**"Horizon projects for Citizens Wellbeing using EO, IoT and Telecommunication Assets: The Examples of D2EPC, euPOLIS, HEART and HARMONIA"**

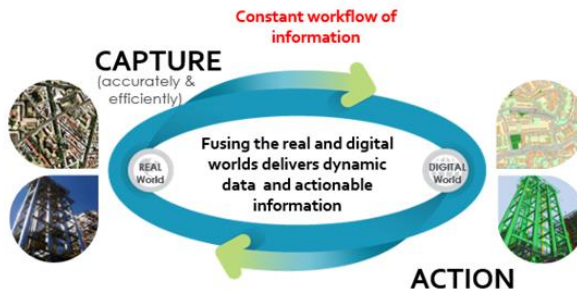**Betty Charalampopoulou**
**Geosystems Hellas S.A.**

- **Session 9**: Facing Market Needs and Applications for Enhancing Wellbeing of Citizens
- Time-Slot: 18h30' – 19h15'

GEOSYSTEMS HELLAS

# Geosystems Hellas

- Established in Athens in 2009 as the newest member of GEOSYSTEMS EU GROUP, with shareholder minoririty on GS GmbH and the rest.

- Nowadays, [GSH] is a Greek SME with a German minority shareholder who was fully acquired from OHB SE on February 2022, so [GSH] is a "sister company" to OHB SE.

- [GSH] has a Dynamic participation to the downstream space sector.

- [GSH] is a funded member of the si-cluster since 2014 (the Unique Hellenic Space Cluster) the Hellenic Association of Space Industry (HASI) and the European Association of Remote Sensing Companies (EARSC) actively participating in the board as the GSH CEO is an elected representative.

- GSH CEO is an EARSC Director and appointed to GEO as the EARSC representative for the Post-2025 Working Group (preparing the Ministerial 2023 and 2015).

- [GSH] participates in ESA and GEO working groups.

- ➢ Serves and consult on services and products to public and private through various industrial projects on
  - ❖ Photogrammetry,
  - ❖ Remote Sensing,
  - ❖ Space & Earth Observation,
  - ❖ GIS,
  - ❖ Imagery intelligence (IMINT)
  - ❖ Geospatial intelligence (GEOINT)
  - ❖ and Smart Cities

- ➢ GSH is The Hexagon Geospatial sole reseller and Hexagon Airborne Solutions authorized reseller in Greece and Cyprus.

- ➢ GSH participates in National and European R&D projects and opportunities on the fields of Environment & Climate Change Adaptation, Urban Resilience & Well-being, Culture Heritage Preservation, Forestry & Agriculture, ICT, and Digital Twin Model.



Constant workflow of information

CAPTURE (accurately & efficiently)

REAL World

Fusing the real and digital worlds delivers dynamic data and actionable information

DIGITAL World

ACTION

# The implementation of the "New space economy"

- **Resilience**
  - ✓ Near real time monitoring by Earth Observation technologies
  - ✓ Definition of risks (risks & hazards)
  - ✓ Earth observation and Decision Systems
  - ✓ Smart cities & security / Emerging Technologies and Blockchain
  - ✓ Borders monitoring and EO contribution to DSS
- **Adaptation**
  - ✓ Proposals and design
  - ✓ Utilities
  - ✓ Culture Heritage
  - ✓ Biodiversity
- **Sustainable development**
  - ✓ Change of urban zone
  - ✓ Design of green structures in the city
  - ✓ NBS & blue and green growth
  - ✓ Citizen health and quality of life
  - ✓ GIS / WebGIS
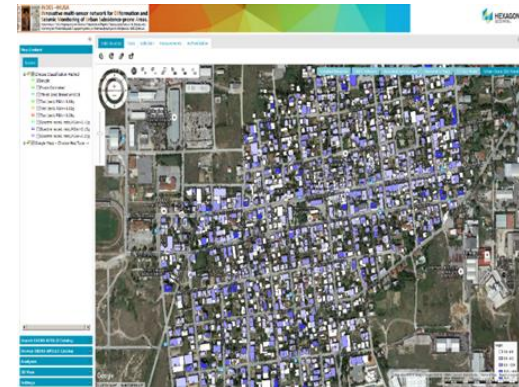
- ❖ High-level applications of remote sensing and photogrammetry, in the space sector

- ❖ Software solutions for on-board and on-site atmospheric correction, cloud cover control and generation of high precision cloud mask

- ❖ Management techniques for big data analysis, machine learning techniques (Big Data Analysis, Data Fusion, ML/DL), - System & Software design and development

- ❖ Airborne Lidar 3D monitoring techniques – development of detectable traces methodology

- ❖ Spatial analysis and GIS / WebGIS applications

- ❖ Geospatial intelligence (GEOINT) and data analytics

- ❖ Smart cities and Security – Earth Observation and Blockchain solutions

**Recent & Current collaborations on:**

- ▪ Earth Observation (EO)
- ▪ NBS & Blue/Green growth
- ▪ Lidar point cloud processing
- ▪ Monitoring Cultural Heritage
- ▪ Monitoring hazards & Decision Support Systems & Early Warning Systems
- ▪ EO application for security

**HORIZON 2020/EUROPE**

**National R&D projects**

**National Projects Service Delivery**

# Ongoing R&D projects under the H2020 framework

**Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens**
*Ongoing R&D project*
https://eupolis-project.eu/

**Development of a Support System for Improved Resilience and Sustainable Urban areas to cope with Climate Change and Extreme Events based on GEOSS and Advanced Modelling Tools**
*Ongoing R&D project*

**DYNAMIC DIGITAL ENERGY PERFORMANCE CERTIFICATES**
*Ongoing R&D project*
https://www.d2epc.eu/en

**Planning And Engagement Arenas For Renewable Energy LandscapeS**
*Ongoing R&D project*
https://pearlsproject.org//

**REmote SEnsing techniques for ARCHaeology**
*Ongoing R&D project*
https://www.re-se-arch.eu

**STructural stABiLity risk assEssment**
*Ongoing R&D project*
http://www.stable-project.eu/ /

**HEAlthier Cities through Blue-Green Regenerative Technologies**
*Ongoing R&D project*

**Development of Utilities Management Platform for the case of Quarantine and Lockdown**
*Ongoing R&D project*

# Ongoing National R&D projects

**Ανάπτυξη πΡακτικών και δημιουργία Τυποποιημένης υπηρΕσίας παρακολούθησης των οικονοΜΙκών δαΣών**
*Ongoing R&D project*
https://artemis2018.eu/

**Information System For Multi-Level Documentation Of Religious Sites And Historic Complexes**
*Ongoing R&D project*
https://www.meteora.net.gr/

**ExPert Integrated suPport systEm for coastaL mixed urbAn – industrial – critical infrastructure monitorinG usIng Combined technologies**
*Ongoing R&D project*
http://epipelagicproject.com//

**Πλαφόρμα πολυΡαμερικής παρακΟλούθησης με μικροαΙσθητήρες τΟυ eNceladus hellenic supersite**
*Ongoing R&D project*
https://proion-hellas.eu/

**CompOlive Project**
*Ongoing R&D project*
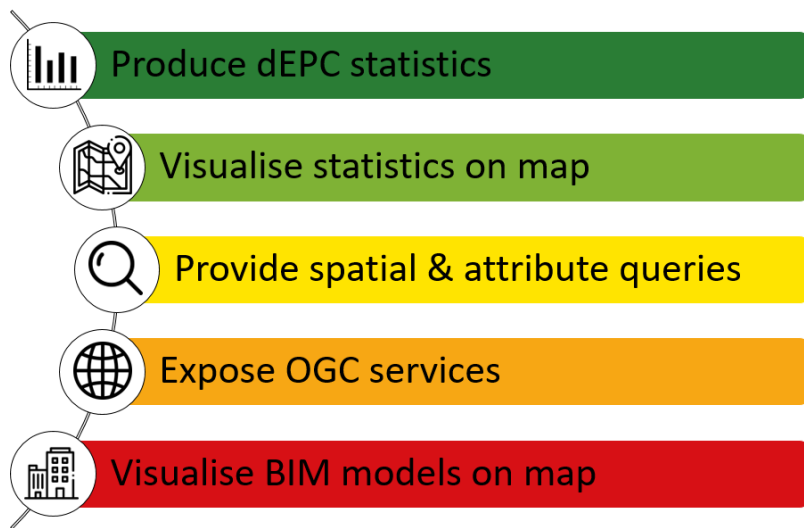http://compolive.eu/en/main

**AEI project**
**Sustainable Development of Less Developed Regions and Isolated Areas by Creating New Touristic Resources and Products through Analysis, Documentation and Modelling of Cultural Asset**
*Ongoing R&D project*

**Geosystems Hellas S.A.**
**225 Imittou, GR11632, Athens**
**Branch : HMU- Building K34, Estavromenos, GR71410, Hraklio, Crete**
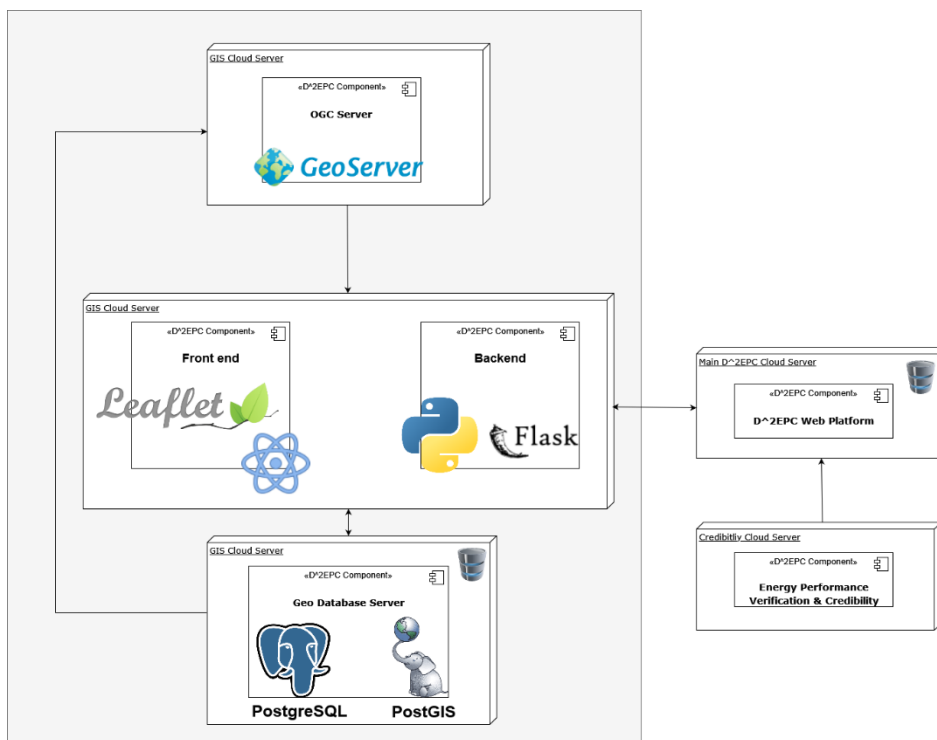
**GEOSYSTEMS HELLAS**

# D^2EPC - Dynamic  Digital Energy Performance Certificate

*The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No.892984*
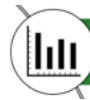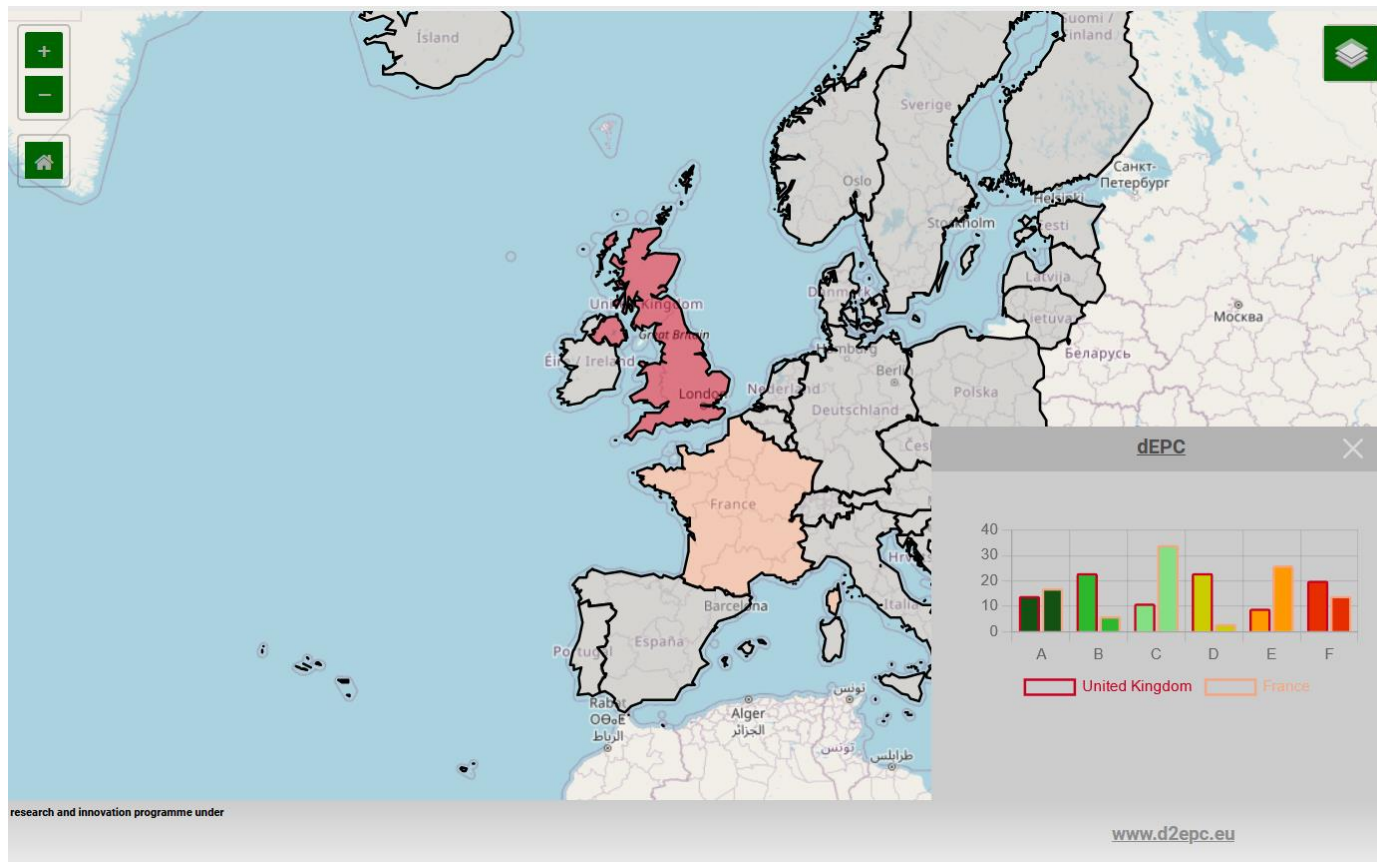
## WebGIS tool functionalities:

- Produce dEPC statistics
- Visualise statistics on map
- Provide spatial & attribute queries
- Expose OGC services
- Visualise BIM models on map

## WebGIS tool's technology stack:

# D^2EPC - Dynamic Digital Energy Performance Certificate

**Produce dEPC statistics**

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225 Imittou, GR11632, Athens
Branch : HMU- Building K34, Estavromenos, GR71410, Hraklio, Crete

**GEOSYSTEMS HELLAS**

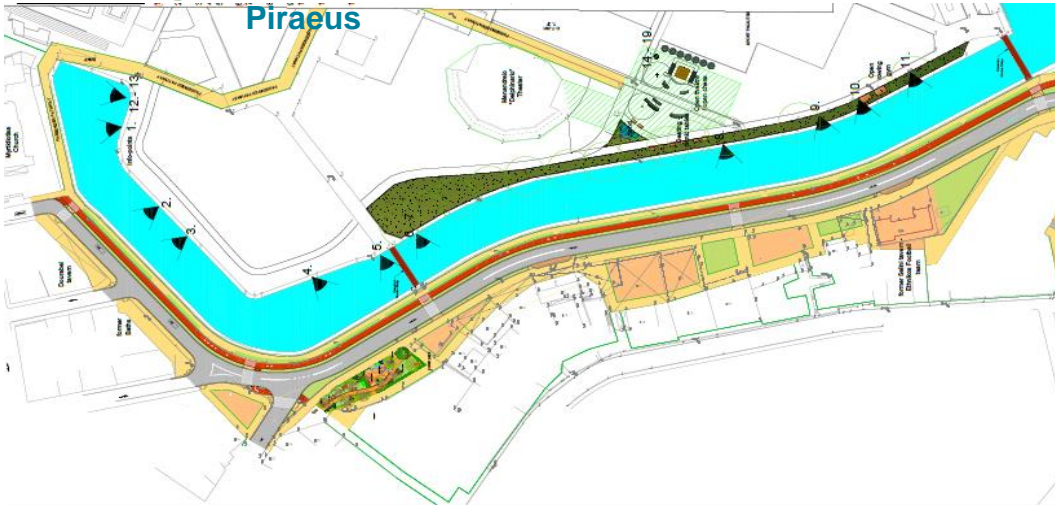# D^2EPC - Dynamic  Digital Energy Performance Certificate

**Visualise BIM models on map**

www.d2epc.eu

# **euPOLIS** - Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens: the euPOLIS Approach

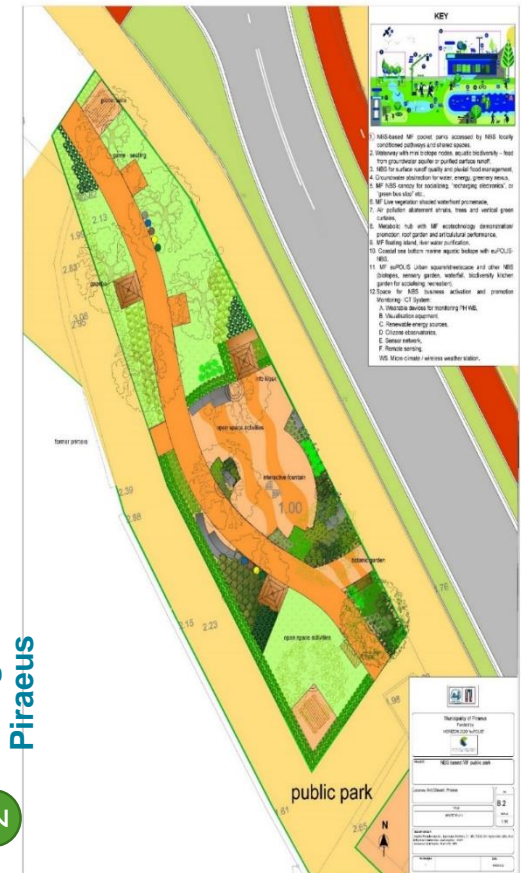**Sample of the elected interventions in the Demo Sites of Piraeus:**

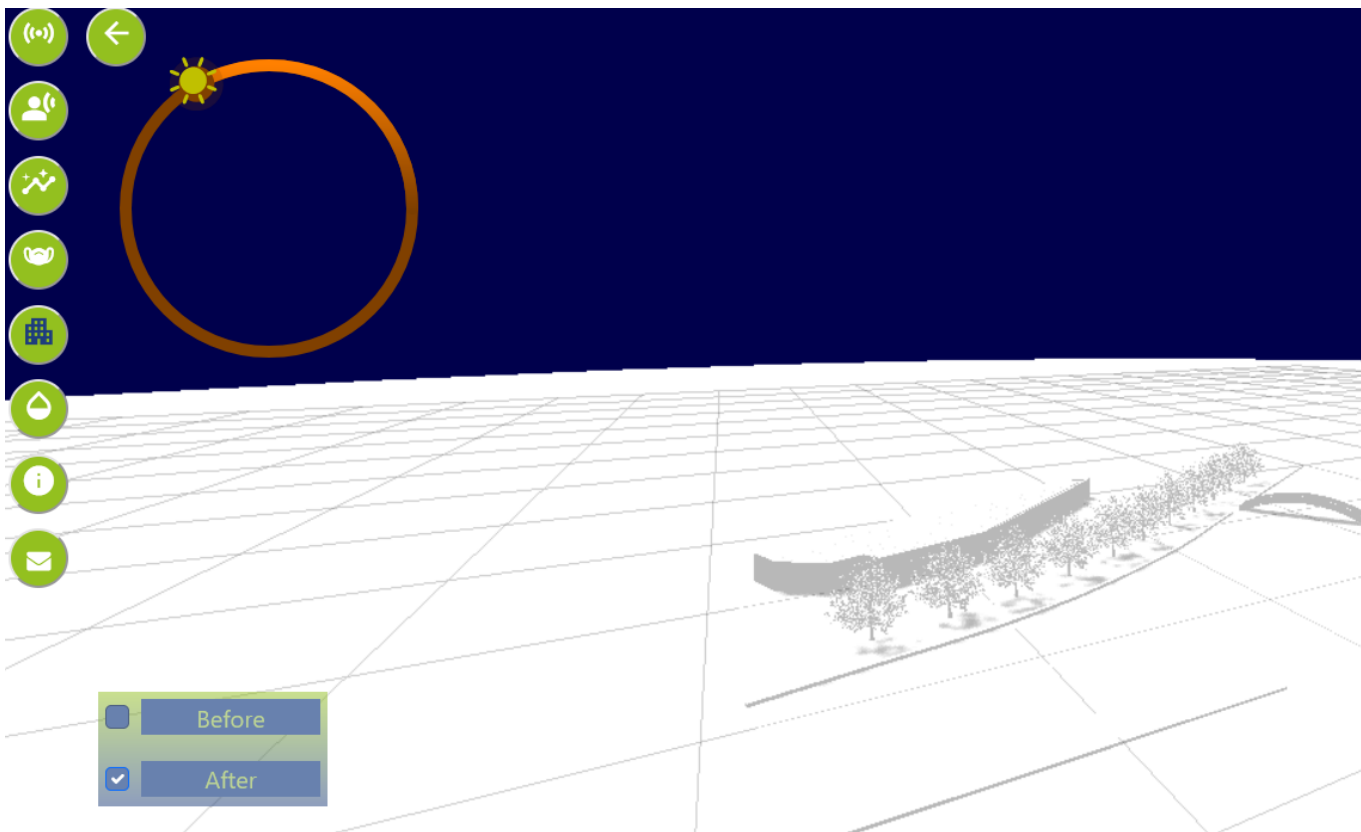**1** **Designed Intervention – Canal pilot cleaning in Piraeus**



**Designed Intervention - Pocket Park in Piraeus**



**2**

**euPOLIS** - Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens: the euPOLIS Approach

**Visualize the designed interventions per Demo Site**

# euPOLIS - Integrated NBS-based Urban Planning Methodology for Enhancing the Health and Well-being of Citizens: the euPOLIS Approach

**Visualize plots regarding Weather & Air Pollution parameters for specific areas of interest**

# HEART - HEAlthier Cities through Blue-Green Regenerative Technologies: the HEART Approach

**Remote Sensing toolkit using Machine Learning algorithms** to extract urban environmental indicators from VHR satellite images in order to be further correlated with health data and assess the impact of BGS to Public Health and Well Being.

**AI Based Raster Classification:**

6 classes
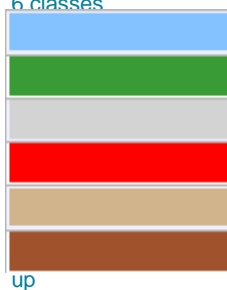
Water

Vegetation

Streets

Red Roofs

Mixed urban b...

up

Bare soil

| Indicator | | Unit | Method to acquire data according to HEART specifications |
|---|---|---|---|
| Imperviousness cover | Imperviousness cover | % | Remote Sensing (satellite image classification) Random Forest surface classification |
| River and/or sea flooding risk | Urban/residential areas exposed to risks | ha, % | Remote Sensing for surface classification and GIS analysis with precise DEM to calculate Flow accumulation areas |
| Blue Space availability | % of the area covered by blue spaces | % | Remote Sensing, maybe field survey or existing data are needed for mapping small blue elements |
| Tree characteristics on site | Tree cover | % | Remote Sensing (Image classification combined with vegetation height calculation from normalized DSM (absolute object heights( [DSM-DEM] |
| | Tree shade for local heat reduction | ºC, m2 | Remote Sensing / GIS analysis / Maybe Field survey to detect shaded areas below trees and is accessibility |
| | Leaf Area Index (LAI) | Dimensionless | Remote Sensing (LAI is calculated with ATCOR during the atmospheric correction of the VHR satellite images) |
| General vegetation status | Vegetation health | NDVI values | Remote Sensing (calculation of vegetation index/indices) |
| Urban greenness | Neighbourhood greenness | UNGI values | Remote Sensing - UNGI index |
| | Share of green urban areas | % | Remote Sensing - % of vegetation areas |

# HEART - HEAlthier Cities through Blue-Green Regenerative Technologies: the HEART Approach

## WebGIS toolkit for environmental monitoring and environmental health monitoring
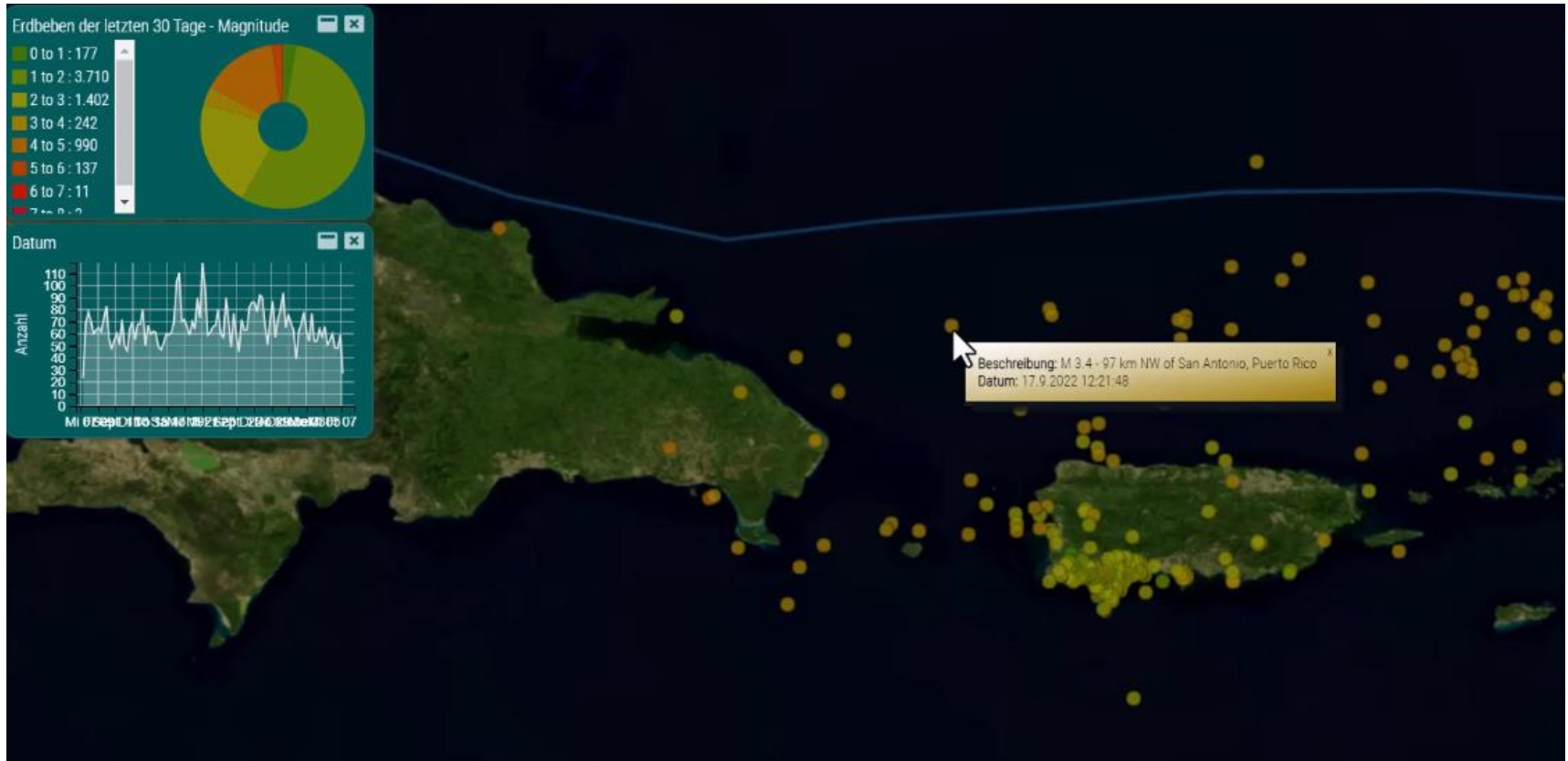
# The HARMONIA Project

*The HARMONIA project has received funding from the EU Horizon 2020 research and innovation programme under agreement No.101003517.*

Development of a Support System for Improved Resilience and Sustainable Urban areas to cope with Climate Change and Extreme Events

**HARMONIA will focus on two types of Climate Change (CC) effects:**

- Natural and man-made hazards intensified by CC, including urban flooding, soil degradation and geohazards (landslides, earthquake, ground deformation)

- Man-made hazards, such as heat islands, urban heat fluxes, air quality, gas emissions
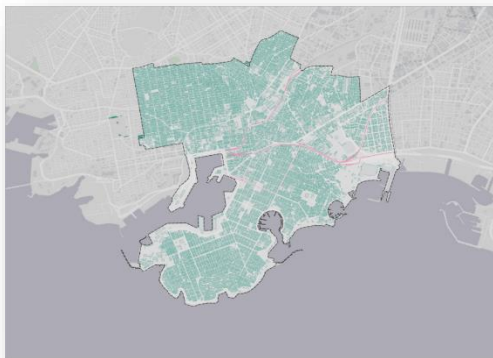
**HARMONIA** will systematically study to integrate knowledge from **EO**, **IoT**, **engineering**, **health**, **physical social** and **biological sciences** with **urban planning** and **ICT**.
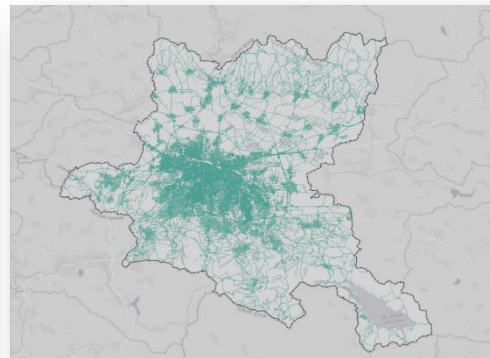
European Commission
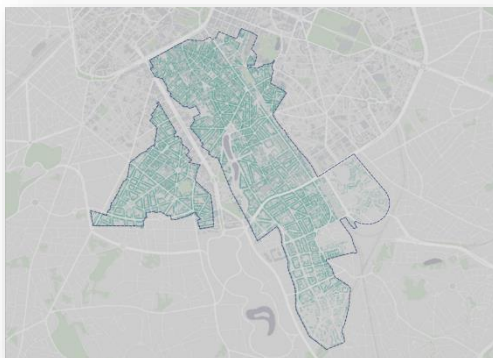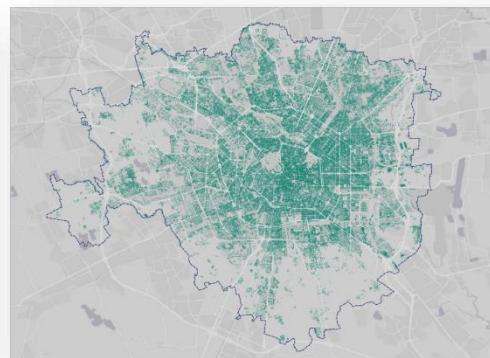
# Pilot Cities

**Piraeus**

**Sofi**





**Ixelles**

**Milano**





*Project funded in the Horizon 2020 Programme under Grant Agreement 101003517*

# HARMONIA Resilience Decision Support System (DSS)

Clear and precise **Risk Mitigation benefits** which facilitate the **Decision Makers** and relevant **Stakeholders**

Create **Climate Resilient Cities**

**Multi-hazard mitigation & adaptation measures**

Frequency, consequences (impact) and magnitude of hazards and their temporal changes → Holistic planning process

**Urban Planning**

**DSS**

**Urban health & well-being application**

Construct **environmental condition profile** for urban sites by producing recommendations

Provide hazard indicators → timely and accurate assessment of short and medium-long term risks to the health of citizens

**HARMONIA Data Repository**

*Project funded in the Horizon 2020 Programme under Grant Agreement 101003517*

Geosystems Hellas S.A.
225 Imittou, GR11632, Athens
Branch : HMU- Building K34, Estavromenos, GR71410, Hraklio, Crete

contact : mail@geosystems-hellas.gr