



DSH
DIGITAL AND
SUSTAINABLE
HARBOUR
2030





THE PROJECT

THE PROJECT BEGINS WITH THE OLD PORT WHILE TAKING AN ALL-INCLUSIVE VIEW OF THE METROPOLITAN CITY. THE PROPOSAL IS A MODEL THAT MAY BE REPRODUCED AT VARIOUS LEVELS AND DEVELOPED TO INCLUDE SEVERAL AREAS OF THE CITY THAT ARE OF TOURISTIC VALUE.

BY INVESTIGATING THE NEEDS OF USERS AND THE GENERAL PUBLIC, A SPECIALISED MODEL IS DEVELOPED TO INCREASE THE ATTRACTIVENESS OF THE AREA BY CONSISTENT AND SKILLED MANAGEMENT OF SPACES.



Marinas are complex environments, part natural and part a built-up system. They involve multiple activities in one of the central urban areas of the **regeneration** process (urban, economic and social) within a European development framework.

They are a vast source of **assorted data** and can provide enormous support when optimising management processes. Each person, building and object can gather information and communicate with devices, thereby instigating improvements capable of optimising activities.

The project goal is to define innovative methods and applications of knowledge management to promote waterfront management and sustainable development.

The project pilot case, currently ongoing in the Porto Antico (Old Port) of Genoa, is already seeing significant experimentation with IoT technologies connected to control systems for water and energy consumption and the application of sensors and smart meters.

The purpose is the creation of an **enhanced digital twin** of the marina to permit the monitoring, and above all optimisation, of processes that:

- Monitor the environment;
- Monitor and optimise resources (water, energy, etc.);

- Monitor and simulate people and vehicle flows (on land and sea) for both safety and commercial purposes (for example, to show where and when to launch a new product);
- Monitor system quality.

PORTO ANTICO DI GENOVA



THE REDEVELOPMENT OF THE PORTO ANTICO (OLD PORT) OF GENOA IS A TASK OF INTERNATIONAL IMPORTANCE, IN WHICH TOURISM AND URBAN DEVELOPMENT COME TOGETHER USING SMART CITY TECHNOLOGICAL SOLUTIONS. BUSINESS INTERESTS AND THE PUBLIC ARE ATTRACTED BY SOLUTIONS THAT ARE DESIGNED TO BE SUSTAINABLE, LONG-LASTING AND CULTURALLY ADVANCED.

1992
Columbus celebrations

2001
G8 Summit

2004
Genoa European Capital of Culture

2006
“Palazzi dei Rolli” UNESCO World Heritage Site

2023
Grand Finale - The Ocean Race

2024
European Capital of Sport

Genoa has attracted companies and enhanced tourism (conferences, cruises and cultural themes) by focussing on:

- **Service industry** activities using high technology;
- **Maritime Economy** activities;
- **Sustainable** urban promotion activities.

Genoa (area 243.6 km², inhabitants 583.601, population density 2,395.7 inhabitants per km²) is a coastal city in a fragile location, squeezed between mountains and the coast, and closely linked to its production engine: the **port**.

Inside the city area of the port, the *Porto Antico* area extends from the Darsena (Old dock) area to the Magazzini del Cotone (Cotton Warehouses).

With an area of 130,000 m², it has an assortment of uses that has been its strength over the last thirty years. Commercial functions (Magazzini del Cotone, the Aquarium, Millo district), commercial and tourist hotels, residential areas, service industries etc., coexist and form its strong points.

Three main events, in direct contact with central urban areas, have contributed to the transformation process of the coastal district:

- 1992, *The International Exhibition. “Christopher Columbus, The ship and the Sea”*, also known as *Expo 1992 or the Colombiadi*;
- 2001, *G8 Summit*;
- 2004, *Genoa European Capital of Culture*.

The major transformation, redevelopment and urban maintenance work undertaken in the historic city centre and on the port waterfront were decisive in triggering the reversal of physical, economic and social decay trends affecting many parts of the city centre.

Opening up the city to a renewed area on the sea created a new and enduring connection between the port basin and the old city.

DIGITAL AND SUSTAINABLE HARBOUR 2030

PORTO ANTICO DI GENOVA SHARES SOME OF THE CHALLENGES OF MANAGING AND TRANSFORMING COMPLEX STRATEGIC URBAN AREAS ON A GLOBAL SCALE. SIMILAR QUESTIONS ARE COMMON TO THESE CHALLENGES.

HOW TO MONITOR URBAN AREA EVOLUTION TO MEET CHANGING NEEDS?

The way we move, study, work and have fun is changing ever more rapidly, and the recent pandemic has further accelerated this trend. How can technological innovation help our buildings and cities to remain attractive in these changing scenarios?

WHAT IMPACT DO DECISIONS HAVE ON THE ORGANISATION AND MANAGEMENT OF URBAN AREAS?

In a prospect of rapid change, the successful combination of social, economic and environmental aspects requires effective organisational processes and management tools. These must be capable of exploiting increasing volumes of information and provide new skills to re-elaborate it all.

The perceived value of our buildings and built-up areas will increasingly depend on their ability to respond adequately to the living or business needs of its users. A Digital Twin will allow us to interpret how they are used, what the relationships are between indoor and outdoor spaces and the accessibility and connections with the surrounding city system.

HOW TO BOOST PROPERTY ASSETS IN A HYPER-DIGITAL WORLD?



Digital tools give privileged access to the knowledge of places, services, and main purchasing choices. DSH2030 will create several digital tools to interact with end-users, and many more to adapt these interactions and provide effective support for strategic and operational decisions.

WHICH INNOVATIVE AND DIGITAL TOOLS WILL ATTRACT AND DIRECT FLOWS?

WHICH PROCESSES HAVE BEEN PUT IN PLACE TO PROMOTE SUSTAINABLE DEVELOPMENT?

Improving processes and making them sustainable, when addressing complex areas such as the Porto Antico, depends on two factors. One is the depth of knowledge available about them, and the other is the ability to effectively re-elaborate them to support decisions and monitor their impact.

TURNING DATA INTO SERVICES

SENSORS, SMART METERS, IOT, DATA AGGREGATION, DATA STRATEGY

Hardware components are set up to communicate flow data in order to configure, test and authenticate them in the phases associated with the digital twin demonstrator. The IoT platform is connected to data sources by integrating all the solutions, including:

- IoT devices;
- databases and external services;
- information from remote sources.

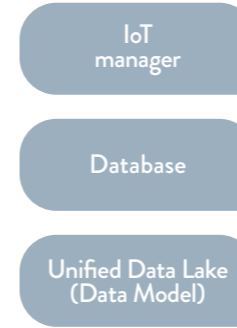
A set of innovative technologies and tools must be organised to create the proposed platform:

- IoT technologies to obtain data sources that can be used in real-time;
- IoT devices to collect data to be transmitted using 5G antennas;
- secure and reliable cloud data-storage;
- Machine Learning and Optimisation techniques applied to AI to extract facts from data.

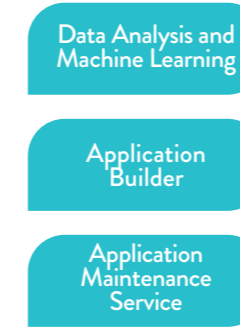
RECORDED DATA



DATA MANAGEMENT



APPLICATION LAYERS



APPLICATION SERVICES AND DASHBOARDS



APPLICATION COOPERATION

FROM DATA TO THE CLOUD



The data-governance plan comprises data management for:

- Digital Twin technology;
- Video Analysis and security;
- AR / VR / Gamification for the enhancement of physical assets.

Verifying ownership and data portability requirements defining cloud infrastructure

characteristics. The analysis and verification of ERP and management systems in use, to define interoperability and portability specifications.

In a people-centric vision of the project, an analysis of user needs helps when identifying:

- feature requirements;
- KPIs for testing and validation.

DATA ACQUISITION

SMART METER

Smart measuring tools for:

DATA IS COLLECTED ON THREE LEVELS TO CREATE DASHBOARDS SHOWING COMMUNICATION DATASETS, DESCRIPTIVE MAPS OF FLOWS IN CRITICAL ZONES AND AN ENVIRONMENTAL MONITORING SYSTEM FOR COMMERCIAL AND SECURITY PURPOSES.



ENERGY PRODUCTION



AIR QUALITY



ENERGY CONSUMPTION



WEATHER FORECASTING



ELECTRIC CHARGING



MARINE WEATHER FORECASTING



WATER CONSUMPTION



ASSET MANAGEMENT AND MAINTENANCE

VIDEO CONTENT ANALYSIS (VCA)

Video analysis and AI sustaining:

SAFETY

- Detection of abnormal crowding and dangers
- Features connected with social distancing rules

MARKETING

- Estimation of the number of people in the area
- Transit/access register to specific areas
- Assistance for planning and organising events

MANAGEMENT OF SPACES

A flow analysis tool using:

- Detection of people and movement
- Overview of the maximum and minimum crowd points
- Reporting faults in buildings and street fixtures
- Accessibility data based on the degree of crowding
- Monitoring and directing of flows via attractors (VR / AR / Gamification)



DASHBOARDS AND INTERFACES

THE PROJECT DEMONSTRATOR IS WORKING AND RELIABLE FOR TWO CONSULTATION SECTORS, THE DATA MANAGER AND THE USER. DEPENDING ON TARGETS, DATA ARE MADE AVAILABLE AND USABLE IN TWO DIFFERENT WAYS.



FOR THE DATA MANAGER

- Monitoring and viewing complete data sets (aggregated, multiple level or modular)

FOR THE USER

- Creating local area engagement and awareness

The data **manager** requires monitoring that is continuous and able to identify issues originating from critical or potentially dangerous events, together with the definition of predictive logic to take corrective action.

For the **public user** (workers, tourists and visitors), “intelligent and adaptive routes” are established in the area, comprising a list of POIs with specific features that will be assessed by the users themselves.

ASSET IMPROVEMENT

The proposed technological system supplies users with environmental and cultural information concerning the area. The interface is a mobile app based on and used as an info-touristic exploration tool. It integrates and improves on the most recent tourism

edutainment techniques and integrates gamification solutions and augmented/virtual reality. The aim is to provide cultural and tourist content in a transparent, accessible and complete way. The prime objective: to enhance the entire urban area.

AUGMENTED REALITY

VIRTUAL REALITY

GAMIFICATION

DIGITAL APPROACHES AND OPPORTUNITIES

TO BETTER UNDERSTAND THE DATA-DRIVEN EXPLOITATION OF PHYSICAL ASSETS, THE DSH2030 DASHBOARD WILL HAVE THE POTENTIAL AND METHODS OF ACCESS AND DATA MANAGEMENT TYPICAL OF WEBGIS PORTALS. THE INTERFACES MANAGE LONG AND SHORT-TERM DATA SEARCHES FOLLOWING SPECIALLY CREATED MODELS THAT MEET USER NEEDS.

DATA-DRIVEN DECISIONS

- B2B2C Dashboard
- Mapping and interoperation of georeferenced information
- Location Intelligence tools

This platform requires the configuration of innovative methodology and tools: IoT technologies are essential when making every object, person or building a source of usable real-time data.

IMPACT MEASUREMENT

- Active measurement of KPIs and Indicators
- Spatial and chronological information mapping

Data gathering is designed to measure the impact of local activity by analysing the complex performance of a system. This leads to greater efficiency of consumption and costs, and the upgraded attractiveness of the area.

USER-CENTRIC MODELS

- Reciprocal experience (B2B2C)
- Ability to gather User Generated Data
- Predictive and trend-detection capabilities

Managing the area also entails improving the location of spaces for users, i.e., the local population, tourists and businesses. Understanding how to ensure the most beneficial renting conditions and commercial value of the spaces is only possible after analysing user requirements. This is the motive for the starting point that will find the right services, able to attract users and meet assured quality standards.



PARTNERS



PORTO ANTICO DI GENOVA

Porto Antico di Genova Spa, founded in 1995, has a statutory mission to maintain and bring the redeveloped Old Port area to life.

The company manages the Centro Congressi Magazzini del Cotone (Cotton Warehouses Conference Centre) and the city trade fairs. With over 4.5 million visitors a year, Porto Antico has recently launched a series of projects on the theme of sustainability: dock electrification for mega-yachts, a photovoltaic system, system efficiency improvements, reduction in the use of disposable plastic, IoT applications for real-time monitoring of water and energy consumption.

The Porto Antico area features a high level of urban quality, rich in scientific and cultural attractions. The Genoese mingle with tourists visiting the local attractions, with urban and tourist functions blending harmoniously.

The company's successful involvement in an urban-port redevelopment operation, which unquestionably contributed to the transformation of Genoa, is increasingly studied and analysed internationally as a good practice.



AITRUST SRL

TECHNOLOGICALLY ADVANCED ICT SOLUTIONS

A consultancy specialising in ICT sector solutions and strategic support. The company sums up its founders' experience in supplying information systems, monitoring and control, security and innovation strategies.

With a strong focus on research and leading-edge technologies and their application to industry, AiTrust concentrates on management and control system markets for critical industrial infrastructures.

Security issues play a significant role and emphasis is placed on video surveillance and video analysis solutions.



BF PARTNERS SRL

MANAGEMENT CONSULTING AND SYSTEM INTEGRATION

BF Partners is a Management Consulting and System Integration company specialising in the design and implementation of organisational processes to improve corporate efficiency in industry and services. The growth strategy of BF Partners includes a multi-year programme of industrial research and experimental development to conceive, develop and fine-tune new technical solutions interconnected with ERP, Business Intelligence and Advanced Analytics tools. It regularly works with universities, business schools and research centres and is a partner of the TRANSIT, SOSIA and PLSV Research and Innovation Centres.



CIRCLE GARAGE SRL

IOT, CLOUD AND HI-TECH SOLUTIONS FOR SECURITY CONTROL AND CUSTOMER SATISFACTION

Circle Garage is a spin-off from the Italian Institute of Technology and specialises in supplying solutions in the IoT, Cloud and hi-tech fields to small, medium and large companies. It has extensive experience and transversal knowledge in consulting, design and the development of software solutions, particularly in microservice architectures, multi-platform development and hybrid technologies in the cloud, also thanks to purpose provided data engineering platforms.

Circle Garage devotes much attention to the research and development sector and is involved in several regional Financed Research projects. It is also a member of the TRANSIT Research and Innovation Centre.



COLOUREE SRL

AI, DATA AND LOCATION INTELLIGENCE FOR THE SMART CITY AND PROPERTY ASSET SECTORS

Colouree is an innovative start-up PropTech company developing solutions based on AI, Data and Location Intelligence for Smart Cities and the property sector.

By integrating and analysing geo-referenced big data from different sources and sensors (IoT), then processing them using AI and location intelligence, thematic maps and ratings of built-up areas can be accessed on any web device, with analysis of indicators and impact scenarios.

As an associate of the Ligurian Regional Innovation Centre EASS, Colouree is part of eminent partnerships, with results being appreciated both in Italy and abroad.



NETALIA SRL

CLOUD SERVICE PROVIDER AND CYBER SECURITY

Netalia is an independent Cloud Service Provider operating principally on public Cloud services for medium and large companies. It is AgID qualified for Cloud PA (public administration) and ensures Italian physical, regulatory and legal residence of processed data. The main client sectors are those with high data sensitivity, such as Healthcare, Energy, Finance and public administration.

Netalia cloud services integrate with currently used systems, developing them with latest-generation services that provide high levels of security, savings and flexibility. Netalia draws on the support of selected Italian software houses, digital publishers and other consultant partners.



ETT SPA

DIGITAL AND CREATIVE-CULTURAL TOOLS FOR ENHANCED DIGITAL TWIN

ETT, a digital and creative industry, is a market leader in the creation of experiential communication systems and complex information systems. From its headquarters in Genoa and its offices in Italy and Europe, ETT specialises in the generation and management of Italian digital cultural heritage, the design of Smart Gov IT systems and integrated systems to connect cities, places and people in Smart City initiatives.

The company offers specific digital solutions in various areas: tourism, cultural and landscape heritage, training, edutainment, corporate communication, fitting-out spaces and corners, digital publishing, data management and data mining.



MaLga is a University of Genoa interdepartmental research centre. Working with mathematics and computer science, it is active in many diverse but connected themes that include Computer vision, Computational Harmonic Analysis, Data Analysis and Statistical Learning. The centre's convergence point is Machine Learning, but its most distinctive feature is the mutual interaction of widely diversified research themes and scientific backgrounds.

The Machine Learning Genoa Center, with its four units, aims to develop a new generation of theoretically sound intelligent systems to be employed in science, engineering and technology.

As a bridge between the academic world and industry, MaLga carries out its research thanks to funding from public and private entities. Over the years, MaLga scholars have published several hundred scientific papers in internationally renowned journals and conferences.



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