LIVING LAB

Snap4City per le Scuole

SCALABLE SMART ANALYTIC APPLICATION BUILDER FOR SENTIENT CITIES

Paolo Nesi, paolo.nesi@unifi.it
https://www.Km4City.org
https://www.disit.org
scalable Smart aNalytic APplication builder for sentient Cities: for Living Lab and co-working with Stakeholders

https://www.Snap4City.org

Snap4City per le Scuole

Full training course on:
https://www.snap4city.org/577

Paolo Nesi, paolo.nesi@unifi.it
https://www.Km4City.org
https://www.disit.org
Retails

Data: Public and Private, Static and Real Time

Private: user movements, social media, crowd sources, commercial (retail)
Public: infomobility, traffic flow, TV cameras, flows, ambient, weather, statistic, accesses to LTZ, services, museums, point of interests, ...

Smart City Engine

Challenges: Requests and Deductions

Public Admin.

Mobility Operators

Tourism Museums

Commercial: customers prediction and profiles, promotions via ads
Pub. Admin: detection of critical conditions, improving services
Tune the service, reselling data and services, prediction

API for SME

Services & Suggestions
Transport, Mobility, Commercial (retail), Tourism, Cultural

User profiling
Collective profiles
User segmentation

User Behavior
Crowd Sources

Personal Time Assistant
dynamic ticketing, whispers to save time and money, geoloc information, offers, etc.

API for SME
From Strategies to (re-)Actions

- Informing
- Suggesting
- Engaging
- Alerting, Early Warning
- Making Decision active
- New Plan

Governance: goals, directives, high level decisions, plans

Other Stakeholders

Operators

Smart City Engine

Data: Public and Private, Static and Real Time

Snap4City (C), November 2020
Data vs Smart Services enabling on Snap4City

- Public Transportation and mobility activated services in some where with Snap4City
  - Smart parking  
    (parking locations and real time parking data) ... predictions
  - Smart Fuel pricing  
    (fuel station locations and real time prices)
  - Routing  
    (detailed GIS information, text indexing of streets, POI, etc.)
    - Quite routing, perfect shopping, etc. etc. (more data in needed....)
  - multimodal routing  
    (detailed GIS information, Public transport time schedule)
  - Info traffic  
    (traffic flow sensors, real time Traffic events, their localization, etc.)
  - Dense info traffic  
    (traffic flow sensors and traffic flow reconstruction algorithm)
  - Car/Bike/Scooter Sharing  
    (position and availability of Cars/Bikes, Scooters) ... predictions
  - Smart Biking  
    (cycling paths, environmental data) ... predictions
  - E-vehicles  
    (position, status of recharging stations, ...) ... predictions vs booking
  - Smart river crossing  
    (position and status of Underpass, Ferry) ... prediction
  - Quality of Public Transport  
    (actual time of arrival at the bus stops, wrt planned time schedule)
  - Early Warning vs Resilience  
    (combination of several data including mobility, events, Social to perform early warning...)
Data vs Smart Services enabling on Snap4City

- **Social and Users Behaviour**
  - **Smart First Aid** (Location of First AID, real time status of triage)
  - search for POI and public transport services (POI geolocalized, spatial queries, along paths)
  - **Social Media Monitoring and acting** (Identif. of dysfunction, quality of service perceived)
  - **Information to Tourists** (Entertainment Events)
  - Early Warning, prediction of audience (Twitter data, social media)
  - Improvement of services for Tourists (people flow, usage of services)

- **Weather and environment, quality of life**
  - Weather forecast/condition (Weather forecast)
  - Air quality Pollution (pollution sensors, PM10, PM2.5, NOX, etc.)
  - **Pollination** (Pollination sensors)
  - Alerting on Air quality for multiple parameters (Prediction of parameters time slots, notification)
  - Information Heatmaps for weather and air quality (air quality sensors, heatmaps, prediction)
  - Air quality indexes, and forecast (...........................
**Firenze Oggi**

**Totale utenti WIFI**
- 43666
- 176 INSTALLATE
- 71 % ATTIVE
- 5.1 % IN USO

**Flussi Ingresso Città**
- 284094 VEICOLI

**Flussi Ingresso ZTL**
- 57499 VEICOLI

### Situazione Viabilità

<table>
<thead>
<tr>
<th>Incidenti</th>
<th>SMN</th>
<th>BINARIO</th>
<th>FORTEZZA</th>
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<td>28.7</td>
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### Analisi

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<td>Verde Pubbli...</td>
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<td>Decoro Urbano</td>
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<tr>
<td>Rifiuti</td>
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</tr>
</tbody>
</table>

[Link: https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQzOAO=]
Smart City Control Room
a set of dashboards and tools
Florence Case

- **Smart City Control Room**
- **Dashboards and Services**
- **Mobile App:** Firenze Where What

**Mobility:**
- quality of public transportation service (mean delay on bus-stops)
- public transport operators schedule and paths, routing, multimodal routing
- traffic flow reconstruction
- Smart parking: predictions
- Accidents and events, Log, heatmaps

**Environment:**
- smart irrigators
- smart waste
- Sensors: PM10, PM2.5, ....
- Heatmaps: PM10, PM2.5, ....
- NOX predictions

**Energy:**
- recharging stations (fast and reg.)
- consumption meters (smart info)
- smart light, street lights

**Weather**
- Forecast and actual

**Social:**
- smart benches
- Twitter monitoring, Sentiment analysis, NLP text
- TV camera streams

**People Flows:**
- Wi-Fi, people flow
- Origin destination matrices

**Governmental and Communications:**
- KPI of the City
- Digital Signage
- Civil protection, Resilience (Resolute)

**Tourism and Culture:**
- POI, etc.

**Analysis:**
- what-if routing, scenarios,
- traffic flow, environmental predictions
Traffic Flow Reconstruction for the cities

https://www.snap4city.org/dashboardSmartCity/view/index.php?id_dashboard=MjY3OA==

https://www.snap4city.org/dashboardSmartCity/view/index.php?id_dashboard=MjY4MQ==

Pisa

https://www.snap4city.org/dashboardSmartCity/view/index.php?id_dashboard=MjY4MQ==
Helsinki City Overview (H5a)

Please note that the data results are not always based on real data.

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNg==
Antwerp Case

- **Dashboards & Services:**
  - **Environment & Weather:** PM10, PM2.5, NO, SO2, CO, etc.
    - Heatmap & Alerts on critical
  - **Mobility:** public transport Operators schedule and path, monitoring of river crossing, routing, what-if
  - **PAX Counters:** museum and public services, mobile PAX Counter for events
  - **Social:** Twitter Vigilance, early warning
  - **Life in Antwerp:** OD matrix people flow, Twitter Vigilance SA, hot places, ...
  - **Tourism and Culture**

- **Mobile App and MicroApplications:**
  - Antwerp in a Snap (all stores)

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MTQwNw==
MyKPI: Tracking of Devices and Mobiles

- Real Time Trajectories for
  - Mobile Phone
  - Moving IOT Devices
  - OBU, Vehicular Kits
  - Multiple tracks
  - Day by day

- Micro Application

Apps

Mobile
PAX Counter

OBU

Mobile sensors

TrackerFordOBD2

Mon 7 Oct 19:03:57

OBD2 - Engine RPM - pL_val.LD_17A0E000B16B (783)
2085.3

OBD2 - Vehicle Speed - pL_val.LD_17A0E000B16B (783)
77.9

OBD2 - Engine Coolant Temperature - pL_val.LD_17A0E000B16B (783)
90

OBD2 - Intake Manifold Absolute Pressure - pL_val.LD_17A0E000B16B (783)
63.8
CANBUS sniffer

Tuscany in a Snap Mobile App on Android
Dashboards & Services:

GIDA 5G demo

Wed 16 Oct 23:01:00

13.4°C 1020 bar 87%
City Dashboard

Snap4City (C), November 2020

https://main.snap4city.org/view/index.php?id_dashboard=MTU1
Roma Demo3 (Qualità dell'Aria)

Andamento nel Tempo di NO2 rilevato nelle stazioni in Roma (stacked)

Dati in Tempo reale inquinanti in Roma e provincia

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=MjcyNg==
Andamenti Nazionali e Regionali infezione COVID-19
Sulla base dei dati della protezione civile, elaborazioni DISITLab

per evidenziare gli andamenti di vostro interesse: eliminare le curve che non interessano selezionandole in legenda.
Alcuni dati in passato non sono pervenuti alla protezione civile

3D Map beta Testing


6.6
num of vehicles
Custom Dynamic Pins

Custom Pins on Map - test GP

https://www.snap4city.org/dashboardSmartCity/view/index.php?iddasboard=Mjk5Mw==
Access to Event information

• Getting Traffic Events: ESB, etc.
• Getting Critical Events: CAP standard
• Getting Police events
• Getting Entertainment Events in the city
  – Theater, museum, show, sport, etc.
  – Getting Event details
    • Event kind, and thus ordering
    • in the day, week, and month
    • Location, and thus ordering, or selecting events per area, per residence
    • General information
    • Opening and cost (if any)
    • Etc.
**Snap4Home**

- Philips Hue: Controlling Lights
- Hue: Motion Control / Alarm
- TP Link: Controlling / Measuring Energy Plugs
- Alexa: Voice Control
- IOT Edge: Raspberry pi: Node-RED + Snap4City
- Measuring: Temperature, Humidity, light in the room
- Monitoring: CPU clock, status
- 5G gateway
- Internet
- Environmental Contextual data from the city.
- Historical Data, Remote Control, Mobile App

Snap4City (C), November 2020
Snap4Home 5G Demo
Snap4City & Snap4Industry Registered Instances
- Scenario: MODBUS for Snap4Industry Snap4City Applications
- Scenario: MOBiMART Interreg: MOBilità Intelligente MArE Terra
- Scenario: City of Roma case, mobility and environmental data
- Scenario: Herit-Data video and aims
- Scenario: Control Room vs Video Wall
- Scenario: Snap4Home the case of: Alexa, Philips, Sonoff, TP-link, etc. (Italiano)
- Scenario: how to manage maintenance and accidents workflows
- Scenario: Snap4Home, how to exploit Snap4City solution on home automation
- Scenario: Energy Monitoring
- Scenario: Multipurpose User Engagement Tools
- Scenario: 5G Enabled Water Cleaning Control (smart city, industry 4.0)
- Scenario: High Level Control of Industrial Plant (industry 4.0)
- Scenario: Vehicle Monitoring via OBD2
- Scenario: Events and Museums Monitoring in Antwerp
- Scenario: High Resolution Prediction of Environmental Data
- Scenario: Mobility and Transport Analyses in multiple cities
- Scenario: People Flow Analysis via Wi-Fi
- Scenario: Antwerp Pilot on Environmental Data
- Scenario: Helsinki Pilot on Environmental Data
- Scenario: Firenze Smart City Control Room
- Scenario: Mobile & Web App: Toscana Where What ... Km4City, Toscana in a Snap
- Scenario: Helsinki Pilot on User Behaviour
- Scenario: Antwerp Pilot on User Behaviour

Data Analytic: Origin Destination Matrices, Algorithms and tools
Data Analytic: Traffic Flow Reconstruction
Data Analytic: in general, and the cases of Antwerp and Helsinki
Data Analytic: Predicting Air Quality
Data Analytic: Analyzing Public Transportation Offer wrt Mobility Demand
Integrated Urban Platform

• Produce value from data supporting Living lab
  – Stimulate virtuous behavior, influence City Users!
  – Put in action CITY Strategies

• Data Exploitation performing
  – predictions, reasoning, business intelligence, ..
  – users behavior analysis, decision support system, ..
  – Control Room, Real Time Monitoring tools, ....

• Aggregate & integrate data
  – Multiple protocols from urban operators, ....
  – open data, IOT, sensors, internet of everything, cloud, mobile devices, Wi-Fi, social media, ...
From Strategies to (re-)Actions

• Informing
• Suggesting
• Engaging
• Alerting, Early Warning
• Making Decision active
• New Plan

Smart City Engine

Governance: goals, directives, high level decisions, plans

Other Stakeholders

Operators

Data: Public and Private, Static and Real Time

Competitive environment
Road Graph (Tuscany region)
132,923 Roads, 389,711 Road Elements
318,160 Road Nodes, 1,508,207 Street Numbers

Info on: points, paths, areas, etc.
Services (20 cat, 512 cat.)
16 Public Transport Operators
21,280 Bus stops & 1081 bus lines

Dynamic/real-time in Tuscany Region
- Real time bus lines: 144 updates X day X line
- 1081 Transport Pub Lines: 1-2 up per day, time-path
- >210 parking lots status: 76 updates X day X sensor
- >796 traffic Sensors: 288 updates X day X sensor
- 285 weather area: 2 updates X day X area
- >12 hospital Triage status: 96 updates X day X FA
- 22 Environmental data: 20 updates X day X sensor
- 39 Bike Sharing data: Pisa and Siena
- 12 Pollination data
- 140 recharging stations
- Smart benches, waste mng, irrigators, lighting,…
- Florence ent.events: about 60 new events X day
- Different kinds of Florence traffic events,
  [1600 Fuel stations: 1 update X day X station]
- Wi-Fi: > 400,000 measures X day
- App mobiles: >50,000 measures X day
- more than 40,000 distinct users X day
- From 600,000 to 4.5 M Tweets X day
- many IOT sensors ……

http://servicemap.km4city.org
What is enabling and providing smart services

- Smart Parking, in Tuscany
- Smart First Aid in Tuscany
- Smart Fuel pricing in Tuscany
- Smart search for POI and public transport srv.
- Public Transportation in Tuscany
- Routing in Tuscany
- Social Media Monitoring and acting
- Traffic events and Resilience in Florence
- Bike Sharing in Pisa and Siena
- Recharge stations for e-vehicles
- Entertainment Events in Florence
- Traffic Sensors in Tuscany
- Weather forecast/condition in Tuscany
- Pollution and Pollination in Tuscany
- People Monitoring Assessment in the City, in Florence via WiFi
- People Monitoring, in Tuscany via App

All Point of Interests, cultural activities, IOT, ...
Over than 1.2 Million of complex events per day!
Overview

Snap4City Living Lab as Dev. Env.
DASHBOARDS AND APPS - CONTROL ROOMS - DECISION SUPPORT SYSTEMS - WHAT-IF ANALYSIS

EXPERT SYSTEM KNOWLEDGE BASE STORAGE

BIG DATA ANALYTICS ARTIFICIAL INTELLIGENCE BUSINESS INTELLIGENCE MACHINE LEARNING

DATA FLOWS, WORKFLOWS MICROSERVICES MANAGEMENT

METHODOLOGIES COURSES AND COMMUNITY LIVING LABS DEVELOPMENT TOOLS

Snap4City (C), November 2020
Welcome: how to start using Snap4City for beginners

Snap4City developers suggest you reading:

If you are not registered please apply for a free registration from https://www.snap4city.org and then pass to ACCESS AT THE TOOLS and full Snap4City environment.

Snap4City puts in the hands of City Users a flexible environment to quickly create a large range of smart city applications/views exploiting heterogeneous data and services of stakeholders by ICT/IOV big data technology. For Snap4City, City Users can be citizens, students, operators, researchers, decision makers, developer, etc. see User Roles:

- Manager: a final user, the capability of accessing and creating Dashboards with a large set of data (high level types: SC, POS, sensors, KPI, micro applications, external services, etc.), attaching alerts and notifications; registering IOV Devices; creating IOV Applications exploiting Microservices: loading and sharing data sets; managing personal and annotated full access to documentation, helpdesk, FAQ, covering; managing personal profile and data according to GDPR; Note: accessible features are mainly simple and useful to access and to use, and provide a limited number of parameters on each dialog for each action.
- AreaManager: in a Developer/researcher, students, city operator, with additional capabilities with respect to the Manager to: register ICT Brokers; creating advanced Snap4City projects; create massive data transformation processes; create data analytics in multiple languages, testing, managing Snap4City; load data sets; share data; accessing the project's back office. Note: technical details and views are fully accessible.

Suggested activities to be performed HOW TO use Snap4City:

This page guide you along few steps and how the solution allows you to incrementally pass from Level 0 to 5, from a Manager to an Area Manager:
- Level 0: access to data/services views of the city by using public Dashboards; (Public User)
- Level 1: create personal/professional views/Dashboards on data (Manager User)
- Level 2: use what a Manager can do (Manager User)
- Level 3: see how Dashboards can be created (Manager User)
- Level 4: manage personal/professional data views/Dashboards on data (AreaManager User)
- Level 5: create personal/professional views/Dashboards on data (AreaManager User)
Snap4City - scalable Smart aNalytic APPlication builder for sentient Cities

Smart Cities need to set up a flexible Living Lab to cope with the city evolution in terms of services and city users' needs and sustainability. Snap4City solution [https://www.snap4city.org](https://www.snap4city.org) provides a flexible method and solution to quickly create a large range of smart city applications exploiting heterogeneous data and enabling services for stakeholders by IOT/IoE, data analytics and big data technologies. Snap4City applications may exploit multiple paradigms as data driven, stream and batch processing, putting co-creation tools in the hands of: (i) Smart Living Lab users and developers of solutions to develop applications without vendor lock-in or technology lock-in, (ii) final users customizable / flexible mobile Apps and tools, (iii) city operators and decision makers specialized / sophisticated city dashboards and IOT/IoE applications for city status monitoring, control and decision support. Snap4City satisfies all the expected requirements of Select4Cities challenge PCC and much more, and it is 100% open source, scalable, robust, respects user needs and privacy; provides MicroServices and easily replaceable tools, compliant with GDPR; provides a set of tools for knowledge and living lab management; and it is compliant with ETSI Smart City framework. It is also supported by selected cities of Europe and the Smart City World Congress.
## On Line Training Material (free of charge)

<table>
<thead>
<tr>
<th>PDF</th>
<th>Interactive</th>
<th>Video1</th>
<th>Video2</th>
<th>Video3</th>
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<td>IOT App, IOT Network</td>
<td>Data Analytics</td>
<td>Data Ingestion processes</td>
<td>System and Deploy Install</td>
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[https://www.snap4city.org/577](https://www.snap4city.org/577)
Development Life Cycle
Smart City Services

Analysis & Design

Data Ingestion

Data Analytics

Development

Deploy
Develop Mobile & Web Applications Exploiting Snap4City Smart City Services

Smart City Services

Analysis & Design
- Analysis
- Design
- Data Discovery
- Data Ingestion

Data Analytics
- Data Analytics Development
- IOT App Development
- Dashboard Development
- Special Tool Development

Advanced Smart City API and MicroServices
- Snap4City Mobile & Web Apps Development Kit
- Application Requirements Analysis
- Application Development

Development
- Deploy
- Testing
- Publication Production

Mobile and Web Apps
- Deploy
- Testing
- Publication Production
Cloud vs Fog/Edge Computing
Snap4City Services on Edge and on Cloud
IOT Devices and IOT Networks of any kind
IOT Devices

LoraWAN + Arduino + I2C, NGSI

Arduino, Wi-Fi, NGSI

Snap4All IOT Button
ESP, NGSI, Wi-Fi, BT

Snap4All PAX Counter
LoraWAN
WIFI, NGSI, GPS

Any Sensor / Actuator
Open to other protocols

IOT Edge Devices

IOT Edge NodeRED:
Raspberry Pi, NGSI, WiFi, RJ45,..

IOT Edge NodeRED:
Android, LINUX, Windows, ...

LoraWan Gateway:
IOT Edge, NGSI, WIFI, RJ45, GPS
IOT Device with Arduino

- Arduino Uno
- Wi-Fi shield, standard
- Mutual Authentication with certificates, or K1,K2,sha
- Secure encrypted connection, NGSI
- Open Source
- Fully Customizable
  - Any sensor
  - NGSI or any other protocol

Snap4City (C), November 2020
Lora IOT Device, Arduino

• Arduino Uno, Mega
• LoraWan Connection
• Any sensor, + I2C
• Fully Customizable
• Open Source
• NGSI or any other protocols
• Gateway: Lora-NGSI Snap4

https://www.snap4city.org/216
Snap4All IOT Button

• Multi Wi-Fi
• Ready to use BLE
• ESP based, cheap & easy
  – low/no energy consumption/ standby
• Mutual Authentication with certificates, or K1,K2,sha
• secure encrypted connection, NGSI
• Open Source, Fully Customizable
• HW extensible to sensors

version: 3

https://www.snap4city.org/drupal/node/276
https://www.snap4city.org/drupal/node/297  help config
PaxCounter devices

- Fixed PaxCounter LoraWan
  - Based on Wi-Fi- Bluetooth

- Mobile PaxCounter LoraWan
  - Based on Wi-Fi- Bluetooth

- Fixed PaxCounter (LoraWan+Wifi out)
  - Based on Wi-Fi- Bluetooth

https://www.snap4city.org/drupal/node/456
Libelium

- PM10
- Temp
- Humidity
- Pm2.5
- NO
- NO2
- CO2
- Etc.

https://www.snap4city.org/659 how to set up on Snap4City
SigFOX: example of a development platform
IOT Network Manager vs Final User

Network of IOT Brokers

IOT Broker

External

Internal

Registering

Knowledge Base, Km4City

Knowledge and Storage Data from the Field and City

Discovering

IOT Directory

Registering

Browsing

IOT Network Manager

Discovering

IOT Directory

Discovering

IOT Directory

Dashboard Wizard

Final user Manager

My IOT Device

Register

ServiceMap

Knowledge Base

Knowledge and Storage Data from the Field and City

Discovering

IOT Application
IOT Edge on Raspberry Pi

- Raspberry Pi
- Mutual Authentication with certificates
- Secure encrypted connection
- IOT Application inside
- Any sensor
- Any protocol from IOT devices
- NGSI or any other protocol
- Fully Customizable
- Local and Cloud Dashboard
- **Special MicroServices**
IOT App for Data Ingestion and Data Transformation
Basic Node.js Blocks on NodeRed on our Advanced IOT Apps

+ on IOT Edge Raspberry
Aug 2020 collection
Two Snap4City Libraries

https://flows.nodered.org/search?term=snap4city
Aug 2020a collection
Two Snap4City Libraries

We suggest also to install:

https://flows.nodered.org/search?term=snap4city
Developing IOT Applications

MicroServices collections
My IOT Applications
IOT App. Editor
Generating IOT App With Dashboard
Sharing/saving reusing IOT App
Resource Manager

ServiceMap Discovery
Dashboard Collection, Editor and Wizard

Knowledge Base, Km4City

Snap4City (C), November 2020
Integrated DataGate/CKAN
Static open data ingestion

Federated Crawling
Federated Distribution

Data Set:
- Search
- Loading
- Download
- Share
- Publish
- Also automated

Automated data regularization
Data Analytics if needed
User Behaviour Analyser

Hot places, trajectories, heatmap
Anomaly Detection

Accidents vs Traffic

Accidents Density
### Free Parking Predictions

**Careggi car park**

<table>
<thead>
<tr>
<th>Model features</th>
<th>BRNN model results</th>
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<td><strong>Baseline + Weather</strong></td>
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<tr>
<td><strong>Baseline + Traffic sensors</strong></td>
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</tr>
<tr>
<td><strong>Baseline + Weather + Traffic sensors</strong></td>
<td>0.975</td>
</tr>
</tbody>
</table>

**Active on Mobile Apps as:**

- «Firenze dove cosa»
- «Toscana dove cosa»

Precision: 97,5%
Data Analytics Dev. in R Studio and/or Tensor Flow

- Swagger
- SPARQL, FLINT
- Knowledge Base, Km4City
- LOG.disit.org
- Ontology Schema
- Big Data Store Facility
- Smart City API from Knowledge Base and other tools
- Creating MicroServices
- Using them into IOT Applications
- Saving / Sharing reusing
- Resource Manager
Data Analytics Development in Python, ..
Dashboards and Business Intelligence
Dashboard List and Editor
Select the area of your interest: panning and zooming
- Select the
  - graphic aspect of your interest, or
  - High Level Type of your interest, or
  - Make a search if you have a precise idea or
  - Act on filters: nature, subnature, type, name, value, date, health, owner, …
  - Combine them as you like
- Select the lines of your interest
- Then click on Next and get the Dashboard by wizard
The Wizard helps you in selecting only possible combination of data vs graphic representation.
Dashboard Embedding

- go in Dashboard Edit
  - Get code for embedding
  - Providing domain on which you embed
  - See Iframe preview

- Dashboard properties
  - we suggest set Responsive
  - deciding on header On Off
  - Adjust size of Iframe and dashboard for tuning
Dashboard Development

- IOT Applications
- Knowledge Base, Km4City
- Knowledge and Storage
  - Data from the Field and City + MyKPI ++

Dashboard Wizard
- Create, save, load, delegate, grant access

Widget Collection
- Micro Applications
- External Services
- Custom Widgets/Synoptics

Dashboard Editor
- Public Dashboard Collection
- My Own Dash/App
Special Custom Widgets

- Smart parking
- Smart Energy
- Smart Light
- Smart ....
- Energy View
- Custom Controls
From-To Custom Widgets / Synoptics to Storage in WS

MyKPI

Sensors

MyKPI

Sensor

New Shared Variables

Constant Values
Web and Mobile App Development
The App is a Bidirectional Device

- GPS Positions
- Selections on menus
- Views of POI
- Access to Dashboards
- Searched information
- Routing
- Ranks, votes
- Comments
- Images
- Subscriptions to notifications
- ...

Produced information
- Accepted?
- Performed?
- ...

Derived information
- Trajectories
- Hot Places by click and by move
- Origin destination matrices
- Most interested topics
- Most interested POI
- Delegation and relationships
- Accesses to Dashboards
- **Cumulated Scores from Actions**
  - Requested information
  - Routing performed
  - ...

Produced information
- Suggestions
- Engagements
- Notifications
- ...

Users

System
Access at Environmental information

- Getting weather forecast for the next hours and days
- Getting alert information from Civil protection
- Getting air quality status
- Getting Air quality via heatmaps, heatmap animation
- Computing Air quality indexes
- Computing Air quality predictions
- Getting pollination status
- Getting actual weather status: temperature, humidity, pressure, rain level, etc.
New way to access at health services

- Searching for pharmacies and hospitals
- Getting the closest hospital first aid locations and status
- Getting real time updated information about the first aid status of major hospitals (triage)
Supporting City Users using Private Mobility

Private Transport
- Parking status (DATEX II, ...)
- Saving car park
- Getting closer parking
- OBD2 data from your engine or fleet
- Getting parking forecast: short and long term
- Getting closer free space on parking
- Getting fuel stations location and fuel product prices
- Getting bike sharing rack status
- Searching Services along a path or closer to a point or Service as Hotel, Restaurants, square, etc.
- Getting closer cycling paths
- Recharging stations: location and status
- Getting traffic information
- Heatmap where is safer to bike
Supporting City Users in using Public Mobility

Public Transportation, PT

– Getting tickets

– Getting bus stops, lines, and timelines for bus, train and tramline (GTFS, ETL, ...)

– Getting Tunnel and Ferry Status

– Searching Services along a Pub. Transport line or closer to a stop

– Searching the closest bus stops

– searching for BUS stops via name

– real time delays of busses

– Modal-multimodal routing for Pub. Transport

– Tracking fleets, trajectories, etc.

– Get connected drive data
ServiceMap Dev Tool (knowledge & Map tool)

- Search along a line
- Search around a GPS point

Smart City API call generation

Web App HTML5

Mobile Apps

Embed into Web pages

Snap4City (C), November 2020

http://www.disit.org/6873
Hackathons and Challenges
SNAP4CITY

Hackathon
Build your app for a connected city

Open from
Jan 21 - Mar 15

Click here to see the hackathon winners

see interim winner Fast Rabbit
Data-driven design platform for offline advertising

Built on big data to determine the most popular location for a customer group
Automatically select billboards with the highest traction. The platform is capable of predicting the reach of every location on a city based on big data analytics.

Skyrocket the traction of offline campaigns
Citizens will run into more relevant advertisements resulting in higher conversion rates and more successful campaigns.
Standards and Interoperability


https://www.snap4city.org/65
Snap4City tools and Living lab Solution have been Created to satisfy requirements of international organizations as:

- **ENOLL**: [https://www.openlivinglabs.eu/](https://www.openlivinglabs.eu/)  
  – European Network of Living Labs

- **EIP-SCC**: European Innovation Partnership on Smart Cities and Communities  
  – [https://eu-smartcities.eu/](https://eu-smartcities.eu/)

- **Select4Cities**: Pre-Commercial Procurement Project to develop a data-driven, Internet-of-Everything (IoE) platform for large-scale urban co-creation  
  – [https://www.select4cities.eu/](https://www.select4cities.eu/)
1° place award to

UNIVERSITY OF FLORENCE - DEPARTMENT OF INFORMATION ENGINEERING

for SNAP4CITY

https://www.snap4city.org/558

DIGIPOLIS
FORUM VIRIUM HELSINKI
CITY OF COPENHAGEN
Buyers Group
Main running instances

- Sii-Mobility → mobility and transport, sustainability
- REPLIvATE → ICT, smart City Control room, Energy, IOT
- RESOLVE → Resilience, ICT, Big Data
- GHOST → Strategies, smart city
- TRAFAIR → Environment & transport
- MOSAIC → mobility and transport
- WEEE Life → Smart waste, environment
- Smart Garda Lake → Castelnuovo del Garda
- 5G → Industry 4.0 vs Smart City
- Green Impact → Industry 4.0, Chemical Plant
- SmartBed (laid) → smart health
- Green Field Peas (soda) → Industry 4.0, Chemical plant
- MobiMart and PISA Agreement → data aggregation, mobility and transport, Living Lab
- Lonato del Garda → smart parking, environment
- Herit Data → tourism, culture and management
- ISPRA JRC → site management and services
- Capelon (Sweden) → smart light solutions
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• **TRAFAIR** is a CEF project. All slides reporting logo of TRAFAIR project are representing tools and research founded by the EC on CEF programme [http://trafair.eu/](http://trafair.eu/).

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• **Km4City** is an open technology and research line of DISIT Lab exploited by a number of projects. Some of the innovative solutions and research issues developed into projects are also compliant and contributing to the Km4City approach and thus are released as open sources and are interoperable, scalable, modular, standard compliant, etc.
Main Organizations/areas

- Antwerp area (Be)
- Capelon (Sweden: Västerås, Eskilstuna, Karlstad)
- DISIT demo (multiple)
- Dubrovnik, Croatia
- Firenze area (I)
- Garda Lake area (I)
- Helsinki area (Fin)
- Livorno area (I)
- Lonato del Garda (I)
- Modena (I)
- Mostar, Bosnia-Herzegovina
- Pisa area (I)
- Pont du Gard, Occitanie (Fr)
- Roma (I)
- Santiago de Compostela (S)
- Sardegna Region (I)
- SmartBed (multiple)
- Toscana Region (I), SM
- Valencia (S)
- Venezia area (I)
- WestGreece area (Gr)
Be smart in a SNAP!

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