SPACE VS CITY

Smart and Green city mobility

November 24th, 2021

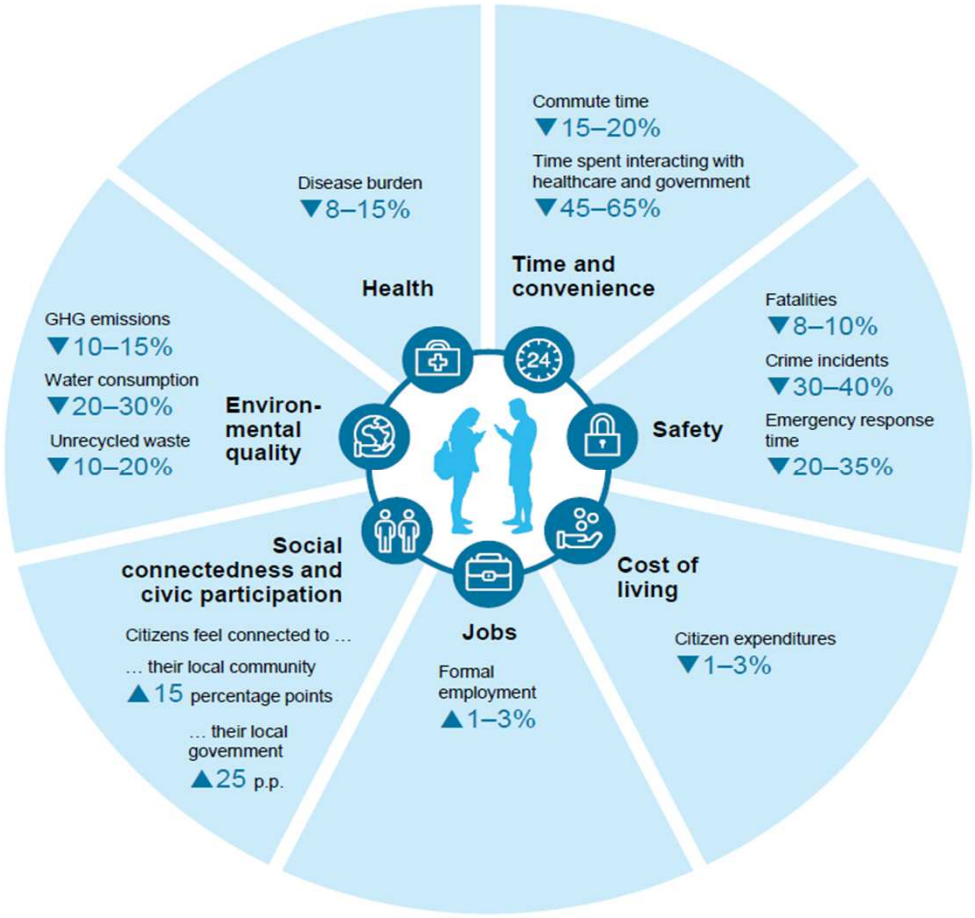
Marco Brancati
Telespazio CTIO

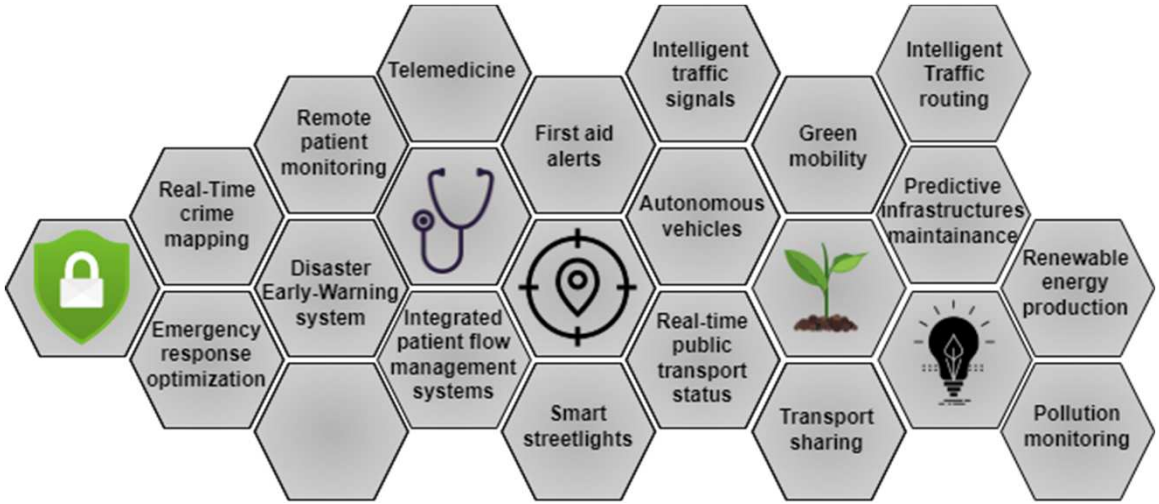
SUMMARY

- Smart and Green City overview
- Smart and Green City mobility
- Space Technologies and Smart City
- Case studies and Telespazio thematic projects:
  - Smart Vehicle Mobility
  - Drones for delivery services
  - Urban Air Mobility
  - Urban Heat Islands
  - Smart Health
- Conclusions

Smart and Green City overview: taxonomy, verticals and applications

- Improvements of Key Quality of Life Indicators → Smart Cities Verticals and Applications





SOURCE: McKinsey Global Institute analysis

Smart and Green City layers

- Smart cities are built on three main layers:
  - First: **sensors layers** where data about fundamentals smart cities' variables are collected
  - Second: **smart applications layers**
  - Third: **adoption/exploitation and usage layers**

Smart and Green City mobility

- Cities are home to over 75% of the EU population
  - Causes:
    - Work Opportunity
    - Career Possibility
    - Economic Growth
    - Innovation and Employment
- 23% of transport emission comes from **urban transport**
- Rapid growth of urbanization (**urban sprawl**)
- Increase environmental pressure
- Common problems:
  - Traffic congestion
  - Increase Harmful Emissions
  - Parking management
  - Increase waiting time in public transportation
- New concept of city: **SMART and GREEN CITY**

Transition to Smart and Green City mobility

- Smart and green cities are based on three foundamentals **technology pillars:**
  - Ubiquitous **location**
  - Ubiquitous **sensing**
  - Ubiquitous **communications**

- Smart cities require *new technologies* that are
  - Efficient
  - User-friendly

- Traditional services become more efficient using new technologies → use of **Satellite Applications**

- More focus on:
  - People
  - Infrastuctures
  - Industries

Credits: European Commision - Smart Cities Marketplace

Space Technologies for Smart and Green City mobility

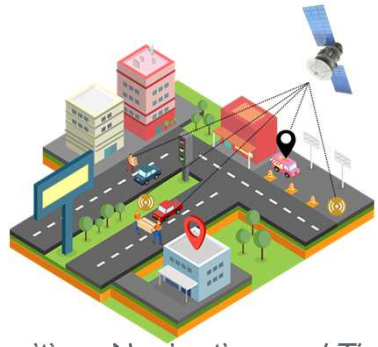
- Having a fully connected intelligent hybrid IoT sensors network is possible to improve the **traffic management performance.** Satellite assets contributes to **a resilient and fully connected hybrid communication network integrated with 5G** for **smart city mobility and services**

- **Specific GNSS applications** allow to **solve urban canyon problem** with **high precision positioning**

  They allow to:
  - Develop autonomous and intelligent systems that can improve the city quality of life
  - Integrate the smart-city ground mobility with smart-city **air mobility**

- **EO satellites provide wide area sensing data** on different thematics relevant **for Smart City safety** and **Green environment**

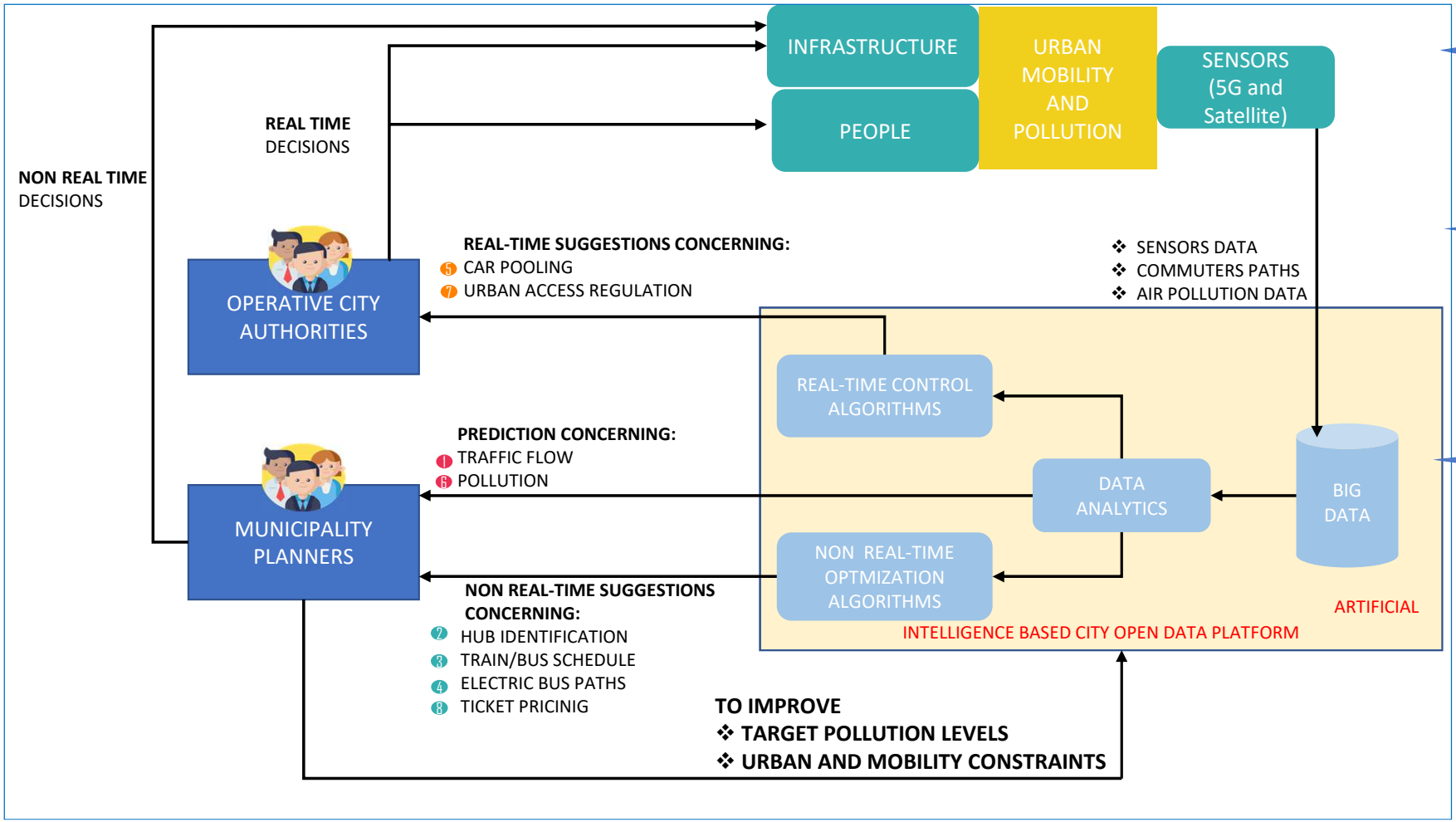
Satellite Communication



Position, Navigation and Timing

Georeferencing and Sensing

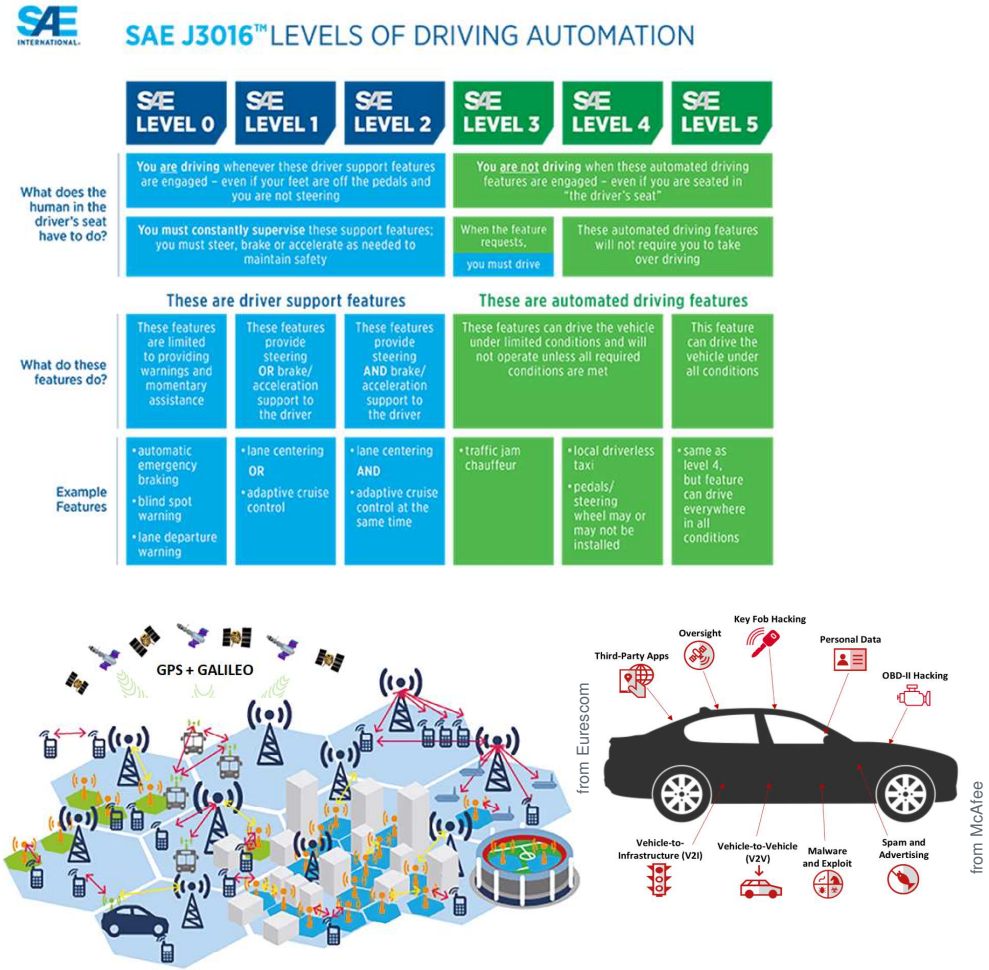
Smart and Green City mobility: Example of service architecture

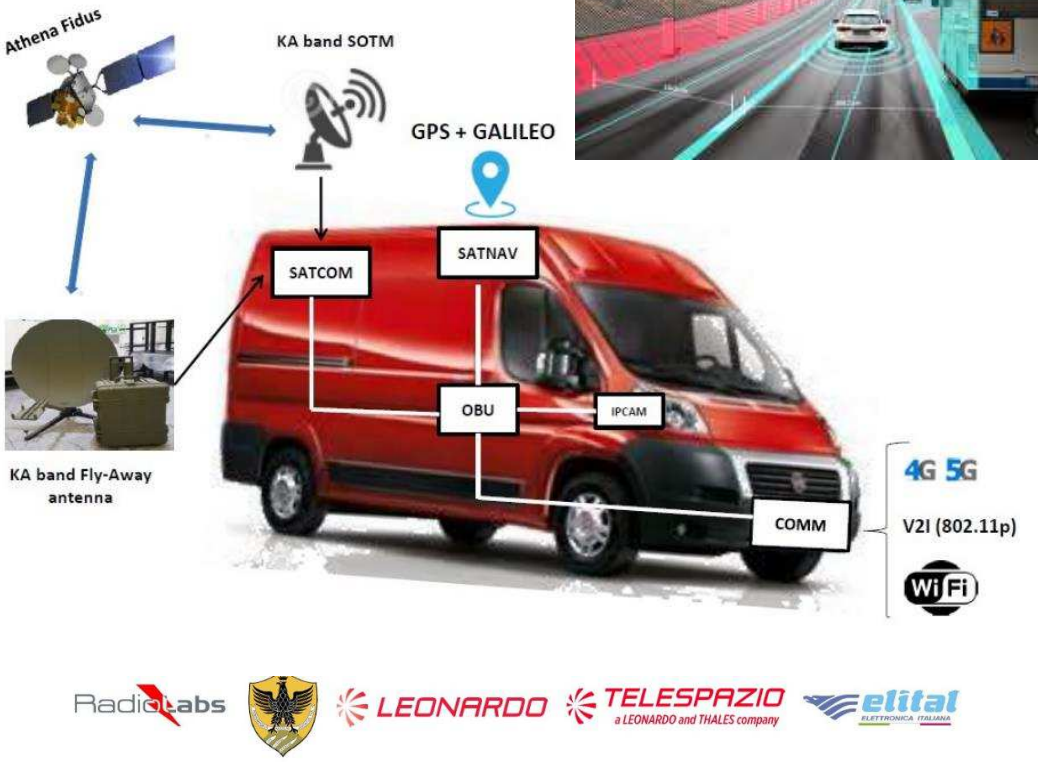


LOCATION BASED SERVICES

Service scenarios

Smart Vehicle Mobility: EMERGE project





RadioLabs LEONARDO TELESPAZIO a LEONARDO and THALES company elital ELETTRONICA ITALIANA

Telespazio as a Drone Service Provider: value chain

Drone Service Provider

Business Mission Design

Fleet Mission Management

Data Processing & Management

User Experience

Mapcy

AWARE

AgriGeo

SEonSE

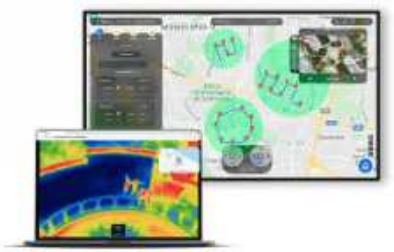
T-DROMES

Partnerships & plug-in cooperation model

paying customer

T-DROMES Users:

- **End Users** of the Vertical Markets
- **Drone Operators** for business services (fleet management)
- **Drone Service Provider** for end-to-end service management



Vertical Markets

Emergency Services

Infrastructure Surveillance

Smart Farming

Maritime Surveillance

Goods Delivery

Experimental drone delivery service project between OPBG sites

Objectives

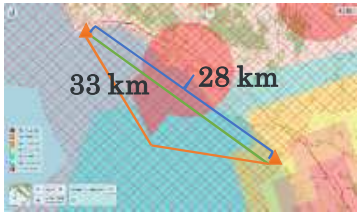
The project aims to define and **develop operational concepts** and the details of a **demonstration phase**, **precursor of the target service** able to support an adequate level of a daily delivery service field of **biomedical transport** and, at the same time, the safety of the goods transported between two sites of the Ospedale Pediatrico Bambin Gesù (OPBG).

Project Team: Leonardo SpA, Telespazio SpA, OPBG and in coordination with ENAC

The OPBG project is structured in ***trials*** where:

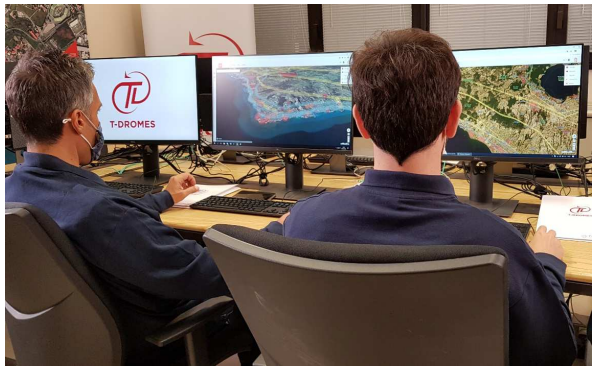
- ❑**Test the capabilities of several RPAS manufactures**, among the state-of-the-art manufactures in Europe and in Italy, with respect to *BVLOS* long distance RPAS delivery sector.
- ❑**Experiment the innovative Telespazio solution T-DROMES** (Telespazio Drone Remote Operation for Mobility Enhanced Services), a comprehensive digital application for the provision of end-to-end RPAS services

Scenario overview



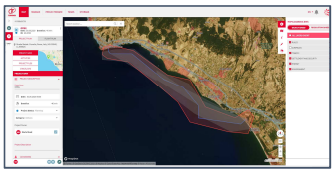
Currently the biological samples are delivered from the ***S. Marinella*** site to ***Palidoro*** site (approximately 38 km), on a **daily basis**,

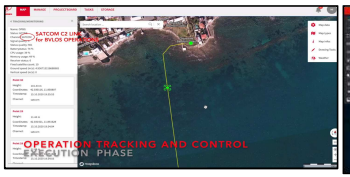
T-DROMES Mobility Enhanced Services – Drone service provider platform

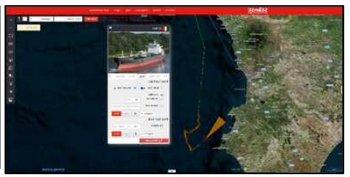


T-Dromes is the digital platform developed by Telespazio to offer services based on the use of drones, on a DaaS (Drone as a Service) business model.

- **Business Mission planning**
- **Mission execution**
- **Mission monitoring**
- **Post analysis monitoring**







Experimental drone delivery service: heavy goods in urban environment

Urban Air Mobility: vertiports for unmanned aerotaxi service

AWARE
Agile Watching of Assets and Resources

URBAN HEAT ISLANDS (UHI) FOR METROPOLITAN CITY OF MILAN

THE CONTEXT

Statistical analysis demonstrates the **increase of mortality in cities during hot seasons**. People over 70 and below 10 years old are the more affected. The Metropolitan city of Milan has started projects to reduce the phenomenon. Within the LIFE METROADAPT project UHI maps have been generated over the whole metropolitan area. These have been used to generate **risk maps for population** according to available statistical data, and the whole has been used by the Metropolitan city to plan mitigation actions as green roof.

e-geos
AN ASI / TELESPAZIO COMPANY

Urban Heat Islands MAPS

The problem:

- High building density causes a **reduced** «**Sky View Factor**». The limited air circulation capacity retains heat in the urban structure. This effect is amplified during the night.

- **High minimum night temperatures carry a great health risk** for some segments of the population

The identification of **Urban Heat Islands (UHI)** supports the administrations in planning mitigation actions (e.g. green roof, new urban park, etc.) making the urban environment more sustainable.

AWARE
Agile Watching of Assets and Resources

Urban Heat Islands MAPS

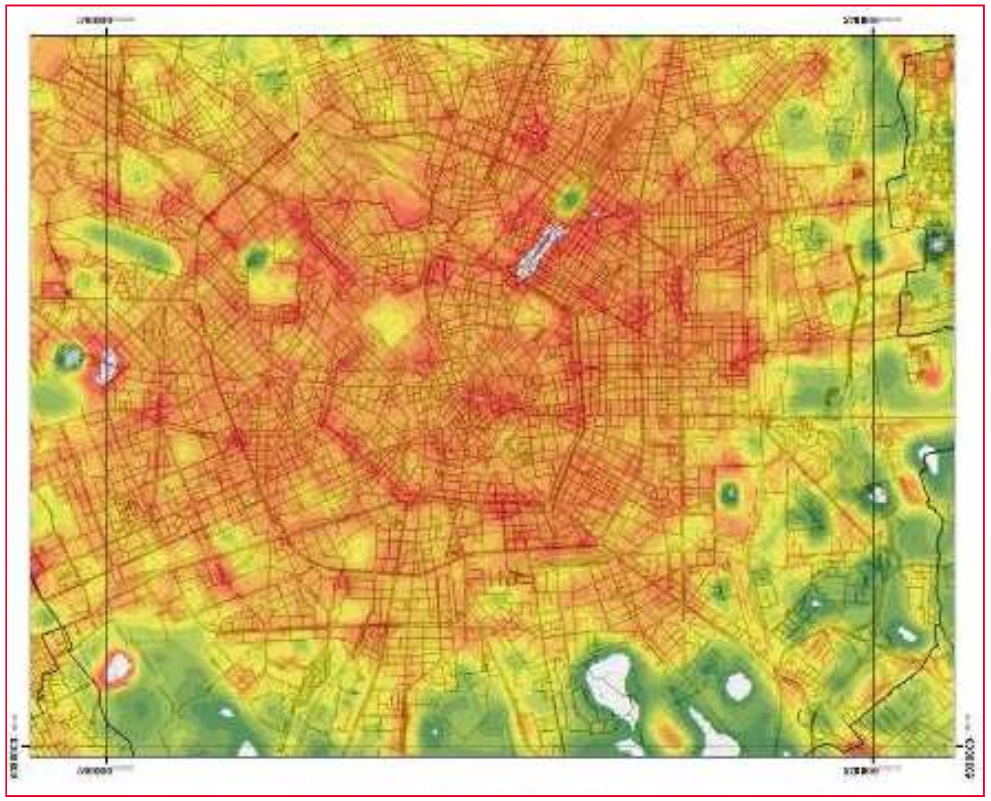
The solution:

Combining the historical data of past heatwaves in the urban area with night time satellite acquisitions, UHI maps highlight **Land Surface Temperatures (LST) anomalies** in the urban structure.

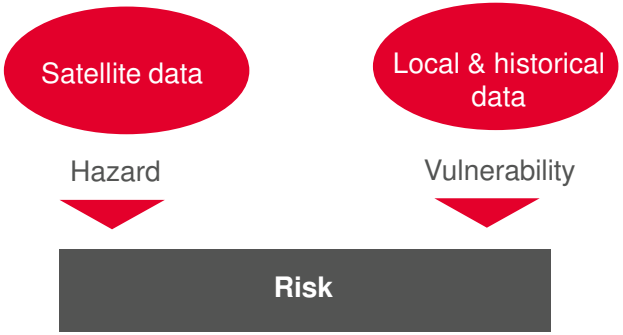
The integration of statistical data as

- Population age distribution over the city,
- Buildings type (e.g. hospitals)
- Socio economical information

with the **UHI** shows the **areas with higher** risk for population in case of new heatwaves, enabling mitigation actions planning.



POPULATION RISK ASSESSMENT - Ingredients

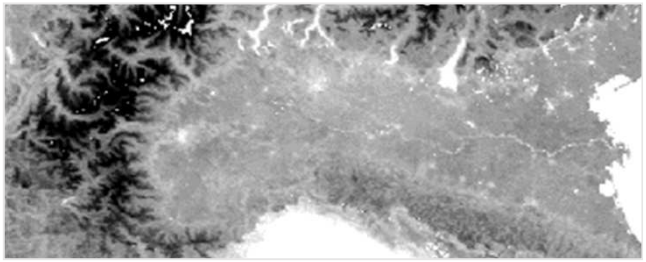


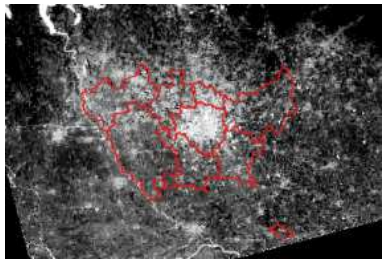
- Analysis of night temperatures in the urban areas. This information represents the **HAZARD.**
- **VULNERABILITY INDEX** derived and normalized by ISTAT data (2011 census, published in 2017): population over 70 and under 10 are categories at risk

RISK INDEX OF THE POPULATION SENSITIVE TO TEMPERATURE ANOMALIES

*Refined analysis can be done considering **ECONOMIC SITUATION**.*

SATELLITE DATA





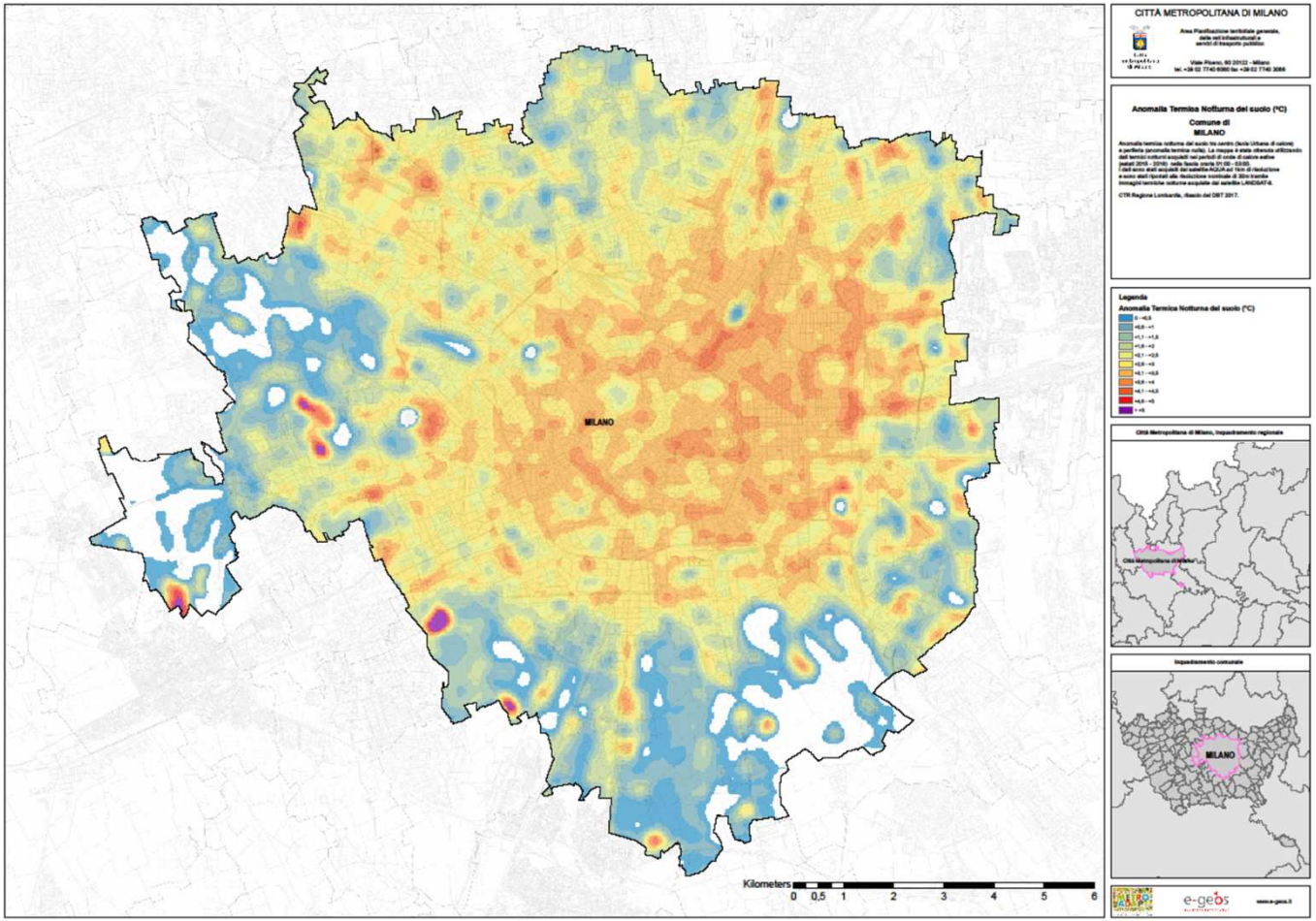
Satellite data are used to create **HAZARD MAPS** providing objective information on the situation
Used data: Nighttime VIS/NIR historical data (Landsat 8 and AQUA/TERRA Modis) in correspondence with recent heat waves.

LOCAL & HISTORICAL DATA

Local & historical data are used to create **VULNERABILITY MAPS** and to contextualize the information provided by satellite.
Topographic Data Base of the Metropolitan City of Milan and derived **Thematic maps, Territorial Index** based on census sections, providing morphological and socioeconomic information.

http://www.cittametropolitana.mi.it/DeCiMetro/DBT/index.html

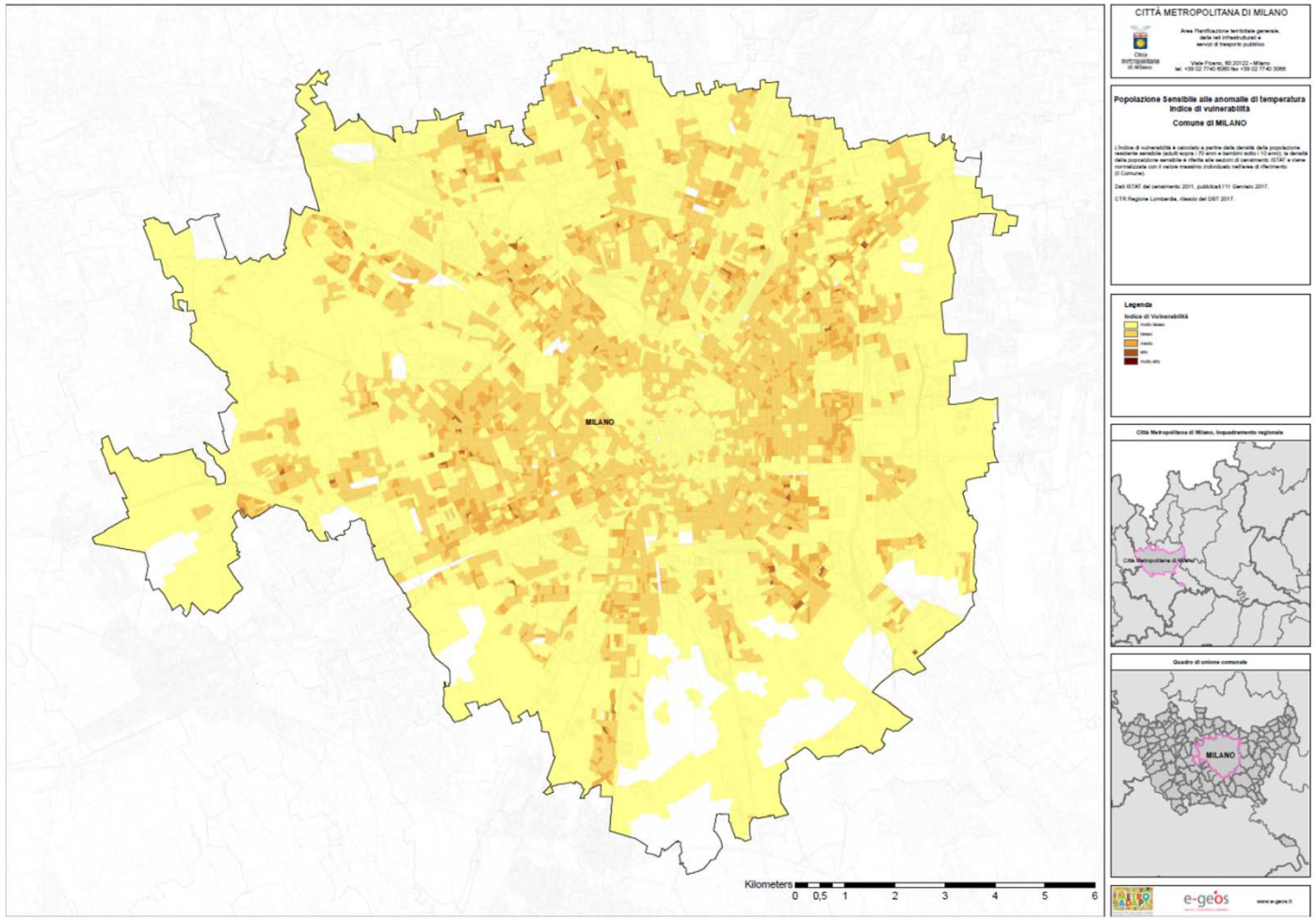
FIRST INGREDIENT - HAZARD



LAND THERMAL ANOMALY

The map shows the distribution of **night temperature** during a classic heatwave over the city highlighting areas (purple) resulting with more than **+5 degrees** with respect to other areas.

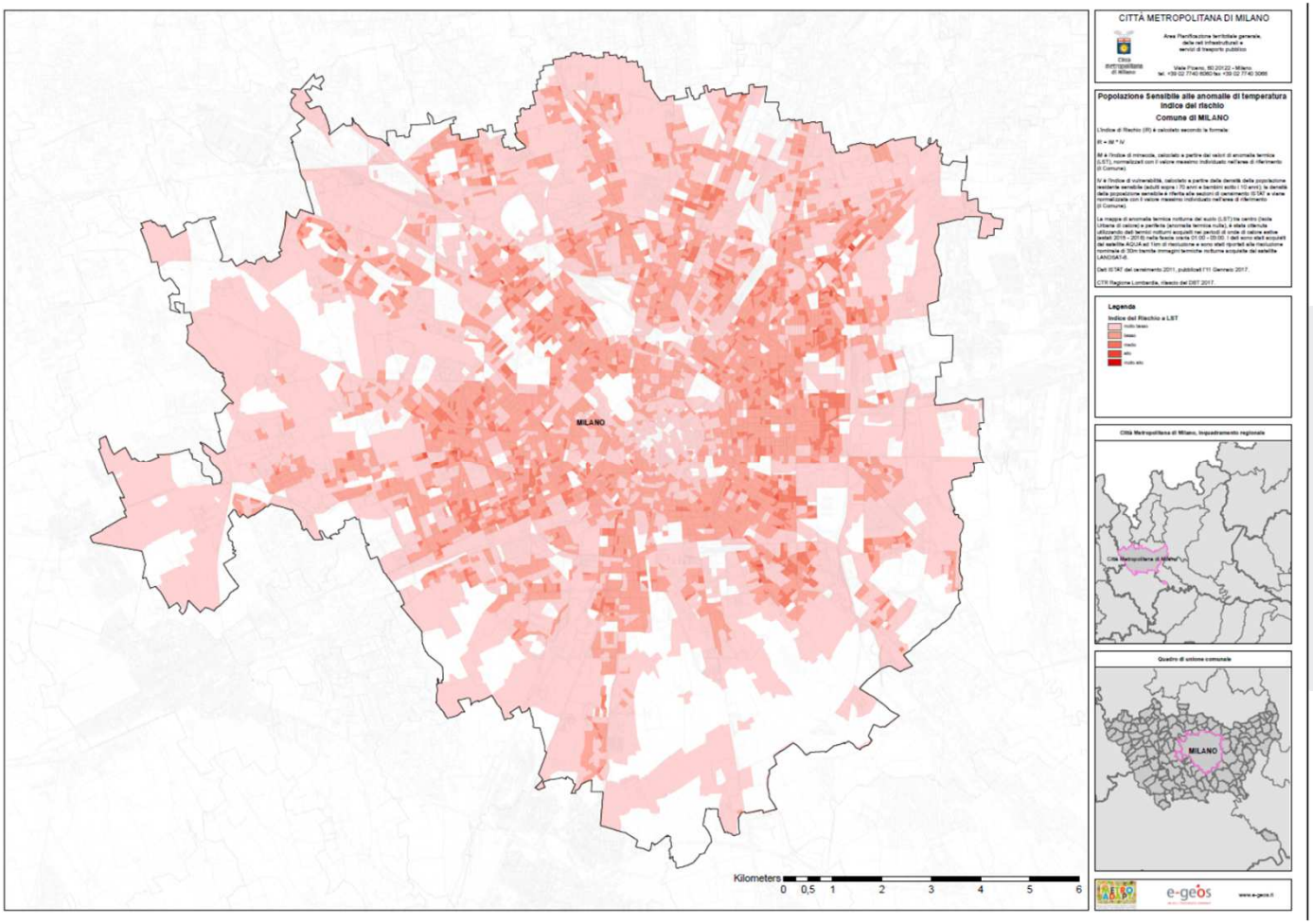
SECOND INGREDIENT - VULNERABILITY INDEX



SENSITIVE POPULATION

The map shows the distribution of population according to the age in the city. For over 70s people high night temperature is considered a risk for their health.

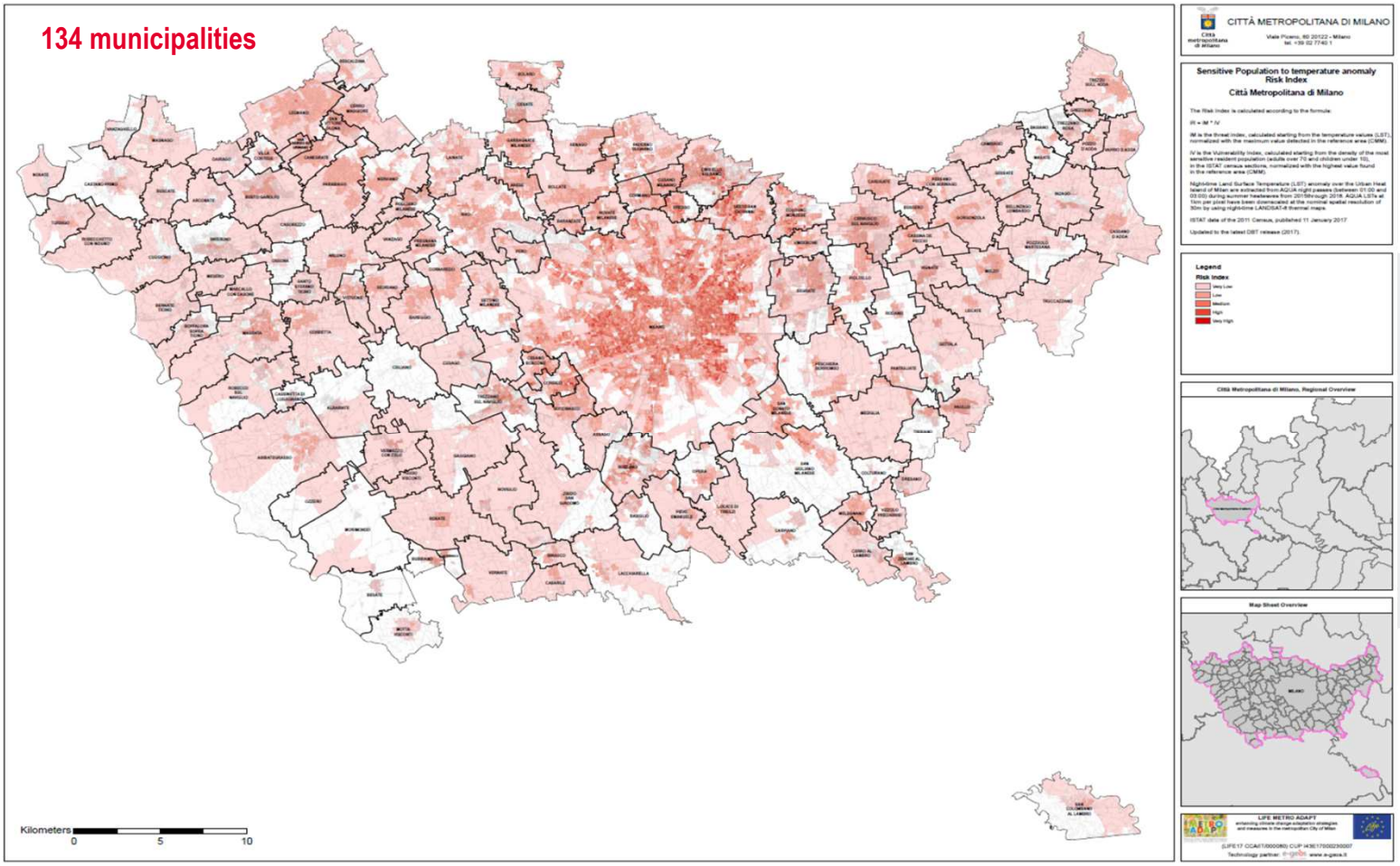
RESULT - RISK INDEX over MILAN



RISK

The map shows the combination of temperature behavior and population age distribution. Areas with high values of night temperature and high average age of population are the most critical. Over these areas mitigation actions have to be defined.

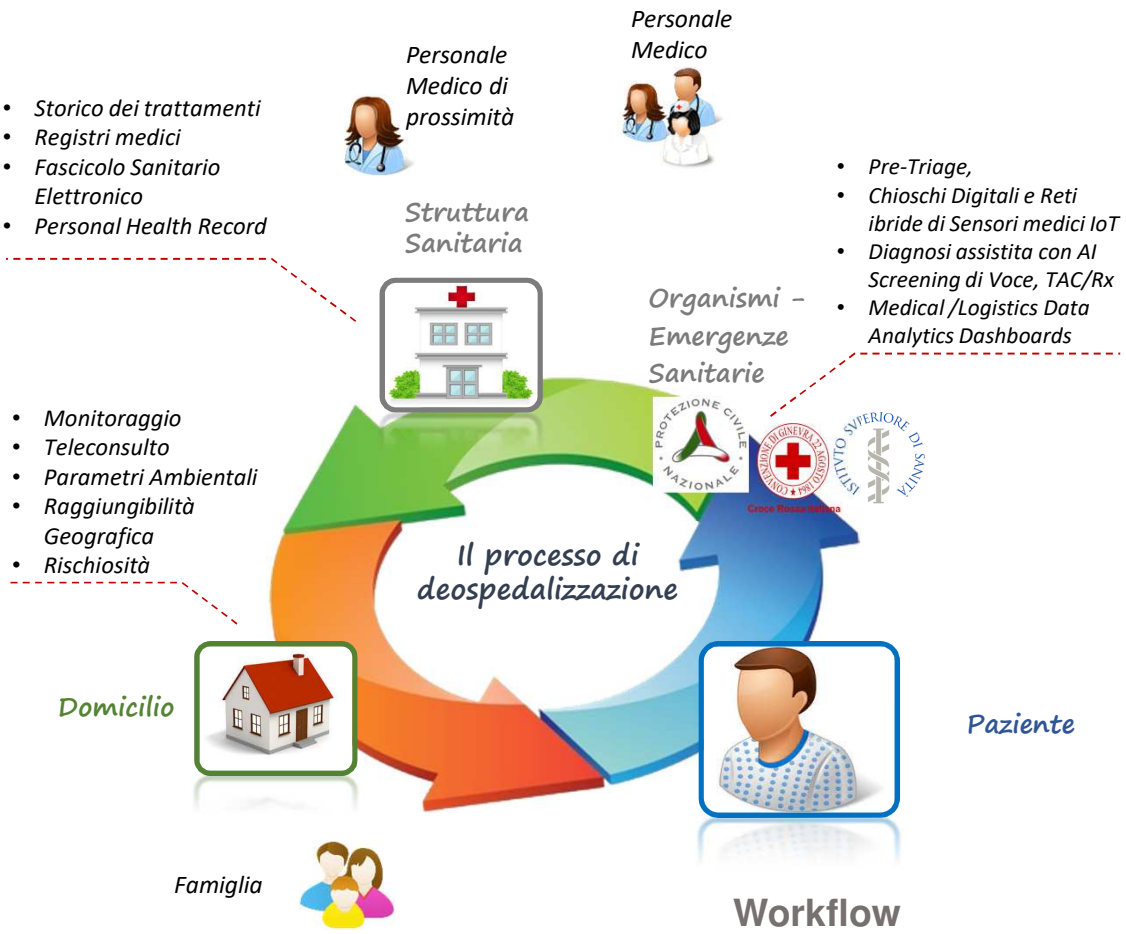
RESULT - RISK INDEX OVER METROPOLITAN CITY OF MILAN



RISK

The map shows the combination of temperature behavior and population age distribution over the whole metropolitan area. Satellite privileged point of view enables the analysis over wide areas

DIGITAL HEALTH for Smart City



OBJECTIVES AND GENERAL REQUIREMENTS

The goal is the creation of a digital platform (**Integrated Digital Health Knowledge Space**) to support the de-hospitalization of city patients (personal health) and collective medical emergencies allowing to:

- provide a risk assessment of the **patient's de-hospitalization at home**, with ML forecasting algorithms and through the analysis of the patient's historical data, the technical / geographical / environmental characteristics of the destination
- trace the **"logistics" of domiciliation** to facilitate the patient/care giver interaction through the integration of collaboration, teleconsultation / television and monitoring services

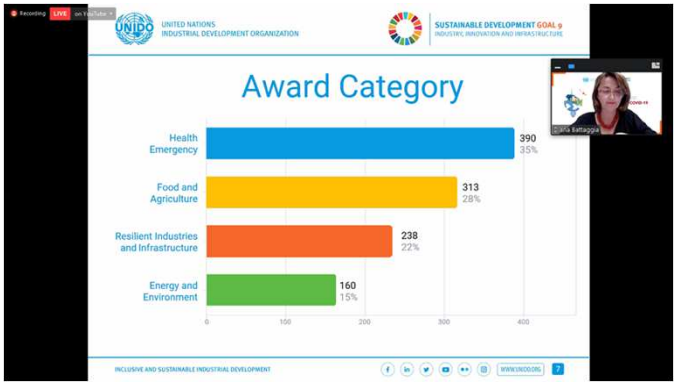
To provide the integration of monitoring, management, prevention and **resource planning services** for **medical emergencies** at a regional and national level due to **epidemics**.

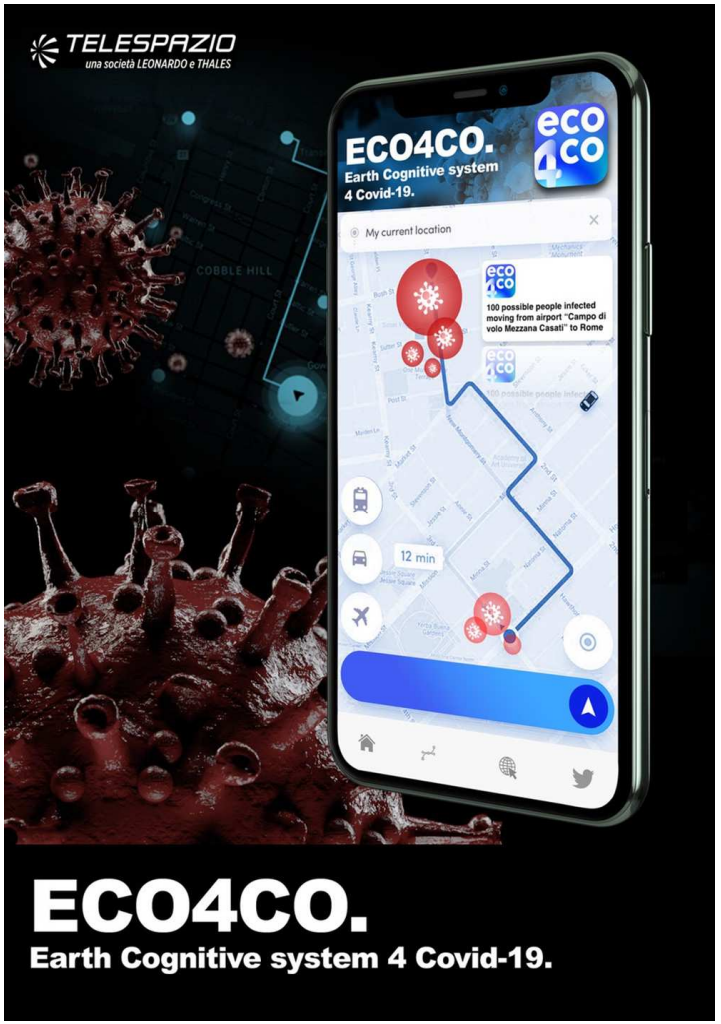
Earth Cognitive System for CoViD-19

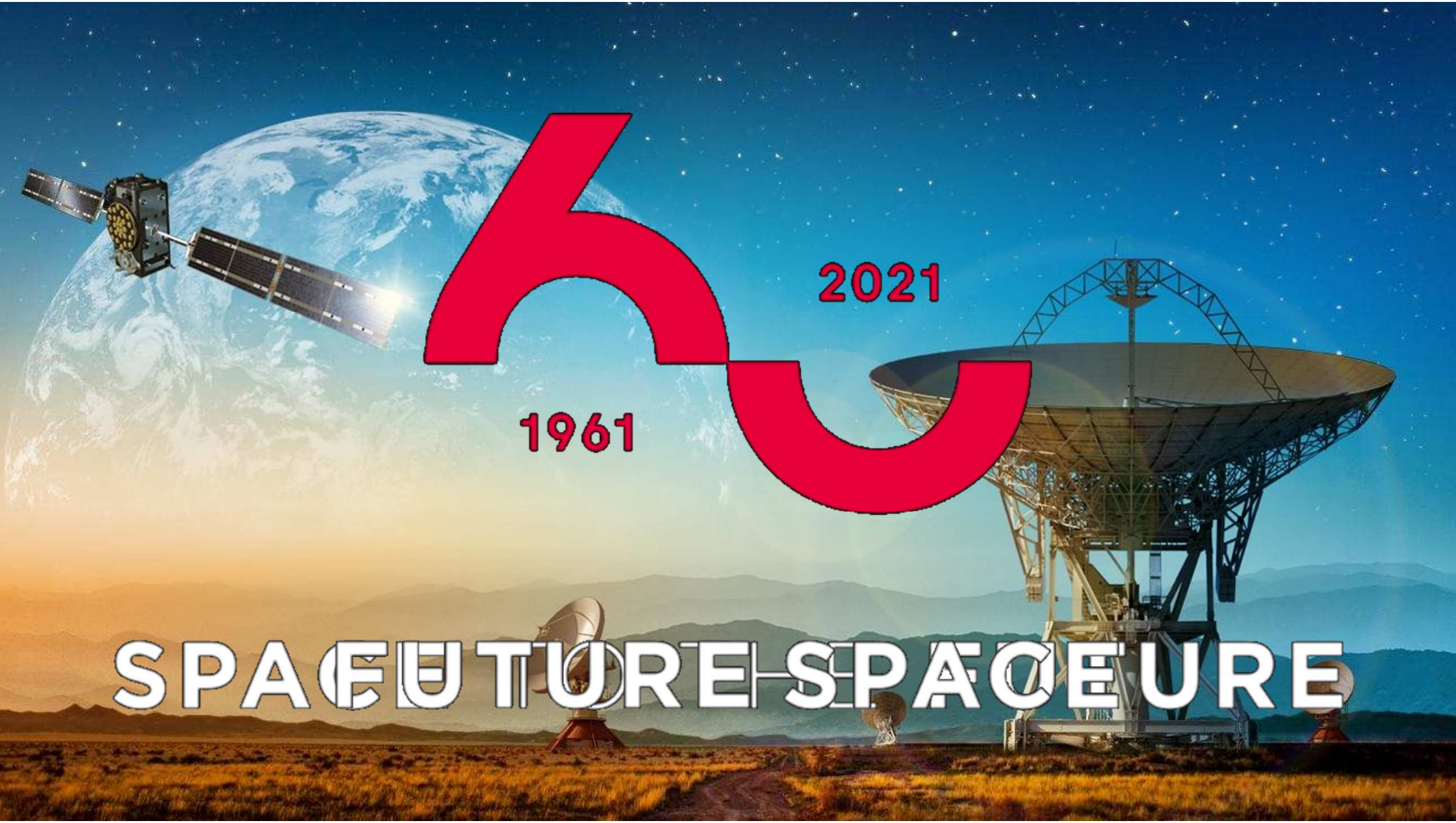
The main goal of **ECO4CO** is to provide rapid insights and evidences about geo-localised events that may have an impact on CoViD-19 outbreak evolution.

Main pillars:

- Cluster Area Identification;
- Intelligent Satellite Tasking;
- Object Detection and Business Intelligence;
- Tracking;
- Logistic;
- Epidemiological study and public health intervention.



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