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New Mobility Data & Solutions Toolkit for Policymakers

The nuMIDAS consortium

01/12/2022



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101007153.

Agenda



Moderation: Carola Vega, FACTUAL

1. nuMIDAS Introduction

Sven Maerivoet, TML

2. nuMIDAS toolkit demo

Steven Boerma, MAPtm

3. A novel approach to predict impacts of parking policies

Eli Nomes, City of Leuven

4. The shared mobility challenge in Milan

Cristina Covelli, AMAT

5. Optimising shared mobility in Milan: data-driven perspectives

Valerio Paruscio, Poliedra

André Maia Pereira, CTU

6. How will your city benefit from nuMIDAS?

Rick Overvoorde, MAPtm





Dealing with new data and mobility solutions

Dr. Sven Maerivoet

1 December 2022



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What are our main objectives?



- Recognise the various **new and emerging mobility trends**
- Understand how efficiency, reliability, safety, ... **change** in light of these
- Identify **major new concepts and variables** and quantify them
- Devise **tools** for the monitoring and assessment of mobility solutions
- Review and **assess** a range of options for **collecting and using new data**

New Mobility Data and Solutions Toolkit

A consortium of nine partners (BE, NL, GR, ES, CZ, IT)



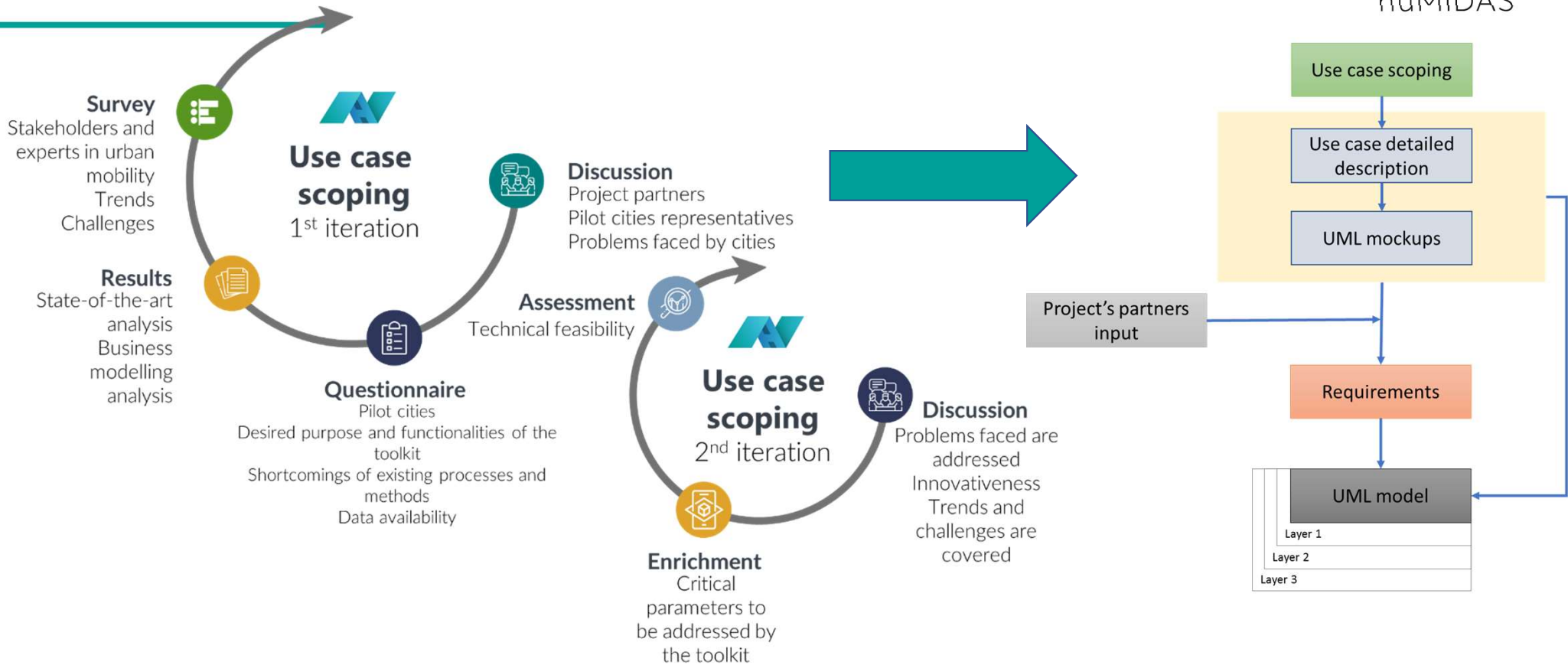
In which pilot cities are we deploying?



- Barcelona (**AMB**) in Spain, supported by FACTUAL
- Milan (**AMAT**) in Italy, supported by POLIEDRA
- Leuven (**LEUVEN**) in Belgium, supported by TML
- Thessaloniki in Greece, supported by **CERTH-HIT**



Scoping the use cases in the cities



What services are we providing?



- Milan:
 - How many shared (micro)mobility services to provide, and where?
- Barcelona:
 - How large are the vehicle emissions?
 - How much vehicles drive from A to B?
- Leuven:
 - Impact of parking space removal?
- Thessaloniki:
 - Impact of traffic management measures?

Obtaining user input/feedback via story boards, interviews, and testing



Frontend

select UC

Create scenario

Timeframe selection
Day type selection (optional)
Time of day selection (optional)
Aggregation period (1/5/15 min)

Edit scenario

Select camera's and relation (1-1 or 1-n)

Edit input

Run text to show that scenario is not yet calculated

Run scenario

Present scenario

5.1. Usability Analysis

nuMIDAS

5.1. Usability analysis

Understand stakeholder needs, motivations, and obstacles.

April 2022

INTRODUCTION

As part of the usability analysis (UAB 5.1), the objective of this report is to report the requirements from the user when addressing the usability requirements through different stages.

The usability objectives of the user are to identify user needs, motivations, and obstacles, which will help the nuMIDAS partners designing a solution.

USE CASE 1: 3.0 per user, 45 - 1 hour

UC1 - TEST USERS

- Session A: 10 nuMIDAS representative (Personas: "Representative" Scenario)
- Session B: 3 AMAT representative (Personas: "City Council member", "Advisory Council")
- Session C: 10 nuMIDAS representative not participating in the project (TED)
- Session D: TED (Public opinion/ independent outside nuMIDAS?)

AGENDA

- Brief introduction, nuMIDAS goals of exercise
- Use case description

1 Use Case 1 - Pilot city: Milan
Preplanning of shared mobility services

Goal
This use case aims to support the definition of the optimal fleet size of shared mobility services (e.g., shared bikes, scooters) taking as input mobility, financial, socioeconomic, and service provision-related parameters and constraints.

2 Persona 1

Policy maker
City Council member, City Manager, Mobility Provider, Developer, Shared City Manager, Planner

DEMOGRAPHICS ROLE TASKS NEEDS CHALLENGES

3 Customer Journey Map: Use case 1

STAGES	LOGIN	CITY SELECTION	USE CASE BOARD
NOVING QUESTIONS	How many users can be logged in at the same time?	How many cities can be selected at the same time?	How many scenarios can be created at the same time?
THOUGHTS	How many users can be logged in at the same time?	How many cities can be selected at the same time?	How many scenarios can be created at the same time?
FEELINGS	How many users can be logged in at the same time?	How many cities can be selected at the same time?	How many scenarios can be created at the same time?
PAIN POINTS	How many users can be logged in at the same time?	How many cities can be selected at the same time?	How many scenarios can be created at the same time?
OPPORTUNITIES	How many users can be logged in at the same time?	How many cities can be selected at the same time?	How many scenarios can be created at the same time?



More information on our website



- (see our deliverables and project video)



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nuMIDAS, New Mobility Data & Solutions Toolkit, started at the beginning of 2021 under the Horizon 2020 programme and its is being developed by a

Contact information



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nuMIDAS Toolkit demo

Steven Boerma



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Final selection of use cases



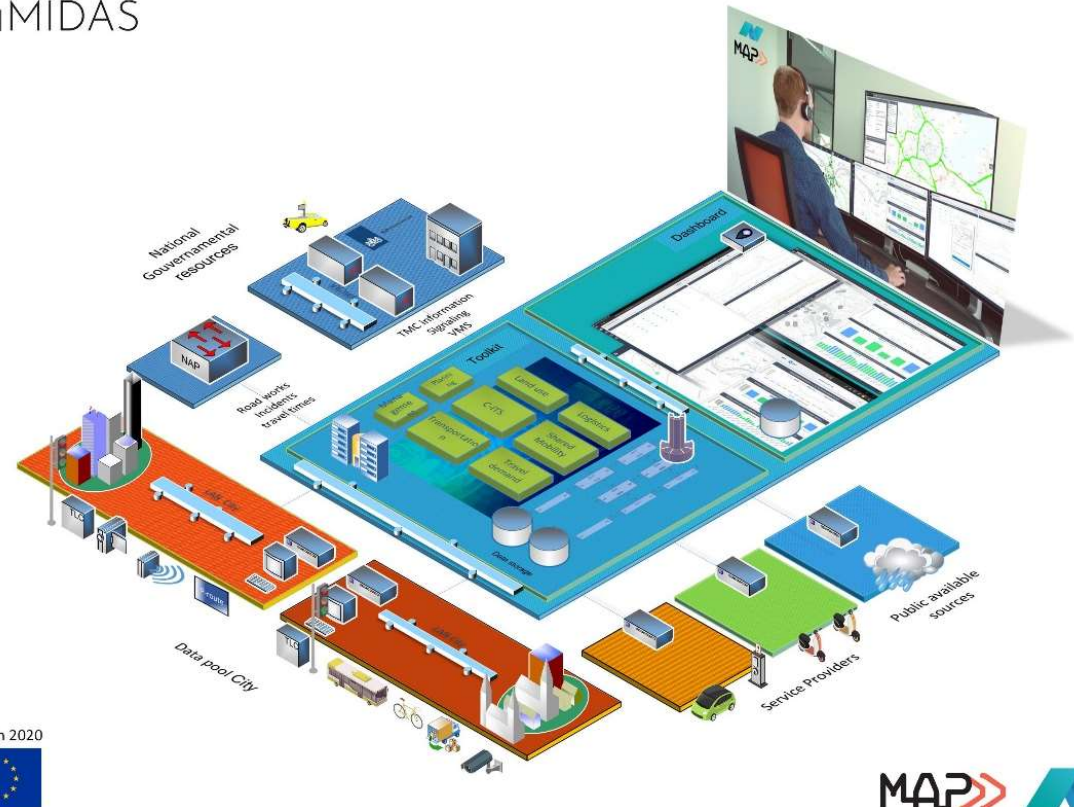
Toolkit development, Architecture



Flexible and scalable toolkit

- Cloud hosting in AWS
- Accessible for all partners
- Standard tooling
 - databases -SQL
 - programming - Python
- Generic approach
 - Naming conventions
 - Visualization config
 - Input/output config

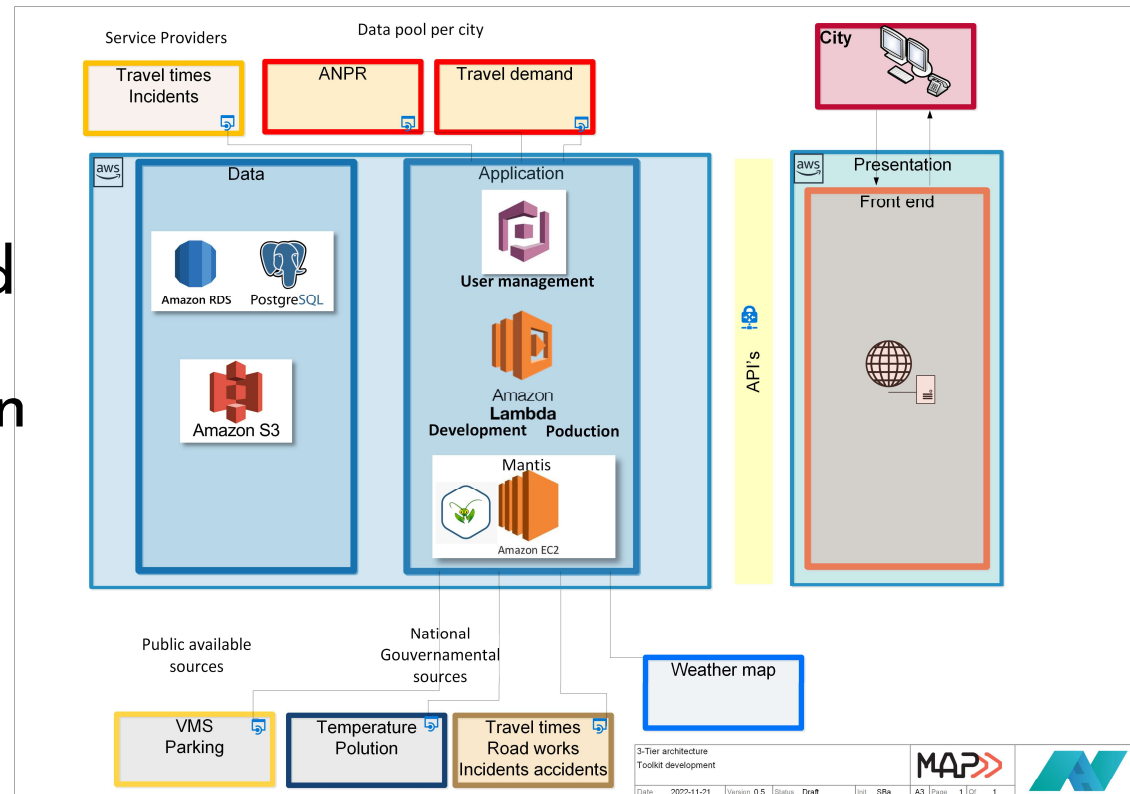
nuMIDAS



Toolkit development, environment



- Partner access
- User & user roles + city management
- Set up data, application and presentation tier
- Development and production environment
- Local testing
- Cloud deployment

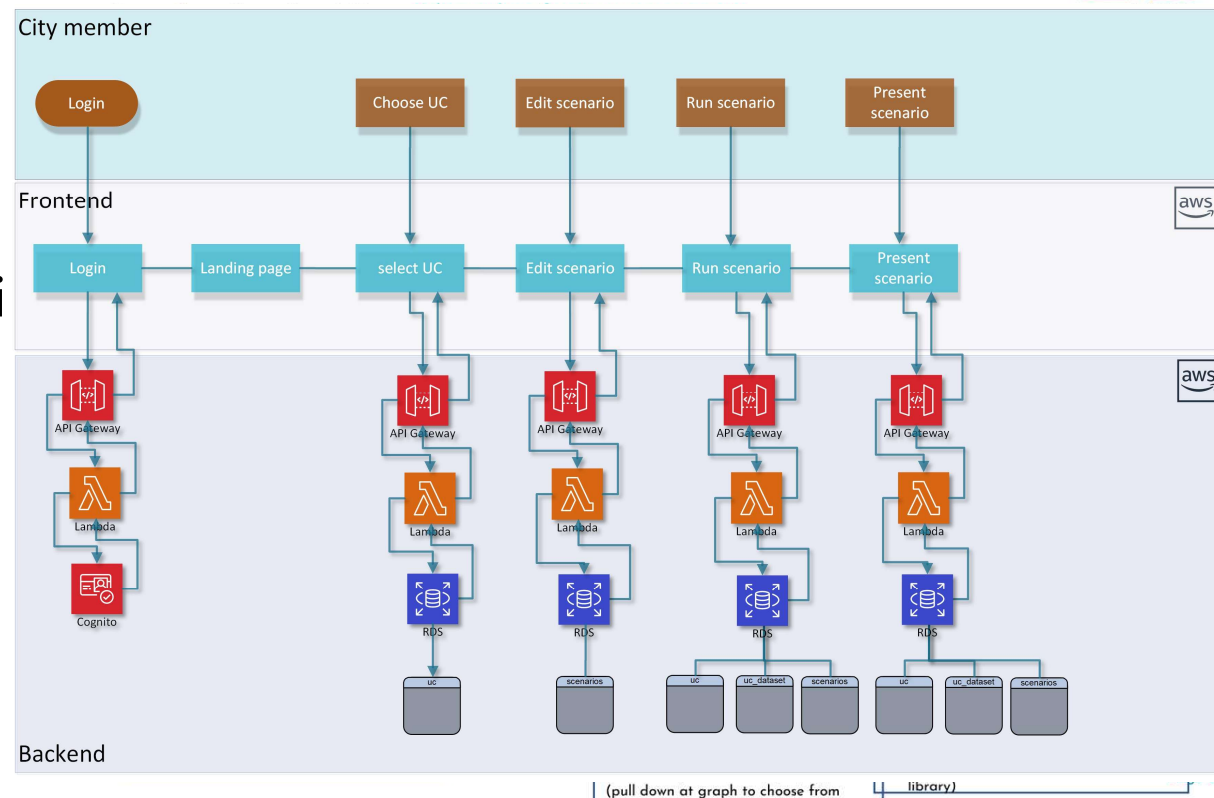


Toolkit development, Collaboration



Intensive collaboration

- Dashboard design
- Code sharing (GitHub)
- Bugs, requirements tracking (Mantis)
- Work package meetings
- Stand ups
- Scrum sessions



Toolkit development, user-centric design



Frontend

select UC

M
5.1. Usability Analysis ↻ ↺ ↻ All changes saved!
👤 3 ↗ Share ⬇ 💬 📄 🔍 ?

nuMIDAS
5.1. Usability analysis

Understand stakeholder needs, motivations, and obstacles

April 2022

INTRODUCTION

As part of the usability analysis (task 5.1), the objective of this mural is to map the experience users have while utilizing the nuMIDAS dashboard through different stages.

The outputs generated will be used to identify user needs, motivations, and obstacles, which will help the nuMIDAS partners designing a solution.

USE CASE
1

PEOPLE
3-5 per use case

TIME
45-1 hour case

UC1 - TEST USERS

Session A: 1 Polledria representative

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The outputs generated will be used to identify user needs, motivations, and obstacles, which will help the nuMIDAS partners designing a solution.

USE CASE
1

PEOPLE
3-5 per use case

TIME
45-1 hour case

UC1 - TEST USERS

- 1 **Session A:** 1 Polledria representative. Persona type: "Researcher". Valerio
- 2 **Session B:** 1 AMAT representative. Persona type: "policy maker". Adriano/ Cristina
- 3 **Session C:** Polledria/ AMAT representative not participating in the project. TBD
- 4 **Session D:** TBD. Proto persona/ policymaker outside nuMIDAS?

AGENDA

- 1 Brief introduction: nuMIDAS, goals of exercise
- 2 Use case description

1 **Use Case 1 - Pilot city: Milan**
Preplanning of shared mobility services

Goal
This use case aims to support the definition of the optimal fleet size of shared mobility services (e.g., shared bikes, scooters) taking as input mobility, financial, socioeconomic, and service provision-related parameters and constraints.

2 **Persona 1**

Policy maker
(70 in with persona type: Policy maker, Researcher, Traffic Manager, Mobility Provider, Traveler/ Citizen, City Manager, future)

DEMOGRAPHICS	ROLE/TASKS	NEEDS/CHALLENGES
Age: 35-45 Gender: Male Education: University	Researching mobility solutions Evaluating different options Communicating with stakeholders	Need to find a solution that is both sustainable and cost-effective Need to ensure the solution is user-friendly and easy to use Need to address the needs of different stakeholders

Policy maker
(70 in with persona type: Policy maker, Researcher, Traffic Manager, Mobility Provider, Traveler/ Citizen, City Manager, future)

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3 **Customer Journey Map: Use case 1**

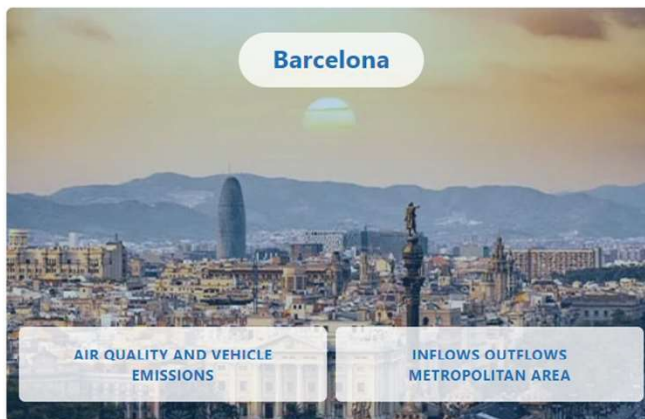
STAGES	LOG IN	CITY SELECTION	USE CASE BOARD
GUIDING QUESTIONS	How do you log in? What are the steps? How do you select a city?	How do you select a city? What are the options? How do you use the board?	How do you use the board? What are the options? How do you interact with the board?
THOUGHTS	How do you log in? What are the steps? How do you select a city?	How do you select a city? What are the options? How do you use the board?	How do you use the board? What are the options? How do you interact with the board?
FEELINGS	Positive Neutral	Positive Neutral	Positive Neutral
STAGES	LOG IN	CITY SELECTION	USE CASE BOARD
GUIDING QUESTIONS	How do you log in? What are the steps? How do you select a city?	How do you select a city? What are the options? How do you use the board?	How do you use the board? What are the options? How do you interact with the board?
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FEELINGS	Positive Neutral	Positive Neutral	Positive Neutral
PAIN POINTS <i>(diff between usability and functionality)</i> <i>(Should have)</i>	How do you log in? What are the steps? How do you select a city?	How do you select a city? What are the options? How do you use the board?	How do you use the board? What are the options? How do you interact with the board?
OPPORTUNITIES <i>(Could have)</i>	How do you log in? What are the steps? How do you select a city?	How do you select a city? What are the options? How do you use the board?	How do you use the board? What are the options? How do you interact with the board?

- User input
- Story board
- Interview
- Usability

nuMIDAS toolkit demo

Welcome to the New Mobility Toolkit.

Please select your city and use case.



Contact information



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A novel approach to predict impacts of parking policies

Eli Nomes, City of Leuven



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Leuven in a nutshell

Population	100.000 inhabitants
	45.000 students
	increasing number of jobs
Dynamic city	20 km east of Brussels Capital
	Fastest growing city in Belgium
	Challenges on traffic congestion
Vision and ambitions	LKN 2030



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EUROPEAN CAPITAL
OF INNOVATION



LEUVEN
2030



The future of onstreet parking



Public space in Leuven and especially in the outer districts is still dominated by cars.

If we want to reach our goal of a radical modal shift, we need to create space for active and shared modes.



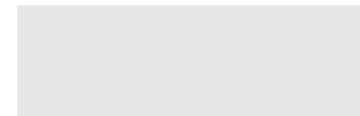
eliminate
all on-street parking



+20%
kerb-to-kerb street space



- Onstreet parking policy and data onstreet parking to free up public space is met with a lot of resistance
- Can data analysis help us in this endeavour?

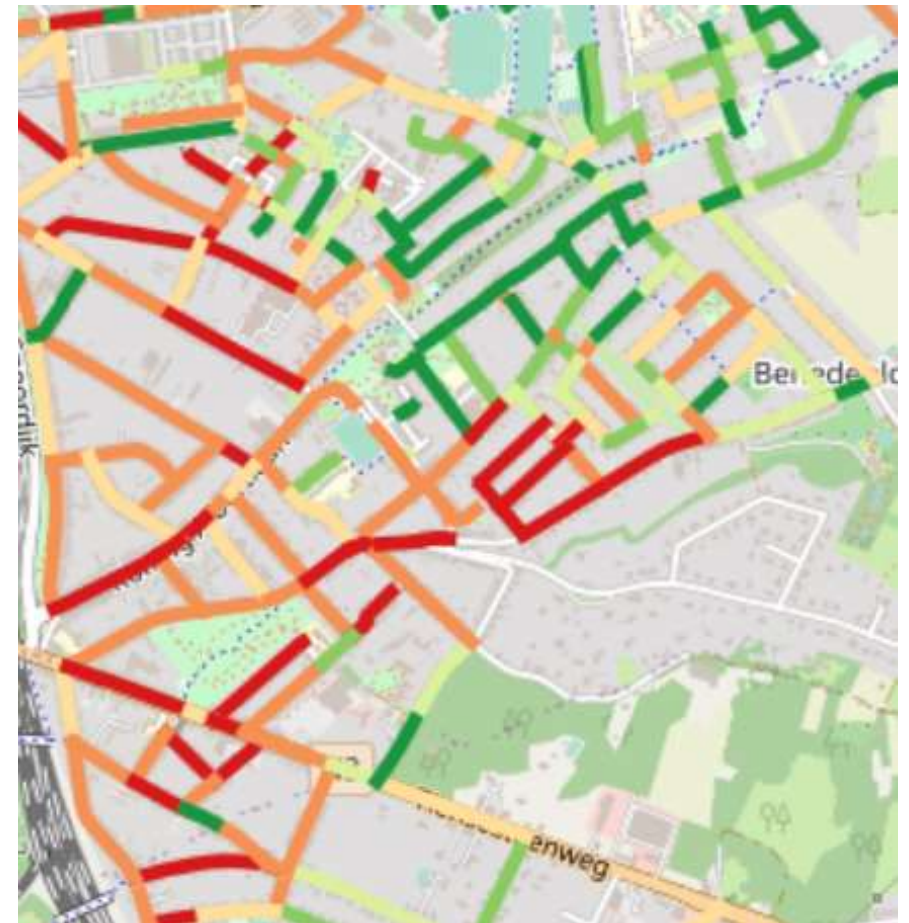
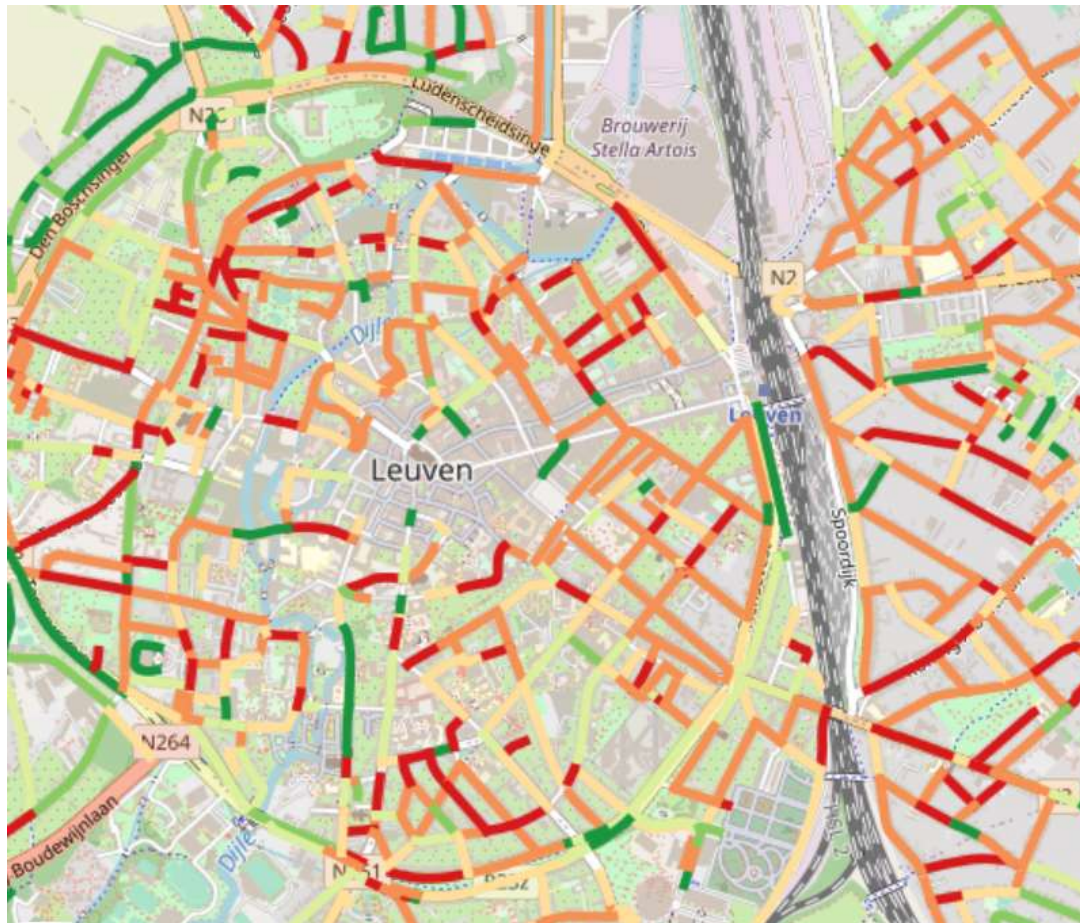


Predicting the impact of parking policies

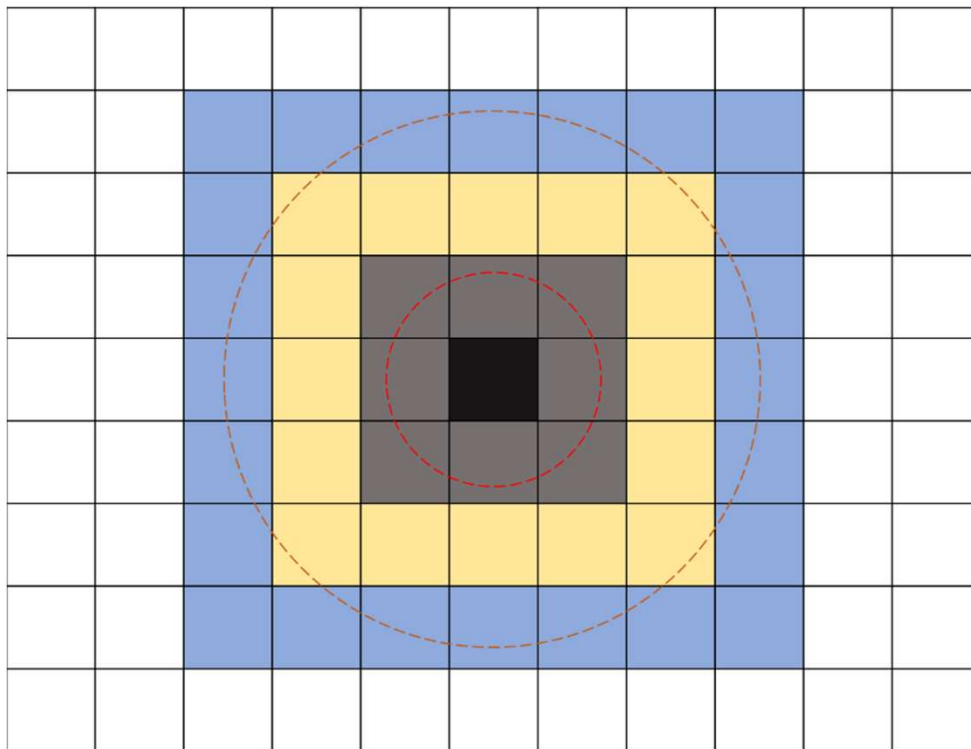







- What is the impact on parking pressure and car use of:
 - Reducing onstreet parking
 - Changing prices
 - Changing rules
- Can we answer this question with relatively simple data?

Parking occupancy measurements

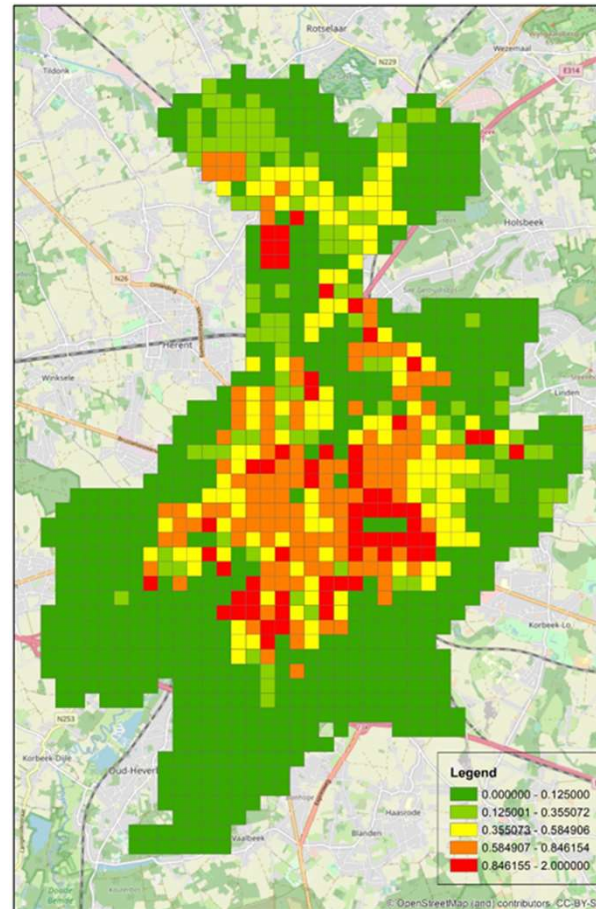
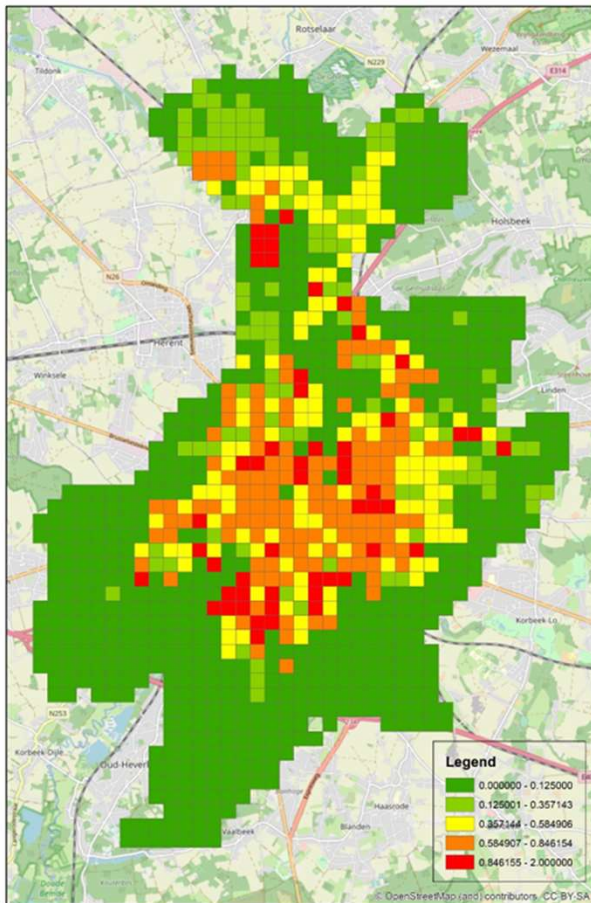


Simple grid approach



-  Cell within which a policy has been enforced
-  Neighbor of the 1st level
-  Neighbor of the (n-j)th level
-  Neighbor of the nth level
-  Cell unaffected by the policy

Predict impact on a hyperlocal level and a city level



Incorporate the tool in the userfriendly nuMIDAS dashboard



A screenshot of the nuMIDAS dashboard interface. On the left is a vertical sidebar with icons for home, a building, LEU, and settings. The main area shows a map with a grid overlay. A green circle labeled 'Edit mode' is positioned above the map. Below it, the text 'Current scenario: POLIS_SB01' is displayed. To the right of this text are two buttons: 'Cancel changes' (in red) and 'Save changes' (in blue). Further right is a blue button labeled 'SCENARIO MANAGEMENT' with a right-pointing arrow. The map itself shows a grid of blue squares over a street network. A small inset map on the left shows a larger area with a red and green grid. The bottom right corner of the map area contains the text 'Leaflet | © Mapbox © OpenStreetMap'.

Scenario management



Scenario management ✕

Use the form below to create a new, or select an existing scenario.

Create new scenario

Scenario name

Baseline ⓘ

Baseline 2020 ▼

Searching speed in km/h ⓘ

Average length of a parking space in (m) ⓘ

Average Spacing Between Parking Places (m) ⓘ

Expansion level 10 ⓘ

Contact information



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The shared mobility challenge in Milan - Optimising shared mobility

Cristina Covelli, AMAT

Valerio Paruscio, Poliedra

André Maia Pereira, CTU

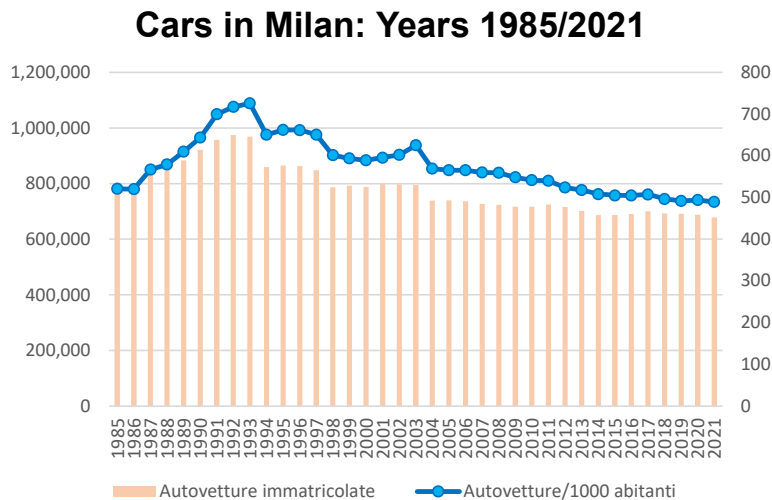




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Milan Mobility background



PRIVATE
CARS
TREND
in Milan



2011		539,90 car/1000 inhb. 724.450 cars
2021		489,68 car/1000 inhb. 678.839 cars
2011/2021		-9,30% car/1000 inhb. -45.611 cars

Current Motorization Rate: 49 cars/100 inhabitants

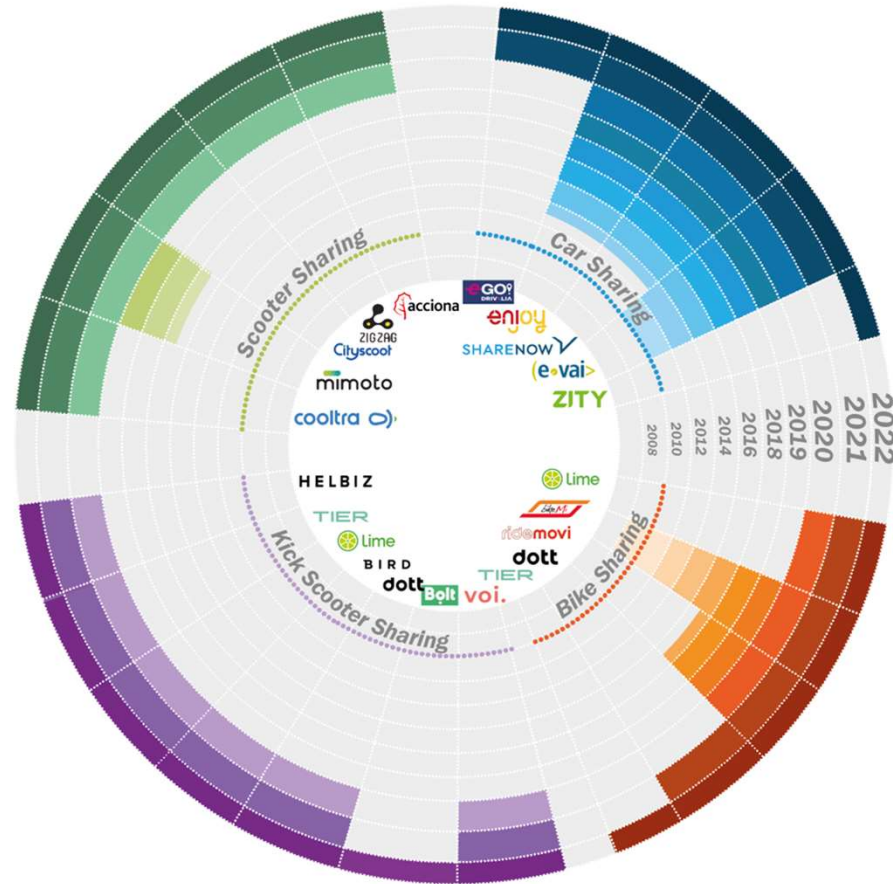
SUMP GOAL: 46 car/100 inhabitants



Milan sharing mobility background



SHARED MOBILITY SERVICES Key Figures



- CAR SHARING
- 2.654 cars, 39% electric
- BIKE SHARING
- 21.930 bikes, 52% electric
- SCOOTER SHARING
- 4.363 scooters, 100% electric
- KICK SCOOTER SHARING
- 5.250 kick scooters, 100% electric

Milan sharing mobility background



SHARED
MOBILITY
SERVICES
Key
Operational Fi
gures



Milan requirements and needs



Milan had a rapid deployment of shared mobility services in recent years.

This new event couldn't be completely controlled by decision makers given its novelty and dynamism.

Hence the need for tools 1) and 2) that **aid decision makers** in guiding a **balanced development of shared mobility**.

Milan use cases



UC1) Pre-planning shared mobility services



This tool aids a decision maker in studying the **dimensioning of shared fleet** in different scenarios.

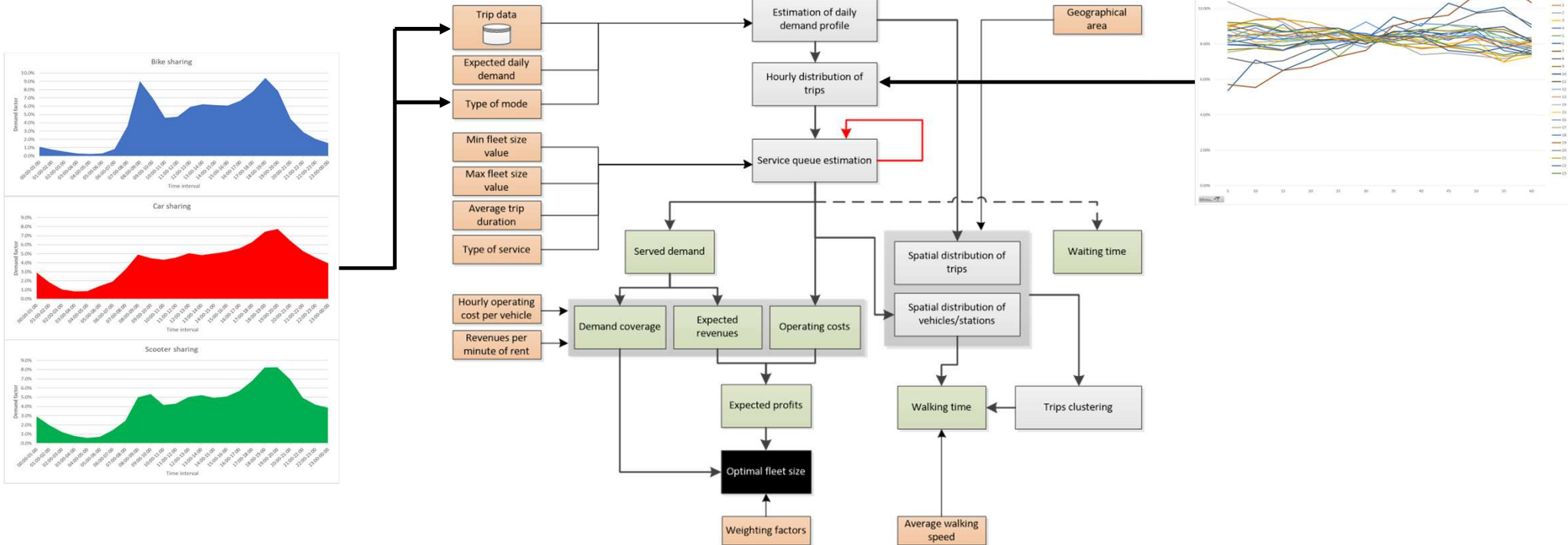
Each scenario based on following inputs:

- sharing modes (bike, car, moped, kick-scooter)
- service modes (station-based and free floating).
- service area
- hourly demand curve
- pricing schemas and costs for operators
- weights operators vs users

UC1) Pre-planning shared mobility services



Computational flow of UC1



UC1) new scenario, input data



Scenario management
Use the form below to create a new, or select an existing scenario.

Create new scenario

Scenario name
SCN001

Mode type Service type

Expected daily demand (in units) Area size (in km²)

Operating cost p/vehicle p/minute (in euro's) Expected revenue per minute of rent (in euro's)

Average trip duration (in minutes) Average walking speed (km per hour)

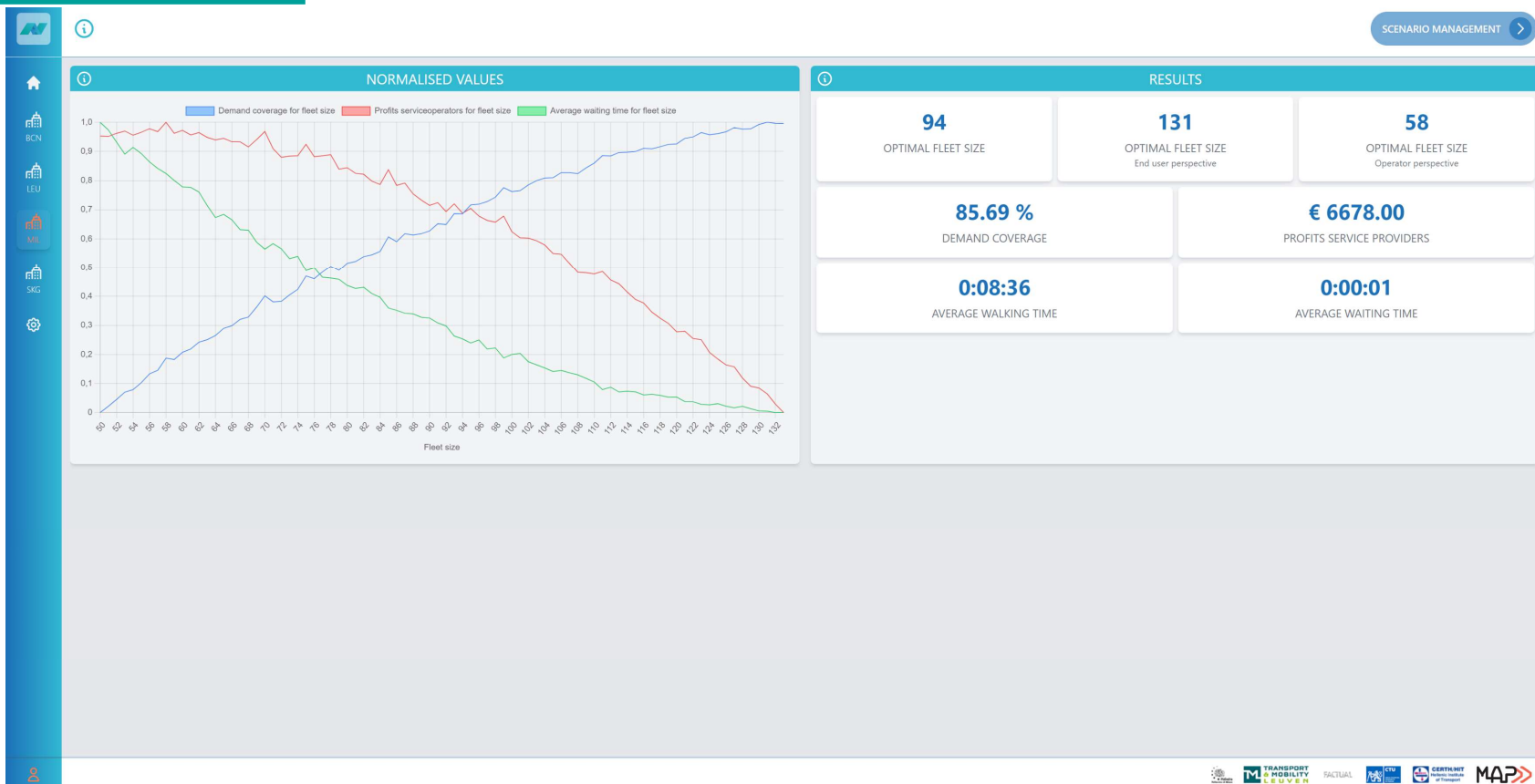
Weighting factor society Weighting factor serviceoperators

Minimum fleet size (in units) Maximum fleet size (in units)

Elastic demand Hourly demand defined by user (in units)

Profits higher then this value

UC1) new scenario, output



UC2) Operative area analysis shared mobility



This tool aids a **decision maker** in studying different scenarios by analyzing the most promising zones of the city **where to extend shared mobility services**.

Each scenario based on following inputs:

- sharing modes (bike, car, moped, kick-scooter) and
- service modes (station-based and free floating)
- about 400 territorial units and include
- origin-destination matrix
- population density
- current served zones (or mandatory/excluded zones)
- pricing schemas and costs for operators

UC2) new scenario, input data

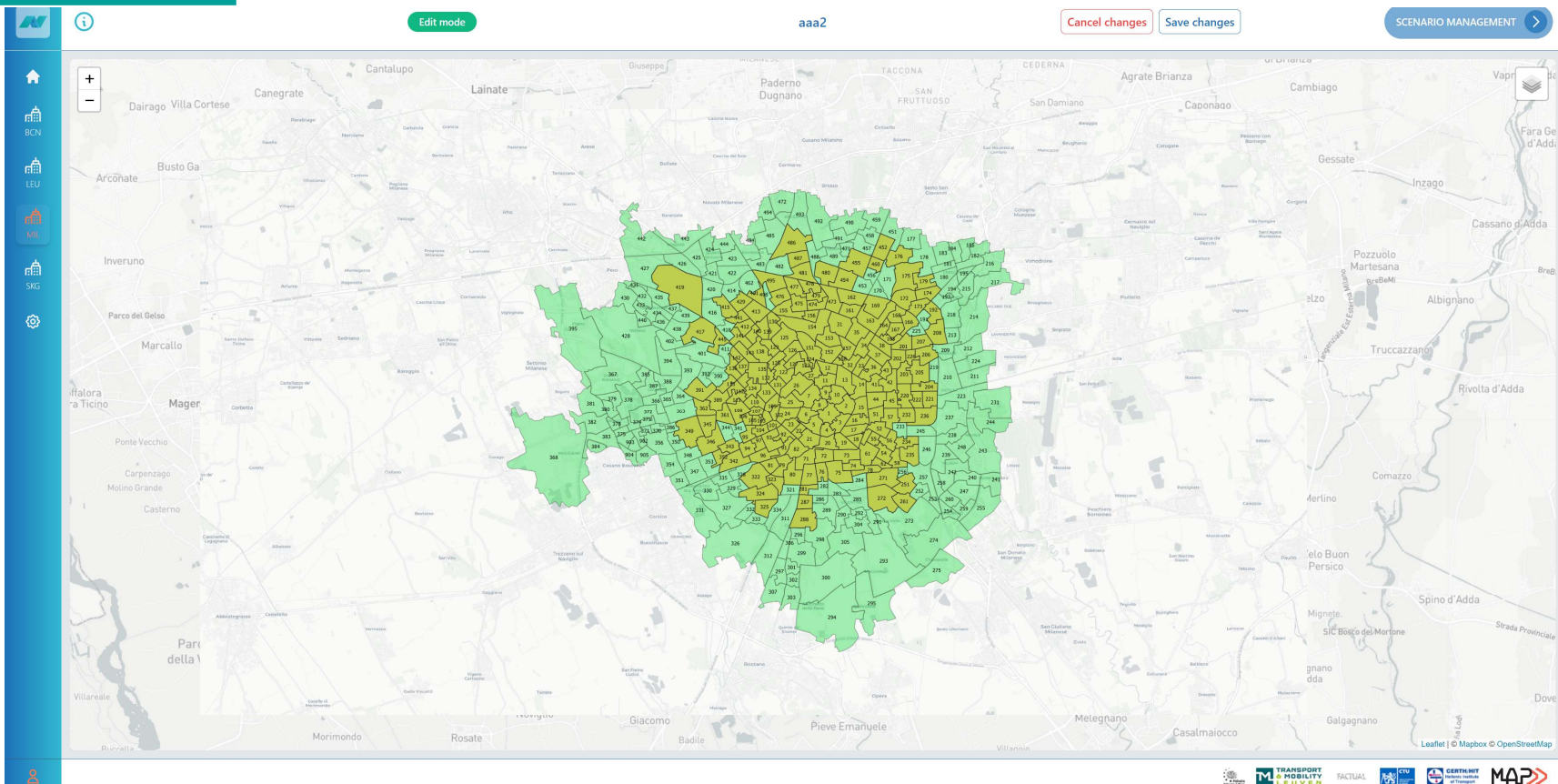


A screenshot of the nuMIDAS software interface. On the left is a map of the Milan area with several zones highlighted in green and blue. A vertical sidebar on the far left contains icons for home, BCN, LEU, MI, and SKG. At the top of the map area is an 'Edit mode' button. On the right, a 'Scenario management' dialog box is open, containing a form for creating or editing a scenario. The form includes fields for 'Scenario name' (filled with 'aaa2'), 'Mode type' (set to 'bike'), 'Average trip duration (in minutes)' (15), 'Operating cost p/vehicle p/minute (in euro/s)' (0.2), 'Expected revenue per minute of rent (in euro/s)' (0.8), 'Weighting factor society' (0.5), and 'Weighting factor serviceoperators' (0.5). There is also a checkbox for 'Use currently served zones?' which is checked. At the bottom right of the dialog are 'Cancel' and 'Save and continue' buttons.

UC2) new scenario, output



nuMIDAS



01/12/2022

nuMIDAS: The New Mobility Data and Solutions Toolkit

UC2) main steps



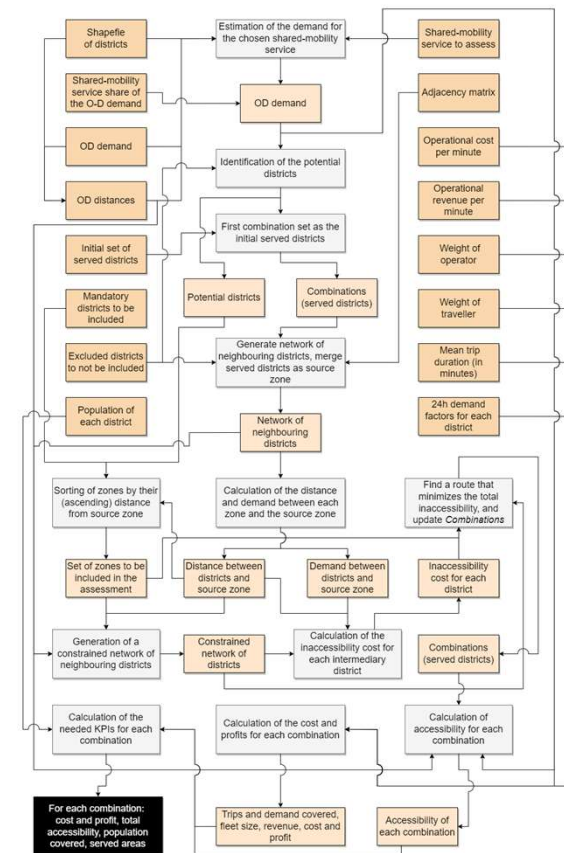
Main Steps

- Mandatory and excluded (for assessment), or already served zones
- Parameters for calculation of costs and profits
 - Operational costs and revenue, mean trip duration, etc.
- Estimated demand for chosen shared-mobility mode
 - Mode share and average trip distance, distance between zones
- Identify potential zones
- Scenarios: one for each inclusion of potential and mandatory zones
- Accessibility, cost, profit, and population covered

UC2) main steps

Highlights

- Arbitrary initial operational area
- Avoidance of isolated zones
 - "Route" to potential zones
 - Accessibility as the main index
- Adaption of mode demand by the distance of zones
- Fast processing time
 - Heuristics to remove not meaningful scenarios





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Contact information

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- Valerio Paruscio: Valerio.Paruscio@gmail.com
- André Maia Pereira: eng.andremaia@gmail.com



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How will your city benefit from nuMIDAS?

Rick Overvoorde, MAPtm



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What can nuMIDAS do for your city?



- Do you have:
 - A mobility policy challenge?
 - Valuable but not (optimally) used data?



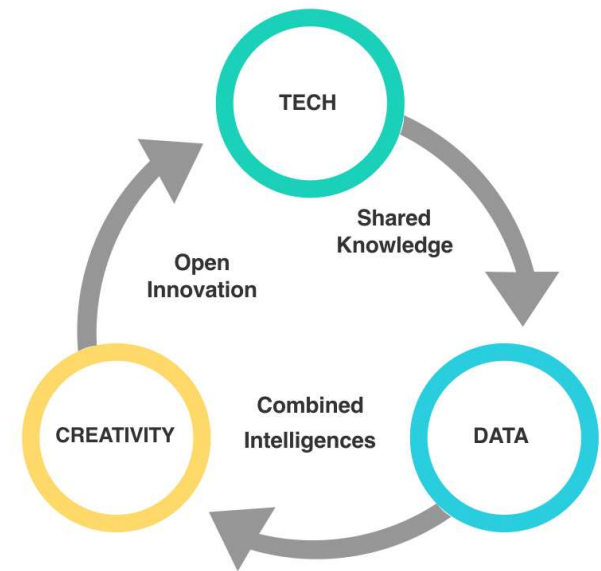
- Or do you recognise any of the problems nuMIDAS is addressing in your city?



What can nuMIDAS do for your city?



- Improved insight in your cities' mobility policy
- With
 - (Adapted) existing tools
 - Tools co-created with you
- Access to knowledge and skills of:
 - Policy makers
 - Researcher
 - Consultants
 - Full stack developers
 - You and your colleagues?

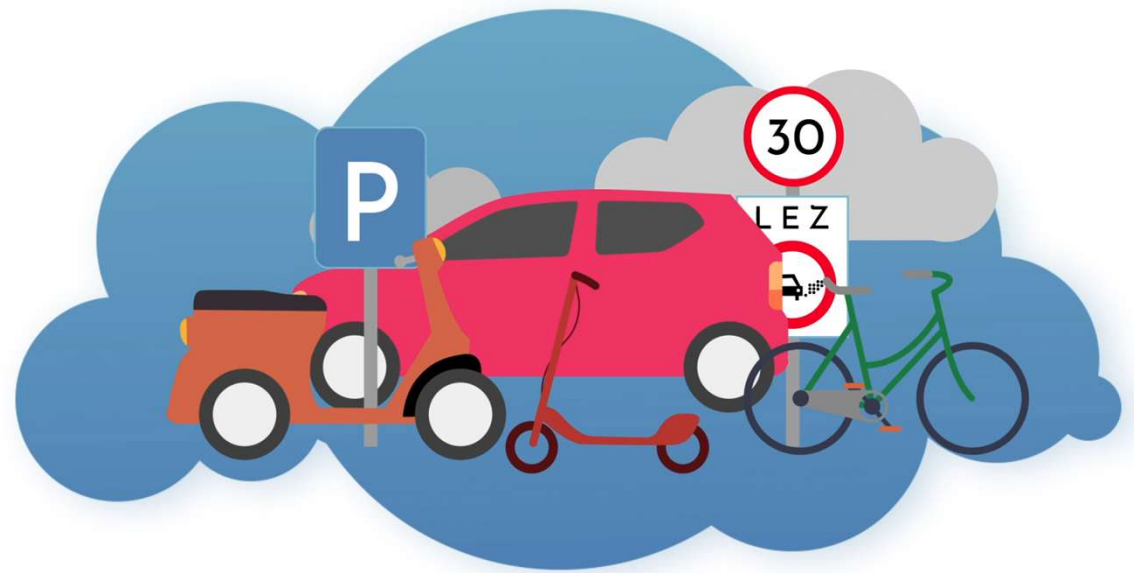


Any tool for your city

Any tool with

- A mobility policy design related question
- that requires data presentation or analysis,
- or requires scenario computation

could be hosted on the toolkit



Interested?



- Send an e-mail to **Rick.Overvoorde@maptm.nl** and we will get into contact to help you with your policy design
- Visit our website numidas.eu



FACTUAL



Contact information



- Rick Overvoorde
 - Rick.Overvoorde@MAPtm.nl



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Thanks for your attention!



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