

D2.3 – Technical and legal requirements, KPIs and use cases

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Acronyms

Acronym	Meaning
EU	European Union
WP	Work Package
KER	Key Exploitable Result; Service
DoA	Description of the Action
KPI	Key Performance Indicator
SUMP	Sustainable Urban Mobility Plan
SULP	Sustainable Urban Logistics Plan
UFT	Urban Freight Transport
MAD	City of Madrid
FLO	City of Florence
BER	City of Berlin
MEC	City of Mechelen
PRA	City of Prague
FUN	City of Funchal
RIG	City of Riga
LEZ	Low Emissions Zone
UCC	Urban Consolidated Centre

Executive Summary

This report presents the results produced in the tasks T2.3, T2.4 and T2.5 of the Work Package (WP) 2 of the UNCHAIN project.

T2.3 is focused on the definition of a KPIs' collection to measure the impact of the implementation of UNCHAIN services in the living labs and the follower cities. The collection of these indicators must cover all the topics related to urban logistics, in order the partners involved in each demonstration identify proper KPIs to assess their pilot tests. The process followed to define the list of indicators is presented in section 4.

The next task's results presented in the report are those linked to T2.4. This task is focused on generating a list of technical and legal requirements, to support technical partners in the development of the project outcomes. Most of these outcomes are the services to be demonstrated in the project's demo sites. The methodology followed to gather all the requirements, and the tables containing these requirements are presented in section 3.

The last task of the WP2 is T2.5. This task is aimed to generate a first approach for the demonstration scenarios, by having bilateral meetings between cities and service developers. Obviously, each demonstration site is testing some of the services, so the meetings were attended by those service developers involved in the cities' pilot tests. The demonstration scenario, named usage scenario, intends to identify a real location in the city where different actions have to be performed by different users' profiles (mainly logistics customers, logistics professionals and city administrators). The actions of the user will allow the developers to monitor and assess their services. The usage scenarios proposed for each demo site are presented in section 5.

Finally, the main conclusions derived from the results generated in the different project's tasks reported in this document, are presented in section 6.

1. Introduction.

This is the last deliverable of WP2, and its release closes the project's tasks focused on defining logistics requirements from the perspective of city councils, end users, logistics professionals and data-based service developers. While the first deliverable was focused on the analysis of the Sustainable Urban Mobility Plans (SUMP) and the Sustainable Urban Logistics Plan (SULP) of the demo sites (living labs and follower cities), and the second on the requirements of end users and professionals involved in the logistics processes, this deliverable is focused on services' requirements and usage scenarios definition.

Therefore, this document reports the results generated through the task 2.3 (KPIs identification), task 2.4 (requirements) and task 2.5 (usage scenarios definition) within WP2.

As stated in the DoA document, the project partners followed the VOLERE methodology to produce the requirements list for the services to be developed within the project. This requirements' list includes both, technical requirements and legal requirements. The list is generated per service, and is presented in section 3.2.

The process followed to produce a indicators' list to assess the impact of the services tested within the project's demonstration, is presented in the section 4. This process included a workshop attended by all partners, to assess the first collection of KPIs created through the review of different indicators' systems for urban logistics. These KPIs, if required, could be further enhanced, refined, and customized during the development and deployment of the usage scenario.

Section 5 is focused on presenting the usage scenarios defined to demonstrate the project's services in the living labs and the follower cities, according to the use cases described in the DoA document. These scenarios aim to match the cities interests with the requirements of services' developers to demonstrate the innovative features of their products in cities' realactual locations. These usage scenarios represent the status of the demonstrations at the end of the WP2, but it is expected that the scenarios reported in this deliverable evolve and are deeper defined and refined jointly with the services development (WP4 and WP5), and with the scaling up and large scale demonstration (WP6).

The main conclusions derived from the completion of the tasks T2.3, T2.4 and T2.5 are presented in Section 6. In addition, the document also includes diverse annexes, with the aim of supporting the deliverable's reading. These annexes present the raw information that has been employed to create the contents shown in the different report's sections.

2. Gender, ethics and data related issues

2.1. Gender related issues.

The research team working at this deliverable is the whole UNCHAIN consortium. As a general remark, the collection of KPIs presented in section 4 have not considered gender related issues, although there is a specific indicator in the social impact category addressing this topic. Regarding the services' legal and technical requirements, the gender related issues have been included in the specification list, under the criterion of the partners that have contributed to this collection.

2.2. Ethics related issues.

No people external to the UNCHAIN project consortium have participated in the activities reported in this document, so ethics related issues are not applicable.

2.3. Data related issues.

Data included in this report have been provided by partners, coming from their own sources (service's technical requirements) or from public sources (service's legal requirements, indicators' system, and city locations for usage scenarios). These data have been managed by ETRA and IBV, by adhering to the GDPR requirements and the project's data management plan.

3. Technical and legal requirements.

The definition of the UNCHAIN requirements is a relevant process that needed the contribution of all the partners since they will determine the functionalities and features of the following 12 innovative services that will be developed, deployed and tested:

- KER2. SUMP and SULPs guidance tool.
- KER3. Freight-efficient land use strategy.
- KER4. UCC location and integrated planning KIT.
- KER5. On-street loading zones planning tool.
- KER6. Active UVARs and city regulations tools.
- KER7. Knowledge powerhouse for urban logistics.
- KER8. Dynamic curb side management.
- KER9. Dynamic management of pick-up/drop-off points.
- KER10. IT Pop-Up delivery points management tool.
- KER11. Logistics operator monitoring system and incentives tool.
- KER12. Congestion forecasting and safe route planning.
- KER13. Advanced Management IT Cockpit of Shared Facilities.

3.1. Methodology.

The process followed to define the UNCHAIN requirements is based on the VOLERE methodology, which has already been successfully used in other H2020 and Horizon Europe projects (UPPER¹, USER-CHI², PODIUM³). The methodology consists of an iterative process of validation and revision of the different requirements. To be sure all partners are aware of the services and have the possibility to include their requirements, everybody is encouraged to actively participate in this definition taking into consideration the use every partner intend for all the services.

3.1.1. Approach.

VOLERE methodology is based in an integrated approach and specific requirements for the UNCHAIN services were obtained from the technical experts, public entities, and logistic operators of the consortium through under the iterative process shown in Figure 1 .

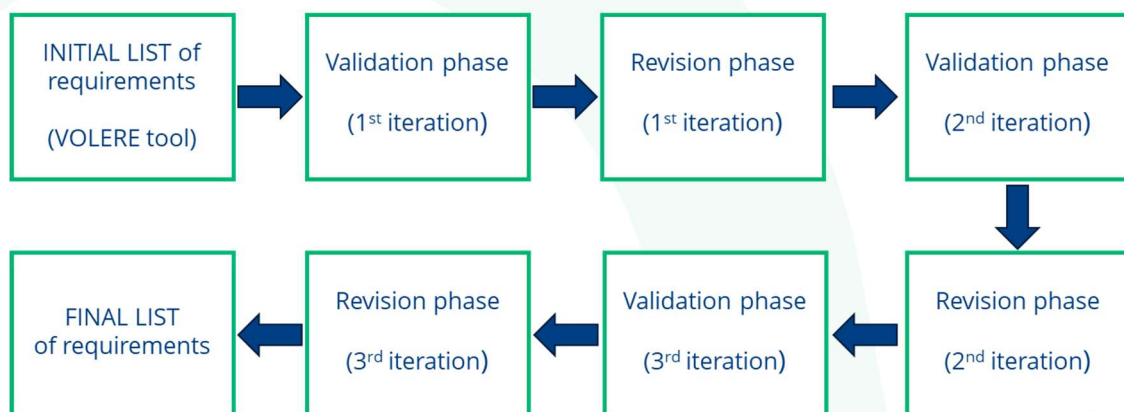


Figure 1: VOLERE methodological approach followed in UNCHAIN.

Despite the initial plan was to have the final list of requirements in 2 iterations, a third one was needed due to the exchange in the leadership of two of the services (KER5 initially developed by VMZ will be performed by ETRA meanwhile KER 12 initially lead by ETRA will be finally carried out by VMZ). This leadership change was considered the best option to cover the German cluster requirements to demonstrate a logistic route planner for cargo bikes in Berlin living lab. Indeed, the project's initial planning included a route planner developed by ETRA focused on general vehicles, but VMZ was very interested in developing a service specifically for cargo bikes. This new perspective in KER12 development, facilitated the leadership change between KER5 and KER12.

¹ <https://www.upperprojecteu.eu/>

² <https://www.userchi.eu/>

³ <https://podium-project.eu/>

3.1.2. VOLERE methodology.

VOLERE methodology has been followed in UNCHAIN for setting the requirements of the different services for its simplicity: (i) simple steps to identify and formalise the requirements unambiguously and (ii) easy process to track and evaluate the progress of the project. Moreover, this methodology provides a mechanism for all partners to specify the requirements in a common standard format.

To select requirements, five level priorities were introduced:

- 5 – High priority: Requirements in this class are either realizing a key innovation of the project or they are needed to realize it. These requirements are necessary to achieve the goals of the project
- 4 - 3 Medium priority: Requirements in this class are not necessary to realize a key innovation but they are necessary or very helpful to develop the services.
- 2 - 1 Low priority: Requirements in this class are not necessary neither for realizing a key innovation nor for the application of the services. However, in a broader context possibly beyond the scope of the project, they may be important.

Therefore, it is essential to fulfil the requirements with high priority and it is important to realize the requirements with medium priority as well (specially for the developers). The requirements with low priority, do not have immediate relevance to the project, but they may provide additional features or benefits so they are essential.

3.1.3. VOLERE tool.

The VOLERE tool used in this project to define the final list of requirements for the 12 innovative services within Task 2.4 is based on the methodology described above. Therefore, a list of requirements for each service was created but also a general group with common requirements to all the services were defined.

As a starting point, the developers made the initial list of requirements and after that all partners contributed through the iterative process of revision and validation, to finally set the requirements (Figure 2).

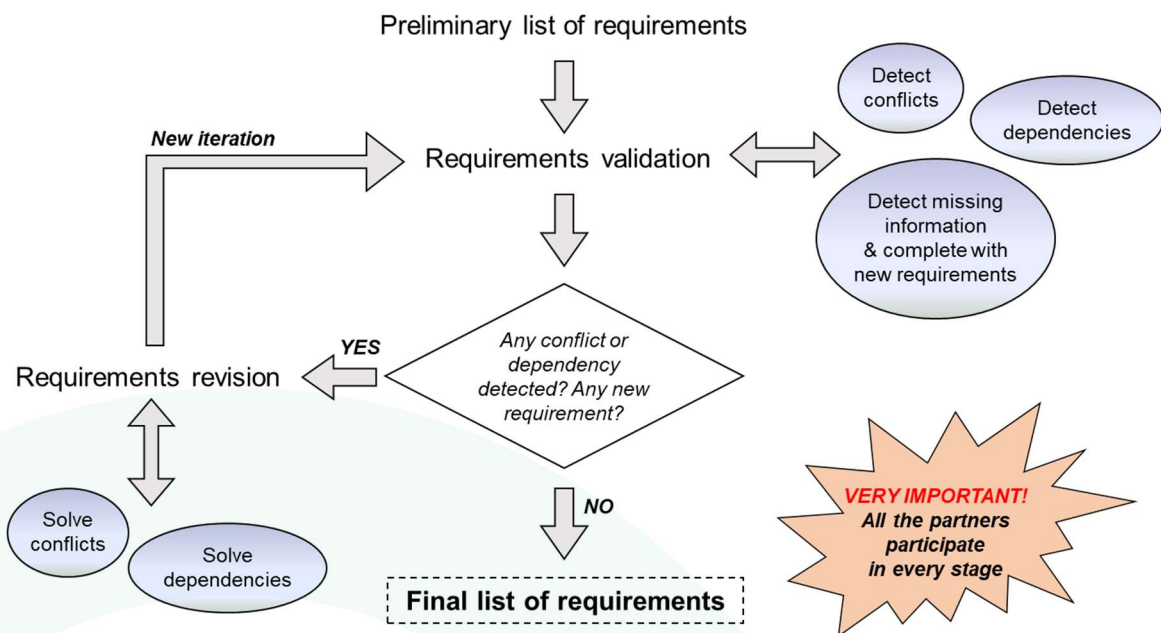


Figure 2: Requirements specification process diagram.

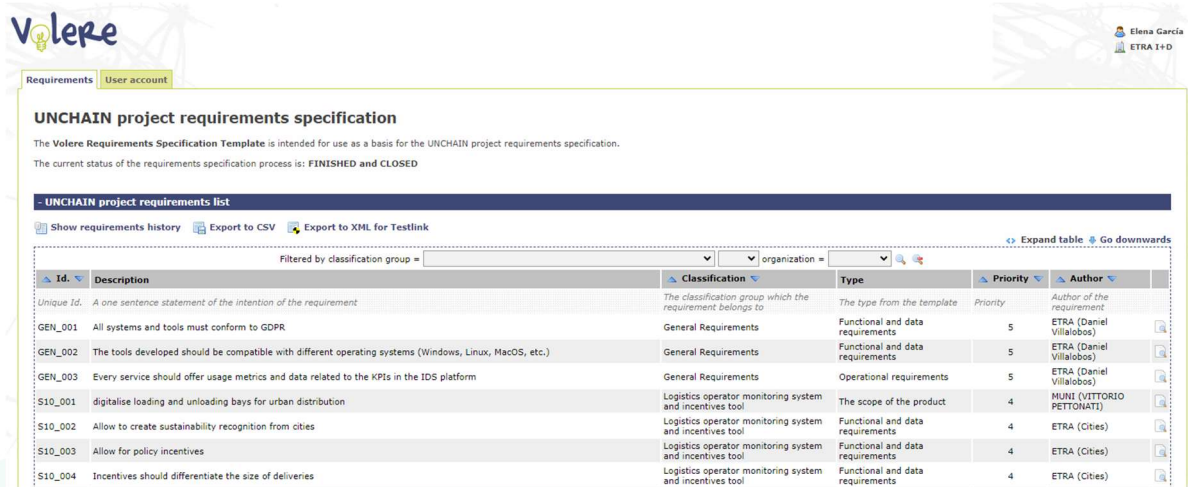
To explain the VOLERE methodology to all the partners, on July 25th, 2023, a workshop was scheduled and organised by ETRA to which all the developers attended.

The following sub-sections summarizes the indications to be followed to define the requirements with VOLERE explained during the workshop.

3.1.3.1. Definition of requirements.

In this first stage, an initial list of the requirements of the services should be defined. The developers were responsible for creating this primary list and all partners were encouraged to participate because the more multidisciplinary team worked on them, the more considerations included.

Initially, 156 requirements were included in the VOLERE web tool (Figure 3) from end of July (right after the workshop organized to explain the VOLERE methodology) to beginning of September 2023.



UNCHAIN project requirements specification

The Volere Requirements Specification Template is intended for use as a basis for the UNCHAIN project requirements specification.
The current status of the requirements specification process is: **FINISHED and CLOSED**

UNCHAIN project requirements list

Show requirements history Export to CSV Export to XML for Testlink

Filtered by classification group = organization =

Id.	Description	Classification	Type	Priority	Author
Unique Id.	A one sentence statement of the intention of the requirement	The classification group which the requirement belongs to	The type from the template	Priority	Author of the requirement
GEN_001	All systems and tools must conform to GDPR	General Requirements	Functional and data requirements	5	ETRA (Daniel Villalobos)
GEN_002	The tools developed should be compatible with different operating systems (Windows, Linux, MacOS, etc.)	General Requirements	Functional and data requirements	5	ETRA (Daniel Villalobos)
GEN_003	Every service should offer usage metrics and data related to the KPIs in the IDS platform	General Requirements	Operational requirements	5	ETRA (Daniel Villalobos)
S10_001	digitalise loading and unloading bays for urban distribution	Logistics operator monitoring system and incentives tool	The scope of the product	4	MUNI (VITTORIO PETTONATI)
S10_002	Allow to create sustainability recognition from cities	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)
S10_003	Allow for policy incentives	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)
S10_004	Incentives should differentiate the size of deliveries	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)

Figure 3: VOLERE main page.

The most useful information and the main functionalities of this stage available on the main page are:

- List of requirements: The list of requirements with some additional options.
 - Filtering options: The list of requirements filtered per id., type, and/or filtered per author.
 - Expand table: Show/hide some columns, displaying more or less information about the requirement.
- Requirements management: Modification options for requirements.
 - View a requirement.
 - Edit a requirement (only available for the author).
 - Delete a requirement (only available for the author).
- Requirements tracing: After the first validation, a new service is made available for keeping track of all requirements history.
- Insert a new requirement: Opens a new window to allow adding a new requirement. All the fields are required except for the “Comments” field which is optional. The required fields are:
 - ID: The code of this requirement. Appended by an automatically generated sequential number, this ID uniquely identifies each requirement. This ID will be generated after the requirement has been added.
 - Classification: The group of requirements to which the requirement belongs.
 - Description: A one-sentence statement which describes the intention of the requirement.
 - Type: The type of requirement as defined by VOLERE.
 - Rationale: A justification of the requirement.
 - Acceptance criteria: A measurement of the requirement for further verification that the solution matches the original requirement.
 - Priority: The importance for the customer of successfully implementing the requirement

3.1.3.2. Validation of requirements.

Once the initial list of requirements was considered as definitive, the validation process starts. Users check if the requirements should be approved or not. At this stage, objections, conflicts and dependencies between requirements are identified.

Objection

An objection is a reason or argument due to disagreement, opposition, refusal, or disapproval of the requirement.

To introduce an objection in VOLERE, the procedure is:

- Identify the Requirement ID to which we want to object.
- Add the objection by clicking the button 
- Select the requirement ID on which to make the objection and write the description of the Objection.

Then, the new objection has been created and the Validator (who introduced the objection) and Revisor (who generated the requirement) for the requirement is assigned.

Conflict

A conflict is the requirement that cannot be implemented if another requirement is implemented or there is a conflict due to an insufficient definition of the requirement.

To introduce a conflict in VOLERE, the procedure is:

- Identify the Requirements ID on which we want to make the conflict.
- Press icon  to add a new Conflict.
- Select the requirements IDs on which to make the conflict (a conflict occurs necessarily between two or more requirements) and write the description of the Conflict.

Then, a new conflict has been created and the Validator (who introduced the objection) and Revisor (who generated the requirement) for that requirement is assigned.

Dependency

A dependency is the direct link from one requirement to other.

To introduce a dependency on VOLERE, the procedure is as follows:

- Identify the Requirements IDs on which we want to establish the dependency.
- Press icon  to add a new Dependency.
- Select the requirement IDs on which we want to establish a dependency (remember, a dependency occurs necessarily between two or more requirements) and write the description of the Dependency.

Then, the new dependency has been created and the Validator (who introduced the objection) and Revisor (who generated the requirement) for that requirement is assigned.

3.1.3.3. Revision of requirements.

The revision phase comes after validation and consists of checking the dependencies, conflicts and objections detected. Since all partners are able to participate in this phase, the authors of the requirements can include the “revisor’s comments” in case they do not agree (see Figure 4).

Dependencies, conflicts and objections				
Please, revise the dependencies and conflicts detected by the validators on the list above or any other objections.				
				Go downwards
Id.	Dependency	Requirements revised	Validator's approval	Revisor's comments
		There are no dependencies on the requirements list!		
Id.	Conflict	Requirements revised	Validator's approval	Revisor's comments
		There are no conflicts on the requirements list!		
Id.	Objection	Requirements revised	Validator's approval	Revisor's comments
		- ETRA (Cities) ☒ S4_028 ☒ S4_029 ☒ S4_030 ☒ S4_031	☐ ETRA (Daniel Villalobos)	* Comment 1 by ETRA (Cities): Agree
OBJ_1610	These requirements are out of the scope of the tool			

Figure 4: Comments during the revision phase.

The procedure in the revision of the requirements is:

- Every partner identifies the requirements with objections, conflicts, or dependencies, by checking the requirement revised column in the dependencies, conflicts, and objections section.
- In case any objection, conflict or dependency emerged, the button “Add comment” should be clicked and the person who create the requirement could be reaffirmed, in case a description was confusing, or informed that the requirement should be edited.
- The person who wrote the requirement should mark the issue as revised once the action was made. Moreover, the person who detected the conflict, dependency or objection should mark the requirement as validated.

3.1.3.4. Final list of requirements.

Considering the VOLERE methodology is an iterative process, a certain number of loops should be done to achieve the final list of requirements (Figure 5). For the UNCHAIN project, this number was 3 iterations.

VOLERE

Requirements User account

UNCHAIN project requirements specification

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UNCHAIN project requirements list

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Expand table Go downwards

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S10_001	Digitalize loading and unloading bays for urban distribution	Logistics operator monitoring system and incentives tool	The scope of the product	4	MUNI (VITTORIO PETTONATI)
S10_002	Allow to create sustainability recognition from cities	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)
S10_003	Allow for policy incentives	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)
S10_004	Incentives should differentiate the size of deliveries	Logistics operator monitoring system and incentives tool	Functional and data requirements	4	ETRA (Cities)
S10_005	The system should provide an "as a service" backend layer for the Urban Active UVAIs and city regulations management	Logistics operator monitoring system and incentives tool	Operational requirements	4	MUNI (Vincenzo Savarino)
S10_006	The system should provide authorized role based front-end available via web or app	Logistics operator monitoring system and incentives tool	Operational requirements	5	MUNI (Vincenzo Savarino)
S10_007	MANAGING REWARD POLICIES - Once logged the PA Operator should be able to define and manage the rules of conduct for the acquisition of credits of the logistics operator	Logistics operator monitoring system and incentives tool	Functional and data requirements	5	MUNI (Vincenzo Savarino)
S10_008	REWARD Dashboard - Once logged the Logistic Operator should have access on behaviour information, the reward criteria and acquired rewards.	Logistics operator monitoring system and incentives tool	Functional and data requirements	5	MUNI (Vincenzo Savarino)
S11_001	The routes provided must be accessible by third party services of the logistics operators.	Congestion forecasting and safe route planning	The scope of the product	3	ETRA (Daniel Villalobos)
S11_002	The safe routes should be provided following any defined standard to allow to use it	Congestion forecasting and safe route planning	Operational requirements	4	ETRA (Daniel Villalobos)
S11_003	An operator should be able to set a street or zone as restricted based on different criteria (streets blocked due to construction work, manifestations, school out times, ...)	Congestion forecasting and safe route planning	The scope of the product	5	ETRA (Daniel Villalobos)
S11_004	Efficient routes should be calculated avoiding restricted areas	Congestion forecasting and safe route planning	Operational requirements	4	ETRA (Daniel Villalobos)
S11_005	The tool should display live status of the restricted streets or zones	Congestion forecasting and safe route planning	Operational requirements	4	ETRA (Daniel Villalobos)

Figure 5: VOLERE final list of requirements.

3.2. KERs' requirements.

The requirements have been classified into 13 groups. One group per each service and another transversal with common requirement called 'GENERAL'. Since naming the services as KER plus the number did not fit because the VOLERE tool just allow three letter per label, the groups and their respective service is gathered in Table 1:

Table 1: UNCHAIN relationship among VOLERE IDs and the services.

VOLERE ID	UNCHAIN Service	Name of the Service	Leader
GEN_	All	Common requirements of all services	-
S1_	KER2	SUMPs and SULPs guidance tool	VMZ
S2_	KER3	Freight-efficient land use strategy	IBV
S3_	KER4	UCC location and integrated planning KIT	VMZ
S4_	KER5	On-street loading zones planning tool	ETRA
S5_	KER6	Active UVARs and city regulations tools	MUNI
S6_	KER7	Knowledge powerhouse for urban logistics	EITUM
S7_	KER8	Dynamic curb side management	ETRA
S8_	KER9	Dynamic management of pick-up/drop-off points	MUNI
S9_	KER10	IT Pop-Up delivery points management tool	ETRA
S10_	KER11	Logistics operator monitoring system and incentives tool	MUNI

S11_	KER12	Congestion forecasting and safe route planning	VMZ
S12_	KER13	Advanced Management IT Cockpit of Shared Facilities	ETRA

The number of the service in VOLERE and of the KER are not the same since the KER1 is the Data-driven urban logistics cooperation framework which is the development of the IDSA architecture within WP3 and not one of the innovative services in WP4 and WP5. As explained in the relevant KER, this difference brings to confusion sometimes and deletions were needed afterwards.

3.2.1. Common requirements to all the services.

Despite each service has its own requirements, there are some that are transversal to all of them and are grouped in the general category. Table 2 shows the general requirements identified by the UNCHAIN members.

Table 2: General requirements common to the UNCHAIN services

VOLERE ID	Description	Priority	Type
GEN_001	All systems and tools must conform to GDPR	5	General Requirements
GEN_002	The tools developed should be compatible with different operating systems (Windows, Linux, MacOS, etc.)	5	General Requirements
GEN_003	Every service should offer usage metrics and data related to the KPIs in the IDS platform	5	General Requirements

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for the general requirements.

3.2.2. KER2: SUMP and SULPs guidance tool.

In KER 2, a web tool (called CLICK^{act}) will be used to assist cities in regularly monitoring and evaluating the measures introduced in the context of SULPs. Relevant data sources will be identified and, in some cases, automatically linked to the tool. The data input will be graphically processed and evaluated in real time in the CLICK^{act} - web interface. The cities can actively design and arrange the generated visualisations in individual dashboards.

The requirements identified for this service is listed in Table 3:

Table 3: Requirements identified for KER2. SUMPs and SULPs guidance tool.

VOLERE ID	Description	Priority	Type
S1_001	CLICK ACT should support the evaluation and monitoring of UCCs	5	The purpose of the product
S1_002	CLICK ACT should be a grafana based online tool that supports user within the monitoring of UCCs.	5	Look and feel requirements
S1_003	The focused user of CLICK ACT should be an urban planner	5	Users of the product
S1_004	CLICK ACT should follow current usability requirements to be easy to use	3	Usability and user centered requirements
S1_005	CLICK ACT must follow a top-down-approach	3	The scope of the product
S1_006	CLICK ACT must have a monitoring functionality	2	Functional and data requirements
S1_007	CLICK ACT must implement interfaces to online data backends in order to retrieve usage data for monitoring functionalities	2	Functional and data requirements
S1_008	Live data from KPI of UCCs must be provided by cities free of charge	5	Functional and data requirements
S1_009	CLICK ACT should provide different templates recommend examples of monitoring charts	4	Functional and data requirements
S1_010	CLICK ACT should provide different visualization types	4	Functional and data requirements
S1_011	CLICK ACT should have an overview monitoring page of all related UCCs	4	Functional and data requirements
S1_012	CLICK ACT should have detailed pages of single UCCs	4	Functional and data requirements
S1_013	CLICK ACT could have a map implementation	3	Functional and data requirements
S1_014	CLICK ACT should have configurable charts based on user preferences	3	Functional and data requirements
S1_015	CLICK ACT should have an export functionality (e.g. PDF or PNG)	4	Functional and data requirements
S1_016	CLICK ACT should have a possibility to choose different time periods	5	Functional and data requirements
S1_017	CLICK ACT should rank different UCCs based on various KPIs	4	Functional and data requirements

S1_018	CLICK ACT should consider requirements of public / stakeholder participation regarding infrastructure planning - if mandatory / existing	4	Legal requirements
S1_019	CLICK ACT should consider requirements deriving from national laws on preservation of historical monuments	4	Legal requirements
S1_020	CLICK ACT should have a public and a private section, where the public contains general information and the private (user restricted) holds the actual monitoring data	4	Functional and data requirements
S1_021	CLICK ACT should use standard tools and components (e.g. Grafana software, leaflet)	3	Functional and data requirements
S1_022	CLICK ACT should have a storage functionality of different charts	4	Functional and data requirements
S1_023	CLICK ACT should evaluate the number of active users	3	Functional and data requirements
S1_024	A basic guide to establish SUMP should be provided	5	Functional and data requirements
S1_025	Easy and comparable evaluation among cities	4	Functional and data requirements
S1_026	The SUMP should include the STOP principle to add priority. S: Pedestrian, T: Cyclist, O: PT, P: Private vehicle	4	Functional and data requirements
S1_027	Collect and analyze data that helps with urban planning decision	4	Functional and data requirements
S1_028	Alignment with other plans or EU (National) Targets	4	The scope of the product

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER2.

3.2.3. KER3: Guidebook for freight-efficient land use strategy.

KER3 is a guidebook, in a handbook format, conceived as a user-centric tool to support urban planners to better understand the freight dynamics within the city and efficiently integrate freight into land-use planning. The handbook will also include recommendations on how to strategically allocate land uses for a more efficient urban freight distribution and determining the logistics solutions to be implemented in different city areas according to the public and private interest.

The requirements identified for this service is listed in Table 4:

Table 4: Requirements identified for KER3. Guidebook for freight-efficient land use strategy.

VOLERE ID	Description	Priority	Type
S2_001	This project's output will be a handbook, created under a user-centric perspective, to support urban planners to better understand the freight dynamics within the city and efficiently integrate freight into land-use planning	5	The purpose of the product
S2_002	Considering existing urban distribution models, it will work on the definition of zones, characterizing EU cities	4	Functional and data requirements
S2_003	The defined zones will be characterized according to logistics operations, employing categories.	4	The scope of the product
S2_004	Among four and six urban zones will be defined.	4	The scope of the product
S2_005	The target audience for the Handbook are professionals from the logistics sector.	5	The scope of the product
S2_011	Allow to mapping interest area based on delivery requests	4	Functional and data requirements
S2_012	Add a best practices collection from cities out of UNCHAIN	2	Functional and data requirements
S2_013	Mixed use of consolidation point	3	The scope of the product
S2_014	Classify delivery strategies in three groups: 1. Radial, 2. Perimeter, 3. Itinerary	3	The scope of the product
S2_015	Define parking areas by vehicle characteristics, like big trucks parking dimensions, etc.	3	Functional and data requirements
S2_016	Dynamic change use of forbidden areas	3	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER3. However, an objection (Table 5) was made to the following requirements:

Table 5: Objection to requirements for KER3. Guidebook for freight-efficient land use strategy.

VOLERE ID	Description	Objection
S2_006	A basic guide to establish SUMP should be provided	Requirements deleted for belonging to S1 instead of S2
S2_007	Easy and comparable evaluation among cities	
S2_008	The SUMP should include the STOP principle to add priority. S: Pedestrian, T: Cyclist, O: PT, P: Private vehicle	
S2_009	Collect and analyse data that helps with urban planning decision	
S2_010	Alignment with other plans or EU (National) Targets	

The reason for this objection was the confusion for the different numbers among the VOLERE's services and KERs defined in the DoA.

3.2.4. KER4: UCC location and integrated planning KIT.

In KER 4, a web tool (called CLICK^{LOG}) will be used to help urban planners in identifying suitable locations for UCCs and micro-depots in a user-defined planning area. Planners will be able to create their individual plans by defining preferences and deciding on dependent inputs. CLICK^{LOG} enables the user to provide planning-relevant data and offers an option for automated retrieval from publicly accessible data sources (e.g. OpenstreetMaps). Users can create different scenarios and receive recommendations on the number and potential locations of UCCs and micro-depots.

The requirements identified for this service is listed in Table 6:

Table 6: Requirements identified for KER4. UCC location and integrated planning KIT.

VOLERE ID	Description	Priority	Type
S3_001	CLICK LOG should support the Planning Process of UCC locations	5	The purpose of the product
S3_002	CLICK LOG should be a map based online tool that supports user within the planning process for UCCs	5	Look and feel requirements
S3_003	CLICK LOG should follow current usability requirements to be easy to use	3	Usability and human centered requirements
S3_004	CLICK LOG must follow a top-down-approach	3	The scope of the product

S3_005	CLICK LOG must have a planning functionality	5	Functional and data requirements
S3_006	The focused user of CLICK LOG should be an urban planner	5	Users of the product
S3_007	Data availability must be supported by cities, access to city information must be granted free of charge	5	Functional and data requirements
S3_008	CLICK LOG should backup data from open sources	3	Functional and data requirements
S3_009	CLICK LOG could implement interfaces to online data backends in order to retrieve usage data for monitoring functionalities	2	Functional and data requirements
S3_010	CLICK LOG could have a monitoring functionality	2	Functional and data requirements
S3_011	CLICK LOG should gather information about the goals and targets of the cities	4	Functional and data requirements
S3_012	CLICK LOG should gather basic information about the city	4	Functional and data requirements
S3_013	CLICK LOG should gather information about the city structure	4	Functional and data requirements
S3_014	CLICK LOG should give a recommendation on UCC placement within areas after completion of data input	4	Functional and data requirements
S3_015	CLICK LOG must provide an option to change inputs and recalculate the recommendation	4	Functional and data requirements
S3_016	CLICK LOG must have the ability to manage multiple planning scenarios	2	Functional and data requirements
S3_017	CLICK LOG results should be provided as a map and a basic data table	4	Functional and data requirements
S3_018	CLICK LOG should evaluate the number of active users	3	Functional and data requirements
S3_019	CLICK LOG must provide an option to consider existing UCCs in the planning	5	Functional and data requirements
S3_020	CLICK LOG should provide/advise a dimensioning of UCCs (small to big)	3	Functional and data requirements
S3_021	CLICK LOG should categorize the attractiveness of a planned UCC locations based on the collected data	4	Functional and data requirements
S3_022	CLICK LOG could differentiate between different user demands (different general preferences)	2	The scope of the product
S3_023	CLICK LOG could take SUMP (Sustainable Urban Mobility Plans) of cities (if available) into account	2	Cultural and political requirements

S3_024	CLICK LOG should consider requirements of public / stakeholder participation in regard to infrastructure planning - if mandatory / existing	4	Legal requirements
S3_025	CLICK LOG should consider requirements deriving from national laws on preservation of historical monuments	4	Legal requirements
S3_026	CLICK LOG should have a public and a private section, where the public contains general information and the private (user restricted) holds the actual planning process	4	Functional and data requirements
S3_027	CLICK LOG should use standard tools and components (e.g. leaflet)	3	Functional and data requirements
S3_028	CLICK LOG should have an export functionality for the results	4	Functional and data requirements
S3_029	CLICK LOG should have a storage functionality in order to pause and resume the process	4	Functional and data requirements
S3_036	Mixed use of consolidation point	3	The scope of the product
S3_037	Provide a map with potential locations for UCC	4	Operational requirements
S3_038	Add a way to help choose the best location without parking for logistic operations taking into account operators needs	3	Operational requirements
S3_039	Dynamic info for all operators and planning	4	Functional and data requirements
S3_040	Offer a way to integrate with KER3	5	Operational requirements

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER4. However, an objection (Table 7) was made to the following requirements:

Table 7: Objection to requirements for KER4. UCC location and integrated planning KIT.

VOLERE ID	Description	Objection
S3_030	Mixed use of consolidation point	Requirements deleted for belonging to S2 instead of S3
S3_031	Allow to mapping interest area based on delivery requests	
S3_032	Add a best practices collection from cities out of UNCHAIN	

S3_033	Classify delivery strategies in three groups: 1. Radial, 2. Perimeter, 3. Itinerary	
S3_034	Define parking areas by vehicle characteristics, like big trucks parking dimensions, etc.	
S3_035	Alignment with other plans or EU (National) Targets	

The reason that caused the delete of these requirements is the same than for KER3, the confusion in the numbering.

3.2.5. KER5: On-street loading zones planning tool.

This tool provides a way to be able to define new zones for on-street loading and unloading. To provide this service, the tool will display a hexagon division view of the city with accessibility indexes values based on proximity and availability of different services and inhabitants.

The requirements identified for this service is listed in Table 8:

Table 8: Requirements identified for KER5. On-street loading zones planning tool.

VOLERE ID	Description	Priority	Type
S4_005	User Authentication and Profiles: Implement user authentication and registration features.	4	Functional and data requirements
S4_007	Provide a user-friendly interface for adjusting preferences.	4	Usability and humanity requirements
S4_011	Data Privacy and Security: Implement robust data encryption and secure transmission protocols to protect sensitive user data.	3	The scope of the product
S4_012	Scalability and Performance: Design the app's architecture.	5	Functional and data requirements
S4_015	User Interface (UI) and User Experience (UX): Consider a visually appealing and responsive design.	3	Look and feel requirements
S4_017	Continuous Updates and Maintenance: Plan for regular updates and maintenance to address bugs.	4	Maintainability and support requirements
S4_018	Documentation and Support: Provide comprehensive documentation for users and developers, explaining app features, usage guidelines, and technical details.	4	The scope of the work

S4_019	Testing and Quality Assurance: Conduct thorough testing, including unit testing, integration testing, and user acceptance testing, to ensure the app's functionality, performance, and security.	4	The scope of the work
S4_020	Data Security: Ensure data security, privacy, and compliance with relevant regulations during data collection and storage.	3	Security requirements
S4_021	Cultural Awareness in Design: User interface (UI) design elements, such as icons, symbols, and colors, should be carefully chosen to avoid inadvertently conveying culturally insensitive or offensive meanings.	4	Cultural and political requirements
S4_022	Localized Content and Language: The app should provide multilingual support	3	Cultural and political requirements
S4_023	Public Policy Goals: The app should align with broader public policy goals.	2	Legal requirements
S4_028	Display a digital map with available loading zones	3	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER5. However, an objection (Table 9) was made to the following requirements:

Table 9: Objection to requirements for KER5. On-street loading zones planning tool.

VOLERE ID	Description	Objection
S4_001	Mixed use of consolidation point on Optimization Algorithm: Develop a sophisticated route optimization algorithm that takes into account traffic conditions, road safety, and delivery time windows.	Requirements deleted for no longer being the service a cargo bike router.
S4_002	Real-Time Data Integration: Integrate with real-time traffic and weather data APIs to provide up-to-date road conditions, traffic congestion, and weather forecasts.	
S3_003	Real-Time Data Integration: Continuously update route suggestions based on real-time data, ensuring efficient route adjustments.	
S4_004	Map Integration: Utilize mapping and navigation APIs (e.g. Mapbox) to display routes, street layouts, bike lanes, and other relevant geographical features.	
S4_006	Route Customization: Enable users to set customizable route preferences.	

S4_008	Real-Time Tracking and Notifications: Develop GPS-based real-time tracking functionality for cargo bike riders to monitor their progress.	
S4_009	Real-Time Tracking and Notifications: Implement in app notifications and alerts (for example: route changes, weather updates).	
S4_010	Safety Features: Ensure the app suggests safe and bike-friendly routes (for example: prioritizing low-traffic streets).	
S4_013	Optimize app performance to provide fast route calculations and real-time updates.	
S4_014	User Interface (UI) and User Experience (UX): Design an intuitive and user-friendly interface that allows cargo bike riders to access route suggestions easily.	
S4_016	Analytics and Reporting: Provide insights (for example route history) to optimize their delivery operations.	
S4_030	Book parking spaces for a certain period of time in advance	Out of the scope of the tool
S4_031	Monitoring and enforcement of the illegal use	Out of the scope of the tool

The reason that caused the delete of these requirements is that KER5 was initially planned to be performed and tested by VMZ, and so, they started introducing the requirements for this service. However, since SenMVKU was interested that VMZ was in charge of developing the route planner for cargo bikes, it was finally agreed that VMZ will carry out KER 12 (route planner), initially led by ETRA according to the DoA, and ETRA the KER5 about on-street loading zones planning tool.

3.2.6. KER6: Active UVARs and city regulations tools.

The KER will provide a communication channel, via specific interfaces, between cities and logistic operators, easing the checking and the acquisition of existing authorizations and implementing an alert system to communicate the regulation and access restrictions in force. Besides, it will provide a self-standing Multi-Criteria Decision Making module to assess possible alternative Urban Vehicle Access Regulations (UVARs) based on the performance of the freight distribution system in meeting the urban logistics policy goals.

The requirements identified for this service are listed in Table 10.

Table 10: Requirements identified for KER6. Active UVARs and city regulations tools.

VOLERE ID	Description	Priority	Type
S5_001	Managing access, transit and parking rules	4	The scope of the product
S5_007	The system should provide an "as a service" backend layer for the Active UVARs and city regulations management platform	5	Operational requirements
S5_008	The system should provide authenticated role based front-end available via web or app	5	Operational requirements
S5_009	MANAGEMENT OF ACCESS, TRANSIT AND PARKING PERMITS- Once Logged, the PA Operator access on the Backend system to define the rules for transit and parking	5	Functional and data requirements
S5_010	ISSUING OF ACCESS, TRANSIT AND PARKING PERMITS- Once Logged the Logistic operator should be able to acquire the access, transit and parking permit and related info	5	Functional and data requirements
S5_011	LOAD INFORMATION MANAGEMENT - Once Logged the Logistic Operator should be able to enter cargo information, e.g. transport of medicines, food, other special goods etc.	5	Functional and data requirements
S5_012	The system should be able to optimise and maximise the loading of vehicles, providing for the concentration of goods to be delivered or collected in the same area and time slot, and can be integrated with the systems already in use by logistics operators.	2	Performance requirements
S5_013	ROUTE PLANNING - Once Logged, the Logistic Operator should receive, by indicating the destination address, the indication of available pick-up/drop-off points, an optimised related route, with an indication of the time of arrival, that it is able to track	5	Functional and data requirements
S5_014	Monitoring and enforcement of the illegal use	4	Functional and data requirements
S5_015	Consider needs of different professional groups (logistics, plumbers, etc)	4	The scope of the product
S5_016	Clear picture of regulations that apply to logistics operators in each city/town/district	4	The scope of the product
S5_017	Municipality should provide their rules and incidents in real time for delivers	4	Operational requirements
S5_018	This service should consider the sustainability of the vehicles	4	Operational requirements
S5_019	Lower speed limit zones and low traffic neighborhoods for increased safety	4	Operational requirements
S5_020	Forecasts on impacts of different regulations	4	Operational requirements

S5_021	Translations of knowledge into different languages	5	Functional and data requirements
S5_022	Module for the multicriteria assessment of alternative UVARs in terms of their performance	5	The scope of the product
S5_023	Decision makers (municipalities) should provide data expressing their preferences regarding the relative importance of KPIs in relation to identified Key Performance Areas (KPAs)	3	The scope of the product
S5_024	Preference data expressing the relative importance of KPAs in ranking the UVARs under consideration.	3	The scope of the product
S5_025	Decision makers (municipalities) should provide the value of the KPIs describing the performance of UVARs under consideration.	3	The scope of the product

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER6. However, an objection (Table 11) was made to the following requirements:

Table 11: Objection to requirements for KER6. Active UVARs and city regulations tools.

VOLERE ID	Description	Objection
S5_002	Managing access, transit and parking rules	Requirements deleted for repeating S5_001
S5_003	Display a digital map with available loading zones	Requirements deleted for belonging to S4 instead of S5
S5_004	Booking system for loading and unloading	
S5_005	Monitoring and enforcement of the illegal use	
S5_006	Book parking spaces for a certain period of time in advance	

The reason for this objection was, once again, the confusion for the different numbers among the VOLERE's services and KERs defined in the DoA.

3.2.7. KER7: Knowledge powerhouse for urban logistics.

The Knowledge powerhouse for urban logistics (KER7) is a platform that will consolidate the R&I findings of the living labs and will set up the mechanism to facilitate capacity building, knowledge sharing and good practice exchange between project partners, SEG members and external experts.

The requirements identified for this service are listed in Table 12:

Table 12: Requirements identified for KER7. Knowledge powerhouse for urban logistics.

VOLERE ID	Description	Priority	Type
S6_001	The tool should have a section to include related EU funded projects and partner's projects, identifying their best practices/solutions applicable to the project	5	The scope of the product
S6_002	The tool should be embedded into the project's website	5	Operational requirements
S6_003	The tool should allow to upload the recorded workshops on capacity building activities related to the transferability of UNCHAIN measures	5	The scope of the product
S6_004	The tool will include an "initiative selector" to help cities identify which UNCHAIN service/tool is more suitable to their needs	5	The scope of the product
S6_005	The transferability guidelines and policy recommendations will be available in different languages	3	Cultural and political requirements
S6_006	Identify options to link the tool with the CIVITAS website and the Cities Mission platform	5	Open issues
S6_007	The tool should include different sections to collect: i) urban logistics news, ii) findings from the project (diagnosis, KPIs, methods, practices, etc)	5	The scope of the product

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER7. However, an objection (Table 13) was made to the following requirements:

Table 13: Objections to requirements for KER7. Knowledge powerhouse for urban logistics.

VOLERE ID	Description	Objection
S6_005	The transferability guidelines and policy recommendations will be available in different languages	Out of the scope of the tool

3.2.8. KER8: Dynamic curb side management tool.

This tool aims to display information about parking lots. For that purpose, the tool is divided in two different parts, one of a physical hardware (i.e electronic informative display) to be

installed on-street to display the current use of the parking zone, and a software that will display schedules and uses that will adapt dynamically for time periods.

The requirements identified for this service are listed in Table 14:

Table 14: Requirements identified for KER8. Dynamic curb side management tool.

VOLERE ID	Description	Priority	Type
S7_001	During delivery peak hours, the service shall dynamically change the use of the parking spaces in the curb side of the street to prioritize the transport operators providing more parking slots for the delivery vehicles.	4	Functional and data requirements
S7_002	An operator should be allowed to check the current curb side status use	5	The scope of the product
S7_003	The current curb side zone state must be able to be changed by an operator	4	Operational requirements
S7_004	Allow to change the use based on calendar	4	Functional and data requirements
S7_006	Display empty and available loading zones	4	Functional and data requirements
S7_007	Made it available to all logistics operators	5	Operational requirements
S7_008	Allow to display and store the parking authorization type the vehicle have	3	Functional and data requirements
S7_009	Identify closest available parking lots for couriers	2	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER8. However, objections (Table 15) were made to the following requirements:

Table 15: Objections to requirements for KER8. Dynamic curb side management tool.

VOLERE ID	Description	Objection
S7_005	The service should include a KPI on pedestrian and cyclist usage of the curb	Out of the scope of the tool
S4_031	Monitoring and enforcement of the illegal use	Out of the scope of the tool

3.2.9. KER9: Dynamic management tool of pick-up/drop-off points.

This KER will provide tools to digitalise loading and unloading bays for urban distribution of goods, monitoring in real time the occupancy status of these spaces and regulating their use to avoid potential abuse. Specifically, the KER supports the dynamic urban space management of loading and unloading bays, able to integrate services & equipment (e.g sensors) on supporting the automation of check-in/check-out procedures, preventing unallowed parking and consequently the slowing down the work of logistical operators. It also aids in defining enforcement, monitoring, and pricing models accordingly.

The requirements identified for this service are listed in Table 16:

Table 16: Requirements identified for KER9. Dynamic management tool of pick-up/drop-off points.

VOLERE ID	Description	Priority	Type
S8_001	Digitalise loading and unloading bays for urban distribution	4	The scope of the product
S8_002	Information on the volume to the picked-up to adapt the vehicles and times	4	Functional and data requirements
S8_003	Procedures to avoid abuses or bad usage by "pirate users"	4	Functional and data requirements
S8_004	Allow to allocate space for logistic operators dynamically depends on demand, optimizing space and revenues	4	Functional and data requirements
S8_005	Allow to measure the number of retailers affected by the service	4	Functional and data requirements
S8_006	Display real time occupation	4	Functional and data requirements
S8_007	Offer a way to integrate with logistic operators' network	4	Functional and data requirements
S8_008	Once logged, the Local Administration (LA) operator can access to the web backend to configure the management of PICK-UP/DROP-OFF points	5	Functional and data requirements
S8_009	The system should provide an "as a service" backend layer for the PA as a real-time and historical data management and monitoring system	4	Operational requirements

S8_010	Once logged, the LA operator can access to the web backend to view, through maps and other views, the status of parking bays dedicated to the loading and unloading of goods by the logistics operators	5	Functional and data requirements
S8_011	The system should provide authenticated role based front-end available via web or app	5	Operational requirements
S8_012	INFORPARKING - Once logged, the logistic operator has the means to check and get info on available logistics parking areas. The operator can perform search per address or through maps	5	Functional and data requirements
S8_013	PICK-UP/DROP-OFF POINT RESERVATION - Once Logged, the Logistic Operator can select a slot, view date and times when it is available, select one or more slots to be booked, receive a notification with confirmation of booked slots	5	Functional and data requirements
S8_014	PICK-UP/DROP-OFF POINT RESERVATION notification should be provided through multiple channels (in-app, email, etc)	4	Functional and data requirements
S8_015	CHECK IN/CHECK OUT of PICK-UP/DROP-OFF POINT- Once logged the Logistic Operator can checking/out the pick-up/drop-off and the system registers the action and the change of point status	4	Functional and data requirements
S8_016	Automatic CHECK IN/CHECK OUT of PICK-UP/DROP-OFF POINT. The system should be able to assure an automatic check-in/check-out via sensors	2	Functional and data requirements
S8_017	DATA ANALYTICS dashboard. Once logged the LA operator can view, produce and in some cases customize analytics data	5	Functional and data requirements
S8_018	DATA ANALYTICS dashboard. The system should provide a set of reports and indicators already configured or support the user in creating new ones	4	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER9.

3.2.10. KER10: IT Pop-Up delivery points management tool.

This tool aims to help to identify IT Pop-delivery points zones to be reallocated based on calendar events and defined zones.

The requirements identified for this service are listed in Table 17:

Table 17: Requirements identified for KER10. IT Pop-Up delivery points management tool.

VOLERE ID	Description	Priority	Type
S9_001	Offer pop-up delivery points information in real time.	4	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER10.

3.2.11. KER11: Logistics operator monitoring system and incentives tool.

The KER will provide an Urban Logistics Monitoring and Rewarding Management Platform covering two purposes: i) allow public authorities to manage the rewarding policy, by defining geographical and temporal rules for access, transit and parking and iia) monitor and analyse the drivers' behaviour in terms of adhering to the policy requirements and assessment. iib) support public authorities to assess the performance of Urban Logistics Operators in adhering to regulations, rules, and guidelines governing operations in the urban area under consideration.

The requirements identified for this service are listed in Table 18:

Table 18: Requirements identified for KER11. Logistics operator monitoring system and incentives tool.

VOLERE ID	Description	Priority	Type
S10_001	Digitalise loading and unloading bays for urban distribution	4	The scope of the product
S10_002	Allow to create sustainability recognition from cities	4	Functional and data requirements
S10_003	Allow for policy incentives	4	Functional and data requirements
S10_004	Incentives should differentiate the size of deliveries	4	Functional and data requirements
S10_005	The system should provide an "as a service" backend layer for to interact with the Active UVARs and city regulations management system	4	Operational requirements
S10_006	The system should provide authenticated role based front-end available via web or app	5	Operational requirements

S10_007	MANAGING REWARD POLICIES - Once logged the PA Operator should be able to define and manage the rules of conduct for the acquisition of credits of the logistics operator	5	Functional and data requirements
S10_008	REWARD Dashboard - Once logged the Logistic Operator should have access on behaviour information, the reward criteria and acquired rewards.	5	Functional and data requirements
S10_009	Multicriteria assessment of Urban Logistics Operators in terms of their performance in relation to regulations, rules, and guidelines of the urban area under consideration.	3	The scope of the product
S10_010	Decision makers (municipalities) should provide data expressing their preferences regarding the relative importance of KPIs in relation to identified Key Performance Areas (KPIAs).	3	The scope of the product
S10_011	Preference data expressing the relative importance of KPIAs in assessing the performance of urban logistics operators under consideration.	3	The scope of the product
S10_012	Decision makers (municipalities) should provide the value of the KPIs measuring the performance of the urban logistics operators.	3	The scope of the product

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER11.

3.2.12. KER12: Congestion forecasting and safe route planning tool.

In KER12, a routing service is being developed, focusing on operational aspects such as efficiency and safety. The service includes Route Planning and Optimization between delivery points, allowing cargo bike riders or delivery vehicle drivers to input start, end, and potentially also via points of a delivery route and relevant information. The application generates optimized routes between these points, taking into account factors specified in collaboration with the partner cities such as road conditions and congestion. Based on the route optimization and real-time tracking capabilities the cargo bike riders or vehicle drivers can get through the city efficiently, steering clear of traffic and congested areas.

The requirements identified for this service are listed in Table 19:

Table 19: Requirements identified for KER12. Congestion forecasting and safe route planning tool.

VOLERE ID	Description	Priority	Type
S11_007	Offer interoperability between mobility department and logistic operators	4	Functional and data requirements

S11_008	Information on forecasted congestion to predict safe alternatives routes	4	Functional and data requirements
S11_009	Allow multi stakeholder	5	Functional and data requirements
S11_010	Allow to adjust the access of cargo vehicles within different areas	4	Functional and data requirements
S11_011	CARGO CONNCECT enables Route Optimization Algorithm: Develop a sophisticated route optimization algorithm that takes into account traffic conditions, road safety, and delivery time windows.	4	Functional and data requirements
S11_012	CARGO CONNECT: Promoting safe and efficient Route Planning Optimization: The application allows logistics service providers and cargo bike riders to input delivery points and other relevant information, and it generates optimized routes that consider fact	4	The client, the customer and other stakeholders
S11_013	CARGO CONNECT enables Real-Time Data Integration: Integrate with real-time traffic and weather data APIs to provide up-to-date road conditions, traffic congestion, and weather forecasts.	4	The scope of the product
S11_014	CARGO CONNECT Real-Time Data Integration: Continuously update route suggestions based on real-time data, ensuring efficient route adjustments.	4	Functional and data requirements
S11_015	CARGO CONNECT Map Integration: Utilize mapping and navigation APIs (e.g. Mapbox) to display routes, street layouts, bike lanes, and other relevant geographical features, where applicable.	3	The scope of the work
S11_016	CARGO CONNECT User Authentication and Profiles: Implement user authentication and registration features.	2	The client, the customer and other stakeholders
S11_017	CARGO CONNECT Route Customization: Enable users to set customizable route preferences.	2	The scope of the product
S11_018	CARGO CONNECT: Provide a user-friendly interface for adjusting preferences.	3	Look and feel requirements
S11_019	CARGO CONNECT Trip Monitoring: Users can track their progress and receive real-time updates on their routes.	4	Functional and data requirements
S11_020	CARGO CONNECT Real-Time Tracking and Notifications: Implement notifications and alerts in the application (for example: route changes, weather updates).	3	The scope of the product
S11_021	CARGO CONNECT Safety Features: Ensure the application suggests safe routes (for example: prioritizing low-traffic streets).	3	The scope of the product

S11_022	CARGO CONNECT Data Privacy and Security: Implement robust data encryption and secure transmission protocols to protect sensitive user data.	4	Security requirements
S11_023	CARGO CONNECT Scalability and Performance: Design an architecture of the application.	3	Performance requirements
S11_024	CARGO CONNECT Optimize application performance to provide fast route calculations and real-time updates	3	Performance requirements
S11_025	CARGO CONNECT User Interface (UI) and User Experience (UX): Design an intuitive and user-friendly interface that allows logistics service providers and cargo bike riders to access route suggestions easily.	4	Usability and humanity requirements
S11_026	CARGO CONNECT: User Interface (UI) and User Experience (UX): Consider a visually appealing and responsive design.	3	Look and feel requirements
S11_027	CARGO CONNECT Continuous Updates and Maintenance: Plan for regular updates and maintenance to address bugs.	3	Maintainability and support requirements
S11_028	CARGO CONNECT Documentation and Support: Provide comprehensive documentation for users and developers, explaining application features, usage guidelines, and technical details.	2	Operational requirements
S11_029	CARGO CONNECT Testing and Quality Assurance: Conduct thorough testing, including unit testing, integration testing, and user acceptance testing, to ensure functionality, performance, and security.	4	The scope of the work
S11_030	CARGO CONNECT Data Security: Ensure data security, privacy, and compliance with relevant regulations during data collection and storage.	5	Security requirements
S11_031	CARGO CONNECT Cultural Awareness in Design: User interface (UI) design elements, such as icons, symbols, and colors, should be carefully chosen to avoid inadvertently conveying culturally insensitive or offensive meanings.	2	Look and feel requirements
S11_032	CARGO CONNECT Localized Content and Language: The application should provide multilingual end-user support	2	Usability and humanity requirements
S11_033	CARGO CONNECT Public Policy Goals: The application should align with broader public policy goals.	4	Legal requirements

Dependencies, objections, and conflicts

No relevant dependencies, and conflicts have been identified for KER12. However, objections (Table 20) were made to the following requirements:

Table 20: Objection to requirements for KER12. Congestion forecasting and safe route planning tool.

VOLERE ID	Description	Objection
S11_001	The routes provided must be accessible by third party services of the logistics operators.	Requirements deleted after VMZ replaced ETRA in the leadership of the service
S11_002	The safe routes should be provided following any defined standard to allow to use it	
S11_003	An operator should be able to set an street or zone as restricted based on different criteria (streets blocked due to construction work, manifestations, school out times, ...)	
S11_004	Efficient routes should be calculated avoiding restricted areas	
S11_005	"The tool should display live status of the restricted streets or zones	
S11_006	Logistic operators should be allowed to share planned logistic routes	

The reason that caused the delete of these requirements is that KER12 was initially planned to be performed and tested by ETRA which started introducing the requirements. However, since SenMVKU was interested that VMZ was in charge of developing the route planner for cargo bikes, it was agreed that VMZ will carry out KER 12 (route planner) and ETRA will be responsible of KER5 (on-street loading zones planning tool).

3.2.13. KER13: Advanced management IT Cockpit of Shared Facilities.

This tool aims to help on the shared facilities, providing control of parking spaces with cameras to be able to identify vehicles parked. This tool will also provide a reservation system to check bad usage of the selected parking zones.

The requirements identified for this service is listed in Table 20:

Table 21: Requirements identified for KER13. Advanced management IT Cockpit of Shared Facilities.

VOLERE ID	Description	Priority	Type
S12_001	An operator should be allowed to check the current status of the parking lots	5	The scope of the product
S12_002	A whitelist of car plates will be provided to check if the vehicle is allowed or not in the parking lot	4	Operational requirements
S12_003	The app will allow to add and remove plates from the whitelist	4	Operational requirements

S12_004	The tool should allow to define a zone for each parking lot	5	Operational requirements
S12_005	People should be able to see if there's a transport nearby and if they can use it	3	Functional and data requirements
S12_006	Integrating logistics into city data dashboards	3	Functional and data requirements
S12_007	Access for logistic operators to see it in real time	5	Functional and data requirements
S12_008	Interoperability with existing system	3	Functional and data requirements

Dependencies, objections, and conflicts

No relevant dependencies, objections and conflicts have been identified for KER13.

4. KPIs identification and selection.

4.1. Methodology description.

Within the tasks related to the task 2.3 of the UNCHAIN project, a first list of KPIs has been defined. This list of KPIs will be used during the definition of the use cases to identify which indicators will be employed in each demonstration, to assess the impact of their activities.

This chapter presents in detail the methodology followed to generate the KPIs collection of the UNCHAIN project, based on four basic steps:

- the review of indicators' systems in the logistics sectors,
- the analysis of these systems to create a comprehensive collection of indicators for the UNCHAIN project,
- the assessment of indicators' collection in a workshop attended by all the project partners,
- and the final selection of indicators according to workshop results.

The review of indicators used in logistics has identified different systems of indicators, adapted to transport sector requirements. The availability of indicators in the literature, in the context of the smart city, is high^{4,5}, so the review focused on indicator's systems updated, and

⁴ Huovila, A., Bosch, P., Airaksinen, M., Comparative analysis of standardized indicators for Smart sustainable cities: What indicators and standards to use and when?, *Cities* 89 (2019) 141-153, <https://doi.org/10.1016/j.cities.2019.01.029>

⁵ Angelakoglou, K., Nikolopoulos, N., Giourka, P., Svensson, I.L., Tsarchopoulos, P., Tryferidis, A., Tzovaras, D., A Methodological Framework for the Selection of Key Performance Indicators to Assess Smart City Solutions, *Smart Cities* 2019, 2, 269–306; doi:10.3390/smartcities2020018

supported by reference institutions. Having identified the most relevant indicators systems for logistics, a selection of the most relevant indicators was required, as the different systems listed similar topics with different names, or even identical indicators. This selection was made by analysing all the indicators, identifying those that were equivalent, and grouping them under a new description. As a result of this analysis, a reduced list of indicators has been produced.

This reduced list of indicators was assessed in a workshop attended by all the consortium partners. In order to facilitate this assessment, the reduced list of indicators was presented grouped in four categories. These categories corresponded to relevant topics in logistics, addressed by the UNCHAIN services.

The assessment of the initial list of indicators, facilitated by the workshop results, was employed to review and enrich the indicators list. As a result of this work, we generated the final indicators list of the UNCHAIN project.

4.2. Selected KPIs.

4.2.1. Indicators' systems review

This section presents the results of the review performed to identify indicators' systems. The main features of these indicators' systems are presented in tables, organised in the following categories:

- Name
- Owner
- Geographical scope
- Content/Description
- Data format
- Gaps
- URL

The following tables (from Table 22 to Table 27) present the main characteristics of the indicators' system identified as relevant for the UNCHAIN project.

The *EcoLogistics Indicator* (ELI, Table 22) system is a sustainable logistics performance measurement system designed for policymakers to intervene and make informed decisions to improve the logistics system's efficiency (63 indicators).

Table 22: Main features of the EcoLogistics Indicator system.

Name	EcoLogistics Indicator (ELI) system
Owner	ICLEI
Geographical scope	Europe
Content/Description	The EcoLogistics Indicator (ELI) system is a sustainable logistics performance measurement system designed for policymakers to intervene and make informed decisions to improve the logistics system's efficiency without compromising social, economic, and environmental components. ELI is structured into four dimensions: (1) environmental sustainability: • E1 Low-/Zero-emission deliveries • E2 Air quality • E3 Greenhouse gas (GHG) emissions • E4 Energy consumption • E5 Noise pollution • E6 Sustainable business (2) social equity, • S1 Public participation • S2 Safety • S3 Freight employee demographics • S4 Exposure to vulnerable communities (3) economic sustainability, • EC1 Employment in transport and logistics (4) operational efficiency. • O1 Mode efficiency • O2 Fleet utilization level • O3 Loading and unloading • O4 Timeliness • O5 Productivity • O6 Distance optimisation
Data format	PDF (guide to measure each indicator)
Gaps	-
URL	https://sustainablemobility.iclei.org/ecologistics/indicators/



Table 23 presents the detailed guidelines for a solid *CIVITAS* evaluation approach to achieve consistent and useful results currently applied by the *Innovation Action* projects (13 indicators). In this sense UNCHAIN should align, at some point, on the KPIs used with CIVITAS.

Table 23: Main features of the CIVITAS Evaluation Framework.

Name	CIVITAS Evaluation Framework
Owner	CIVITAS
Geographical scope	Europe
Content/Description	The framework includes, in its Annex 1, a detailed description of indicators. The indicators are classified into three types: i) Key indicators (to understand the impact of the CIVITAS measures), ii) intermediate indicators (to derive with further calculations the impact in the CIVITAS impact categories), and iii) additional indicators (to understand specific aspects of the impact of a measure or as an alternative for the key indicators making use of available data). Key indicators related to urban logistics: • Modal Split goods (trips): Percentage of goods (described in parcels, tons, etc) using each (sub) mode (e.g. : heavy and light trucks, tram, train, cargobikes, etc.) during a day (weekday, week-end day) or per hour (peak hour, off-peak hour) for a specific target group. • Number of freight movements: number of freight vehicles (per day or per hour) passing at reference points (e.g. entering the city centre) divided over different type of vehicles: heavy trucks, light trucks, e-cargo bikes, etc. Intermediate indicators related to urban logistics: • Number of goods movements: Total goods (parcels, tons, etc) to be transported departing or arriving in a specific area during a chosen period: hour, day, year (for all modes together). • Load factors: Average loading percentage of the freight vehicles passing at reference points. • Vehicle utilisation factor: Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours • Reliability of just-in-time freight deliveries: the number and percentage of just-in-time freight deliveries that arrive within an acceptable interval around the planned times The guide also includes other indicators that should be applied to all transport services, including both passengers and freight transport (average operating revenue, Capital investment costs, Average Operating costs, vehicle fuel efficiency, fuel mix, share cars and stations per capita, Bike sharing and stations per capita).
Data format	PDF (guide to measure each indicator)
Gaps	-
URL	https://civitas.eu/resources/civitas-2020-process-and-impact-evaluation-framework
  THE CIVITAS INITIATIVE IS CO-FUNDED BY THE EUROPEAN UNION	

The *ULaaDS* impact assessment framework (Table 24) builds on existing knowledge and expertise in the field obtained through literature review, studying documentation from other EU projects and by leveraging the *ULaaDS* partners' expertise (23 indicators)

Table 24: Main features of *ULaaDS* project indicators system.

Name	ULaaDS impact assessment framework
Owner	ULaaDS project
Geographical scope	Europe
Content/Description	The <i>ULaaDS</i> impact assessment framework builds on existing knowledge and expertise in the field obtained through literature review, studying documentation from other EU projects and by leveraging the <i>ULaaDS</i> partners' expertise. Preliminary KPIs were defined and are listed below. • More efficient use of existing public space: ○ Public space used for UFT activities (hrs per m2) • Reduced congestion: ○ Obstruction of other road users during loading / unloading (Veh/hrs) ○ UFT vehicles travelling on congested streets / shared spaces (Veh/hrs) • Improved traffic safety ○ Road accidents, injuries and fatalities (number) ○ Damages to freight vehicles (number) ○ Interactions between vehicles and other road user groups (number) ○ Perceived safety (index) • Increased utilisation of load capacity of vehicles ○ Vehicle load factor (percentage (%)) ○ Integration of goods and passenger flows (number) • Increased speed of delivery ○ Time per delivery / pick up (minutes) ○ Number of delivery attempts (number) • More efficient use of vehicle fleet ○ Deliveries per tour per vehicle (number) ○ Dimension weight / day per vehicle (kg, m3) ○ Drop density per vehicle (percentage (%)) ○ Days in operation per vehicle (percentage (%)) • Economically sustainable business models ○ Last mile delivery cost per delivery / pick up ○ Distribution and warehouse cost per delivery / pick up (%) ○ Investment costs for the city (%) • Same or better level of service as existing schemes and increased acceptance ○ On time in full (OTIF) (%) ○ Customer satisfaction (index) ○ Level of acceptance (%) • Increased awareness of sustainable delivery solutions ○ Recipient awareness of sustainable delivery options (index) ○ Recipient willingness to pay for sustainable delivery (index)
Data format	PDF (report identifying indicators)
Gaps	The report available on the project website is not the last version, some KPIs might have been updated but are not public yet.
URL	ULaaDS D5.1: Framework, methodology and KPI identification



NetZeroCities (Table 25) includes, in its indicator framework, 2 indicators for the transport and mobility field. The purpose of these indicators is to get an overview of transport emissions to understand which types of transport should be avoided to reduce the city's emissions.

Table 25: Main features of *NetZeroCities* indicators' system.

Name	NetZeroCities Comprehensive Indicator Framework																						
Owner	NetZeroCities project																						
Geographical scope	Europe																						
Content/Description	NetZeroCities includes, in its indicator framework, 2 indicators for the transport and mobility field. The purpose of these indicators is to get an overview of transport emissions to understand which types of transport should be avoided to reduce the city's emissions.																						
Data format	PDF (guide to measure each indicator)																						
Gaps	Indicators are not specific for urban logistics; however, freight vehicles are considered as one of the transport modes to be assessed.																						
URL	https://netzerocities.eu/results-publications/																						
	<table> <tr> <th>Indicator Title</th><td>GHG emission from transport</td><td>Fuel consumption for in-boundary transportation per fuel type</td></tr> <tr> <th>Unit of Measurement</th><td>t CO2 equivalent</td><td>MJ/kg/kWh</td></tr> <tr> <th>Required or Recommended</th><td>Required</td><td>Recommended</td></tr> <tr> <th>Definition</th><td>Greenhouse gas emissions from the operations of vehicles.</td><td>Emissions per fuel type emerging from the operations of vehicles.</td></tr> <tr> <th>Source</th><td>Sustainable Urban Mobility Indicators (SUMI) by DG MOVE</td><td>GHG Protocol for Cities (GPC)</td></tr> <tr> <th>Calculation Formula</th><td>Calculation methodology and spreadsheet for GHG emissions from transport can be found under Indicator 7, SUMI. This overall methodology is recommended but the extent of application of such calculations can be defined by the data granularity available to the cities.</td><td>Calculation formulae for Transport indicators from GHG Protocol for Cities (GPC) pages 75 to 87.</td></tr> <tr> <th>Emission Scope for GHG Indicator</th><td>Scope 1 and 2. Scope 3 can be calculated but is not mandatory.</td><td>Scope 1</td></tr> </table>	Indicator Title	GHG emission from transport	Fuel consumption for in-boundary transportation per fuel type	Unit of Measurement	t CO2 equivalent	MJ/kg/kWh	Required or Recommended	Required	Recommended	Definition	Greenhouse gas emissions from the operations of vehicles.	Emissions per fuel type emerging from the operations of vehicles.	Source	Sustainable Urban Mobility Indicators (SUMI) by DG MOVE	GHG Protocol for Cities (GPC)	Calculation Formula	Calculation methodology and spreadsheet for GHG emissions from transport can be found under Indicator 7, SUMI . This overall methodology is recommended but the extent of application of such calculations can be defined by the data granularity available to the cities.	Calculation formulae for Transport indicators from GHG Protocol for Cities (GPC) pages 75 to 87.	Emission Scope for GHG Indicator	Scope 1 and 2. Scope 3 can be calculated but is not mandatory.	Scope 1	NET ZERO CITIES
Indicator Title	GHG emission from transport	Fuel consumption for in-boundary transportation per fuel type																					
Unit of Measurement	t CO2 equivalent	MJ/kg/kWh																					
Required or Recommended	Required	Recommended																					
Definition	Greenhouse gas emissions from the operations of vehicles.	Emissions per fuel type emerging from the operations of vehicles.																					
Source	Sustainable Urban Mobility Indicators (SUMI) by DG MOVE	GHG Protocol for Cities (GPC)																					
Calculation Formula	Calculation methodology and spreadsheet for GHG emissions from transport can be found under Indicator 7, SUMI . This overall methodology is recommended but the extent of application of such calculations can be defined by the data granularity available to the cities.	Calculation formulae for Transport indicators from GHG Protocol for Cities (GPC) pages 75 to 87.																					
Emission Scope for GHG Indicator	Scope 1 and 2. Scope 3 can be calculated but is not mandatory.	Scope 1																					

Sustainable urban mobility indicators (*SUMI*, Table 26) are a useful tool for cities and urban areas to identify the strengths and weaknesses of their mobility system and to focus on areas for improvement (3 logistic related indicators).

Table 26: Main features of the SUMI indicators' system.

Name	Sustainable Urban Mobility Indicators (SUMI)
Owner	European Commission
Geographical scope	Europe
Content/Description	Sustainable urban mobility indicators are a useful tool for cities and urban areas to identify the strengths and weaknesses of their mobility system and to focus on areas for improvement. The European Commission has therefore developed a comprehensive set of practical and reliable indicators that support cities to perform a standardised evaluation of their mobility system and to measure improvements that result from new mobility practices or policies. SUMI indicators related to urban logistics are listed below: • Air pollutant emissions: air pollutant emissions of all passenger and freight transport modes (exhaust and non-exhaust for PM2.5) in the urban area. • Greenhouse gas emissions (GHG): Well-to-wheels GHG emissions by all urban area passenger and freight transport modes. • Modal split (for freight transport): ○ Modal split according to goods vehicles kilometres ran ○ Modal split according to freight tonnes kilometres ran
Data format	-
Gaps	The EC SUMI website was not available when the review was done.
URL	Technical support related to sustainable urban mobility indicators (SUMI) (europa.eu)
	

In addition, Table 27 presents an indicator provided by the *Agenda Española 2030*, focused on estimating the amount of distribution centres required for a more sustainable last mile delivery.

Table 27: Main features of the Agenda Urbana indicators' system.

Name	Indicadores de la Agenda Urbana Española 2030
Owner	Spanish Ministry of Transport, Mobility and Urban Agenda
Geographical scope	Spain
Content/Description	The Spanish Urban Agenda is the roadmap that will mark the strategy and actions to be carried out until 2030 to move forward more friendly, healthy and committed cities. The Agenda includes a set of indicators to help cities monitor the deployment of their Action Plans. The Agenda includes one indicator related to urban logistics within the Transport and Mobility section: Sustainability of the urban distribution of goods (last mile): The indicator reflects load breaking facilities, making it possible to distribute goods with small vehicles. For this purpose, cargo storage and consolidation centers are needed in urban areas. The indicator is calculated as: Density of load distribution centres = (Number of centers in the city / Urban area (km²)) x 100
Data format	PDF (guide)
Gaps	
URL	https://cdn.mitma.gob.es/portal-web-drupal/AUE/04 doc. indicadores de seguimiento y evaluacion 0.pdf
 Agenda Urbana Española	

These indicators system are the ones analysed to produce the first version of the UNCHAIN KPIs list. In addition, results generated in deliverable 2.1⁶ of the project has also been considered in the analysis, as Florence, Madrid and Funchal have identified KPIs on their urban logistic strategies and plans (SUMP, SULP, Madrid360).

4.2.2. Analysis of the indicators' systems

The analysis of the indicators' collections presented in the previous section facilitated the production of the result presented in Table 28. A total amount of 135 indicators are included in the indicators' systems identified. Some of these indicators are equivalent or overlapped, and in essence intend to measure similar impacts. These equivalent indicators were grouped under a common term, what result in a selection of 30 KPIs (Table 28).

⁶ https://unchainproject.eu/content/uploads/2023/11/20231031-SPES-UNCHAIN-D2.1_Local-frameworks_SUMPSULP_vf.pdf

Table 28: First KPIs collection for the UNCHAIN project and the indicators' systems including them.

Type of indicator	Frequency	Sources			
Number of sustainable commercial or freight vehicles (LEV, ZEV)	5	Madrid360	Florence SUMP	ICLEI	
Number of logistic centres, platforms, hubs, lockers	5	Madrid360	Florence SUMP	Spanish Urban Agenda	
Number of loading/unloading areas and/or public space dedicated to urban logistics	4	Madrid360	ICLEI	ULaaDS	
Percentage of freight vehicles in total vehicular traffic	1	ICLEI			
Congestion	6	Florence SUMP	Funchal Sulp	ICLEI	ULaaDS
Policies related to urban logistics	3	Florence SUMP	ICLEI		
Fuel consumption	3	Florence SUMP	ICLEI	NetZeroCities	
Customer satisfaction with the delivery	5	ICLEI	ULaaDS	Florence SUMP	
Stakeholder engagement	6	Florence SUMP	Funchal Sulp	ICLEI	
Km traveled by commercial vehicles	7	Florence SUMP	Funchal Sulp	ICLEI	
loading/unloading time - time per delivery	6	Florence SUMP	Funchal Sulp	ICLEI	ULaaDS
Air quality, GHG emissions and particles	11	Funchal Sulp	ICLEI	NetZeroCities	SUMI
Noise level	3	Funchal Sulp	ICLEI		
Freight-related accidents (accidents, people injured, vehicles involved, etc)	8	ICLEI	ULaaDS		
Severe violations (Speed violation, drivers testing positive on alcohol or drugs)	2	ICLEI			
Soft violations (unauthorized parking in loading zones // commercial vehicles with parking-related fines)	2	ICLEI			
Reliability of just-in-time freight deliveries	5	ICLEI	CIVITAS		
Increased utilisation of load capacity of vehicles	4	ICLEI	CIVITAS	ULaaDS	
Gender/ethnicity of workers in freight-related industries & occupations	4	ICLEI			
Modal split	7	ICLEI	CIVITAS	SUMI	
Freight logistic intensity // delivery productivity	11	Funchal Sulp	ICLEI	ULaaDS	
Costs of the last mile per delivery/ pick up	3	ULaaDS			
Percentage of total vehicle-kilometers that run empty	1	ICLEI			
Recipient awareness of sustainable delivery options (index) // Recipient willingness to pay for sustainable delivery (index)	2	ULaaDS			
Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours	1	CIVITAS			
Energy use and infrastructure available at warehouses, microplatforms, etc	3	Madrid360	ICLEI		
Night deliveries	1	Madrid360			
Employment rate and annual average income for freight employees in city	2	ICLEI			
Average age of freight vehicles	1	Funchal Sulp			
Average utilization of the warehouse or distribution centers	1	ICLEI			

To facilitate the comprehension of this collection of indicators, it was decided to classify them into different categories.

These categories were initially defined in a workshop⁷ performed during the project kick-off meeting. The workshop aimed to identify the main drivers to consider when evolving towards more sustainable urban logistics. The drivers identified were gathered into 3 categories, which were the ones used to classify the indicators: *urban planning, data* and *customers' attitude*.

⁷ https://unchainproject.eu/content/uploads/2024/02/UNCHAIN-D2.2_User-needs-of-the-main-actors-of-urban-logistics-ecosystem.pdf

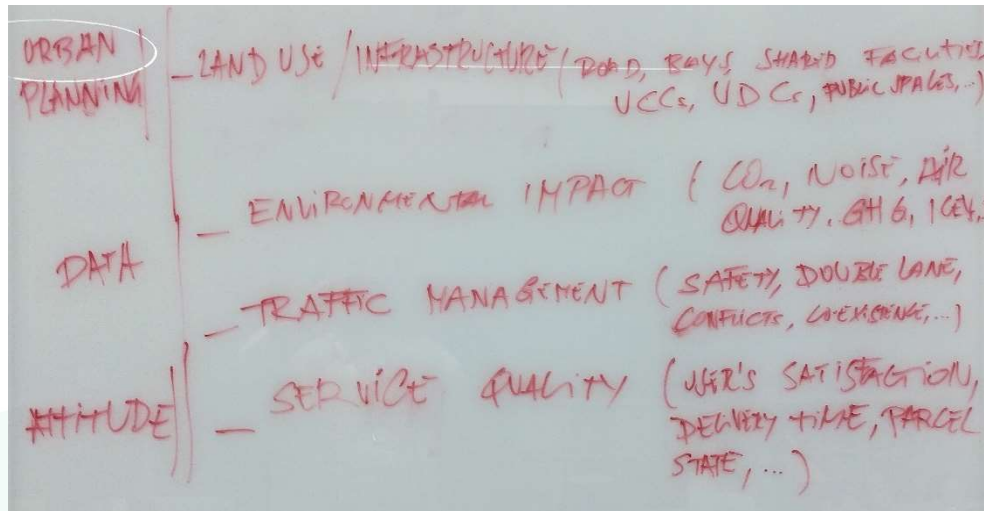


Figure 6: Categories to drive the interventions in the logistics sector.

The three initial categories defined, together with the drivers included in each one of them, are listed below and presented in Figure 6.

- **Urban planning:**
 - *Land use / Infrastructure*, including indicators such as shared facilities, UCCs or public spaces, among others.
- **Data:**
 - *Environmental impact*, including indicators such as CO₂, noise or ICEVs, among others.
 - *Traffic management*, including indicators such as safety, or co-existence among others.
- **Attitude:**
 - *Service quality*, including indicators such as user's satisfaction or delivery time among others.

This initial definition of the categories was slightly adapted when the indicators were assigned to each category to better adapt to the urban logistic framework and then 4 categories were defined (instead of 3) The final name of the category and the KPIs allocated under each one, is the one shown in Table 29.

Table 29: Initial Indicators' list classified per categories.

Category	Indicators	
Urban Planning (land use/infrastructure/public participation)	5	• Number of logistic centres, platforms, hubs, lockers • Number of loading/unloading areas and/or public space dedicated to urban logistics • Energy use and infrastructure available at warehouses, microplatforms, etc • Policies related to urban logistics • Stakeholder engagement
Environmental and social Impact	6	• Number of sustainable commercial or freight vehicles (LEV, ZEV) • Fuel consumption • Air quality, GHG emissions and particles • Noise level • Gender/ethnicity of workers in freight-related industries & occupations • Employment rate and annual average income for freight employees in city
Traffic Management	5	• Percentage of freight vehicles in total vehicular traffic • Congestion • Freight-related accidents (accidents, people injured, vehicles involved, etc) • Severe violations (Speed violation, drivers testing positive on alcohol or drugs) • "Soft" violations (unauthorized parking in loading zones, commercial vehicles with parking fines)
Service Efficiency	14	• Modal split • Customer satisfaction with the delivery • Km traveled by commercial vehicles • loading/unloading time or time per delivery • Reliability of just-in-time freight deliveries • Increased utilisation of load capacity of vehicles • Freight logistic intensity or delivery productivity • Costs of the last mile per delivery/ pick up • Percentage of total vehicle-kilometers that run empty • Recipient awareness of sustainable delivery options (index) or Recipient willingness to pay for sustainable delivery (index) • Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours • Night deliveries • Average age of freight vehicles • Average utilization of the warehouse or distribution centers

4.2.3. Assessment of the initial indicators' list.

To assess the indicators' list presented in Table 28, a workshop was organized during the 2nd UNCHAIN general assembly, performed in Florence between 19th and 20th, September 2023.

The workshop was divided in two sessions:

- A presentation (see ANNEX 1) of the work performed to generate the first indicators' list, in order to sensitize the consortium partners on KPIs collection. The sensitization session was focused on presenting the process followed to produce the first KPIs collection, shown in Table 29.
- and an online questionnaire addressed through the Mentimeter⁸ platform.

The second session of the workshop, focused on the indicator's collection assessment, presented a questionnaire with the following questions per each KPI categories (Table 30).

⁸ <https://www.mentimeter.com/>

Table 30: Questionnaire for the 2nd workshop in Florence.

Q1: [Name of the Category] KPIs ☐ This KPIs collection covers my expectations. ☐ This KPIs collection is useful for me. ☐ <i>(scale 1-5, with 1 indicating the lowest level of satisfaction and 5 indicating the highest).</i> Q2: Regarding [Name of the Category], which relevant KPIs are missing? <i>(3 contributions as maximum, word cloud)</i> Q3: Regarding [Name of the Category], which datasets are required to feed this KPIs collection? <i>(3 contributions as maximum, word cloud).</i>

The ANNEX 2 presents the workshop's results generated by the Mentimeter platform. The results evidenced the high agreement level with the initial KPIs collection. The Figure 7 presents the answers to the first question, which have a mean value close to 4 (out of 5). Therefore, with this result, the consortium partners consider that the initial KPIs collection (Table 29) cover their expectations

Land Use/Infrastructures/Public participation KPIs



Environmental and Social impact KPIs



Traffic management KPIs



Service efficiency KPIs



Figure 7: Participants' answers to the first question per each KPI category.

Table 31: Missing KPIs and required datasets, related to all indicators' categories.

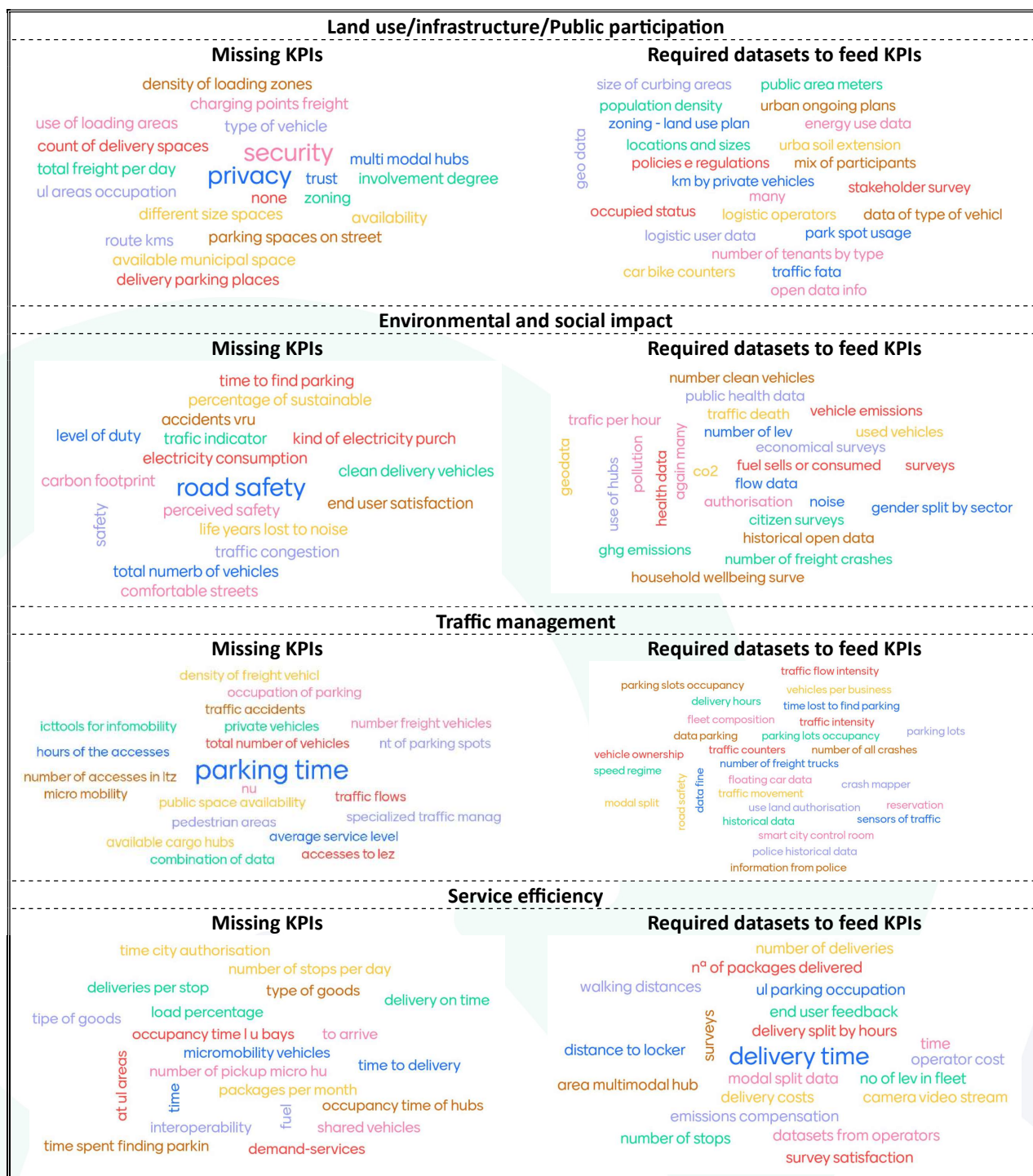


Table 31 shows the word clouds for all the indicators categories, produced by participants answers to the question of missing KPIs (Q2), and the question of datasets required to feed the KPIs (Q3).

Table 32: Topics cited in the workshop, covered by the Initial Indicators' list.

KPIs	Missing indicators (sub-indicators)	Word cloud
Land use/Infrastructure/Public participation		
Number of logistic centers, platforms, hubs, lockers	multi modal hubs	Land use
	number of pickup micro hubs	Service efficiency
	interoperability	
Number of loading/unloading areas - public space dedicated to urban logistics	density of loading zones	Land use
	charging points freight	
	count of delivery spaces	
	zoning	
	availability	
	parking spaces on street	Traffic management
	available municipal space	
	delivery parking places	
	data parking	
	parking lots	
use land authorisation	Traffic management-Dataset	
Policy related	speed regime	Traffic management-Dataset
Stakeholder engagement	trust	Land use
	involvement degree	Environment&Social impact
level of duty		
Energy use and infrastructure available at warehouses, microplatforms, etc	electricity consumption	Environment&Social impact
Environmental and social impact		
Number of sustainable commercial or freight vehicles (LEV, ZEV)	type of vehicle	Land use
	clean delivery vehicles	Environment&Social impact
	total number of vehicles	Environment&Social impact
	vehicles per business	Traffic management-Dataset
	fleet composition	
	micromobility vehicles	Traffic managementtt
shared vehicles	Service efficiency	
Fuel consumption		fuel
Noise level	life years lost to noise	Environment&Social impact
Traffic management		
Percentage of freight vehicles in total vehicular traffic	number of freight trucks	Traffic management-Dataset
Congestion	traffic indicator	Environment&Social impact
	traffic congestion	
	traffic flow intensity	
	traffic intensity	Traffic management-Dataset
	traffic counters	
	floating car data	
	traffic movement	
	sensors of traffic	
smart city control room		
Soft violations (unauthorized parking in loading zones // commercial vehicles with parking-related fines)	data fine	Traffic management-Dataset
Service efficiency		
Customer satisfaction with the delivery	end user satisfaction	Environment&Social impact
km traveled by commercial vehicles	route kms	Land use
Reliability of just-in-time freight deliveries	delivery on time	Traffic management
Increased utilisation of load capacity of vehicles	load percentage	Service efficiency
Modal split	modal split	Traffic management-Dataset
	type of goods	Service efficiency

Freight logistic intensity // delivery productivity	total freight per day	Land use
	packages per month	
	number of stops per day	Service efficiency
	deliveries per stop	
Average utilization of the warehouse or distribution centers	time to delivery	
	occupancy time of hubs	

To analyse the results generated in the workshop. It was extracted those terms that could be assimilated to KPIs that were included in the initial KPIs' list. The results of this analysis are presented in Table 32, and most of the partners contributions are close to indicators obtained from the indicators systems' review.

Nevertheless, there are some topics from the word clouds that are not addressed by the initial indicators' list, so it was decided to add some KPIs to cover these potential impacts. On one hand, there were some references to the number of accesses to LEZs (Table 32, Traffic management, Missing KPIs), that could be considered with a KPI employed in Riga (*Revenue from LEZ access fee (EUR)*, which was reported in deliverable D2.1⁶). On the other hand, there are some references to delivery hours in the *Service efficiency datasets*, that could be covered by a new KPI called *Time window in city for urban logistics*. In addition, the references to parking lots availability (Missing KPIs in Land use and Traffic Management) could be covered by a KPI employed in Madrid360⁶, which is *N. of commercial outlets having a cargo area within a 75 m radius*. These three KPIs have been added to the category of *Land use/Infrastructure/Public participation*. In this way, the number of indicators considered in this category increases from five to eight (Table 33, Table 35).

Table 33: New indicators added to the Initial Indicators' list.

	Initial number of KPIs	KPIs added	Final number of KPIs
<i>Land use/Infrastructure/Public participation</i>	5	+3	8
<i>Environmental and social impact</i>	6	+3	9
<i>Traffic management</i>	5	0	5
<i>Service efficiency</i>	14	+5	19
TOTAL	30	11	41

Related to *Environmental and Social impact* indicators, the word cloud of missing KPIs (Table 32), presents *Road safety* as the term that appears more frequently mentioned, although urban logistics does not seem to be involved with it. On the contrary, different participants mention *electricity consumption*, *ecological footprint*, *noise* or *safety* as terms closer to these indicators' category. Although the ecological impact and the safety could be assimilated to *Air quality*, *GHG emissions and particles*, we decided to split this indicator in three different ones (*GHG emissions*, *Particles (PM2.5 and/or PM10)*, and *Nitrogen Oxide (NO₂)*), and adding the *Ecological footprint* to complement the environmental impact in our indicators list. By doing this, the number of indicators included in this category increases in three new entries, reaching the total amount of nine (Table 33).

In the case of *Traffic management* missing KPIs (

Table 31), a topic is clearly highlighted over the others (*parking time*), but it was considered that this impact is linked to *Service efficiency* category. Moreover, it has been considered that parking topics and LEZ accesses are covered by *Infrastructure* indicators, therefore they must be addressed in this category. The impact of the other relevant topics included in the word cloud (number of freight vehicles, traffic accidents or density of freight vehicles) can be estimated by the indicators list presented in Table 29, so no additional indicators have been included in this category.

Regarding *Service efficiency*, we have added five additional indicators (Table 35) in order to include some of the topics addressed by the workshop's participants. The first KPI added is *Privacy*, the term with highest cites in the *Missing KPIs* word cloud of the *Land use* category (Table 31). This KPI does not exist in the indicators' system reviewed (section 4.2.1), so its calculation needs to be further discussed.

Table 34: Topics cited in the workshop, uncovered by the Initial Indicators' list.

KPIs	Missing indicator (sub-indicators)	Word cloud
Occupancy of (un)loading/parking areas	use of loading areas	Land use
	UL areas occupation	
	parking lots occupancy	Traffic management
	occupancy time loading unloading bays	Service efficiency
	urban logistics parking occupation	Service efficiency-Dataset
Time spent to find parking/(un)loading area	time to find parking	Environment&Social impact
	time spent finding parking	Service efficiency
Reservation of parking areas	reservation	Traffic management-Dataset

Parking time is also the term most cited in *Missing KPIs* word cloud of the *Traffic management* category. In addition, the occupancy of loading and unloading areas, the time spent to find parking and the parking reservation are also terms appearing in the workshop (Table 34). These three terms have been converted in KPIs, but they do not exist in the indicators' system reviewed. To compensate this, an additional KPI defined in the *Funchal SULP*⁶ (Constraints identified during the last mile stage) has been added, as it was considered that is also related to parking issues.

4.2.4. Final indicators' list.

Table 35 presents the final list of 41 indicators to estimate the impact of the UNCHAIN services. The new entries compared to the indicators lists presented in Table 29 are shown in *italics*. In addition, the ANNEX 3 presents a table where the process followed to group the indicators is shown. In yellow it is highlighted the indicators included from the workshop's word clouds (Table 31), and in green the added KPIs in the final indicators' list. ANNEX 33 table also presents the sources of sub-indicators that are part of every selected indicator.

This list has been considered in the usage scenarios definition presented in the following section, and some of them are presented as reference indicators for the pilot tests. However, as the project will evolve over time, *Data owners*, *Service developers* and the project's *Evaluation Manager* will have to decide jointly in WP6 which indicators of those selected (Table 35), will be finally considered to assess the impact of each demonstration.

Table 35: Final indicators' list.

Categories	Indicator
Environmental and social impact	(1) Number of sustainable commercial or freight vehicles (LEV, ZEV)
	(2) Fuel consumption
	(3) GHG emissions
	(4) <i>Particles (PM2.5 and/or PM10)</i>
	(5) Noise level
	(6) Gender/ethnicity of workers in freight-related industries & occupations (See also comment regarding GDPR issues)
	(7) Employment rate and annual average income for freight employees in city (how employment rate will be measured?)
	(8) <i>Carbon footprint of deliveries</i>
	(9) <i>Nitrogen Oxide (NO₂)</i>
Urban Planning (land use, infrastructure, public participation)	(10) Number of logistic centres, platforms, hubs, lockers
	(11) Number of loading/unloading areas - public space dedicated to urban logistics
	(12) Policy related
	(13) Stakeholder engagement
	(14) Energy use and infrastructure available at warehouses, microplatforms, etc
	(15) <i>Time window in city for urban logistics</i>
	(16) <i>Revenue from LEZ access fee (EUR)</i>
Traffic management	(17) <i>N. of commercial outlets having a cargo area within a 75 m radius.</i>
	(18) Percentage of freight vehicles in total vehicular traffic
	(19) Congestion
	(20) Freight-related accidents (accidents, people injured, vehicles involved, etc)
	(21) Severe violations (Speed violation, drivers testing positive on alcohol or drugs)
	(22) Soft violations (unauthorized parking in loading zones // commercial vehicles with parking-related fines)
Service Efficiency	(23) Customer satisfaction with the delivery.
	(24) km traveled by commercial vehicles
	(25) Loading/unloading time - time per delivery
	(26) Reliability of just-in-time freight deliveries
	(27) Increased utilisation of load capacity of vehicles
	(28) Modal split (which modes will be considered?)
	(29) Freight logistic intensity // delivery productivity
	(30) Costs of the last mile per delivery/ pick up
	(31) Percentage of total vehicle-kilometers that run empty

(32) Recipient awareness of sustainable delivery options (index) // Recipient willingness to pay for sustainable delivery (index)
(33) Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours
(34) Night deliveries
(35) Average age of freight vehicles
(36) Average utilization of the warehouse or distribution centers
(37) <i>Occupancy of (un)loading/parking areas</i>
(38) <i>Privacy</i>
(39) <i>Time spent to find parking/(un)loading area</i>
(40) <i>Reservation of parking areas</i>
(41) <i>Constraints identified during the last mile stage</i>

The indicators included in Table 35 are related with different sub-indicators presented in ANNEX 3, according to the calculation methods. These calculation methods are correspondingly related to different datasets, which availability and exchange is being addressed by project partners in WP3. Therefore, the calculation methods and the datasets involved will be reported in WP3's deliverables.

5. Usage scenarios to deploy project's use cases.

Usage Scenarios are feasible situations that can be created in the UNCHAIN demonstration sites, with the aim of proving project services' innovative features. These scenarios must meet cities' interests and product leaders' requirements to demonstrate UNCHAIN services.

The performance of UNCHAIN services must be demonstrated under real conditions, in a controlled environment. To accomplish these demonstration requirements, it is needed to generate scenarios that facilitate the test of the services by the defined user's profiles, in facilities located in the project demonstration sites. These scenarios, that we refer as *Usage Scenarios*, are consequently characterised by three main attributes: one or various UNCHAIN services, one or several user profiles and a physical location or facility.

Regarding locations and facilities, *Usage Scenarios* must be deployed in the living labs of the UNCHAIN project, i.e. Florence (FLO), Berlin (BER), and MAD (MAD), but also in the follower cities, i.e. Mechelen (MEC), Prague (PRA), Funchal (FUN) and Riga (RIG). Therefore, the cities must be involved in the definition of *Usage Scenarios*, as these scenarios have to be achievable for them, and meet their interests and expectations in terms of urban planning, logistics sustainability and implementation within their territory.

On the other hand, UNCHAIN services are being defined and developed by some companies (project partners), which are the developers. These companies require that certain user's profiles, including logistics customers but also logistics professionals and city managers, test their products to validate the main innovative features. In this sense, the *Usage Scenarios*

must be realistic scenarios to be deployed in a city, where services can be properly demonstrated.

In this section the procedure followed to define UNCHAIN's *Usage Scenarios* is reported. As a starting up task IBV, WP2's leader of UNCHAIN project, organised bilateral meetings between cities and developers, in order to expose and compare their interests and the services' requirements for the demonstration phase.

5.1. Methodology description.

The Table 36 presents the list of use cases described in the DoA document, and the services (KERs) to be demonstrated in each use case, differentiating *Living Labs* (MAD, FLO and BER), and *Followers cities* (MEC, PRA, FUN, and RIG). Taking into account that there are additional services that will be developed within the project (i.e guidelines, recommendations) that do not need physical location to be developed (KER1, KER2, KER3 and KER7), the KERs shown in Table 36 are those which demonstration involve the participation of users, and the employment of applications in a controlled and real environment.

Table 36: Services to be demonstrated in each use case.

	KER4	KER5	KER6 ⁹	KER8	KER9	KER10	KER11 ⁹	KER12	KER13
LIVING LABS	MAD_UC1	•				•			•
	MAD_UC2							•	
	MAD_UC3			•					
	BER_UC1		•						
	BER_UC2							•	
	BER_UC3	•							
	FLO_UC1	•	•	•	•				•
	FLO_UC2							•	
	FLO_UC3		•				•		
TWINNING CITIES	MEC_UC1								•
	MEC_UC2		•						
	PRAG_UC1			•					
	PRAG_UC2				•				
	FUN_UC1				•				
	FUN_UC2		•						
	RIG_UC1	•							
	RIG_UC2		•						

⁹ This service includes a multicriteria decision module, to be defined within WP4 and WP6.

To launch the definition of the usage scenarios, IBV organised bilateral meetings with cities. As shown in Table 36, all the KERs have to be demonstrated in the Living Labs, and consequently, *Usage scenarios* at the follower cities are going to be based in the *Living Lab's Usage scenarios*. Therefore, it was decided to tackle the *Usage scenarios* definition at the *Follower cities* once it was made progress at *Living Lab's Usage scenarios*

Every bilateral meeting was participated by service developers who were involved in one or more *Living lab's* use cases, by the partners integrating the city cluster (the city administration and logistics operators), and by the project coordinator (ETRA). Therefore, and considering the information presented in Table 37, the partners who participated in each Living Lab's meeting were:

- MAD_UC meeting: Madrid city administration, DHL, EMT, VMZ, ETRA and IBV.
- FLO_UC meeting: Florence city administration, UPS, VMZ, MUNI, ETRA and IBV.
- BER_UC: Berlin city administration, MUNI, VMZ, ETRA and IBV.

Table 37: KER developers and tool's short description

VMZ	KER4	UCC location and integrated planning KIT
	KER12	Congestion forecasting and safe route planning
MUNI	KER6	Active UVARs and city regulations tools
	KER9	Dynamic management of pick-up/drop-off points
	KER11	Logistics operator monitoring system and incentives tool
ETRA	KER5	On-street loading zones planning tool
	KER8	Dynamic curb side management
	KER10	IT Pop-Up delivery points management tool
	KER13	Advanced Management IT Cockpit of Shared Facilities

As a working document to focus on the discussion for the first meeting, IBV generated the draft version of the *Usage scenarios* related to each use case. To define these scenarios, we had the following information:

- The services to be tested in each use case, according to Table 36.
- The description of the services presented in the service cards¹⁰.
- The users (intermediate users and end users, including logistics professionals and logistics customers) potentially involved in the demonstration, according to service description.
- A use case can include different usage scenarios, considering that:
 - Each usage scenario is participated by a unique service developer.
 - A usage scenario can include more than one service (having a common service developer).

¹⁰ A template where the main UNCHAIN services features were described by the development leaders.

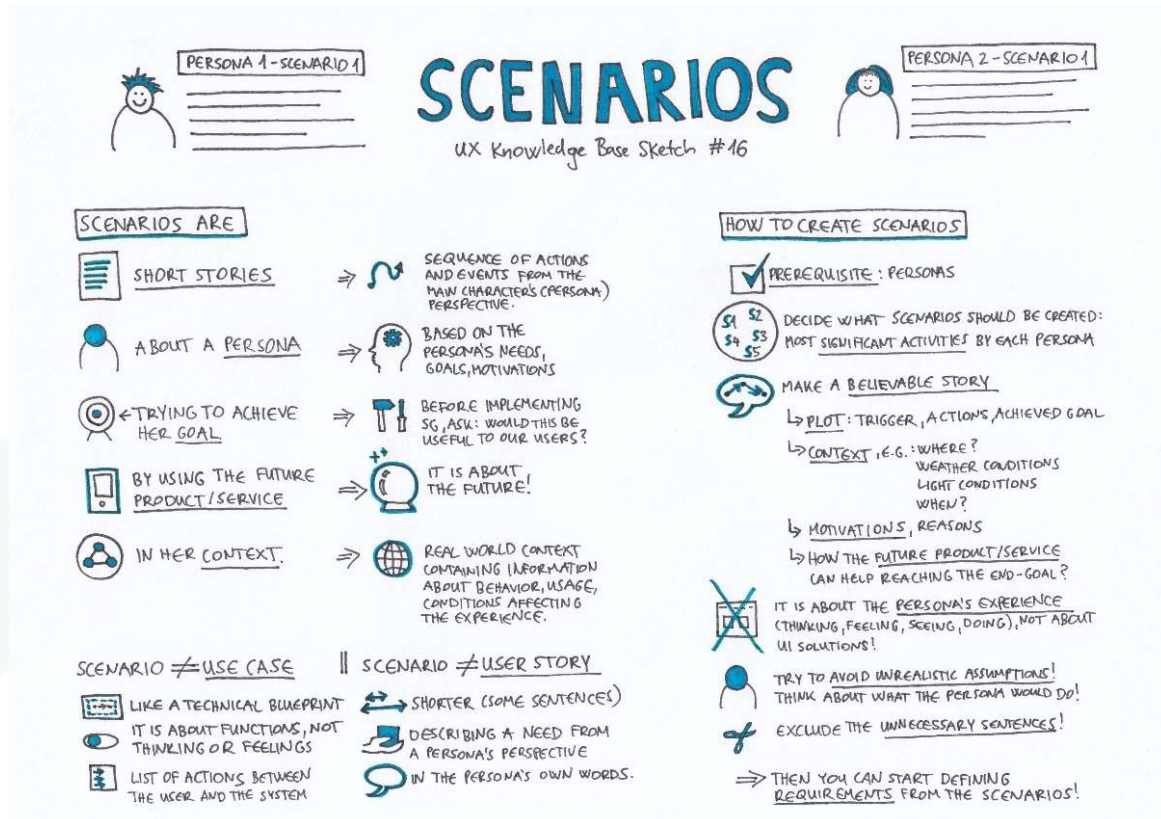


Figure 8: Elements to consider when generating scenarios.

These scenarios, aimed to define the way the products are going to be employed in each *Living lab* in order to demonstrate their innovative features, are the *Usage Scenarios*, as detailed in Figure 8. It describes a real-world example of how one or more people or organizations interact with a system, and the steps, events, and actions which occur during the interaction^{11,12,13}. If required, further refinement, enhancements, and details regarding the requirements of the UNCHAIN demonstrators including indicators to be used, sample size and composition, will be defined in WP6.

¹¹ BØDKER, S. (2000). SCENARIOS IN USER-CENTRED DESIGN-SETTING THE STAGE FOR REFLECTION AND ACTION. INTERACTING WITH COMPUTERS, 13(1):61-75.

¹² ROSSON, M. B., & CARROLL, J. M. (2009). SCENARIO BASED DESIGN. HUMAN-COMPUTER INTERACTION. BOCA RATON, FL, 145-162.

¹³ WIECHER, C. (2020, OCTOBER). A FEATURE-ORIENTED APPROACH: FROM *USAGE SCENARIOS* TO AUTOMATED SYSTEM OF SYSTEMS VALIDATION IN THE AUTOMOTIVE DOMAIN. IN PROCEEDINGS OF THE 23RD ACM/IEEE INTERNATIONAL CONFERENCE ON MODEL DRIVEN ENGINEERING LANGUAGES AND SYSTEMS: COMPANION PROCEEDINGS (PP. 1-6).

CITY_UC1 Usage Scenario CITY_1.1

KERs involved: SERVICE_NAME (KER)

Objective: A brief description of the main objective of the pilot test

Location: Proposed location to perform tests

Professional users & citizens:

- **End user's profile:** End user's designation
- **Intermediate user's profile:** Intermediate user's designation.

User's sample: Number of users per group, involved in the demonstration

Resources: Equipment involved in the demonstration

Partners: Partners involved in the demonstration

Datasets: Datasets required by the service

KPIs: Main indicators considered to measure the service impact

Figure 9: Template used to define the main components of the usage scenario.



Figure 9 shows the template employed to register the main features of the *Usage scenario* for the cities and their use cases. Each Usage scenario is characterized by:

- *Objective:* main description of the demonstration.
- *Location:* A place in the city to perform the tests.
- *Professional users and citizens:* the persons who are going to employ the service, distinguishing between end users (service's customers) and intermediate users (service's prescribers).
- *User's sample:* number of persons taking part in the pilot tests.
- *Resources:* equipment required to perform the service demonstration, including software and hardware.
- *Partners:* the main entities involved in the demonstration.
- *Datasets:* the data files required by the service to work.
- *KPIs:* proposed indicators to measure the service impact¹⁴.

The *Usage scenario's* description also includes a user story per each user profile taking part in the demonstration. This story presents an invented character, that suits the user profile identified to participate in the demonstration. This character performs the main actions planned to assess the service, in a given location. Figure 10 presents an example of the user story generated to assess the KER4.

¹⁴ The KPIs to consider in the demonstration assessment should be extracted from the final indicators list presented in section 4.2.4.

BER_UC3 Usage Scenario BER_3.1

CLICK_LOG. Test & Assessment. Urban planner

User story:

Marie is a urban mobility planner within Berlin Council (BER).

She is one of the three-five participants who are going to use and assess the UCC Location and Holistic Planning Kit (CLICK_LOG), a platform to support city planners in defining where to install logistic centers.

Marie receives a document to use the platform (tasks and tutorial), and a personalized link to the web frontend of the platform to perform planning activities.

He accesses the CLICK_LOG platform by inserting the personalized code and explores the functionalities. After reading through the tutorial, Marie starts a first planning process:

- She is guided through a multistep-process. In the first step she enters the City's goals and preferences for the planning: BER wants to optimize logistics in the city. BER already has a number of UCCs, micro-depots, and some facilities shared by mobility companies and logistics companies.

BER wants to primarily focus on public space extension and last mile logistics. Marie uploads a list of existing UCCs and micro-depots, and formatted condensed usage data from a previous analysis. Furthermore, Marie enters some basic data of the region she obtained from the open data portal (as size, population etc.) and some logistics key facts of the region, e.g. the expected demand for the e-commerce at the planning horizon.

Next, Marie is asked for geo-information on the area of BER. She uploads a shape file containing the area boundaries with structural information and socio-economic information. BER also wants to promote special user groups as cargo-bikes and ZEVs. Marie enters this information alongside with the location of POI for this.

The data entry is completed. Marie gets a map with a recommendation for the extension of the UCCs network. She reviews all the recommendations to install UCCs according to user demand, logistics needs, territory coverage, access and urban integration with BER real data.

As time goes by, an unexpected growth of e-commerce demand takes place that lets Marie to review the parameters set within CLICK_LOG. She and her team uses several parameters to adapt the assumptions and gets a new recommendation. CLICK_LOG provides an adjusted suggestion and saves it in order to refine and review it later.



Berlin



vmz



Figure 10: User story for the demonstration of an UNCHAIN service.

Finally, the *Usage Scenarios* presented in the following sections are not locked scenarios, so further refinement, enhancements, and details will be produced from now to the pilot tests start up, within WP6. Nevertheless, we consider that its generation has been a very profitable exercise for cities, to think about not only in their expectations and interest during the demonstration phase of the project, but also in all the required efforts to execute the tests in real use conditions. In addition, during this task service developers envisaged real validation scenarios, that helped them to better identify their products' key features, and to find a way to demonstrate its main innovations in the complex logistics ecosystem.

5.2. Usage scenarios to test KERs in the Living Labs.

5.2.1. MAD usage scenarios.

On Friday 17th of November IBV performed the first bilateral meeting with MAD cluster (MAD municipality, EMT, and DHL). The meeting, which had a workshop format, was led by IBV, with the participation of service developers (VMZ-KER4 and ETRA-KER8-KER10-KER12¹⁵-KER13).

As presented in Table 36, the services to be demonstrated in three MAD's use cases are:

- MAD_UC1: KER4, KER10 and KER13.
- MAD_UC2: KER12

¹⁵ At the date of the meeting, KER12 was a service which was going to be developed by ETRA, as stated in the DoA. Along the following weeks, ETRA and VMZ agreed on making a change in the services' developers. As a result of this agreement, VMZ was going to be KER12 developer, substituting ETRA, and ETRA was going to be KER5 developer, instead of VMZ.

- MAD_UC3: KER8.

MAD_UC1 Usage Scenario MAD_1.1

KERs involved: CLICK_LOG (KER4)

Objective: To test *CLICK_LOG* in Madrid, as part of the Madrid UseCase1. This service is a tool for urban planners, to support them in UCCs' optimal location. Madrid Council urban planners will test the tool, and will provide feedback to developers.

Location: Madrid Council Headquarters.

Professional users:

- **End user's profile:** Madrid Council Urban Planners. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

User's sample: 3-5 end users.

Resources: PC with internet connection to reach *CLICK_LOG* Website.

Partners: Madrid Council – VMZ - EMT

Datasets: Those required by the *CLICK_LOG* platform.

KPIs: Number of logistic centres, platforms, hubs, lockers &
Number of loading/unloading areas - public space dedicated to urban logistics



Figure 11: Usage Scenario to assess KER4, within MAD_UC1.

The main aim of the workshop was to review each use case independently, trying to identify the usage scenario required to test all the KERs linked to the use case. Following the template shown in Figure 9, we also tried to identify all the components of the usage scenario, in an open discussion with MAD cluster members, and service developers.

MAD_UC1 Usage Scenario MAD_1.2

KERs involved: Pop_Up_Delivery (KER10), Shared_Facilities (KER13)

Objective: To test *IT Pop Up Delivery Management and Management IT of Shared Facilities*, as part of Madrid UseCase1. Logistics planners select PopUp delivery points (lockers, delivery vehicle, ...) employing KER10. These delivery points will include parking lots of EMT parkings, reserved for logistics operators (KER13). Customers, delivery persons, logistics planners and parking managers test both tools and provide feedback to developers.

Location: Lockers in Madrid & EMT parking.

Professional users & Customers:

- **End user's profile:**
 - KER10: DHL's customer, DHL's delivery person, DHL's logistics planner
 - KER13: DHL's delivery person, DHL's logistics planner.
- **Intermediate user's profile:** KER13: EMT parking manager .

User's sample: 10 customers, 5-10 professional end users, and 1-3 intermediate users.

Resources: EMT parking, sensors, cameras.

Partners: Madrid Council – ETRA - DHL - Madrid EMT

Datasets: Traffic data (real time), Deliveries schedule, Parking spots

KPIs: Customer satisfaction with the delivery & Km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



Figure 12: Usage Scenario to assess KER10 and KER13, within MAD_UC1.

As a result of this discussion, we identified two usage scenarios to test the services linked to MAD_UC1. The *Usage Scenario MAD_1.1*, focused on the demonstration of KER4, as shown in Figure 11. This scenario proposes a demonstration to be performed by professionals that are part of the city council staff.

MAD_UC2 Usage Scenario MAD_2.1

KERs involved: Safe_Route KER12

Objective: To test *Congestion forecasting and Safe Route planning* in Madrid, as the Madrid UseCase2. The logistics planner employs the KER12 to plan safe routing for deliveries men, who follow the plan route, and get updates in real time.

Location: Madrid metropolitan area.

Professional users:

- **End user's profile:**
 - DHL logistics planners tests the planning utilities and optimization capabilities.
 - DHL delivery person tests the routing utilities and the real time updates.
- **Intermediate user's profile:** ---.

User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Madrid Council - ETRA - DHL

Datasets: Those required by KER12

KPIs: km traveled by commercial vehicles & loading/unloading time - time per delivery & carbon footprint of deliveries



Figure 13: Usage Scenario to assess KER12, within MAD_UC2.

The *Usage Scenario* MAD_1.2 includes two services, that are demonstrated in the same scenario (Figure 12), in a location managed by EMT. Different user profiles participate in the demonstration, including logistics customers, logistics professionals and managers. The involvement of companies in Madrid cluster (EMT and DHL) makes the scenario feasible, as they can provide the resources and users profiles required for the demonstration.

The *Usage Scenarios* for the other two use cases were simpler, because there is only one service per use case. Therefore, the discussion was focused on defining a scenario feasible to demonstrate KER12 and KER8.

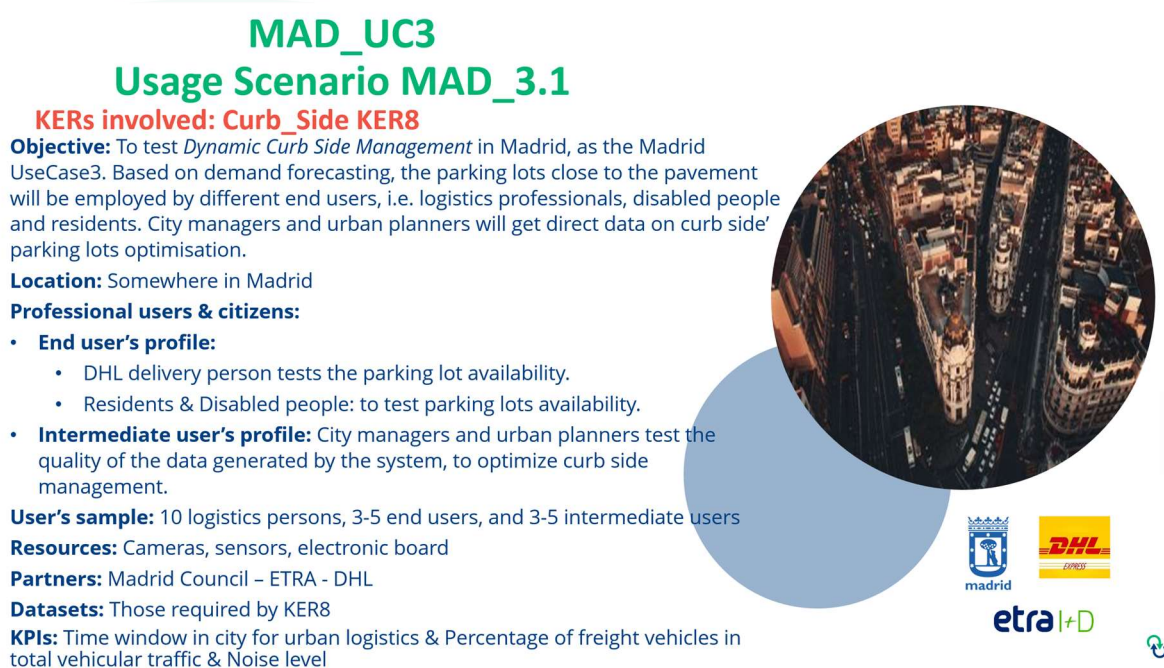


Figure 14: Usage Scenario to assess KER8, within MAD_UC3.

Figure 13 presents the scenario defined to test KER12, in the second MAD's use case. Two different professionals took part in the demonstration of this service, that includes the participation of the service developer, and the logistics company. At this definition level, the identification of datasets to feed the service, and the KPIs that could be employed to measure the impact, were still pendent at the end of the first meeting.

Figure 14 shows the main features of the usage scenario defined to demonstrate KER8, in MAD_UC3. This scenario comprehends the participation of professionals from the logistics sector and from the administration, but also citizens. In addition, this service requires the installation of specific equipment, so the location to perform the demonstration is critical for this use case.

The proposal of usage scenarios presented in the previous paragraphs were reviewed and enriched by the members of MAD cluster, producing the final usage scenarios and the users' stories shown in ANNEX 4: Living Labs' Usage Scenarios.

Table 38 summarizes the main features of the defined usage scenarios. The table presents the final amount on usage scenarios per use case and the services tested in each usage scenario. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 4 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Table 38: Main features of Madrid Usage Scenarios.

	Usage Scenario	KER	User's profiles	KPIs ^{16,17}	Data sets	Location
UC1	MAD_1.1	KER4	Urban planner	(10) Number of logistic centres, (11) Number of loading/unloading	---	City centre
	MAD_1.2	KER10 & KER13	- DHL Customer - DHL Delivery person - DHL Logistics planner - EMT Parking manager	(37) Occupancy of parking	DUM data	EMT parking Avda Portugal, Mayor/ Avda Portugal + Fuente de la Mora)
UC2	MAD_2.1	KER12	DHL Operator	(24) km traveled by commercial vehicles, (25) Time per delivery, (8) Carbon footprint	---	Metropolitan area
UC3	MAD_3.1	KER8	- Urban planner¹⁸ - DHL delivery person - Resident&Disabled	(22) Soft violations (double lane), (37) Occupancy of parking	---	Paseo del Marqués de Zafra

5.2.2. FLO usage scenarios.

On Wednesday 17th of January IBV performed the first bilateral meeting with FLO cluster (FLO municipality, UPS, MUNICIPIA and SPES). The meeting, which had a workshop format, was led by IBV, with the participation of service developers (ETRA-KER8-KER13-KER5, MUNI-KER9-KER6-KER11 and VMZ-KER4-KER12).

As presented in Table 36, the services to be demonstrated in three FLO's use cases are:

- FLO_UC1: KER4, KER5, KER8, KER9 and KER13.

¹⁶ The logistics indicators are referred to the numbering of the KPIs in Table 35.

¹⁷ Indicators which are not linked to a number are considered no logistics KPIs.

¹⁸ The user story of this profile has not been included in the usage scenario description, as this profile has not been agreed with the city council.

- FLO_UC2: KER12.
- FLO_UC3: KER6, KER11.

The main aim of the workshop was to review the initial approach of FLO_Usage Scenarios, considering the one performed with MAD cluster on November '23 (section 5.2.1). Indeed, this first approach included the usage scenarios for KER4, KER8, KER12 and KER13 produced for MAD, and a tentative proposal for KER5, KER9 and KER11.

FLO_UC1 Usage Scenario FLO_1.1

KERs involved: CLICK_LOG (KER4)

Objective: To test *CLICK_LOG* in Florence, as part of the Florence UseCase1. This service is a tool for urban planners, to support them in UCCs' optimal location. Florence Council urban planners will test the tool, and will provide feedback to developers.

Location: Florence Council Headquarters.

Professional users:

- **End user's profile:** Florence Council Urban Planners. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

User's sample: 3-5 end users.

Resources: PC with internet connection to reach *CLICK_LOG* Website.

Partners: Florence Council – VMZ

Datasets: Those required by the *CLICK_LOG* platform.

KPIs: Number of logistic centres, platforms, hubs, lockers &
Number of loading/unloading areas - public space dedicated to urban logistics



Figure 15: Usage Scenario to assess KER4, within FLO_UC1.

As a result of this discussion, it was identified four usage scenarios to test the services linked to FLO_UC1. The *Usage Scenario FLO_1.1*, focused on the demonstration of KER4, is shown in Figure 15. This scenario proposes a demonstration to be performed by professionals that are part of the municipality staff.

FLO_UC1 Usage Scenario FLO_1.2

KERs involved: Dynamic_pick-up/drop-off (KER9)

Objective: To test *Dynamic management of pick-up/drop-off points*, as part of Florence UseCase1. The system includes parking lots that can be monitored (occupied/free) with sensors. These parking lots can be booked by employing KER9. The parking lots can be used as cargo bike's pick-up or drop-off points. Customers, delivery persons, logistics planners and parking managers test the tool and provide feedback to developers.

Location: Sant'Ambrogio market place

Professional users & Customers:

- **End user's profile:**
 - KER9: UPS customer, UPS delivery person, UPS logistics planner
- **Intermediate user's profile:** Florence urban traffic manager.

User's sample: 10 customers, 5-10 professional end users, and 1-3 intermediate users.

Resources: Sensors.

Partners: Florence Council – MUNICIPIA - UPS

Datasets: Traffic data (real time), Deliveries schedule, Parking spots

KPIs: Customer satisfaction with the delivery & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



Figure 16: Usage Scenario to assess KER9 within FLO_UC1.

The *Usage Scenario FLO_1.2* is dedicated to KER9, a service developed by MUNICIPIA, employing cargo bikes in the area of Sant'Ambrogio market (Figure 16). Different user profiles participate in the demonstration, including logistics customers, logistics professionals and managers. The involvement of a logistics company in Florence cluster (UPS) makes the scenario feasible, as they can provide the resources and users profiles required for the demonstration.

FLO_UC1 Usage Scenario FLO_1.3

KERs involved: Shared_Facilities (KER13)

Objective: To test *Management IT of Shared Facilities*, as part of Florence UseCase1. Logistics planners book parking lots of Florence council, reserved for logistics operators (KER13). According to their route planning, the delivery persons access to a certain area in a time window, that ensures them to booked parking lot. Delivery persons, logistics planners, and urban traffic managers test the tool and provide feedback to developers.

Location: Sant'Ambrogio market place

Professional users & Customers:

- **End user's profile:** UPS delivery person, UPS logistics planner
- **Intermediate user's profile:** Florence urban traffic manager.

User's sample: 5-10 professional end users, and 1-3 intermediate users.

Resources: Cameras, sensors.

Partners: Florence Council – ETRA - UPS

Datasets: Traffic data (real time), Deliveries schedule, Parking spots

KPIs: Customer satisfaction with the delivery & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



Figure 17: Usage Scenario to assess KER13, within FLO_UC1.

The *Usage Scenario* FLO_1.3 (Figure 17) focuses on KER13 demonstration. This service, developed by ETRA, facilitates the employment of facilities by different logistics companies, to make daily operations. Logistics professionals from UPS and municipality managers are involved in the demonstration, that will also take place in Sant'Ambrogio market.

FLO_UC1

Usage Scenario FLO_1.4

KERs involved: Loading_zones (KER5), Curb_Side (KER8),

Objective: To test *On-street loading zones planning tool*, and the *Dynamic Curb Side Management* as part of Florence UseCase1. The parking lots close to the pavement will be employed by different end users, i.e. logistics professionals, disabled people and residents, based on demand forecasting (KER8). Logistics planners employ KER5 to identify on-street loading zones, which occupancy can be monitored. Delivery persons, logistics planners, residents & disabled people and urban traffic managers test the tool and provide feedback to developers.

Location: Florence city centre

Professional users & Customers:

- **End user's profile:**
 - KER8: UPS delivery person, residents & disabled people
 - KER5: UPS delivery person, UPS logistics planner
- **Intermediate user's profile:** Florence urban traffic manager.

User's sample: 5-10 professional end users, and 1-3 intermediate users, 3-5 end users.

Resources: Cameras, sensors, electronic board

Partners: Florence Council – ETRA - UPS

Datasets: Traffic data (real time), Deliveries schedule, Parking spots

KPIs: Customer satisfaction with the delivery & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)

Figure 18: Usage Scenario to assess KER5 and KER8, within FLO_UC1.



The fourth Usage Scenario for FLO (Figure 18) combines two services developed by ETRA: KER5 and KER8. The UPS logistics planners employ KER5 to select parking lots as loading zones. This parking lots are managed by KER8, so delivery persons can park there and report their location to planners.

The *Usage Scenarios* for FLO_UC2 includes a unique service, developed by VMZ (Figure 19). This scenario is similar to that proposed for MAD, as we have the same service in a use case that only includes one tool. UPS logistics professionals participate in the demonstration, jointly to service developer and the municipality. At this definition level, the identification of datasets to feed the service, and the KPIs that could be employed to measure the impact, were still pendent.

FLO_UC2

Usage Scenario FLO_2.1

KERs involved: Safe_Route (KER12)

Objective: To test *Congestion forecasting and Safe Route planning* in Florence, as the Florence UseCase2. The logistics planner employs the KER12 to plan safe routing for deliveries men, who follow the plan route, and get updates in real time.

Location: Florence city centre.

Professional users:

- **End user's profile:**

- UPS delivery person
- UPS logistics planner

- **Intermediate user's profile:** ---.

User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Florence Council - VMZ - UPS

Datasets: Those required by KER12

KPIs: km traveled by commercial vehicles & loading/unloading time - time per delivery & carbon footprint of deliveries



Figure 19: Usage Scenario to assess KER12, within FLO_UC2.

The two services to be tested within FLO_UC3 are developed by MUNICIPIA, but two different usage scenarios have been proposed to test them, as it could not define a feasible scenario to combine both tools. UPS and the municipality, jointly to MUNICIPIA, are involved in both demonstrations.

FLO_UC3

Usage Scenario FLO_3.1

KERs involved: Active_UVARs (KER6)

Objective: To test *Active UVARs and city regulations tools* in Florence, as the Florence UseCase3. UPS delivery persons employ KER6 to access to restricted areas in the city, and to get optimal routes. The logistics planners get information about deliveries to assess performance improvements. In addition, city managers get information about accesses and permits.

Location: Florence city centre

Professional users & citizens:

- **End user's profile:** KER6: UPS delivery person, UPS logistics planner.
- **Intermediate user's profile:** City managers, urban planners.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Florence Council – MUNICIPIA - UPS

Datasets: Those required by KER6

KPIs: Time window in city for urban logistics & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



Figure 20: Usage Scenario to assess KER6, within FLO_UC3.

Figure 20 presents the usage scenario defined to demonstrate KER6 in Florence, while Figure 21 shows the proposed scenario to test KER 11. Both usage scenarios integrate the third use case for Florence.

FLO_UC3 Usage Scenario FLO_3.2

KERs involved: Active_UVARS (KER6), Monitoring_Incentives (KER11)

Objective: To test *Logistics operator monitoring system and incentives tool* in Florence, as the Florence UseCase3. UPS delivery persons employ KER11 to identify the parking lot booked to make the deliveries. The booking is made by the UPS logistics planners, by using KER11, according to delivery plans. City managers apply rewards policies to logistics companies, based on the information reported by KER11.

Location: Florence city centre

Professional users & citizens:

- **End user's profile:** UPS delivery person, UPS logistics planner.
- **Intermediate user's profile:** City managers, urban planners.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Florence Council – MUNICIPIA - UPS

Datasets: Those required by KER11

KPIs: Time window in city for urban logistics & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



Figure 21: Usage Scenario to assess KER11, within FLO_UC3.

The proposal of usage scenarios presented in the previous paragraphs were reviewed and enriched by the members of FLO cluster, producing the final usage scenarios and the users' stories shown in ANNEX 4: Living Labs' Usage Scenarios.

Table 39 summarizes the main features of the defined usage scenarios. The table presents the final usage scenarios per use case and the services tested in each usage scenario. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 4, are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also included.

Table 39: Main features of Florence Usage Scenarios.

Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
FLO_1.1	KER4	Urban planner	(10) Number of logistic centres, (11) Number of loading/unloading	---	City Centre (ZTL A & B)
FLO_1.2	KER9	- Local Administration - UPS Operator	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	Sant'Ambrogio market place/other similar place
UC1 FLO_1.3	KER13	- Local Administration - UPS Operator	(37) Occupancy of parking	DUM data	Sant'Ambrogio underground parking or other one in the city centre
FLO_1.4	KER5 & KER8	- Urban planner¹⁹ - UPS logistic planner - UPS operator - Resident&Disabled	(22) Soft violations (double lane), (37) Occupancy of parking	---	Selected area in Florence city centre (Sant'Ambrogio surroundings or other)
UC2 FLO_2.1	KER12	UPS Operator	(25) Time per delivery, (8) Carbon footprint	---	Urban area
FLO_3.1	KER6	- Local Administration - UPS Operator - UPS logistics planner	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	City centre
UC3 FLO_3.2	KER11		(27) Average loading charge, (37) Occupancy of parking, (20) Road accidents, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	City centre

5.2.3. BER usage scenarios.

On Thursday 15th of February, IBV performed the first bilateral meeting with BER cluster (BER municipality and VMZ). The meeting, which had a workshop format, was led by IBV, with the participation of service developers (MUNICIPIA-KER6 and VMZ-KER4-KER12), and ETRA as project coordinator.

¹⁹ The user story of this profile has not been included in the usage scenario description, as this profile has not been agreed with the city council.

As presented in Table 36, the services to be demonstrated in three BER's use cases are:

- BER_UC1: KER6.
- BER_UC2: KER12.
- BER_UC3: KER4.

The main aim of the workshop was to review the first approach we have produced for BER_Usage Scenarios, considering the results generated in the meeting performed with MAD cluster on November '23 (section 5.2.1), and FLO cluster on January '23 (section 5.2.2). Indeed, this first approach included the usage scenarios for KER4 and KER12 produced for MAD, and the usage scenario for KER6, produced for FLO.

BER_UC1

Usage Scenario BER_1.1

KERs involved: Active_UVARS (KER6)

Objective: To test *Active UVARS and city regulations tools* in Berlin, as the Berlin UseCase1. Delivery persons employ KER6 to access to restricted areas in the city, and to get optimal routes. The logistics planners get information about deliveries to assess performance improvements. In addition, city managers get information about accesses and permits.

Location: Berlin city centre

Professional users & citizens:

- **End user's profile:** KER6: Delivery person, Logistics planner.
- **Intermediate user's profile:** City managers, urban planners.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Berlin Municipality – MUNICIPIA

Datasets: Those required by KER6

KPIs: Time window in city for urban logistics & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)






Figure 22: Usage Scenario to assess KER6, within BER_UC1.

Figure 22 presents the proposed scenario to demonstrate KER6 in Berlin. Obviously, Berlin is a huge city, with traffic restrictions in different areas, so the demonstration will have to be implemented in a certain area or neighbourhood, more specific than city centre. In addition, BER cluster does not include a logistics operator, and this usage scenario comprehends a logistics company being part of the demonstration, as delivery persons and logistics planners must to assess the service.

BER_UC2 Usage Scenario BER_2.1

KERs involved: Safe_Route (KER12)

Objective: To test *Congestion forecasting and Safe Route planning* in Berlin, as the Berlin UseCase2. The logistics planner employs the KER12 to plan safe routing for delivery persons, who follow the plan route, and get updates in real time.

Location: Berlin city centre.

Professional users:

- **End user's profile:**
 - Delivery person
 - Logistics planner
- **Intermediate user's profile:** ---.

User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Berlin Municipality - VMZ

Datasets: Those required by KER12

KPIs: km traveled by commercial vehicles & loading/unloading time - time per delivery & carbon footprint of deliveries

Figure 23: Usage Scenario to assess KER12, within BER_UC2.



The *Usage Scenarios* for BER_UC2 includes a unique service, developed by VMZ (Figure 23). This scenario is similar to that proposed for MAD, as we have the same service in a use case that only includes one tool. Logistics professionals must participate in the demonstration, jointly to service developer and the city council.

BER_UC3 Usage Scenario BER_3.1

KERs involved: CLICK_LOG (KER4)

Objective: To test *CLICK_LOG* in BER, as the Berlin UseCase3. This service is a tool for urban planners, to support them in UCCs' optimal location. Berlin Council urban planners will test the tool, and will provide feedback to developers.

Location: Berlin Council Headquarters.

Professional users:

- **End user's profile:** Berlin Council Urban Planners. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

User's sample: 3-5 end users.

Resources: PC with internet connection to reach CLICK_LOG Website.

Partners: Berlin Municipality – VMZ

Datasets: Those required by the CLICK_LOG platform.

KPIs: Number of logistic centres, platforms, hubs, lockers & Number of loading/unloading areas - public space dedicated to urban logistics

Figure 24: Usage Scenario to assess KER4, within BER_UC3.



The *Usage Scenario* BER_3.1, focused on the demonstration of KER4, is shown in Figure 15. This scenario, similar to those defined for the other living labs of the UNCHAIN project, proposes a demonstration to be performed by professionals that are part of the city council staff. At this definition level, the identification of datasets to feed the service, and the KPIs that could be employed to measure the impact, were still pendent.

The proposal of usage scenarios presented in the previous paragraphs were reviewed and enriched by the members of BER cluster, producing the final usage scenarios and the users' stories shown in ANNEX 4: Living Labs' Usage Scenarios.

Table 40 summarizes the main features of the defined usage scenarios. The table presents the final amount on usage scenarios per use case and the services tested in each usage scenario. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 4 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Table 40: Main features of Berlin Usage Scenarios.

Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
UC1 BER_1.1	KER6	- Logistics operator - Local administration - Urban mobility planner - Urban mobility officer	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	Berlin city centre; Alexanderplatz surroundings
UC2 BER_2.1	KER12	- Logistics planner - Delivery person	(24) km traveled by commercial vehicles, (25) Time per delivery, (8) Carbon footprint	---	City centre
UC3 BER_3.1	KER4	Urban planner	(10) Number of logistic centres, (11) Number of loading/unloading	---	Berlin Council Headquarters

5.3. Usage Scenarios to test KERs in the Follower Cities.

5.3.1. MEC usage scenarios.

On Wednesday 21st of February IBV performed the first bilateral meeting with MEC council, a Follower City. The meeting, which had a workshop format, was led by IBV, with the participation of service developers (ETRA-KER13, and MUNICIPIA-KER6).

As presented in Table 36, the services to be demonstrated in two MEC's use cases are:

- MEC_UC1: KER13.
- MEC_UC2: KER6.

The main aim of the workshop was to review the first approach we have produced for MEC_Usage Scenarios (Figure 25), considering the results generated in the meeting performed with FLO cluster on January '23 (section 5.2.2). Indeed, this first approach included the usage scenarios for KER13 (Figure 17) and for KER 6 produced for FLO (Figure 20).



Figure 25: Usage Scenarios to assess services linked to MEC use cases.

Regarding KER13, the MEC staff informs that it is not possible to use the parking lots to perform logistics operations in Belgium. In addition, it is expected that the logistics company participating in the demonstration of KER operates with cargo bikes. So, they will consider transforming the usage scenario for KER13 towards mobile UCCs, that the logistics companies employ to supply cargo bikes with parcels.

Related to KER6, the city of Mechelen has implemented an UVAR area which is active, equipped with a system that automatically recognises the authorised vehicles. Combining the resources of the active UVAR with KER6 features is a promising possibility, to define the usage scenario to demonstrate this tool in Mechelen.

The proposal of usage scenarios presented in the Figure 25 were reviewed and enriched by the members of MEC cluster, producing the final usage scenarios and the users' stories shown in ANNEX 5: Follower Cities Usage Scenarios.

Table 41 summarizes the main features of the defined usage scenarios. The table presents usage scenario per use case, and the service tested. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 5 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Table 41: Main features of Mechelen Usage Scenarios.

Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
UC1 MEC_1.1	KER13	- Logistics planner - Delivery person - Urban traffic manager	(37) Occupancy of parking	---	Mechelen city centre (construction site in the inner city)
UC2 MEC_2.1	KER6	- Logistics planner - Delivery person - Urban traffic manager	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	Mechelen city centre (UVAR)

5.3.2. PRA usage scenarios.

On Tuesday 21th of February IBV performed the first bilateral meeting with PRA council, a follower City. The meeting, which had a workshop format, was led by IBV, with the participation of service developers (ETRA-KER8 and MUNICIPIA-KER9).

As presented in Table 36, the services to be demonstrated in two PRA's use cases are:

- PRA_UC1: KER8.
- PRA_UC2: KER9.

The main aim of the workshop was to review the first approach we have produced for PRA_Usage Scenarios (Figure 26), considering the results generated in the meeting performed with MAD cluster on November '23 (section 5.2.1) and FLO cluster on January '23 (section 5.2.2). Indeed, this first approach included the usage scenarios for KER8 (Figure 14) and for KER 9 (Figure 16) produced for FLO.



Figure 26: Usage Scenarios to assess services linked to PRA use cases.

Regarding KER8, the PRA staff had some doubts about the enforcement measures to guarantee the parking lots made available with KER8 are properly used. Indeed, the city has some queries about the system resources to avoid non-authorized drivers parked their cars in

the parking lots managed with KER8. ETRA mentioned the possibility of including a QR to register the parking lot occupancy, but KER8 proposes a dynamic management of the parking lots for professionals and selected drivers (e.g. residents or people with functional diversity), without access control.

On the other hand, DPD Logistics will participate in the demonstration of KER8 and KER 9 in Prague pilot tests.

The proposal of usage scenarios presented in the Figure 26 were reviewed and enriched by the members of PRA cluster, producing the final usage scenarios and the users' stories shown in ANNEX 5: Follower Cities Usage Scenarios.

Table 42 summarizes the main features of the defined usage scenarios. The table presents usage scenario per use case, and the service tested. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 5 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Table 42: Main features of Prague Usage Scenarios.

	Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
UC1	PRA_1.1	KER8	- Delivery person - Resident&Disabled	(22) Soft violations (double lane), (37) Occupancy of parking	---	Disctrict 5 (Lidicka St.) or
UC2	PRA_2.1	KER9	- Logistics customer - Delivery person - Logistics planner	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	Disctrict 4 (Taborska St.)

5.3.3. FUN usage scenarios.

On Friday 8th of March IBV performed the first bilateral meeting with FUN municipality, a Follower City. The meeting, which had a workshop format, was led by IBV, with the participation of service developers (MUNICIPIA-KER9&KER6), and ETRA as the project coordinator.

As presented in Table 36, the services to be demonstrated in two FUN's use cases are:

- FUN_UC1: KER9.
- FUN_UC2: KER6.

The main aim of the workshop was to review the first approach we have produced for FUN_Usage Scenarios (Figure 27), considering the results generated in the meeting performed with FLO cluster on January '23 (section 5.2.2). Indeed, this first approach included the usage scenarios for KER9 (Figure 16) and for KER 6 (Figure 20) produced for FLO.



Figure 27: Usage Scenarios to assess services linked to FUN use cases.

Regarding KER9, the FUN staff is very interested with the possibility of booking parking lots as loading and unloading bays. Nevertheless, the orography of the city makes very difficult communications with sensor networks, and the city failed in implementing a project based on a LORA network. Therefore, although the KER9 seems to be very interesting for the city, they express some doubts regarding the implementation phase of the pilot test. Regarding logistics company, they consider feasible the participation in the demonstration of the city beer company (Empresa de Cervejas da Madeira).

The proposal of usage scenarios presented in the Figure 27 were reviewed and enriched by the members of PRA cluster, producing the final usage scenarios and the users' stories shown in ANNEX 5: Follower Cities Usage Scenarios.

Table 42 summarizes the main features of the defined usage scenarios for FUN_UC1. The table presents the usage scenario for UC1, and the service tested. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 5 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Regarding UC2, at the time of writing this report the service to be tested in Funchal as UC2 is still in negotiation. The council claims that an UVARs area has no sense in the city, so testing KER6 is unmeaningful. The changes in the use case definition requires a negotiation involving different actors (project leader, service developers and the project officer), and this process is at this moment ongoing (end of March 2024).

Table 43: Main features of Funchal Usage Scenarios.

Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
UC1 FUN_1.1	KER9	- Delivery person - Logistics planner - Urban traffic manager	(37) Occupancy of parking	UVAR Info, Parking/UN & Load Status	Mercado dos Lavradores
UC2 FUN_2.1	---	---	---	---	---

5.3.4. RIG usage scenarios.

On Thursday 7th of March IBV performed the first bilateral meeting with RIG municipality, a Follower City. The meeting, which had a workshop format, was led by IBV, with the participation of service developers (ETRA-KER5 and MUNICIPIA-KER6).

As presented in Table 36, the services to be demonstrated in two RIG's use cases are:

- RIG_UC1: KER5.
- RIG_UC2: KER6.

The main aim of the workshop was to review the first approach we have produced for RIG_Usage Scenarios (Figure 28), considering the results generated in the meeting performed with FLO cluster on January '23 (section 5.2.2). Indeed, this first approach included the usage scenarios for KER5 (Figure 18) and for KER 6 (Figure 20) produced for FLO.



Figure 28: Usage Scenarios to assess services linked to RIG use cases.

Regarding KER5, the RIG team identified different areas of the city where there was a demand for loading zones, as they were located in the historical part of the city, or in commercial areas. In this sense, the use of this planning toolkit can actively contribute to promote the provision of additional loading and unloading zones. On the other hand, it is expected that RIG's UVAR zone is active next year, so the demonstration of KER6 can be part of the launching of this area of restricted in the city.

The proposal of usage scenarios presented in the Figure 28 were reviewed and enriched by the members of RIG cluster, producing the final usage scenarios and the users' stories shown in ANNEX 5: Follower Cities Usage Scenarios.

Table 44 summarizes the main features of the defined usage scenarios. The table presents usage scenario per use case, and the service tested. Moreover, the different user profiles participating in the assessment, which main actions are described in the *User story* of the ANNEX 5 are also presented. A proposed list of KPIs to assess the demonstration, jointly to some data sets required to run the services, identified by the developers, are also presented.

Table 44: Main features of Prague Usage Scenarios.

	Usage Scenario	KER	User's profiles	KPIs ¹⁷	Data sets	Location
UC1	RIG_1.1	KER5	Urban planner	(22) Soft violations (double lane), (37) Occupancy of parking	---	City center
UC2	RIG_2.1	KER6	- Urban mobility officer - Urban mobility planner - Logistics operator	(37) Occupancy of parking, Rotation index, Average length of employment	UVAR Info, Parking/UN & Load Status	City LEZ

6. Conclusions

The main conclusions coming from the preceding sections, are the following:

- This deliverable specifies the requirements for the *UNCHAIN* services, which consists of KER2 (Guidance_Tool), KER3 (Land Use), KER4 (UCC Planning), KER5 (Loading Zones), KER6 (Active UVARs), KER7 (Knowledge Powerhouse), KER8 (Curb Side), KER9 (Pick up/Drop off), KER10 (Pop-Up_Delivery), KER11 (Incentives_Tool), KER12 (Safe Route), and KER13 (Shared Facilities). The active involvement of demo sites (living labs and follower cities) and their local clusters has played a vital role in the process of defining these requirements for the UNCHAIN services. These demo sites and local clusters serve as the end-users of these services, giving them a leading role in determining the functionalities that the tools need to incorporate to align with their specific needs and expectations. It's worth highlighting that UNCHAIN's services have been specifically designed to provide support for the development, deployment, and scaling of solutions for urban logistics in European cities, in a first stage to the project's cities, but in a further scenario, being upscaled to any European city. Therefore, the identification by UNCHAIN partners of potential gaps in the solutions proposed by the services has been of utmost importance to enable the identification of new functionalities, with the ultimate goal of overcoming any drawback found.

- The identification of requirements for the services, has not only requested the contribution of the UNCHAIN demo sites. It is important to note that UNCHAIN's services are not entirely standalone; in several cases, there will be connections between them. For instance: KER12, a service to provide a safe routing, could be integrated in those services offering a parking lot reservation for a time slot (KER9 and KER13); KER4 and KER5 are planning tools which are going to share data sets related to logistics demands, in order to generate objective data for a better provision of UCCs loading and unloading bays. Therefore, it is highly recommended to define the requirements together with the flow of information between these tools. The developers of each tool, cities and transport operators have then actively participated in defining requirements, not only for their specific tool but also for those ones with which there will be some interaction.
- The developers of the UNCHAIN services, in the next months, will work on WP4 and WP5 to integrate the identified requirements, especially those with the highest priority rate, in their services, aiming to deliver an initial functional version of the services to share with the demo sites, and the final version by M24 (April 2025). Further specification could incur in WP6, within scaling up and large scale demonstration process.
- A review of reference projects in urban logistics has been made, in order to produce a list of indicators that represents the main operations that characterise this sector. This review includes the CIVITAS evaluation framework, and the Sustainable Urban Mobility Indicators (SUMI).
- A list of 41 indicators, grouped in four categories, i.e., Environmental and social impact, Urban planning, Traffic management, and Service efficiency has been defined. This indicator's list covers all the topics related to the performance of urban logistics.
- The list of indicators is a collection of KPIs covering all the topics related to project services and pilot demonstrations. Each combination of service-demonstration will have to select a proper indicator or indicators, useful to measure the impact of the service, according to different variables such as demonstration's time duration, data sets availability or users' profiles involved in the tests.
- The KPIs to assess the impact of the services implementation is closely related to the availability of data sets. These data sets will have to be provided by both, municipalities and logistics operators, and the procedure and conditions to obtain them will be defined in the deliverable D3.1, to be released on M15 (July 2024).
- Usage Scenarios to demonstrate UNCHAIN services have been defined, according to service developers' requirements to clearly show the innovations related to project KERs, and interests, expectations, capabilities and facilities of the cities that takes part in the project demonstration.
- Twenty one (21) Usage Scenarios have been defined (Table 38 to Table 44), covering the project products that have to be demonstrated with end users and intermediate users' participation (KER4, KER5, KER6, KER8, KER9, KER10, KER11, KER12, KER13).

Fourteen (14) of those usage scenarios will be deployed in the living labs (Madrid, Florence and Berlin), and seven (7) in the follower cities (Mechelen, Prague, Funchal, and Riga).

- The Usage Scenarios' description includes the objective to achieve in the demonstration tests, the profile of the participants, and the main city resources to mobilize. In addition, the Usage Scenarios also include user stories describing the main actions to be performed by the participants in order to demonstrate the services.
- The demonstration of KER6, KER8, KER9 and KER13 require the purchase and installation of equipment (sensors, cameras, electronics boards, ...) by the cities. KER6, KER10 and KER13 will also involve the use of existing facilities like parking lots, UVAR zones or electronic lockers.
- If needed, the number of users involved in the different Usage Scenarios can be adjusted from now to the starting up of demonstration (April 2025 - M24), in order to achieve the amount of users taking part in the demonstration tests to check the innovation linked to services implementation.
- The Usage Scenarios presented from Table 38 to Table 44 must be considered as final result of the WP2. Please notice that there is a possibility that these scenarios may change during the project implementation according to the new possible entities enrolled or new relevant aspects to be considered in the demonstration phase raised. Therefore, further refinement, enhancements, modifications, and details could take place within WP4, WP5 and WP6. Anyway, the most critical elements for the scenario to test the services are included in the Usage Scenarios presented in section 5 of this report.
- The Usage Scenarios belong to the partners involved in the demonstrations (mainly the cities' clusters and the service developers). They are the most interested partners in evolving them, going ahead in defining as much aspects as possible, in order to deploy successful demonstrations for the citizens, and for the service developers.
- The identified service requirements, use cases, and assessment indicators, provide a final specification of the inputs required for the design, development, implementation, and evaluation of the UNCHAIN services and KERs. However, as the project will evolve over time, these inputs could be enhanced, refined, further specified, and modified as needed in WP4, WP5, and WP6.

ANNEX 1. Sensitization of Florence GA workshop.



Overview

- 01 Presentation of the session and methodology
- 02 KPIs presentation (sources and classification)
- 03 Urban Planning (land use/infrastructure) assessment
- 04 Environmental Impact assessment
- 05 Traffic Management assessment
- 06 Service quality assessment

01

Presentation of the session and methodology



SCHEDULE

		(Plenary)
10:15 – 10:20	Session presentation. Methodology (5')	
10:20 – 10:25	KPIs presentation (5')	
		(Individual)
10:25 – 10:30	Land use/Infrastructure/Public participation) assessment (5')	
10:30 – 10:35	Environmental and Social impact assessment (5')	
10:35 – 10:40	Traffic Management assessment (5')	
10:40 – 10:45	Service efficiency assessment (5')	
		(Plenary)
10:45 – 10:50	Workshop closure (5')	

02

KPIs presentation



Main KPI sources identified as references

UNCHAIN cities' Urban Logistic Strategies

Florence, Madrid and Funchal have identified KPIs on their urban logistic strategies/plans (SUMP, Sulp, Madrid360).

CIVITAS Evaluation Framework

Detailed guidelines for a solid CIVITAS evaluation approach to achieve consistent and useful results currently applied by the Innovation Action projects (13 indicators). UNCHAIN will have to align on the KPIs used at some point with CIVITAS.

ULaADS Project (H2020)

The ULaADS impact assessment framework builds on existing knowledge and expertise in the field obtained through literature review, studying documentation from other EU projects and by leveraging the ULaADS partners' expertise (23 indicators)



Main KPI sources identified as references

ICLEI

The EcoLogistics Indicator (ELI) system is a sustainable logistics performance measurement system designed for policymakers to intervene and make informed decisions to improve the logistics system's efficiency (63 indicators)

NetZeroCities

NetZeroCities includes, in its indicator framework, 2 indicators for the transport and mobility field. The purpose of these indicators is to get an overview of transport emissions to understand which types of transport should be avoided to reduce the city's emissions

SUMI

Sustainable urban mobility indicators (SUMI) are a useful tool for cities and urban areas to identify the strengths and weaknesses of their mobility system and to focus on areas for improvement (4 logistic related indicators)



Main insights

Sources reviewed:

7

Total KPIs identified in the review

135

Consolidated KPIs

30



Most common KPIs

Type of indicator	Frequency	Sources			
Number of sustainable commercial or freight vehicles (LEV, ZEV)	5	Madrid360	Florence SUMP	ICLEI	
Number of logistic centres, platforms, hubs, lockers	5	Madrid360	Florence SUMP	Spanish Urban Agenda	
Number of loading/unloading areas and/or public space dedicated to urban logistics	4	Madrid360	ICLEI	ULaaDS	
Percentage of freight vehicles in total vehicular traffic	1	ICLEI			
Congestion	6	Florence SUMP	Funchal SULP	ICLEI	ULaaDS
Policies related to urban logistics	3	Florence SUMP	ICLEI		
Fuel consumption	3	Florence SUMP	ICLEI	NetZeroCities	
Customer satisfaction with the delivery	5	ICLEI	ULaaDS	Florence SUMP	
Stakeholder engagement	6	Florence SUMP	Funchal SULP	ICLEI	
Km traveled by commercial vehicles	7	Florence SUMP	Funchal SULP	ICLEI	
loading/unloading time - time per delivery	6	Florence SUMP	Funchal SULP	ICLEI	ULaaDS
Air quality, GHG emissions and particles	11	Funchal SULP	ICLEI	NetZeroCities	SUMI
Noise level	3	Funchal SULP	ICLEI		
Freight-related accidents (accidents, people injured, vehicles involved, etc)	8	ICLEI	ULaaDS		
Severe violations (Speed violation, drivers testing positive on alcohol or drugs)	2	ICLEI			
Soft violations (unauthorized parking in loading zones // commercial vehicles with parking-related fines)	2	ICLEI			
Reliability of just-in-time freight deliveries	5	ICLEI	CIVITAS		
Increased utilisation of load capacity of vehicles	4	ICLEI	CIVITAS	ULaaDS	
Gender/ethnicity of workers in freight-related industries & occupations	4	ICLEI			
Modal split	7	ICLEI	CIVITAS	SUMI	
Freight logistic intensity // delivery productivity	11	Funchal SULP	ICLEI	ULaaDS	
Costs of the last mile per delivery/ pick up	3	ULaaDS			
Percentage of total vehicle-kilometers that run empty	1	ICLEI			
Recipient awareness of sustainable delivery options (index) // Recipient willingness to pay for sustainable delivery (index)	2	ULaaDS			
Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours	1	CIVITAS			
Energy use and infrastructure available at warehouses, microplatforms, etc	3	Madrid360	ICLEI		
Night deliveries	1	Madrid360			
Employment rate and annual average income for freight employees in city	2	ICLEI			
Average age of freight vehicles	1	Funchal SULP			
Average utilization of the warehouse or distribution centers	1	ICLEI			

03 – 04 – 05 - 06

Classification of KPI

Classification of KPIs

Category	Indicators	
Urban Planning (land use/infrastructure/public participation)	5	- Number of logistic centres, platforms, hubs, lockers - Number of loading/unloading areas and/or public space dedicated to urban logistics - Energy use and infrastructure available at warehouses, microplatforms, etc - Policies related to urban logistics - Stakeholder engagement
Environmental and social Impact	6	- Number of sustainable commercial or freight vehicles (LEV, ZEV) - Fuel consumption - Air quality, GHG emissions and particles - Noise level - Gender/ethnicity of workers in freight-related industries & occupations - Employment rate and annual average income for freight employees in city
Traffic Management	5	- Percentage of freight vehicles in total vehicular traffic - Congestion - Freight-related accidents (accidents, people injured, vehicles involved, etc) - Severe violations (Speed violation, drivers testing positive on alcohol or drugs) "Soft" violations (unauthorized parking in loading zones, commercial vehicles with parking fines)



Classification of KPIs

Category	Indicators	
Service Efficiency	14	- Modal split - Customer satisfaction with the delivery - Km traveled by commercial vehicles - loading/unloading time or time per delivery - Reliability of just-in-time freight deliveries - Increased utilisation of load capacity of vehicles - Freight logistic intensity or delivery productivity - Costs of the last mile per delivery/ pick up - Percentage of total vehicle-kilometers that run empty - Recipient awareness of sustainable delivery options (index) or Recipient willingness to pay for sustainable delivery (index) - Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours - Night deliveries - Average age of freight vehicles - Average utilization of the warehouse or distribution centers



07

Questions



QUESTIONS

(From each section we are going to ask the same questions)

- Go to menti.com and use the code shown below ...
84 47 31
- For each section, we have four questions, arranged in 3 slides:
 - Slide model A:
 - This KPIs collection cover my expectations (scale 1-5).
 - This KPIs collection is useful for me (scale 1-5)
 - Slide model B:
 - Which KPIs are missing (3 contributions as maximum, Word Cloud)
 - Slide model C:
 - Which datasets are required to feed this KPIs collection (3 contributions as maximum, Word Cloud)



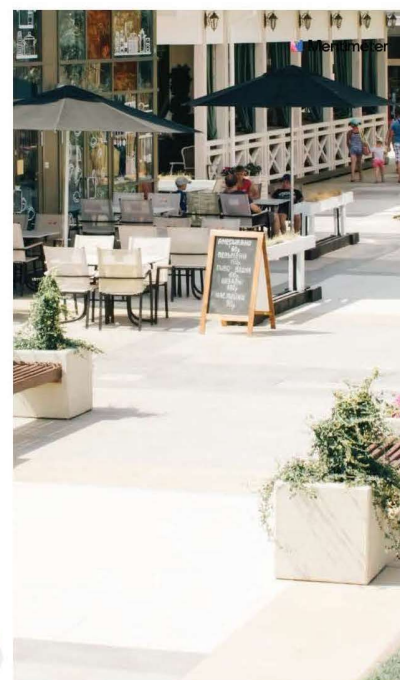
ANNEX 2. Results of KPIs' assessment workshop.

UNCHAIN Workshop. KPIs collection for efficient logistics

Florence GA, September '23



Land Use/Infrastructures/Public participation KPIs



Regarding Land Use/Infrastructures/Public participation, which relevant KPIs are missing?

22 responses

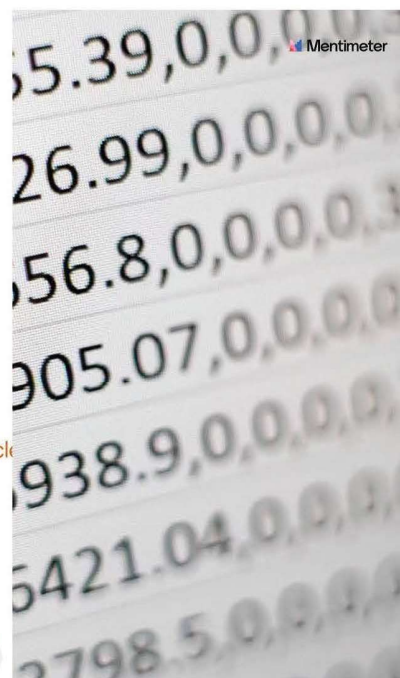
density of loading zones
charging points freight
use of loading areas
count of delivery spaces
total freight per day
ul areas occupation
different size spaces
route kms
available municipal space
delivery parking places
type of vehicle
security
privacy
trust
multi modal hubs
involvement degree
none
zoning
availability
parking spaces on street



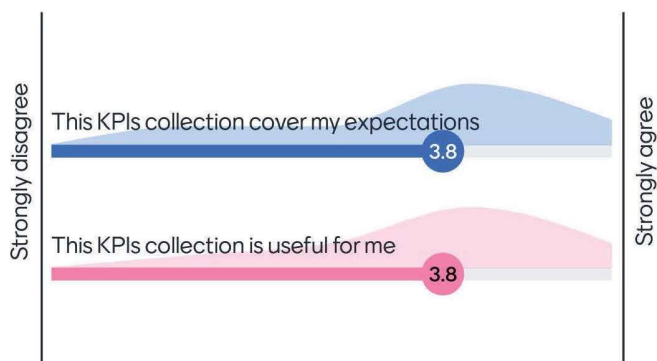
Regarding Land Use/Infrastructures/Public participation, which datasets are required to feed this KPIs collection?

23 responses

size of curbing areas
population density
zoning - land use plan
locations and sizes
policies e regulations
km by private vehicles
occupied status
logistic user data
car bike counters
public area meters
urban ongoing plans
energy use data
urba soil extension
mix of participants
stakeholder survey
many
logistic operators
data of type of vehicle
park spot usage
number of tenants by type
traffic fata
open data info
geo data



Environmental and Social impact KPIs



Regarding Environmental and Social impact, which relevant KPIs are missing?

18 responses



Regarding Environmental and Social impact, which datasets are required to feed this KPIs collection?

25 responses



Traffic management KPIs



Regarding Traffic management, which relevant KPIs are missing?
23 responses



Regarding Traffic management, which datasets are required to feed this KPIs collection?
28 responses



Service efficiency KPIs

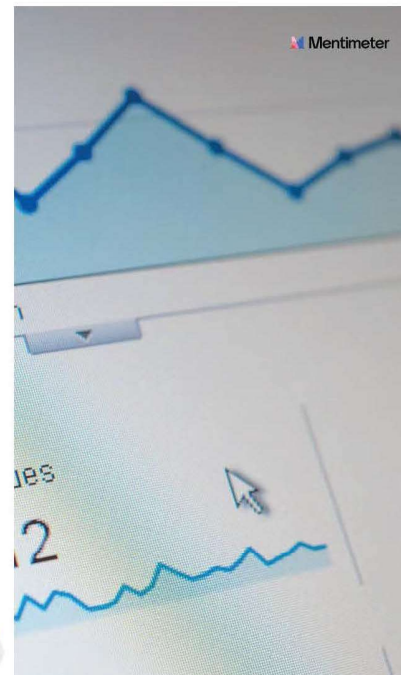


Regarding Service efficiency, which relevant KPIs are missing?
21 responses



Regarding Service efficiency, which datasets are required to feed this KPIs collection?

21 responses



ANNEX 3. KPIs grouping and indicators's sources.

Categories	Indicator	Sub-indicators	Madrid 360	Florence SUMP/ Sulp	Funchal Sulp	ICLEI - EcoLogistics Indicator (ELI)	CIVITAS evaluation framework	ULaaDS	NetZeroCities Comprehensive Indicator Framework	SUMI	Spanish Urban Agenda	Prague	Riga	Workshop Florence
Urban Planning (land use, infrastructure, public participation)	Number of logistic centres, platforms, hubs, lockers	Number of logistic centres	x	x										
		Number of microplatforms	x											
		Number of lockers	x											
		Sustainability of the urban distribution of goods (last mile): Number of centers in the city / Urban area (km2)) x 100									x			
		multi modal hubs												x
		number of pickup micro hubs												x
		interoperability												x
	Number of loading/unloading areas - public space dedicated to urban logistics	Number of monitored loading & unloading areas	x		x							x	x	
		Number of loading & unloading areas	x											
		loading and unloading in a zone: Number of public parking places for freight vehicles				x								
		More efficient use of existing public space: Public space used for UFT activities (hrs per m2)						x						
		density of loading zones												x
		charging points freight												x
		count of delivery spaces												x
		zoning												x
		availability												x
		parking spaces on street												x
		available municipal space												x

		Existence of Stakeholder working group and extent of participation: Percentage of actual participants in ecologistics-related stakeholder meetings and working groups.				x						x	
		Existence of Stakeholder working group and extent of participation: Percentage of participation representing marginal or underrepresented community groups, e.g., people of color, poor income group, impacted communities				x							
		Existence of Stakeholder working group and extent of participation: The degree to which the city investigates the current and future needs of all supply chain users and collects relevant baseline data on the ecologistics status (freight- related data, livability, safety) of the city and the public participation process to understand their views.				x							
		trust											x
		involvement degree											x
		level of duty											x
	Energy use and infrastructure available at warehouses, microplatforms, etc	Number of EV charging points in microplatforms	x									x	
		Energy consumption at warehouses: Energy use for each floor space (m2)				x							
		Energy consumption at warehouses: Energy use for a cubic capacity of shelf space (m3)				x							
		electricity consumption											x
	Time window in city for urban logistics	delivery hours											x
		time city authorisation											x

Environmental and social impact	Revenue from LEZ access fee (EUR)												X	
	N. of commercial outlets having a cargo area within a 75 m radius.	X												
	Number of subsidised clean vehicles	X										X		
	n. "sustainable" commercial vehicles (cargo-bike, electric, methane, hydrogen) active in restricted traffic areas/total km2. of ZTL-hour (n. commercial vehicles active in the ZTL compared to its extension (km2) per unit of time)		X										X	
	number of vehicles with emissivity class ≤EURO5/ total number of registered cars (open vehicle fleet)		X											
	number of vehicles with emissivity class > EURO5/ total number of registered cars (open vehicle fleet)		X											
	number of electric vehicles / total number of cars		X											
	percentage of alternative fuel vehicles	X	X									X	X	
	The share of LEVs and ZEVs in the urban freight vehicle fleet: The percentage of low-emission vehicles and zeroemission vehicles in urban freight delivery					X								
	Renewable fuel sources: Share of renewable energy use at the energy source for Low and zero-emission vehicles					X								
	type of vehicle													X
	clean delivery vehicles													X

	GHG emissions	Exposure to vulnerable communities – air pollution: Percentage of transport-related pollutants (NOx, PM) emissions that are emitted by urban freight in the transport-related emissions at neighborhoods with low-income population or vulnerable communities (%)											
		Greenhouse gas emissions (GHG): Well-to-wheels GHG emissions by all urban area passenger and freight transport modes (t CO2 equivalent)											
		GHG emission from transport: greenhouse gas emissions from the operations of vehicles (source: SUMI) (t CO2 equivalent)											
	Particles (PM2.5 and/or PM10)	Particles (PM10 and PM2.5)											
		Air Quality Index – Particulate matter (PM10 and PM2.5): Percentage of inhabitants exposed to Particulate matter (PM10 and PM2.5) exceedances per the World Health Organization (WHO) guideline limit											
		Air pollutant emissions: air pollutant emissions of all passenger and freight transport modes (exhaust and non-exhaust for PM2.5) in the urban area.											
	Nitrogen Oxide (NO2)	Nitrogen Oxide (NO2)											
		Air Quality Index – Nitrogen dioxide (NO2): Percentage of inhabitants exposed to concentrations of nitrogen dioxide (NO2) exceedances per the World Health Organization (WHO) guideline limit											

	Noise level	Noise Level : Data collected through sensors and surveys geared at local traders			x								
		Day noise exposure: Percentage of inhabitants exposed to Lden noise levels higher than 55 dB (ISO 1996-1:2016)				x							
		Night noise exposure: Percentage of inhabitants exposed to Lnight noise levels higher than 50 dB (ISO 1996-1:2016)				x							
		life years lost to noise											x
	Gender/ethnicity of workers in freight-related industries & occupations	The percentage difference between male and female workers in the freight industry				x							
		The average difference of income between male vs. Female in the freight industry in comparison to similar sectors (managerial positions)				x							
		The percentage of representation from other race or ethnic groups in managerial positions in the freight industry				x							
		The average difference between different race profile in the freight industry				x							
	Employment rate and annual average income for freight employees in city	The employment rate for freight in the city (percentage of workers employed in the freight sector). Study of Urban Freight Transport define five major market sectors: Retail (including, e-commerce) - Express, courier and post - Hotel, restaurant and catering - Construction - Waste	x			x							
		The average annual income of workers in freight-related				x							

		industries in comparison to similar roles												
	carbon footprint of deliveries													x
Traffic management Traffic management	Percentage of freight vehicles in total vehicular traffic	Share of freight vehicles				x								
		number of freight trucks												x
	Congestion	Reduction of congestion (ratio between the total time spent on a congested road network and the total "virtual" time spent in the absence of congestion)		x										
		Road congestion			x									
		Congestion: Average duration of delay due to traffic congestion or a vehicle in a day (mins/vehicle/day)				x								
		Congestion: Percentage of freight traffic at main traffic corridors (%)				x								
		Reduced congestion: Obstruction of other road users during loading / unloading (Veh/hrs)					x							
		Reduced congestion: UFT (urban freight transport) vehicles travelling on congested streets / shared spaces (Veh/hrs)					x							
		traffic indicator												x
		traffic congestion												x
		traffic flow												x
		traffic intensity												x
		traffic counters												x
		floating car data												x
		traffic movement												x
		sensors of traffic												x

	positive on alcohol or drugs)	Speed violations: The number of speed violators				x							
		security											x
		accidents vru											x
		perceived safety											x
		road safety											x
		safety											x
		number of all crashes											x
		crash mapper											x
		road safety											x
		police historical data											x
		information from police											x
	Soft violations (unauthorized parking in loading zones // commercial vehicles with parking-related fines)	loading and unloading in a zone: Percentage of unauthorized parking in loading zones for HGV				x							
		loading and unloading in a zone: Total number of commercial vehicles with parking-related fines per million freight vehicle km				x							
		data fine											x
Service Efficiency	Customer satisfaction with the delivery	level of satisfaction with the urban mobility system with focus on weak users (pedestrians, disabled people, elderly people, children) on the freight side: (index)		x									
		Customer satisfaction: Percentage of distributors and end customer that are satisfied with delivery times(%)				x							
		Same or better level of service as existing schemes and increased acceptance: On time in full (OTIF)(%)						x					

		Same or better level of service as existing schemes and increased acceptance: Customer satisfaction(index)						x					
		Same or better level of service as existing schemes and increased acceptance: Level of acceptance(%)						x					
		end user satisfaction											x
	Km traveled by commercial vehicles	light commercial vehicle mileage: (miles)		x								x	
		Distance travelled by freight vehicles: Traffic counts through car plates, complemented with a survey:(l)				x							
		Total km traveled by LEVs and ZEVs: The total distance traveled by LEVs and ZEVs(km)					x						
		Vehicle-kilometers traveled: Total kilometers traveled per day according to LDV, LGV, and HGV (Distance traveled by a vehicle multiplied by the number of vehicles)(Vehicle-kilometers traveled)						x					
		loading and unloading in a zone: Distance covered for loading and unloading in a zone, per vehicle, per activity(Number of km covered for one delivery/ pickup)							x				
		Delivery organization: Average distance traveled per delivery/pickup (from urban delivery hub to core servicing areas)(km)								x			
		The distance of warehouse from city center: Average distance between logistics centers/ warehouses/distribution hubs									x		

		and delivery points within the urban core(km)											
		route kms											x
	loading/unloading time - time per delivery	loading/unloading time: (min)	x	x	x								
		Parking time for freight operations: Sensors or empirical observation()			x								
		loading and unloading in a zone: The average number of minutes of on-street parking for delivery or pickup in a zone, per vehicle(Mins/vehicle)				x							
		loading and unloading timeliness: The average standard deviation of loading/unloading time for bulk goods(Mins)				x							
		loading and unloading timeliness: The average standard deviation of loading/unloading time for container goods(Mins)				x							
		loading and unloading timeliness: The average standard deviation of loading/unloading time for a package(Mins)				x							
	Reliability of just-in-time freight deliveries	On-time deliveries: Percentage of on-time deliveries vs. total deliveries(%)				x							
		On-time deliveries: Percentage of on-time deliveries on the road(%)				x							
		On-time deliveries: Percentage of on-time deliveries on the rail(%)				x							
		On-time deliveries: Percentage of on-time deliveries on inland waterways(%)				x							

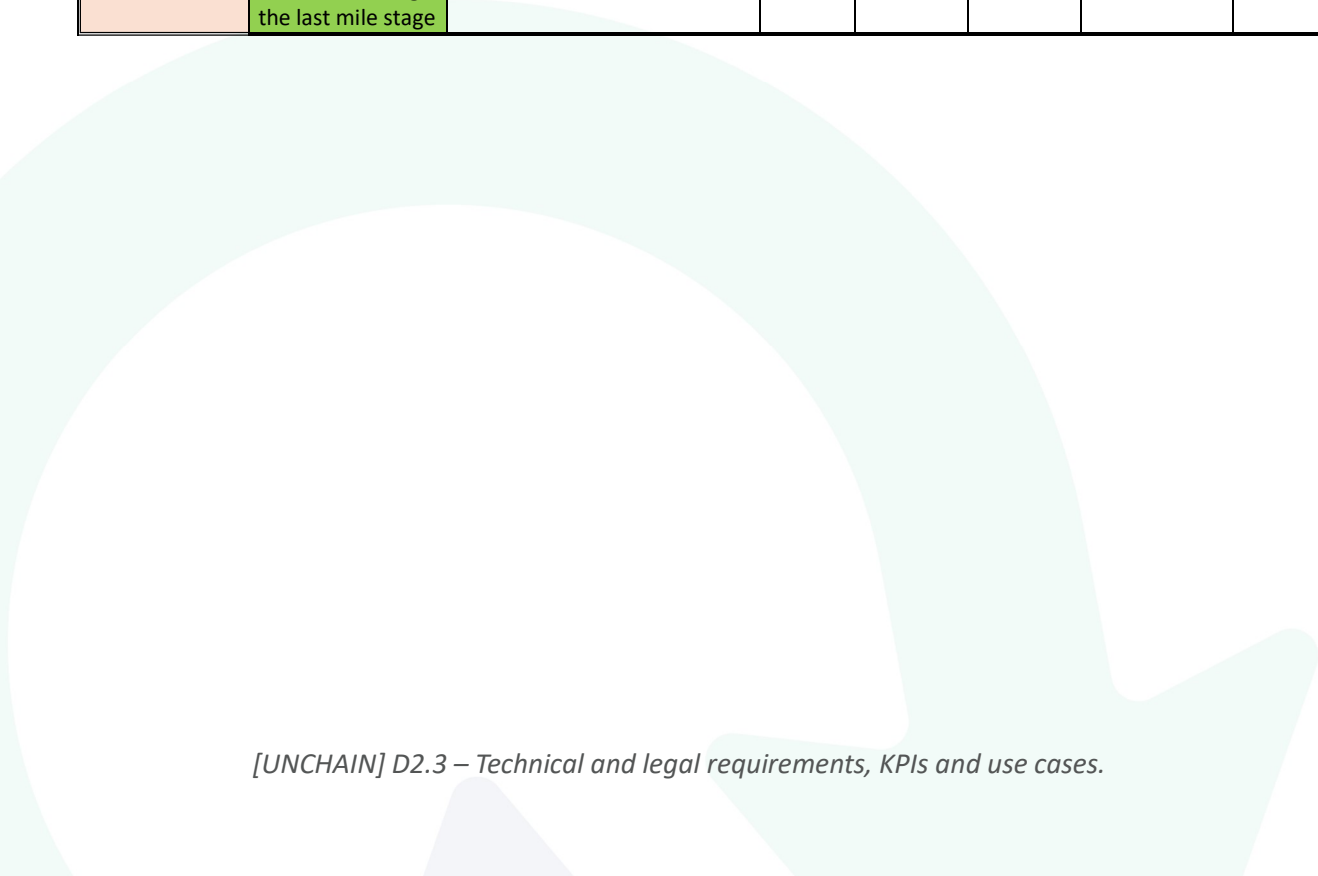
		Reliability of just-in-time freight deliveries: number and percentage of just-in-time freight deliveries that arrive within an acceptable interval around the planned times(number & %)					x						
		delivery on time											x
	Increased utilisation of load capacity of vehicles	Capacity utilization: The load capacity of different freight vehicles(%)				x							
		Load factors: Average loading percentage of the freight vehicles passing at reference points(%)					x						
		Increased utilisation of load capacity of vehicles: Vehicle load factor (percentage (%))						x					
		Increased utilisation of load capacity of vehicles: Integration of goods and passenger flows (number)(number)						x					
		load percentage											x
	Modal split	Low emission delivery: The share of low emission delivery in total km traveled(%)				x							
		Modal split: Percentage of total inland freight ton-km(%)				x						x	
		Modal Split goods: Percentage of goods (described in parcels, tons, etc) using each (sub) mode (e.g. : heavy and light trucks, tram, train, cargobikes, etc.) during a day (weekday, week-end day) or per hour (peak hour, off-peak hour) for a specific target group.(%)					x						

Number of freight movements: number of freight vehicles (per day or per hour) passing at reference points (e.g. entering the city centre) divided over different type of vehicles: heavy trucks, light trucks, e-cargo bikes, etc.()					x							
Number of goods movements: Total goods (parcels, tons, etc) to be transported departing or arriving in a specific area during a chosen period: hour, day, year (for all modes together).(goods/time)					x							
Modal split (for freight transport): (goods vehicles kilometres ran)								x				
Modal split (for freight transport): (freight tonnes kilometres ran)								x				
Overall transited cargo in the city split by transport mode (road, rail, air, water)											x	
Type of goods delivered			x									
modal split												x
type of goods												x
Freight logistic intensity: Traffic counts through car plates			x									
Speed (within urban core during peak hours): Average speed per delivery excluding stops, per type of vehicle(Km/hr)				x								
Delivery productivity: Average tons of goods delivered per kilometer(tons/km)				x								

		Delivery productivity: Average number of deliveries a vehicle can accomplished in a day (based on the sum of time spent on operations) (per type of vehicle: LDV, LGV, HGV)(Number of deliveries/ operational time/ vehicle)	x			x							
		Delivery organization: Average deliveries per round per vehicle (parcel, express, and courier)(number of deliveries)				x							
		Increased speed of delivery : Time per delivery / pick up(minutes)					x						
		Increased speed of delivery : Number of delivery attempts(number)					x						
		More efficient use of vehicle fleet : Deliveries per tour per vehicle(number)					x						
		More efficient use of vehicle fleet : Dimension weight / day per vehicle(kg, m3)					x						
		More efficient use of vehicle fleet : Drop density per vehicle(%)					x						
		More efficient use of vehicle fleet : Days in operation per vehicle(%)					x						
		N. of deliveries			x								
		total freight per day											x
		packages per month											x
		number of stops per day											x
		deliveries per stop											x
		time to delivery											x
	Costs of the last mile per delivery/ pick up	Economically sustainable business models: Last mile delivery cost per delivery / pick up(%)					x						

		Economically sustainable business models: Distribution and warehouse cost per delivery / pick up (%)(Km/hr)						x					
		Economically sustainable business models: Investment costs for the city (%)(tons/km)						x					
	Percentage of total vehicle-kilometers that run empty				x								
	Recipient awareness of sustainable delivery options (index) //	Recipient awareness of sustainable delivery options (index)						x					
		Recipient willingness to pay for sustainable delivery (index)						x					
	Hours that vehicles are in service, e.g. deliveries, pick ups, transporting, weighting, loading/unloading over 24 hours						x						
	Night deliveries	% delivery vehicles from 22h to 7h/total	x										
	Average age of freight vehicles		x		x							x	
	Average utilization of the warehouse or distribution centers	Warehouse utilisation: Average utilization of the warehouse or distribution centers(%)				x							
		occupancy time of hubs											x
	Occupancy of (un)loading/parking areas	Occupancy status of load and unloading parking spots			x								
		use of loading areas											x
		UL areas occupation											x

	the last mile stage				
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[UNCHAIN] D2.3 – Technical and legal requirements, KPIs and use cases.

ANNEX 4. Living Labs' Usage Scenarios.



Overview

01 MAD_Usage Scenarios

02 FLO_Usage Scenarios

03 BER_Usage Scenarios



01

MAD_Usage Scenarios

UC1: KER4, KER10, KER13

UC2: KER12

UC3: KER8



MAD_UC1 Services included: KER4, KER10, KER13

KER4: CLICK_LOG (VMZ)

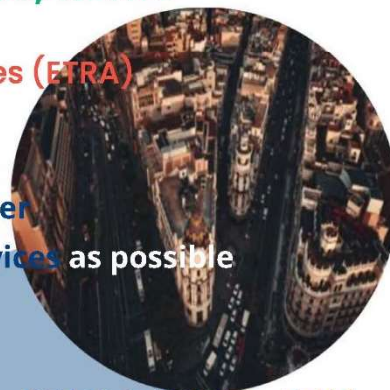
KER10: Pop_up_Delivery – KER13: Shared_Facilities (ETRA)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- MAD_1.1: CLICK_LOG - KER4 - VMZ
- MAD_1.2: Pop_up_Delivery & Shared facilities – KER10 & KER 13 – ETRA



MAD_UC1 Usage Scenario MAD_1.1

KERs involved: CLICK_LOG (KER4)

Objective: To test *CLICK_LOG* in Madrid, as part of the Madrid UseCase1. This service is a tool for urban planners and parking managers, to support them in UCCs' optimal location. Madrid Council urban planners and EMT parking managers will test the tool, and will provide feedback to developers.

Madrid Council is interested in setting new UCC taking advantage of existing facilities, like EMT parkings.

Location: Madrid city centre.

Professional users:

- **End user's profile:** Madrid Council Urban Planners and EMT parking managers. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

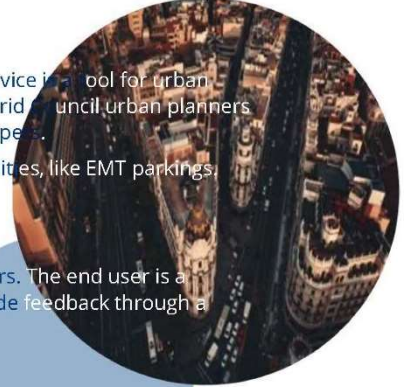
User's sample: 3-5 end users

Resources: PC with internet connection to reach *CLICK_LOG* Website.

Partners: Madrid Council – VMZ – EMT

Datasets: ---.

KPIs: Number of logistic centres, platforms, hubs, lockers &
Number of loading/unloading areas - public space dedicated to urban logistics



MAD_UC1 Usage Scenario MAD_1.1

CLICK_LOG. Test & Assessment.

User story 1: Urban planner

Carlos is an urban mobility planner within Madrid Council (MAD).

He is one of the three-five participants who are going to use and assess the UCC Location and Holistic Planning Kit (*CLICK_LOG*), a platform to support city planners in defining where to install logistic centers and UCCs.

Carlos receives a document to use the platform (tasks and tutorial), and a personalized link to the web frontend of the platform to perform planning activities.

He accesses the *CLICK_LOG* platform by inserting the personalized code and explores the functionalities. After reading through the tutorial, Carlos starts a first planning process:

- He is guided through a multistep-process. In the first step he enters the City's goals and preferences for the planning: MAD wants to optimize logistics in the city. MAD already has a number of UCCs, micro-depots, and some facilities shared by mobility companies and logistics companies.

MAD wants to primarily focus on public space extension and last mile logistics. Carlos uploads a list of existing UCCs and micro-depots, and formatted condensed usage data from a previous analysis. Furthermore, Carlos enters some basic data of the region he obtained from the open data portal (as size, population etc.) and some logistics key facts of the region, e.g. the expected demand for the e-commerce at the planning horizon.

Next, Carlos is asked for geo-information on the area of Madrid. He uploads a shape file containing the area boundaries with structural information and socio-economic information. MAD also wants to promote special user groups as cargo-bikes and ZEVs. Carlos enters this information alongside with the location of POI for this.

The data entry is completed. Carlos gets a map with a recommendation for the extension of the UCCs network. He reviews all the recommendations to install UCCs according to user demand, logistics needs, territory coverage, access and urban integration with MAD real data.

As time goes by, an unexpected growth of e-commerce demand takes place that lets Carlos review the parameters set within *CLICK_LOG*. He and his team uses several parameters to adapt the assumptions and gets a new recommendation. *CLICK_LOG* provides an adjusted suggestion and saves it in order to refine and review it later.



MAD_UC1 Usage Scenario MAD_1.1

CLICK_LOG. Test & Assessment.

User story: EMT Parking Manager

Pepe is a parking manager from EMT.

He is one of the three-five participants who are going to use and assess the UCC Location and Holistic Planning Kit (CLICK_LOG), a platform to support city planners in defining where to install logistic centers and UCCs.

Pepe receives a document to use the platform (tasks and tutorial), and a personalized link to the web frontend of the platform to perform planning activities.

Considering the potential facilities from EMT with possibilities to be set as Consolidation Center and the volume of goods DHL deliver in the city of Madrid, Pepe uses the CLICK Log tool to set the best location to create parking slots for a logistic purpose. The software proposes locations for UCCs in different neighborhoods, and Pepe focuses on those areas where EMT facilities exist.

As time goes by, an unexpected growth of e-commerce demand takes place that lets Pepe review the parameters set within CLICK_LOG. He and his team uses several parameters to adapt the assumptions and gets a new recommendation. CLICK_LOG provides an adjusted suggestion and saves it in order to refine and review it later.



MAD_UC1 Usage Scenario MAD_1.2

KERs involved: Pop_Up_Delivery (KER10), Shared_Facilities (KER13)

Objective: To test *IT Pop Up Delivery Management* and *Management IT of Shared Facilities*, as part of Madrid UseCase1. Logistics planners select PopUp delivery points (lockers, delivery vehicle, ...) employing KER10. These delivery points will include parking lots of EMT parkings, reserved for logistics operators (KER13). Customers, delivery persons, logistics planners and parking managers test both tools and provide feedback to developers.

Location: EMT parking (city centre: Avda Portugal, Mayor/ Portugal + Fuente de la Mora).

Professional users & Customers:

• End user's profile:

- KER10: DHL's customer, DHL's delivery person, DHL's logistics planner
- KER13: DHL's delivery person, DHL's logistics planner.

• Intermediate user's profile: KER13: EMT parking manager .

User's sample: 10 customers, 5-10 professional end users, and 1-3 intermediate users.

Resources: EMT parking, sensors, cameras.

Partners: Madrid Council – ETRA - DHL - Madrid EMT

Datasets: DUM data

KPIs: Customer satisfaction with the delivery & km traveled by commercial vehicles & Time spent to find parking/(un)loading area & carbon foot print (of deliveries)



MAD_UC1 Usage Scenario MAD_1.2

Pop_Up_Delivery & Shared_Facilities. Test & Assessment

User story 1: DHL customer

Patricia/Gustavo is a young professional who lives in Madrid city center. She loves to buy on the website, specially fashion garments.

Most of the day she/he is no at home due to professional obligations, so when she/he purchases something in an online shop, she/he uses to send the parcel to a locker, or a shop.

One of her/his favorite online shops uses DHL as logistic provider, and this company has recently launched a new service of Pop Up delivery points. This delivery points are open at certain hours at day, and change their location every week. One of this delivery points is near to Patricia/Gustavo's home, and it is open at an hour that she/he is in the neighborhood, so she/he decides to use it for her/his last purchase.

Patricia/Gustavo receives a message from DHL in her/his phone, with a link to a web page. The web page informs about the locations and schedules of the Pop Up delivery points within the next two weeks. As the one located near her/his home is open at a time that fits Patricia/Gustavo's agenda, she/he selects it.

This Pop Up delivery point is a DHL van, parked at the street. Within the time window the Pop Up delivery point is open, Patricia/Gustavo goes to the exact location where the van is parked, and a DHL delivery person gives her/him the parcel.



MAD_UC1 Usage Scenario MAD_1.2

Pop_Up_Delivery & Shared_Facilities. Test & Assessment

User story 2: DHL delivery person

Alvaro works in DHL as a delivery person. He drives a mid-sized van, and he usually delivers parcels and packs in Madrid city center.

DHL has launched a new programme to implement Pop Up delivery points, so every week the locations where Alvaro delivers parcels, change. Alvaro receives a weekly plan, detailing the location of the delivery points, that include lockers, on street locations and parking lots.

Some of this parking lots are booked in advance. The reservation is made from the DHL headquarters, so when Alvaro arrives to the Pop Up delivery point located in the parking, settling the van is not a problem.

Six customers has selected this Pop Up delivery point to collect their parcels today. Alvaro checks that all the customers have confirmed the parcel collection within an hour, so during this period of time Alvaro will wait for the customers to come to collect their parcels.



MAD_UC1 Usage Scenario MAD_1.2

Pop_Up_Delivery & Shared_Facilities. Test & Assessment

User story 3: DHL logistics planner

Pepa is a logistics planner in DHL. She is in charge of planning the routes for the delivery vans in the area of Madrid city center.

DHL has recently launched a new delivery modality, consisting of Pop Up delivery points that are open at certain hours. These Pop Up delivery points are mainly lockers and the delivery vans parked in selected parking lots.

Pepa has to select the Pop Up delivery points that will be available in her area, for the following two weeks. For doing this, she employs the *IT Pop Up Delivery Management* system, that presents her the available options, according to different events occurring at the city centre. Combining the expected deliveries for the next two weeks, and the information provided by the *IT Pop Up Delivery Management*, Pepa plans the routes for the delivery vans.

Some of the delivery points selected are located in shared facilities, hosted in EMT parkings. To book the parking lots that are available for logistics uses, Pepa employs the *Management IT of Shared Facilities* system. Once the parking lots have been booked, the delivery persons will park easily their vans, and the customers will collect their parcels in the agreed location.



MAD_UC1 Usage Scenario MAD_1.2

Pop_Up_Delivery & Shared_Facilities. Test & Assessment

User story 4: EMT parking manager

Sandra works in EMT as a parking manager. The company has launched a new programme of shared facilities, consisting of the use by external companies of some of the parking lots included in the parking. To employ these parking lots, dedicated to different uses including logistics operations, the registered users must in advance the parking lot and the time they intend to stay by employing the *Management IT of Shared Facilities* system.

As a parking manager, Sandra is in charge of assessing the productivity of the shared facilities programme in the parking where she works, so she needs different data such the occupation level of the shared parking lots, or the uses made the registered companies. She gets these data from the developer of the *Management IT of Shared Facilities* system (ETRA), who periodically (weekly) sends the datasets containing all this information.



MAD_UC2 Services included: KER12

KER12: Safe_Route (VMZ)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- MAD_2.1: Safe_Route – KER12 - VMZ



MAD_UC2 Usage Scenario MAD_2.1

KERs involved: Safe_Route KER12

Objective: To test *Congestion forecasting and Safe Route planning* in Madrid, as the Madrid UseCase2. The logistics planner employs the KER12 to plan safe routing for deliveries men, who follow the plan route, and get updates in real time.

Location: Madrid metropolitan area.

Professional users:

- **End user's profile:**
 - DHL logistics planners tests the planning utilities and optimization capabilities.
 - DHL delivery person tests the routing utilities and the real time updates.
- **Intermediate user's profile:** ---.

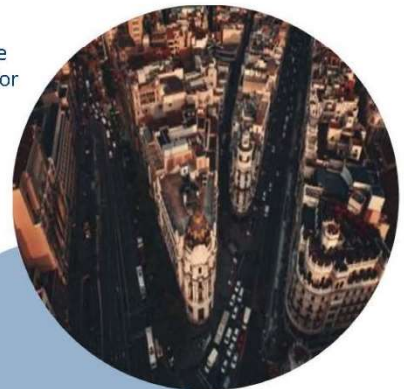
User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Madrid Council – VMZ - DHL

Datasets: ---

KPIs: km traveled by commercial vehicles & loading/unloading time - time per delivery & carbon footprint of deliveries



MAD_UC2 Usage Scenario MAD_2.1

Safe_Route. Test & Assessment

User story 1: DHL logistics planner

Rosa is a logistics planner in DHL. She is in charge of planning the routes for the delivery van in the area of Madrid city center.

DHL is employing a new tool to optimize the preparation of the routes for the delivery persons. The *Congestion forecasting and Safe Route planning* tool is a software, that proposes optimal routing by providing real-time data about areas to avoid at specific times or days.

Rosa monitors the route of the vans that are guided by the Safe_Route tool, and checks that along the working day there are no unexpected events to avoid. If this is the case, she prepares a new optimal route, and sends a message to the delivery persons to update their routes.



MAD_UC2 Usage Scenario MAD_2.1

Safe_Route. Test & Assessment

User story 2: DHL delivery person

Miguel works in DHL as a delivery person. He drives a mid-sized van, and he usually delivers parcels and packs in Madrid city center.

Early in the morning, just before starting the daily delivery, Miguel receives a route to follow, that is sent from DHL headquarters in Madrid. This route is optimized, and includes all the locations where parcels must be delivered.

Miguel follows the route that is presented in a navigation map, on a tablet.

If there is any unexpected event affecting his route, Miguel receives a message from DHL headquarters, asking him to update the route. By doing this, Miguel avoids congestions and other issues related to traffic performance, that could potentially delay his deliveries.



MAD_UC3 Services included: KER8

KER8: Curb_Side (ETRA)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- MAD_3.1: Curb_Side – KER8 - VMZ



etra I+D



MAD_UC3 Usage Scenario MAD_3.1

KERs involved: Curb_Side KER8

Objective: To test *Dynamic Curb Side Management* in Madrid, as the Madrid UseCase3. Based on demand forecasting, the parking lots close to the pavement will be employed by different end users, i.e. logistics professionals, disabled people and residents. City managers and urban planners will get direct data on curb side' parking lots optimisation.

Location: Paseo del Marqués de Zafra

Professional users & citizens:

• **End user's profile:**

- Logistics (DHL) delivery person tests the parking lot availability.
- Residents & Disabled people: to test parking lots availability.

• **Intermediate user's profile:** City managers and urban planners test the quality of the data generated by the system, to optimize curb side management.

User's sample: 10 logistics persons, 3-5 end users, and 3-5 intermediate users

Resources: Informative displays, sensors, electronic board, LORA/WIFI connection

Partners: Madrid Council – ETRA - DHL

Datasets: ---

KPIs: Double lane reduction, Occupancy percentages



etra I+D



MAD_UC3 Usage Scenario MAD_3.1

Curb_Side. Test & Assessment

User story 1: DHL delivery person

Antonio works in DHL as a delivery person. He drives a mid-sized van, and he usually delivers parcels and packs in Madrid city center.

In the area where he usually delivers parcels there are some new parking lots (between 5 and 10) close to the curb side, that are available for logistics vehicles from 8 a.m. to 5 p.m. If he has to park in this area, the first option is to drive around these parking lots. An electronic board presents the type of vehicles which are authorized to park in the free parking lots and the time for each use. During the last weeks, most of times he tried to park in these parking lots, he found a free one.

Residents and people with functional diversity are also authorized to park in this parking lots, but the system adapts dynamically the offer to demand, and for logistics professionals is now much more easier to find a free parking lot in the area.



MAD_UC3 Usage Scenario MAD_3.1

Curb_Side. Test & Assessment

User story 2: Resident&Person with functional diversity

Sofia is a middle age woman, living in Madrid metropolitan area. Their parents live in Madrid city center, and she usually visits them, both during working days and during the weekend. It is very difficult to park in the city center, and normally takes a long time.

Fortunately, one month ago the city council installed a parking lots control with a digital board, and she can park at certain hours. The digital board shows the type of user who is authorized to park at any moment (the parking lots are shared by logistics professionals, residents and relatives, and people with functional diversity), but Sofia is satisfied with the system, as now it is easier for her to park close to her parents home.





02

FLO_Usage Scenarios

UC1: KER4, KER5, KER8, KER9, KER13
 UC2: KER12
 UC3: KER6, KER11



FLO_UC1

Services included: KER4, KER5, KER8, KER9, KER13

KER4: "CLICK_LOG" UCC location and integrated planning KIT (VMZ)
 KER5: Loading_zones + KER8: Curb_Side
 KER9: Dynamic_pick_up/drop_off (MUNI)
 KER13: Shared_Facilities (ETRA)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- **FLO_1.1:** CLICK_LOG - KER4 - VMZ
- **FLO_1.2:** Dynamic_pick_up/drop_off - KER9 - MUNI
- **FLO_1.3:** Shared_facilities - KER13 - ETRA
- **FLO_1.4:** Loading_zones & Curbside - KER5 & KER8 - ETRA




FLO_UC1 Usage Scenario FLO_1.1

KERs involved: "CLICK_LOG" UCC location and integrated planning KIT (KER4)

Objective: To test *CLICK_LOG* in Florence, as part of the Florence UseCase1.

This service is a tool for urban planners, to support them in UCCs' optimal location. Florence Council urban planners will test the tool, and will provide feedback to developers.

Location: Florence Council Headquarters.

Test area: City Centre (ZTL A & B)

Professional users:

- **End user's profile:** Florence Council Urban Planners. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

User's sample: 3-5 end users.

Resources: PC with internet connection to reach *CLICK_LOG* Website.

Partners: Florence Council – VMZ

Datasets: Those required by the *CLICK_LOG* platform.

KPIs: Number of logistic centres, platforms, hubs, lockers &
Number of loading/unloading areas - public space dedicated to urban logistics



FLO_UC1 Usage Scenario FLO_1.1

KER 4 CLICK_LOG. Test & Assessment:

User story 1: Urban planner

Vincenzo is an urban mobility planner within Florence Council (FLO).

He is one of the three-five participants who are going to use and assess the UCC Location and Holistic Planning Kit (*CLICK_LOG*), to support city planners in defining where to install logistic centers.

Vincenzo receives a document to use the platform (tasks and tutorial), and a personalized link to the web platform of the planning activities.

He accesses the *CLICK_LOG* platform by inserting the personalized code and explores the functionalities.

After reading through the tutorial, Vincenzo starts a first planning process: he is guided through a multistep process. He starts by first City's goals and preferences for the planning:

- FLO wants to optimize logistics in the city.
- FLO already has a number of UCCs, micro-depots, and some facilities shared by mobility companies and logistics companies.
- FLO wants to primarily focus on public space extension and last mile logistics.

Vincenzo uploads a list of existing UCCs and micro-depots, and formatted condensed usage data from a previous analysis. Furthermore, Vincenzo enters some basic data of the region he obtained from the open data portal (as size, population etc.) and some logistics key facts of the region, e.g. the expected demand for the e-commerce at the planning horizon.

Next, Vincenzo is asked for geo-information on the area of FLO. He uploads a shape file containing the area boundaries with structural information and socio-economic information. FLO also wants to promote special user groups as cargo-bikes and ZEVs. Vincenzo enters this information alongside with the location of POI for this.

The data entry is completed. Vincenzo gets a map with a recommendation for the extension of the UCCs network. He reviews all the recommendations to install UCCs according to user demand, logistics needs, territory coverage, access and urban integration with FLO real data.

As time goes by, an unexpected growth of e-commerce demand takes place that lets Vincenzo to review the parameters set within *CLICK_LOG*. He and his team uses several parameters to adapt the assumptions and gets a new recommendation. *CLICK_LOG* provides an adjusted suggestion and saves it in order to refine and review it later.



FLO_UC1 Usage Scenario FLO_1.2

KERs involved: Dynamic_pick-up/drop-off (KER9)

Objective: To test *Dynamic management of pick-up/drop-off points*, as part of Florence UseCase1. The system includes parking areas that can be monitored (occupied/free) with sensors. These parking lots can be managed by employing KER9 service. The parking areas (which would also include a fixed station) can be used as pick-up or drop-off points. Local Administration and Logistic Operators (UPS and its Outside Service Provider – OSP) test the tool and provide feedback to the solution developers.

Location: Sant'Ambrogio market place/other similar place

Professional users & Customers:

• End user's profile:

- Local Administration LA (e.g urban mobility officer),
- Logistic Operator LO (UPS LO, UPS Outside Service Provider)

User's sample: ≤10 end users, LA and LO users

Resources: Parking Sensors/Cameras + Dedicated Gateway

Partners: Florence Council – MUNICIPIA - UPS

Datasets: UVAR Info, Parking /Loading /Unloading Status etc.

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment etc.



FLO_UC1 Usage Scenario FLO_1.2

KER9 Dynamic_pick-up/drop-off. Test & Assessment:

User story 1: Local Administration LA/urban mobility officer

Francesca is an in-charge officer of urban mobility department and want to manage and monitor, in real time, the occupancy status of goods loading and unloading bays and the regulation of their use. To this end, she access to the Dynamic Pick-up/drop-off service.

Firstly, Francesca authenticates herself to the backend system of the service to configure the sections for logistics of the bays. Once entered, at least she:

- Registers the new parking areas to be monitored;
- Registers the parking areas and related sensors
- Configures booking slots for loading and unloading spaces and related rules (e.g booking interval..)

At a later stage, she accesses to the backend section of dedicated to the supervision of logistics parking areas. Francesca displays the status of the parking bays dedicated to the loading and unloading of goods by transport carriers. In particular, she want to display in a map:

- Whether the stall is booked and the data relating to the booking (carrier name, date of booking, etc.);
- If the stall is occupied and has been checked in by the carrier;
- If the stall is occupied but has not been checked in by the carrier;
- If the stall is free.
- How long the stall is being used and at what time, volumes and all other data that the UPS LO can provide being partner user.



FLO_UC1 Usage Scenario FLO_1.2

KER9 Dynamic_pick-up/drop-off. Test & Assessment

User story 2: Local Administration LA/urban mobility officer

Francesca was asked to extrapolate some analytics, produce some indicators and summary reports on loading and unloading bays.

To this end Francesca authenticates herself to the backend system of the service and accesses to the Analytics section to analyze the data collected by the system.

Once analyzed she defines several standard views of the archived data, in graphical, tabular and cartographic mode. She needs other not yet defined indicators and through the system she can add the new ones (e.g. average occupancy rate of stalls, turnover rate..).

Besides, she defines alerts on specific indicators by selecting such thresholds and/or events to be notified.

At a later stage, Francesca was asked to define and monitor specific indicators to be used in the definition and application of specific incentives policies towards the Logistic operators operating in the specific area.



FLO_UC1 Usage Scenario FLO_1.2

KER9 Dynamic_pick-up/drop-off. Test & Assessment

User story 3: UPS operator during delivery on-road time

Once arrived on the chosen parking slot, Leonardo performs the check-in by using the APP and pressing the "Start parking" button.

The App requests Leonardo to complete and confirm the data for the stall he is checking in.

The App sends the necessary information to the backend supervision system, which proceeds to report the legitimate occupancy status of the stall.

The App starts counting the time from the instant of activation of the acquired parking and it shows the maximum occupancy time and the time at which the parking space must be left free.

After a period of time, Leonardo receives a warning message from the APP about the expiry of his right to occupy the reserved parking space.

When the loading/unloading operations are finished, Leonardo leaves the parking (making the check-out) and the APP notifies the system of the end of the parking period and marks the stall as available.



FLO_UC1 Usage Scenario FLO_1.3

KERs involved: Shared_Facilities (KER13)

Objective: To test *Management IT of Shared Facilities*, as part of Florence UseCase1. Logistics planners can book underground or covered parking lots in Florence, reserved for logistics operators (KER13). According to their route planning, the delivery persons access to a certain area in a time window. Delivery persons, logistics planners, and urban traffic managers test the tool and provide feedback to developers.

Location: Sant'Ambrogio underground parking or other one in the city centre

Professional users:

- **End user's profile:** UPS OSP (delivery operator), other delivery operators
- **Intermediate user's profile:** Florence urban traffic manager.

User's sample: 5-10 professional end users, and 1-3 intermediate users.

Resources: Cameras (detecting vehicle type and plate).

Partners: Florence Council – ETRA - UPS

Datasets: DUM data

KPIs: occupancy of parking areas



FLO_UC1 Usage Scenario FLO_1.3

KERs involved: Shared_Facilities (KER13)

User story 1: Local Administration LA/urban mobility officer

Francesca is an in-charge officer of urban mobility department and want to manage and monitor, in real time, the occupancy status of goods loading and unloading bays and the regulation of their use. To this end, she access to the *Management IT of Shared Facilities* service.

Firstly, Francesca authenticates herself to the backend system of the service to configure the sections for logistics of the bays. Once entered, at least she:

- Registers the new parking areas to be monitored;
- Registers the parking areas and related cameras
- Configures booking slots for loading and unloading spaces and related rules (e.g booking interval..)

At a later stage, she accesses to the backend section of dedicated to the supervision of logistics parking areas. Francesca displays the status of the parking bays dedicated to the loading and unloading of goods by transport carriers. In particular, she wants to display in a map:

- Whether the stall is booked and the data relating to the booking (carrier name, date of booking, goods transported, etc.);
- If the stall is occupied and if it is occupied by the carrier who booked it;
- If the stall is occupied but not by the booked carrier;
- If the stall is free.
- How long the stall is being used and at what time, volumes and all other data that the logistic operator can provide.



FLO_UC1 Usage Scenario FLO_1.3

KERs involved: Shared_Facilities (KER13)

User story 2: Local Administration LA/urban mobility officer

Francesca was asked to extrapolate some analytics, produce some indicators and summary reports on loading and unloading bays.

To this end Francesca authenticates herself to the backend system of the service and accesses to the Analytics section to analyze the data collected by the system.

Once analyzed she defines several standard views of the archived data, in graphical, tabular and cartographic mode. She needs other not yet defined indicators and through the system she can add the new ones (e.g. average occupancy rate of stalls, turnover rate, type of vehicles...).

Besides, she defines the time limitations to be notified.



FLO_UC1 Usage Scenario FLO_1.3

KERs involved: Shared_Facilities (KER13)

User story 3: UPS operator during delivery on-road time

Once arrived on the chosen parking slot, Leonardo's vehicle plate is recognized by the system as the booked user for the time slot.

The App sends the necessary information to the backend supervision system, which proceeds to report the legitimate occupancy status of the stall.

The App starts counting the time from the instant of activation of the acquired parking and it shows the maximum occupancy time and the time at which the parking space must be left free.

After a period of time, Leonardo receives a warning message from the APP about the expiry of his right to occupy the reserved parking space.

When the loading/unloading operations are finished, Leonardo leaves the parking and the APP notifies the system of the end of the parking period and marks the stall as available.



FLO_UC1 Usage Scenario FLO_1.4

KERs involved: Loading_zones (KER5), Curb_Side (KER8),

Objective: To test *On-street loading zones planning tool*, and the *Dynamic Curb Side Management* as part of Florence UseCase1. The parking lots close to the pavement will be employed by different end users, i.e. logistics professionals, disabled people and residents, based on demand forecasting (KER8). Urban planner employ KER5 to identify on-street loading zones. Delivery persons, logistics planners, residents & disabled people and urban traffic managers test the tool and provide feedback to developers.

Location: selected area in Florence city centre (Sant'Ambrogio surroundings or other)

Professional users & Customers:

- **End user's profile:**
 - KER8:
 - UPS OSP delivery operator,
 - residents & disabled people
 - KER5:
 - Urban planner,
- **Intermediate user's profile:** Florence urban traffic manager.

User's sample: 5-10 professional end users, and 1-3 intermediate users, 3-5 end users.

Resources: Informative displays, sensors, electronic board, LORA/WIFI connection

Partners: Florence Council – ETRA - UPS

Datasets: ---

KPIs: Double lane reduction, Occupancy percentages



FLO_UC1 Usage Scenario FLO_1.4

KER5 Loading_zones and KER 8 Curb_Side Test & assessment

User story 2: UPS OSP logistic planner

Every Friday Giovanni, the OSP route planner, reviews all routes plan for the week after, analyzing the data available (either on his device or sent by the mobility department of Florence) about stall occupancies. Specifically, he can see how long he kept every stall busy, his utilization and general utilization of all stalls (there is no reservation for nor KER5 either KER8). He can see the current week utilization.

Every morning Giovanni review daily plan with Leonardo (delivery person) based on the week-day, the number of parcels arrived and possible temporary events like non-fixed market-places, works on the roads, most used stalls out of order (sensors broken), etc.

During the day Giovanni keeps track of traffic congestion data with particular attention to unplanned situations and he can assist Leonardo in case of needs by answering requests on the phone or giving proactive indications



FLO_UC1 Usage Scenario FLO_1.4

KER5 Loading_zones and KER 8 Curb_Side Test & assessment

User story 3: UPS operator during delivery on-road time

Once arrived on the chosen parking slot, Leonardo performs the check-in by using the Curb_Side app and pressing the "Start parking" button.

The App requests Leonardo to complete and confirm the data for the stall he is checking in.

The App sends the necessary information to the backend supervision system, which proceeds to report the legitimate occupancy status of the stall.

The App starts counting the time from the instant of activation of the acquired parking and it shows the maximum occupancy time and the time at which the parking space must be left free.

When the loading/unloading operations are finished, Leonardo leaves the parking (making the check-out) and the APP notifies the system of the end of the parking period and marks the stall as available.



FLO_UC1 Usage Scenario FLO_1.4

KER5 Loading_zones and KER 8 Curb_Side Test & assessment

User story 4: Citizen (residents and disabled people)

Maria is a city centre inhabitant with the UVAR permission. She's looking for a parking near home and sees on the variable message panel or in the APP that the stalls have been dynamically assigned to residents until the 7 o'clock of the morning after.

She can now easily use the parking area for the whole night.

The day after, she checks again the APP and the panels to look for available parking for residents.



FLO_UC2

Services included: KER12

KER12: Safe_Route (VMZ)

The following usage scenarios are proposed

- FLO_2.1: Safe_Route - VMZ



FLO_UC2

Usage Scenario FLO_2.1

KERs involved: Safe_Route (KER12)

Objective: To test *Congestion forecasting and Safe Route planning* in Florence. The logistics operator employs the KER12 to plan safe routing for deliveries men with cargo-bike, who can use it to follow the best route, and to get updates in real time.

Route logic: bike lanes, pavement/surface, other security issues (heavy trucks...).

Location: Florence city.

Professional users:

- **End user's profile:**
 - UPS LO and UPS OSP delivery operator
- **Intermediate user's profile:** ---.

User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Florence Council - VMZ - UPS

Datasets: ---

KPIs: Total time per delivery, Carbon footprint of deliveries



FLO_UC2 Usage Scenario FLO_2.1

KER12 Safe_Route. Test & Assessment

User story 1: UPS and UPS OSP delivery operator

Rosa works for a UPS OSP. As part of her work, she needs to identify the delivery plan for the area of Florence city centre.

UPS is employing the UNCHAIN new tool to optimize the preparation of the routes for the delivery persons. The *Congestion forecasting and Safe Route planning* tool is a software, that proposes optimal routing by providing real-time data about areas to avoid at specific times or days.

Rosa compares in real time the planning of deliveries and makes sure she is guided by the *Safe_Route* tool, and checks that along the working day there are no unexpected events to avoid. If this is the case, she updates and define a new optimal route.



FLO_UC2 Usage Scenario FLO_2.1

KER12 Safe_Route. Test & Assessment

User story 2: UPS OSP delivery operator (on duty - real time option)

Michele works for UPS OSP as a delivery person. He has mid-sized vans and cargo bikes, and he usually delivers parcels and packs in Florence city center.

Early in the morning, just before starting the daily delivery, Michele receives the list of the delivery stops that need to be done from UPS. UPS informs the OSP on the time of deliveries of the parcels which need then to be realized and the delivery person needs to notify the completion of the delivery via dedicated tablet.

Michele can follow a route that can be optimized by UNCHAIN APP.

If there is any unexpected event affecting his route, Michele receives a message from the UNCHAIN App. By doing this, Michele avoids congestions, other issues related to traffic performance, can use safer itineraries (with bike lanes, adapt floors, no heavy trucks, less pollution...) that could potentially delay his deliveries and he can receive weather alerts.



FLO_UC3 Services included: KER6, KER11

KER6: Active_UVARS – KER11: Monitoring_Incentives (MUNI)

The following usage scenarios are proposed

- FLO_3.1: Active_UVARS - MUNI
- FLO_3.2: Monitoring_Incentives - MUNI



FLO_UC3 Usage Scenario FLO_3.1

KERs involved: ACTIVE UVARS AND CITY REGULATIONS TOOLS (KER6)

Objective: To test *Active UVARS and city regulations tools* in Florence, as the Florence UseCase3. This service will allow the PA to manage authorizations, access, transit and parking rules for logistic operators and the possibility of carrying out related analyses and statistics. In addition, it will allow logistics operators to acquire access, transit and parking permits and a route planning function able to return real time information (e.g. traffic situation) to support logistics operators in reaching the parking spaces.

Location: Florence city centre

Professional users & citizens:

- **End user's profile:** Local Administration LA (e.g urban mobility officer), Logistic Operator LO (UPS and UPS OSP Delivery operator)

User's sample: ≤10 end users, LA and LO users

Resources: Cameras, sensors

Partners: Florence Council – MUNICIPIA - UPS

Datasets: UVAR Infos, Parking /Loading /Unloading Status etc.

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment, etc.



FLO_UC3 Usage Scenario FLO_3.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 1: Local Administration LA/urban mobility officer

Sara is an employee of Florence urban mobility department. She is in charge of the authorizations management, access, transit and parking rules for logistic operators (LOs). To perform these tasks, she accesses the *Active UVARS and City Regulations Tools* backend.

Firstly, she checks&updates the existing transit rules and she decides to define a new one. Through the backend dashboard she can provide/update at least the following information:

- LTZ access points;
- Time slots for access to the LTZ;
- Costs of access to the LTZ
- Parking areas in which a LO may park
- Parking time bands;
- Parking costs;
- Application procedures for transit and parking permits.

Through the backend dashboard, Sara also sees a pending permission request from a LO. Sara displays the LO's request with the attached documentation, takes over the processing of the file for appropriate validation. The request and attached documentation are found to comply with the requirements, then the LO is pre-issued for the finalization of the permit and payment by the LO



FLO_UC3 Usage Scenario FLO_3.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 2: Local Administration LA/urban mobility planner

Vincenzo is an urban mobility planner working for Florence. He wants to study the optimisation of the UVAR regulation for logistics.

He accesses the *Active UVARS and City Regulations Tools* backend to analyse the demand picks.

Through the backend dashboard he can access the following information:

- LTZ access points;
- Actual Time slots for access to the LTZ;
- Costs of access to the LTZ
- Timing of the Demand for transit and parking permits
- Statistic use of monitored parkings.

The tool gives him also the possibility of calculating the impacts of different scenarios



FLO_UC3 Usage Scenario FLO_3.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 3: UPS OSP operator/logistics planner

Michelangelo is an UPS OSP employee responsible to manage the requests for the access to the limited traffic zone of Florence City. He wants to check and update the transit permissions, so he accesses to the dedicated *Active UVARS and City Regulations Web Fronted* offered by the city. He visualizes the rules of transit and parking in the LTZ and applies for a permit by enclosing the requested documentation.

Michelangelo is notified that the pending request is approved, and he proceeds on the finalization and payment of the permit through the web front-end of the service.

At the end, all the information is available to Leonardo, the UPS OSP delivery operator, through the APP of the service. From this, Leonardo consults the route planning entering the planned destination and receives information on the loading/unloading stalls present in the destination consistent with the acquired permits and with the status of possible reservation/occupancy of the stall in relation to the estimated time of arrival. The route planning offered by the APP supports Leonardo in defining the route to the chosen destination, with an indication of arrival time and an optimised route that takes into account the updated status of the traffic.



FLO_UC3 Usage Scenario FLO_3.2

KERs involved: Monitoring_Incentives (KER11)

Objective: To test *Logistics operator monitoring system and incentives tool* in Florence, as the Florence UseCase3. The solution allows the monitoring of logistics operators' behavior and the management of reward policies, the rules of which will be defined by the administration, aimed at rewarding virtuous behavior or penalizing less virtuous ones.

Location: Florence city centre

Professional users & citizens:

- **End user's profile KER11:**
 - Local Administration LA (e.g urban mobility officer),
 - Logistic Operator LO (UPS and UPS OSP delivery operator)

User's sample: ≤10 end users, LA and LO users

Resources: Cameras, sensors

Partners: Florence Council – MUNICIPIA - UPS

Datasets: UVAR Info, Parking /Loading /Unloading Status etc.

KPIs: average loading charge, average occupancy rate of parking spaces, rotation index, Average length of employment, road accidents, etc.



FLO_UC3 Usage Scenario FLO_3.2

Monitoring_Incentives . Test & Assessment

User story 1: Local Administration LA/urban mobility officer

Sara is an employee of Florence of urban mobility department, and she is in charge of the authorisations, access, transit and parking rules for logistic operators and related behavioral incentives and awards. She has to define a new incentive campaign and she accesses on the Incentives backend dashboard.

Sara defines the behavioral rules for the logistic operator to acquire credits: she defines the maximum stall time in LTZ, indicating a threshold, as well as the max number of trips for different time slots. Sara also defines the thresholds for the number of drivers present at the same time for each LO. Finally, for each stall, she defines the thresholds for occupancy time, the corresponding scores credits and the modality their spending.

About a previous campaign, already launched, Sara sends a set of notification/alert to the LOs and several news, in particular she prepares and publishes a report from the data analytics offered by the backend dashboard.



FLO_UC3 Usage Scenario FLO_3.2

Monitoring_Incentives. Test & Assessment

User story 2: UPS delivery operator

Michelangelo as clerk activity in UPS OSP delivery operator checks regularly the KPIs of all drivers who have access to the ZTL in order to monitor them against the standard to allow the incentives.

By accessing the *Logistics operator monitoring system and incentives tool* platform he validates himself as authorized user and downloads the report and checks potential notifications published by the urban mobility department of Florence.

In case of not recognized behaviours he requests more information about events filling the correct form.





03

BER_Usage Scenarios

UC1: KER6
UC2: KER12
UC3: KER4



BER_UC1 Services included: KER6

KER6: Active_UVARS (MUNI)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- BER_1.1: Active_UVARS - MUNI






BER_UC1 Usage Scenario BER_1.1

KERs involved: Active_UVARs (KER6)

Objective: To test *Active UVARs and city regulations tools* in Berlin, as the Berlin UseCase1. This service will allow the PA to manage authorizations, access, transit and parking rules for logistic operators and the possibility of carrying out related analyses and statistics. In addition, it will allow logistics operators to acquire access, transit and parking permits.

Location: Berlin city centre; Alexanderplatz surroundings

Professional users:

- **End user's profile:** Logistics operator.
- **Intermediate user's profile:** Local administration, urban mobility.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Berlin Municipality – MUNICIPIA

Datasets: UVAR Infos, Parking /Loading /Unloading Status etc.

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment, etc.



BER_UC1 Usage Scenario BER_1.1

KER6 Active UVARs and City Regulations Tools. Test & Assessment

User story 1: Local Administration LA/urban mobility officer

Annika is an employee of Berlin urban mobility department. She is in charge of the authorizations management, access, transit and parking rules for logistic operators (LOs). To perform these tasks, she accesses the *Active UVARs and City Regulations Tools* backend.

Firstly, she checks&updates the existing transit rules and she decides to define a new one. Through the backend dashboard she can provide/update at least the following information:

- LTZ access points;
- Time slots for access to the LTZ;
- Costs of access to the LTZ
- Parking areas in which a LO may park
- Parking time bands;
- Parking costs;
- Application procedures for transit and parking permits.

Through the backend dashboard, Annika also sees a pending permission request from a LO. Annika displays the LO's request with the attached documentation, takes over the processing of the file for appropriate validation. The request and attached documentation are found to comply with the requirements, then the LO is pre-issued for the finalization of the permit and payment by the LO



BER_UC1 Usage Scenario BER_1.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 2: Local Administration LA/urban mobility planner

Joachim is an urban mobility planner working for Berlin. He wants to study the optimisation of the UVAR regulation for logistics.

He accesses the *Active UVARS and City Regulations Tools* backend to analyse the demand picks.

Through the backend dashboard he can access the following information:

- LTZ access points;
- Actual Time slots for access to the LTZ;
- Costs of access to the LTZ
- Timing of the Demand for transit and parking permits
- Statistic use of monitored parkings.

The tool gives him also the possibility of calculating the impacts of different scenarios.



BER_UC1 Usage Scenario BER_1.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 3: Logistics operator

Hans is an employee of a logistics operator, responsible to manage the requests for the access to the limited traffic zone of Berlin City. He wants to check and update the transit permissions, so he accesses to the dedicated *Active UVARS and City Regulations Web Fronted* offered by the city. He visualizes the rules of transit and parking in the LTZ and applies for a permit by enclosing the requested documentation.

Hans is notified that the pending request is approved, and he proceeds on the finalization and payment of the permit through the web front-end of the service.

At the end, all the information is available to Karl, the delivery operator, through the APP of the service. From this, Karl consults the route planning entering the planned destination and receives information on the loading/unloading stalls present in the destination consistent with the acquired permits and with the status of possible reservation/occupancy of the stall in relation to the estimated time of arrival. The route planning offered by the APP supports Karl in defining the route to the chosen destination, with an indication of arrival time and an optimised route that takes into account the updated status of the traffic.



BER_UC2 Services included: KER12

KER12: Safe_Route (VMZ)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- BER_2.1: Safe_Route – KER12 - VMZ



BER_UC2 Usage Scenario BER_2.1

KERs involved: Safe_Route (KER12)

Objective: To test *Congestion forecasting and Safe Route planning* in Berlin, as the Berlin UseCase2. The logistics planner employs the KER12 to plan safe routing for delivery persons riding cargo bikes, who follow the plan route, and get updates in real time.

Location: Berlin city centre.

Professional users:

• End user's profile:

- Delivery person
- Logistics planner

• Intermediate user's profile: ---.

User's sample: 3-5 logistics planners, and 10 delivery persons.

Resources: PC with internet connection, tablets with internet connection.

Partners: Berlin Municipality - VMZ

Datasets: ---

KPIs: km traveled by commercial vehicles & loading/unloading time - time per delivery & carbon footprint of deliveries



FLO_UC2 Usage Scenario FLO_2.1

Safe_Route. Test & Assessment

User story 1: Logistics planner

Jürgen is a logistics planner in a logistics operator. He is in charge of planning the routes for the cargo bikes in the area of Berlin city center.

The logistics company is employing a new tool to optimize the preparation of the routes for the delivery persons. The *Congestion forecasting and Safe Route planning* tool is a software, that proposes optimal routing by providing real-time data about areas to avoid at specific times or days.

Jürgen monitors the route of the cargo bikes that are guided by the *Safe_Route* tool, and checks that along the working day there are no unexpected events to avoid. If this is the case, he prepares a new optimal route, and sends a message to the delivery persons to update their routes.



BER_UC2 Usage Scenario BER_2.1

Safe_Route. Test & Assessment

User story 2: Delivery person

Sonja works as delivery persons in a logistics company. She rides a cargo bike, and she usually delivers parcels and packs in Berlin city center.

Early in the morning, just before starting the daily delivery, Sonja receives a route to follow, that is sent from the logistics company headquarters in Berlin. This route is optimized, and includes all the locations where parcels must be delivered.

Sonja follows the route that is presented in a navigation map, on a tablet.

If there is any unexpected event affecting her route, Sonja receives a message from the logistics planner, asking her to download a new route. By doing this, Sonja avoids congestions and other issues related to traffic performance, that could potentially delay her deliveries.



BER_UC3 Services included: KER4

KER4: CLICK_LOG (VMZ)

USAGE SCENARIOS, two basic principles:

- A usage scenario is unique for a service developer
- The usage scenario should include as much services as possible

The following usage scenarios are proposed

- BER_3.1: CLICK_LOG - KER4 - VMZ



BER_UC3 Usage Scenario BER_3.1

KERs involved: CLICK_LOG (KER4)

Objective: To test *CLICK_LOG* in BER, as the Berlin UseCase3. This service is a tool for urban planners, to support them in UCCs' optimal location. Berlin Council urban planners will test the tool, and will provide feedback to developers.

Location: Berlin Council Headquarters.

Professional users:

- **End user's profile:** Berlin Council Urban Planners. The end user is a professional, that will test the tool following a defined protocol, and will provide feedback through a questionnaire or an interview.
- **Intermediate user's profile:** ---.

User's sample: 3-5 end users.

Resources: PC with internet connection to reach *CLICK_LOG* Website.

Partners: Berlin Municipality – VMZ

Datasets: ---

KPIs: Number of logistic centres, platforms, hubs, lockers &
Number of loading/unloading areas - public space dedicated to urban logistics



BER_UC3 Usage Scenario BER_3.1

CLICK_LOG. Test & Assessment. Urban planner

User story 1: Urban planner

Marie is a urban mobility planner within Berlin Council (BER).

She is one of the three-five participants who are going to use and assess the UCC Location and Holistic Planning Kit (CLICK_LOG), a platform to support city planners in defining where to install logistic centers.

Marie receives a document to use the platform (tasks and tutorial), and a personalized link to the web frontend of the platform to perform planning activities.

He accesses the CLICK_LOG platform by inserting the personalized code and explores the functionalities. After reading through the tutorial, Marie starts a first planning process:

- She is guided through a multistep-process. In the first step she enters the City's goals and preferences for the planning: BER wants to optimize logistics in the city. BER already has a number of UCCs, micro-dépôts, and some facilities shared by mobility companies and logistics companies.

BER wants to primarily focus on public space extension and last mile logistics. Marie uploads a list of existing UCCs and micro-dépôts, and formatted condensed usage data from a previous analysis. Furthermore, Marie enters some basic data of the region she obtained from the open data portal (as size, population etc.) and some logistics key facts of the region, e.g. the expected demand for the e-commerce at the planning horizon.

Next, Marie is asked for geo-information on the area of BER. She uploads a shape file containing the area boundaries with structural information and socio-economic information. BER also wants to promote special user groups as cargo-bikes and ZEVs. Marie enters this information alongside with the location of POI for this.

The data entry is completed. Marie gets a map with a recommendation for the extension of the UCCs network. She reviews all the recommendations to install UCCs according to user demand, logistics needs, territory coverage, access and urban integration with BER real data.

As time goes by, an unexpected growth of e-commerce demand takes place that lets Marie to review the parameters set within CLICK_LOG. She and her team uses several parameters to adapt the assumptions and gets a new recommendation. CLICK_LOG provides an adjusted suggestion and saves it in order to refine and review it later.



ANNEX 5. Follower Cities Usage Scenarios.



Overview

04 MEC_Usage Scenarios

05 PRA_Usage Scenarios

06 RIG_Usage Scenarios

07 FUN_Usage Scenarios



04

MEC_Usage Scenarios

UC1: KER13
UC2: KER6



MEC_UC1 Usage Scenario MEC_1.1

KERs involved: Shared_Facilities (KER13)

Objective: To test *Management IT of Shared Facilities*, as Mechelen UseCase1. Logistics planners can book a slot for the loading and unloading zone at the construction site, reserved for logistics operators (KER13). According to their route planning, the delivery persons access to a certain area in a time window, that ensures them to booked parking lot. Delivery persons, logistics planners, and urban traffic managers test the tool and provide feedback to developers.

Location: Mechelen city centre (construction site in the inner city)

Professional users & Customers:

- **End user's profile:** Delivery person, logistics planner
- **Intermediate user's profile:** Mechelen urban traffic manager, contractor.

User's sample: 5-10 professional end users, and 1-3 intermediate users.

Resources: Cameras, sensors.

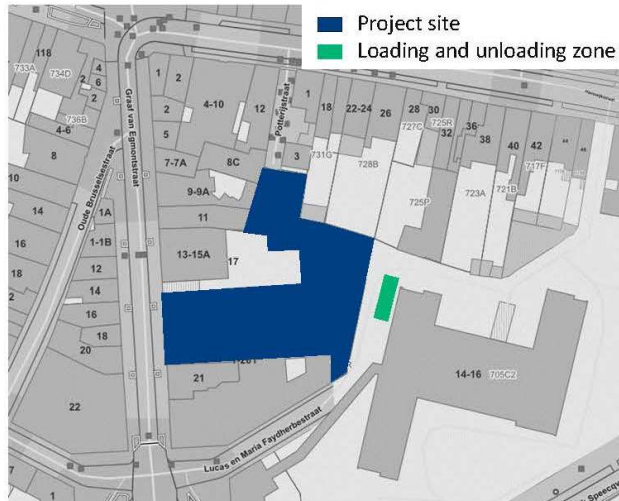
Partners: Mechelen Council – ETRA

Datasets: DUM data

KPIs: Occupancy of parking areas




Illustration of pilot



For example:

A load of bricks has to be delivered to the construction site – the supplier books an available slot for the loading and unloading zone at the construction site – the supplier provides information about the load (contents, weight, ...)

The contractor at the site can check the schedule of the deliveries via the app and see the arrival time – when the truck arrives, the camera checks if it's the correct numberplate

During the testing phase the service will record the deliveries to the construction site to analyse further



MEC_UC1 Usage Scenario MEC_1.1

KERs involved: Shared_Facilities (KER13)

User story 1: Urban traffic manager

There is an in-charge officer of urban traffic department and want to manage and monitor, in real time, the occupancy status of goods loading and unloading bays and the regulation of their use. To this end, she access to the *Management IT of Shared Facilities* service.

Firstly, Therese authenticates herself to the backend system of the service to configure the sections for logistics of the bays. Once entered, at least she:

- Registers the new parking areas to be monitored;
- Registers the parking areas and related cameras
- Configures booking slots for loading and unloading spaces and related rules (e.g booking interval...)

At a later stage, she accesses to the backend section of dedicated to the supervision of logistics parking areas. Therese displays the status of the parking bays dedicated to the loading and unloading of goods by transport carriers. In particular, she wants to display in a map:

- Whether the stall is booked and the data relating to the booking (carrier name, date of booking, goods transported, etc.);
- If the stall is occupied and if it is occupied by the carrier who booked it;
- If the stall is occupied but not by the booked carrier;
- If the stall is free.
- How long the stall is being used and at what time, volumes and all other data that the logistic operator can provide.



MEC_UC1 Usage Scenario MEC_1.1

KERs involved: Shared_Facilities (KER13)

User story 2: Delivery person

Once arrived on the chosen parking slot, Louis' vehicle plate is recognized by the system as the booked user for the time slot.

The App sends the necessary information to the backend supervision system, which proceeds to report the legitimate occupancy status of the stall.

The App starts counting the time from the instant of activation of the acquired parking and it shows the maximum occupancy time and the time at which the parking space must be left free.

After a period of time, Louis receives a warning message from the APP about the expiry of his right to occupy the reserved parking space.

When the loading/unloading operations are finished, Louis leaves the parking and the APP notifies the system of the end of the parking period and marks the stall as available.



MEC_UC2 Usage Scenario MEC_2.1

KERs involved: Active_UVARs (KER6)

Objective: To test *Active UVARs and city regulations tools* in Mechelen, as the Mechelen UseCase2. Delivery persons employ KER6 to receive the permission to access the restricted areas in the city. The permission is managed by *SpotBooking*, but the KER6 mobile app presents the information. In addition, city managers get information about accesses and permits.

Location: Mechelen UVAR

Professional users & citizens:

- **End user's profile:** Delivery person, Logistics planner.
- **Intermediate user's profile:** City managers, urban mobility officer.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Mechelen Council – MUNICIPIA

Datasets: UVAR Infos, Parking /Loading /Unloading Status etc.

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment, etc.



UVARs in Mechelen

Low car zone:

Yellow: 11h - 18h

Black: 11h30 - 6h (Sunday: 13h30 - 6h)

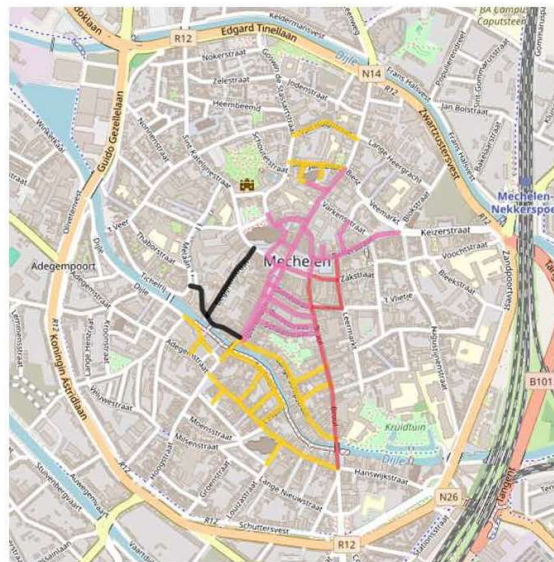
Pink: 11h - 18h (Saturday: 7h30 - 18h)

Car free zone:

Red: 11h - 18h (Saturday: 7h30 - 18h)

Vehicles can enter before/after these time slots and exit the zone whenever.

LSPs cannot apply for permits
Enforced by ANPR-camera's



UVARs in Mechelen

Heavy and long vehicles restrictions:

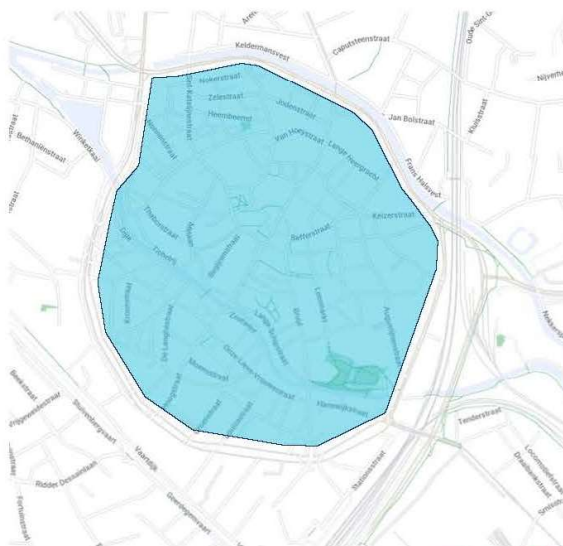
Vehicles longer than 11m and heavier than 10 ton cannot enter the inner city (blue area)

LSPs can get a permit to enter this area
→ via department 'Traffic Signalisation'

Process flow:

LSPs send e-mail to 'Traffic Signalisation'
→ type data manually into Arco →
approve request → e-mail with access permit

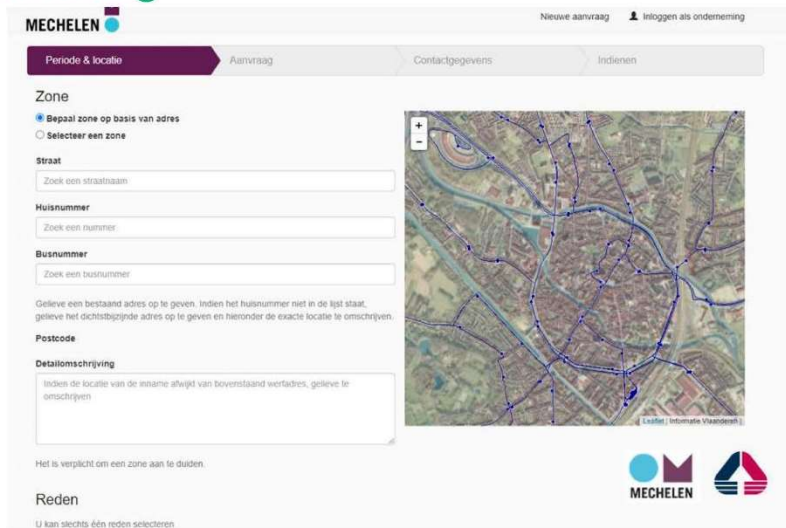
Enforcement by police → they check if the LSPs have the right documents



UVARs: Spotbooking

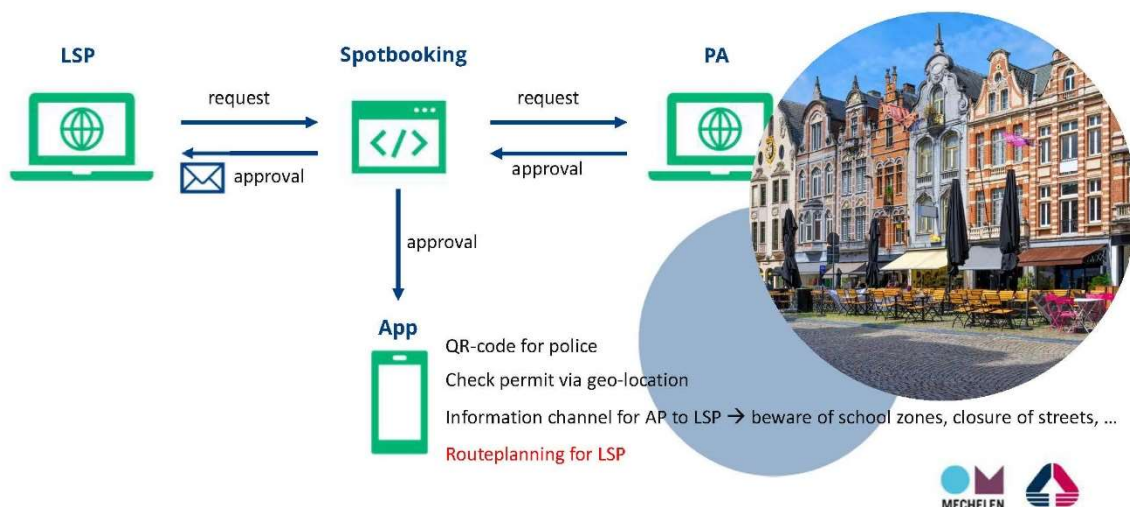
Used for:

- Use of public domain
 - Access to low car zone
 - Request for signalisation
-
- Possibility to also use this for heavy and long vehicle restrictions



The screenshot shows the 'MECHELEN' Spotbooking web application. It features a navigation bar with 'Nieuwe aanvraag' and 'Inloggen als onderneming'. The main form is titled 'Periode & locatie' and includes sections for 'Zone' (with radio buttons for 'Bepaal zone op basis van adres' and 'Selecteer een zone'), 'Straat' (with a search field), 'Huisnummer' (with a search field), 'Busnummer' (with a search field), 'Postcode', and 'Detailsomschrijving'. A map on the right shows the selected location. At the bottom, there is a 'Reden' section with a note 'U kan slechts één reden selecteren'.

User scenario KER6



MEC_UC2 Usage Scenario MEC_2.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 1: Urban mobility planner

Emma is an urban mobility planner working for Mechelen. She wants to study the optimisation of the UVAR regulation for logistics.

She accesses the *Active UVARS and City Regulations Tools* backend to analyse the demand picks.

Through the backend dashboard she can access the following information:

- LTZ access points;
- Actual Time slots for access to the LTZ;
- Costs of access to the LTZ
- Timing of the Demand for transit and parking permits
- Statistic use of monitored parkings.

The tool gives her also the possibility of calculating the impacts of different scenarios.



MEC_UC2 Usage Scenario MEC_2.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 2: Logistics operator

Adam is an employee of a logistics operator, responsible to manage the requests for the access to the limited traffic zone of Riga City. He wants to check and update the transit permissions, so he accesses to the *Web Fronted* offered by the city of Mechelen. He visualizes the rules of transit and parking in the LTZ and applies for a permit by enclosing the requested documentation in *SpotBooking*.

Adam is notified that the pending request is approved, and he proceeds on the finalization and payment of the permit through the web front-end of the service.

At the end, all the information is available to Jules, the delivery operator, through the APP of the KER6 service. From this, Jules consults the route planning entering the planned destination and receives information on the loading/unloading stalls present in the destination consistent with the acquired permits and with the status of possible reservation/occupancy of the stall in relation to the estimated time of arrival.



KERs involved: Curb_Side (KER8)

KPIs: Double lane reduction, occupancy percentages



PRA	HA
PRA	GUE
PRA	GA
PRA	G

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PRA_UC1 Usage Scenario PRA_1.1

Curb_Side. Test & Assessment

User story 1: Delivery person

Jan works in DPD as a delivery person. He drives a mid-sized van, and he usually delivers parcels and packs in Prague city center.

In the area where he usually delivers parcels there are some new parking lots (between 5 and 10) close to the curb side, that are available for logistics vehicles from 8 a.m. to 5 p.m. If he has to park in this area, the first option is to drive around these parking lots. An electronic board presents the type of vehicles which are authorized to park in the free parking lots and the time for each use. During the last weeks, most of times he tried to park in these parking lots, he found a free one.

Residents and people with functional diversity are also authorized to park in this parking lots, but the system adapts dynamically the offer to demand, and for logistics professionals is now much more easier to find a free parking lot in the area.



PRA_UC1 Usage Scenario PRA_1.1

Curb_Side. Test & Assessment

User story B: Resident&Person with functional diversity

Anna is a middle age woman, living in Prague metropolitan area. Their parents live in Prague city center, and she usually visits them, both during working days and during the weekend. It is very difficult to park in the city center, and normally takes a long time.

Fortunately, one month ago the city council installed a parking lots control with a digital board, and she can park at certain hours. The digital board shows the type of user who is authorized to park at any moment (the parking lots are shared by logistics professionals, residents and relatives, and people with functional diversity), but Anna is satisfied with the system, as now it is easier for her to park close to her parents home.



PRA_UC2 Usage Scenario PRA_2.1

KERs involved: Dynamic_pick-up/drop-off (KER9)

Objective: To test *Dynamic management of pick-up/drop-off points*, as Prague UseCase2. The system includes parking lots that can be monitored (occupied/free) with sensors. These parking lots can be booked by employing KER9. The parking lots can be used as light vehicle's pick-up or drop-off points. Customers, delivery persons, logistics planners and parking managers test the tool and provide feedback to developers.

Location: District 5 (Lidicka St.) or District 4 (Taborska St.)

Professional users & Customers:

- **End user's profile:**

- KER9: Logistics customer, delivery person, logistics planner

- **Intermediate user's profile:** Prague urban traffic manager.

User's sample: 10 customers, 5-10 professional end users, and 1-3 intermediate users.

Resources: Sensors.

Partners: Prague Council – MUNICIPIA

Datasets: UVAR Info, Parking /Loading /Unloading Status etc.

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment etc.



PRA_UC2 Usage Scenario PRA_2.1

Dynamic_pick-up/drop-off. Test & Assessment

User story A: Logistics customer

Christina is an architect who lives and works in Prague city center. She works at home, and he usually needs to send documents (colleagues, customers, Prague urbanism department, ...) within the city. For doing this, she employs the new sustainable service set up in Prague, that employs light delivery vehicles.

Christina

- Needs to send documents to colleagues.
- Selects (and pays for) the logistics service in company's website
- Receives an appointment from logistics company, with detailed information on how the documents will be collected.
- She is invited to assess this new service.



PRA_UC2 Usage Scenario PRA_2.1

Dynamic_pick-up/drop-off. Test & Assessment

User story B: Delivery person

Adam works as a delivery person in a logistics company (DPD). He drives a light vehicle which has a lower ecological footprint, and he usually delivers parcels and small packs in Prague city center.

The logistics company has launched a new programme to use the parking lots in some specific locations of Prague city centre as pick-up and drop-off delivery points. So every day the locations where Adam delivers parcels could include these points to pick-up or drop-off parcels. Adam receives a daily plan, detailing the time slot appointed to be at this specific parking lots to collect or deliver parcels.

This parking lots are booked in advance. The reservation is made from the company's headquarters, so when Adam arrives, a parking lot is free to settle his light delivery vehicle. Once he is parked, he registers the check-in the front-end mobile app of the *Dynamic management of pick-up/drop-off points* system.

A customers is waiting there to deliver a parcel, while other one is appointed is fifteen minutes, to collect its parcel.

Once the collection and deliveries of parcels is done, Adam registers the check-out in the mobile app of the system.



PRA_UC2 Usage Scenario PRA_2.1

Dynamic_pick-up/drop-off. Test & Assessment

User story C: Logistics planner

Adéla is a logistics planner. She is in charge of planning the routes for the light delivery vehicles in the area of Prague city centre.

The logistics company has recently launched a new delivery modality, consisting of pick-up/drop-off delivery points for light delivery vehicles, located at some parking lots of Prague city centre. The customers of this service have the possibility of delivering parcels or collecting them at these specific parking lots marketplace, at the time they are appointed.

Adéla has to prepare the routes for her delivery persons, including the booking of parking lots, when it is required. For doing this, she employs the *Dynamic management of pick-up/drop-off points* system, that presents her the available options.

Once the parking lots have been booked, the delivery persons will park easily their light delivery vehicles, and the customers will collect or will deliver their parcels in the agreed location.



PRA_UC2 Usage Scenario PRA_2.1

Dynamic_pick-up/drop-off. Test & Assessment

User story D: Prague urban traffic manager

Jakub works at Prague council as a traffic manager. The council has installed sensors at specific areas of the city centre, to control the access to some parking lots. This parking lots can be used by external companies. To employ these parking lots, dedicated to different uses including logistics operations, the registered users must book in advance the parking lot and the time they intend to stay by employing the *Dynamic management of pick-up/drop-off points* system.

As a traffic manager, Jakub is in charge of assessing the use of the parking lots equipped with sensors and the system productivity, so she needs different data such the occupation level of the shared parking lots, or the uses made by the registered companies. He gets these data from the developer of the *Dynamic management of pick-up/drop-off points* system (MUNICIPIA), who periodically (weekly) sends the datasets containing all this information.



06

RIG_Usage Scenarios

UC1: KER5

UC2: KER6



RIG_UC1 Usage Scenario RIG_1.1

KERs involved: Loading_zones (KER5)

Objective: To test *On-street loading zones planning tool* as Riga UseCase1. Urban planners employ KER5 to optimize the location of loading and unloading zones within the city. The service identifies the city's zones where logistics operations are more intensive, based on different datasets. Urban planners test the tool and provide feedback to developers.

Location: Riga city centre

Professional users & Customers:

- **End user's profile:** Riga urban planner
- **Intermediate user's profile:** ---

User's sample: 1-3 end users.

Resources: PC

Partners: Riga Council – ETRA

Datasets: ---

KPIs: Double lane reduction, Occupancy percentages



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RIG_UC1 Usage Scenario RIG_1.1

Loading_zones. Test & Assessment. Urban planner

User story: Urban planner

Daniels is an urban mobility planner within Riga Council (RIG). He is participating in the assessment of the *On-street loading zones planning tool*, of the UNCHAIN project.

Daniels receives a document to use the platform (tasks and tutorial), and a personalized link to the web frontend of the platform to perform planning activities.

He accesses the *Loading_zones* platform by inserting the personalized code and explores the functionalities.

After reading through the tutorial, Daniels starts a first planning process:

He is guided through a multistep-process. In the first step he enters the City's goals and preferences for the planning: RIG wants to optimize logistics in the city. Obviously, RIG has a number of Loading/Unloading zones, but this service will support the urban planners in redistributing these zones in a more efficient way.

RIG wants to primarily focus on the city centre. Therefore, Daniels uploads a list of data sets related to traffic data, residents, commercial flows, and logistics related to online purchases, among others.

Once the data entry is completed, Daniels gets a map with the expected demand for logistics, street by street. By having this information, Daniels can compare the distribution of the Loading/Unloading Zones with the expected demand, what facilitates the decision making about redistributing areas, or providing new ones.



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RIG_UC2 Usage Scenario RIG_2.1

KERs involved: Active_UVARs (KER6)

Objective: To test *Active UVARs and city regulations tools* in Riga, as the Riga UseCase2. This service will allow the PA to manage authorizations, access, transit and parking rules for logistic operators and the possibility of carrying out related analyses and statistics. In addition, it will allow logistics operators to acquire access, transit and parking permits.

Location: Riga LEZ

Professional users:

- **End user's profile:** Logistics operator.
- **Intermediate user's profile:** Local administration, urban mobility.

User's sample: 10 logistics persons, and 3-5 intermediate users

Resources: Cameras, sensors

Partners: Riga Council – MUNICIPIA – Logistics Operator (National Postal Service, DPD, ...)

Datasets: UVAR Infos, Parking /Loading /Unloading Status etc

KPIs: Average occupancy rate of parking spaces, Rotation index, Average length of employment, etc.



RIG_UC2 Usage Scenario RIG_2.1

KER6 Active UVARs and City Regulations Tools. Test & Assessment

User story 1: Local Administration LA/urban mobility officer

Alise is an employee of Riga urban mobility department. She is in charge of the authorizations management, access, transit and parking rules for logistic operators (LOs). To perform these tasks, she accesses the *Active UVARs and City Regulations Tools* backend.

Firstly, she checks and updates the existing transit rules and she decides to define a new one. Through the backend dashboard she can provide/update at least the following information:

- LTZ access points;
- Time slots for access to the LTZ;
- Costs of access to the LTZ
- Parking areas in which a LO may park
- Parking time bands;
- Parking costs;
- Application procedures for transit and parking permits.

Through the backend dashboard, Alise also sees a pending permission request from a LO. Alise displays the LO's request with the attached documentation, takes over the processing of the file for appropriate validation. The request and attached documentation are found to comply with the requirements, then the LO is pre-issued for the finalization of the permit and payment by the LO.



RIG_UC2 Usage Scenario RIG_2.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 2: Local Administration LA/urban mobility planner

Andrejs is an urban mobility planner working for Riga. He wants to study the optimisation of the UVAR regulation for logistics.

He accesses the *Active UVARS and City Regulations Tools* backend to analyse the demand picks.

Through the backend dashboard he can access the following information:

- LTZ access points;
- Actual Time slots for access to the LTZ;
- Costs of access to the LTZ
- Timing of the Demand for transit and parking permits
- Statistic use of monitored parkings.

The tool gives him also the possibility of calculating the impacts of different scenarios.



RIG_UC2 Usage Scenario RIG_2.1

KER6 Active UVARS and City Regulations Tools. Test & Assessment

User story 3: Logistics operator

Roberts is an employee of a logistics operator, responsible to manage the requests for the access to the limited traffic zone of Riga City. He wants to check and update the transit permissions, so he accesses to the dedicated *Active UVARS and City Regulations Web Fronted* offered by the city. He visualizes the rules of transit and parking in the LTZ and applies for a permit by enclosing the requested documentation.

Roberts is notified that the pending request is approved, and he proceeds on the finalization and payment of the permit through the web front-end of the service.

At the end, all the information is available to Aleksejs, the delivery operator, through the APP of the service. From this, Aleksejs consults the route planning entering the planned destination and receives information on the loading/unloading stalls present in the destination consistent with the acquired permits and with the status of possible reservation/occupancy of the stall in relation to the estimated time of arrival. The route planning offered by the APP supports Aleksejs in defining the route to the chosen destination, with an indication of arrival time and an optimised route that takes into account the updated status of the traffic.





07

FUN_Usage Scenarios

UC1: KER9
UC2: ---



FLO_UC1 Usage Scenario FUN_1.1

KERs involved: Dynamic_pick-up/drop-off (KER9)

Objective: To test *Dynamic management of pick-up/drop-off points*, as Funchal UseCase1. The system includes parking lots that can be monitored (occupied/free) with sensors, with the possibility of including electronic bollards, to control access. These parking lots can be booked by employing KER9. The parking lots can be used as pick-up or drop-off points. Delivery persons, logistics planners and parking managers test the tool and provide feedback to developers.

Location: 5 parking lots in Mercado dos Lavradores

Professional users & Customers:

- **End user's profile:**
 - Delivery person, Logistics planner
- **Intermediate user's profile:** Funchal urban traffic manager.

User's sample: 5-10 professional end users, and 1-3 intermediate users.

Resources: Sensors, electronic bollards.

Partners: Funchal Council – MUNICIPIA – Empresa cervejas da Madeira

Datasets: Parking /Loading /Unloading Status.

KPIs: Average occupancy rate of parking spaces






FUN_UC1 Usage Scenario FUN_1.1

Dynamic_pick-up/drop-off. Test & Assessment

User story A: Delivery person

Gabriel works in Cervejas da Madeira as a delivery person. He drives a van, and he usually delivers goods in Funchal Mercado dos Labradores.

His logistics company is employing a new application to use parking lots as pick-up and drop-off delivery points. So every day the locations where Gabriel delivers parcels could include these points to pick-up or drop-off goods. Gabriel receives a daily plan, detailing the time slot appointed to be at a certain parking lot of Mercado dos Labradores to deliver goods.

Once he is parked, he registers the check-in in the front-end mobile app of the *Dynamic management of pick-up/drop-off points* system.

He has a time slot to complete his deliveries.

Once the deliveries of parcels is done, Gabriel registers the check-out in the mobile app of the system.



FUN_UC1 Usage Scenario FUN_1.1

Dynamic_pick-up/drop-off. Test & Assessment

User story B: Logistics planner

Joana is a logistics planner. She is in charge of planning the routes for vehicles in the area of Funchal city centre.

Her logistics company has recently launched a new delivery modality, consisting of pick-up/drop-off delivery points for vehicles, located at parking lots Mercado dos Lavradores.

Joana has to prepare the routes for her delivery persons, including the booking of the parking lots in Mercado dos Lavradores, when it is required. For doing this, she employs the *Dynamic management of pick-up/drop-off points* system, that presents her the available options.

Once the parking lots have been booked, the delivery persons will park easily their vehicles and will deliver their parcels in the agreed location.



FUN_UC1 Usage Scenario FUN_1.1

Dynamic_pick-up/drop-off. Test & Assessment

User story C: Funchal urban traffic manager

Clara works at Funchal council as a traffic manager. The council has installed sensors to control the access to some parking lots at Mercado dos Lavradores. This parking lots can be used by external companies. To employ these parking lots, dedicated to different uses including logistics operations, the registered users must book in advance the parking lot and the time they intend to stay by employing the *Dynamic management of pick-up/drop-off points* system.

As a traffic manager, Clara is in charge of assessing the use of the parking lots equipped with sensors and the system productivity, so she needs different data such the occupation level of the shared parking lots, or the uses made by the registered companies. She gets these data from the developer of the *Dynamic management of pick-up/drop-off points* system (MUNICIPIA), who periodically (weekly) sends the datasets containing all this information.

