Regulating Vehicle Access for improved Livability

D2.1 Inventory of UVAR measures on ZEZ, Spatial Interventions and Pricing Measures

Ghent University

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Summary sheet

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ReVeAL partners

	Partner name	Abbreviation	Country
1	Stadt Bielefeld	Bielefeld	Germany
2	Comune di Padova	Padova	Italy
3	Università degli studi di Padova	UNIPD	Italy
4	Gemeente Helmond	Helmond	Netherlands
5	V-Tron BV	V-TRON	Netherlands
6	Municipality of Jerusalem	Jerusalem	Israel
7	City of London Corporation	CoL	UK
8	Transport for London	TfL	UK
9	Centro de Estudios Ambientales	CEA	Spain
10	Sadler Consultants Europe GmbH	Sadler	Germany
11	TRT Trasporti e Territorio SRL	TRT	Italy
12	WSP Sverige AB	WSP	Sweden
13	Polis	Polis	Belgium
14	Universiteit Gent	UGent	Belgium
15	Rupprecht Consult – Forschung und Beratung GmbH	Rupprecht	Germany

Document history

Version	Date	Organisation	Main area of changes	Comments
1.0	November 30, 2019	UGent	Construction of document	Previous versions were made in another layout
2.0	December 13, 2019	UGent	Revision of the document following the delayed timeline for D2.1 and D2.2	New selection of city case studies and building blocks
2.1	December 18, 2019	UGent	Incorporation of comments and revisions by the MFLs and project coordinator	

List of acronyms

BB	Building Block
FO	Future Options
LEZ	Low-Emission Zone
LTZ	Limited Traffic Zone
MFA	Measure Field Area
MFL	Measure Field Leader
PM	Pricing Measures
PZEZ	Pathways to ZEZ
SI	Spatial Interventions
UK	The United Kingdom
USA	The United States of America
ZEZ	Zero-Emission Zone

ReVEAL overview

Smarter urban vehicle access regulations

Despite urgent calls for "smarter urban vehicle access regulations" in the Urban Mobility Package and other high-level political commitments, very few decision makers are keen on going public with the idea of restricting car access (in time or space) in urban areas. ReVeAL will help to add Urban Vehicle Access Regulations (UVAR) to the standard range of urban mobility transition approaches of cities across Europe. Toward this end, the ReVeAL consortium will combine conceptual work and case study research with hands-on UVAR implementation in six pilot cities and systematic stakeholder interaction and professional communication activities.

The ReVeAL approach works along three different dimensions when considering the implementation of new UVARs:

1. It looks at a range of UVAR measures, grouping them into *Measures Fields*.
2. It looks at all measures through the lens of four *Transition Areas*, which need to be taken into account in any local setting (Governance and Financing, Mobility Services and Concepts, System Design and Technology, User Needs and Acceptance)
3. It approaches all of these in the light of the stages of the change process, understanding that cities at different stages are capable of different levels of ambition.

These aspects are crucial to consider for the implementation of any kind of UVAR measure. ReVeAL will open and expand the UVAR toolbox through a dedicated work package (WP2 – UVAR Options and Scenarios), covering both established and cutting-edge approaches. The most important and new ones are Pathways to Zero-Emission Zones (ZEZ) as well as planning and design-related approaches for Spatial Interventions at district level such as superblocks. Also included is the broad array of Pricing Measures (e.g. dynamic road and curb space user charges, congestion charging, paid or regulated parking space) and radically novel approaches such as C-ITS-based strategies to control vehicle access through automated C2I communication or geo-fencing. ReVeAL includes world-leading experts in these four areas who can support the pilot cities during the design and implementation of their UVAR measures. Some of these approaches will be considered in more detail in scenario building activities which will take place in each of the Pilot Cities.

Overview of Deliverable 2.1: Inventory of UVAR measures on ZEZ, Spatial Interventions and Pricing Measures

This deliverable defines the raw data and documentation of the current state internationally. As such, a short list of city case studies has been selected for detailed description of UVAR strategies, and city examples have been selected for general description of UVAR building block for three Measure Fields: Spatial Interventions, Pricing Measures and Pathways to ZEZ (formerly known as ZEZ)[1]. In addition, the short list also contains various building blocks in the MFA Future Options. This short list is a first step towards an extensive, searchable UVAR database and will be elaborated on in task T2.3 (and deliverable D2.4).

Describing urban vehicle access regulations

ReVeAL is gathering and structuring existing evidence, current trends and developments in the implementation of various UVAR measures in Europe and around the world. Evidence will be gathered in four ReVeAL Measure Fields, namely:

- Spatial Interventions
- Pricing Measures
- Pathways to ZEZ
- Future Options

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[1] In D2.1, we refer to the MFAs Spatial Interventions (SI), Pricing Measures (PM), Future Options (FO) and Pathways to ZEZ (PZEZ). The last one was formerly known as Zero-Emissions Zones (ZEZ); however, in consultation with the Measure Field Leader, it was decided to change the title to "Pathways to ZEZ". Spatial Interventions and Pricing Measures are methods, whereas ZEZ is a goal that can be reached through regulations, pricing or spatial interventions. Most of the regulations are the same mechanisms that can be extended into ZEZs. However, the title ZEZ can mislead cities into calling an UVAR a ZEZ when they actually mean a Low-Emission Zone (LEZ) or Limited Traffic Zone (LTZ). Therefore, a broader title was selected, indicating that several steps can be taken towards the end goal of a ZEZ. In addition, the project examines existing schemes, yet the few ZEZ that are currently in place are very recent. Therefore, it was decided to keep the theme but change the labelling. As such, the MFA Pathways to ZEZ covers a range of schemes including LEZ, LTZ, schemes regulating limited access to freight traffic to protect road safety of vulnerable road users (with, for example, a possible end goal of Vision Zero) or schemes aimed at reducing the number of cars entering an area to improve quality of life (e.g., air quality, noise levels, car-free public spaces, etc.). The MFA focuses on schemes that require a regulatory instrument (often called a 'ban'). This overlaps in some cases with Spatial Interventions as, for larger car-free areas (such as in the pilot city Helmond), vehicle access for delivery and servicing is needed, and to be a ZEZ, these need to meet certain regulatory requirements.

The purpose is to construct a ReVeAL knowledge base that will serve as a basis for building UVAR-related scenarios for the six ReVeAL pilot cities as well as feed into the Process Advisor of the decision support tool for cities post-project.

The knowledge base is filled with best practices and experience of existing UVAR implementations and with observed processes in the pilot cities. Data will be collected and related to the three Measure Fields: Spatial Interventions, Pricing Measures and Pathways to ZEZ. Future Options are handled differently as, due to their nature, few known implementations exist.

Two types of UVAR activity will be collected:

4. **City case studies**

A city case study is an extensive review of a city where implementation of measures in one or more Measure Fields has taken place (e.g., a ZEZ by design in Amsterdam, a pollution charge in London or the circulation plan in Ghent). Each case study examines the change processes through the lens of the four ReVeAL Transition Areas and gives a global and connected view of UVAR implementation. For deliverable D2.1, a short list of example UVAR strategies for 8 city case studies has been selected.

5. **UVAR building blocks**

A measure in this context is a building block (e.g. a parklet) that moves in the direction of a larger implementation (e.g. superblock). Such measures may take the form of small or large-scale initiatives, or specific aspects of initiatives ranging across the different ReVeAL Transition Areas. These could include, for example, parklets, urban freight regulation, or successful methods to implement an aspect of a controversial LEZ (e.g. a logistics hub). For deliverable D2.1, a short list of example UVAR building blocks from 30 cities has been selected.
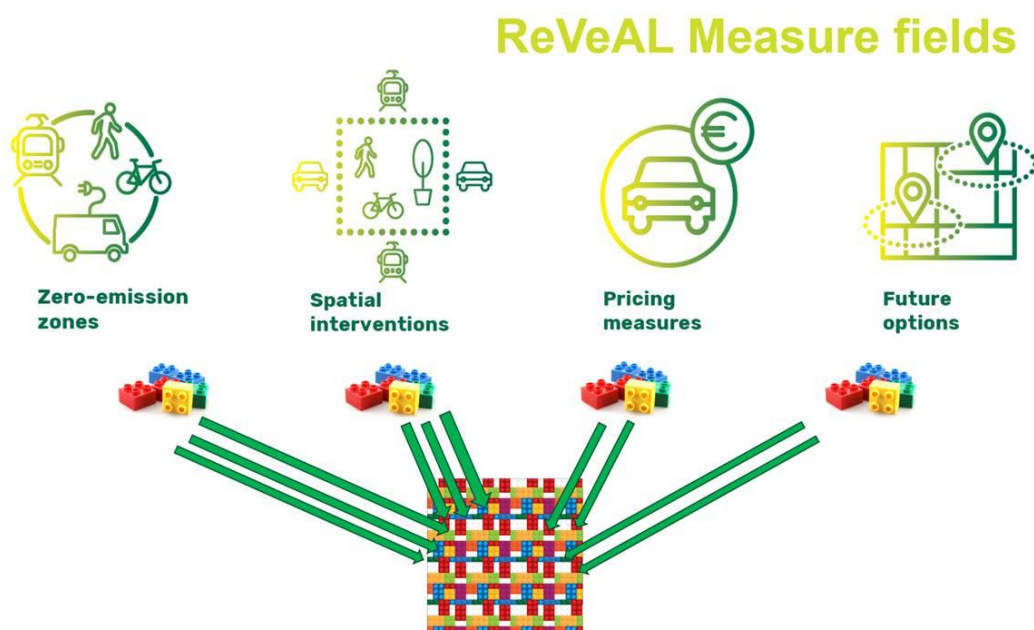

Figure 1. The aim of the inventory is to describe UVAR building blocks and strategies for the various MFAs. One or more building blocks from the different MFAs can constitute an UVAR strategy

Many different types of UVARs are in place and increasingly combined schemes. This can include an LTZ combined with LEZ, or an LTZ that makes available additional road space, enabling SI measures to improve the city and 'compensate' for any inconvenience. The strategies outlined in ReVeAL may not suit every new city, but there are many different UVAR building blocks that can be combined (also from different MFAs) to produce a strategy that is appropriate to that city. This is then combined with aspects from the transition framework that gives a common way of looking at Best Practice UVARs. This is detailed further in D2.2 (Set of Categories of UVAR measures in ZEZ, Spatial Interventions and Pricing Measures).

Short list of city case studies

The D2.1 Inventory of UVAR Measures consists of a database of UVAR strategies/concepts with specific example city case studies in the measure fields Spatial Interventions, Pricing Measures and Pathways to ZEZ.

For this deliverable (due in month 6), the number of case studies was limited to 8 (3 for Spatial Interventions, 2 for Pricing Measures and 3 for Pathways to ZEZ). These city case studies were chosen to provide a wide range of examples of UVAR strategies in the different MFAs and for a wide geographical and contextual spread (for Europe). Eastern European cities are underrepresented due to a limited number of UVAR implementations there. Keeping in mind the data collection necessities for the detailed strategy and process description for deliverable D2.4, the final selection for the UVAR Inventory short list of city case studies includes:

Spatial Interventions

o   Barcelona, Spain (Superblocks)
o   Ghent, Belgium (Circulation plan)
o   Mechelen, Belgium (Zone prioritizing active modes)

Pricing Measures

o   Greater London, UK (Pollution charge applied to a perimeter or an area)
o   Milan, Italy (Congestion charge applied to a perimeter or an area)

Pathways to ZEZ

o   La Rochelle, France (Delivery regulations – LEZ/LTZ by vehicle trip)
o   Bologna, Italy (LTZ – increasingly limited traffic)
o   Amsterdam, The Netherlands (Low/Zero-emission zone)

The city case studies in the UVAR Inventory show the implementation of UVAR strategies/concepts for various international state-of-the-art examples for each Measure Field Area (MFA). They are linked to:

- the building blocks as described in deliverable D2.2 (Set of Categories of UVAR Measures) that form the strategy/concept;
- a detailed explanation of the Impact and Process Parameters; and

- Indicators in deliverable D2.3 that describe the characteristics of the strategy/concept.

The UVAR Inventory documents the UVAR strategy/concept, city case study and Measure Field. The short list mainly refers to strategies that have been successfully implemented. The description in task T2.3 (resulting in deliverable D2.4) will elaborate further on the process of the city case studies by categorizing the case studies (from Task 2.1) according to the set of categories developed in Task 2.2.

Ideally, the case study cities show a wide range of strategies that combine various building blocks (or implement specific building blocks in light of a broader strategy), acting as case study examples of UVAR implementations. This results in a framework that should be generally applicable and should also serve as a general framework for cases outside the pilot cities (from the overall goal of providing an UVAR inventory within a European project). Therefore, existing cases are matched with the needs of new cities interested in UVAR implementation.

Table 1: Short list of UVAR strategies and related city case studies

MFA	City case study	Country	UVAR strategy
SI	Barcelona	Spain	Superblocks
SI	Ghent	Belgium	Traffic circulation plan
SI	Mechelen	Belgium	Cycling zone
PM	Milan	Italy	Congestion charge applied to a perimeter or an area
PM	Greater London	UK	Pollution charge applied to a perimeter or an area
PZEZ	La Rochelle	France	Delivery regulations
PZEZ	Bologna	Italy	Limited Traffic Zone (LTZ)
PZEZ	Amsterdam	Netherlands	Low-/Zero-Emission Zones (LEZ/ZEZ)

Short list of building blocks

The D2.1 Inventory of UVAR Measures also contains a database of UVAR building blocks (and building block subtypes) with city examples in the measure fields Spatial Interventions, Pricing Measures and Pathways to ZEZ, and by extension possible building blocks for the MFA Future Options.

For this deliverable (due in month 6), the number of example cities was limited to 30 (7-8 for each MFA). These city case studies were chosen to have a wide range of example UVAR building blocks in the different MFAs and a wide geographical and contextual spread (for Europe). This short list is the selection of building blocks that constitute the widest range of possible combinations to address specific UVAR strategies. The long list can be found in D2.2. Eastern European cities are underrepresented due to a limited number of UVAR implementations in that area. Keeping in mind the data collection requirements for the general description through the city-ID cards, the following cities were selected for the short list of building blocks and city examples:

Spatial Interventions

o   School street – car-free school area (London, UK)
o   Cycling streets (Ghent, Belgium)
o   Traffic filer – road block (Barcelona, Spain)
o   Removing parking spaces – parklet (Paris, France)
o   Cycle lane – redistribution of road space (Oslo, Norway)
o   Pedestrian street – mixed use cycling-pedestrians (Ljubljana, Slovenia)
o   Bus/tram priority lane (Freiburg, Germany)
o   Woonerf (Sibiu, Romania)

Pricing Measures

O   Congestion charge – applied to a perimeter or an area (Milan, Italy)
o   Congestion charge – applied to specific points (Oslo, Norway)
o   Congestion charge – distance-based charge (Singapore)
o   Pollution charge – applied to a perimeter or an area (London, UK)
o   Parking charge – dynamic price (real time) (San Francisco, USA)
o   Parking charge – emission-based charge (Madrid, Spain)
o   Traffic flow management – time-based charge (Valletta, Malta)

Pathways to ZEZ

o   Regulations by emissions (Brussels, Belgium)
o   Regulations by vehicle type and dimension – vehicle type (Paris, France)

o   Regulations by vehicle type and dimension – HDV/LDV (Utrecht, The Netherlands)
o   Regulations by trip purpose – delivery (Strasbourg, France)
o   Scheme timescale – night time regulations (Stockholm, Sweden)
o   Scheme timescale – time window (Madrid, Spain)
o   Regulations by permit – permit to travel (Siena, Italy)
o   Regulations by permit – permit (planning) (London, UK)

Future Options

o   Geofencing (enabler)
o   Connected vehicles and infrastructure (enabler)
o   Autonomous vehicles (enabler)
o   Digital twins/data sharing platforms/standards/systems (enabler)
o   Dynamic traffic signalling/management/ITS/rerouting (indirect UVAR)
o   Dynamic curb side management/parking management (indirect UVAR)
o   Sharing/mobility hub/MaaS/rented micro-mobility (promote alternatives)

The city examples in the UVAR Inventory (short list of building blocks) show the implementation of UVAR building blocks for various international state-of-the-art examples for each Measure Field Area (MFA). The selection of the short list is linked to the Set of Categories of UVAR Measures (D2.2), which show the long list of UVAR building blocks and city examples. The UVAR Inventory short list of building blocks documents the UVAR building block, example city and Measure Field (excluding the MFA Future Options).

Table 2: Short list of building blocks and related example cities

MFA	UVAR building block	City example	Country
SI	School street - car-free school area	London	UK
SI	Cycling streets	Ghent	Belgium
SI	Traffic filter - road block	Barcelona	Spain
SI	Removing parking spaces - parklet	Paris	France
SI	Cycle lane - redistribution of road space	Oslo	Norway
SI	Pedestrian street - mixed use cycling-pedestrians	Ljubljana	Slovenia
SI	Bus/tram priority lane	Freiburg	Germany
SI	Zone de rencontre/Begegnungszone/woonerf	Sibiu	Romania
PM	Congestion charge - applied to a perimeter or an area	Milan	Italy
PM	Congestion charge - applied to specific points	Oslo	Norway
PM	Congestion charge - distance-based charge	Singapore	Singapore
PM	Pollution charge - applied to a perimeter or an area	London	UK
PM	Parking charge - dynamic price (real time)	San Francisco	US
PM	Traffic flow management - time-based charge	Valletta	Malta
PM	Urban logistic charge - size/load-based charge	Parma	Italy
PZEZ	Regulations by emissions	Brussels	Belgium
PZEZ	Regulations by vehicle type and dimension - vehicle type	Paris	France
PZEZ	Regulations by vehicle type and dimension - HDV/LDV	Utrecht	The Netherlands
PZEZ	Regulations by trip purpose - delivery	Strasbourg	France
PZEZ	Scheme timescale - night time regulations	Stockholm	Sweden
PZEZ	Scheme timescale - time window	Madrid	Spain

PZEZ	Regulations by permit - permit to travel	Siena	Italy
PZEZ	Regulations by permit - permit (planning)	London	UK
FO	Geofencing (enabler)	/	/
FO	Connected vehicles and infrastructure (enabler)	/	/
FO	Autonomous vehicles (enabler)	/	/
FO	Digital twins/data sharing platforms/standards/systems (enabler)	/	/
FO	Dynamic traffic signalling/management/ITS/rerouting (indirect UVAR)	/	/
FO	Dynamic curb side management/parking management (indirect UVAR)	/	/
FO	Sharing/mobility hub/MaaS/rented micro-mobility (promote alternatives)	/	/

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Annex

UVAR inventory: short list of city case studies and UVAR strategies and short list of city examples and building blocks

City Case Studies

Measure field	UVAR strategy	City	Country	Description	Reference
Spatial interventions	Superblocks	Barcelona	Spain	The freeing up of public space to manage traffic and promote active travel modes by limiting motorized vehicle access within a combination of various building blocks in the city into one superblock of around 400mx400x.	https://www.vox.com/energy-and-environment/2019/4/9/18300797/barcelona-spain-
Spatial interventions	Traffic circulation plan	Ghent	Belgium	Limiting through traffic and increasing accessibility by sustainable transport modes by reducing the number of motorized vehicles in the historic city center of Ghent. The circulation plan divides the city in sectors and car-free areas to increase the livability.	https://stad.gent/nl/mobiliteit-openbare-werken/mobiliteit/plannen-projecten-subsidies-cijfers-scholenwerking/het-
Spatial interventions	Cycling zone	Mechelen	Belgium	The entire city center of the city center of Mechelen was converted to a cycle zone, consisting of 179 cycling streets where the cyclists have priority and motorized vehicle are considered as guest in the public space and can only drive at a reduced speed.	https://www.mechelen.be/fietszone
Pricing measures	Congestion charge applied to a perimeter or an area	Milan	Italy	The congestion charge in Milan applies to the city center (Cerchia dei Bastioni area) replacing the former pollution charge. It works 07:30-19:30, Monday to Friday, excluding public and bank holidays. If a vehicle enters the charging zone during these times, it needs to pay the congestion charge. Exemptions are foreseen for low-pollutant vehicles. Moreover, the system has been recently flanked by a LEZ covering the urban area.	https://www.comune.milano.it/aree-tematiche/mobilita/area-c
Pricing measures	Pollution charge applied to a perimeter or an area	Greater London	United Kingdom	London combines the application of pollution charging mechanisms on two different scales. An Ultra Low Emission Zone (ULEZ) operates 24 hours a day, 7 days a week, within the area of central London. Most vehicles, including cars and vans, need to meet the ULEZ emissions standards or their drivers must pay a daily charge to drive within the zone. At the same time, a LEZ covers most of Greater London and is in operation 24 hours a day, every day of the year. Vehicles that do not meet LEZ standards need to pay an entry fee. The two systems are additional to a congestion charging scheme, which is in place in central London.	https://tfl.gov.uk/modes/driving/ultra-low-emission-zone https://tfl.gov.uk/modes/driving/low-emission-zone

Pathways to ZEZ	Delivery Regulation - LEZ/LTZ by vehicle trip	La Rochelle	France	Regulating deliveries with a time window, is used widely, for example to ensure pedestrian areas can recieve deliveries. Additional requirement can be added to this to make it increasingly difficult for non-EV / non-sustainable mobility, up to a stage when they are not possible	http://urbanaccessregulations.eu/countries-mainmenu-147/netherlands-mainmenu-88/amsterdam
Pathways to ZEZ	LTZ - increasingly limiting traffic	Bologna	Italy	ZTL with Access enabled through purchase of 3 permits per year and time periods, and with limited exemptions. Emissions standards appllied, strengthening over time to ZEZ. Reducing residents permits.	https://urbanaccessregulations.eu/countries-mainmenu-147/italy-mainmenu-81/toscana-
Pathways to ZEZ	Low/Zero Emission Zones (LEZ/ZEZ)	Amsterdam	The Netherlands	Regulation to a ZEZ. A camera enforced LEZ, started in 2008 for lorries only under a covenant. Phased tightening by vehicle type, fuel and in future phases. Extended to all vehicles in 2017, and plans to become a ZEZ in 2025/30.	https://www.agglo-larochelle.fr/-/place-aux-solutions-durables-pour-la-livraison-en-centre-ville

City examples (20-30)

Measure field	UVAR building block	City	Country
Spatial interventions	School street - car-free school area	London	United Kingdom
Spatial interventions	Cycling streets	Ghent	Belgium
Spatial interventions	Traffic filter - road block	Barcelona	Spain
Spatial interventions	Removing parking spaces - parklet	Paris	France
Spatial interventions	Cycle lane - redistribution of road space	Oslo	Norway
Spatial interventions	Pedestrian street - mixed use cycling-pedestrians	Ljubljana	Slovenia
Spatial interventions	Bus/tram priority lane	Freiburg	Germany
Spatial interventions	Zone de rencontre/Begegnungszone/woonerf	Sibiu	Romania
Pricing measures	Congestion charge - applied to a perimeter or an area	Milan	Italy
Pricing measures	Congestion charge - applied to specific points	Oslo	Norway
Pricing measures	Congestion charge - distance-based charge	Singapore	Singapore
Pricing measures	Pollution charge - applied to a perimeter or an area	London	United Kingdom
Pricing measures	Parking charge - dynamic price (real time)	San Francisco	United States
Pricing measures	Parking charge - emission-based charge	Madrid	Spain
Pricing measures	Traffic flow management - Time-based charge	Valletta	Malta
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Pathways to ZEZ	Scheme timescale - night time regulations	Stockholm	Sweden
Pathways to ZEZ	Scheme timescale - time window	Madrid	Spain
Pathways to ZEZ	Regulations by permit - permit to travel	Siena	Italy
Pathways to ZEZ	Regulations by permit - permit (planning)	London	United Kingdom
Future Option	Geofencing (enabler)	/	/
Future Option	Connected vehicles and infrastructure (enabler)	/	/
Future Option	Autonomous vehicles (enabler)	/	/
Future Option	Digital twins/data sharing platforms/standards/systems (enabler)	/	/
Future Option	Dynamic traffic signaling/management/ITS/rerouting (indirect UVAR)	/	/
Future Option	Dynamic curb side management/parking management (indirect UVAR)	/	/
Future Option	Sharing/mobility hub/MaaS/rented micro-mobility (promote alternatives)	/	/