SNAP4CITY SOLUTIONS

Snap4City provides real-time and offline solutions to support decision makers in cities to their daily operational actions on Digital Twin, grounded on ethical and explainable artificial intelligent, XAI/AI, solutions, deductions and assessments. It provides a complete understanding of the city conditions, producing early warning, providing suggestions, enabling simulations and plans as what-if analysis. It is used to suggest strategic and real time interventions to improve city services and general quality of life also providing living lab support.

Snap4City is a 100% open-source platform used in many cities and areas, includes Km4City ontological and semantic model (https://www.km4city.org) to guarantee the data interoperability. It is an official FIWARE Platform (https://www.snap4city.org/467), compliant with FIWARE Smart Data Models, and a large range of High Level Types, official EOSC Platform, official Node-RED Library, official FIWARE iHub. Snap4City is provided "as a Service" or installed in your location (from yourself, as well as using a number of Snap4City certified companies), no licence fee is needed. The platform facilities a wide range of applications in the smart cities and IoT/IoE (Internet of Things/Web of Everything) integrated domains: defining city strategies, implementing control rooms, realizing ethics and explainable artificial intelligent solutions, computing key performance indicators (SUMI, SUM, IEEE, EC kpi, etc.), setting up solutions, harmonizing any legacy solution in place.

From security and privacy aspects, Snap4City is GDPR compliant, and passed PENTest. With Snap4City you can create your certified entities, and sequences of events using the provided Blockchain component. End-3-end and secure connections are established from devices to dashboards. Snap4City is compliant with OpenID Connect, SSO, European Identity Card, SPID, EU Login, etc.

Snap4City platform can cope with any data and information covering **multiple domains / scenarios** (https://www.snap4city.org/4) in integrated Digital Twins, for management, simulation, what if analysis, and strategic planning:

- **Mobility and transport:** smart parking, traffic flow reconstruction, traffic flow prediction, offer vs demand of transportation analysis, vehicle tracking, dynamic routing, multimodal routing, smart biking, reducing traffic congestion, people classification and counting, people flow tracking, etc.

- **Energy:** smart light, control room on energy production and recovering, charging stations, electric vehicles fleet control, monitoring energy production and consumption; For example, in REPLICATE for recharging stations, for CAPELON partner in Sweden for Smart Light, for data centers, for single and groups of houses with PV panels and CER, in Merano for smart light.

- **Environment:** monitoring pollutant and weather; pollutant predictions, landslides 24H predictions, NOx predictions, NO2 very long-term predictions of annual average KPI, alerting, CO2 reduction, CO2 estimation from traffic, CO2 estimation for the city, smart waste management, decarbonization, collection of RAEE, satellite data. For example, in Florence, Pisa, Livorno for NOx/NO2 predictions, and general pollutant monitoring in Tuscany, Antwerp, Helsinki.

- **Governance control and KPI:** assets control, utilities, quality of life assessment and control, computing 15MinCityIndex, building construction, building energy management vs usage, digital twin, sustainability, smart decision support, city management KPI, etc. For example: in REPLICATE H2020 for Smart City Control Room of Florence; in the Firenze and Bologna for the 15 Min City Index; 15Min City Index model adopted a national level.

- **Tourism:** reputation assessment and control, tourists city usage monitoring, POI; For example: in Antwerp for monitoring people flows with PAXCounters, and in Dubrovnik, Pont du Gard, and Valencia for monitoring people flow (via PAXCounters and/or TV Cams) and tourism aspects with HERIDATA (https://heri-data.interreg-med.eu/).

- **Safety & Security:** data and evolution certification with Blockchain; thermal cameras for critical condition monitoring, people counting, people tracking, automated moving object tracking with branded cameras, etc.; integration with VMS of Milestone, integration and plugin for AXIS cameras.

- **Industry 4.0:** depuration plants, production plants (monitoring industry plant, control and optimization; digital twin), production plant, predictive maintenance, integrated life cycles among different industry plant, such as on ALTAIR chemical plant, marketing analysis, production of suggestions and engagements; https://www.snap4city.org/369.

- **Interoperability:** In this large range of solutions, Snap4City is compliant with more than 180 protocols and formats, and it is capable to fully interoperate and/or integrate legacy systems. It is highly interoperable with any GIS, BIM, CKAN, Satellite Services, OSM, GTFS/NeTex, transport protocols, and IoT Networks protocols (IoT protocols), WoT, smart data models, data spaces, services and databases: https://www.snap4city.org/283, https://www.snap4city.org/65. Snap4City is an official FIWARE platform, exploits FIWARE multi-tenant Context Broker, NGSI-V2/LD protocols, Smart Data Models, automated broker deploy, protected automations and multiple broker connections. The interoperability, flexibility and modularity of Snap4City together enable the creation of business intelligence applications in a wide range of scenarios and domains. Snap4City enables the creation of federations of Smart solutions via Smart City API. All Snap4City APIs are accessible and well documented for developers, allowing customization and online development.

- **Data Integration, ingestion and distribution:** Snap4City provides effective and simple tools and solutions for immediate data ingestion and data aggregation exploiting a large range of protocols and standards. Snap4City provides a range of tools (event driven, real time, push/pull) for shortening the processes for manipulating simple and complex data such as POI, KPI, IoT Devices, Satellite, Digital Twins, BIM, OD Matrices, Traffic Flows, Heatmaps, 3D Shapes/patterns, Typical Time trends, Color Maps, Trajectories, Flows, Video Streams, User profiles, Terrains, Maps, Orthomaps, SVG graphics; etc.

- **Security and Privacy:** Snap4City platform passed the penetration and vulnerability tests and has been proven to be GDPR compliant. Snap4City provides end-2-end and event-driven secure applications with real time connections from devices to dashboards and vice versa, including data processing, storage and data analytics. https://www.snap4city.org/549.

SNAP4CITY

www.snap4city.org
www.snap4solutions.org

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100% OPEN SOURCE

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#disitlab
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DIGITAL TWIN SOLUTIONS TO SETUP SUSTAINABLE DECISON SUPPORT SYSTEMS AND BUSINESS INTELLIGENCE

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● SCENARIOUS
https://www.snap4city.org/4

● ORGANIZATIONS
https://www.snap4city.org/download/video/cov/

● INTEROPERABILITY
https://www.snap4city.org/283

● APPLICATIONS / PROCESSING
https://www.snap4city.org/22

● CLIENT SIDE BUSINESS LOGIC
https://www.snap4city.org/911

● INSTALLATIONS
https://www.snap4city.org/471

● DEVELOPMENT LIFE CYCLE
https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf

● TECHNICAL OVERVIEW
https://www.snap4city.org/download/video/Snap4City-PlatformOverview.pdf

● SNAP4CITY FIWARE IMPACT STORY
https://www.snap4city.org/drupal/sites/default/files/files/FF_ImpactStories_Snap4City.pdf

● TUTORIAL
https://www.snap4city.org/577

● INNOVATIONS
https://www.snap4city.org/343

● MOBILE APPS
https://www.snap4city.org/489

● ARTIFICIAL INTELLIGENCE
https://www.snap4city.org/524

● ARTICLES
https://www.snap4city.org/78

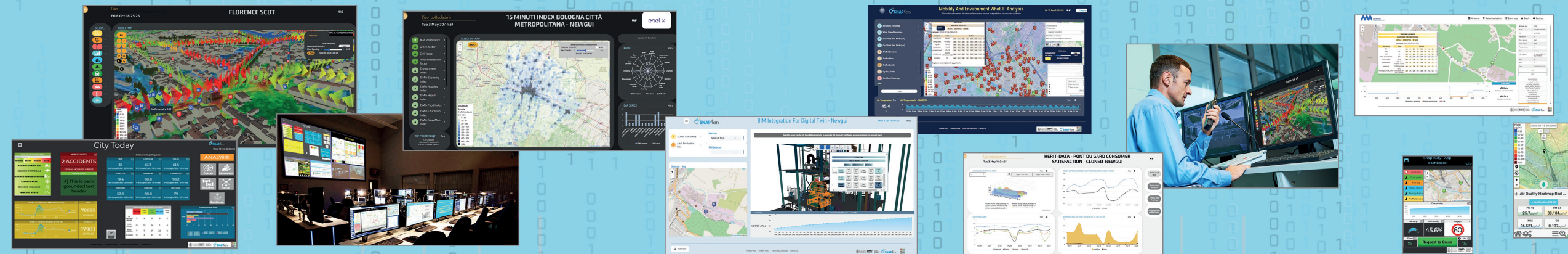SNAP4CITY — UNIVERSITÀ DEGLI STUDI FIRENZE — DINFO — DISIT

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SNAP4CITY

KM4CITY

SMART SOLUTIONS AND DECISION SUPPORT SYSTEMS

CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS - BUSINESS INTELLIGENCE - SIMULATIONS - SMART APPLICATIONS

DASHBOARDS - VISUAL ANALYTICS - SYNOPTICS - DIGITAL TWIN - GRAPHICAL WIDGETS - ANALYTICS - GUI CUSTOM STYLES - VISUAL PROGRAMMING
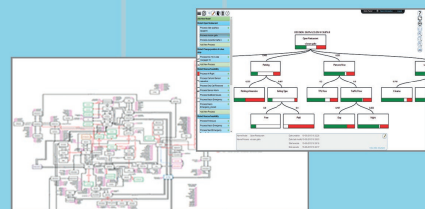

DASHBOARDS, WIDGETS TEMPLATES

PREDICTION - ANOMALY DETECTION - CLUSTERING - ROUTING - SENTIMENT NLP - TRAFFIC FLOW
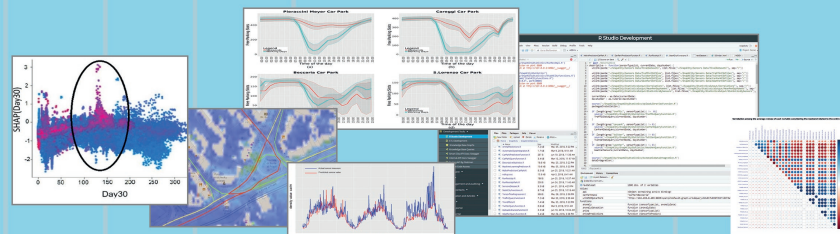**PEOPLE FLOWS - SDG - 15 MIN CITY INDEX - KPI - HEATMAPS - ORIGIN DESTINATION - ETC...**

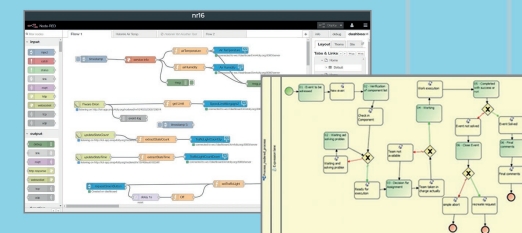**API - MICROSERVICES - GIS - BPM**
VIDEO - REPORTS - MAPS - 3D ...

ANY: DATA, BROKER, NETWORK AND VERTICAL

SMART CITY LIVING LAB

Native and External Applications

- **Smart Parking**
- **Smart Light**
- **Smart Waste**
- **Smart Energy**
- **Smart Building**
- **Smart Tourism**
- **Social Media Analysis**
- ...

EXPERT SYSTEM, KNOWLEDGE BASE
SEMANTIC REASONING
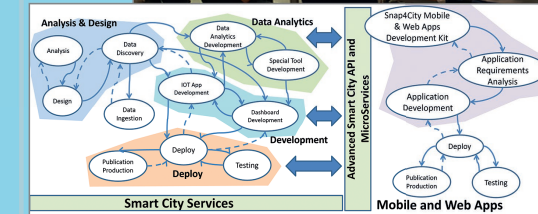**SMART DATA MODEL**
IOT DEVICE MODELS, STORAGE

BIG DATA ANALYTICS, ARTIFICIAL INTELLIGENCE
EXPLAINABLE AI, MACHINE LEARNING
OPERATIVE RESEARCH, STATISTICS

VISUAL PROGRAMMING, ADAPTERS
DATA FLOWS, WORKFLOWS
PARALLEL DISTRIBUTED PROCESSING
DATA DRIVEN

METHODOLOGIES
LIVING LABS
COURSES AND COMMUNITY
DEVELOPMENT TOOLS

INDUSTRY4.0
ENVIRONMENT
HEALTH
SECURITY
CONTROL ROOM
SATELLITE
PARKING
AGRICOLTURE
ENERGY
MOBILE
WASTE
BUILDING
TRANSPORT