input type="checkbox"/> Digitalization (translation) to a data model



		<input type="checkbox"/> The large variation in UVAR parameters defining the UVAR <input type="checkbox"/> Validation and certification of digital UVAR <input type="checkbox"/> Information on UVAR data updates <input type="checkbox"/> other, please describe
	Technical	<input type="checkbox"/> Geographical codification of locations / geofences <input type="checkbox"/> varying formats provided on the NAP <input type="checkbox"/> other, please describe (also if different per country)
The ultimate aim of the EU is to collect and digitize UVAR data following the DATEX II standard and make it available as open data via EU NAPs network	Would you be in favour of this scenario for collection and publication of UVAR data and information?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> this is not ideal, but we would use it to get the data If not, could you indicate the main reasons, and suggest alternatives
	Which organizational and business aspects should be addressed in order to achieve the EU envisaged scenario for collection and digitization of UVAR data?	For example; Data quality management: which processes and responsible organizations.
	Which functional aspects should be addressed in order to achieve this?	For example; Data quality standardization: agreeing which data parameters should be controlled and validated towards a norm.
	Which technical aspects should be addressed in order to achieve this?	For example; compliance with which technologies
Use of DATEX II standard for UVAR data	Are you familiar and user of DATEXII?	<input type="checkbox"/> No <input type="checkbox"/> Yes as a publisher <input type="checkbox"/> Yes as a producer <input type="checkbox"/> Other, please describe
	If you are using DATEX which version are you using?	<input type="checkbox"/> Version 3.2 <input type="checkbox"/> Version 3.1 <input type="checkbox"/> Version 3.0 <input type="checkbox"/> Version 2.3 <input type="checkbox"/> Version 2.2 <input type="checkbox"/> Version 2.1 <input type="checkbox"/> Version 2.0 <input type="checkbox"/> Other:
	If you are not using DATEX, what are the reasons or obstacles not to use it? And what format are you currently using?	<input type="checkbox"/> We do not have the resources inside our organisation to use it <input type="checkbox"/> The use cases for DATEX are too limited <input type="checkbox"/> Other, please explain <input type="checkbox"/> We currently use:



Use of NAP to publish UVAR data as a single point of publishing per country	Are you familiar to, or publishing, Real Time Traffic Information (RTTI)? Are any other data formats published via NAP?	<input type="checkbox"/> Yes <input type="checkbox"/> No If you have any comments, please explain <input type="checkbox"/> Yes <input type="checkbox"/> No If you have any comments, please explain
	Which organizational and business aspects should be addressed in order for UVAR data to be published on the NAP?	
	Which functional aspects should be addressed in order for UVAR data to be published on the NAP?	
	Which technical aspects should be addressed in order for UVAR data to be published on the NAP?	