Fostering the adoption of shared mobility in Smart Sustainable Districts

Alberto Colorni, Alessandro Luè, Valerio Mazzeschi, Valerio Paruscio, Luca Studer, Mara Tanelli

Accessibility and Connectivity of the 15-minute-city | Joint ACUTE / UERA TWG Urban Accessibility and Connectivity
8 March 2023, Milano

Smart Sustainable Districts

The *Smart Sustainable Districts (SSD)* project focuses on **urban transformation** through the lens of the urban districts

Promoted by **Politecnico di Milano** and coordinated by Consorzio Poliedra, the project started in 2021 and involved more than 100 researchers from all Departments and Consortia of Politecnico

Proposes **actions** for the sustainable development, the ecological transition and the enhancement of resilience of places and communities at a **local scale**

Speak to **local authorities** and to the stakeholder that are active in urban and districts regeneration

100 Ricercatori del Politecnico di Milano

11 Pillar (ambiti tematici)

30 Topics

+200 Buone pratiche rappresentate

180 Soluzioni operative

credits: pensagrafica.it

www.poliedra.polimi.it/en/ssd-smart-sustainable-districts

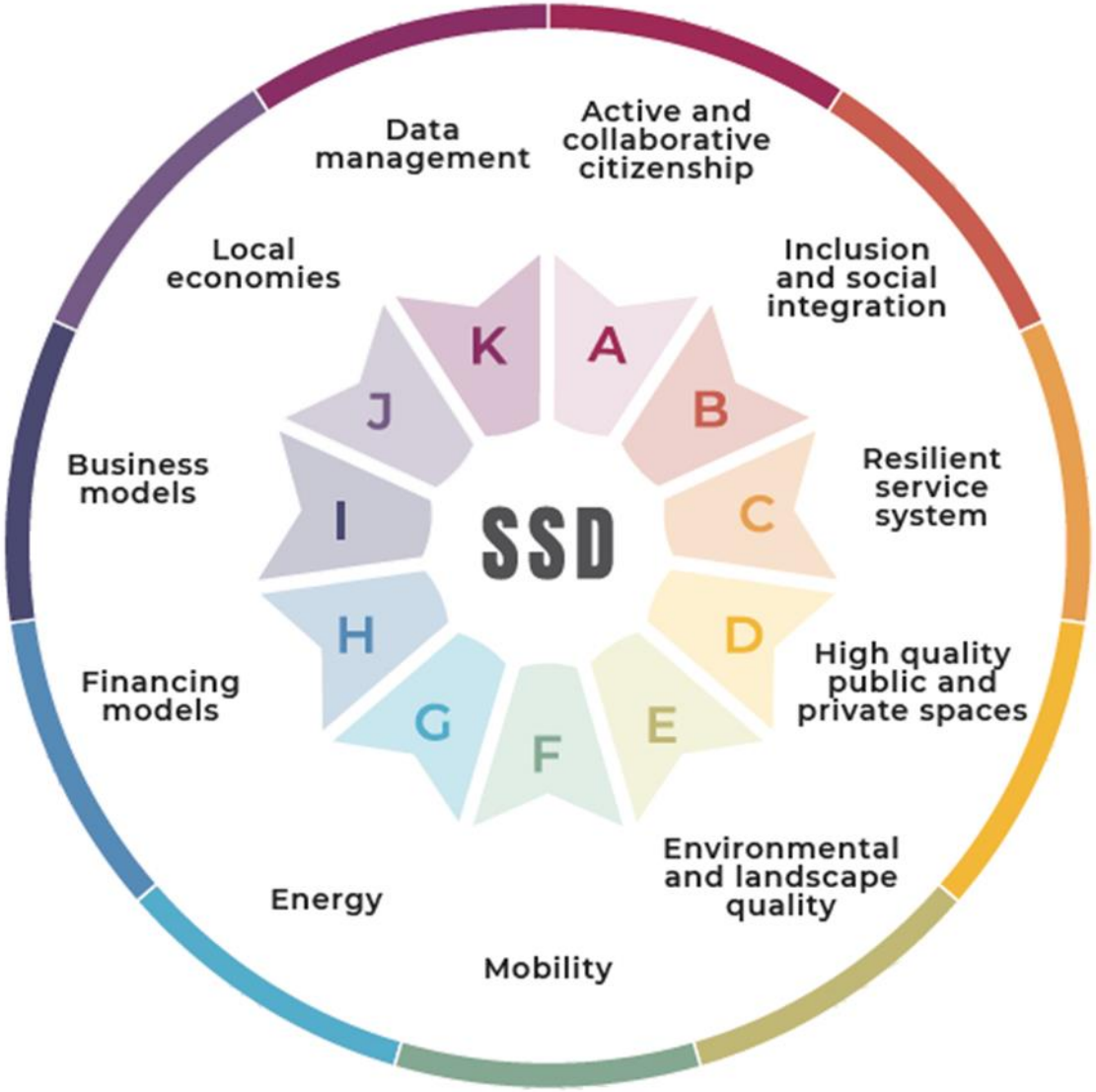
The SSD guidelines

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The thematic areas (pillars)

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The white paper is divided into 11 thematic areas (**pillars**) to represent urban districts from a smart and sustainable point of view and to define the possible lines of action

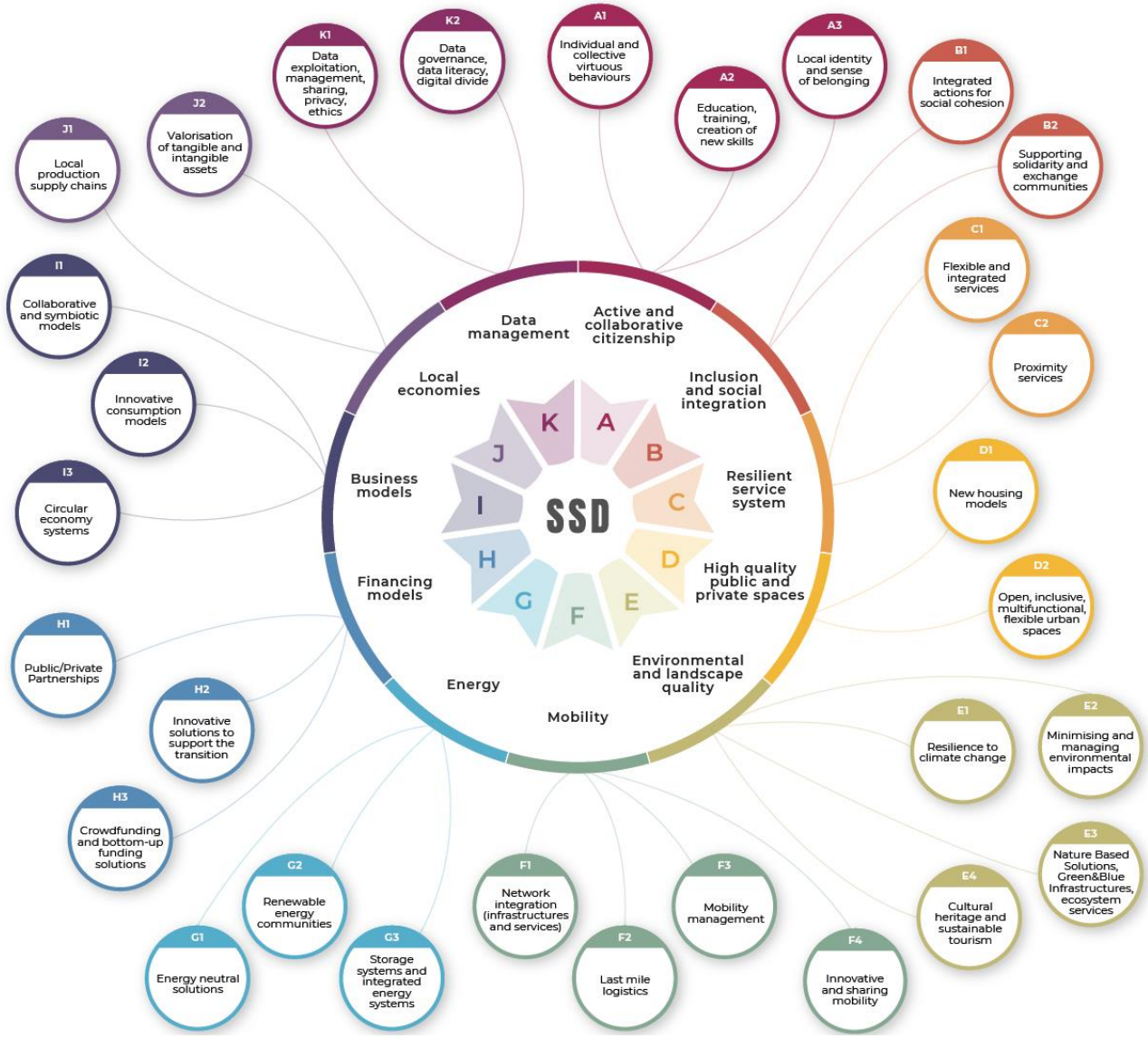


Topics and pillars

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The white paper is divided into 11 thematic areas (**pillars**) to represent urban districts from a smart and sustainable point of view and to define the possible lines of action

For each pillar, some sub-areas have been identified (**topics**), to detail the possible actions and good practices

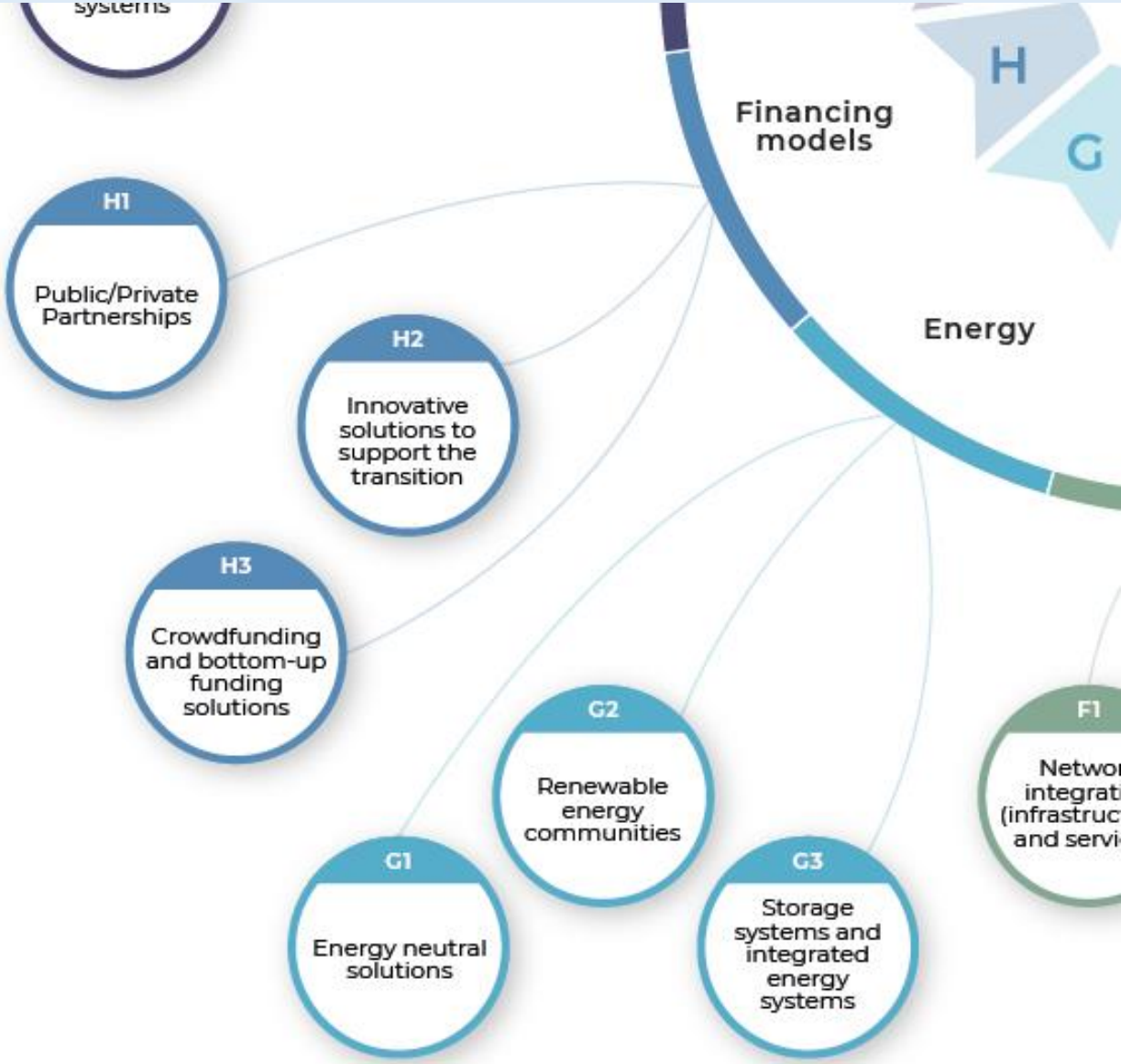


Topics and pillars

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The white paper is divided into 11 thematic areas (**pillars**) to represent urban districts from a smart and sustainable point of view and to define the possible lines of action

For each pillar, some sub-areas have been identified (**topics**), to detail the possible actions and good practices

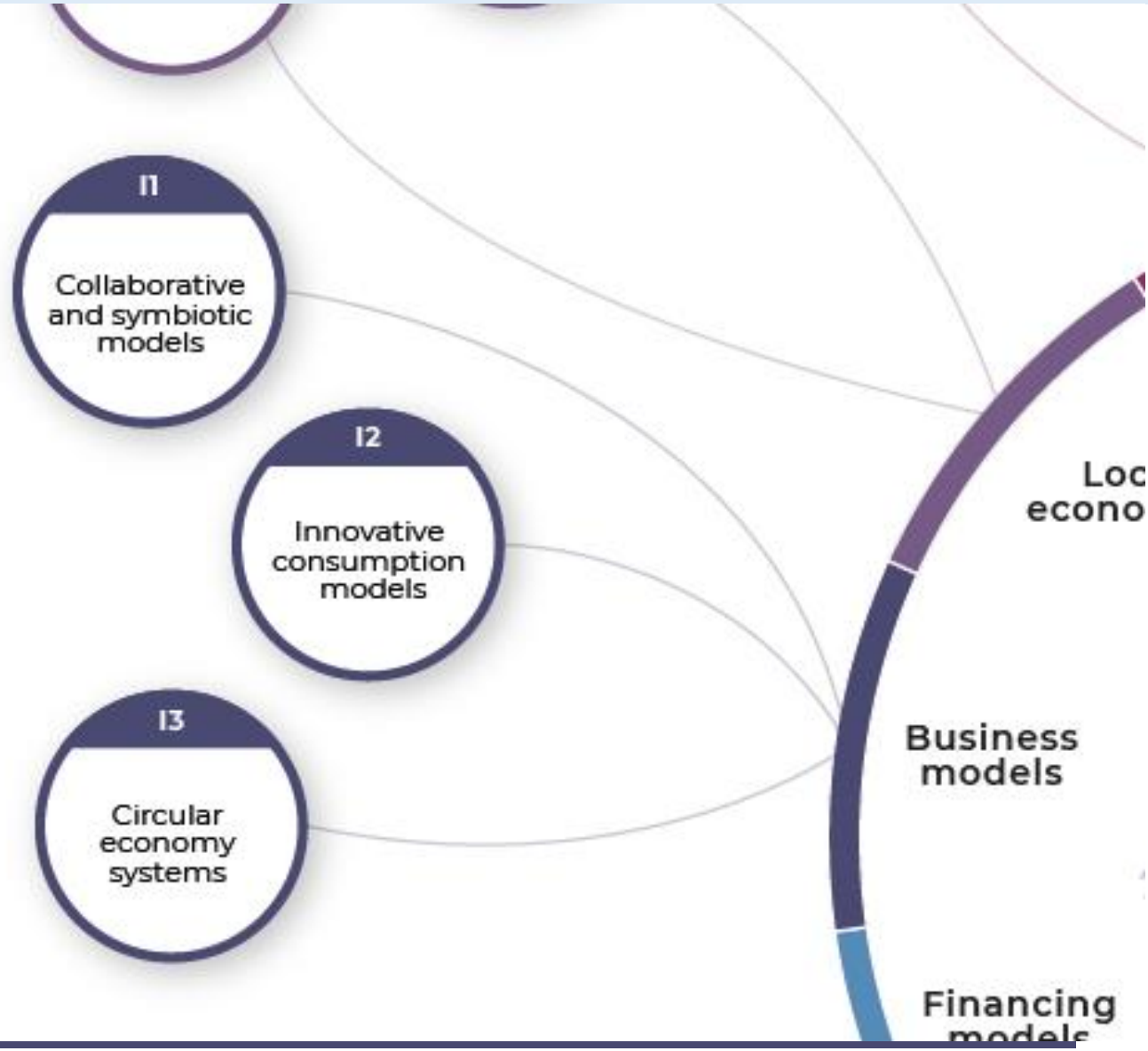


Topics and pillars

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The white paper is divided into 11 thematic areas (**pillars**) to represent urban districts from a smart and sustainable point of view and to define the possible lines of action

For each pillar, some sub-areas have been identified (**topics**), to detail the possible actions and good practices

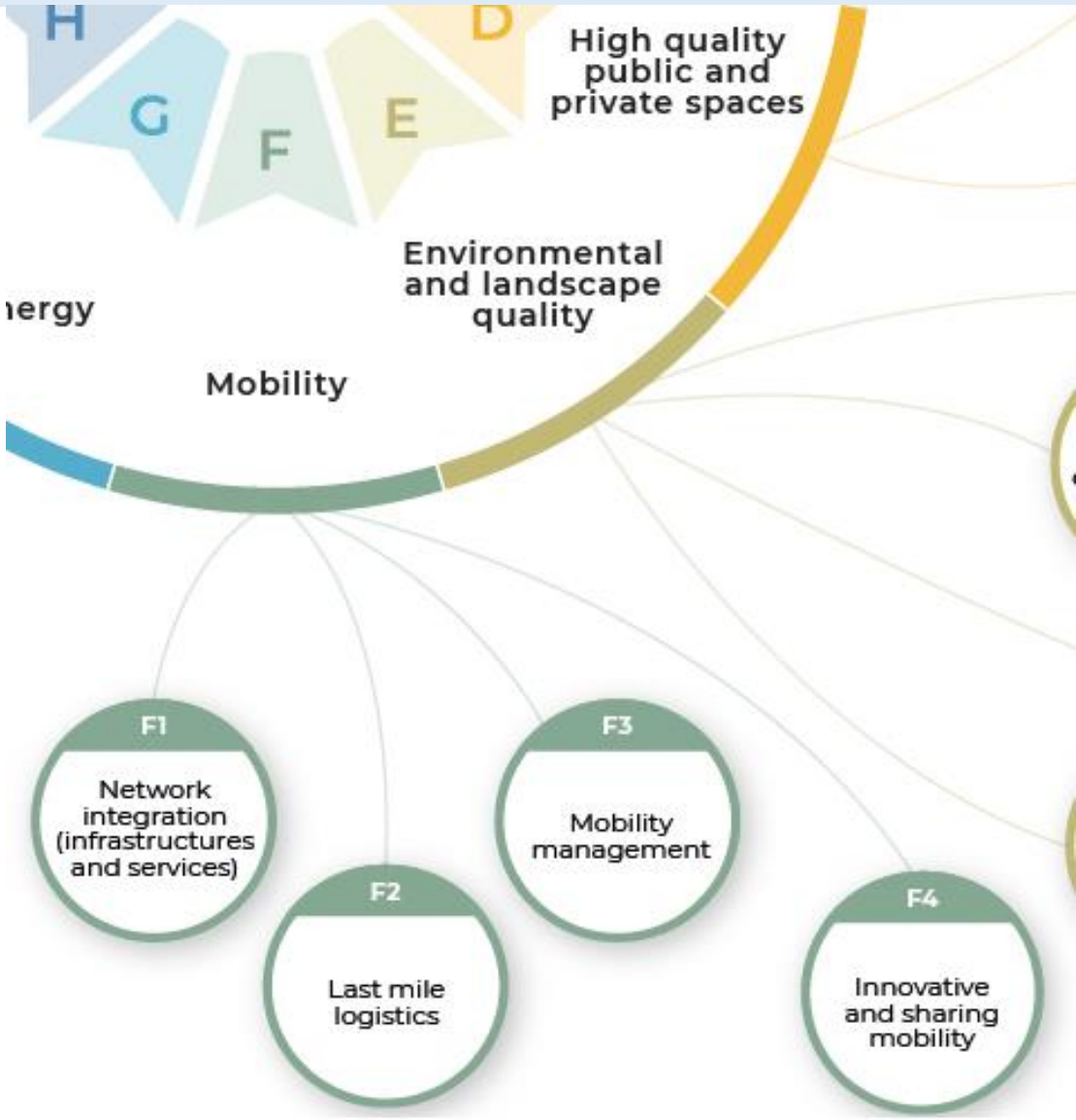


Topics and pillars

Main output is a **white paper**, that aims to draft some practical **guidelines** to deal with planning and management of urban transformations at the district scale

The white paper is divided into 11 thematic areas (**pillars**) to represent urban districts from a smart and sustainable point of view and to define the possible lines of action

For each pillar, some sub-areas have been identified (**topics**), to detail the possible actions and good practices



Mobility in Smart Sustainable Districts

F – Mobility

F1 – Network integration (infrastructure and services)

P. Coppola, con P. Beria, L. Studer

- **Intermodality**
- **Integration of mobility services**
- Encouraging **active mobility** in accessing modal interchanges

F2 – Last mile logistics

A. Tumino e A. Seghezzi, con F. Braghin, F. Cheli, R. Mangiaracina, V. Paruscio, C. Siragusa, D. Tarsitano, P. Tresca

- **Optimising** the delivery of **small parcels** and **ultra-rapid** delivery requests
- **Micro-warehousing**
- Small and **electric** vehicles (i.e. cargo bike)
- **Drones and Robotics** delivery

F3 – Mobility management

L. Studer, con M. Brambilla, E. Perotto

- Define actions on working hours to **reduce peak phenomena** on collective transport
- Create facilities and infrastructures that **facilitate the use of sustainable** means of transport such as electric recharging stations, bicycle facilities (bicycle racks, bicycle repair spaces, showers)

F4 – Innovative systems and sharing mobility

M. Tanelli, con F. Bordignon, F. Braghin, F. Capella, F. Cheli, P. Coppola, S. Franzò, A. Lué, A. Nasca, V. Paruscio, L. Studer, E. Verga

Department of Design

Department of Mechanical Engineering

Department of Management, Economics and Industrial Engineering

Department of Electronics, Information and Bioengineering

Poliedra

Cefriel

MIP

Innovative systems and sharing mobility

Strategies and policies

Providing alternative and integrated mobility services to the private car

Exploit the opportunities of new technologies to improve mobility services

Developing MaaS (Mobility as a Service) systems

Solutions

Community car-sharing

Bike/… hub

Promotion of active mobility

Charging stations

Best practices

nuMIDAS
https://numidas.eu/

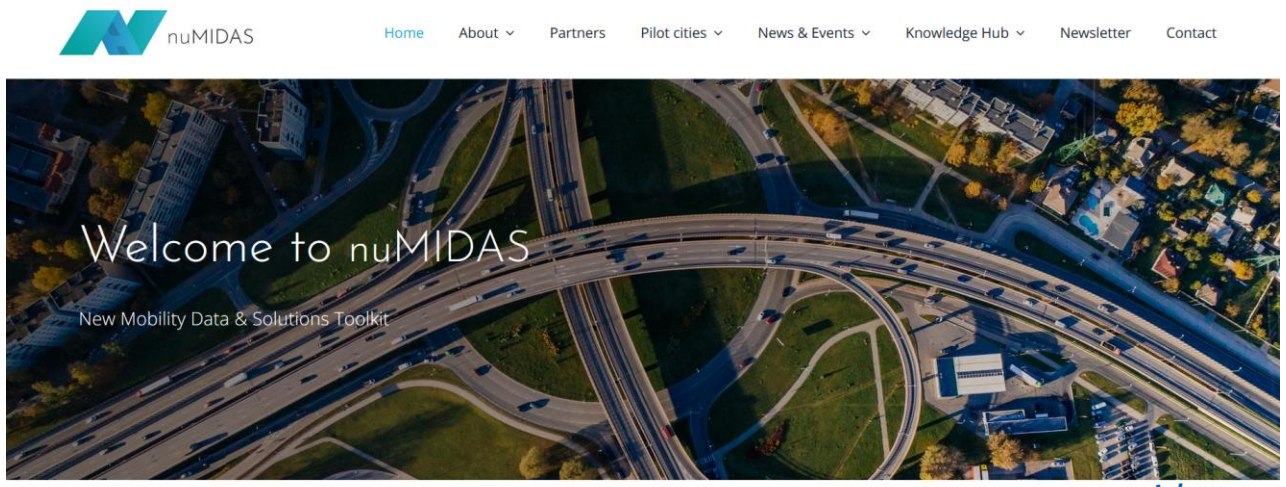
Sharing Cities
https://sharingcities.eu/

I-SharE
http://www.i-sharelife.eu/en/homepage-2/

The *nuMIDAS* project

New Mobility Data & Solutions Toolkit

- Recognise new and emerging **mobility trends**
- Identify relevant **new concepts** playing an increasingly important role in transport and mobility analyses
- Review, assess and develop innovative methods for **collecting and using mobility data**, including also Artificial Intelligence / Machine Learning techniques for dealing with Big Data



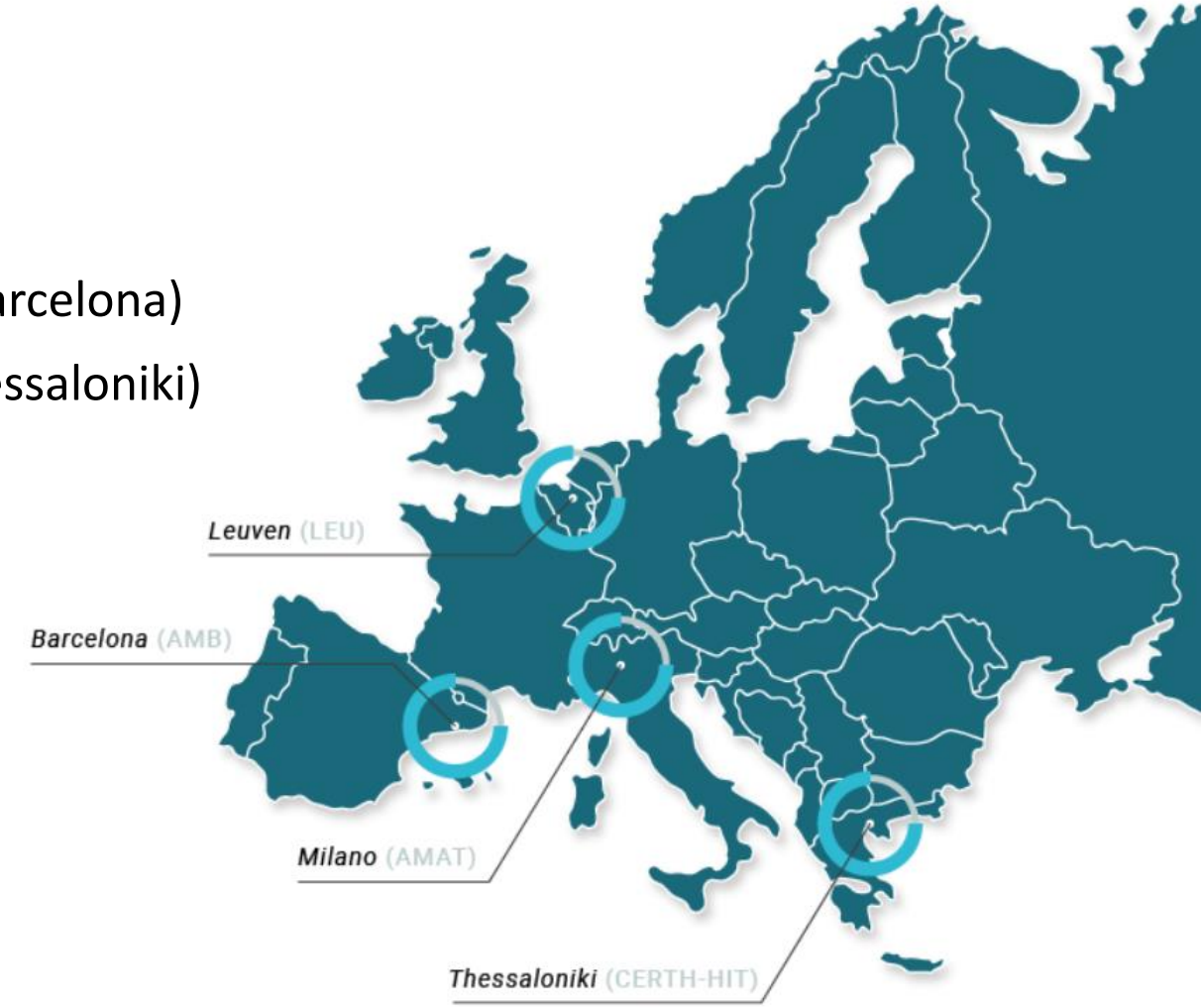
www.numidas.eu

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

Use Cases in pilot cities

The project builds on a distributed selection of Use Cases tested in four pilot cities

- UC1+UC2: **Shared mobility** (Milan)
- UC3: Vehicle **emission** estimation (Barcelona)
- UC4: Planning for **parking** (Leuven)
- UC5: **OD matrix** estimation from traffic camera data (Barcelona)
- UC6: Assessment of **traffic management** scenarios (Thessaloniki)



Use Case 1: pre-planning of shared services

- Scope: support to public **decision makers** in the estimation of **fleet size** for the definition of the tender
- How: **maximising** the supply of services (**vehicles**) for users, ensuring **economic sustainability** for the operator
- Estimated result: recommendation for an **optimal fleet size**

Input

- Selection of the type of the mode and the service (bike/car/moped/kick-scooters; station-based/free floating)
- Expected daily demand (trips/day)
- Size of the area of interest (km^2)
- Operating costs per vehicle per minute (Euros)
- Expected revenues per minute of rent (Euros)
- Average user walking speed (km/h)
- Average trip duration (minutes)
- Weighting factors assigned to service operator's and end-users' perspectives
- Minimum and maximum value of the fleet size

Output (KPIs)

- Optimal fleet size
- Optimal fleet size (end-user perspective)
- Optimal fleet size (operator perspective)
- Demand Coverage
- Profits service providers
- Average walking time
- Average waiting time

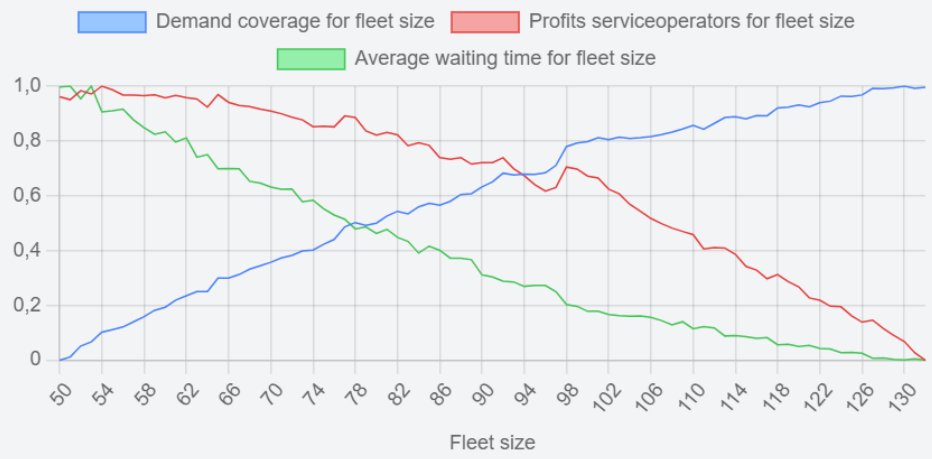
Use case 1: example of output

View mode

Base (14-11-2022)

SCENARIO MANAGEMENT

NORMALISED VALUES



RESULTS

92 OPTIMAL FLEET SIZE	**130** OPTIMAL FLEET SIZE End user perspective	**54** OPTIMAL FLEET SIZE Operator perspective
85.29 % DEMAND COVERAGE	**€ 7087.95** PROFITS SERVICE PROVIDERS	
0:08:48 AVERAGE WALKING TIME	**0:00:01** AVERAGE WAITING TIME	

City of Utopia

- Selection of the type of the mode and the service: **Bike sharing station based**
- Expected daily demand (trips/day): **5000**
- Size of the area of interest (in km^2): **5**
- Operating costs per vehicle per minute (in Euros): **0,2**
- Expected revenues per minute of rent (in Euros): **0,45**
- Average user walking speed(km/h):**3**
- Mean trip duration (in minutes):**18**
- Weighting factors assigned to service operator's and end society's perspectives: **0,5 and 0,5**
- Minimum and maximum value of the fleet size **(50;500)**

Use case 2: operative areas analysis

- Scope: support to public **decision-makers** in identifying the **areas** in which sharing mobility operators can/should implement the service
- How: **maximising** the supply of services (**areas** served) for users, ensuring **economic sustainability** for the operator
- Estimated result: generation of **alternatives**, described by **KPIs**, for evaluation/choice by the decision-maker

Input

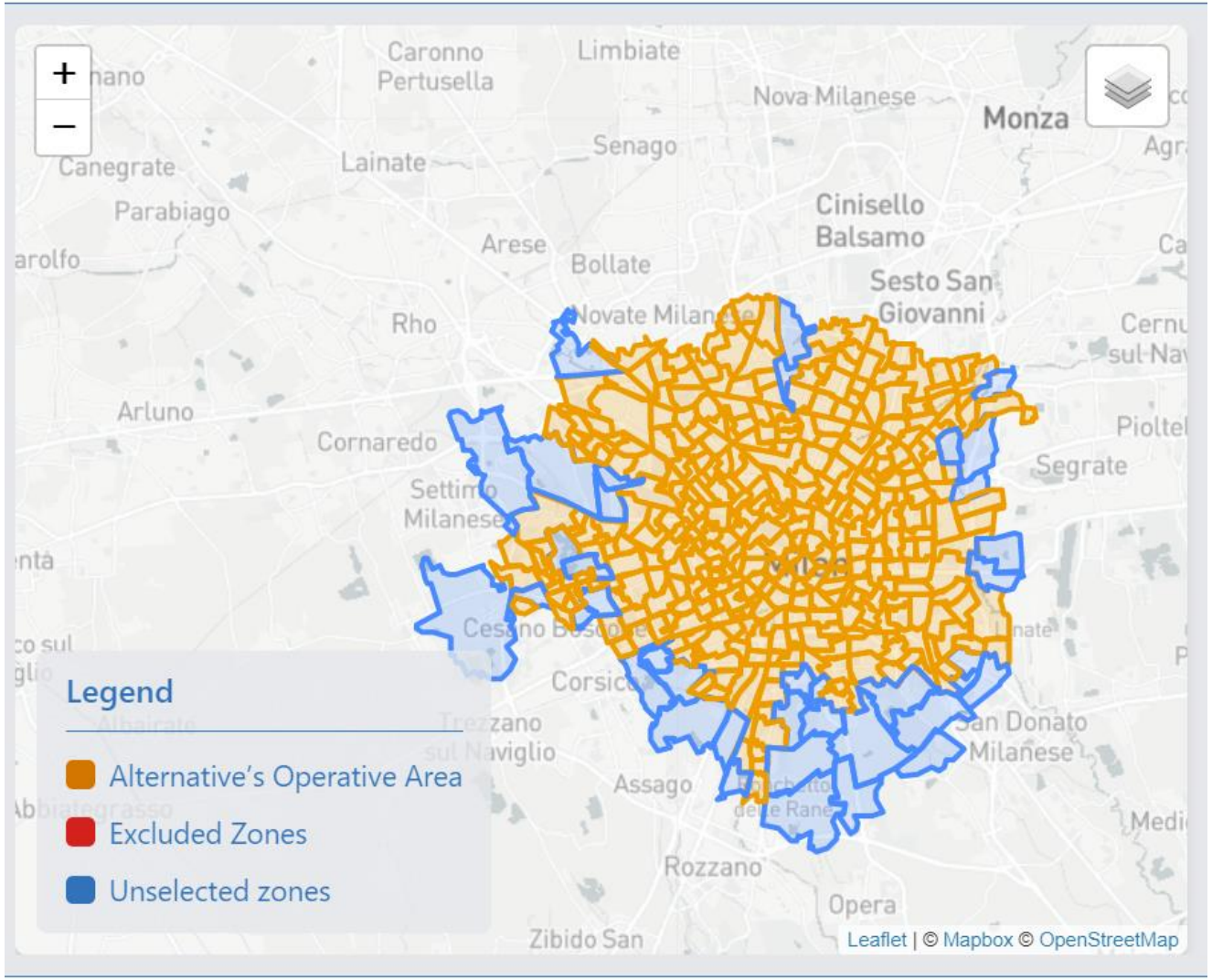
- Selection of the type of the mode and the service
- Operating costs per vehicle per minute (Euros)
- Expected revenues per minute of rent (Euros)
- Average trip duration (minutes)

Output (KPIs)

for each alternative area

- Optimal fleet size
- Costs service providers
- Profits service providers
- Accessibility
- Population covered

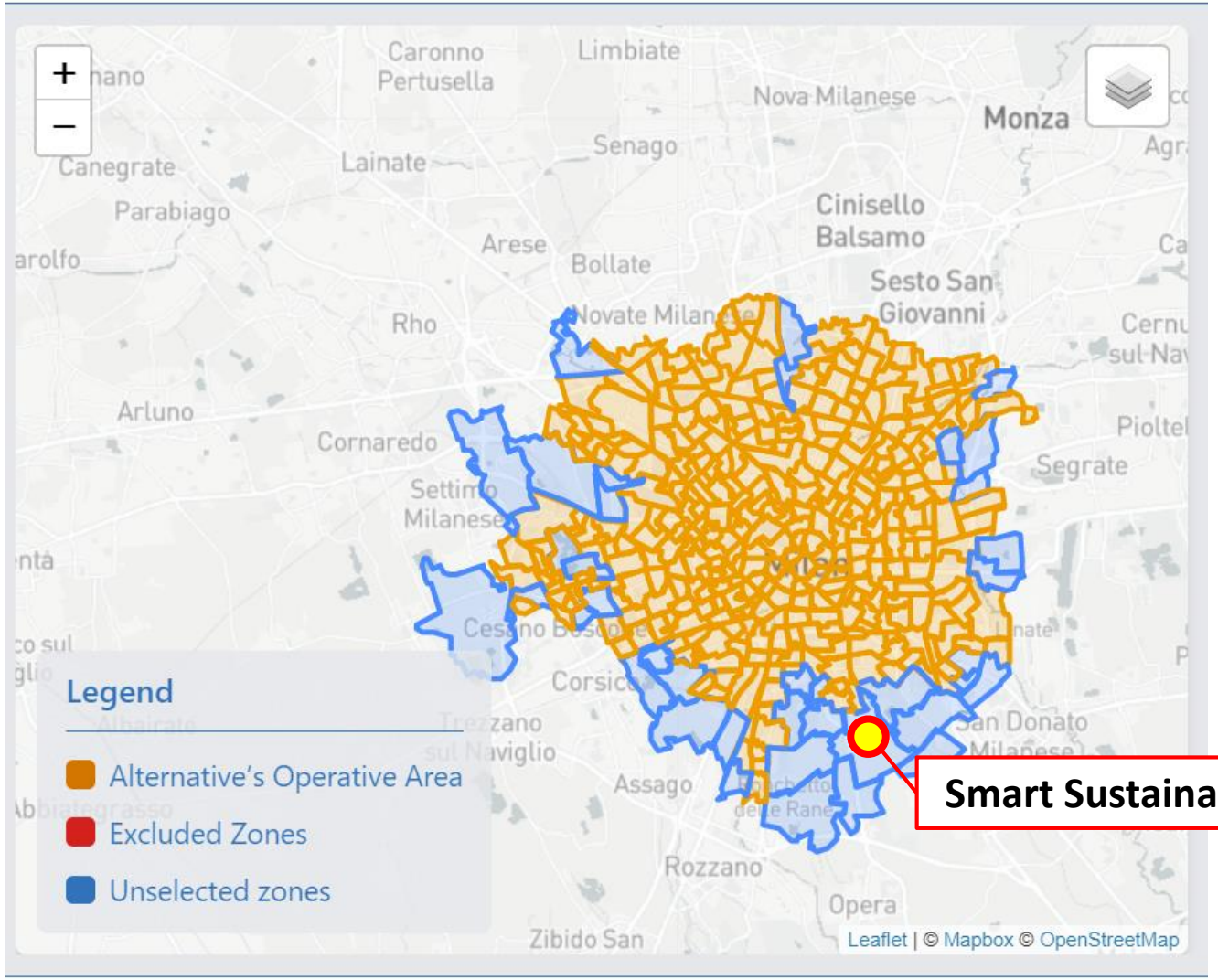
Use case 2: example of output



The tool returns a set of **alternative areas** with KPIs.

There is no automatic determination of the **"best" solution** → the public decision-maker chooses based also on his or her own experience and knowledge of the area and the subject matter

Use case 2 and District planning



Smart Sustainable District

The tool returns a set of **alternative areas** with KPIs.

There is no automatic determination of the **"best" solution** → the public decision-maker chooses based also on his or her own experience and knowledge of the area and the subject matter

The tool as a support to plan (Smart Sustainable) **Districts**

Conclusions

- In the realisation of the tools, greater emphasis was placed on the **transferability** of the methodology through the use of a **transferability for design** approach.
- This approach was preferred because not all European (and non-European) cities have the same **amount and type of data**.
- In this way, the project had as one of its outputs a **toolbox** that is easily **adaptable** to the variety of situations in European urban areas

POLITECNICO
MILANO 1863

Thank you

Poliedra
POLITECNICO DI MILANO

**Alberto Colorni, Alessandro Luè, Valerio Mazzeschi,
Valerio Paruscio, Luca Studer, Mara Tanelli**

Consorzio Poliedra

www.poliedra.polimi.it

linkedin.com/company/consorzio-poliedra

mOve research group

Dipartimento di Elettronica, Informazione e Bioingegneria

www.move.deib.polimi.it

Mobility and Transport Lab

Dipartimento di Design

www.trasporti.polimi.it