Bologna Digital Twin

Enhancing the public value of data.

Comune di Bologna

We want to create a more just, fair and sustainable city

The Administration is committed to the challenge of making Bologna the most progressive city in Italy, by promoting an alternative model of city capable of contributing to the solution of economic, social and environmental challenges.

The success of this vision lays on the implementation of major projects and investments for the social, environmental and technological transition of the city and the enhancement of Bologna's historic values:

City of Knowledge

To relocate the axis of the city's economic and social development on the knowledge dimension with the redevelopment of a large area of the city and the creation of active policies.

Bologna Climate Neutral

To achieve climate neutrality by 2030 through investments on new mobility, education and information, energy efficiency, waste management and urban greening.

Green Footprint

To improve people's health, quality of life and public spaces with the construction of a large green infrastructure embracing the entire city

Plan for Housing

To tackle the housing crisis by creating 10 thousand homes in the next 10 years.

Bologna Digital Twin is a new civic infrastructure for the city.

It will help us to improve the quality of people's lives, generate economic opportunities for the city and tackle global challenges.

Comune di Bologna

A new asset to address contemporary challenges and bring concrete change

Bologna's DT will allow us to:

Using data and knowledge to implement analysis and forecasts to address the needs of the city, its citizens and users.

Supporting decisions that bring substantial change to city government and to tackle environmental, economic and social challenges by experimenting with different forms of public engagement.

Activate knowledge processes that can generate new economies and responsiveness to improve territorial governance.

Bologna's DT will provide a new civic infrastructure at the disposal of the entire city. It will be financed through an initial investment of 7 million euro from EU Cohesion funds.

An opportunity to improve the quality of life, generate opportunities and play a new national and international role.

MUNICIPAL LEVEL

A new civic infrastructure that can be used to generate public value. It will enable a new pact between the city, its citizens and other relevant stakeholders. It will improve the social and economic impact of urban policies; stimulate the development of new enterprises and services; involve all the realities of the territory.

REGIONAL AND NATIONAL LEVEL

It will give Bologna a leading, innovative and frontier role in the development of Data Valley (Spoke 9 of the National High Performance Computing Centre: Digital Society & Smart Cities). It will position Bologna as an Italian model to be followed in building the Digital Twin.

INTERNATIONAL LEVEL

It will increase the city's attractiveness to people and organisations interested in contributing to frontier issues related to global challenges. It will allow to strengthen relations with European cities and its excellences as Barcelona Municipality and BSC (international protocol) and Hamburg. It will allow to join the network of cities collaborating on pan-European digital services.

A set of comprehensive and coordinated action to generate public value

A **PLATFORM** collecting, analysing, integrating, visualising and simulating city data and supporting decision-making processes.
BDT technologies offer a model of the city comprehensive, integrated, dynamic and, predictive

BOLOGNA DIGITAL TWIN

A transformative **PROCESS** of the administration governance, city engagement and international network creation, based on research activities, experimentations and feedback creation in the design process.

A **POLICY** on knowledge, big data and new technologies that generates awareness of the value of data, regulates its democratic and civic use and guides the generation of public value.

A digital model designed to accurately reflect the behaviour of the city

An Urban Digital Twin is a complete digital model of the city, which continuously adapts according to the data and information collected, supports decision-making through analysis and forecasting, and co-evolves with its physical counterpart.

A Urban DT is:

A comprehensive model
it is able to answer all relevant questions about the functioning and evolution of the city.

An accurate model
it is able to answer all relevant questions about the functioning and evolution of the city.

The realisation of a Digital Urban Twin is therefore an incremental process aimed at having an increasingly complete and precise model.

This requires the ability to model all urban systems (from physical infrastructure, to processes, to social and organisational dynamics) and to capture the complexity of their mutual relationships and influences.

A city model that works in synergy with the city

REAL CITY

Analysing, correlating and visualising data to facilitate understanding and exploration of city phenomena and systems.

Anticipating urban developments and emerging risks, and assessing their impacts, also by constructing hypothetical scenarios and simulating their evolution over time.

Monitoring the evolution and effects of external events and government actions.

Optimising the effectiveness of services and the impact of government actions by continuously reviewing them based on data on their functioning.

Supporting decision processes and the translation of decisions into actions aiming at urban change.

Involving citizens in design activities and behavioural change processes, which start from the digital and move into the real city.

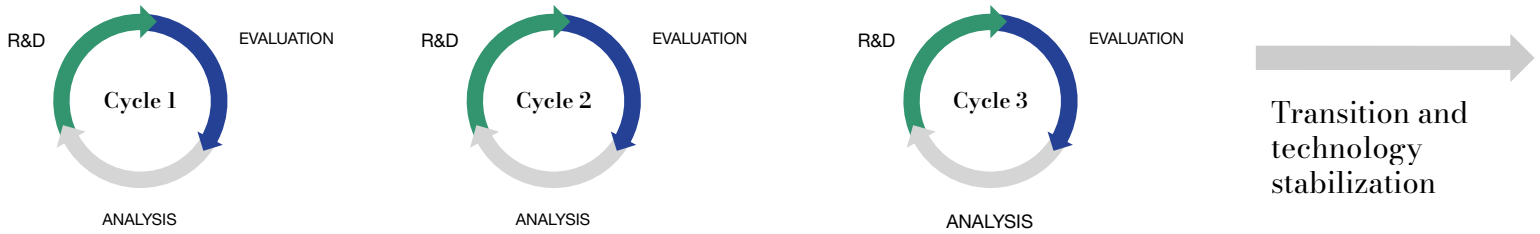
DIGITAL TWIN

We design and test innovation using an incremental approach

Starting from what we know how to do and studying what we do not yet know how to do

Focusing on clear and codified problems in order to make new, more complex problems emerge

Building broader and more structured partnerships and collaboration networks



Strengthening human capital of Bologna, enhancing past innovation and existing technologies

ADMINISTRATIVE CAPACITY
Key factor in activating and accelerating innovation projects

OPEN DATASETS
for modelling, training and implementing new tools

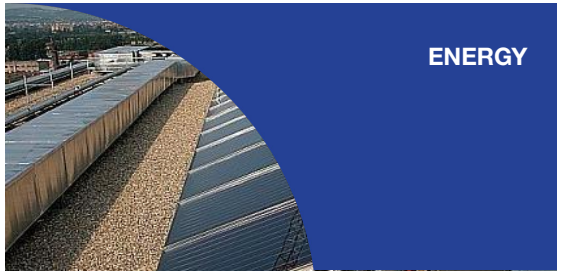
DIGITAL INFRASTRUCTURES
They enable the connection between information, projects and strategic assets

SOFTWARES AND REUSABLE PLATFORMS
To improve sustainability, interoperability and dissemination

PARTNERS SKILLS
All the necessary skills, experience and track record

First domains for experimentation and the refinement of processes and technologies

Supporting the city in the challenges that will transform urban mobility (30 km/h city, trams, cycle lanes). Enhancing data assets: data integration and access; advanced analysis; new data sources from partner companies.



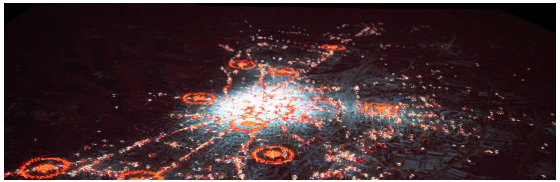
Analysing the energy response of the city's building stock and supporting sustainability assessments. Simulating the impact of new projects in urban plans, design alternatives, policies and incentives.

The digital twin is increasingly identified as a useful tool to improve urban planning tools (e.g. Neighbourhood Plan) and to support the municipality in managing emergencies (e.g. Garisenda Tower).

3 features that make our Digital Twin unique

The civic value

The project is led by the administration and based on a pact with all city stakeholders with the aim to share data, imagine new solutions and implement them together.



A research and innovation approach

Bologna wants to be a research and innovation laboratory where the administration plays a leading role in promoting cutting-edge projects and experimenting with the most advanced technologies.

The ethical dimension

The project is based on the importance of ethics, respect for citizens' digital rights, transparency, fairness, neutrality and data protection.

The milestones for the creation of our Digital Twin

2023

Defining a clear and **shared vision**, objectives and work plan

Acquisition of **economic resources and expertise**

Partnership with the National Research Centre in HPC, Big Data and Quantum Computing and other European initiatives

Development of the **first prototype platform**

2024

Co-design and construction of **datasets** with internal users and stakeholders

Creation of **use cases** to demonstrate the potential of the model

Business model definition, data value and BGD governance

2025

Development of **extended version of the platform**

Creation of **cross-sectoral use cases,** integrating the social and economic dimensions.

Implementation of **Reliable AI and privacy-preserving algorithms**

Involvement of **industrial partners**

2024

Enabling **data-driven decision-making and civic use** of the BGD

Finalisation of the platform.

Evolution and **sustainability strategy**

Completion of the **ethics and privacy framework** in the BGD system

A public consortium of internationally recognized excellence who have chosen to team together

Comune di Bologna

Strategic management

The project sponsor and the ultimate responsible for all strategic decisions. Moreover, Municipal department have an active role in the use cases implementations.

FONDAZIONE BRUNO KESSLER

Technical Coordinator & Project Manager

General manager, coordinating the Bologna Digital Twin Project Consortium and supervising its progress.

ALMA MATER STUDIORUM UNIVERSITÀ DI BOLOGNA

Scientific Manager

Scientific leader, responsible for the research development and results.

CINECA

Technical Manager

Supervisor of the technology requirements, of the software development and of the technological infrastructure management.

fondazione innovazione urbana

Community Manager

Responsible for ensuring that the knowledge produced within the project is shared with citizens and stakeholders.

For more information

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COESIONE ITALIA 21-27
METRO PLUS E CITTÀ MEDIE SUD

Cofinanziato dall'Unione europea

Agenzia per la Coesione Territoriale