



**Preparatory action — User-friendly  
information tool on urban and regional  
vehicle access regulation schemes 2  
UVAR Exchange**

**Task 2.3**

**Recommendations on improving data  
sharing to enforce UVARs in a cross-border  
context**

Final report

**PREPARED BY:** CORTE, MAPtm, Panteia, ARMIS, AustriaTech, TRT, and Sadler Consultants

Draft report: submitted on 28 October 2022

Draft Final report: submitted on 23<sup>rd</sup> January 2023

Final report: submitted on 17<sup>th</sup> March 2023

**FOR THE  
EUROPEAN COMMISSION**

European Commission, B-1049 Brussels

Directorate-General for Transport and Mobility

Directorate B - Investment, Innovative & Sustainable Transport

Unit B3 Innovation & Research Contact: Isabelle VANDOORNE

E-mail: [Isabelle.VANDOORNE@ec.europa.eu](mailto:Isabelle.VANDOORNE@ec.europa.eu)

# Table of Contents

List of figures .....	4
List of tables .....	4
Abbreviations and acronyms.....	5
Executive Summary.....	7
1. Introduction .....	9
2. Methodology.....	10
3. Cross border data exchange demonstrations .....	12
3.1 Goal of the demonstrations activities .....	12
3.2 Stepwise approach .....	12
3.3 Stakeholder engagement .....	13
3.4 Aachen .....	14
3.5 Antwerp .....	15
3.6 Barcelona .....	16
3.7 Brussels .....	17
3.8 Rotterdam .....	19
3.9 Verona .....	19
3.10 Interviews with solution providers .....	20
3.11 Real-life demonstrators .....	22
3.11.1 Antwerp Low Emission Zone foreign vehicle enforcement cases .....	22
3.11.2 Rotterdam Low Emission Zone foreign vehicle enforcement cases .....	23
3.11.3 Verona Limited Traffic Zone foreign vehicle enforcement cases .....	25
3.11.4 Barcelona Low Emission Zone foreign vehicle enforcement cases .....	27
3.11.5 Owner/holder centric demonstration (Brussels) .....	30
3.12 Lessons learned & recommendations .....	33
4. Steps required to enable solutions/services under different data-sharing model.....	41
4.1 Introduction .....	41
4.2 Authority-Centric (A to A) Data Sharing Model .....	42
4.2.1 EUCARIS .....	42
4.2.2 Internal Market Information System (IMI) .....	44
4.3 Driver Centric (D to A) Data Sharing Model .....	47
4.3.1 Verifiable Credential based solution .....	47
4.4 Vehicle Centric (V to A) Data Sharing Model .....	51
4.4.1 Solution/service based on Extended/Connected Vehicle (ExVe) concept.....	51
4.4.2 Solution/service based on Tachograph/DSRC.....	53
5. Options for legal basis to facilitate cross-border enforcement of UVARs .....	58
6. Conclusions & next steps .....	63
6.1 Authority to Authority (A to A) data sharing should be strengthened .....	63
6.2 Empower EU citizens to share their data to compliment A to A data sharing .....	64
6.3 Use growing vehicle connectivity and evolution of vehicle devices to compliment A to A data sharing .....	64
References.....	66
Appendix A .....	67
Appendix B .....	68
Appendix C .....	68

## List of figures

Figure 1: LEZ enforcement reference process.....	13
Figure 2: LEZ enforcement process city of Aachen .....	14
Figure 3: Number plate electric vehicles Germany (source adac.de) and UK (source www.gov.uk)....	15
Figure 4: LEZ enforcement process city of Antwerp .....	16
Figure 5: LEZ enforcement process city of Barcelona .....	17
Figure 6: LEZ enforcement process city of Brussels .....	18
Figure 7: LEZ enforcement process city of Rotterdam .....	19
Figure 8: LTZ enforcement process city of Verona.....	20
Figure 9: LEZ enforcement process EUCARIS implementation .....	21
Figure 10: New LEZ enforcement process city of Antwerp .....	23
Figure 11: New LEZ enforcement process city of Rotterdam.....	24
Figure 12: The EUCARIS monitoring dashboard .....	25
Figure 13: Infoweb vehicle technical information request .....	26
Figure 14: Infoweb vehicle technical information result .....	26
Figure 15: Future LTZ enforcement process Verona .....	27
Figure 16: EUCARIS webservice technical test data EV .....	28
Figure 17: EUCARIS Webservice technical and holder test data Euro 3 vehicle .....	29
Figure 18: Future LEZ enforcement process Barcelona region .....	30
Figure 19: Driver-centric solution, Carla enabling admittance for UVARs thru registration of exemption .....	32
Figure 20: Collaboration needed to implement IMI.....	46
Figure 21: How Verifiable Credentials Work .....	47
Figure 22: Connected Vehicle based solution .....	52
Figure 23: Typologies of tachograph/DSRC based solution .....	54

## List of tables

Table 1: Rating of requirements.....	34
Table 2: Lessons learned from.....	37
Table 3: EUCARIS user groups .....	42
Table 4: Legal basis for cross-border UVAR Enforcement.....	58
Table 5: Rating on requirements.....	68

## Abbreviations and acronyms

A2A	Authority Centric data sharing
ACEA	European Automobile Manufacturers' Association
AMB	Area Metropolitana de Barcelona
ANPR	Automatic Number Plate Recognition
API	Application Programming Interface
ATEX	Web service for the Register of Vehicles and Drivers of the Dirección General De Tráfico (Spain)
BOSA	FOD Beleid en Ondersteuning (Belgium)
CBE	Cross-Border Enforcement
CJIB	National Central Judicial Collection Agency
CORTE	Confederation of Organisations in Road Transport Enforcement
COVID-19	Coronavirus disease 2019 SARS-CoV-2
D2A	Driver Centric data sharing
DG GROW	Directorate General for Internal Market, Industry, Entrepreneurship and SMEs
DG MOVE	Directorate General for Transport and Mobility
DGT	Dirección General De Tráfico (Spain)
DID	Decentralized Identifier
DIV	Dienst voor Inschrijvingen van Voertuigen (Vehicle register Belgium)
DSRC	Dedicated Short Range Communications
EBSI	European Blockchain Service Initiative - European Blockchain Service Infrastructure
EETS	European Electronic Toll Service
eIDAS	electronic IDentification, Authentication and trust Services
EReg	The Association of European Vehicle and Driver Registration Authorities
EU	European Union
EUCARIS	European car and driving licence information system
EV	Electric Vehicle
ExVe	Extended Vehicle
FOD	Federaale Overheidsdienst Financien (Belgium)
IMI	Internal Market Information System
IRU	World Transport Organization
ITS	Intelligent Transport Systems
KBA	Kraftfahrt-Bundesamt (Vehicle register Germany)
LEZ	Low Emission Zone
LTZ	Limited Traffic Zone
MAGDA	Gegevensdelingsplatform (Governmental platform ensuring data exchange from authentic sources, Belgium)
NAP	National Access Point
NCP	National Contact Point
O	Organisational
PHEV	Plug-in Hybrid Electric Vehicle
RDW	Rijksdienst Voor het Wegverkeer (Vehicle register The Netherlands)
REDCR	Remote Early Detection Communication Reader
SDG	Single Digital Gateway
SME	Small and medium-sized enterprises
SRTI	Safety Related Traffic Information
STD	Use case and Test Scenarios

*UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context*

STP	Software Test Plan (Following J-STD-016 standard)
ToR	Terms of Reference
UNECE	United Nations Economic Commission for Europe
UVAR	Urban Vehicle Access Regulation
V2A	Vehicle Centric data sharing
VC	Verifiable Credential
VMM	Vlaamse Milieumaatschappij (environmental organisation of the Gouvernement of Vlandres)
VT	Verhoogde Tegemoetkoming (regulation for people with low income, Belgium)
W3C	World Wide Web Consortium
ZEZ	Zero Emission Zone

## Executive Summary

Enforcing any traffic rule in a cross-border context is generally a complex exercise, which requires:

- Connections between several stakeholders,
- Appropriate legal agreements between countries to provide the basis for exchanging data,
- Systems that can ensure secure transfer of data, and
- Qualitative data on the vehicle and vehicle owner, which is up-to date and digitalized and can be trusted by enforcers.

For enforcement of Urban Vehicle Access Regulations (UVARs) with respect to foreign vehicles, further layers of complexity are added:

- There is a multiplication of stakeholders, as local/city authorities and departments get involved in enforcement,
- Different cities use different methods to enforce UVARs, e.g., some use physical checks through traffic police, others use automated checks through vehicle number plate recognition,
- Sometimes data needs to be consulted before the occurrence of a traffic violation (i.e., *ex-ante*) to establish if there is non-compliance with a UVAR (e.g., low emission zones),
- Exemptions to UVARs also need to be managed (e.g., disability, provision of services etc.), which may require additional data to know if there is a non-compliance with a UVAR or not.

Given this complexity, the report adopts a comprehensive approach and provides broad recommendations that can foster cross-border data exchange not only to improve the '*enforcement of*' UVARs but also to support '*compliance with*' UVARs.

The recommendations included in this report have been developed with the intention to:

- Inform city authorities about different mechanisms through which they can seek data, relevant for enforcing UVARs, concerning foreign vehicles and drivers, and
- Inform EU citizens about emerging technologies and EU initiatives that can empower them to share their data in a cross-border context to prove compliance with local rules.

The report places UVAR enforcement in the larger policy landscape of European Union, where emerging technologies, digitalization and increasing connectivity are being leveraged to improve the experience of citizens travelling and working across EU Member States.

The report discusses the experiences of different cities on enforcing UVARs, mapping their diverse enforcement processes and developing practical demonstrations to showcase data sharing through simulated and real-live demos. (See [chapter 3](#) below).

It also describes three different types of *data-sharing models* that can support the '*enforcement of*' and '*compliance with*' UVARs in a cross-border context. For each model, specific examples of solutions/services applying those models have also been discussed:

- **Authority Centric data sharing (A2A)** – where city enforcement authorities can seek relevant data from vehicle registration authorities of the country where the vehicle is registered. For this model "EUCARIS" and "Internal Market Information" (IMI) system have been discussed.
- **Driver Centric data sharing (D2A)** – where city enforcement authorities can seek relevant data from drivers or owners of a vehicle. For this model "Verifiable Credential based solution" has been discussed.

- **Vehicle Centric data sharing (V2A)** – where city enforcement authorities can seek relevant data from the vehicle itself or devices fitted in the vehicle. For this model “connected vehicle-based solution” and a “tachograph/DSRC technology-based solution” has been discussed.

The report provides specific steps (see [chapter 4](#) below) on how the different solutions/services (under each data-sharing model) can be actualized for UVAR enforcement.

In addition, different EU laws (such as CBE Directive, EETS Directive, Single Digital Gateway Regulation, Climate Action Regulations) and their relevance to UVAR enforcement has been discussed (see [chapter 5](#) below).

In conclusion, the report recommends that:

- **Authority to authority data sharing should be strengthened between countries.** This can be done by improving the quality of data available with vehicle registration authorities, by introducing a legal basis that allows the sharing of data for UVAR enforcement across EU, and by exploring the use of data-sharing solutions such as EUCARIS and IMI for this purpose.
- **EU Citizens should be empowered to share their data** to prove that they comply with a given UVAR either because they meet the criteria or because an exemption (e.g., disability) applies to them. This can be done by leveraging the *Verifiable Credential* technology and initiatives such as *EU digital identity wallet* and *EU blockchain services infrastructure*, to establish a system similar to COVID certificates to allow free movement of citizens across EU. Doing so will complement the authority-centric approach to enforcement by reducing its burden, as only non-compliant vehicles will have to be checked using authority-to-authority data sharing.
- **Increasing connectivity of vehicles and evolution of devices fitted in the vehicles (such as tachographs) should be used to detect vehicles that do not comply with UVARs.** This can be done by establishing a legal basis for accessing vehicle data relevant to UVAR enforcement and collaborating with vehicle manufacturers to develop an ecosystem for UVAR enforcement. Collaboration with tachograph manufacturers should also be explored, as tachograph is already used for enforcing different regulations across the EU, its evolution and increasing use (also in Light Commercial Vehicles) can provide an opportunity for enforcing UVARs.



# 1. Introduction

This document describes the work developed in Task 2 of the UVAR Exchange project.

The objectives of this task are to:

- Investigate and identify the various challenges related to data sharing for the purposes of enforcing UVARs in a cross-border context,
- Demonstrate how data can be exchanged, and
- Provide recommendations on how to improve cross-border data sharing for UVAR enforcement

The scope of this task is the cross-border enforcement of Low Emission Zones (LEZs), one of the most common and widely used UVARs in the EU.

Task 2 started with the identification of the challenges and opportunities on the legal, administrative and technical levels. These were described in the previous report of Task 2.1 and Task 2.2 “Challenges and opportunities related to cross-border data sharing for enforcing UVARs”.

The previous report also scanned the horizon to consider different data-sharing models, as well as EU laws to identify the legal basis and solutions that could help cross-border data sharing for UVAR enforcement.

This document builds on the previous work and provides recommendations that can help EU-wide data sharing for UVAR enforcement concerning foreign vehicles. The information gathered in the first phase of the project (as reflected in the previous report – Task 2.1 and Task 2.2 report) has been further expanded in this document to provide comprehensive insight and steps that can help to share vehicle data and vehicle owner/holder data for enforcing UVARs in a cross-border context.

- [Chapter 2](#) of the document details the methodology used for accomplishing the objectives.
- [Chapter 3](#) describes the demonstrations activities on data exchange by outlining:
  - a. the discussions held with several cities,
  - b. interviews held with data-sharing solution/service providers,
  - c. organization of dry-runs and real-live demos in collaboration with different stakeholders.
- [Chapter 4](#) provides an overview of the different data-sharing models and co-related solutions/services that apply these models. The steps needed to implement different solutions for UVAR enforcement have also been described.
  - a. For Authority-to-authority data-sharing model – EUCARIS<sup>1</sup> and IMI<sup>2</sup> solutions have been discussed.
  - b. For Driver to authority data sharing model – Verifiable Credential based solution has been discussed.
  - c. For Vehicle to authority data sharing model – Connected vehicle and tachograph/DSRC<sup>3</sup> based solution model have been discussed.
- [Chapter 5](#) discusses different EU laws and initiatives that could be leveraged for providing a legal basis for sharing data for UVAR enforcement. Here recommendations have also been

---

<sup>1</sup> European CAR and driving licence Information System, <https://www.eucaris.net/>

<sup>2</sup> European Internal Market Information System, [https://ec.europa.eu/internal\\_market/imi-net/index\\_en.htm](https://ec.europa.eu/internal_market/imi-net/index_en.htm)

<sup>3</sup> Dedicated Short Range Communications

provided on how the EU laws would need to change, to provide a legal basis for cross-border UVAR enforcement.

- [Chapter 6](#) provides recommendations and actions that can facilitate data sharing for cross-border enforcement in the EU.

## 2. Methodology

The methodology adopted for Task 2 consists of: a) the discussions held with different cities to understand their enforcement practices and b) the mapping of different data sharing models as well as co-related solution/service providers.

The methodology is based on the following 3 main pillars:

### *Survey*

At the beginning of the project, a survey was conducted inviting primarily city/enforcement authorities to share the challenges they face regarding the exchange of vehicle data and vehicle owner/holder data for the purposes of UVAR enforcement.

### *Desk Research*

In parallel, extensive desk research was conducted to identify data-sharing models, solutions as well as relevant EU regulations. *Among others*, the following sources were consulted:

- Reports and outcomes prepared under related projects such as UVARBox<sup>4</sup>, REVEAL<sup>5</sup>, and LeMO<sup>6</sup>.
- Publicly available documents related to discussions held in EU expert groups and committees.
- Legal resources (such as EUR-lex and United Nations Treaty Collection) for multilateral treaties and EU laws.
- Documents developed by working groups of European Associations such as EReg<sup>7</sup>, IRU<sup>8</sup>, ACEA<sup>9</sup>, POLIS<sup>10</sup>, CORTE<sup>11</sup>.

### *Stakeholder Consultations*

A range of stakeholders was consulted through bilateral meetings and workshops, such as:

- City/Enforcement authorities
- Ministry level authorities

---

<sup>4</sup> DG MOVE project for digitising & exchanging data of UVAR across Europe to facilitate the private, public and commercial use of UVARs, <https://uvarbox.eu/>

<sup>5</sup> The goal of EU funded R&IReVeAL is to add Urban Vehicle Access Regulations (UVAR) to the standard range of urban mobility transition approaches of cities across Europe, <https://civitas-reveal.eu/about/>

<sup>6</sup> LeMO project focused on identifying a policy and research roadmap that could foster the use of big data in the transport sector. It identified the challenges and barriers to data sharing in EU and developed recommendations on how these challenges and barriers could be overcome, <https://lemo-h2020.eu/>

<sup>7</sup> Association of European vehicle and driver registration authorities, [www.ereg-association.eu](http://www.ereg-association.eu)

<sup>8</sup> World transport organisation, [www.iru.org](http://www.iru.org)

<sup>9</sup> European Automotive Manufacturers Association, [www.acea.auto](http://www.acea.auto)

<sup>10</sup> Network of European cities and regions developing technologies and policies for local transport, [www.polisnetwork.eu](http://www.polisnetwork.eu)

<sup>11</sup> Confederation of organisations in road transport enforcement, [www.corte.be](http://www.corte.be)

- Data Exchange solution providers – EUCARIS, IN Groupe<sup>12</sup>, Vehicle Manufacturers, DG GROW (IMI team), and Tachograph Manufacturers.
- Vehicle Registration Authorities through EReg
- European Associations – EReg<sup>13</sup>, IRU<sup>14</sup>, ACEA<sup>15</sup>, POLIS<sup>16</sup>
- European Commission – DG MOVE

The demonstration activities involved the following steps:

- **STEP 1:** After the first workshop, a preliminary list of cities that were willing to collaborate in the demonstration activities was identified. These include:
  - Aachen (Germany)
  - Antwerp (Belgium)
  - Barcelona (Spain)
  - Brussels (Belgium)
  - Rotterdam (The Netherlands)
  - Verona (Italy)
- **STEP 2:** A series of meetings were organized with different departments and stakeholders at national, regional and city levels, to map the enforcement processes applied by cities for UVARs.
- **STEP 3:** The enforcement structure maps were validated with each city.
- **STEP 4:** Demonstration planning was discussed with solution providers (EUCARIS and IN Groupe)
- **STEP 5:** A dry-run of the demonstration was organized with each city to understand if a real-live demo could also be conducted.
- **STEP 6:** A real-live demo was organized with Antwerp, Rotterdam, Verona and Barcelona..

---

<sup>12</sup> Specialist in identity and secure digital services, partner of the French government, [www.ingroupe.com](http://www.ingroupe.com)

<sup>13</sup> <https://www.ereg-association.eu/>

<sup>14</sup> <https://www.iru.org/>

<sup>15</sup> <https://www.acea.auto/>

<sup>16</sup> <https://www.polisnetwork.eu/>

## 3. Cross border data exchange demonstrations

### 3.1 Goal of the demonstrations activities

The cross-border data exchange demonstrators aimed to test and showcase the organisational and technical aspects of the UVAR enforcement processes and to support the identification of current barriers and potential solutions while implementing and operating a cross-border data exchange solution. Annex 5, chapter 3 provides a full overview of the demonstration's activities.

The demonstrations were performed in several different European cities to capture the different national and local characteristics of the enforcement process.

The demonstrations were done within the legal framework in place for the specific city and country. When this was not possible a test environment with simulated test data was used to demonstrate the technical possibility of data exchange between EU Member States.

The results provided the basis for developing recommendations for the wide implementation of cross-border solutions. At the same time, the demonstrations also aimed to raise awareness among Member States, and national and local stakeholders, and contribute to the promotion of potential cross-border solutions.

### 3.2 Stepwise approach

#### **Preliminary meetings**

As preparation for the demonstrations, preliminary meetings were held with representatives of different cities in Europe. During these preliminary meetings, the goals for the UVAR Exchange project and the demonstrations were explained, initial ideas were discussed, and all the relevant stakeholders that are needed to perform a demonstration were identified. During these meetings, the current situation of enforcement done by the city was mapped and possible missing technical, legal and organisational steps for cross-border enforcement were identified. The possibility of demonstrating cross-border data exchange was discussed to showcase the benefits of solutions and show how they add value to cross-border data exchange. By demonstrating a solution in different local contexts, practical shortcomings or challenges could be identified.

#### **Dry run phase**

For the dry run phase of the demonstrations, a test plan description (STP) was developed in which, for each city, the necessary steps to be taken for a successful demonstration have been described. As the next step, a walk-through dry run was prepared for each city, for which use case and test scenarios (STD) were developed.

During the dry run meetings, the local enforcement steps were discussed with the city and the solution providers. Where applicable national agencies were also involved in the process. A review of the main preconditions and requirements of using one of the identified solutions was performed. Based on this review, actions needed to implement the solution in the future were formulated, including the ones necessary for a real-life demonstration.

Based on the findings during the dry runs, **real-life demonstrations** were planned and developed, including a walk-through of all the test steps and scenarios. These demonstrations were recorded in video and test results were reported.

### 3.3 Stakeholder engagement

The group of cities involved and interested since the start of the project was extended with cities that showed interest in participation during the initial workshops with stakeholders. Following individual contacts allowed us to further align each city's situation with the project objectives and proposed approach for the demonstration of cross-border data exchange supporting UVAR enforcement of foreign vehicles. Parallel to the city engagement activities, the available cross-border data exchange solutions were identified and detailed, and jointly explored the feasibility of demonstration with the available cities and countries. This matchmaking was not always straightforward as each city has different local conditions and possibilities for implementing, testing or demonstrating a proposed solution.

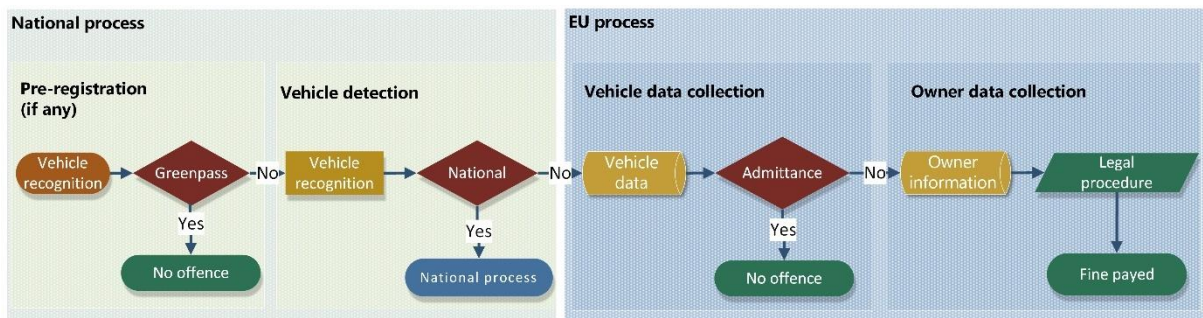
The initial introductory meetings with each city, allowed us to collect the current UVAR enforcement practices, as well as to identify the division of roles between the different local, regional or national organisations involved in the foreign vehicle enforcement tasks. A major (time-consuming) challenge was not only the identification of the right organisations but also the identification and engagement of the responsible or necessary person(s) to participate in the project demonstrations.

After the introductory meetings the following cities participated in the demonstration activities:

- Aachen
- Antwerp
- Barcelona
- Brussels
- Rotterdam
- Verona

Below follows a description of demonstration steps and collected insights from each city and solution provider. To understand the general steps of cross-border enforcement a general workflow was defined (see **Error! Reference source not found.**).

**Figure 1: LEZ enforcement reference process**



The figure addresses the process steps with the following actors and stages.

Actors:

- Driver and vehicle
- UVAR enforcement: cities, regional or national authority
- Fine collecting agency

Stages:

- Pre-registration
- Foreign vehicle detection
- Foreign vehicle technical data collection
- Foreign vehicle owner/holder data collection

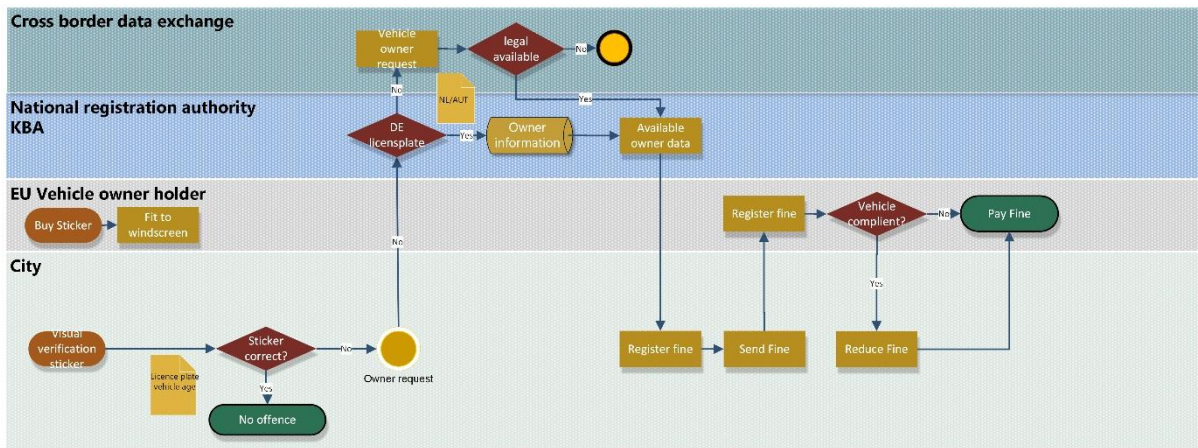
### 3.4 Aachen

Current foreign vehicle enforcement practice:

- Main contact: division leader of the department ‘Fachbereich Sicherheit und Ordnung’ of Aachen.
- LEZ is based on the national framework. **A vehicle needs to meet German sticker standards.** The enforcement is done based on street manual/visual *vehicle detection and compliance assessment* by 100 city officers. If a LEZ sticker is on an “older” vehicle the officer will use **expert judgment** to assess a *possible* violation.
- When a foreign vehicle owner-holder wants to register for a sticker he/she must register at the local Strassenverkehrsamt which will forward the registration information to the KBA which is the central register for Germany.
- When a vehicle has no sticker, the license plate is registered and processed by the city system for sending a fine. After receiving the fine the vehicle owner holder can present proof that the vehicle is compliant and the fine will be reduced to 35 euros for administrative costs.
- **For registering and processing offences the city uses “Winowig” (<https://www.owig.de/referenzen>) a software solution used in hundreds of cities in Germany.** The solution organises all the steps for retrieving vehicle owner-holder data and preparing and sending fines. The system also couples with the KBA in Flensburg. **During the night a bulk license plates request is done and all possible owner-holder data is retrieved.** This is also done for foreign vehicles although it only retrieves the data from the countries where it is legally possible.
- There is a bilateral agreement for the exchange of owner data with the Netherlands and Austria.
- Approximately 1.8 million Euros in UVAR fines are issued per year by the city. Half of the violations are related to vehicles registered in Belgium.

Error! Reference source not found. below shows the enforcement process of the city of Aachen.

Figure 2: LEZ enforcement process city of Aachen



#### Electric Vehicles

In Germany, based on the Electric Mobility Act (EmoG – Elektromobilitätsgesetz) cities can create incentives for electric vehicle drivers like free parking or special lanes. To allow identification of electric and plug-in-hybrid vehicles the letter E is added to the license plates, see **Error! Reference source not found.** below. The system of using distinct markers on the number plates of electric vehicles is also used in ten other EU Member States, plus Norway, UK, Ukraine, and Switzerland, sometimes combined electric and plug-in-hybrid vehicles. Three EU Member States have stickers to identify these vehicles, **one of which mixes plug-in hybrid with battery electric.** Countries distinguish between the license plates of Electric/Hydrogen/PHEV using one of the following ways: using a special series, additions (like Germany), a different coloured background (e.g., Poland), different colours of letters (Austria),

different colours combined with two reserved starting letters (Latvia) or a green strip (flash) on the left-hand side of the number plate for zero-emission vehicles (United Kingdom).

**Figure 3: Number plate electric vehicles Germany (source [adac.de](http://adac.de)) and UK (source [www.gov.uk](http://www.gov.uk))**



*Proposed cross-border data exchange demonstrations in Aachen*

- Demonstrations in the City of Aachen were not feasible as KBA required an EU legal basis to cooperate further for “Dry run demonstration” and “Real life demonstration” steps.

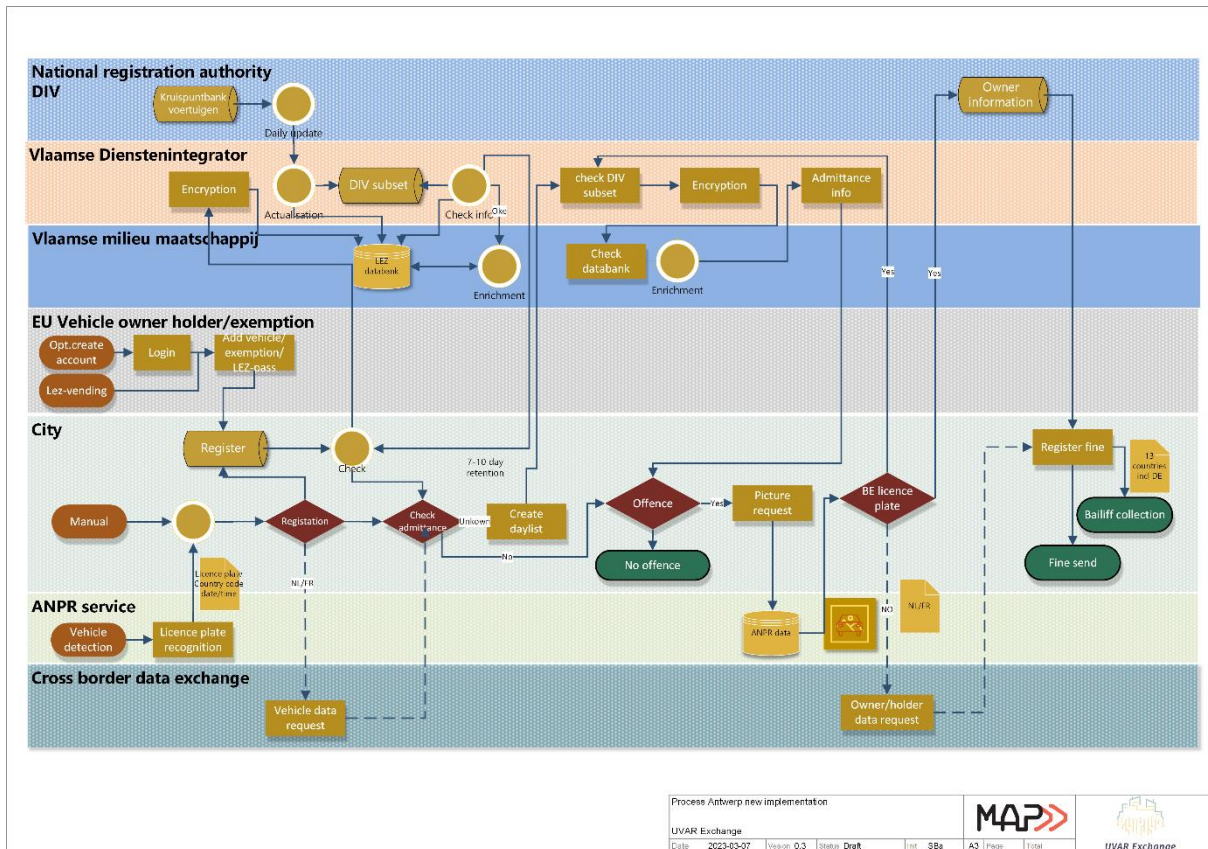
### 3.5 Antwerp

*Current foreign vehicle enforcement practices*

- LEZ UVAR is based on a Flanders region and city regulation. A vehicle needs to meet the Antwerp standards and a mandatory (free of charge) registration for non-Belgium vehicles. Only Dutch vehicles do not have to register because of the open technical data feed of the RDW. A “day pass” can be bought 8 times a year or one can pay for temporary access for a longer period to the LEZ if the vehicle does not meet the emission requirement of the LEZ. Registration can be done until the day after entering the LEZ. The UVAR is monitored with ANPR cameras and on-street by officers.
- The vehicle compliance check for both Belgium and Dutch vehicles is done through cooperation between the city, the region and federal organizations. The city sends daily bulk requests for license plates from its system to the Vlaamse Milieumaatschappij (VMM). The automatic check is done by Vlaamse Dienstintegrator and uses the Federal Belgium Vehicle registration database managed by the DIV. The vehicle technical details of Dutch vehicles are collected via the RDW vehicle open data API.
- Between BeNeLux there is a political declaration signed by the countries, federal organisations regional organisations and several cities. This declaration enables the exchange of vehicle technical data and vehicle owner-holder information. At the moment this report is written there is no follow-up on the agreement for Luxembourg. With the Netherlands, there is an exchange of data. Also with France, there is on a federal level an agreement for exchanging owner-holder information. Because non-registration is seen as an offence under Belgium law French owner-holder data is obtained in the case that a French driver did not register for entering the LEZ.
- The fine issuing is done (and collected) by the city fiscal services after receiving the vehicle owner-holder data from the regional VMM. Besides the Netherlands and France, for 13 other countries, the fine collection goes via a bailiff with a mandate of the city of Antwerp. The bailiff will try to retrieve owner-holder information based on the license plate of a vehicle observed by the ANPR system of the city.

**Error! Reference source not found.** below shows the enforcement process of the city of Antwerp.

Figure 4: LEZ enforcement process city of Antwerp



*Proposed cross-border data exchange demonstrations in Antwerp:*

- “Dry run demonstration” applying EUCARIS solution to the following LEZ enforcement use cases: French and Dutch holder-owner and vehicle technical data exchanged via the “DIV-EUCARIS service”, under the bilateral agreements between Belgium-France and Belgium-the Netherlands.
- Explore with EUCARIS, City of Antwerp, Flemish Environment and Digital Agencies and Federal government, the feasibility of “Real life demonstration” based on “Dry Run demonstration” results.

### 3.6 Barcelona

*Current foreign vehicle enforcement practices*

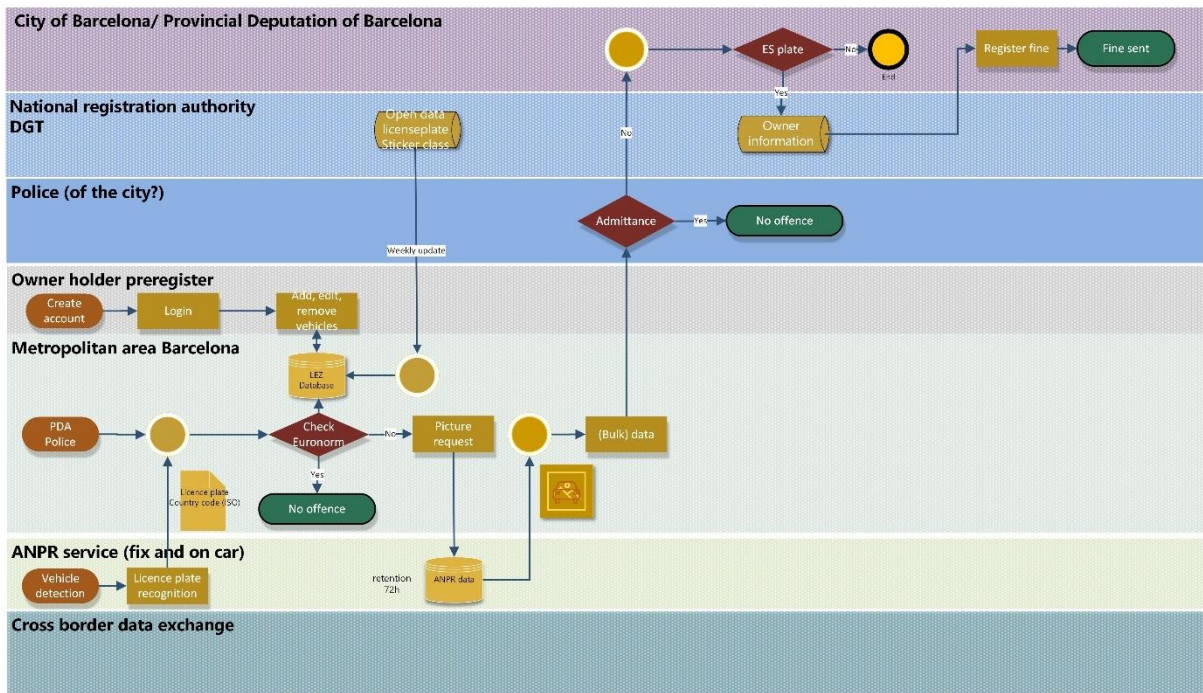
- To enter LEZ in Barcelona a vehicle needs to meet Spanish national standards and to have a sticker (Distintivo Ambiental) provided by the Ministry of Interior organization Dirección General de Tráfico (DGT). Based on the vehicle data, DGT categorises all vehicles into the sticker classification. This dataset of licence plates and sticker categories is retrieved weekly by Barcelona from DGT national database, and the LEZ local database of vehicles is actualised with this information. Vehicle owners can print the stickers if they want but they are not obliged to.
- Foreign vehicle owners need to pre-register through the city website where the vehicle owner/holder makes an individual profile and provides vehicle characteristics and a copy of the vehicle technical information. This is currently verified manually by a city service. Vehicle registration costs 7 euros and is valid indefinitely. Owner-holder contact information is also needed to be able to inform in case of tightening of the LEZ regulation. The owner holder can always log in to their profile to add or change the vehicle or personal information. Registered data can be shared (user consent) with national DGT but this is not done yet. If a vehicle is not compliant with LEZ regulation there is an option to buy a max of 10 daily passes per year.



- The LEZ is enforced by automatic vehicle detection with Automatic Number Plate Recognition (ANPR) system, managed at a regional level. Most license plates can be matched with the country of origin, but some license plates are difficult to match, e.g. from Belgium or Morocco.
- When a vehicle is not compliant nor registered, the (stored) ANPR picture is sent to the city police department where the offence took place. The local police will manually control the offence (check the license plate with the vehicle and owner registration). The fine issuing and collection are done by the provincial fiscal department “Deputation de Barcelona”, except in Barcelona city which has its own fiscal services. A fine collection for foreign vehicles is not processed as there is no legal basis for it.

Error! Reference source not found. below shows the enforcement process of the city of Barcelona.

Figure 5: LEZ enforcement process city of Barcelona



Proposed cross-border data exchange demonstrations in Barcelona:

- “Dry run demonstration” applying EUCARIS solution to the following LEZ enforcement use cases: French and or Dutch holder-owner and vehicle technical (simulated) data exchanged via the “EUCARIS test environment”, due to lack of legal basis for use of EUCARIS available data.
- Explore with EUCARIS, Area Metropolitana de Barcelona and DGT the feasibility of “Real life demonstration” based on “Dry Run demonstration” results.

### 3.7 Brussels

Current foreign vehicle enforcement practices

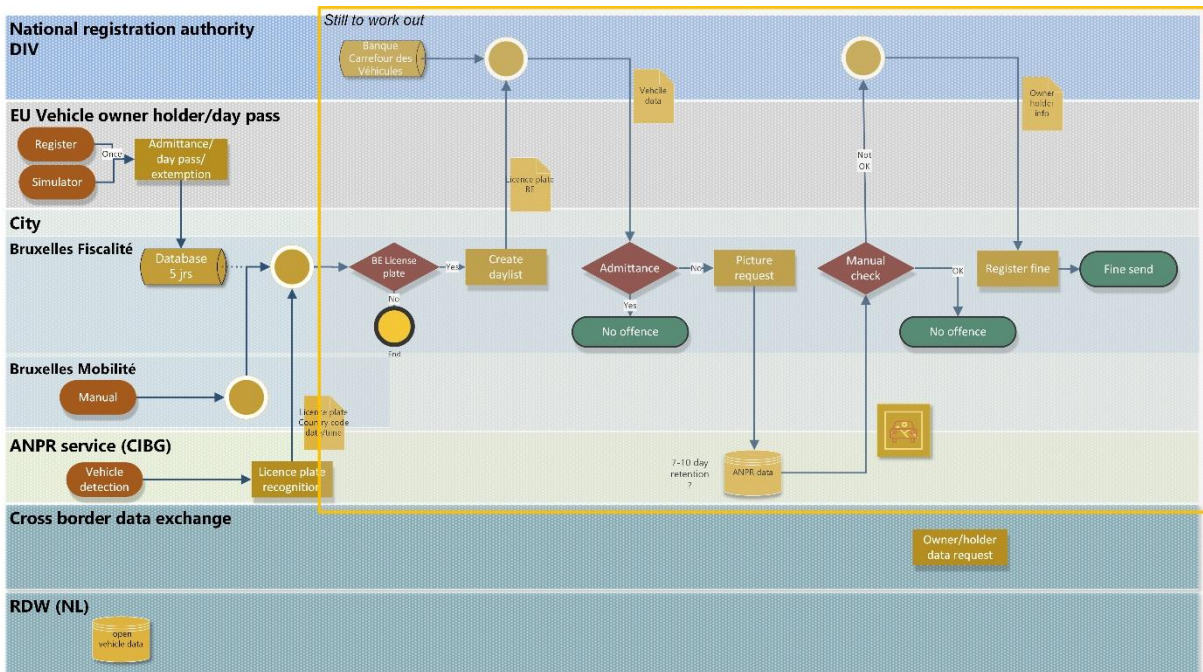
- Bruxelles capital Region has a LEZ UVAR in place where pre-registration is obligatory for foreign vehicles except for Dutch vehicles.
- The LEZ enforcement is currently done through vehicle detection with an ANPR system maintained by CIRB (Brussel IT department). At the moment only 3% of foreign vehicles registered by the ANPR system have been registered. When a violation is registered by the LEZ IT-platform it is obligatory

to perform a manual check verifying the picture of the vehicle created by the ANPR system. See the procedure in Figure 6.

- Bruxelles Mobilité is currently developing a system to enable checking vehicles with mobile control officers (mobile inspection team) as well. This will be applied not only to the LEZ but also to monitor other traffic regulations.
- The vehicle compliance check for both Belgium and Dutch vehicles is done through cooperation between the city, the region and federal organizations. For Belgium, vehicles check is done directly with the Federal DIV. For the Dutch (aforementioned BeNeLux political declaration) and French, there is a legal basis in place to exchange owner-holder information. For equity reasons, Brussels (on a regional level) choose to first develop a solution to control all countries (the mobile inspection team), before developing a process specifically to fine the French and Dutch. The exchange for the French and the Dutch will be developed within the “new DIV application”. Based on the information from Bruxelles Fiscalité this application will be ready for usage end of this year / first part of 2024.
- Bruxelles Fiscalité processes the collection of owner-holder data from Federal DIV<sup>17</sup> and issues the fines related to the violations of the LEZ regulations. The fine for not being registered is €150 and for non-compliance it is €350.

**Error! Reference source not found.** below shows the first draft of the enforcement process of the city of Brussels.

Figure 6: LEZ enforcement process city of Brussels



*Proposed cross-border data exchange demonstrations in Brussels:*

- “Dry run demonstration” applying IN Groupe UVAR Wallet solution to the following LEZ enforcement use cases:
  - Simulated use case of French disabled person visiting Brussels with a non-compliant French vehicle.
  - Simulated use case of a mobile compliance check by an Enforcement officer in Brussels.

<sup>17</sup> Vehicle registration organisation in Belgium

- Explore with IN Groupe and the City of Brussels (Environment and Mobility department) the feasibility of “Real life demonstration” based on “Dry Run demonstration” results.

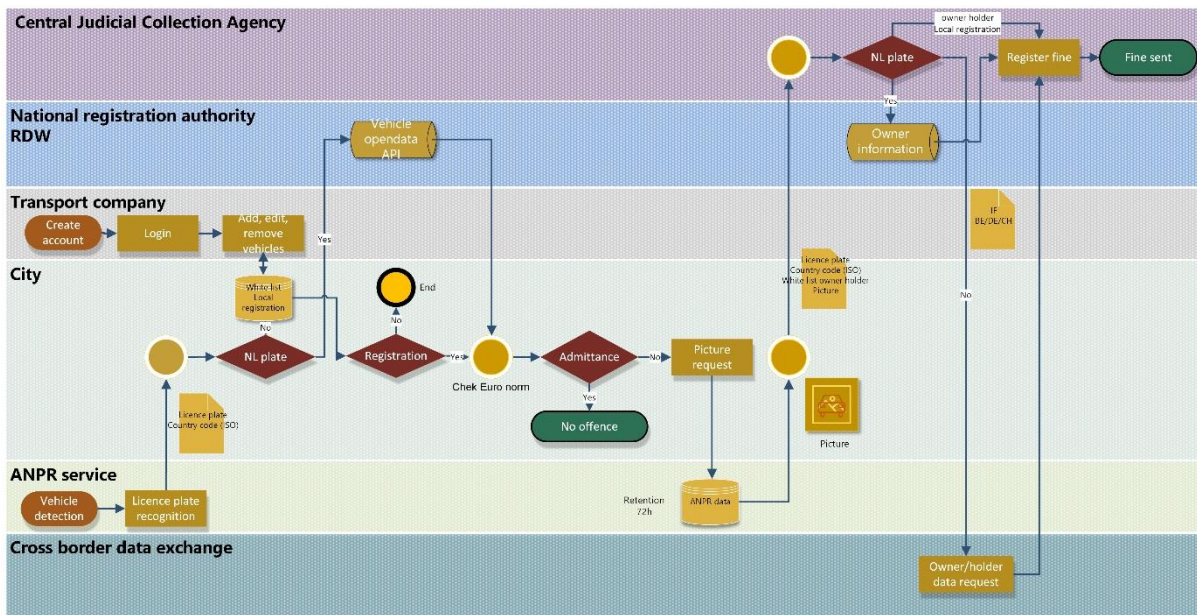
### 3.8 Rotterdam

*Current foreign vehicle enforcement practices*

- The municipality of Rotterdam manages a LEZ in the city centre of Rotterdam and the LEZ in the “Maasvlakte” harbour area/access. For the Maasvlakte there is a mandatory (free) registration for all foreign vehicle trucks (>3.5T), where vehicle registration and owner-holder information is required. Day exemptions are available for €22,70.
- LEZ enforcement is done with both ANPR-system and mobile traffic control officers.
- The vehicle compliance check is done locally by the city based on the local registration database and the Dutch RDW open data feed on vehicle technical data. Non-compliant vehicles’ license plates or holder-owner information is passed to the National Central Judicial Collection Agency (CJIB) which will issue and collect the fines both for national and foreign vehicles where this is legally allowed.

**Error! Reference source not found.** below shows the first draft of the enforcement process of the city of Rotterdam.

**Figure 7: LEZ enforcement process city of Rotterdam**



*Proposed cross-border data exchange demonstrations in Rotterdam:*

- “Dry run demonstration” applying EUCARIS solution of the following LEZ enforcement use cases:
  - Belgium vehicle owner-holder and vehicle technical data via the RDW under the bilateral agreement with Belgium and France.
- Explore with EUCARIS, City of Rotterdam, RDW and CJIB the feasibility of “Real life demonstration” based on “Dry Run demonstration” results.

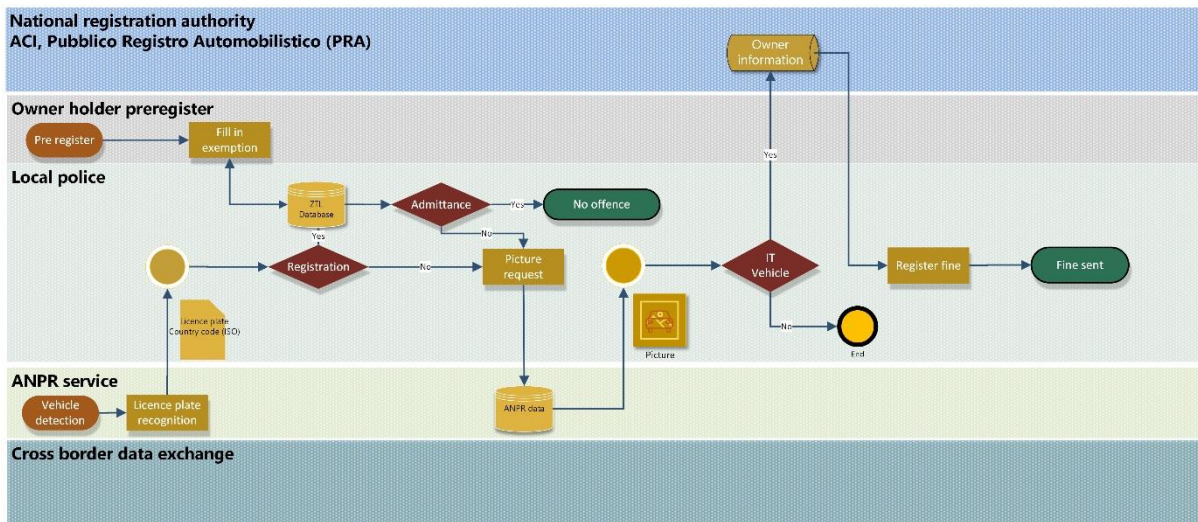
### 3.9 Verona

*Current foreign vehicle enforcement practices*

- The city of Verona has a Limited Traffic Zone (LTZ) UVAR in place, restricting access to the city centre in pre-defined periods and days of the week. Vehicles with specific travel purposes or driver’s conditions can apply for occasional or permanent authorization.
- The LTZ enforcement is done with an ANPR system to detect and identify the vehicles.
- The vehicle compliance check is done locally by comparing the license plate with the registered vehicle database. Non-compliant vehicle license plates are sent to the national vehicle registry for collection of holder information for the municipal police to process and send the corresponding fine. Foreign vehicle license plates are sent to the Italian EUCARIS National Contact Point, the Ministry of Sustainable Infrastructure and Mobility, to collect owner-holder information under the EU CBE regulation.
- The Ministry of Sustainable Infrastructure and Mobility provides access to domestic and foreign vehicle owner-holder information via a web service platform made available to all local authorities. To gain access and be able to collect domestic information, local authorities need to pay a yearly fee and a fee per single request.

**Error! Reference source not found.** below shows the first draft of the enforcement process of the city of Verona.

**Figure 8: LTZ enforcement process city of Verona**



Proposed cross-border data exchange demonstrations in Verona:

- “Dry run demonstration” of the EUCARIS service with the following Limited Traffic Zone enforcement use cases:
  - Dutch, Belgium and German vehicle owner-holder data via the EUCARIS under the CBE agreement;
  - Demonstration of the use cases facilitated by the Italian Ministry of Transport portal <http://ilportaledellautomobilista.it/>
- Explore with EUCARIS, the City of Verona, the Police of Verona and the Italian Ministry of Transport the feasibility of a “Real life demonstration” based on “Dry Run demonstration” results.

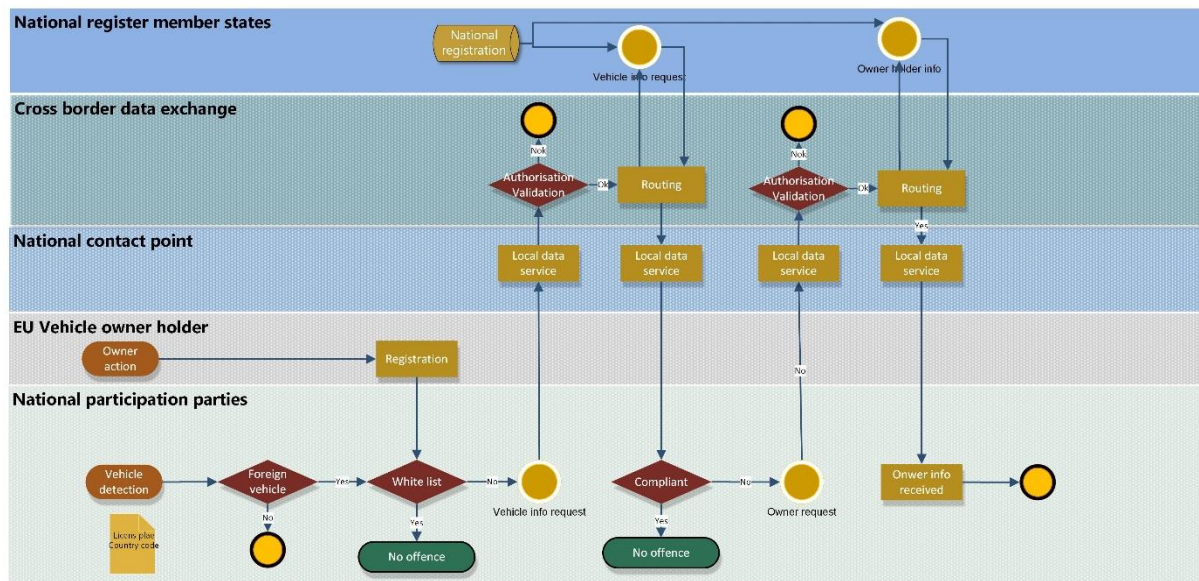
### 3.10 Interviews with solution providers

With the solution providers, EUCARIS and IN Groupe intensive talks were held to deep-dive into the possible solutions to support the enforcement of UVARs.

## EUCARIS

EUCARIS provides the service used to exchange vehicle and owner data supporting the CBE and EETS Directives and other countries' agreements under the EURCARIS treaty. From the start of the project, talks were held with EUCARIS to understand the solution for cross-border data exchange and in what way EUCARIS can support the demonstrations organised with cities and necessary stakeholders like vehicle registration agencies and the different ministries involved in cross-border data exchange and enforcement. The EUCARIS approach is that every country organises its application where public authorities within the country can connect and access is granted through the national contact point of EUCARIS. **Error! Reference source not found.** shows the general workflow for enquiries regarding UVARs/LEZ.

Figure 9: LEZ enforcement process EUCARIS implementation



For the exchange of (non-sensitive) vehicle technical data and vehicle owner-holder data EUCARIS prepared the following messages sets :

- EUCARIS XML Message Specification Non-Sensitive Vehicle Data [V2.06, 04-10-2022]
- EUCARIS-XML-Message-Specification-Vehicle-Owner-Holder-sVHOH [V9.01, 22-06-2021]

See also the description of EUCARIS in [section 4.2.1 below](#).

## IN Groupe

IN Groupe is a key player in identity and trust solutions. Its shares are owned by the French State and they are empowered by the State to take care of several technical implementations linked to EU and national obligations (for example the issuing of personalised tachograph cards in commercial road transport). IN Groupe was also responsible for the implementation of COVID pass solution in France. The COVID pass solution allows the issuance of certificates that can be controlled by foreign police forces inside the country or at border control points. The COVID pass solution is also made available to the port/airport infrastructure operators or airlines for integration into their equipment to facilitate control of passenger flow. During meetings, IN Groupe explained the application of COVID pass solution to enforce UVARs through verifiable credentials or VC (see [section 4.3.1 below](#)) using a European Trusted Repository ledger hosting UVAR-VC issuing authorities' public keys and Applicable dynamic rules. Based on this concept IN Groupe created a user story using the 'UVARwallet' integrated

solution. This is demonstrated by a disabled French driver wanting to access Brussels LEZ, see section 3.11.3 below.

## 3.11 Real-life demonstrators

The preliminary meetings and dry run phases with cities and solution providers delivered both an overview of current UVAR (foreign) vehicle enforcement practices as well as a set of feasible real-life demonstrations of how city authorities can use the EUCARIS or IN Groupe proposed solutions. These proposed demonstrations aimed at:

- “Learning by doing”, meaning continuing to capture insights and lessons while testing the solutions in different local contexts and identifying practical shortcomings and challenges.
- “Showcase and record” the use and the benefits of the solutions and how they support and add value to cross-border data exchange.
- Enrich the recommendations with practical aspects to overcome encountered challenges during hands-on experiences.

Below follows a summary description of the demonstrators and results in the respective cities of Antwerp, Rotterdam, Verona and Barcelona using EUCARIS solution, and the IN Groupe UVARWallet<sup>18</sup> in Brussels.<sup>19</sup>

### 3.11.1 Antwerp Low Emission Zone foreign vehicle enforcement cases

#### Characteristics of the Antwerp demonstration

- *Participants:* City of Antwerp, DIV, FOD, Digitaal Vlaanderen, EUCARIS
- *User stories:* Non-registered foreign vehicle entering Antwerp
- *EUCARIS solution:* Full functional implementation of the connection to the Belgian EUCARIS NCP<sup>20</sup>, DIV
- *Systems in place:*
  - City Antwerp ANPR monitoring and enforcement systems
  - ‘MAGDA’ connection between Antwerp and DIV
  - EUCARIS digital service
- *Steps taken to perform the real-life demo*
  - “Use cases” and “Enforcement process flowchart” detailed descriptions based on “Dry run demonstration” results
  - EUCARIS integration through MAGDA service in the City of Antwerp
- *Showcase and record*
  - Video recording for showcasing was not feasible during the project period.

#### Description

The bilateral political declaration of the Benelux countries enables data exchange of technical vehicle data between the countries. For the ‘Lage-emissie zone’ the Euro class of Dutch and possibly French vehicles can be checked through the EUCARIS connection towards the RDW and S=DIV. **Error! Reference source not found.** shows the setup of the new enforcement process of the city of Antwerp.

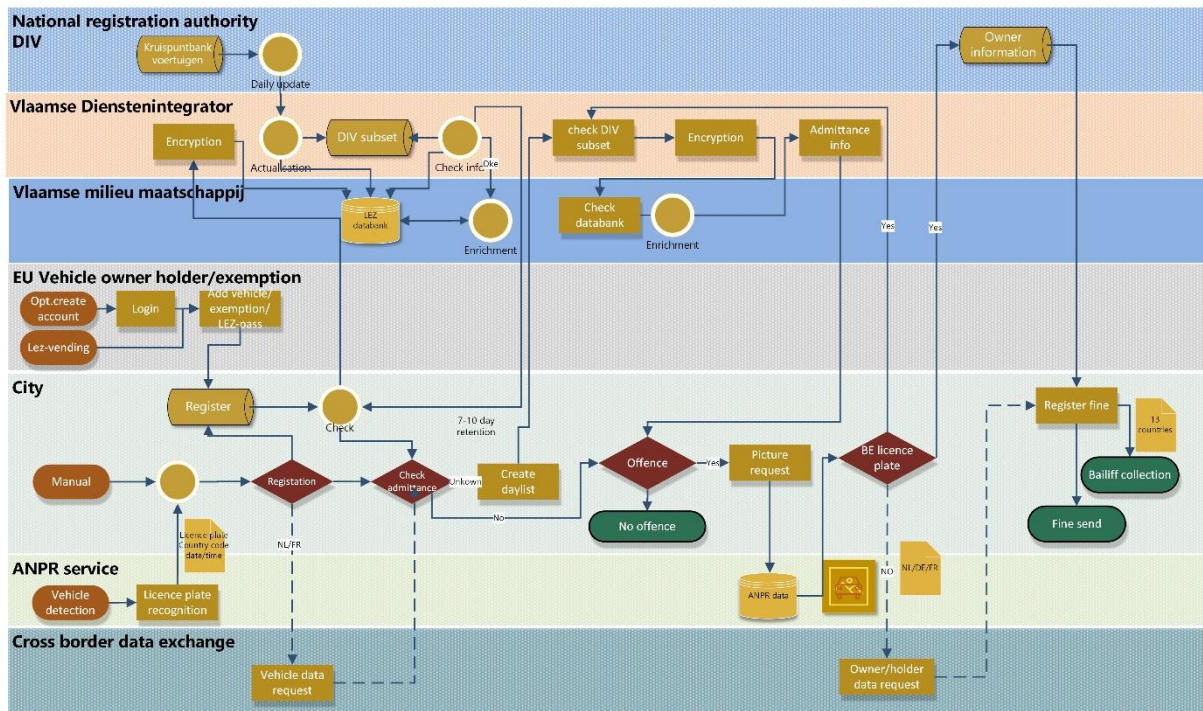
---

<sup>18</sup> Name of the concept of the driver centric model.

<sup>19</sup> Status in October 2022.

<sup>20</sup> National Contact Point of EUCARIS.

Figure 10: New LEZ enforcement process city of Antwerp



The connection from the city of Antwerp (and other cities in Flanders) to EUCARIS has been set up through the MAGDA network, a closed coupled network of the governments in Flanders. A new data API service ‘Crossborder Registrations’ is available via MAGDA (via BOSA, via FOD Mobiliteit via EUCARIS) by which vehicle technical data and owner-holder data can be retrieved for foreign vehicles (where a legal framework is in place). When operational the API service will replace the open data API from the RDW (Netherlands) and enables the exchange of French owner-holder information. From that moment pre-registration of French vehicles is no longer necessary. To do so, talks were organised with all parties involved (VMM, Antwerpen, Gent, and Digitaal Vlaanderen).

Next to this on the federal level talks are conducted to lower the tariffs for inhabitants of the LEZs that are entitled to receive a larger contribution to healthcare, such as those on low incomes (Verhoogde Tegemoetkoming, VT). In addition, people that have a parking permit (e.g. disabled) have a right to free registration of their vehicle. At the moment these processes are complex and not all citizens are aware of this. Flanders wants to simplify these processes for the citizens by using business rules when inhabitants register for financial compensation or a disabled permit.

Also, Flanders started working on remote sensing and road checks to detect LEZ violations. A study will be started with the goal of enrolling the telemetric system in 2023 and full functionality in 2024.

### 3.11.2 Rotterdam Low Emission Zone foreign vehicle enforcement cases

#### Characteristics of the Rotterdam demonstration

- *Participants:* City of Rotterdam, RDW, CJIB, EUCARIS
- *User stories:* Non-registered foreign lorry vehicle entering Maasvlakte
- *EUCARIS solution:* Full functional implementation of the connection to the Dutch EUCARIS NCP<sup>21</sup>, RDW

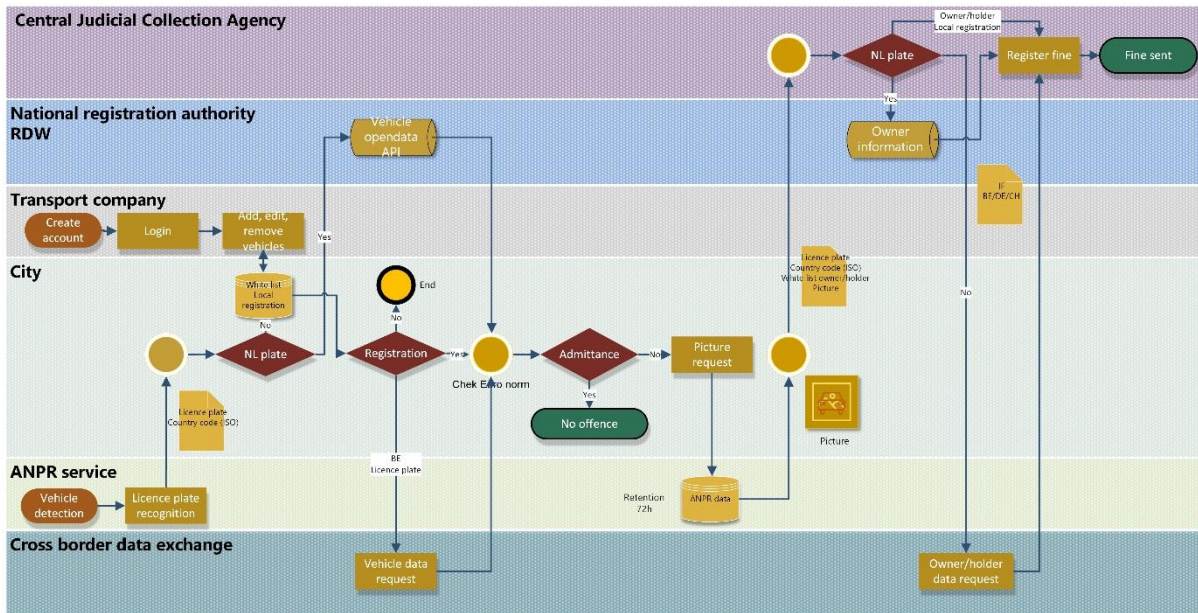
<sup>21</sup> National Contact Point of EUCARIS

- *Systems in place:*
  - City Rotterdam ANPR monitoring and enforcement systems at Maasvlakte (simulated data)
  - ‘Diginetwerk’ connection between Rotterdam and RDW
  - CJIB transaction Module
  - EUCARIS digital service
- *Steps taken to perform the real-life demo*
  - “Use cases” and “Enforcement process flowchart” detailed descriptions based on “Dry run demonstration” results
  - DIGINET integration in the City of Rotterdam Monitoring and enforcement systems
  - EUCARIS integration in the City of Rotterdam Monitoring and enforcement systems
  - Collection of simulated data from non-registered foreign vehicles (not on “white list”) in Rotterdam
  - Simulated steps by the city of Rotterdam enforcement services (manual) to input simulated data in the CJIB transaction module”
- *Showcase and record*
  - All user stories steps were video recorded for further (after the project) showcasing activities via [www.uvarbox.eu](http://www.uvarbox.eu) website

**Description**

The bilateral political declaration of the Benelux countries enables data exchange of technical vehicle data between the countries. For the ‘milieuzone Maasvlakte’ the euro class of Belgian vehicles can be checked through the EUCARIS connection towards de DIV. **Error! Reference source not found.** shows the setup of the new enforcement process of the city of Rotterdam.

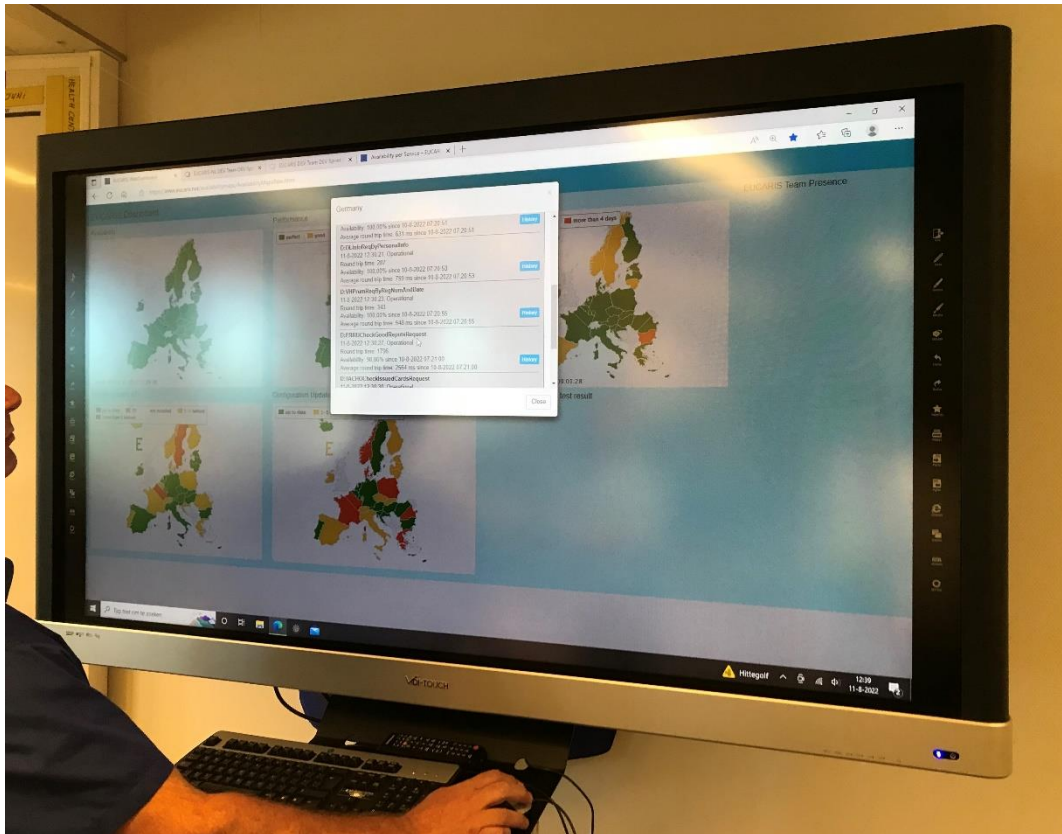
**Figure 11: New LEZ enforcement process city of Rotterdam**



The connection from the city of Rotterdam to EUCARIS has been set up through Diginetwerk, a closed coupled network of the governments in the Netherlands. The connection from EUCARIS towards the DIV has yet to be established. For the demonstration, simulated data is used to clarify the enforcement process. For the demonstration, a storyboard has been created and discussed with the participants. The final video can be found through this [link](#). **Error! Reference source not found.** shows the monitoring dashboard of all the connections of EUCARIS to the different countries.



Figure 12: The EUCARIS monitoring dashboard



### 3.11.3 Verona Limited Traffic Zone foreign vehicle enforcement cases

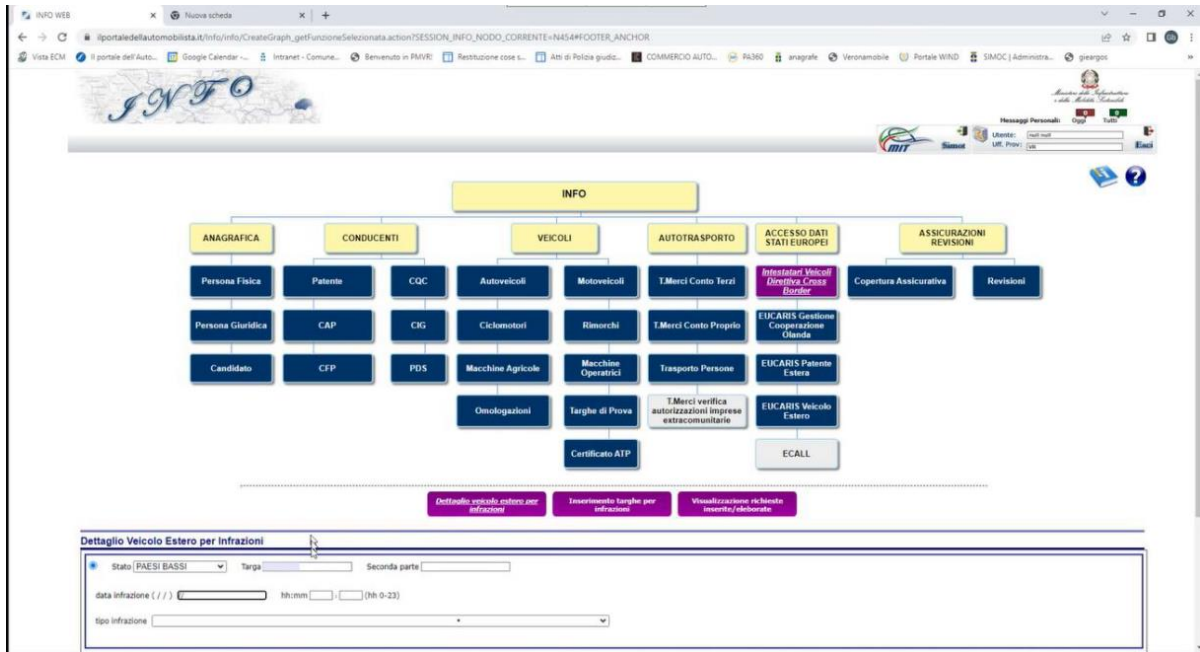
#### Characteristics of the Verona demonstration

- *Participants:* City of Verona, Verona local Police
- *User stories:* Non-registered foreign vehicle (Dutch, French and German) entering Verona
- EUCARIS solution
  - Existing and accessible to Verona police via InfoWeb: Italian Webservice supporting data exchange between the Ministry of Infrastructure and Transport and local organisations (like local police or city departments)
- *Systems in place:*
  - City of Verona ANPR monitoring and enforcement systems (simulated data)
  - InfoWeb connection between Verona and the Ministry of Infra and transportation
  - EUCARIS Italian NCP
- *Steps taken to perform the real-life demo*
  - “Use cases” and “Enforcement process flowchart” detailed descriptions based on “Dry run demonstration” results
  - Collection of simulated data from non-registered foreign vehicles (not on the “white list”) in Verona
  - Simulated steps by Verona local police enforcement services (manual) to input simulated data in InfoWeb module
- *Showcase and record*
  - Video recording for showcasing was not feasible during the project period.

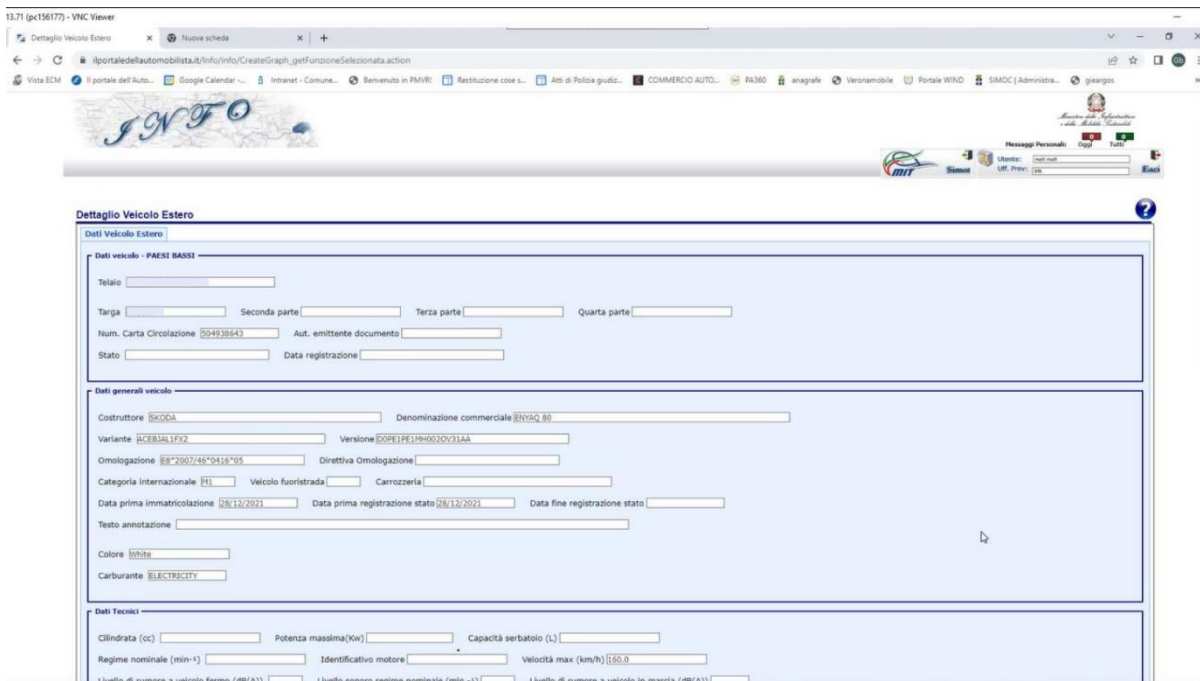
**Description**

In the historic centre of Verona a Limited Traffic Zone (Zona a Traffico Limitato) is in place. The Verona local police has access to several EUCARIS services to retrieve technical vehicle information and owner/holder data based on several treaties and bilaterals between European countries. A demonstration of retrieving vehicle information was executed (see **Error! Reference source not found.** and **Error! Reference source not found.**).

**Figure 13: Infoweb vehicle technical information request**

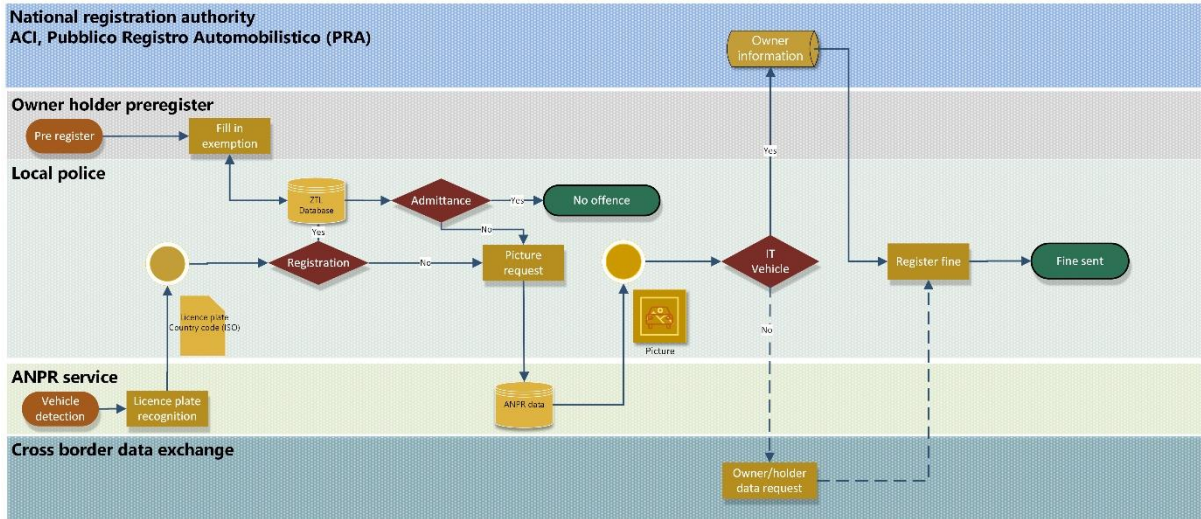


**Figure 14: Infoweb vehicle technical information result**



This demonstration shows that technically the exchange of data is already possible within different legal frameworks, but the EU-wide legislation to do so is still missing. **Error! Reference source not found.** shows the possible future enforcement procedure of Verona.

Figure 15: Future LTZ enforcement process Verona



### 3.11.4 Barcelona Low Emission Zone foreign vehicle enforcement cases

#### Characteristics of the Barcelona demonstration

- *Participants:* Area Metropolitana de Barcelona (AMB), DGT IT department, DGT EUCARIS NCP
- *User stories:* Non-registered foreign vehicle (Dutch and French) entering Barcelona
- *EUCARIS solution*
  - Existing and accessible to AMB via ATEX: Spanish Webservice supporting data exchange between DGT and local organisations (like local police or city departments)
- *Systems in place:*
  - AMB ANPR monitoring and enforcement systems (simulated data)
  - ATEX connection between AMB and DGT
  - EUCARIS Spanish NCP
- *Steps taken to perform the real-life demo*
  - “Use cases” and “Enforcement process flowchart” detailed descriptions based on “Dry run demonstration” results
  - System integration workshop between DGT and AMB to discuss and agree on the integration of EUCARIS in AMB monitoring systems
  - Collection of simulated data from non-registered foreign vehicles in Spain (not on Barcelona “white list”)
  - Simulated steps by AMB LEZ enforcement services (manual) to input simulated data in ATEX /EUCARIS Webservice
- *Showcase and record*
  - Video recording for showcasing was not feasible during the project period due to delays in the integration of EUCARIS in AMB monitoring systems.

#### Description

In meetings with AMB and DGT, a set-up of demonstrations has been discussed using the same setup of network connections that is already available between the Metropolitan Area of Barcelona and the

DGT NCP for EUCARIS to demonstrate with a test setup at EUCARIS the technical feasibility of data exchange through the EUCARIS solution. At the time of writing this report, preparations are ongoing to showcase the solution. Through the EUCARIS Web service in test environment, created for Barcelona, the functionality can be showcased. **Error! Reference source not found.** and **Error! Reference source not found.** show the interface for retrieving technical data from a French EV and technical and owner/holder data from a Dutch Euro 3 vehicle.

Figure 16: EUCARIS webservice technical test data EV

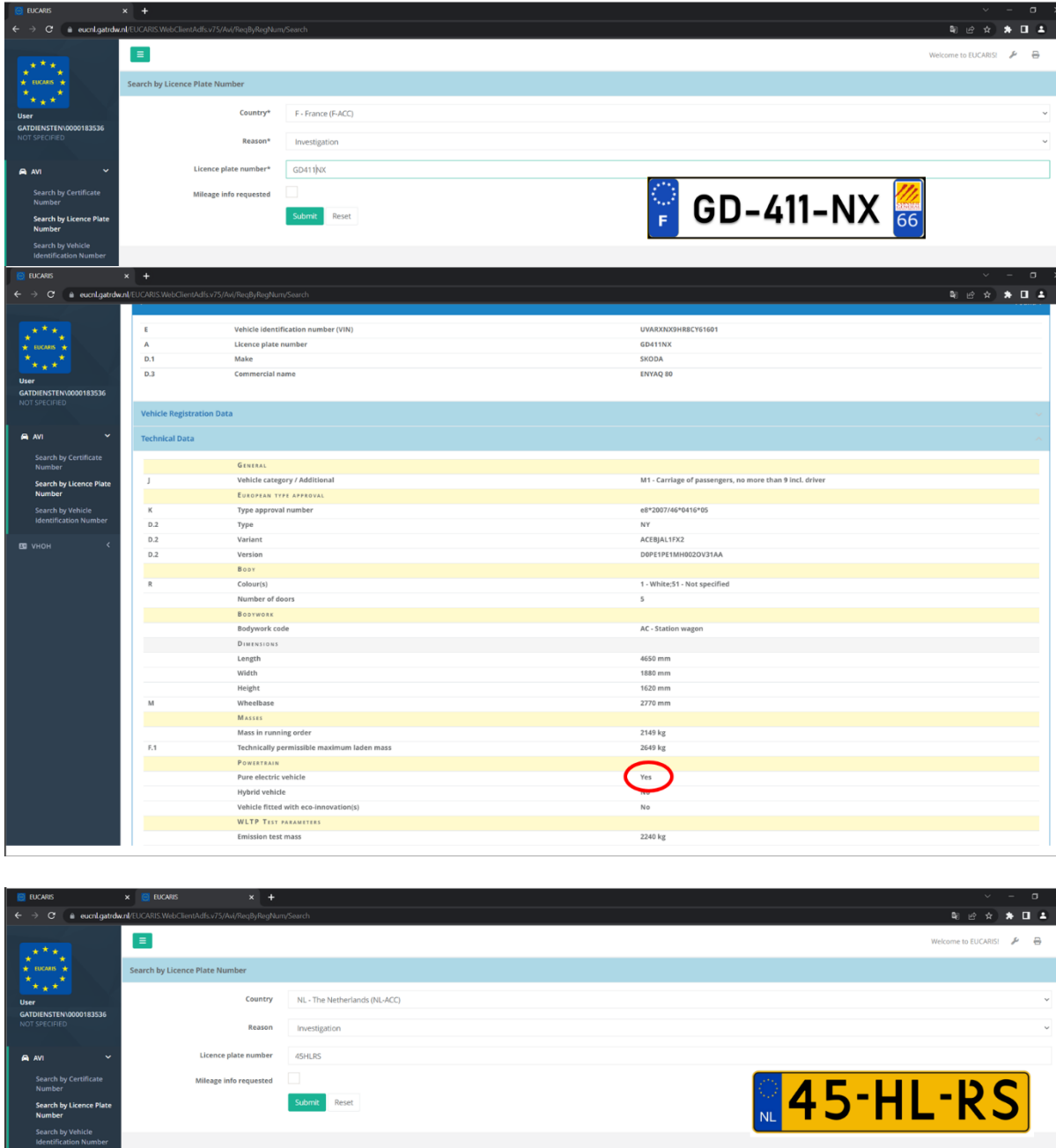


Figure 17: EUCARIS Webservice technical and holder test data Euro 3 vehicle

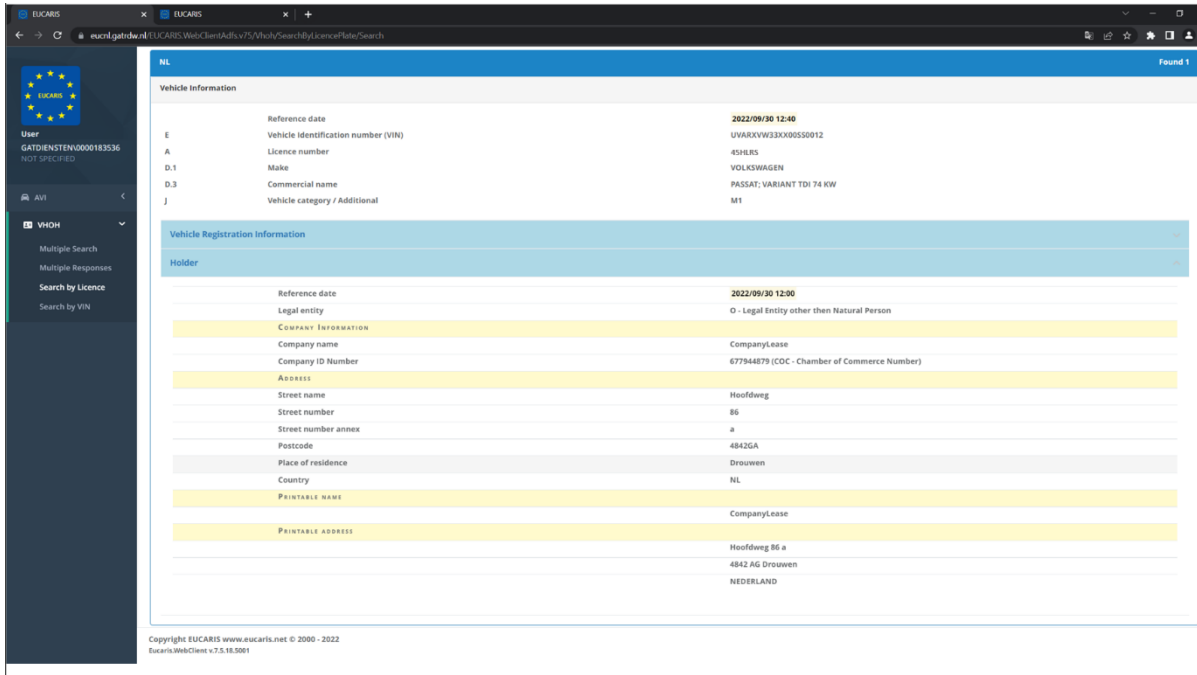
The screenshot displays the EUCARIS Webservice interface. On the left, a sidebar shows the user 'GATDIENSTEN\0000183536' and search options for AVI and VHOH. The main content area shows search results for a vehicle with VIN 'UVARXVW33XX0650012'. The 'Vehicle Registration Data' section includes fields for first and start registration dates (2003/01/02), registration certificate details, and roadworthiness test dates. The 'Technical Data' section lists fuel type (Diesel), maximum net power (74.00 kW), and sound level (72 dB(A)). The 'Emission Data' section shows the Euro exhaust emission level as 'EURO3', which is circled in red. The 'CO2 Emission' field is also visible.

Field	Value	
E	Vehicle identification number (VIN)	UVARXVW33XX0650012
A	Licence plate number	452CAR11
D.1	Make	VOLKSWAGEN
D.3	Commercial name	PASSAT; VARIANT TDI 74 KW
<b>Vehicle Registration Data</b>		
B	First registration date (world)	2003/01/02
I	Start registration date (Member State)	2003/01/02
<b>REGISTRATION CERTIFICATE</b>		
	Id number	UV2002235144
	Issuing authority	RDW
<b>ROADWORTHINESS</b>		
	Test date	2022/03/18
	Expiry date	2023/04/13
<b>Technical Data</b>		
<b>Fuel(s)</b>		
P.3	Fuel	20 - Diesel
P.2	Maximum net power	74.00 kW
<b>SOUND LEVEL (EXTERIOR)</b>		
U.1	Stationary	77 dB(A)
U.2	Stationary, engine speed	3000 min <sup>-1</sup>
U.3	Drive-by	72 dB(A)
<b>EMISSION DATA</b>		
V.9	Euro exhaust emission level	EURO3
	Number of base regulatory act incl. last amendment applicable (exhaust emissions) for motor vehicles	76/225/2001/1A
<b>CO2 EMISSION</b>		

The screenshot shows the 'VHOH - Search by Licence' form in the EUCARIS Webservice. The form contains the following search criteria:

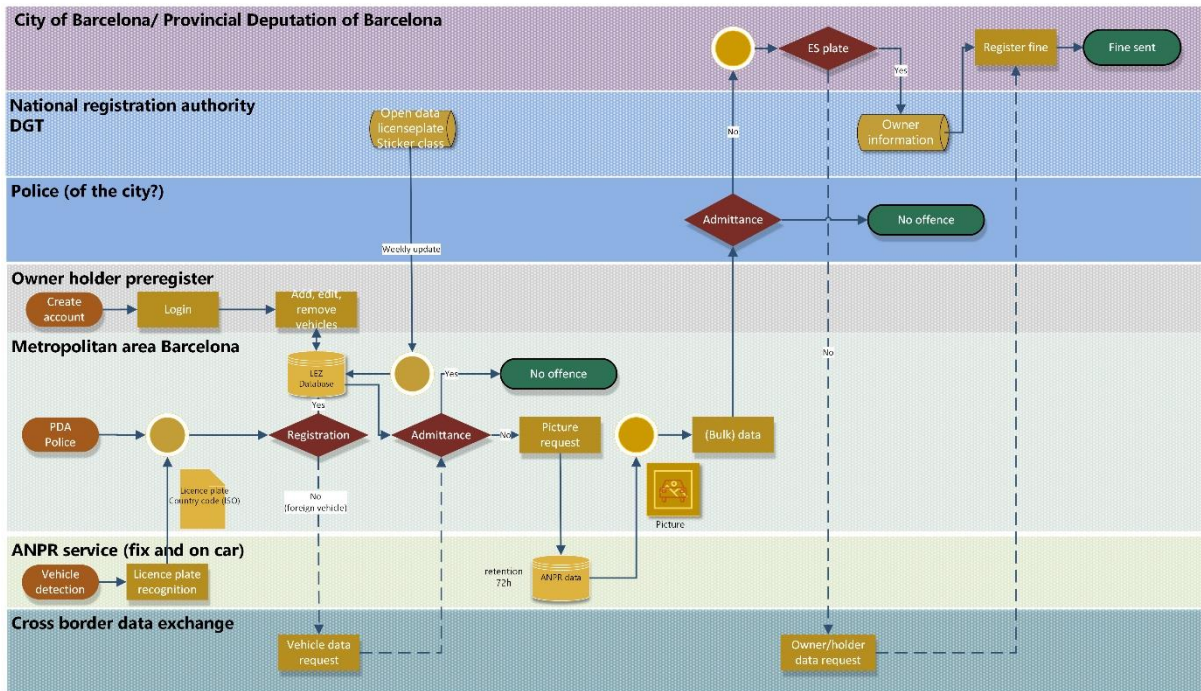
- Country\*: NL - The Netherlands (NL-ACC)
- Licence number\*: 45HLRS
- Reference date\*: 2022/11/11
- Reference time\*: 11:11
- Inquiry reference\*: AMB
- Case type code: 3 - Administrative Offence
- Case code: 32 - Environment zone offence
- Case handling organisation type code: 2 - Public sector
- Case handling organisation name: AMB Barcelona

The form includes 'Submit' and 'Reset' buttons at the bottom.



When legally possible the enforcement of cross-border data will probably look like the scheme in Error! Reference source not found..

Figure 18: Future LEZ enforcement process Barcelona region



### 3.11.5 Owner/holder centric demonstration (Brussels)

#### Characteristics of the Owner/holder centric demonstration

- Participants: IN Groupe
- User stories: French driver (French) registering to enable entering Brussels
- Owner/Holder centric solution
- Systems in place:

## ***UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context***

- IN Groupe demo environment
- UVAR Box data schemes
- Demo walk-through prepared by IN Groupe
- *Steps taken to perform the real-life demo*
  - “Use cases” and “Enforcement process flowchart” detailed descriptions based on “Dry run demonstration” results
  - UVAR wallet “storyboards” and mock-up development by IN Groupe supported by UVAR exchange
  - Simulated steps for UVARWallet LEZ enforcement services (manual) to input simulated data in the Webservice
- *Showcase and record*
  - Video recording of UVARWallet “solution walkthrough” and “user stories”

### **Description**

IN Groupe demonstrated the concept of an integrated solution for UVARs where the vehicle owner/holder registers the car and any exemptions relevant in the UVARWallet enabling access to all European cities at once when compliant with the local UVAR rules. **Error! Reference source not found.** shows in short, the sequence of the solution. The recorded showcase can be found at this [link](#).

Figure 19: Driver-centric solution, Carla enabling admittance for UVARs thru registration of exemption

**ZONE**

Brussels is a Low Emission Zone

Carla knows that and to **avoid any risk of fine**, she should

- **register her car** in the UVAR system
- obtain an **exemption for her disability**

the solution is

**UVARWallet**  
with Carla's SSI wallet

Preview : Uvar 00:00

**UVARMobile** Register Exemption FAQ Contact Carla

Home / LEZ Map

Brussels

Your vehicle is not allowed to circulate in this city

**Reminder**  
Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute inure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur.  
[Learn more](#)

**Right to ride**

**Brussels**  
Not allowed

Retrieve and control all your data with the Uvar Mobile application

Mobile number  **GO**

or

[GET IT ON THE APP STORE](#) [GET IT ON GOOGLE PLAY](#)











### 3.12 Lessons learned & Recommendations

Based on the findings from the meetings, dry runs and demonstrations the lessons learned are brought together and rated against the requirements reported in ‘Task 2.1 and 2.2 Challenges and opportunities related to cross-border data sharing for enforcing UVARs’ Appendix A. Appendix A of this report contains the rating for all requirements where applicable. The General (G) and organisational (O) requirements which are applicable to both cities and solution models are presented in

Table 1. The ratings are based on the perception and experience of the Uvar Exchange team.

Table 1: Rating categorisation

	Unknown
	Yes
	Yes in progress/ near future or possible but not legally
	Needs clarification/could be but not yet the case
	No
	Not applicable

Class

M	Mandatory
I	Ideally

Table 1: Rating of requirements

#	Requirement	Class	Cities						Solutions		
			Aachen	Antwerp	Barcelona	Brussels	Rotterdam	Verona	Authority	Owner	Vehicle
G01	The system as a whole supports cross-border exchange of vehicle and owner data	M									
G02	Should be sustainable and minimise the burden for EU citizens of extra costs and being able to enter UVARs	I									
G03	Should be cost efficient	I									
G04	Needs to work for ANPR and manual schemes	M									 a)
G05	Should accommodate different enforcement entities	M									
G06	Should work for all types of UVARs	I									 b)
O01	Vehicle owners should ideally not have to preregister to be able to enter a UVAR legally	I								 c)	
O02	Should be able to be implemented EU wide	I									
O03	The cross-border exchange process should be simplified	I									
O04	Solution provider should be able to have a direct link to governing authority	I								 d)	
O06	If registration of the vehicle is necessary for the vehicle owner/holder, the solution should incorporate mechanisms that make the process easy	I									
O07	Vehicle information should be aligned in EU	I									
O08	Should accommodate (vehicle-type - based) exemptions	I							 e)		

- a) For a C-ITS or tachograph solution ANPR systems are not needed for the solution itself but any enforcement system (manual or ANPR) should still be in place. Using a specific identifier for zero-emission vehicles in the numberplate (specific colouring/badge etc.) would enable ANPR-systems to detect this group of vehicles.
- b) Older vehicles (without) retrofit C-ITS or added tachograph systems are not able to communicate which means that some enforcement system should still be in place.

- c) In the owner/holder-centric approach described in paragraph 3.11.3 the compliance check through EUCARIS is part of the chain, so vehicle technical compliance can be done ideally without pre-registration. Only for exemptions and then only once for the EU.
- d) Requirement O04 refers to the access to technical and owner-holder data through the National Contact Point as ideally is the case with the owner/holder-centric approach. But different approaches could be possible. The owner based solution operator should validate the data with an authentic source (e.g., the vehicle registration authority).
- e) In the authority-centric model, a number of vehicle type base exemptions like type, vehicle age or specific type registrations (e.g. an altered vehicle with special road clearance like a ladder truck of the fire brigade) are covered. Person base exemptions are not covered at the moment (needs coupling of different sets of national registrations)

Interpreting the lessons learned and the overview of Table 1 the following can be said:

- i. If a legal basis for data exchange is established,<sup>22</sup> then technical and organisational implementation of UVAR enforcement can be set-up within short term (i.e., up to 1 year) using the EUCARIS system which relies on authority-to-authority data sharing. This is because technical components for EUCARIS are already in place and it is already being used by Member States for exchanging vehicle and vehicle owner/holder data to enforce other regulations.

Of course, such implementation would only help sharing technical vehicle data and vehicle owner/holder data and would not include sharing data on conditions that may exempt a vehicle/driver from compliance with a given UVAR. Getting data on exemptions (e.g., disability permits) will have to be organized by each city or Member State separately. If cities digitalize UVAR rules using UVARBox specifications, then vehicle owners can be better informed about UVARs and applicable exemptions for different cities.

It must be noted that the suggested timeline assumes that all Member States will allow city authorities responsible for enforcing UVARs to connect to their EUCARIS National Contact Points. This is not always easy, as administrative procedures and complexities at the national level can result in delays. However, in some Member States (e.g., Italy, Spain and the Netherlands), city authorities responsible for enforcing different traffic rules have been found to be already connected to their EUCARIS national focal points. Some countries have procedures for ensuring appropriate access by cities, and where needed, these can be shared and processes in new countries could be set up in parallel to the EUCARIS changes.

- ii. *A verifiable credential-based* solution (demonstrated by IN Groupe above), which uses driver-to-authority data sharing, can be technically set-up at the EU level within mid-term (i.e., up to 2 to 3 years). The technology has already been successfully applied for other use-cases (e.g., Covid certificates) and it can be used for sharing relevant data for UVAR enforcement, including information on any applicable exemptions. The use of such a solution for UVARs will depend on the will of the EU to set up a system linked to the Once-Only Technical System (OOTS) under single digital gateway regulation, by leveraging initiatives such as the EU digital wallet and European Blockchain Services Infrastructure.

Of course, such a solution would cover only those vehicles where a verifiable credential has been created based on the consent provided by vehicle owners and drivers. Where such consent does not exist authority-to-authority data sharing would have to be relied upon for UVAR enforcement.

- iii. For the vehicle centric solutions (which rely on connected vehicles or devices fitted in the vehicles to share data with enforcement authorities), the timeline can also be mid-term (i.e.,

---

<sup>22</sup> See section 5 below

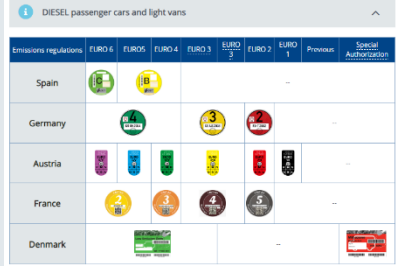
up to 2 to 3 years), as the implementation of communication vehicle specification through the short-range communication/C-ITS solution is more likely to happen in the medium term.

- iv. An EU-wide introduction of a standardised way of 'coding' special number plates for zero-emission vehicles is technically also feasible. However, given that the issuance of number plates is legally within the domain of each Member State, it may take a long time to establish a common EU-wide understanding on the recognition and acceptance of these number plates in a cross-border context. For this, changes to the Vienna Convention on Road Traffic, 1968 may be necessary along with an EU regulation harmonizing the symbols used on number plates across EU.

The table 2 below shows the lessons learned from the dry runs, demonstrations and discussions held with city authorities and other stakeholders. It provides an overview of some of the challenges in enforcing UVARs due to different practices adopted by cities and provides an overview of observations and recommendations that can help address these challenges. The observations and comments in this table should be read together with the recommendations and actions provided in chapter 6 of this report.

Table 2: Cross border data exchange lessons learned and recommendations

#	Topic	Comments/Observations/Recommendations
A	<p><b>License plate recognition</b> Recognizing foreign number plates can be challenging as similarities between license plate types of some countries can result in multiple matches.</p> <p>The practices of using Automatic Number Plate Recognition (ANPR)-system is common but not used by all Member States, e.g. in the city of Aachen, compliance check is done only manually. This is a common approach within Germany. Other engaged cities use ANPR systems sometimes combined with manual checks.</p>	<p>When setting up ANPR-systems, it is important to ensure that such systems also recognize foreign license plates.</p> <p>Many countries are starting to use special number plates for zero-emission vehicles (ZEVs) (10 Member States and 3 neighbouring countries so far, plus 3 Member States with ZEV Stickers). Remark is that in some Member States PHEVs are combined with ZEVs (numberplate or sticker).</p> <p>However, ensuring the use of this approach in a cross-border context for ANPR to detect zero-emission vehicles would require the development of standards at an international level. For this the Vienna Convention on Road Traffic, 1968 may have to be amended.</p>
B	<p><b>Accommodate different enforcement entities</b> After discussions with the cities and capturing the enforcement procedures used by them, it appears that different entities are involved in different steps of the enforcement process. Each of these entities has a different information need, depending on its role in the enforcement process.</p> <p>Also, for different types of offences, different entities are in charge in Member States. For example, the entities that enforce safety-related traffic offences under the CBE Directive are not the same as those responsible for enforcing UVARs.</p>	<p>The entities in charge of enforcing UVARs can learn from the practices and experience of entities in charge of safety-related traffic offences. This information sharing at the national level can help cities move forward with the enforcement of UVARs concerning foreign vehicles.</p>
C	<p><b>Lack of harmonization and quality of national data:</b> Different countries adopt different national low emission zones classifications for vehicles, based on the common Euro standards. Using domestic low emission zones classifications for foreign vehicles can be difficult due to the lack of harmonization.</p> <p>The practices to update data in vehicle registers differ across the EU. This impacts the quality of data needed for enforcing UVARs.</p>	<p>Equivalence tables could be developed to help enforcers understand how a foreign country's low emission classification matches with local low emission classifications. E.g., Spain has developed a table to reflect this:</p>

#	Topic	Comments/Observations/Recommendations
	<p>The quality of data (needed for UVAR enforcement) can also be impacted by differences in national practices on whether the license plate number is linked to a vehicle or its owner/holder.</p>	 <p>The quality of data in vehicle registers of Member States should be improved, the data should be harmonized and digitized by leveraging the EU initiative to revise Directive 1999/37/EC.</p> <p>For this purpose, the recommendations and findings of the EReg topic group XXI should also be taken into account (see Appendix B).</p>
<p><b>D</b></p>	<p><b>Pre-registration by vehicle owners should be minimized.</b></p> <p>When non-sensitive vehicle data can be obtained, pre-registration is not necessary. For example, The Netherlands considers vehicle data to be open data and cities like Antwerp in Belgium can obtain these data for Dutch vehicles. Under such as system only those vehicles which need an exemption (such as delivery service, disabled etc.) need to register.</p> <p>The current practice is that every city has its registration system, and some of them require all foreign vehicles to register to have access to their data, using different portals and services specific to each city.</p>	<p>Registration requirements should be minimized, by reinforcing authority-to-authority data sharing solutions such as EUCARIS.</p> <p>The authority-to-authority data-sharing solution should be complemented by solutions that follow the once-only principle of the single digital gateway regulation. See the solution description of the UVARWallet approach. This also incorporates the requirement of the possibility to register once only.</p>
<p><b>E</b></p>	<p><b>Managing “white/black lists”</b></p> <p>Some cities require that foreign vehicles are pre-registered to have access to relevant data. The data so collected is used to create lists.</p> <p>“White lists” can include vehicles that are compliant with local regulations and sometimes also vehicles that may have committed the traffic offence only once.</p>	<p>It would be important to provide guidance to cities on how such lists can be managed and provide inputs on the GDPR obligations for data retention and use.</p>

**UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context**

#	Topic	Comments/Observations/Recommendations
	<p>“Black lists” include vehicles that are either not registered or are not compliant with local regulations. The black lists may also indicate if a vehicle has infringed traffic regulations multiple times.</p> <p>Explanation:  <i>Under the current systems, the lists are a useful mechanism allowing cities to keep track of foreign vehicles, and also allowing them the opportunity to register after arrival in a city or to make payments later. However, it is not clear how long the data can be retained by the cities and what their GDPR obligations are in this respect.</i></p>	
<b>F</b>	<p><b>Connection of cities with EUCARIS service</b>                      EUCARIS manages and supports the “connections”/ interface with National Contact Points (NCP). It is up to each NCP to establish connections with the city’s (or UVAR enforcement-related) authorities.</p> <p>In some countries/cities (e.g., Barcelona and Verona), these connections already exist for supporting cross-border data exchange related to traffic safety violations indicated in the CBE Directive e.g., with local police or fiscal departments. But connections with authorities responsible for UVAR enforcement are lacking.</p> <p>In some countries (e.g., Spain and Italy) the technical interface between cities and NCP is already implemented centrally through national or regional level government entities, that use a web/software application for data exchanges.</p>	<p>The example of cities and countries that already connect to EUCARIS for the enforcement of different regulations against foreign vehicles, should be shared with other cities across the EU to raise awareness and facilitate such linkages in other countries as well.</p> <p>The technical readiness to incorporate the authority-centric model is illustrated with the rating of the requirements against the technical readiness of the engaged stakeholders, which makes implementation possible within the time stretch of one year.</p>
<b>G</b>	<p><b>Data Protection</b>                      Member States differ in how they categorize data as sensitive and non-sensitive. In some countries, such as the Netherlands, vehicle data is considered open data, but in other countries, it is considered sensitive and there is a reluctance to share this data. This creates a direct problem for the cross-border exchange of vehicle technical data.</p>	<p>While establishing a legal basis for exchanging data to enforce UVARs, the data elements that Member States can share should be specifically outlined. This will lead to a harmonized understanding among Member States. Vehicle data is already shared by Member States with each other and with the EU for different regulatory obligations (e.g., roadworthiness tests, climate action etc.). Such regulations can provide insight as to what data should be considered non-sensitive by all Member States. EUCARIS has also identified certain vehicle data sets as non-sensitive, which could be useful.</p>

*UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context*

#	Topic	Comments/Observations/Recommendations
<b>H</b>	<b>Vehicle technical compliance check</b> In some countries, checks for UVARs are carried out by city authorities themselves while in other countries such checks are carried out by authorities set up at a regional or national level.	A cross-border data-sharing solution for UVAR enforcement must be able to adapt to different technical setups.



## 4. Steps required to enable solutions/services under different data-sharing model

### 4.1 Introduction

The previous report<sup>23</sup> provided an overview of different *data-sharing models*. It discussed 3 models:

- **Authority Centric model (A to A)** where data can be shared between vehicle registration authorities of different Member States and then passed to city enforcement authorities.
- **Driver Centric model (D to A)** where data can be shared by the driver/owner of a vehicle with enforcers (using a trusted digital credential), to show compliance with and facilitate enforcement of regulations. And,
- **Vehicle Centric model (V to A)** where the vehicle (or devices fitted in it) can share information with sensors and control devices deployed by enforcers on the road.

The report also illustrates **how** these *data-sharing models* could practically be used for the enforcement of UVARs. For this, existing and potential *solutions/services* under each model were described. In this context, technical and legal challenges related to data sharing for enforcement of UVARs were also discussed.

Building upon the previous report, the present section indicates steps that can help overcome data-sharing challenges and realize various *solutions/services* for data sharing to enforce UVARs in a cross-border context.

*Solution/services* under each of the 3 data-sharing models mentioned above have been discussed:

- For **Authority Centric model** – steps to use *EUCARIS* and *Internal Market Information (IMI)* have been discussed.
- For **Driver Centric model** – steps to use a *Verifiable Credential*-based solution have been discussed.
- For **Vehicle Centric model** – steps to use an *Extended Vehicle (ExVe)*-based solution and *Tachograph/DSRC*-based solution have been discussed.

The following points must be noted about the descriptions contained in this section:

- In the previous report, it was suggested that Internal Market Information System (IMI) could potentially be used as a solution/service under both the Authority Centric model as well as Driver Centric model. However, upon a deeper understanding of the Driver Centric model, it has been realized that IMI would be a more suitable solution/service under the Authority Centric model.
- A tachograph/DSRC-based solution is being introduced in this report under the Vehicle Centric model based on the recent discussions held between CORTE and some tachograph manufacturers with respect to the evolution of the smart tachograph across the EU.

---

<sup>23</sup> UVAR Exchange Task 2.1 and 2.2 Report on Challenges and opportunities related to cross-border data sharing for enforcing UVARs

## 4.2 Authority-Centric (A to A) Data Sharing Model

Under this model, UVAR enforcement authorities would seek relevant data from foreign vehicle registration authorities where vehicles are registered. This would require:

- use of an intermediary solution/service that would help connect different authorities for exchanging data.

Within the scope of this study, two solutions/services have been considered that can potentially act as an intermediary to facilitate cross-border UVAR enforcement at the EU level, by applying the Authority Centric model:

- *European car and driving licence information system (EUCARIS) and*
- *Internal Market Information system (IMI) developed by DG GROW of the European Commission.*

Steps that can help realize these solutions/services are described below.

### 4.2.1 EUCARIS

#### *EUCARIS in brief*

EUCARIS is a secure, European-wide, information exchange system that provides countries with an infrastructure and software environment to exchange vehicle, driving licence and owner-holder information from the national registries. EUCARIS is developed by governmental authorities to support transport-related information exchange, based on treaties, directives as well as multi-lateral agreements. EUCARIS was founded in the early nineties in cooperation with several national traffic registries to support the fight against cross-border vehicle theft and curb driver’s license tourism. From the nineties EUCARIS’ fields of application have been extended. It supports different legislations and agreements, and at present it is a general exchange mechanism for all mobility and transport-related data between all registration authorities of Europe (see Table below).

**Table 3: EUCARIS user groups**

User Group	Legal base
01 Vehicle and Driving Licence (VDL) exchange User Group	EUCARIS Treaty and Directive 1999/37/EU
02 Prüm User Group	Prüm Treaty / EU Council Decision 2008/615/JHA and 2008/616/JHA
03 Vehicle Owner/Holder exchange User Group	Bi- and multilateral agreements on the collection of traffic fines, tolls etc.
04 Mileage exchange User Group	EUCARIS Treaty, Directive 1999/37/EU and bilateral agreements on the exchange of mileage data
05 ERRU User Group	Regulation (EC) No 1071/2009, 1072/2009, 1073/2009
06 TACHO User Group	Council Regulation (EEC) No 3821/85
07 RESPER User Group	3 <sup>rd</sup> Driving Licence Directive
08 eCall User Group	Delegated Regulation (EU) No 305/2013
09 CoC exchange User Group	Directive 2007/46/EC, Regulation 2018/858
10 CBE User Group	Directive (EU) 2015/413
11 Salzburg Forum User Group	Salzburg Agreement
12 Tax User Group	Directive 2010/24 EU and 2011/16/EU, Council Regulation (EU) No 904/2010
13 Tolls User Group	EETS Directive (EU) 2019/520
14 RSI User Group	Directive 2014/47/EU
15 PCC SEE User Group	PCC SEE Convention

The EUCARIS system connects national vehicle registers using a decentralized approach. Each country is responsible for its data and procedures. Authorized national bodies like the police and governmental organisations can query national registers of another country through the EUCARIS national contact points in each country, provided there is a legal basis for the query. EUCARIS provides data exchange service, through its national contact points which can be, for instance, the Ministry of interior or the Ministry of Transport of a country.

#### *Steps required to use EUCARIS for cross-border UVAR enforcement*

To enable the use of EUCARIS as an intermediary between vehicle registration authorities and UVAR enforcement authority of a city, the following steps would have to be taken:

### **Step 0 – Legal basis**

#### ***Legal basis for data sharing***

- A multilateral agreement between Belgium, The Netherlands and Luxemburg already exists, which allows the exchange of vehicle information and owner-holder data, including for UVAR enforcement via EUCARIS. Several countries (e.g., Germany with The Netherlands, France with Belgium) have also signed bilateral agreements that allow them to share owner-holder information via EUCARIS, when an offence has been established.
- However, a legal basis would be required at the EU level to use EUCARIS for UVAR enforcement. The legal basis would have to indicate that both technical vehicle data and personal (vehicle owner-holder) data could be exchanged between the EU Member States *to enforce UVARs*.
- To establish such a legal basis several options can be explored. Prominent among these are Directive (EU) 2015/413 (CBE Directive) and Directive (EU) 2019/520 (EETS Directive), which make a direct reference to the use EUCARIS for data exchange. [Chapter 5 below](#) provides a detailed description of how these regulations could be relevant for UVAR enforcement and includes recommendations on changes required in their text.

#### ***Legal basis for technical architecture of EUCARIS***

The EUCARIS treaty provides the legal basis for the establishment and functioning of EUCARIS.

#### **Ongoing initiatives that would benefit the use of EUCARIS for UVAR enforcement**

Enforcement of UVARs (through EUCARIS) would also benefit from [ongoing EU initiatives to revise roadworthiness package](#), which aims to update [Directive 1999/37/EC](#) to:

- harmonize the technical vehicle data available with vehicle registration authorities,
- digitize vehicle registration certificates and mandate their electronic storage in national databases, and
- electronically link different vehicle registration authorities and national databases of EU Member States.

### **Step 1 – Requirements**

#### ***EUCARIS National Contact Point enabled for data sharing***

- Presence of EUCARIS National Contact Points (NCP's) - All EU Member States have already designated NCPs. In many countries, vehicle registration authorities or relevant departments in transport ministries are the designated focal points.
- Legal basis for vehicle and owner data exchange for UVAR enforcement must be established – This is required for countries where a bilateral or multi-lateral agreement is missing.

<p><b>EUCARIS technical requirements</b></p> <ul style="list-style-type: none"> <li>• EUCARIS software needs to be installed at NCP to manage connections with national registers and other competent authorities.</li> <li>• NCP’s need to implement “Local Data Service” to provide access to their data</li> <li>• For the exchange of (non-sensitive) vehicle technical data and vehicle, owner-holder data the following messages sets are available and implemented at NCP Local Data Service</li> <li>• EUCARIS XML Message Specification Non-Sensitive Vehicle Data [V2.06, 04-10-2022]</li> <li>• EUCARIS-XML-Message-Specification-Vehicle-Owner-Holder-sVHOH [V9.01, 22-06-2021]</li> </ul>
<p><b>Step 2 – Software</b></p> <ul style="list-style-type: none"> <li>• A EUCARIS web client is available for both message sets and a cross border data exchanges (already being implemented in the Netherlands and Belgium)</li> <li>• NCP can also implement its Custom client to retrieve data from EUCARIS (other Member States)</li> <li>• NCP and local city or regional authorities can implement own web service to facilitate requests from cities to NCP</li> </ul>
<p><b>Step 3 – Translation support</b></p> <p>Translation is supported through country-specific implementation</p>
<p><b>Step 4 – Training Users</b></p> <p>In the past decade's implementation of EUCARIS services is done in 31 countries for violation and safety-related inquiries. Now different stakeholders within city governments are involved regarding UVARs which demands some training and explaining the common practice of the use of the EUCARIS system.</p>
<p><b>Step 5 – Release</b></p> <p>Implementation is done country wise.</p>
<p><b>Step 6 – Post Release support</b></p> <p>EUCARIS support team is available.</p>

**4.2.2 Internal Market Information System (IMI)**

*IMI in brief:*

IMI is a generic online application for administrative cooperation between EU/EEA public authorities. Currently IMI is being used for 19 policy areas within the EU by more than 12.000 authorities. It facilitates exchange of information, including personal data between involved actors. Under IMI information can be exchanged in the following manners:

- REQUEST (One to One Exchange) – Authorities in a Member State can send a request to another registered authority of another Member State
- NOTIFICATION (One to many exchange) – A registered authority can send out notifications or alerts to authorities of other or all Member States
- PUBLIC INTERFACE (Portal for external actors) – As a customized option, portals (front office) are made available to external actors for specific policy areas which are integrated with IMI (back office)
- REPOSITORIES (Information database) – Repository to maintain and access records specific to certain policy areas.

*Steps required to use IMI for cross-border UVAR enforcement*

To use IMI for cross border cooperation to enforce UVARs, steps described below would have to be taken.

It must be noted that only Steps 1 to 6 have been discussed with DG GROW (IMI team). The information on the legal basis provided in step 0 has not been discussed with DG GROW (IMI team). The information contained in step 0 are recommendations solely from the authors of the report, based on desk research.

## Step 0 – Legal basis

### **Legal basis for exchanging information to comply with administrative cooperation obligation**

- A legal basis would be required at the EU level to use IMI for UVAR enforcement. The legal basis would have to indicate that both technical vehicle data and personal (vehicle owner-holder) data could be exchanged between EU Member States *for the purposes of enforcing UVARs*.
- To establish such a legal basis several options can be explored. Prominent among these is Regulation (EU) 2018/1724 (single digital gateway regulation). It already makes a direct reference to using IMI for the purposes of exchanging evidence among Member State authorities for the purposes of issuing emission stickers ([see Article 15 of the Regulation and its Annex II](#)).

### **Legal Basis for functioning of IMI**

- [Regulation \(EU\) No 1024/2012](#) (IMI Regulation) provides the basis for the functioning of IMI.
- Annex to IMI Regulation would also have to be amended to reflect UVARs as a use case that relies on IMI application for data exchange. Alternatively, a pilot project could be initiated by adopting an implementing act to serve as a basis for expanding the use of IMI. DG GROW (IMI team) will agree with the client DG on the best option.

### **Ongoing initiatives that would help administrative cooperation through IMI for UVAR Enforcement**

Administrative cooperation on UVARs (through IMI) would also benefit from [ongoing EU initiative to revise roadworthiness package](#), which aims to update [Directive 1999/37/EC](#) to:

- harmonize the technical vehicle data available with vehicle registration authorities,
- digitize vehicle registration certificates and mandate their electronic storage in national databases, and
- electronically link different vehicle registration authorities and national databases of EU Member States.

## Step 1 – Definition of Requirements and decision on feasibility

DG MOVE (client DG) in collaboration with DG GROW (IMI team) would have to define policy rules and business requirements. This would entail describing, among other things, the information to be exchanged on IMI for UVAR enforcement (see Appendix A), the workflow, and defining the potential users (such as city enforcement authorities and vehicle registration authorities) of the new module who will need to be registered in the system.

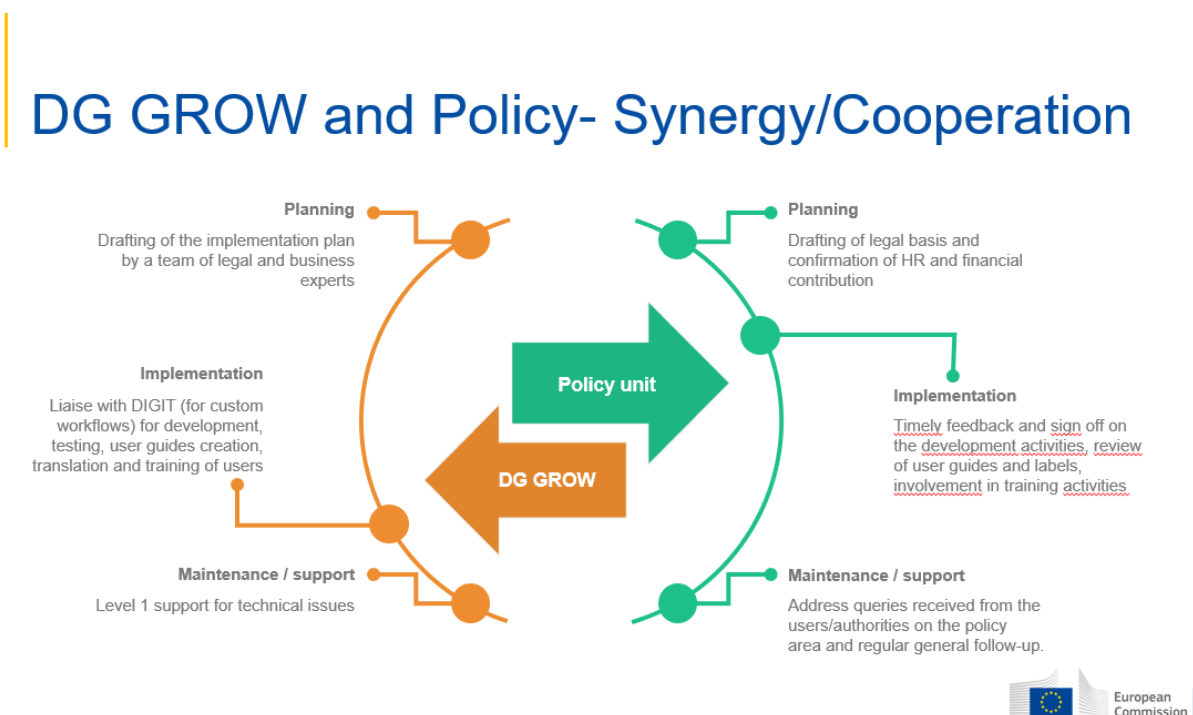
Based on the information provided by the client DG, DG GROW will make a decision if it is feasible to use IMI for the defined use-case.

## Step 2 – Development of customized workflow in IMI

IMI is a re-usable system. Depending on technical analysis and on basis of pre-assessment by DG GROW, DIGIT may have to develop a customised workflow in IMI.
<b>Step 3 – Translation support</b>
DG Translation would have to provide support for the translation of labels and user guides, to comply with the multilingual feature of IMI.
<b>Step 4 – Training Users</b>
Introduction of the new service module to train and inform users.
<b>Step 5 – Release</b>
Release of the new module in the IMI system.
<b>Step 6 – Post Release support</b>
Once released the first line of support will be given by the IMI team (on technical matters) with the input of the policy team when it regards policy issues. Additional support from DIGIT (Level 2 support), to ensure smooth uptake and functioning of the new module.

To achieve these steps a close coordination and joint efforts would be required between DG GROW (IMI team) and Policy Unit team from DG MOVE for planning, implementation, and maintenance phase. The diagram below provides an overview of the cooperation required:

Figure 20: Collaboration needed to implement IMI



Source: Presentation shared by DG GROW (IMI Team)

### 4.3 Driver Centric (D to A) Data Sharing Model

Under this model enforcement authorities would seek relevant data directly from the driver/owner of a vehicle, either through road-side checks or through Automatic Number Plate Recognition (ANPR) checks.

This process would require:

- a mechanism through which data can be digitally shared by driver/owner of a vehicle with enforcement authority,
- a mechanism that can authenticate that digital data being shared by driver/owner of a vehicle is true and can be trusted by enforcers, and
- a mechanism for proving that the system used by driver/owner to share data cannot be controlled by anyone but them.

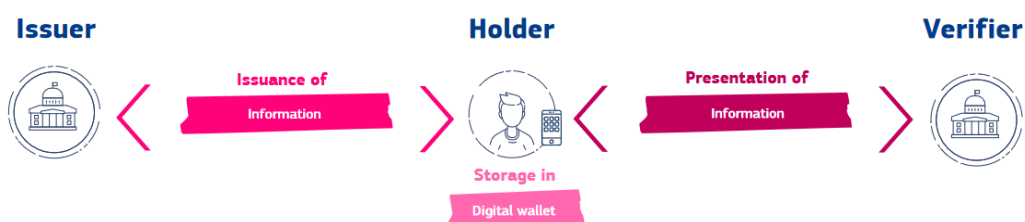
Within the scope of this study, a *Verifiable Credential (VC)* based solution/service has been considered that can facilitate cross-border UVAR enforcement, using driver-centric model. The subsections below describe the technical and legal steps necessary for implementing this solution/service.

#### 4.3.1. Verifiable Credential based solution

*Verifiable Credentials based solution in brief*

- Verifiable Credentials are a new way of expressing information in digital format, they usually contain the following data:
  1. Data that a user would like to convey/share (e.g., for UVAR enforcement this can be information about the emission class of a vehicle driven or owned by the user).
  2. Data about the entity that issued the verifiable credential as well as its date of issuance and expiry (if any).
  3. Data proving that the information above comes from an authentic source (e.g., the vehicle registration authority) and has not been tampered or changed by anyone.
- Verifiable Credentials can be issued to a ‘holder’ (e.g., a person or an organization related to a vehicle) by an entity designated as ‘issuer.’
- The ‘issuers’ must be part of ‘trust framework,’ so that people reading the verifiable credentials (e.g., enforcers) can believe the information contained in the Verifiable Credential and can check its veracity.
- A Verifiable Credential is by design linked to its holder in a unique way (Decentralized Identifier - DID).
- Verifiable Credentials can be presented through digital wallets activated by their unique holder and can be checked by enforcers by consulting holder’s digital wallet either in-person or online.
- The diagram below provides an oversimplified description of how verifiable credentials work in general:

**Figure 21: How Verifiable Credentials Work**



Source: EBSI Website

*Steps required to use Verifiable Credentials for UVAR Enforcement*

The enabling technological components that can help realise the use of verifiable credentials for UVAR enforcement already exist:

- Standards or data models to create and issue Verifiable Credentials have already been developed by the internet’s standard setting body, the World Wide Web Consortium (see [W3C’s verifiable Credential data model](#)). These are already being used for issuing Verifiable Credentials for different use-cases.
- ‘Trust frameworks’ to designate “issuers” of verifiable credential also exist. Notable among these are the ‘trust frameworks’ developed by the EU:
  - **EU Gateway (developed for issuance and verification of digital covid certificates)** whereby the Commission can manage a centralised service responsible for managing and distributing certificates to issuers of electronic documents. This trust framework can also be used for use-cases other than covid.
  - **Federated trust model (developed pursuant to eIDAS regulation)** which has put in place an EU-wide list of providers of qualified certificates. This list can be used to verify information about issuers of electronic documents.
  - **European Blockchain Service initiative (EBSI)**, which leverages blockchain and World Wide Web Consortium’s (W3C) decentralised identifier standard to create a fully distributed trust model, where each sector or Member State can define and manage issuer accreditations, which can be trusted by actors in other EU Member States.
- Electronic Identification and Digital Wallets are already being used by EU citizens in cross border contexts. With EU’s European digital identity wallet initiative, all EU citizens will eventually have the right to hold a European Digital Identity Wallet, accepted in all Member States. Through the wallet it will be possible for EU citizens to digitally identify themselves as well as store and manage identity data and official documents (such as a verifiable credentials) in electronic format.

To combine these available technological components and build a technical architecture for verifiable credential-based UVAR enforcement solution/service at the EU level, following steps need to be taken:

**Step 0 – Legal basis**

***Legal basis for the setting up such a solution/service***

- The legal basis to set up a solution/service that enables EU citizens to prove that they or their vehicles possess the criteria to move freely in EU territory and can access restricted zones in other Member States, stems from the right of free movement of persons within the EU.
- [Regulation \(EU\) 2018/1724](#) (single digital gateway regulation) in its article 14 also refers to the obligation of the European Commission to establish a technical system for the automated exchange of evidence between competent authorities in different Member States. Pursuant to this the European Commission recently also adopted an [implementing regulation](#) setting out technical and operational specifications of a ‘once-only’ technical system “OOTS”. This provision could help facilitate the establishment of a verifiable credential-based solution/service that can be integrated in OOTS, especially because in Annex II of the regulation a reference to “emission stickers” has already been made, indicating the intention to include UVARs as a procedure that could benefit from the Regulation.



### **Legal basis for sharing data**

- The legal basis for sharing data through a verifiable credential-based solution/service is the consent provided by a user and as such a separate legal basis may not be needed at the EU level.
- The user holding a verifiable credential (i.e., driver/owner of a vehicle) could explicitly agree to share their vehicle data and linked identity data, allowing enforcers to check if their vehicle is complying with a regulation or not. The users may be willing to do so, to exercise their freedom of movement within EU by indicating to local enforcement authorities that they comply with a regulation or fall into an exempted category (e.g., disability) and can freely move in an otherwise restricted zone.
- Users that do not give consent, could be stopped by enforcement authorities to gain relevant information. Alternatively, authority centric model could be relied upon, to seek information about the vehicle and its owner-holder. This functionality could be added in the technical architecture of verifiable credential-based solution/service. The solution could allow enforcers to connect to vehicle registration authorities or other services for seeking information on vehicles that do not have or provide access to their verifiable credentials. The legal basis for this functionality would be the same as discussed under Authority Centric model above.
- The users could also be obliged to possess a verifiable credential and share it with authorities for UVAR enforcement. However, given the local nature of vehicle access regulations, this would have to be done at the level of each Member State.

### **Legal basis for the technical architecture of a VC-based solution**

The legal basis for one of the key technological components of the architecture i.e., the ‘trust framework’ already exists. As indicated before, there are 3 different types of ‘trust models’ that could be leveraged for the technical architecture of a verifiable credential-based solution:

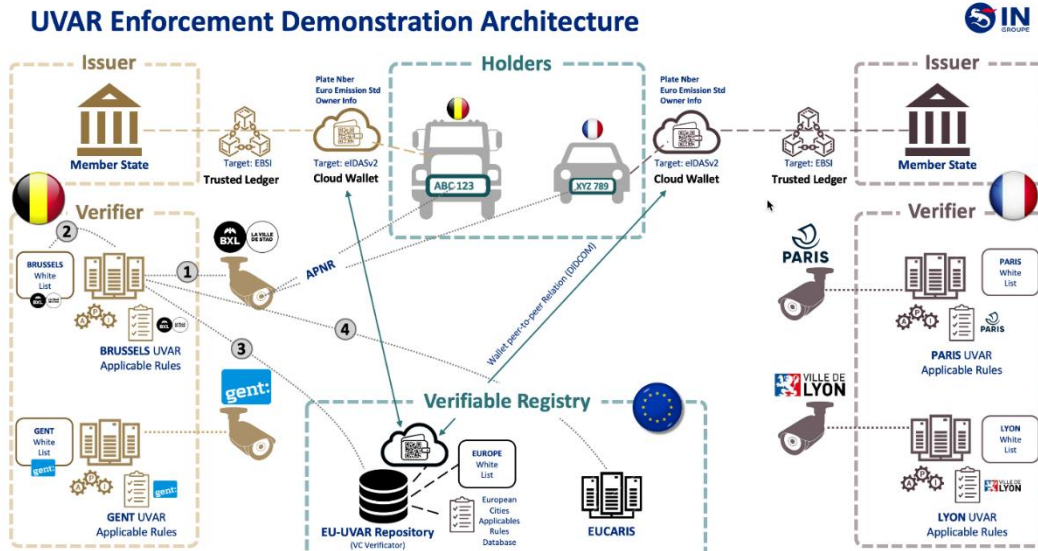
- *EU Gateway* – [Regulation \(EU\) 2021/953](#) or the EU covid certificate regulation provides the legal framework for this trust model.
- *Federated trust model* – [Regulation \(EU\) No 910/2014](#) or the eIDAS Regulation provides the legal framework for this trust model.
- *European Blockchain Service Infrastructure* – [Joint Declaration signed on the 10th of April 2018](#) provides the legal framework for this trust model.

In addition, the technical architecture for a Verifiable Credential based solution would also benefit from legislative changes foreseen under ongoing EU initiatives:

- [Changes foreseen to the Regulation \(EU\) No 910/2014](#) (eIDAS regulation v.2) and introduction of EU digital wallets.
- [Changes foreseen to Directive 1999/37/EC](#) (under revision of roadworthiness package), which would digitize the vehicle registration certificates.

**Step 1 – Definition of Requirements**

This would entail describing, among other things, the information to be exchanged (see Appendix A) and the workflow. The demonstration architecture developed by IN GROUPE could be leveraged for this step, as it provides a detailed description of the actors involved, the workflow and requirements of the use-case.



Source: IN GROUPE description of VC based solution architecture

This step would also involve selecting technological components that could be used for developing the technical architecture.

- For example, for ‘trust frameworks’ to be used to designate entities as “issuers,” the use of European Blockchain Service Infrastructure (EBSI) could be indicated as a requirement, as it relies on decentralized identifier standards.
- Similarly, establishing linkages to European Digital Identity Wallet initiative could also be mandated.

**Step 2 – Development of the technical architecture**

This would entail establishing a call (this could either be in the form of a tender or rely upon other funding mechanisms such as the Digital Europe Program) for developing the technical architecture based on the requirements defined in step 1, as well as the interface for different users.

The funding mechanisms such as Digital Europe Program could be especially relevant when linkages to EBSI and European Digital Wallet initiative are defined as part of the requirements to develop the technical architecture.

**Step 3 – Piloting the technical architecture**

Once the technical architecture has been developed, its first implementation will have to be tested with interested stakeholder organizations in Member States and users. Feedback collected from early adopters would have to be integrated in the technical architecture by the developers, to make the architecture stable and prepare it for production.

#### Step 4 – Production and release

This step will involve:

*Onboarding of issuers* – Member States will have to designate and accredit “issuer” organizations (these could be national vehicle registration authorities), which can rely on the technical architecture to issue verifiable credentials to drivers/owners of vehicles upon request.

*Setting up of digital wallets* – The European digital identity wallet integrated into the technical architecture, would allow users (i.e., drivers/owners of a vehicle) to store and share their verifiable credential containing data necessary to enforce UVARs in a cross-border context. The vehicle license plate number may be considered as a possible Uniform Resource Identifier (URI) reference to ease the authority’s access to the wallet of a vehicle in a cloud infrastructure.

*On-boarding of verifiers* – The verifiers (i.e., city enforcement authority) will be onboarded to the technical architecture by providing them with an application/software that can interact with the European digital identity wallet to access data included in the verifiable credential.

## 4.4 Vehicle Centric (V to A) Data Sharing Model

Under this model, the enforcement authorities would seek relevant data directly from the vehicle itself or through devices fitted in a vehicle.

This process would require:

- a mechanism/equipment through which data can be digitally shared by a vehicle with enforcement authority, and
- sensors/equipment/mechanisms that can allow enforcement authorities to interact with a vehicle to collect and process data being emitted.

Within the scope of this study, two solutions/services have been considered that can facilitate cross-border UVAR enforcement, using the vehicle-centric model, namely:

- *Extended Vehicle (ExVe) based solution/service, and*
- *Tachograph-DSRC based solution/service*

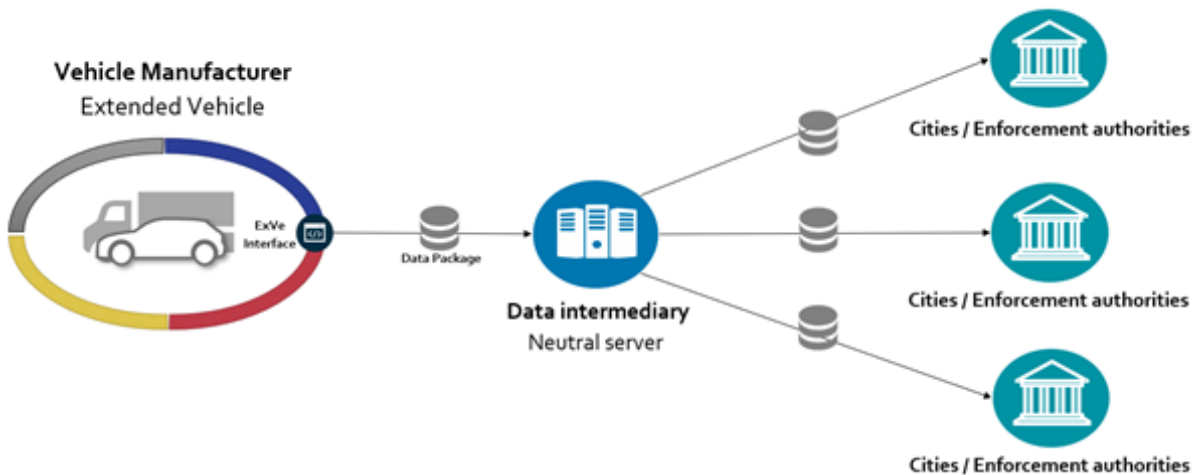
Below are the steps necessary for implementing these solution/services.

### 4.4.1. Solution/service based on Extended/Connected Vehicle (ExVe) concept

#### *Extended Vehicle Concept in Brief*

For the exchange of data from vehicles with external parties, vehicle manufacturers have developed the ‘extended vehicle’ concept (ExVe). Under this concept, all vehicles are connected via cellular network to a back-end cloud system of the vehicle manufacturer and other parties can access data there (whether or not for a fee). Further, it is also possible to work with an intermediary (a neutral server) that collects vehicle data from various vehicle manufacturers and relays it to other parties. The diagram below indicates how the model works with the help of a data intermediary:

Figure 22: Connected Vehicle based solution



Source: Presentation from ACEA

The ExVe concept is [already being used](#) within the context of Safety Related Traffic Information (SRTI) Regulation (Commission Delegated Regulation (EU) No 886/2013), which requires vehicle manufacturers to share road safety-related minimum universal traffic information free of charge.

The ExVe concept could help city enforcement authorities to scan foreign vehicles entering Low Emission Zones and detect non-compliant vehicles in real time. The vehicles found to be non-compliant could then be stopped by enforcement authorities to seek vehicle owner/holder data to issue warnings and fines. Alternatively, authority centric model could also be relied upon to seek vehicle/owner-holder data for vehicles found to be non-compliant.

It must be borne in mind that there are discussions ongoing in the DG Move expert group on roadworthiness and vehicle registration documents for the modification of roadworthiness regulations on access to vehicle data. These discussions relate to how the trust framework for sharing vehicle data can be setup and how the roles for the same can be assigned. These discussions can be used for the purpose of making sure that future modifications to EU roadworthiness rules can help and not impair data sharing for the purpose of enforcing UVARs.

#### Steps required to use extended vehicle concept for UVAR enforcement

##### Step 0 – Legal Basis

###### Legal Basis for data sharing

- A legal basis would be required to allow vehicle manufacturers to share data with city enforcement authorities for the purposes of enforcing UVARs.
- Existing regulations such as [Regulation \(EU\) 2017/2400](#) and [Regulation \(EU\) 2018/956](#) for heavy duty vehicles and [Regulation \(EU\) 2019/631](#) and [Implementing Regulation \(EU\) 2021/392](#) for light vehicles require sharing of vehicle emissions related data, but for the purpose of determining and monitoring CO2 emissions. The use of vehicle data available through these regulations could be extended to UVAR enforcement.
- The [ongoing initiative of the European Commission on Access to vehicle data, functions and resources](#), within the framework of the proposed [Data Act](#) could also provide an occasion to include references for sharing data for enforcing regulations such as UVARs.
- Consent of the vehicle owner-holder (sought at the time of purchasing/change of ownership a vehicle) could also serve as a legal basis for vehicle manufacturers to share relevant vehicle data with city enforcement authorities. Where consent is not provided, vehicles could be

<p>stopped to conduct roadside checks or Authority-Centric model could be relied upon to obtain relevant data. The legal basis for the latter would be the same as discussed under Authority-Centric model above.</p> <p><b>Legal Basis for the ExVe architecture</b></p> <ul style="list-style-type: none"> <li>• <a href="#">ISO 20077-1:2017</a> on Extended Vehicle Concept could provide the basis for the technical architecture of this solution.</li> <li>• <a href="#">Multi Party Agreement on Deployment of the SRTI Ecosystem: Data for Road Safety</a> could also provide the reference text for establishing the architecture of an ExVe solution for UVAR enforcement.</li> </ul>
<p><b>Step 1 – Definition of Requirements</b></p> <p>This would entail describing, among other things, the information to be exchanged (see Appendix A) and the vehicle data chain.</p> <p>Reference for the vehicle data chain can be taken from the Safety Related Traffic Information (SRTI) Ecosystem where the ExVe concept is already being used. Here, at the top level of the chain are the vehicle manufacturers who have data about their vehicles. In the middle level are the neutral intermediaries who interact with ExVe interface and develop data packages as per the needs of an end-user who requires specific data. At the end level of the chain can be city enforcement authorities, which can seek data from intermediaries to enforce UVARs.</p>
<p><b>Step 2 – Development of the technical architecture</b></p> <p>This would entail the development of UVAR enforcement ecosystem similar to the SRTI ecosystem and could be achieved through a public-private partnership approach of the Data Task Force established under the SRTI framework. The Data Task Force could also be tasked to develop and pilot the technical architecture for ExVe-based solution for UVAR enforcement.</p>
<p><b>Step 3 – Piloting the technical architecture</b></p> <p>The pilot phase would allow testing of the technical architecture and also help identification of steps for scaling it up to the EU level.</p>
<p><b>Step 4 – Production and release</b></p> <p>This phase will focus on increasing the number of stakeholders participating in the ecosystem, including vehicle manufacturers and city authorities.</p>

#### 4.4.2 Solution/service based on Tachograph/DSRC

##### *Tachograph/DSRC Concept in Brief*

The Tachograph is used in the European Union to check driving times of drivers and enforce legislation on social rules (rest period, driving time limits), in relation with the road safety objectives.

Over past years tachograph has evolved as a device, from analogue to digital to the present-day smart version. It is expected to undergo further changes in the future. It is also going to be present in a greater number of vehicles across the EU, since, owing to the recent regulatory changes under the [mobility package 1 framework](#), not only heavy duty, but also light commercial vehicles will also have to be fitted with a smart tachograph.

The present-day smart tachographs are capable of relaying information remotely using the ‘Dedicated Short Range Communication’ (DSRC) technology. This allows enforcement authorities to conduct checks without stopping vehicles. They can use equipment called the ‘Remote Early Detection Communication Reader’ (REDCR) and obtain data from a moving vehicle.

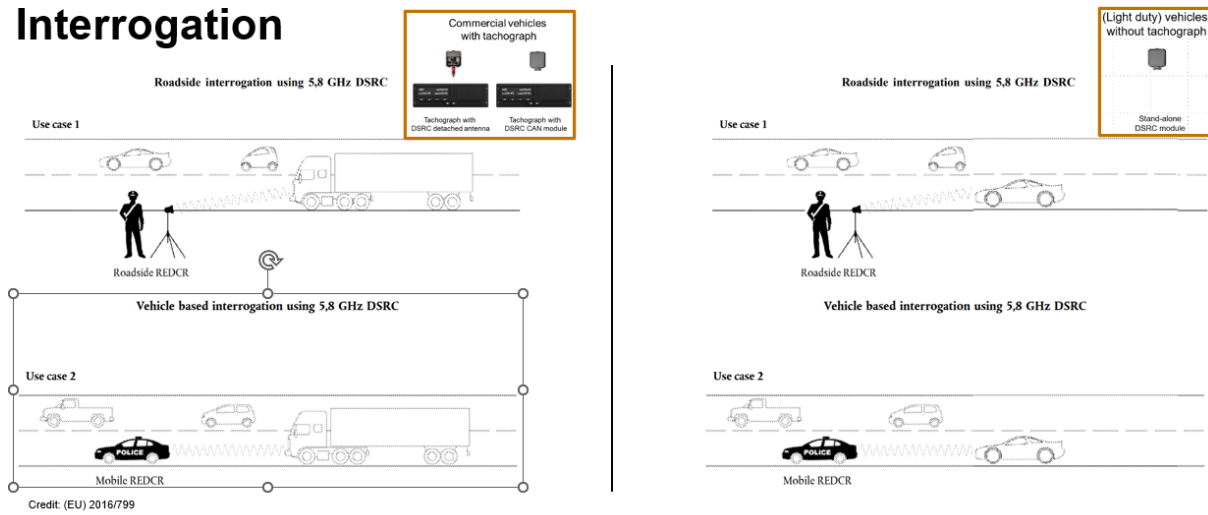
In view of the above and the increasing use of remote reading devices by enforcement authorities across EU, tachograph and related technologies could potentially also be used to enforce UVARs. Discussions held with tachograph manufacturers within the framework of UVAR-Exchange project have revealed that these technologies could be used for enforcement of UVARs in the following manner:

- Smart Tachographs equipped in commercial vehicles could be updated, allowing them to relay vehicle data relevant for enforcing UVARs (e.g., emission class).
- Light duty vehicles without tachographs could be equipped with a standalone Dedicated Short-Range Communications (DSRC Module), to relay vehicle data relevant for enforcing UVARs.

The figure below indicates the above two typologies:

Figure 23: Typologies of tachograph/DSRC based solution

## Emission class readout via DSRC Interrogation



Using above technologies could help city enforcement authorities to scan foreign vehicles entering Low Emission Zones and detect non-compliant vehicles in real-time. The vehicles found to be non-compliant could then be stopped by enforcement authorities to seek vehicle owner-holder data to issue warnings and fines. Alternatively, authority centric model could also be relied upon to seek vehicle/owner-holder data for vehicles found to be non-compliant.

### Steps required to use Tachograph/DSRC for UVAR enforcement

#### Step 0 – Legal Basis

##### Legal Basis for data sharing

- A legal basis would be required to allow smart tachograph and DSRC stand-alone module to share data with city enforcement authorities for the purposes of enforcing UVARs.
- Existing regulations such as [Commission Regulation \(EU\) 2017/2400](#) and [Regulation \(EU\) 2019/631](#) (along with [Implementing Regulation \(EU\) 2021/392](#)) require sharing of vehicle emissions related

data, but for the purpose of determining and monitoring CO<sub>2</sub> emissions. The use of vehicle data available through these regulations could be extended to UVAR enforcement.

- The [ongoing initiative of the European Commission on Access to vehicle data, functions and resources](#), within the framework of the proposed [Data Act](#) could also provide an occasion to include references for sharing data for enforcing regulations such as UVARs.
- Consent of the vehicle owner-holder (sought at the time of adding updates to the smart tachograph OR at the time of installing DSRC standalone module) could also serve as a legal basis to share relevant vehicle data with city enforcement authorities. Where consent is not provided, vehicles could be stopped to conduct road-side checks or authority centric model could be relied upon to obtain relevant data. The legal basis for the latter would be the same as discussed under Authority Centric model above.

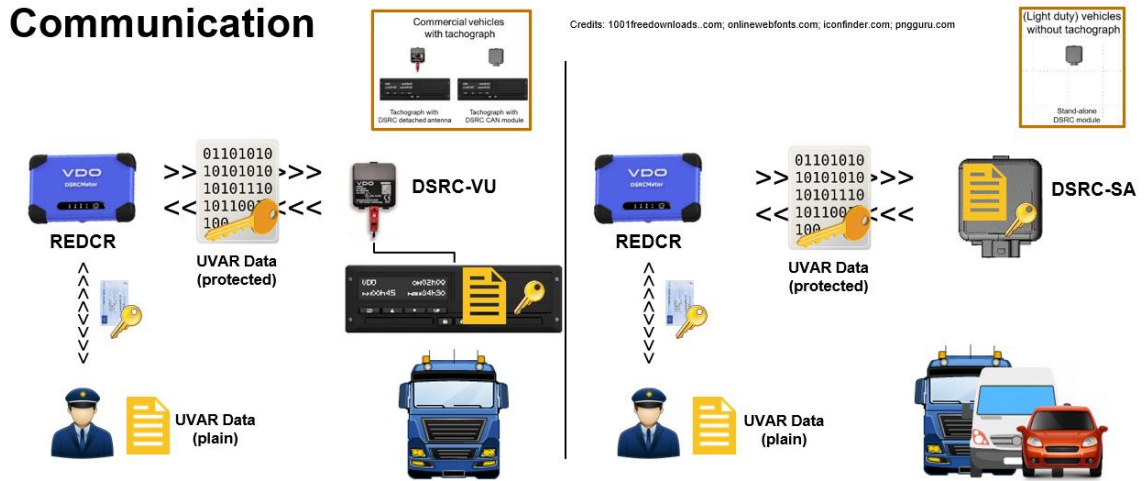
#### **Legal Basis for the technical architecture**

- Regulation (EU) No 165/2014 and Commission Implementing Regulation (EU) 2016/799 contain detailed provisions with respect to technical specifications and use of tachograph as an enforcement tool in road transport. It has resulted in the establishment of an EU wide technical architecture including workshops that are accredited to check and update the settings of the tachographs. The regulation could be amended allowing tachograph to be updated and relay data relevant for UVAR enforcement.
- The regulation could also provide a reference framework for DSRC stand-alone module to be used for vehicles not equipped with a smart tachograph.

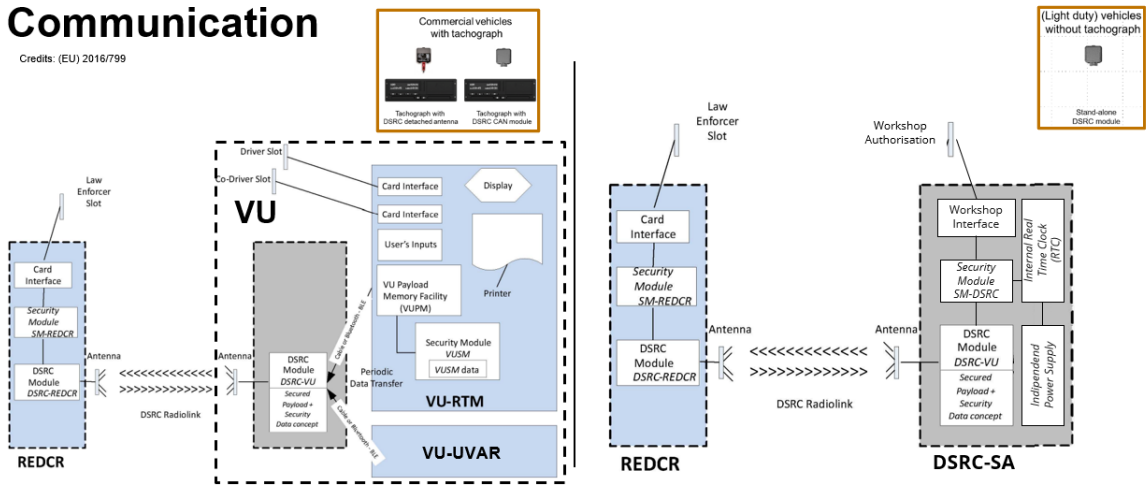
#### **Step 1 – Definition of Requirements**

- Two typologies of the tachograph/DSRC based solution are possible:
  - Using Smart Tachographs to relay data that can be read by ‘remote early detection communication reader’ (REDCR); and
  - For vehicles not equipped with smart tachographs, using DSRC stand-alone module to relay data that can be read by REDCR.
- In step 1 the requirements for both typologies would be defined.
- The dataset to be communicated would have to be determined – this could be in accordance with Appendix A and aligned to the provisions in regulation (EU) 2017/2400 and Regulation (EU) 2019/631, if they are used as a legal basis for data sharing.
- Communication flows would have to be established – for this the template provided by tachograph manufacturers below could be helpful:

## Emission class readout via DSRC Communication



## Emission class readout via DSRC Communication



Source: Presentation from a Tachograph Manufacturer

### Step 2 – Development

- Step 2 for smart tachograph typology would involve – development of a software update for the smart tachograph.
- Step 2 for DSRC standalone module would involve – development of a hardware (using basic DSRC technology) that can be programmed to relay relevant vehicle data.

### Step 3 – Release and Implementation

- Step 3 for smart tachograph typology would involve – updating the software of smart tachographs in all vehicles. For this tachograph workshops would be used. These workshops exist across EU and are responsible for regularly calibrating tachographs.



- Step 3 for DSRC standalone module would involve – authorizing tachograph workshops to install the hardware in vehicles that do not have smart tachographs.
- Additionally, city enforcement authorities would have to be onboarded by issuing control cards or “shared secret” keys for them. The control cards or “shared secret” keys would enable city enforcement authorities to read vehicle data (relayed by smart tachographs or DSRC stand-alone modules) using a REDCR devices. The cities will also have to be equipped with REDCR devices.

#### **Step 4 – Post release support**

- Step 4 would entail collaboration with tachograph workshops by providing them with regular updates and enabling them to adjust data parameters as per any changes in UVAR rules.
- A workshop card or “shared secret” key would have to be issued for workshops to allow them to make relevant calibrations to smart tachographs and DSRC stand-alone modules.

## 5. Options for legal basis to facilitate cross-border enforcement of UVARs

Table 4: Legal basis for cross-border UVAR Enforcement

No.	Law/Initiative	Comment/Recommended Changes	Timeline	Relevance for different solutions
1	<a href="#">Directive (EU) 2015/413</a> – Cross Border Enforcement Directive	<p>The Cross Border Enforcement or CBE Directive focuses on cross-border exchange of information between Member State authorities/national focal points for enforcing road-safety-related traffic offences. The key offences covered by the regulation include – speeding, failing to use a seat-belt, failing to stop at a red traffic light, drink-driving, driving while under the influence of drugs, failing to wear a safety helmet, the use of a forbidden lane, illegally using a mobile telephone or any other communication devices while driving.</p> <p>After an offence has been committed, the CBE Directive plays a vital role in identification of owner, holder or driver of a vehicle and in follow-up proceedings where a penalty notice/information letter is delivered to the presumed offender.</p> <ul style="list-style-type: none"> <li>• The CBE Directive can be relevant for UVARs such as <i>Limited Traffic Zones</i>, where a UVAR offence is immediately detected and data is not required <i>ex ante</i> to detect non-compliance. For such UVARs the CBE Directive could play a role in identification of owner, holder or driver of a vehicle. For this, the scope of CBE Directive would have to be extended to specifically include such UVARs.</li> <li>• The CBE Directive can also be relevant for UVARs such as <i>Low Emission Zones</i>, where data is required <i>ex ante</i> to detect non-compliance. However, for this, the scope of CBE Directive would have to be further extended to specifically indicate that vehicle data can also be requested by Member States <i>ex ante</i> to establish that a UVAR offence has been committed.</li> </ul>	<p><a href="#">The revision process of the Directive is ongoing</a>, and a legislative proposal for a revision is expected from the Commission in: <b>the last quarter of 2022.</b></p>	<p><b>EUCARIS &amp; IMI</b> – If the scope of CBE Directive is extended then it could be used as a legal basis for sharing data between authorities. EUCARIS is already mentioned in the CBE Directive and is used by Member States to exchange data for the purposes specified in the Directive. If a workflow in IMI is developed to share data for UVAR enforcement, the revised CBE Directive could also provide a basis for data sharing through IMI.</p> <p><b>Verifiable Credential based solution</b> – In a <i>VC based solution</i> the data is shared with the authorities by the driver/owner of a vehicle. It is not shared directly between authorities. In view of this the CBE Directive is not relevant for <i>VC based solution</i>.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> – In <i>vehicle centric solutions</i> the data is shared with the authorities though connected vehicle itself or through devices fitted in the vehicles. It is not shared directly between authorities. In view of this the CBE Directive is not relevant for such solutions.</p>

**UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context**

2	<p><a href="#">Directive (EU) 2019/520</a> – European Electronic Toll Service (EETS)</p>	<p>The EETS Directive in its chapter VIII lays down conditions necessary for facilitating cross-border exchange of vehicle registration data and data on owners or holders of vehicles for which there was a failure to pay road fees of any kind in the Union.</p> <p>Article 23.1 of the Directive reads –  <i>In order to allow the identification of the vehicle, and the owner or holder of that vehicle, for which a failure to pay a road fee has been established, each Member State shall grant access only to other Member States' national contact points to the following national vehicle registration data, with the power to conduct automated searches thereon:</i></p> <p><i>(a) data relating to vehicles; and</i>  <i>(b) data relating to the owners or holders of the vehicle.</i></p> <ul style="list-style-type: none"> <li>• <b>The EETS Directive is already relevant for enforcing UVARs such as congestion or pollution charging schemes, which involve payment of a charge/fee. For these UVARs, data related to foreign vehicles and their owner/holders can be shared between Member States if <i>failure to pay a road fee has been established</i>. However, access to this data is granted <u>only</u> to national contact point of a Member State or to “entity responsible for levying the road fee” (as per Article 25). For effectively using this provision for fee-based UVARs, Article 25 would have to be revised to indicate that an “entity responsible for enforcing UVARs” in a Member States can also access this data.</b></li> <li>• <b>Considering that the EETS Directive already provides the legal basis for sharing data to enforce fee-based UVARs, its scope should also be extended also to cover fine-based UVARs, which are enforced through issuance of fines. For this, Chapter VIII of the Directive (including Articles 23 to 25) would have to be revised. In addition to amending Article 25 of the Directive, as explained in the paragraph above, article 23 of the Directive would also have to be revised to include – low emission zones, restricted access zones and other fine-based UVAR schemes.</b></li> <li>• <b>For low emission zones, the Directive would also have to specify that “data related to vehicles” can be shared <i>ex ante</i>. As this can help to check if a vehicle is non-compliant or not.</b></li> </ul>	<p>As per Article 28 of the Directive the European Commission has to prepare a report for the Parliament. Among other things the report should also include proposal for further revision of the Directive for facilitating cross-border enforcement to low emission zones, restricted access zones or other urban vehicle access regulation schemes. Deadline for the report is:  <b>19 Apr 2023</b></p>	<p><b>EUCARIS &amp; IMI</b> – If the scope of EETS Directive is extended then it could be used as a legal basis for sharing data between authorities. EUCARIS is already mentioned in the EETS Directive and is used by Member States to exchange data for the purposes specified in the Directive. If a workflow in IMI is developed to share data for UVAR enforcement, the revised EETS Directive could also provide a basis for data sharing through IMI.</p> <p><b>Verifiable Credential based solution</b> – In a VC based solution the data is shared with the authorities by the driver/owner of a vehicle. It is not shared directly between authorities. In view of this the EETS Directive is not relevant for a VC based solution.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> – In vehicle centric solutions the data is shared with the authorities though connected vehicle itself or through devices fitted in the vehicles. It is not is not shared directly between authorities. In view of this the EETS Directive is not relevant for such solutions.</p>
3	<p><a href="#">Regulation (EU) 2018/1724</a> – Single Digital Gateway Regulation</p>	<p>Articles 13 to 15 of the regulation mention the establishment of a technical system by the Commission for automated exchange of evidence between government authorities of different Member States to help EU citizens complete administrative procedures in a cross-border context.</p> <p>Article 14 of the regulation, specifically states that –</p> <p>1. <i>For the purpose of the exchange of evidence for the online procedures listed in Annex II to this Regulation and the procedures provided for in Directives 2005/36/EC, 2006/123/EC, 2014/24/EU and 2014/25/EU, a technical system for the automated exchange of evidence between competent authorities in different Member States (‘the technical system’) shall be established by the Commission in cooperation with the Member States.</i></p> <p>2. <i>Where competent authorities lawfully issue, in their own Member State and in an electronic format that allows automated exchange, evidence that is relevant for the online procedures referred to in paragraph 1, they shall also make such evidence available to requesting competent authorities from other Member States in an electronic format that allows automated exchange.</i></p>	<p>Article 13, Article 14(1) to (8) and (10) and Article 15 shall apply from  <b>12 Dec 2023.</b></p>	<p><b>EUCARIS &amp; IMI</b> – Article 14.2 could potentially provide a basis for authorities to exchange relevant data for UVAR enforcement, if a specific reference is made to enforcement of UVARs in the Regulation, by including them as a procedure for which evidence can be exchanged.</p> <p><b>Verifiable Credential based solution</b> – Under the regulation VC based solution could become a service that is integrated in OOTS, which allows EU citizens to showcase compliance with a UVAR.</p>

**UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context**

		<p>Article 15 of the regulations, specifically states that –  <i>“Where the technical system, or other systems for the exchange or verification of evidence between Member States are not available or are not applicable, or where the user does not request the use of the technical system, competent authorities shall cooperate through the Internal Market Information System (IMI) where this is necessary in order to verify the authenticity of evidence that was submitted to one of them in an electronic format by the user for the purpose of an online procedure.”</i></p> <p>In August 2022, the European Commission adopted the <a href="#">Implementing Regulation (EU) 2022/1463</a>, setting out technical and operational specifications of a technical system for the cross-border automated exchange of evidence and application of the ‘once-only’ principle. The technical system referred to as ‘once-only’ technical system (OOTS), is yet to be established. It aims to rely on reusable solutions, be implementation technology neutral and accommodate different national solutions. To reduce the costs of, and the time necessary for, establishing the OOTS, it aims to be adaptable to use the existing national, including central, regional and local level, procedure portals, data services or intermediary platforms, which have been created for national use.</p> <p><b>In view of the above, the Single Digital Gateway regulation and its implementing regulation could potentially provide a basis for:</b></p> <ul style="list-style-type: none"> <li>• <b>Establishing a solution/service by the commission that could be integrated in OOTS and could allow EU citizens to share their data to show that they possess criteria to access restricted UVAR zones.</b></li> <li>• <b>Exchanging information between Member States to enforce UVARs in a cross-border context, where such information has already been shared by them once at the national level.</b></li> <li>• <b>Annex II of the regulation could be updated to specifically include enforcement of UVARs as a specific procedure, for which Member State authorities could <i>exchange or verify evidence</i>. The annex II already makes a reference to <i>“Obtaining stickers for the use of the national road infrastructure: time-based charges (vignette), distance-based charges (toll), issued by a public body or institution”</i> and <i>“Obtaining emission stickers issued by a public body or institution”</i>.</b></li> </ul>		<p><b>ExVe &amp; Tachograph/DSRC</b> – the regulation is not directly relevant for these solutions because they rely on connectivity of vehicles and devices instead of using a distinct “technical system” to share data.</p>
4	Climate Action Regulations	<p>Existing regulations such as <a href="#">Regulation (EU) 2017/2400</a> and <a href="#">Regulation (EU) 2018/956</a> for heavy duty vehicles and <a href="#">Regulation (EU) 2019/631</a> and <a href="#">Implementing Regulation (EU) 2021/392</a> for light vehicles require vehicle manufacturers to share vehicle emissions related data for each vehicle. Manufacturers are required to share the vehicle identification number (VIN) along with various data elements relating to its emission, mass, fuel type etc with Member States and the commission.</p> <p>The data has to be shared by the manufacturers with Member States and it has to also be collected and stored by the commission for the purposes of monitoring CO<sub>2</sub> emission.</p> <p>The commission also maintains a central register of this data, which is public. However, some data elements such as the Vehicle Identification Number (VIN) are not shared publicly.</p> <p><b>1. The use of this technical vehicle data could be extended for the purposes of checking whether a vehicle complies with Low Emission Zone regulations or not.</b></p>	<p>The commission has the power to adopt delegated acts under these regulations.</p>	<p><b>EUCARIS &amp; IMI</b> – The regulations cover the monitoring and reporting of data by manufacturers as well as Member States. If the scope of these regulations is extended, they could potentially be relevant for facilitating exchange of vehicle data between authorities through EUCARIS and IMI.</p> <p><b>Verifiable Credential based solution</b> – In a VC based solution the central register maintained by the commission could potentially become the source for authenticating or verifying the data</p>

**UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context**

		<p>2. A delegated act could be adopted by the Commission allowing Member States to exchange the vehicle data with each other to check compliance with Low Emission Zones.</p> <p>3. Similarly, city authorities could also be provided access to this data for the purposes of checking compliance with Low and Zero Emission Zones. The access to city authorities could be provided through connected vehicles or devices fitted within the vehicles.</p>		<p>shared by an individual through their verifiable credential.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> – In <i>vehicle centric solutions</i> the regulation could serve as the basis for seeking relevant data directly from the connected vehicle or the devices fitted in vehicles.</p>
5	Roadworthiness Directives	<p>This roadworthiness package includes 3 Directives which lay down the provisions for periodic testing of vehicles (<a href="#">Directive (EU) 2014/45</a>), roadside inspection for commercial vehicles (<a href="#">Directive 2014/47/EU</a>) and electronic recording of data related to vehicles (<a href="#">Directive 2014/46/EU</a> amending <a href="#">Directive 1999/37/EC</a>).</p> <p>Out of these, Directive 1999/37/EC (as amended by Directive 2014/46/EU) is relevant for enforcing different regulations (including UVARs) in a cross-border context, because:</p> <ul style="list-style-type: none"> <li>• it obliges Member States to electronically record data on vehicles registered in their territory (Article 3),</li> <li>• it refers to ‘national electronic databases’ of vehicle data (Article 9), and</li> <li>• it mentions sharing of this data (for the purposes of the directive) on bilateral and multilateral level by creating an electronic network (Article 9)</li> </ul> <p>However, many challenges relating to electronically recording vehicle data still exist, as there is a lack of harmony across vehicle registration authorities of Member States.</p> <p>The Directive 1999/37/EC, if revised, can play an important role in creating harmonized ‘national electronic databases’ of vehicle data across the EU. It can lead to full digitalization of vehicle registration certificates and can also help exchange of data by interlinking the national electronic databases.</p> <ul style="list-style-type: none"> <li>• <b>Directive 1999/37/EC could be revised to:</b> <ul style="list-style-type: none"> <li>○ harmonize the technical vehicle data available with vehicle registration authorities,</li> <li>○ digitize vehicle registration certificates and mandate their electronic storage in national databases, and</li> <li>○ electronically link different vehicle registration authorities and national databases of EU Member States.</li> </ul> </li> </ul>	<p>The initiative to revise the Directive 1999/37/EC is <a href="#">ongoing</a>.</p>	<p><b>EUCARIS &amp; IMI</b> – The changes proposed to Directive 1999/37/EC would be directly relevant for improving the quality of data available with vehicle registration authorities, also for the purposes of enforcing UVARs. Interlinking of vehicle registration authorities would also strengthen authority to authority data sharing.</p> <p><b>Verifiable Credential based solution</b> – <i>VC based solution</i> could benefit from the digitalization of vehicle registration certificates, which could be shared by vehicle owner/holders through EU digital identity wallets for proving compliance with UVARs.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> In <i>vehicle centric solutions</i> the data is shared with the authorities though connected vehicle itself or through devices fitted in the vehicles. It is not is not shared directly between authorities. In view of this, Directive 1999/37/EC is not directly relevant for such solutions.</p>
6	EU Digital Identity Wallet Initiative	<p><a href="#">Regulation (EU) No 910/2014</a> provides the basis for cross-border electronic identification, authentication and website certification within the EU. However, it does not contain any obligation for Member States to provide their citizens and businesses with a digital identification, which can also be recognized by other Member States.</p> <p><a href="#">A recent proposal of the European Commission</a> to update Regulation (EU) No. 910/2014, aims to change this. The proposal will allow all EU citizens to have the right to a digital identity wallet that can be recognized across the EU. This will be particularly helpful to citizens in a cross-border context, as they can use this technology to prove their identity to foreign authorities and to showcase that they possess necessary traits as per a given regulation.</p>	<p>The regulation proposed by the commission is being discussed by the Industry, Research and Energy Committee (ITRE)</p>	<p><b>EUCARIS &amp; IMI</b> – Under <i>authority centric</i> model the data is shared directly between authorities. It is not shared by a driver/owner of a vehicle with the authorities. In view of this, the initiative is not relevant for <i>authority centric solutions</i>.</p>

**UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context**

		<ul style="list-style-type: none"> <li>• <a href="#">The initiative</a> to introduce an <a href="#">EU digital identity</a> wallet should be supported.</li> </ul>	of the European Parliament.	<p><b>Verifiable Credential based solution - VC based solution</b> could benefit from EU digital identity wallet, as the wallets could be used to share verifiable credentials with foreign authorities.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> – In <i>vehicle centric solutions</i> the data is shared with the authorities through connected vehicle itself or through devices fitted in the vehicles. It is not shared by drivers/owners of vehicle. In view of this, the EU digital identity wallet is not directly relevant <i>for vehicle centric solutions</i>.</p>
7	Access to vehicle data, functions and resources	<p>In February 2022, the European Commission proposed a “<a href="#">Data Act</a>”, which will further empower users by giving them the right to have access to vehicle data and the right to share the data with third parties. To compliment the proposal in the Data Act, the European Commission has also initiated steps for sector specific regulations.</p> <p>In this context, the <a href="#">Access to vehicle data, functions and resources initiative</a> has been launched, which aims to tackle the problem of accessing vehicle data for development of innovative data-driven mobility services as well as <i>for ensuring compliance with pollutant emissions regulations</i> or doing roadworthiness controls.</p> <ul style="list-style-type: none"> <li>• <b>The initiative on access to vehicle data for ensuring compliance with regulation should be supported and compliance with UVARs should be specifically included in the legislative proposal.</b></li> </ul>	Currently policy options are being assessed by the European Commission, based on which a proposal for a regulation would be developed.	<p><b>EUCARIS &amp; IMI</b> – Under <i>authority centric</i> model the data is shared directly between authorities. It is not shared by a connected vehicle itself or through devices fitted in the vehicle. In view of this the initiative is not directly relevant for <i>authority centric</i> solutions.</p> <p><b>Verifiable Credential based solution - In a VC based solution</b> the data is shared with the authorities by the driver/owner of a vehicle. It is not shared by the connected vehicle itself or through devices fitted in the vehicle. In view of this the initiative is not directly relevant for a <i>VC based solution</i>.</p> <p><b>ExVe &amp; Tachograph/DSRC</b> – The initiative is directly relevant for connected vehicles and devices fitted in the vehicles, as they could leverage the future regulation as a basis for sharing data with public authorities for UVAR enforcement.</p>

## 6. Conclusions and Next Steps

### 6.1 Authority to Authority (A to A) data sharing should be strengthened

Authority Centric data sharing can allow a direct communication between city enforcement authorities and vehicle registration authorities of another EU Member State. This type of data sharing does not rely on registration of foreign vehicles in the cities being visited, as data on all foreign vehicles visiting a city can be consulted. To strengthen authority to authority data sharing for UVAR enforcement, following actions are proposed:

- a. **Action A – Improve the quality of data** available with vehicle registration authorities. This can be achieved by supporting the [ongoing EU initiatives to revise roadworthiness package](#), which aims to update [Directive 1999/37/EC](#). This will help the harmonization and digitalization of data available with national vehicle registration authorities. The initiative aims to:
  - i. harmonize the technical vehicle data available with vehicle registration authorities,
  - ii. digitize vehicle registration certificates and mandate their electronic storage in national databases, and
  - iii. electronically link different vehicle registration authorities and national databases of EU Member States.
  
- b. **Action B – Establish an EU wide legal basis** that allows cross-border data sharing specifically for the purposes of UVAR enforcement. Such a legal basis can be established via different options:
  - i. expanding the scope of *CBE Directive* to include in its remit UVARs and to allow *ex ante* data sharing for enforcing LEZs.
  - ii. expanding the scope of *EETS Directive* to include in its remit also fine based UVARs and allow city authorities to have access to relevant data. The directive can already be used to for fee based UVAR schemes (see [chapter 5](#) above).
  - iii. expanding the scope of *single digital gateway* regulation to include UVAR enforcement as a procedure for which authorities can share data.
  - iv. expanding the use of data collected through *climate action* regulations for the purposes of UVAR enforcement.

See [chapter 5](#) of this document for specific recommendations on different regulations.

- c. **Action C – Support the uptake and use of EUCARIS by cities.** EUCARIS already connects National Contact Points (NCPs) in each EU Member State, allowing them to share vehicle data and vehicle owner/holder data for enforcing CBE and EETS Directives as well as several other regulations. But city authorities are sometimes unable to access EUCARIS due to a lack of awareness or absence of national processes to connect to their EUCARIS National Contact Points. Cities across the EU should be informed about this possibility and countries should be encouraged to share relevant data with their cities for UVAR Enforcement, after an appropriate legal basis is established.

UVAR Exchange project has identified cities that already use EUCARIS and have processes in place that can connect cities to their EUCARIS NCPs, good practices from these cities should be shared with other EU cities, so that they can become aware about EUCARIS and how to connect to their EUCARIS National Contact Points.

See [chapter 3](#) of this document for practices used by some cities to connect to EUCARIS.

- d. **Action D – Explore the use of Internal Market Information (IMI) system** for direct administrative cooperation between city authorities and foreign national vehicle registration authorities. In addition to EUCARIS the European Commission could consider developing a workflow in IMI to facilitate direct administrative cooperation between cities and foreign vehicle registrations authorities for the purposes of enforcing UVARs.

## **6.2 Empower EU citizens to share their data to compliment A to A data sharing**

In parallel and to strengthen authority-to-authority data sharing, EU citizens should also be allowed to showcase that they possess required criteria to move freely within a regulated zone of an EU city.

The use of COVID certificates during the COVID pandemic has led to the establishment and frequent use of EU-wide systems and technologies that allow individuals to securely share information about themselves with foreign control authorities. Individuals can also easily prove that the information being shared is authentic and can be trusted by a foreign control officer.

These systems and technologies should be leveraged to compliment authority-to-authority data sharing. Doing so could reduce the workload of authority centric model, as only non-compliant cases would require the use of authority-to-authority data sharing. This would also help foreign citizens to prove that any exception (such as disability) applies to them and that they should be exempted from the regulation.

- a) **Action A – Support the [changes foreseen to the Regulation \(EU\) No 910/2014](#)** (eIDAS regulation v.2) and introduction of EU digital wallets.
- b) **Action B – Support the [changes foreseen to Directive 1999/37/EC](#)** to digitize vehicle registration certificates and mandate their electronic storage in national databases.
- c) **Action C – [Leverage the provisions of Single Digital Gateway Regulation](#) and [implementing regulation on OOTS](#)**, which obliges the commission to set up automated systems for the exchange of evidence between competent authorities of Member States.
- d) **Action D – Establish a pilot linked to European Blockchain Services Initiative (EBSI) and EU digital wallet initiative.** Through initiatives such as EBSI and EU digital wallet, the European Commission is investing considerable efforts to use new technologies and systems for different use-cases. UVAR enforcement through verifiable credentials could be added as a use case in these initiatives and piloted for uptake by Member States.

See [chapter 4.3](#) of this document for more details on citizen centric solution to UVAR enforcement.

## **6.3 Use growing vehicle connectivity and evolution of vehicle devices to compliment A to A data sharing**

Growing connectivity of vehicles and evolution of smart tachographs/DSRC technology can also help city enforcement authorities to detect vehicles that donot comply with UVARs.

These technologies can complement authority centric approach to enforcement, as authority-to-authority data sharing can then be used to obtain further information only with respect to non-compliant vehicles.



- a) **Action A – Leverage the provisions of climate action regulations** to facilitate access to vehicle data for checking compliance with UVARs (such as low emission zones).
- b) **Action B – Use [ongoing initiative of the European Commission on Access to vehicle data, functions and resources](#)**, within the framework of the proposed [Data Act](#) to seek vehicle data for enforcing regulations such as UVARs.
- c) **Action C – Establish collaboration with Vehicle Manufacturers** to develop a UVAR enforcement ecosystem, similar to the Safety Related Traffic Information (SRTI) ecosystem, so that vehicle data can be shared with city enforcement authorities to detect non-compliant vehicles.
- d) **Action D – Leverage the evolution of smart tachograph and the adoption of DSRC technology by Member States.** Tachograph and DSRC technology are used in heavy commercial vehicles as an enforcement tool. It will soon also be fitted in Light Commercial Vehicles. Smart Tachograph can be updated to also relay information about the vehicle emission standards, allowing city authorities to detect non-compliant vehicles.

## References

### Studies and Reports

- European Commission, [Final Report Study on Urban Vehicle Access Regulations](#), April 2017
- European Commission, [Fact-Finding Study On Status And Future Needs Regarding Low- And Zero- Emission Urban Mobility](#), December 2021
- European Commission, **Error! Hyperlink reference not valid.**, December 2021
- Reveal Project, [UVAR Guidance: Ensuring Compliance](#), June 2021
- P. Cestra, [Legal aspects of police cooperation in cross border Enforcement of traffic offences in the European union](#), March 2018
- UVARBox, [UVAR State of Play Report](#), December 2021
- EUCARIS Platform, [General Information](#), March 2022
- ACEA Position paper, [Access to vehicle data for third-party services](#), December 2016

### Legal Texts

- [EUCARIS Treaty](#)
- [Schengen Acquis](#) – Decision of the Executive Committee SCH/Com-ex (99)11 Rev. 2
- [Directive \(EU\) 2015/413](#) – facilitating cross-border exchange of information on road-safety-related traffic offences
- [Directive \(EU\) 2019/520](#) – on the interoperability of electronic road toll systems and facilitating cross-border exchange of information on the failure to pay road fees in the Union
- [Directive 2014/45/EU](#) – on periodic roadworthiness tests for motor vehicles and their trailers
- [Directive 2014/46/EU](#) – amending [Council Directive 1999/37/EC](#) on the registration documents for vehicles
- [Directive 2014/47/EU](#) – on the technical roadside inspection of the roadworthiness of commercial vehicles circulating in the Union
- [Regulation \(EU\) 2017/2400](#) – on determination of the CO2 emissions and fuel consumption of heavy-duty vehicles.
- [Regulation \(EU\) 2018/956](#) – on the monitoring and reporting of CO2 emissions from and fuel consumption of new heavy-duty vehicles.
- [Regulation \(EU\) 2019/631](#) – on setting CO2 emission performance standards for new passenger cars and for new light commercial vehicles.
- [Implementing Regulation \(EU\) 2021/392](#) – on the monitoring and reporting of data relating to CO2 emissions from passenger cars and light commercial vehicles.
- [Directive 2010/40/EU](#) – on the framework for the deployment of Intelligent Transport Systems in the field of road transport and for interfaces with other modes of transport
- [Regulation \(EU\) 2018/1724](#) – establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services.
- [Regulation \(EU\) 2021/953](#) – on a framework for the issuance, verification and acceptance of interoperable COVID-19 vaccination, test and recovery certificates (EU Digital COVID Certificate) to facilitate free movement during the COVID-19 pandemic.
- [Regulation \(EU\) No 910/2014](#) – on electronic identification and trust services for electronic transactions in the internal market.
- Proposal for a Regulation of the European Parliament and of the Council on [European Data Governance](#).
- Proposal for a Regulation on harmonised rules on fair access to and use of data – [Data Act](#).

### Websites

- <https://www.eucaris.net/>
- <https://ec.europa.eu/digital-building-blocks/wikis/display/EBSI/Home>
- <https://civitas-reveal.eu/>

- <https://uvarbox.eu/>
- <https://toop.eu/>

## Appendix A

### ***Data required for the Enforcement of UVARs such as Low Emission Zones***

#### ***Vehicle Data***

- Euro emission standard (Euro 1, Euro 2, Euro 3, Euro 6d TEMP etc.)
- CO2 emission
- Date of first registration
- Presence of exhaust particulate filter
- Any retrofits or reengining
- Type of exhaust particulate filter
- Vehicle category/class/subcategories (e.g., M1, M2, M3, N1, N2, N3 etc.)
- Special vehicle classifications, e.g., Agricultural, Army, emergency, mobile crane etc, specify if possible
- Fuel type (e.g., diesel, petrol, BEV, hybrid, fuel cell, PHEV, LPG, CNG, LNG)
- Fuel type plus maximum range possible for PHEV
- Vehicle Identification Number (VIN)
- Weight of the vehicle
- Number of Axles
- Number of seats
- Length of the vehicle
- Maximum Axel load

#### ***Vehicle Owner/holder Data***

- Name of the vehicle/owner holder
- Current address of the vehicle owner/holder
- National identification number of the vehicle owner/holder

## Appendix B

### Information of datasets available with Vehicle Registration Authorities – inputs collected from European Vehicle and Driver Registration Authorities (EReg).






The two reports below, provided by EReg Secretariat and published on their website indicate the datasets available with vehicle registration authorities across the EU:

- EReg Topic Group XXI, [Harmonization of registration procedures, and data quality, Proposal on the registration of vehicle data for M1](#), July 2020
- EReg Topic Group XXI, [Harmonization of registration procedures, and data quality, Proposal on the registration of vehicle data](#), October 2021

## Appendix C

Appendix C gives the full list of requirements of the system as a whole scored for our contributing cities and solution types were relevant.

Table 1: Rating categorisation
























	Unknown
	Yes
	Yes in progress/ near future or possible but not legally
	Needs clarification/could be but not yet the case
	No

### Non-functional requirements

Table 1: Requirements

G	General	P	Performance
O	Organisational	Q	Quality
L	Legal	<b>Class</b>	
S	Solution	M	Mandatory
T	Technical	I	Ideally

Table 5: Rating on requirements

#	Requirement	Class	Cities						Solution models			
			Aachen	Antwerp	Barcelona	Brussels	Rotterdam	Verona	Authority	Owner	Vehicle	
G01	The system as a whole supports cross-border exchange of vehicle and owner data	M										
G02	Should be sustainable and minimise the burden for EU citizens of extra costs and being able to enter UVARs	I										
G03	Should be cost efficient	I										

UVAR Exchange - Recommendations on improving data sharing to enforce UVARs in a cross border context

#	Requirement	Class	Cities						Solution models		
			Aachen	Antwerp	Barcelona	Brussels	Rotterdam	Verona	Authority	Owner	V e chile
G04	Needs to work for ANPR and manual schemes	M	...	✓	✓	✓	✓	✓	✓	✓	...
G05	Should accommodate different enforcement entities	M	✓	✓	✓	✓	✓	✓	✓	✓	...
G06	Should work for all types of UVARs	I	...	✓	✓	✓	✓	✓	✓	✓	...
O01	Vehicle owners should ideally not have to preregister to be able to enter a UVAR legally	I	✗	+	...	+	+	...	✓	...	+
O02	Should be able to be implemented EU wide	I	...	...	...	...	...	...	✓	✓	...
O03	The cross-border exchange process should be simplified	I	...	...	...	...	...	...	✓		...
O04	Solution provider should be able to have a direct link to governing authority	I	...	✓	✓	✓	✓	✓	✓	...	
O06	If registration of the vehicle is necessary for the vehicle owner/holder, the solution should incorporate mechanisms that make the process easy	I	✓	+	+	+	...	...	...	✓	...
O07	Vehicle information should be aligned in EU	I									
O08	Should accommodate (vehicle-type based) exemptions	I	✓	✓	✓	✓	✓	✓	✗	✓	...
S01	The solution must have a level of maturity that an EU-wide rollout is evident possible within 3 (5) years	I							✓	✓	✗
S02	The solution should provide an API or other mechanism by which requests can be activated	I							✓	✓	
S03	The solution should provide a response API / mechanism with handshake to ensure delivery of the information	I							✓	✓	
S04	Should be easy to use for authorities	M							✓	...	
S05	Should have good cybersecurity for personal data	M							✓	✓	...
S06	Needs to work for all vehicles, not just new ones	M							✓	✓	✗
S07	A single option for vehicle identification as well as sending fines	I							✓	✓	
S08	Should have a roadmap explaining how it can be feasible to be implemented in all Member States	I							✓	✓	...
S09	Should be accompanied with technical functional documentation supporting the implementation of its components by all needed local national organisations	M							✓	...	
S10	Is similar to what cities are currently using.	I							✓	✗	✗
S11	The system should give reliable, valid data, and be robust against fraud.	M							✓	...	
T01	Vehicle types should be made available on request for foreign vehicles based on the number plate (or registration)	M							✓	✓	...
T02	Vehicle UNECE category should be made available on request for foreign vehicles base on the Number plate (or registration)	M							✓	✓	✓

#	Requirement	Class	Cities						Solution models		
			Aachen	Antwerp	Barcelona	Brussels	Rotterdam	Verona	Authority	Owner	V ehicle
T03	Vehicle weight should be made available on request for foreign vehicles based on the number plate (or registration)	M							✓	✓	✓
T04	Vehicle length should be made available on request for foreign vehicles based on the number plate (or registration)	M							✓	✓	✓
T05	Vehicle propulsion type should be made available on request for foreign vehicles based on the number plate (or registration)	M							✓	✓	✓
T06	Vehicle Euro norm and propulsion should be made available on request for foreign vehicles based on the number plate (or registration)	M							✓	✓	✓
T07	Vehicle retrofit should be made available on request for foreign vehicles based on the number plate (or registration)	I							✓	✓	...
T08	Vehicle owner data should be made available based on the number plate (or registration) on request for foreign vehicles that do not comply to regulations	M							✓	✓	...
T09	Interfaces need to be standardized	I							✓	✓	✓
T10	The vehicle information should be in a standardised form, so that it can be exchanged between countries.	I							✓	...	✓
T11	Query multiple countries in one batch if needed	I							✓		
T15	Technical interfaces must be based on documented open standards	I							✓	✓	✓
T16	Ideally give vehicle holder, where this varies from the owner and is available	I									
P01	The solution must be scalable for retrieving 1 million foreign vehicle technical information requests per day over the whole of Europe	M							✓	✓	...
P02	The solution must be scalable for retrieving 50.000-100.000 on foreign owner information requests per day for LEZs	M							✓	✓	...
P03	Response time should be within 72 hours amount of time	I							✓	✓	✓
P04	Include performance indicators/ reporting.	I									
Q01	The solution should be available for 95% of the time with a maximum downtime of 1 day once per quarter	M							✓	✓	✓
Q03	Vehicle information obtained must be up to date and correct, and protected from fraud	M									
Q04	Vehicle data needs to be validated by national authority to prevent / reduce fraudulent entries	M							✓	✓	