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BUILDSPACE

# BUILDSPACE

Enabling Innovative Space-Driven  
— Services for Energy Efficient Buildings  
and Climate Resilient Cities



# 16th International Scientific Conference on Energy and Climate Change

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MOBICS S.A.  
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- ▶ Content
- ▶ Why BUILDSPACE?
- ▶ Aim of the Project
- ▶ Objectives
- ▶ Concept
- ▶ Services and Pilots
- ▶ Impact
- ▶ Beneficiaries
- ▶ Contact Information

# Why BUILDSPACE?

- Buildings account for **40%** of the EU's energy consumption
- Almost **97%** of the EU's building stock is not considered energy efficient
- Buildings generate more data (ICT, IoT, AI, DLT, blockchain and big data)



High impact of energy usage on climate change

Call for evidence-based decision-support

Data-informed decision-making and digital upgrading can help upyield operational efficiencies at low cost.

# Aim of the Project

- ▶ BUILDSPACE is a **3-year** project determined to support the Green Deal Objectives
- ▶ The goal of BUILDSPACE is to couple **terrestrial data from buildings** (collected by IoT platforms, BIM solutions and other) with **aerial imaging** from drones equipped with thermal cameras and location annotated data from satellite services (i.e. EGNSS and Copernicus).
- ▶ The BUILDSPACE platform will allow **integration** of these heterogeneous data and will offer a range of **decision support tools** applied from building to urban scale for key stakeholders of the construction and renovation sector, urban planners, city authorities, NGOs, SMEs in the space/building/energy industry, as well as policy makers and researchers.

**DONOR**  
Horizon

**BUDGET**  
€ 2.632. 367,50

**TIMEFRAME**  
02/2023 -  
01/2026

# Project's Objectives

To engage Buildings Value Chain (BVC) stakeholders in a co-creation process for the design of innovative applications to support sustainable, resilient buildings.

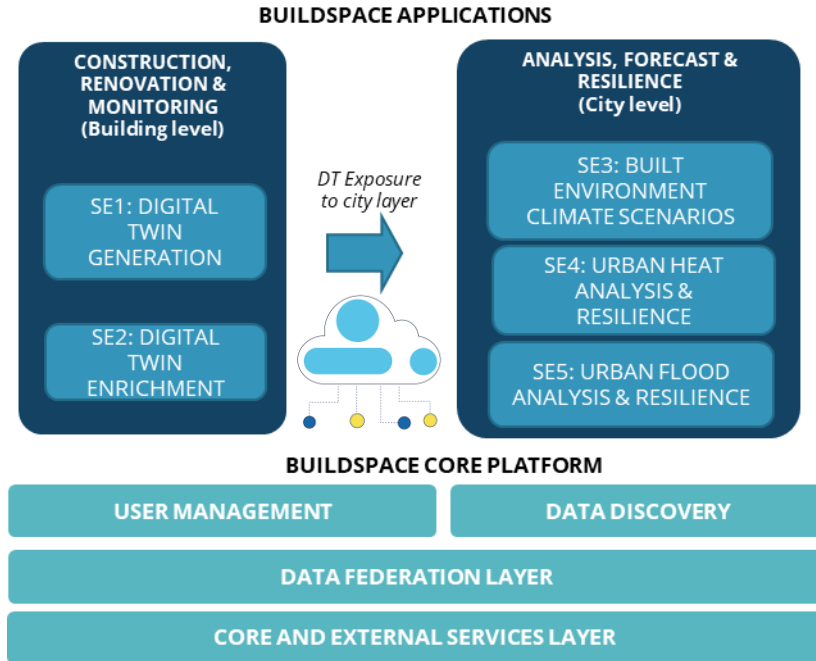
To build the baseline infrastructure that allows access to data sources which enable the development of location-based and remote sensing applications

To develop novel services using Digital Twins to support building construction, and link them with city scale services enabling urban environment analysis, forecast and climate resilience.

To test and evaluate the services with the relevant stakeholders in 4 pilots across EU and pave the way for their exploitation and sustainability plans

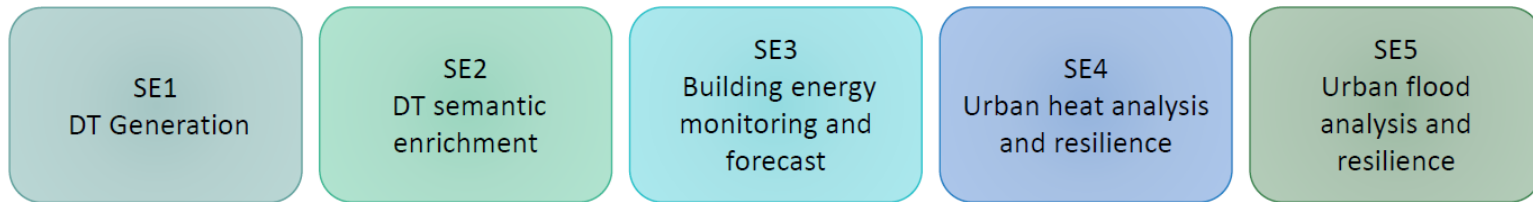
To deliver an open and transparent promotion of BUILDSPACE results through a comprehensive dissemination, communication and exploitation strategy

# Overall BUILDSPACE Concept



- ▶ BUILDSPACE aims to build an **interoperable** platform that offers **added value services at building and city scale**
- ▶ **Building level:** Building construction, monitoring and renovation
- ▶ **City level:** Energy performance analysis, forecast resilience to climate change hazards (urban heat, urban flood)

# BUILDSPACE Services



Land



Land



Land



Climate Change



Atmosphere



Land



Climate Change



Land



Climate Change



# Building Level: Digital Twin Services

## SE1 Digital Twin Generation

- ▶ Integrate methods for **generating the geometry of Digital Twins of Buildings** from locally sourced geometry data
- ▶ Build the associated interfaces for **human-information interaction** between users and Digital Twins in mixed reality environments.
- ▶ Linked with **EGNSS data for integration into city-scale models** and enable users to visualise the resulting DTs in mixed reality environments.
- ▶ Enable interactive screen-use, **VR and AR interfaces** for visualising DTs at construction site and 3D DT visualisation for existing buildings.



## SE2 Digital Twin Enrichment

- ▶ Enable the integration of Simultaneous Localisation and Mapping (SLAM) based approaches, Unmanned Aerial Vehicles (UAV) platforms and **thermal analysis** for Digital Twins enrichment.

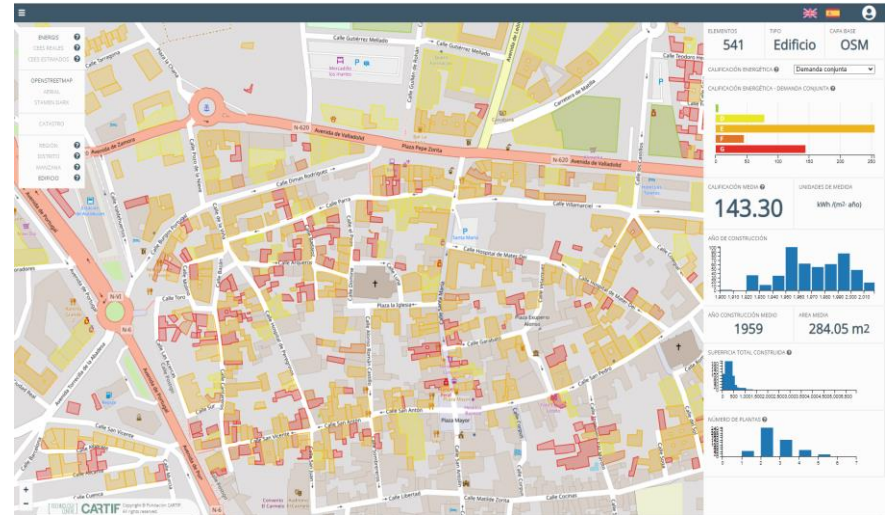




# City level: Built environment

## SE3 Building Energy monitoring and forecast

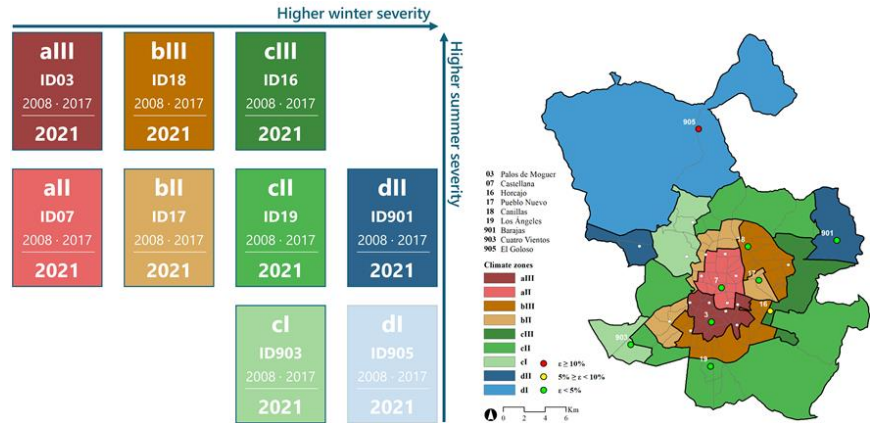
- Support urban stakeholders (e.g. urban planners, real estate and construction companies) in understanding how the **building stock energy demand** will be affected in the future by climate change leveraging Copernicus data
- Supports decision-making processes at urban scale through modelling of relevant KPIs to **retrofitting strategy gains**



# City level: Urban Heat Analysis

## SE4 Urban heat analysis and resilience

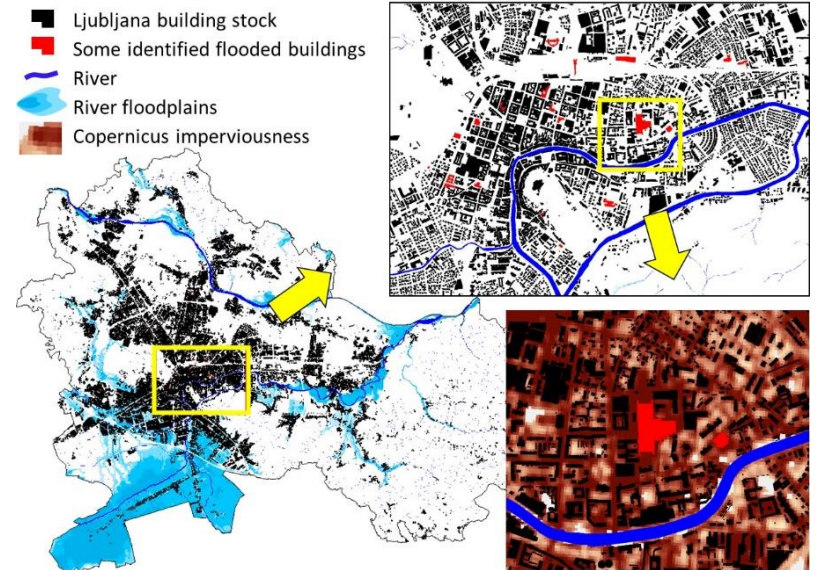
- Analyse **urban heat at high resolution** and combine demographic data to calculate the so-called urban heat risk and assess **social vulnerability to heat** to guide urban stakeholders' adaptation and mitigation strategies to climate change at building-neighbourhood scales.



# City level: Urban Flood Analysis

## SE5 Urban flood analysis and resilience

- Combine Copernicus and available public data with simplified model calculations to assess **potential flooding hotspots** and the impact of blue-green infrastructure implementation to increase buildings' resilience to flood damages in urban environments.



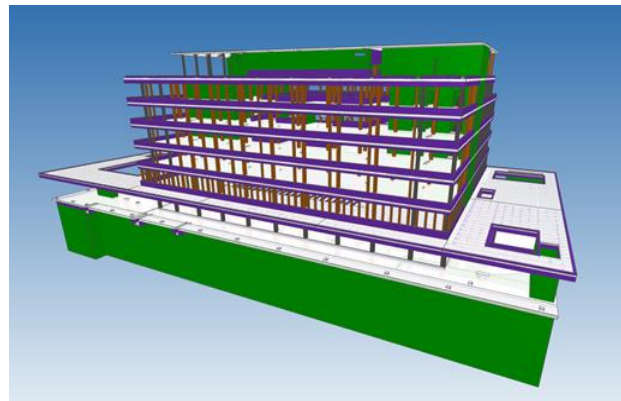
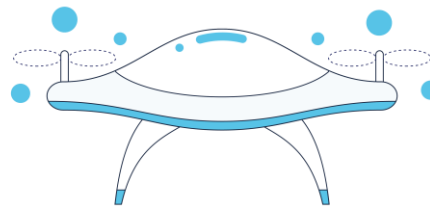
# BUILDSPACE Pilots: Construction Site

## Building Construction (Poland)

- The pilot will take place during the construction of a **new building** at Warsaw, Poland
- This pilot will deploy the services at building level (DT generation and DT enrichment). It will test the VR/AR-enabled DT generation and will validate its applicability and effectiveness in facilitating building construction works.

SE1: DIGITAL TWIN  
GENERATION

SE2: DIGITAL TWIN  
ENRICHMENT



# BUILDSPACE Pilots: Cities

## Energy Demand Analysis & Resilience (Riga)

- Focuses on a part of one of the **Riga city neighbourhoods**, in a walking distance from the Old Town (a UNESCO Heritage site) and in a close proximity to the Riga city centre.
- The pilot is expected to provide key insights on the planning and assessment of policies and measures to support sustainable energy management at buildings and city level.

SE3: BUILT ENVIRONMENT CLIMATE SCENARIOS

## Urban Heat Analysis and Resilience (Piraeus)

- Piraeus is one of the largest Greek urban centres. A major challenge for the local authorities is to take informed decisions that **analyse urban heat and increase resilience of the building infrastructure**.
- The pilot will analyse urban heat in current and future scenarios and provide insights on the social vulnerability to heat.

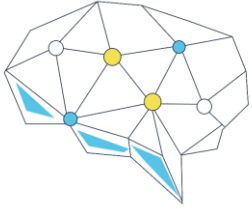
SE4: URBAN HEAT ANALYSIS & RESILIENCE

## Urban Flood Analysis and Resilience (Slovenia)

- The Slovenian case study will focus on the City of Ljubljana. Ljubljana has a long history of various flood protection measures due to its **vulnerability to flooding**. Many parts of the city are still heavily threatened by the floods.
- The pilot is expected to extract guidelines at building and city scale to mitigate the risk of flood damages.

SE5: URBAN FLOOD ANALYSIS & RESILIENCE

# BUILDSPACE Impact



- ▶ Generate high fidelity multi-modal DTs and eliminate the need of the current measurement and surveying processes on the construction site.



- ▶ Reduction of greenhouse gases emissions



- ▶ Support informed decision making of buildings and city stakeholders towards energy efficient buildings and climate Resilient Cities



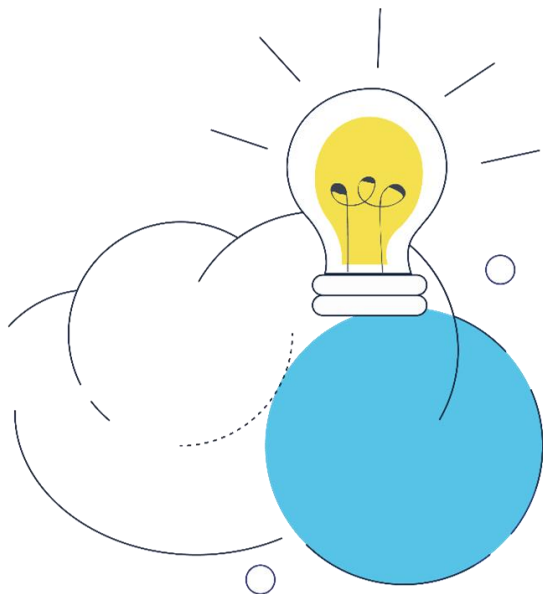
- ▶ Cumulative investments in sustainable energy triggered by the project

- ▶ Primary energy savings triggered by the project

- ▶ Uptake of BUILDSPACE by energy and non-energy stakeholders, SMEs, universities, policy makers and public authorities.

# Project Beneficiaries





# Q&A





# Contact Information



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