



www.snap4industry.org

Super Automation

Horizontal AI Platform



Smart Energy

Generative AI

Operation and Plan

Artificial Intelligence

DIGITAL TWINS, BUSINESS INTELLIGENCE APPLICATIONS AND SERVICES



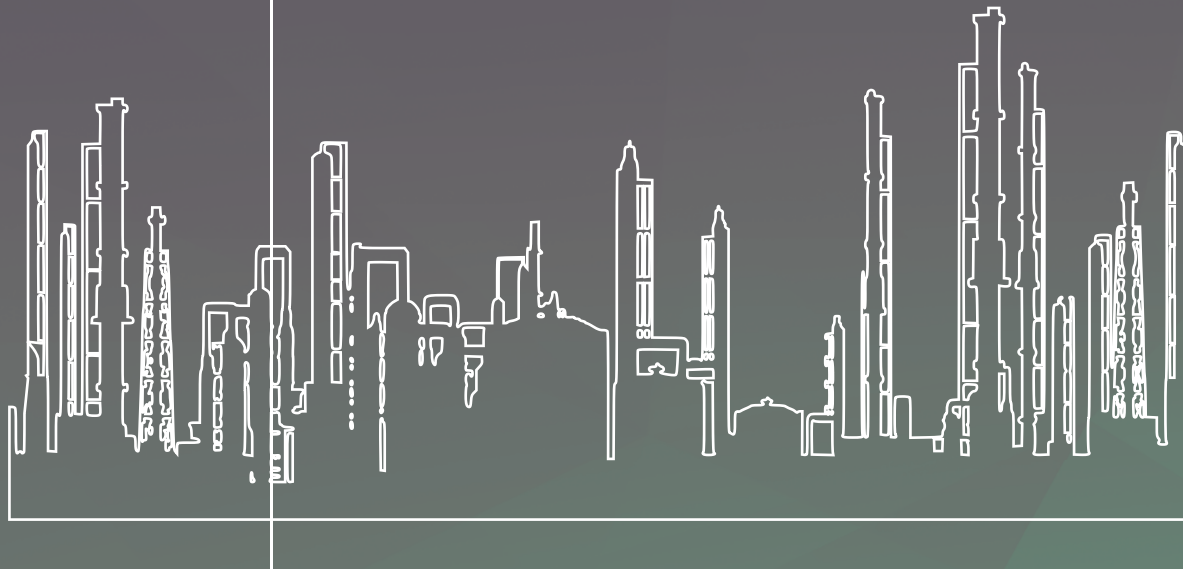
UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

2025/26

• Introduction	p.3
• Snap4Industry solution	p.4-7
• Main Solutions	p.8
• How it Works	p.10-13
• Adoption of Snap4Tech for Integrators	p.14
• Technical Architecture	p.15
• Benefits and Impacts	p.16-17
• Notes	p.18
• Useful Links	p.19



INTRODUCTION



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

Artificial Intelligence, Data Hubs, Business Intelligence Applications and smart Solutions are instruments to address marketing industrial evolution, economic challenges and control. Integrated BI/ AI solutions are replacing traditional applications being capable of exploiting a huge range of data channels, getting smarter, and cross exploiting data with AI techniques. A flexible AI based highly interoperable platform is needed to increase reactivity, sustainability, profits and full control of operational objectives, fully exploiting and overcoming legacy solutions, integrating administrative, marketing and productive aspects and indicators, and producing plans. Combining AI with Web/Internet of Thing (WoT/IoT) allows to overcome the approaches based on single data sources to rapidly becoming aware of actual data, behaviour, trends, and forecasts and this on needed actions exploring multiple possible directions in few seconds and capabilities of the Digital Twins for modelling and simulating all aspects of complex physical systems, for data driven what-if analysis and optimisation.

The use of the AI and data exploitation is pervasive in all fields of the industry: marketing, commercial, production, delivering, planning new opening of shops, reduction of emissions, management of fleets, monitoring and control the energy consumption, management, and preserving privacy, etc. DISIT lab with its Snap4 technology has a large experience on AI solutions from classic machines learning, ML, to deep learning, generative AI, reinforced learning, PINN (Physically informed Neural Networks), federated learning, Generative AI, LLM (Large Language Models), and XAI (eXplainable AI), can be make the difference in industry domain. The integrated approach of AI, simulation and data determined a change of paradigm, pushing towards the Digital Twins, also attributing to objects/things a large set of values and features in the digital world that enhance their capabilities beyond the limitations of their physical counterpart to be: simulated, manipulated, composed, viewed, transformed, copied, controlled, lend, etc., and to use them as instruments in other contexts. For example, the tags for tracking, the mobiles devices as sensors, the post on social media as sensor values, the digital twin as a sandbox for making what-if analysis and optimisation of your production process, the dashboards and Apps as receiver of action as actuators, etc.

Snap4Industry has leveraged the intelligence level of the applications and solutions. To this end, Snap4Industry allowed to exploit data, data spaces, data models with, providing business intelligence applications and AI services thanks to:

- **integrated AI support**, and ethics in multiple layers, producing predictions, prescriptions, suggestions and optimisations on a large range of your industry applications,
- **interoperability support** with different industry plants/sectors and productive scenarios in real time, harmonizing heterogeneous control systems, product life cycles, etc.
- **data management** solutions to respect privacy, GDPR compliance, ethics, exploit end-to-end secure solutions, passed the PEN tests.
- **powerful visual intelligence and simulation tools** including highly interactive and reactive graphics (closing the loop with AI) on dashboards, synoptics, notification, and mobile Apps, etc., accessible in any your place and device, to create from very simple to powerful AI applications.

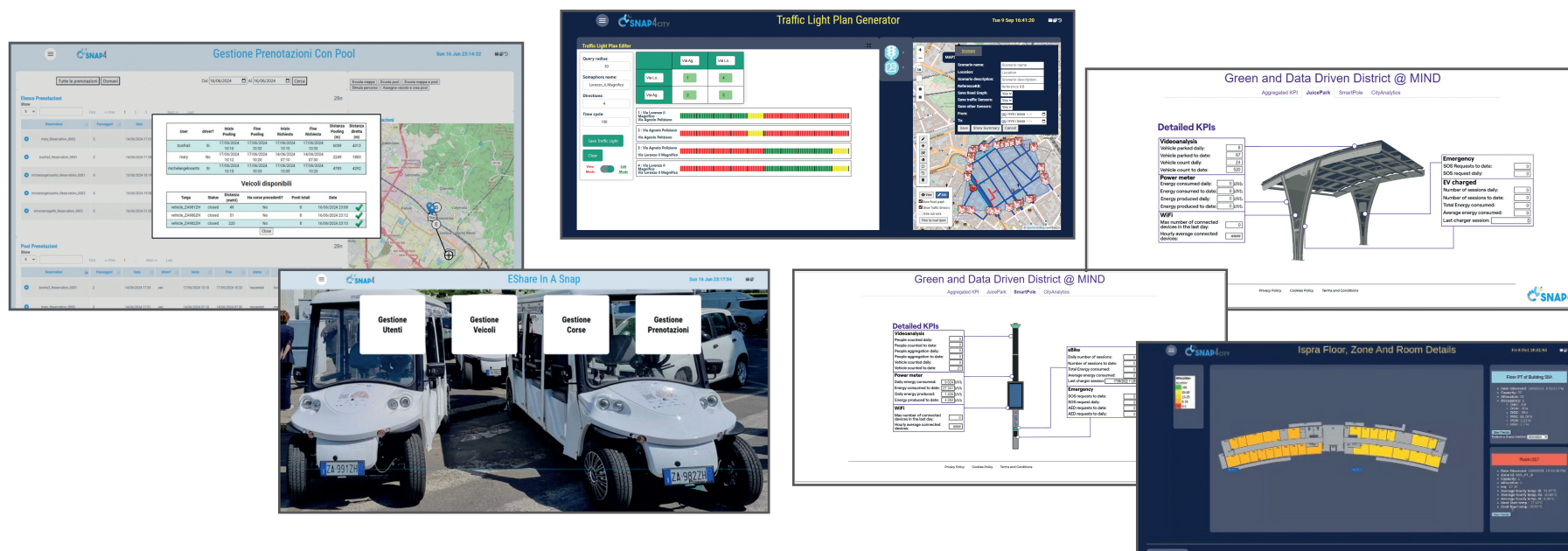
With **Snap4Industry**, multiple domains are enforced enabling operation, management, plan and strategic views for **energy, management, production, marketing, distribution and delivery, security, safety, environment, and asset management** for people and products/goods. Snap4Industry provides real-time and offline solutions to support decision makers 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 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 services.

Snap4Industry is a 100% open-source platform which provides fast and easy start up (on public and private clouds) thanks to its interoperability and automated installation tools. **Snap4Industry** is semantically interoperable with Km4City ontology (<https://www.km4city.org>) grounded on SAREF/S4CITY, WGS84, OTN, DCterms, GTFS, OWL-Time, FOAF, BOT, SSN, etc., is an official FIWARE Platform (<https://www.snap4city.org/467>, <https://www.fiware.org/>), compliant with FIWARE Smart Data Models, IoT Data Models, Data Spaces, and a large range of High-Level Types, official EOSC (European Open Science Cloud) Platform, official Node-RED Library, official E015 API, etc. Snap4Industry is provided "as a Service" or installed on premise, as well as on pub cloud as AWS, MS-Azure, ARUBA, etc., no licence fee is needed. The list of public Snap4Industry installations is accessible on web portal.

Snap4Industry platform has a number of Verticals and Applications ready to use as presented in the following. The platform facilitates a wide range of applications and IoT/IoE integrated domains: defining strategies, implementing control rooms, realizing ethics and explainable artificial intelligent solutions, computing key performance indicators, setting up solutions, harmonizing any legacy solution in place.

Cybersecurity and Privacy: Snap4 platforms are GDPR (General Data Protection Regulation of Europe Union) compliant, and passed **PEN-Test**. With Snap4 you can create your certified entities/ data, and sequences of events using the provided Blockchain support. End-2-end secure connections are established from devices to dashboards, web user interfaces, including data processing, storage and data analytics. <https://www.snap4city.org/549>. **Snap4Industry** is compliant with OpenID Connect, SSO, OIDC, SAML/IAM, European Identity Card, SPID, EU Login, Active Directory, etc. The platform is provided with its **Snap4 Sentinel** application to monitor 24/7 all the functionalities and report any kind of problem over multiple channels. An easy tool for Docker based installations of the platform is provided: <https://www.snap4city.org/738>.

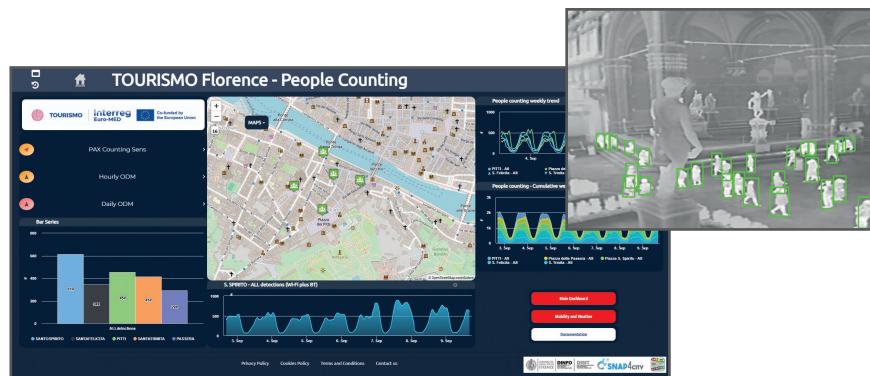
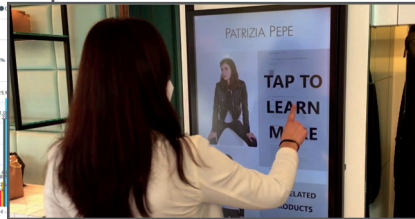
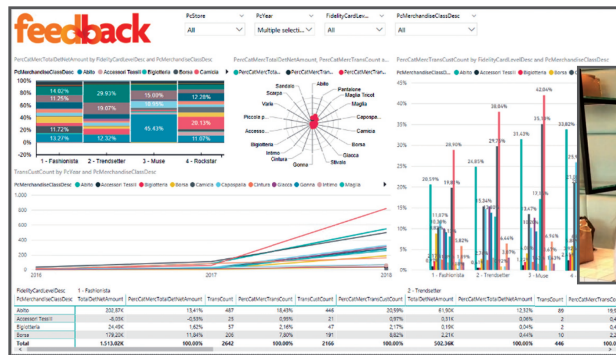
SNAP4INDUSTRY SOLUTION



Snap4Industry platform can cope with any data and information covering multiple domains / scenarios (<https://www.snap4city.org/4>) in integrated Digital Twins, coverage for requirements and providing functionalities for operational management, simulation, what-if analysis, optimization and plan, and in more details for the technical activities of:

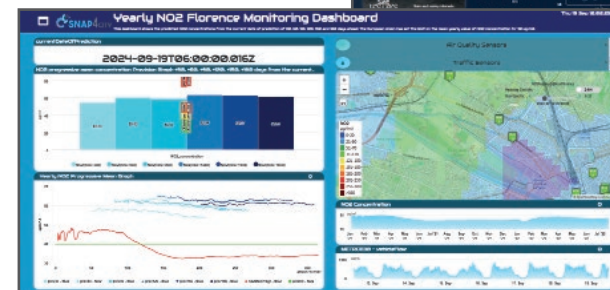
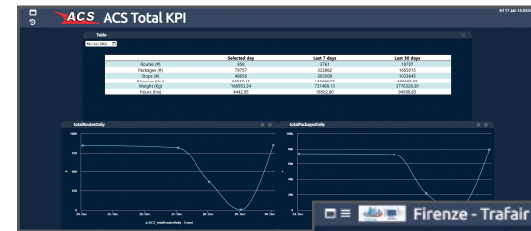
- **Processing huge number of documents, slides, web pages, etc.:**
- **Goals:** costs reduction, fastening processes, improve reliability
- **Operation at the support of marketing and management with the SnapAdvisor capable to dialogue on multilingual natural language:**
 - Fast analysis of requests/orders to produce formal offers
 - Keep under control a number of web pages to monitor competitors or market
 - Computing KPIs
 - **Mobile App:** notification on changes and productions, decision making from mobile app on the move.

- **Energy, eVehicles and Building's solutions and applications:**
 - **Goals:** Energy consumption reduction; increment of efficiency; areas and building sustainability; improve accessibility to services, security and safety
 - **Energy Monitoring:** Production processes, Building, floors, rooms, recharging poles, cabinets, Community of Energy, Data centres, Energy for Hot / cold, air condition, energy vs temperature and usage, etc
 - **Energy Management:** Predictions, early warning, identification of critical conditions
 - **Smart Building Management:** consumptions, number of people, communities of energy, photovoltaic plants, sustainability, ..
 - **KPI:** Energy consumption, efficiency; autoclave industrial plants optimisation, photovoltaic plant simulation; consumption / usage, energy vs temperature, ...
 - **Mobile App:** monitoring, info-recharge, eSharing, booking, notification on changes, ...

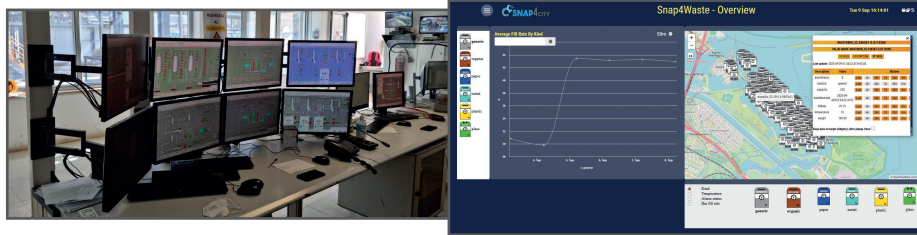


Mobility and transport solutions and applications:

- **Goals:** costs reductions, improve accessibility to services, improve Security/Safety of city users.
- **Operation and Plan:** fleet delivery optimisation, fleet monitoring, prediction, identification of critical conditions (early warning), dynamic routing, multimodal routing. Reduction of: travel time, waiting time, stops, CO2 emissions, consume fuel.
- **Sharing / Pooling Management:** eShare and mobile app, bike-sharing, smart bike, fleet management.
- **KPI:** travel time, emissions, traffic status, accessibility, ..
- **Mobile App:** final users and operators: Info Mobility, traffic, parking, charging, ...



- **Users' behaviour services solutions and applications:**
 - **Goals:** Costs reduction of services; Improve accessibility to services.
 - **People Flow Analysis / Management, optimisation of factory layout:** in/out-door, retail, attractions: counting, tracking, flows, origin destination matrices, sentiment, etc.;
 - Multiple sources: thermal & TV cameras, radar sensors, PAX sniffers, mobile data, Wi-Fi, traffic data, mobile phone data, card data, etc.
 - Suggestions: factory digital signages, engagement, ..
 - **Retail Management:** predictions of presences, services' reputations, suggestions on second offer, over-tourism mitigation, notifications, early warning.
 - **KPI:** over-crowded, suggestions, precision.
 - **Mobile App:** final users services/informing and operators; people flows, participation, engagement, ...



- **Environment and Waste Management solutions and applications:**
 - **Goals:** reduction of emissions and EC taxations;
 - **Environment Management producing prescriptions:** monitoring, long/short-term predictions, early warning: GHG, emissions, pollutants, aerosol, chemical plants analysis, land slide, coastal erosion (blue economy); impact emissions, predictions.
 - **KPI:** SDG, QOS, costs, Km, collecting time, EC KPI, emissions
 - **Mobile App:** final users services/informing and operators, participation, optimal routing, RAEE Collection, ...
- **Horizontal Platform, a decision support system, which may integrate all the above plus: governance, security, asset management, solutions and applications**
 - **Goals:** Increase quality of services; Sustainability; increase efficiency and production optimisation; Improve security/safety, risk reduction; costs reduction of services, energy consumption reduction; reduction of emissions and EC taxations.
 - **Horizontal homogeneous platform Uniform Technology for**
 - **Any Vertical operation/plan:** mobility, energy, security, infrastructure and assets control, buildings, etc.
 - **AI Solutions:** early warning, predictions, simulation, what-if, optimisation;
 - Deep Learning, ML, BERT, LLM, XAI (Shap/Lime), etc.
 - **Development Environment for any vertical, Digital Twin:** Global and Local DT, IoT, VR, business intelligence, Blockchain, etc.
 - **Interoperability:** any format, any protocol, any video management system, any sensor, any device, etc.
 - **KPI:** multidomain KPI, general management, early warning, early detection of critical conditions, etc.
 - **Mobile App:** modular applications, operators' modules, multiple cities, etc.

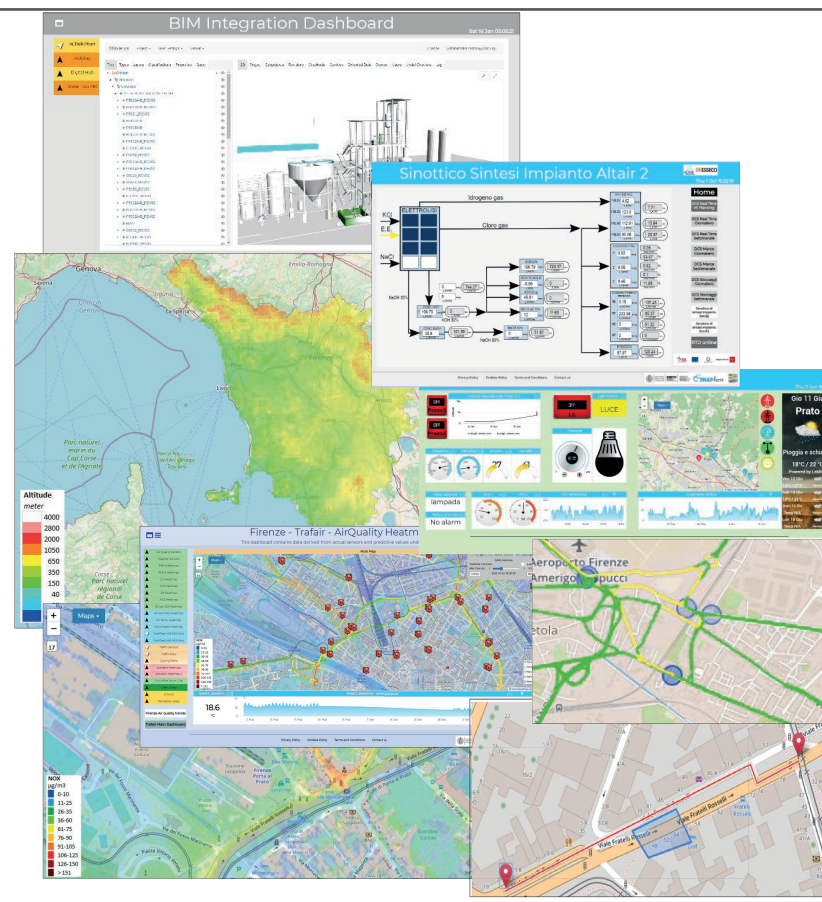
- **Industry 4.0:** depuration plants, production plants (monitoring industry plant, control and optimization, digital twin), production plant, predictive maintenance, integrated life cycles among different industry plant, such as on ALTAIR chemical plant, marketing analysis, production of suggestions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

Interoperability: In this enormous range of solutions, Snap4Industry is compliant with more than 190 protocols, formats, and modalities of work <https://www.snap4city.org/65> for example:

- **Industry:** OPC/OPC-UA, OLAP, ModBUS, RS485, RS232, ...
- **IoT:** NGSI V2/LD, LoRa, LoRaWan, NBIOT, MQTT, AMQP, COAP, OneM2M, TheThingsNetwork, SigFOX, Libelium, IBIMET/IBE, Enocean, Zigbee, DALI, ISEMC, Alexa, Sonoff, HUE Philips, Tplink, BACnet, TALQ, Protocol Buffer, KNX, OBD2, Proximus, ...
- **IoT model:** FIWARE Smart Data Model, Snap4City IoT Device Models, Data spaces
- **Database:** Open Search, MySQL, Mongo, HBASE, SOLR, SPARQL, ODBC, JDBC, Elastic Search, Phoenix, PostGres, MS Azure, OSM, ...
- **General:** HTTP, HTTPS, TLS, Rest Call, SMTP, TCP, UDP, SOAP, WSDL, FTP, FTPS, WebSocket, WebSocket Secure, GML, WFS, WMS, RTSP, ONVIF, AXIS TVCam, CISCO Meraki, OSM, Copernicus, The Weather Channel, Open Weather, OLAP, ...
- **Formats:** JSON, GeoJSON, XML, CSV, GeoTIFF, OWL, WKT, KML, SHP, db, XLS, XLSX, TXT, HTML, CSS, SVG, IFC, XPD, OSM, Enfuser FMI, Lidar, glTF, GLB, DTM, GDAL, Satellite, D3 JSON, ...
- **Mobility:** DATEX, GTFS, Transmodel, ETSI, ...
- **Social:** Twitter, FaceBook, Telegram, ...
- **Events:** SMS, EMAIL, CAP, RSS Feed, ...
- **OS:** Linux, Windows, Android, Raspberry Pi, Local File System, AXIS, ESP32, etc.

HIGH LEVEL TYPES

- **POI, IOT Devices, shapes, ...**
- **FIWARE Smart Data Models**
- **IoT Device Models**
- **GIS, maps, orthomaps, WFS/WMS,**
- **GeoTiff, calibrated heatmaps, ..**
- **Traffic flow, typical trends, ..**
- **Public Transport Services,....**
- **3D Models, BIM, planimetries,**
- **2D/3D Digital Twins, ..**
- **OD Matrices of several kinds, ..**
- **Vector Fields**
- **KPI, personal KPI,..**
- **Satellite data, microsatellite, ..**
- **Synoptics, animations, ..**
- **trajectories, events, Workflow, ..**
- **Dynamic icons/pins, ..**
- **Social media data, TV Stream,**
- **Routing, multimodal, constraints, ..**
- **City area scenarios,**
- **Measures on floors and maps**
- **etc.**



Snap4 provides open-source code for implementing Arduino, ESP32, Raspberry Pi, Linux, ARM, and Windows devices and solutions compliant with the platform and communicating in secure manner via TLS, HTTPS, WSs.

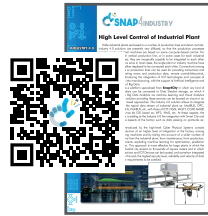
The interoperability, flexibility and modularity of Snap4Industry together enable the creation of business intelligence applications in a wide range of scenarios and domains. Snap4Industry enables the creation of federations of solutions via API. All Snap4 APIs are accessible and well documented for developers, allowing customization, usage and development of mobile and web Apps.

Data Integration, ingestion and distribution: Snap4Industry provides effective and simple to use tools and solutions for fast data ingestion and aggregation exploiting a large range of protocols and standards, and supporting any. Snap4Industry provides a large range of ready to use connectors (event driven, real time, push/pull) and High Level Types models for shortening the processes for manipulating simple and complex data such as *POI, KPI, IoT Devices/entities, Satellite, Digital Twins, BIM, OD Matrices, Flows, Heatmaps, 3D Shapes/patterns, Typical Time Trends, Color Maps, Trajectories, Video Streams, TV Cams, CAP events, Routings, User profiles, Maps, SVG graphics for synoptics, Scenarios, Vector Fields, 3D shapes, Payment Profiles, Payment Policies, user profiles, annotations on floors, Floors, etc.*

MAIN SOLUTIONS

● HIGH LEVEL CONTROL

<https://www.snap4city.org/546>



● BUILDING MANAGEMENT

<https://www.snap4city.org/970>



● SNAPADVISOR

<https://www.snap4city.org/1116>

● WASTE MANAGEMENT

<https://www.snap4city.org/982>



● PRODUCTION QUALITY CONTROL

<https://www.snap4city.org/815>



● VEHICLE MONITORING

<https://www.snap4city.org/545>



● SMART LIGHT MANAGEMENT

<https://www.snap4city.org/968>

● CAR SHARING/POOLING

<https://www.snap4city.org/1004>



● VMS INTEGRATION

<https://www.snap4city.org/966>



● ENERGY MANAGEMENT

<https://www.snap4city.org/1038>

The Power of Artificial Intelligence at the Service of Your Operation and Plan

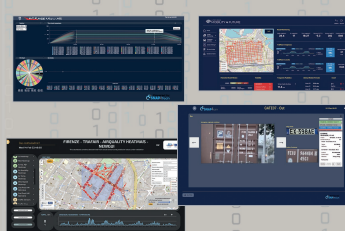
COMMERCIAL MARKETING AI ADVISOR DSS



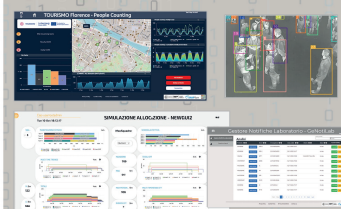
ENERGY, eVEHICLES, BUILDING



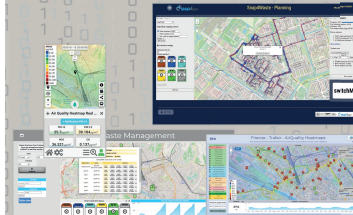
MOBILITY AND TRANSPORT



CUSTOMER BEHAVIOUR



ENVIRONMENT AND WASTE MANAGEMENT



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 ...

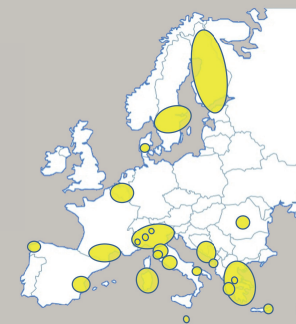
ANY: DATA, BROKER, NETWORK AND VERTICAL

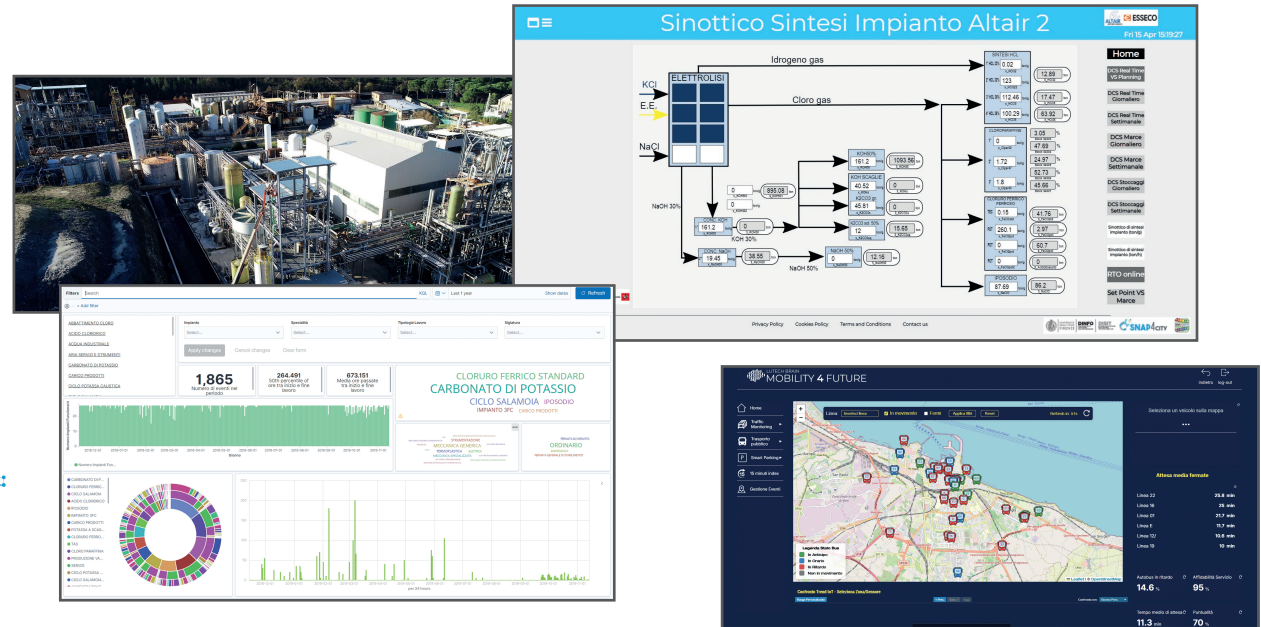
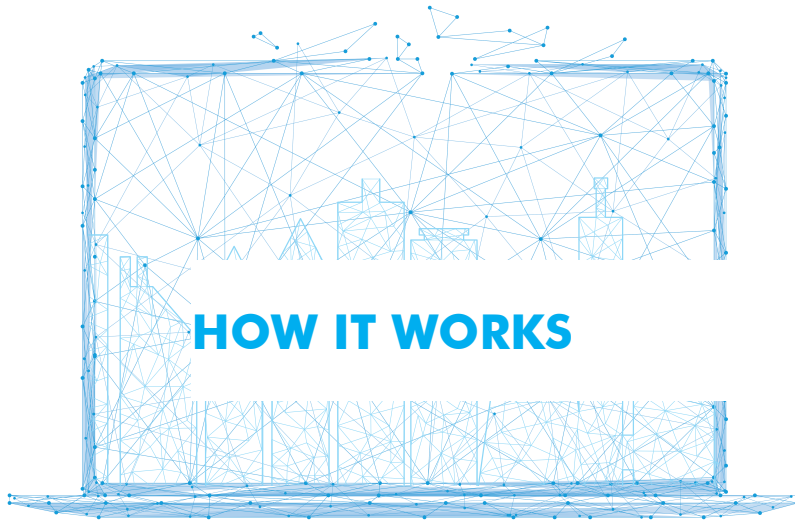
EXPERT SYSTEM, KNOWLEDGE BASE
SEMANTIC REASONING
SMART DATA MODEL
IOT DEVICE MODELS, STORAGE

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

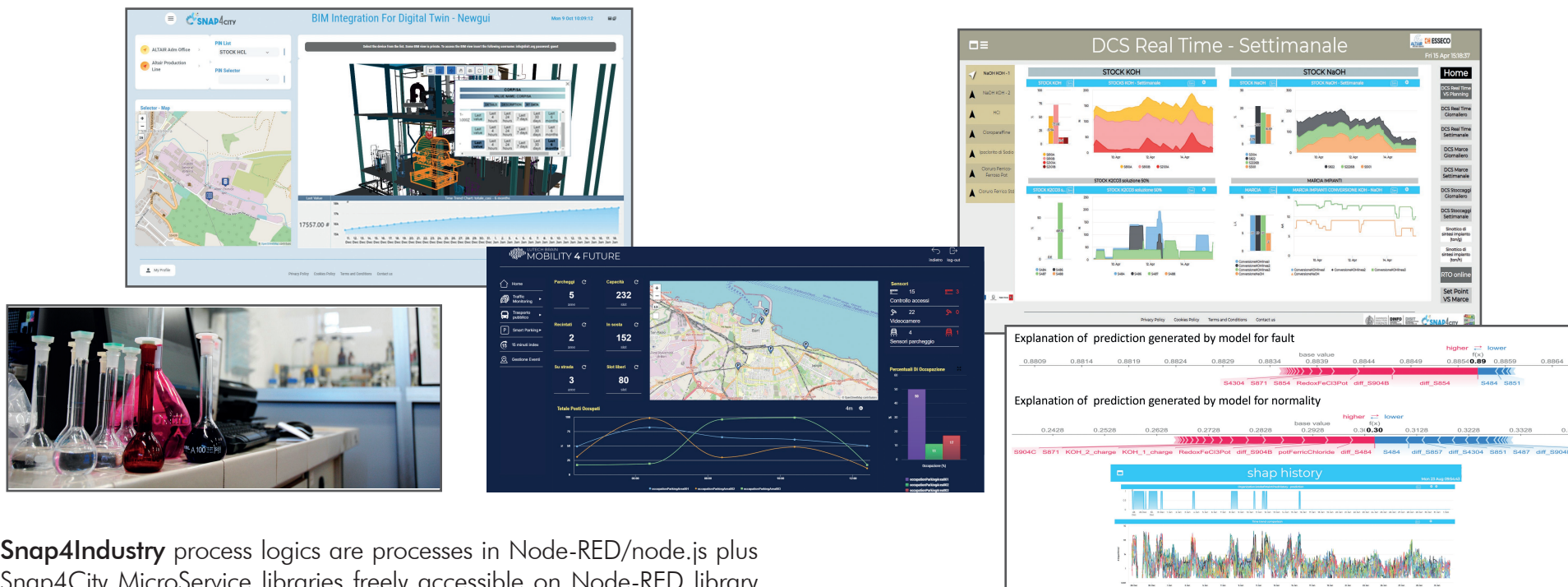




Snap4Industry provides a consolidated number of tools to manage the any data type, data sources and devices in a unified and effective manners:

- **A large range of Applications** providing business intelligence, visual analytics, AI support, optimisation, KPI, such as those listed in the previous section.
- **Data connectors** (administrative server, OPC-UA, ModBUS, social media marketing data, rest call, etc.) of any kind connected via IoT Brokers, Gateways and directly to IoT App in Push and Pull (Discovery, Telemetry, Inquire, Commands and Notifications).
- **Multiple brokers**, devices, Mobile Devices and edge devices can be connected and managed via the **Entity Directory**. Internal and external **Brokers** managed and harvested by the Directory.
- **Dashboards and control room applications** with business intelligence and logic.

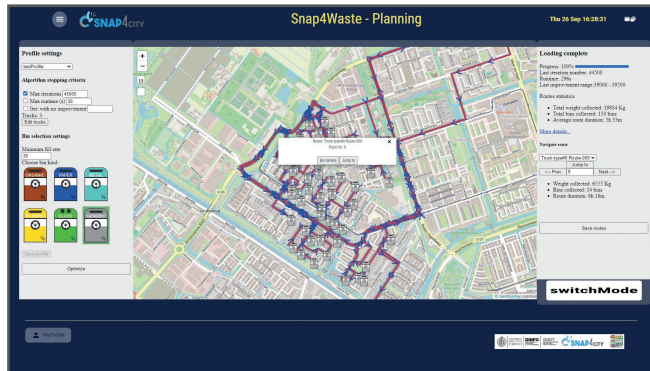
- **Artificial Intelligence based tools** running on NVIDIA and CPU/GPU clusters, and when needed also on HPC, as well as on cloud servers in Python, Rstudio and other languages. They can be developed or integrated by following a MLOps for scalable solutions.
- **Digital Twin Local**: representing 3D shapes of building, BIM, internal and external navigation, association of 3D elements to devices, IoT real time data, etc. <https://www.snap4city.org/716>
- **Mobile Applications** for mobility and transport, sharing, environment, participation, etc.
- **Edge Devices**: supporting the installation of **Snap4Industry** processes and interfaced in embedded systems, such as Linux based, windows based, Arm, AXIS cameras, Raspberry Pi, Android, etc. Remote Edge Devices can be maintained, also updating the logic of control and data processing based on Node-RED.



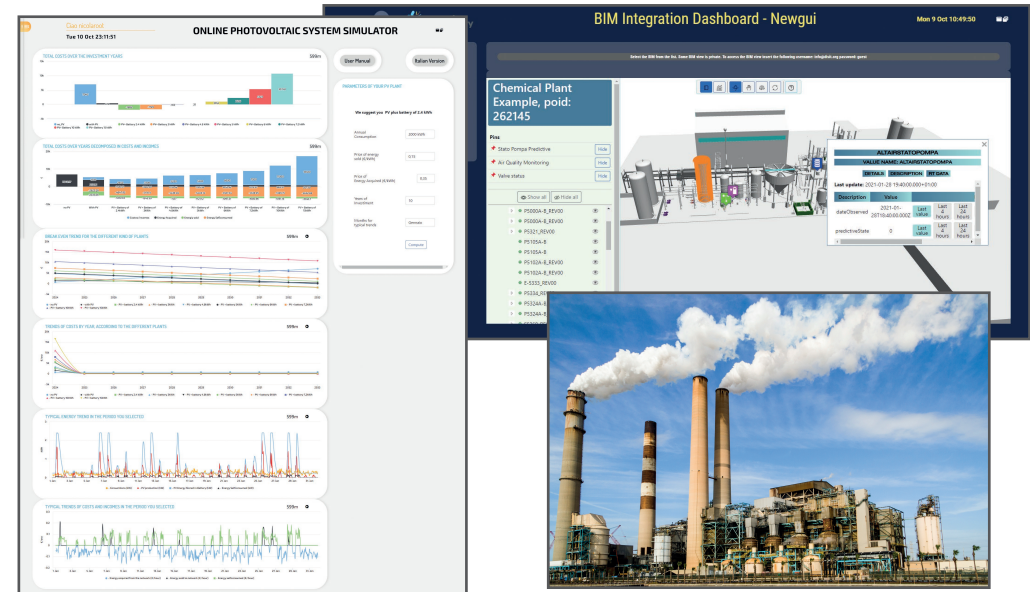
Snap4Industry process logics are processes in Node-RED/node.js plus Snap4City MicroService libraries freely accessible on Node-RED library listed as: user, advanced and tunnelling. The processes can be executed periodically, or on demand, event driven in real time and/or quasi real time as Agents, Business Logics, data back-office automations, event driven data management. It includes processes to produce data with respect to gateways, devices, brokers, services, Edge devices, etc., by using some protocol and format (such as JSON, XML, encoded, binary).

The **Snap4Industry/City** PPalette on Node-RED is based on MicroServices. Thus, Process Logic / IoT Apps are developed in visual programming data flow and/or data driven flows in Node-RED exploiting Palette of more than 190 MicroServices covering areas of: data ingestion, data conversion, directory, storage, AI, dashboards, protocols, communications, workflow integration, event driven, data analytics, social media, maps, geo reverse, routing, tunnelling via IoT edge, etc., and are used to implement:

- **processes** for: data gather, ingestion, harvest, crawl, aggregate, translate, transform, covert, collect, adapt, integrate, normalize, enrich, establish data entity relationships, complete, according to push and pull protocols.
- **migrations and transformations** of data among different installations and/or users of different Snap4 platforms and derived platforms.
- **business logs of event driven** user interface behind smart applications and dashboards via: Regular widgets as: single trend, time trends, Kiviat, barseries, buttons, knob, switches, donut, etc.; Custom Widgets and Synoptics,
- controls of **Data Analytics** as ML, AI and MLOps processes: parametrizing, scheduling, planning, optimization, early warning, predictions, simulations, etc.

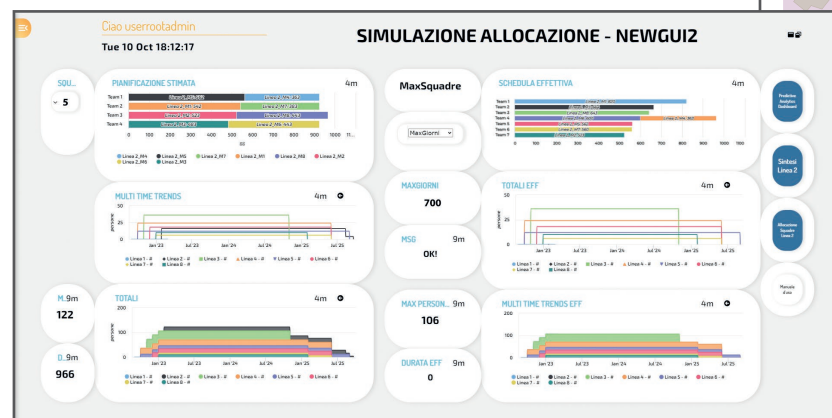


Snap4Industry also supports the most recent solutions for **Global Digital Twin**: representing and navigating in 3D, with shapes of the building, heatmaps and animations, devices, POI, KPI, etc. **Local Digital Twin**: representing 3D shapes of building, internal and external navigation, association of 3D elements to devices, etc. <https://www.snap4city.org/716> Snap4Industry Verticals, Applications, and Dashboards are based on Dashboard Builder and its Snap4 intelligence engine provides a wide range of AI functionalities to produce data hints (<http://www.snap4city.org/997>) including SnapAdvisor Generative AI, and interactively play with any variety of complex data via powerful graphic representations: maps, tables, time trends, heatmaps, heatmap sequences/animations, flows and animations, origin destination matrices and animations, typical trends, calendar heatmaps, Kiviat / spider, hierarchies, sunburst, bubbles, scatterplot, tree maps, Ven circle packing, chords, stream graphs, radial, barseries, custom widgets, animations, what-if scenarios, routing, weather forecast, BIMs, buttons, 3D shapes on local (building) and global Digital Twins (for the whole city), synoptics of any kind, dynamic / graphics PIN, trajectories, generative AI scenarios, payment profiles, fines, vector fields, services, etc.

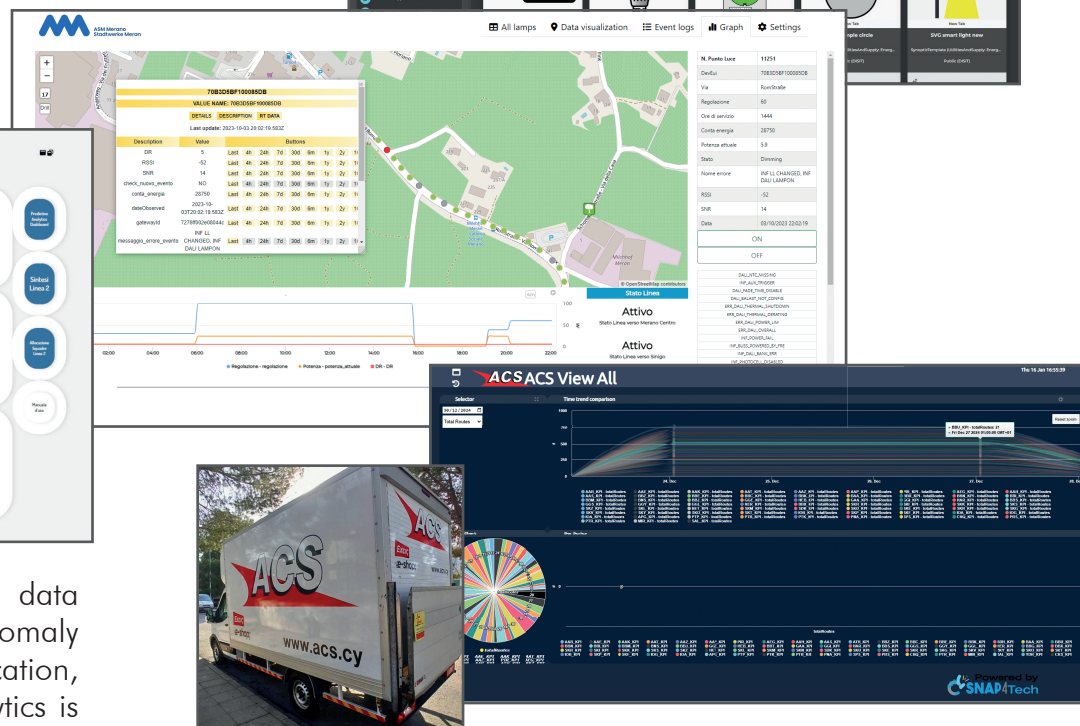
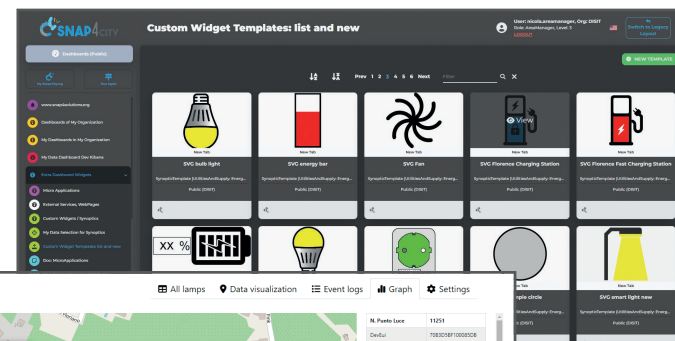


Dashboards/Views are easily created by means of the **Wizard** in a easy manner to create solutions, along with complex applications with multiple dashboards and tools, up to complete smart applications. They realize data-driven and event-driven solutions working in real time and provide interactive web tools and mobile Apps, for operators and final users.

Snap4Industry fully supports the development of **Artificial Intelligence**, ethic explainable artificial intelligent (XAI) via languages such as Python, Java, R-Studio, also exploiting Tensor Flow, Pandas, Keras, BERT, LLM, and any kind of library for AI, machine learning, deep learning, fine tuning, transfer learning, etc. Large scale AI development environment include MLOps facilities and clusters of GPU/CPU such as on Snap4City.org and for CN MOST. Large number of AI solutions is accessible: <https://www.snap4city.org/997>



Snap4Industry is distributing Open-Source platform, data analytics tools and algorithms for: prediction, anomaly detection, heatmap production, clustering, classification, match demand vs offer, and many others. Data Analytics is fully integrated into **What-If analysis and Optimisation tools** in control rooms and for operators, defining scenarios and solutions. Integrated tools with Snap4Industry are: VMS Milestone, Graphhopper routing, CKAN, Brokers, Node-RED, Cultron debug Node-RED, ClearML MLOps, ArcGIS, QGIS, Copernico, D3 library, NeTex, LOGraph, Jasper report, OpenMaint, BIM server, etc.



Security and Privacy: Snap4Industry platform passed the penetration and vulnerability tests and has been proven to be GDPR compliant. Snap4Industry provides end-2-end 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>

ADOPTION OF SNAP4 FOR INTEGRATORS

Trial for single users is open on Snap4City.org portal via a free registration.

Snap4Industry multitenant multidomain platform can be adopted by requesting the installation on your premise on public/private cloud or requesting a solution “as a service” from our or other public cloud. We can customize your Snap4Industry instance, integrate your legacies or preferred third party modules of any kind (they can be open source or proprietary). We provide H24 help-desk, maintenance according to consolidated SLA. Training for the adoption and usage of the Snap4City tools is provided and freely accessible on web. List of registered Snap4City installations: <https://www.snap4city.org/661>

Integrators and adopters can access to the catalogue of modules and services to compose their preferred version of Snap4Industry platforms. **Snap4 multitenant multidomain modular platform based on microservices** which can be installed on-cloud, on-premises and on hybrid solutions; via VM, dockers and Kubernetes, on AWS, Ms-Azure, etc. - all modules are licence free. An easy tool to get container-based installations is accessible from: <https://www.snap4city.org/738>. Snap4City provides a set of standard configurations from small standalone solutions to very large scalable installations. Typically, one starts small (e.g., using a Micro X) to progressively extended storage and redundancy with simple procedures. All the installations are endowed by dedicated tool for supervision and control. The so-called platform Sentinel.

Snap4Industry/City is distributed open source (Affero GPL) including the applicative layers, as providing all needed tools for managing: data, users, organizations/multitenant, resource, accounting, processes, auditing, high level types, reporting, multilingual, menu configuration, scheduling, alerting, quality

control, data inspection, reporting, view, verticals, applications, mobile applications, etc. The deploy of Snap4Industry/City includes also supports for: 2D/3D Digital Twin, smart application, dashboard control and usage, business intelligence, etc. Specific modules have to be installed to add AI engines, which can be installed as scalable and can be progressively extended, also to exploit clusters of CPU/GPU, HPC.

For the list of installed platforms see: <https://www.snap4city.org/661> which use the **Powered by Snap4Tech** logo in their installations. We may provide H24 help-desk, maintenance and/or second/third level maintenance for distributors and integrators worldwide. All the installed versions of Snap4Industry/City include also the development environment which allows you to develop data models, data processes, and dashboards; and data analytics with AI static environmen.

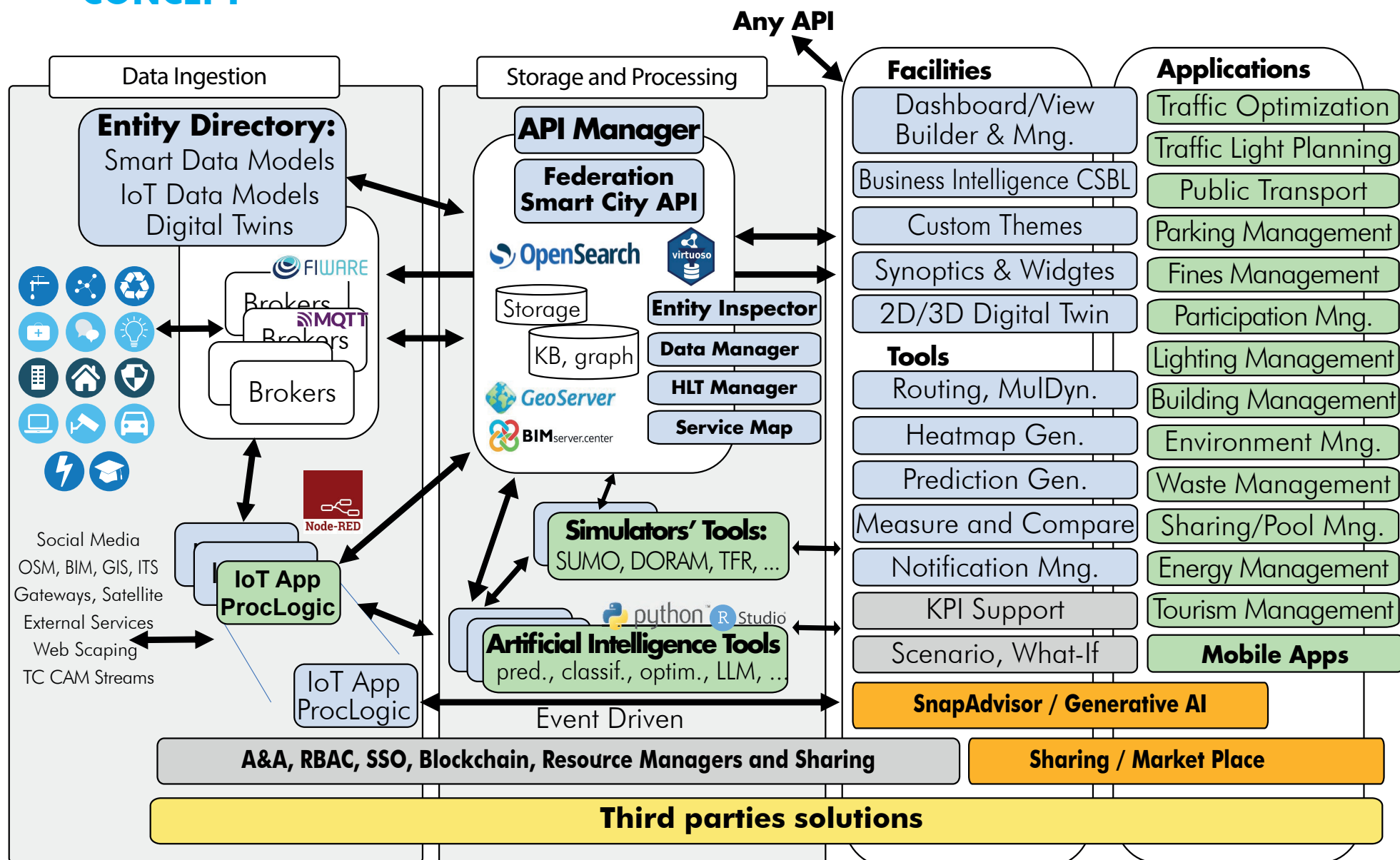
Training and Hackathons: The Snap4Industry/City community of developers and users is a source of stimulus and innovations. Snap4Industry/City provides an open, free of charge and comprehensive training course and on-line development open platform for testing and using the solution. The course is provided on slides, interactive slides and videos, and includes case studies from: <https://www.snap4city.org/944>. In most cases, for stimulating a larger local collaboration of stakeholder, hackathons have been launched, for example with Sii-Mobility, Select4Cities, and IEEE Intelligent Transportations Systems societies.

Special program for research institutions: Research no-for-profit institutions or foundations can set up agreement with DISIT Lab for exchanging researchers and/or becoming experts lab of Snap4City in your area. A setup support is provided free of charge to help them starting using the platform. The results produced are promoted by Snap4City according to different channels including the Snap4City users’ network and mailing lists.

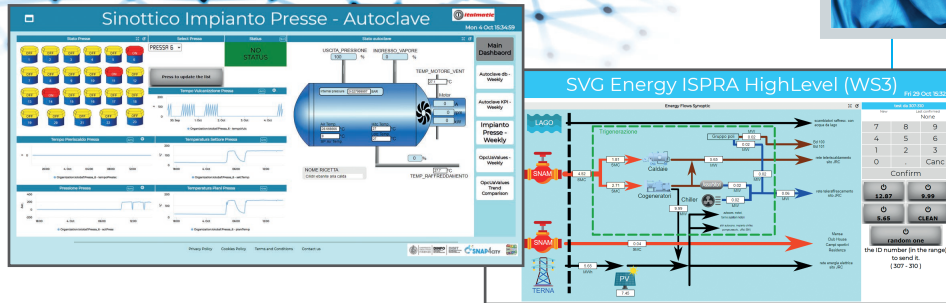
Snap4City provides a support for setting up Living Labs. The largest is on Snap4City.org. A consolidated methodology based on quadruple helix helps you setting up your smart city engaging stakeholders and final users.

Living Lab and working support with stakeholders.

CONCEPT



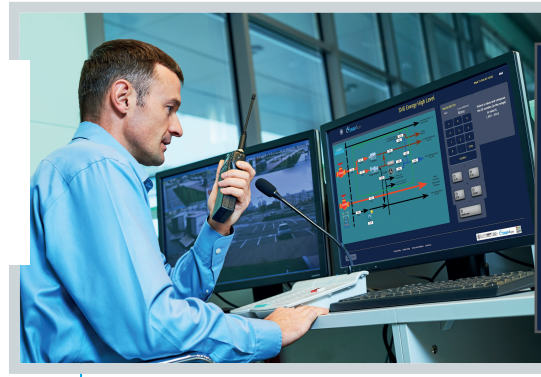
BENEFITS AND IMPACT



The usage of **Snap4Industry** has brought about improvements and has been of great benefit to a wide range of applications where it has been adopted for operational management, prediction and plans. The very low costs for its adoption and usage, has impressed many adopters, which may also add functionalities and perform changes by exploiting the visual tools. Adopter may delegate the maintenance to Snap4Industry or may take full control of the platform with limited effort.

In the following, some recent operational scenarios in which AI solutions of Snap4 are briefly described, more details descriptions can be recovered from the portal.

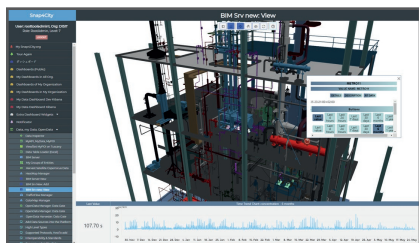
In **ALTAIR chemical** plant, Snap4Industry solution collect data regarding the H24/7 continuous production to support the quality control production process, providing notification, and getting feedbacks and decision from decision maker in real time. **Benefits:** improvement of product quality, reduction of processing time and costs. <https://www.snap4city.org/815>



In **Rhodes**, a Snap4City platform on premise, set up in collaboration with UNISYSTEMS, provide support for the control room and for a number of applications developed by multiple industries & vendors of the area. **Benefits:** reduction of costs, increment of services and quality of life. <https://www.snap4city.org/1052>

For **CN MOST** (national center on sustainable mobility in Italy), a Snap4City **national platform** named **Mobility4Future** provides solutions as a service for industry mobility operators which may use for providing services to small and medium cities regarding operation and plan for the reduction of congestion and emissions. To this purpose a number of AI tools of Snap4 are disposal of the cities such as: advanced routing, road infrastructure optimisation, traffic monitoring, simulation of traffic conditions, match demand and offers of public transportation, computation of SUMI, etc. See flagship actions as OPTIFaaS, LeverageOPTIFaaS, SASUAM. **Benefits:** reduction of congestion and emissions, reduction of costs for mobility planning, reduction of costs for KPI computing. <https://www.snap4city.org/1008>

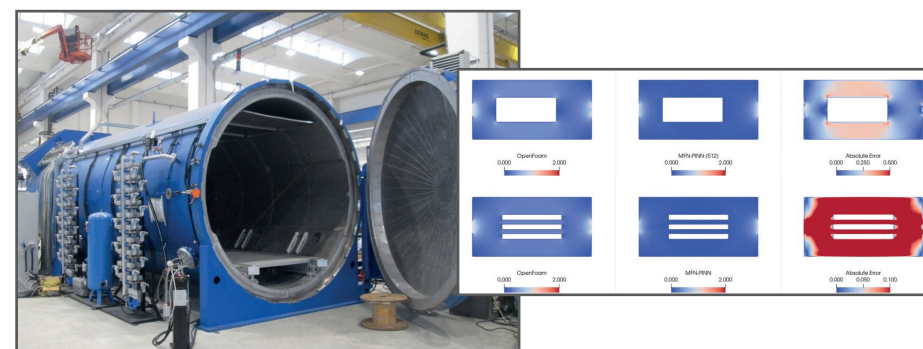
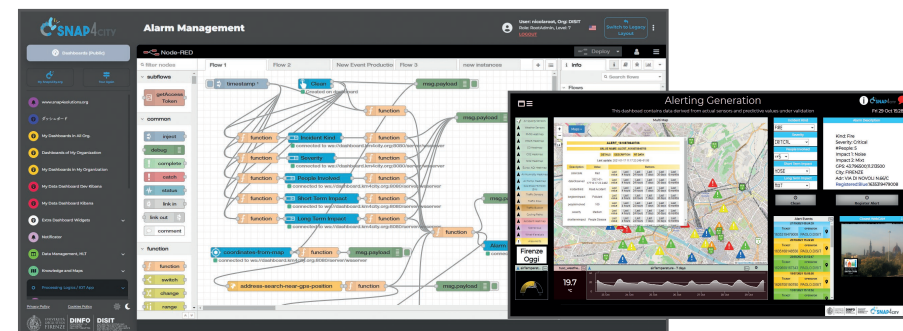
In **Cuneo**, a Snap4City platform on premise monitor and control ICT assets (switched, APC, TV Cameras) and security and by using special AI tools of Snap4City Plugin on AXIS thermal camera to count people and detecting critical cases and notifying events in real time. **Benefits:** reduction of costs, increment of security, increment of reliability. <https://www.snap4city.org/975>



In **ALMAFLUIDA**, Snap4Industry AI solution based on PINN have reduced the time for simulating complex fluid dynamics phenomena, thus reducing the costs of production and plan. In AMPERE, Snap4 solution has improved an industry 4.0 process among a number of production process industries reducing the costs and time of the tedious procedures along the value chain of production on multiple plants. <https://www.snap4city.org/709>

Several other installations and services have been performed in multiple cities and areas. See for a large list and for updates: <https://www.snap4city.org/4> and/or <https://www.snap4city.org/download/video/cov/>, installed Snap4 platforms <https://www.snap4city.org/661>

Snap4 technology has been adopted in a number of European, national and regional actions and projects: TOURISMO Interreg, AMMIRARE Interreg, ELLIE Horizon Europe, Tuscany X.0 EDIH, CAI4DSA of FAIR PE (national project on Artificial Intelligence for society), CN HPC big data and quantum computing (DI-DTPlatform, UrbanDR4TF), SMART3R-FLITS, SADI-MIAC, REPLICATE lighthouse H2020, RESOLUTE H2020, TRAFAR CEF, Sii-Mobility MIUR, SODA4.0 of ALTAIR, 5G MIUR, MOBIMART Interreg, HERIT-DATA Interreg lighthouse, Life Weee, IMPETUS, MOSAIC, AMPERE, Enterprise, PANACEA, ALMAFLUIDA, Energia, Bullvit, The Masterpiece, and PC4City, etc. These actions have involved a large number of partners from private industries and public institutions (cities, regions, universities, foundations) working and using Snap4City platform. For most of them, a dedicated web page is provided on main platform, see the news on these issues on <https://www.snap4city.org/135> Moreover, since a number of years Snap4City platform is on progressive adoption of the SOC of ISPRA JRC of the European Commission. Its capability and compliance to perform a huge number of integrations has been very useful in Merano, Cuneo, Valencia, Rhodes, Antwerp, Pisa, Malta, Livorno, Firenze, Modena, Santiago de Compostela, Pont du Gard, Dubrovnik, Lonato del Garda, Helsinki, Bisevo, Mostar, Varna, etc.



Awards: DISIT lab started the Snap4City line since 2013 with the first data integration for Florence city, and in the 2019, turned out to be the winner of the Select4Cities PCP of EU managed by Antwerp, Helsinki and Copenhagen, one year later won the ENEL-X open data challenge in 2020. Also, Herit-Data action with Snap4City platform received the Lighthouse flag from the European Commission. Currently, Snap4City is one of the platforms of the EOSC (European Open Science Cloud), library of Node-RED, CN MOST, CN HPC big data and quantum computing, etc., and DISIT Lab is a Gold Member of FIWARE and an official FIWARE Platform and Solution, certified Consultant, certified Trainer, provides two certified FIWARE Experts; member of GAIA-X; and recent best awards for Digital Twin platform for Smart Cities from DMS, and ICCSA communities, and from the observatory of Digital Twins of FBK and IFAB in the context of CN HPC big data and quantum computing.

● NOTES

www.snap4industry.org



UNIVERSITÀ
DEGLI STUDI
FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB

● SCENARIOUS

<https://www.snap4city.org/4>



● DIGITAL TWIN

<https://digitaltwin.snap4city.org/>



● ORGANIZATIONS

<https://www.snap4city.org/download/video/cov/>



● LATEST NEWS

<https://www.snap4city.org/135>



● INTEROPERABILITY

<https://www.snap4city.org/65>



● ARTIFICIAL INTELLIGENCE

<https://www.snap4city.org/524>



● APPLICATIONS / PROCESSING

<https://www.snap4city.org/997>



● ARTICLES

<https://www.snap4city.org/78>



● HOW TO INSTALL

<https://www.snap4city.org/738>



● SNAP4INDUSTRY

<https://www.snap4industry.org>



● CLIENT SIDE BUSINESS LOGIC

<https://www.snap4city.org/911>



● SIMULATORS

<https://www.snap4city.org/1053>



● DEVELOPMENT LIFE CYCLE

<https://www.snap4city.org/download/video/Snap4Tech-Development-Life-Cycle.pdf>

<https://www.snap4city.org/download/video/ClientSideBusinessLogic-WidgetManual.pdf>

<https://www.snap4city.org/download/video/Snap4City-MLOps-Manual.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





Powered by



CITY



INDUSTRY



ARTIFICIAL
INTELLIGENCE



SASUAM



Interreg



AMMIRARE

Marittimo-IT FR-Maritime



TOURISMO



SADI-MIAC



Funded by the European Union



FREE TRIAL



CONTACT

DISIT Lab, DINFO: Department of Information Engineering
Università degli Studi di Firenze - School of Engineering

Via S. Marta, 3 - 50139 Firenze, ITALY
<https://www.disit.org>

www.snap4industry.org

Email: snap4city@disit.org

Office: +39-055-2758-515 / 517
Cell: +39-335-566-86-74
Fax.: +39-055-2758570



UNIVERSITÀ
DEGLI STUDI
DI FIRENZE

DINFO
DIPARTIMENTO DI
INGEGNERIA
DELL'INFORMAZIONE

DISIT
DISTRIBUTED SYSTEMS
AND INTERNET
TECHNOLOGIES LAB