



BRAIN-IoT

model-Based fRamework for dependable sensing
and Actuation in INtelligent decentralized IoT systems



February 19th 2019 - Grenoble

ECLIPSE TECHNOLOGIES TO DEVELOP BRAIN-IOT FRAMEWORK

ECLIPSE IOT DAY

Maria Teresa Delgado (Eclipse Foundation) & Levent Gurgun (CEA)

OUTLINE



WHAT IS BRAIN-IOT?

BRAIN-IOT USE CASES

ECLIPSE FOUNDATION IN BRAIN-IOT

ECLIPSE PAPYRUS AND ECLIPSE SENSINACT

ECLIPSE TECHNOLOGIES INTEGRATION IN BRAIN-IOT

WHAT IS BRAIN-IOT



EU RESEARCH PROJECT

- Co-funded by the Horizon 2020 programme of the European Union
- Research and Innovation Action



3 YEAR DURATION

- January 2018 – December 2020



12 PARTNERS

- From 5 European countries: Italy, Germany, Spain, France and UK
- Including SMEs, Industry and Academy



POWERED BY ECLIPSE TECHNOLOGIES

- Eclipse Papyrus and Eclipse SensinAct



IOT EUROPEAN AND PRIVACY PROJECTS

- BRAIN-IoT is part of the IoT-ESPP cluster



COLLABORATIONS

- Strong relationship with OSGi Alliance
- European IoT Large Scale Pilots projects
- Strong involvement in W3C consortium to define the WoT standard

THE CONSORTIUM



SIEMENS



Brain-IoT - Eclipse IoT Day ●●● ●●● Grenoble, February 19th 2019



BRAIN-IOT FOCUS

- Framework for composability and deployment of heterogeneous IoT platforms

Considering:

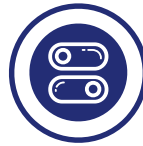
- Complex scenarios involving smart autonomous actuation
- Critical requirements in terms of dependability, security, privacy and safety
- Tightly integrated IoT and CPS systems



OPEN ISSUES IN IOT DOMAIN

HETEROGENEITY AND (LACK OF) INTEROPERABILITY

Heterogeneity of protocols, APIs, device models and data interchange formats hamper interoperability in IoT



SECURITY AND SAFETY

Autonomous actuation in IoT systems calls for strong security requirements



SUSTAINABLE BUSINESS MODELS

Many IoT solutions on the market adopt fully centralized, cloud-oriented approaches but singular point of failures makes survivability and resiliency difficult in the long term



IMPLEMENTING "SMART BEHAVIOURS" IN OPEN COLLABORATION CONTEXT

Difficulty to generically "bind" AI and ML solutions to IoT and CPS platforms
Lacking a solution that enables collaboration to achieve common tasks



ENFORCEMENT OF PRIVACY AND DATA OWNERSHIP POLICIES

A comprehensive solution able to give back control of privacy aspects to users is still missing



MARKET FRAGMENTATION

IoT platforms focused on verticals often associated with technology stacks

BRAIN-IOT FEATURES



IoT Cross-Platform Interoperability & Federation

Fully de-centralized, composable and dynamic federations of heterogeneous IoT platforms

Adoption of shared semantic models



Smart Behaviour

Facilitates the deployment of smart, cooperative behavior by employing modular AI features



Security and Privacy

Establish Authentication, Authorization and Accounting (AAA)

Embedded privacy-awareness and privacy control features

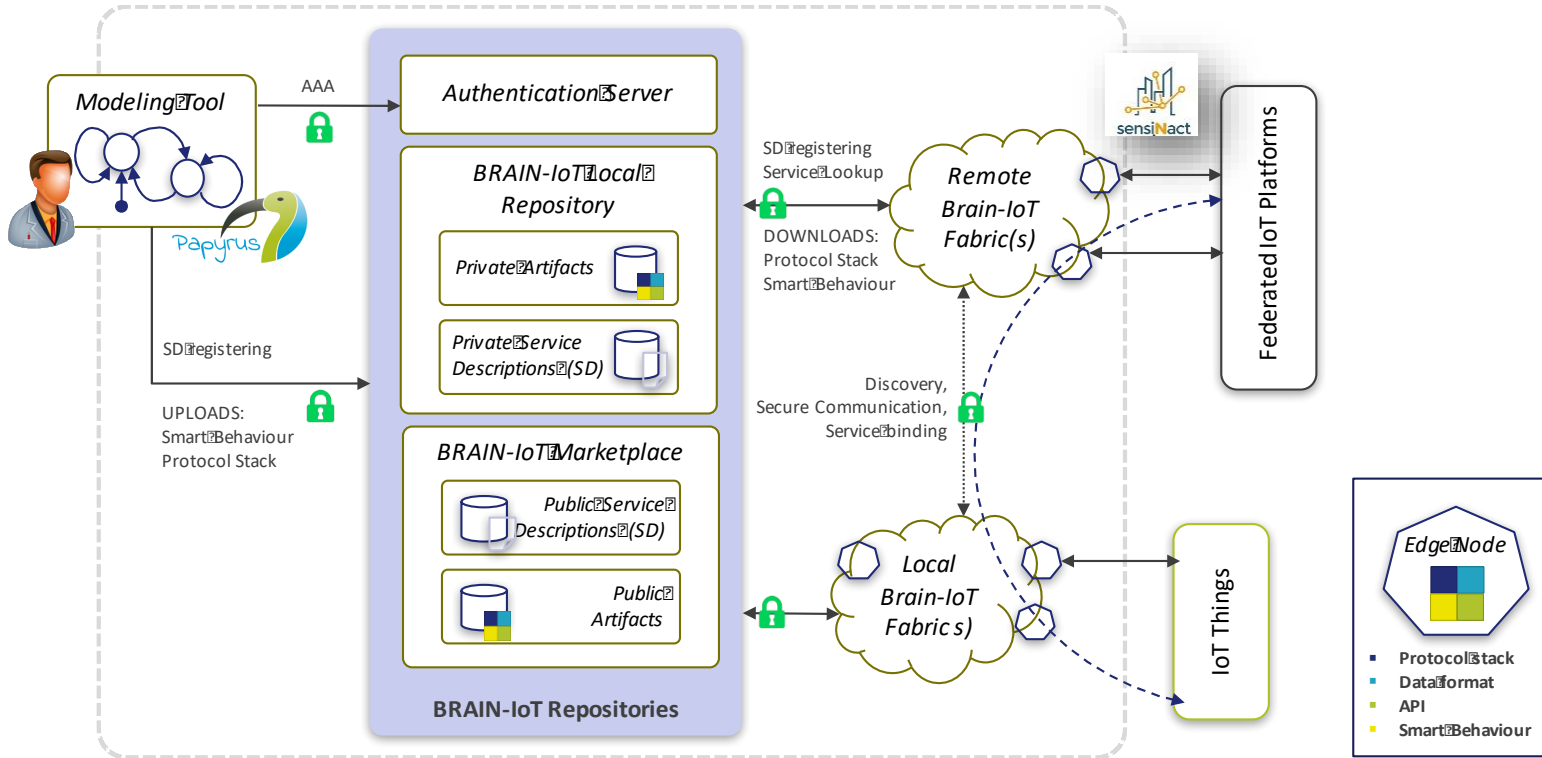


Commissioning and reconfiguration

Dynamic commissioning and reconfiguration choosing among available platforms, modules implementations and services, along with edge-cloud balancing

Model-based approach

BRAIN-IOT HIGH-LEVEL ARCHITECTURE



SCENARIOS

The viability of the proposed approaches is demonstrated in **two usage scenarios**, namely Service Robotics and Critical Infrastructure Management, as well as through a series of proof-of-concept demonstrations in **collaboration with on-going IoT large-scale pilot initiatives**.



The Critical Water Infrastructure Monitoring and Control use case focuses on the management of the water urban cycle in metropolitan environment of Coruña.

Service Robotics

Critical Infrastructure Management

Links with European IoT Large Scale Pilots



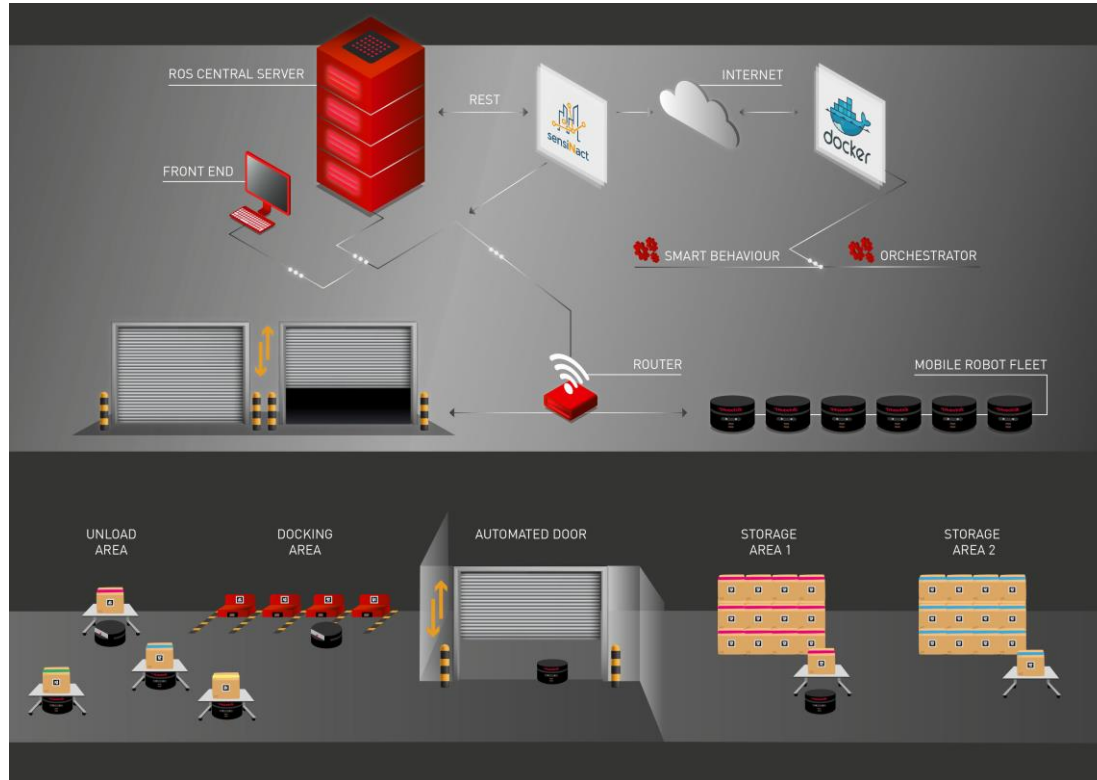
The Service Robotics use case will involve several robotic platforms, like the open-source Robotics Operating System (ROS), which need to collaborate to scan a given warehouse and to assist humans in a logistics domain.



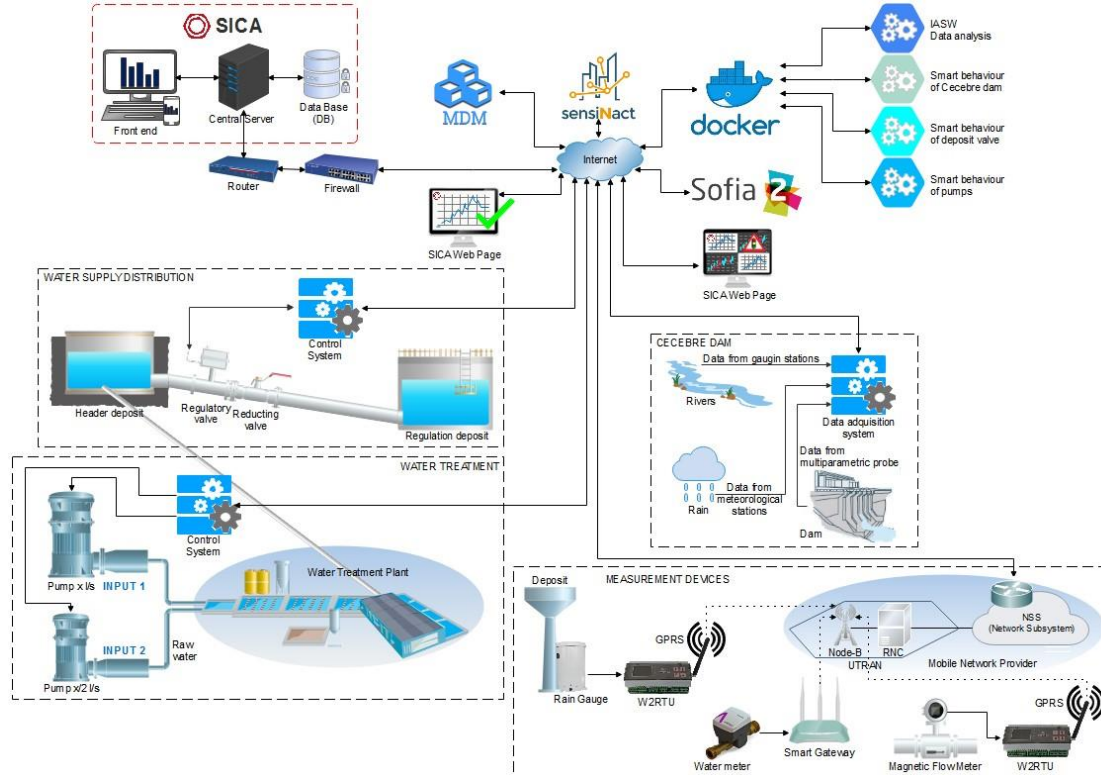
In addition to the first two usage scenarios, few other scenarios will be derived creating a link with European IoT Large Scale Pilots where BRAIN-IoT partners are involved in.



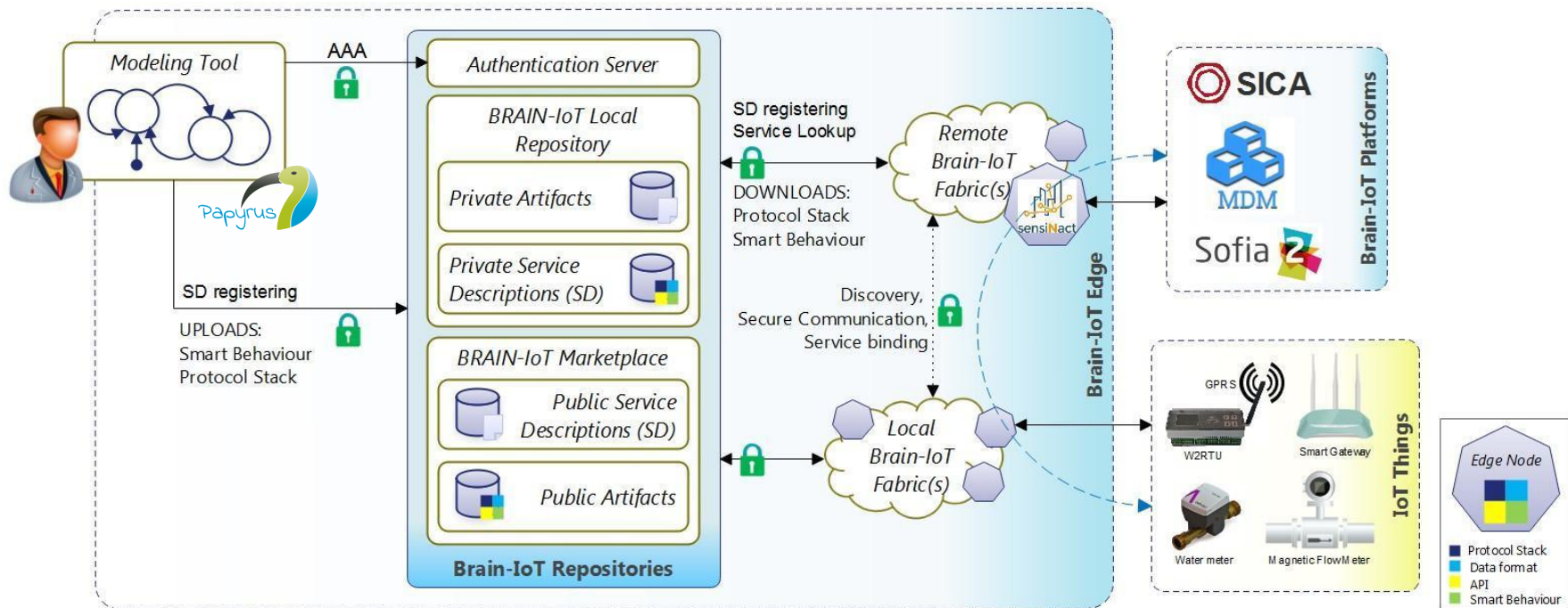
LOGISTIC ROBOTICS SCENARIO



WATER MANAGEMENT USE CASE



WATER MANAGEMENT USE CASE



ECLIPSE FOUNDATION IN BRAIN-IOT

- Promoting use of Eclipse Technologies in research projects
 - Eclipse Papyrus and Eclipse SensinAct (but not only!)
- Community building around project results (like today 😊)
 - Updating and engaging Eclipse community in EU projects
 - Supporting publication of project results in the Eclipse Foundation platform



Safety Assurance & Certification



IoT Gateway



GDPR Dev Tools



IoT Model-based Interoperability



Research @ ECLIPSE FOUNDATION™



Industry 4.0 Standard

OSS Data Mining



Robotic Platform Standard

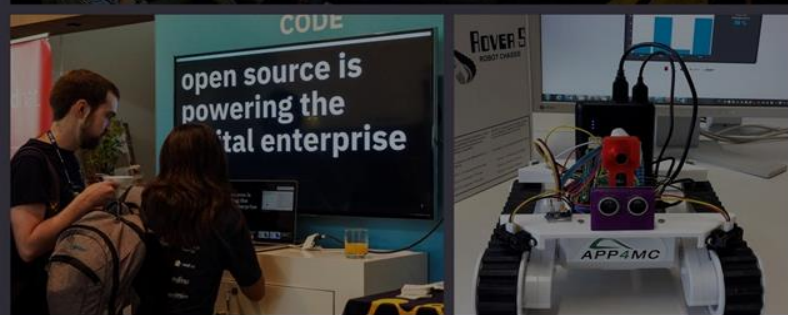


Automotive & Smart Mobility



Research@ ECLIPSE FOUNDATION™

eclipse.org/research





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and Actuation in INtelligent decentralized IoT systems



ECLIPSE TECHNOLOGIES IN BRAIN-IOT

Levent Gurgun

CEA LETI

leti
cea tech



ECLIPSE SENSINACT: OPEN PLATFORM FOR SMARTER CITIES

Dr. Levent Gürgen
levent.gurgen@cea.fr

Eclipse IoT Days, Grenoble
February 19th 2019

SmartHome



- Monitoring and controlling
- Saving energy comfortably
- Interacting with appliances
- ...

SmartHealth

- Monitoring medicine intake
- Personalized diabetes assistance
- Providing training tips
- ...



SmartTransport



- Promoting carpooling
- Minimizing taxi delays
- Avoiding traffic jams
- ...



SmartCity

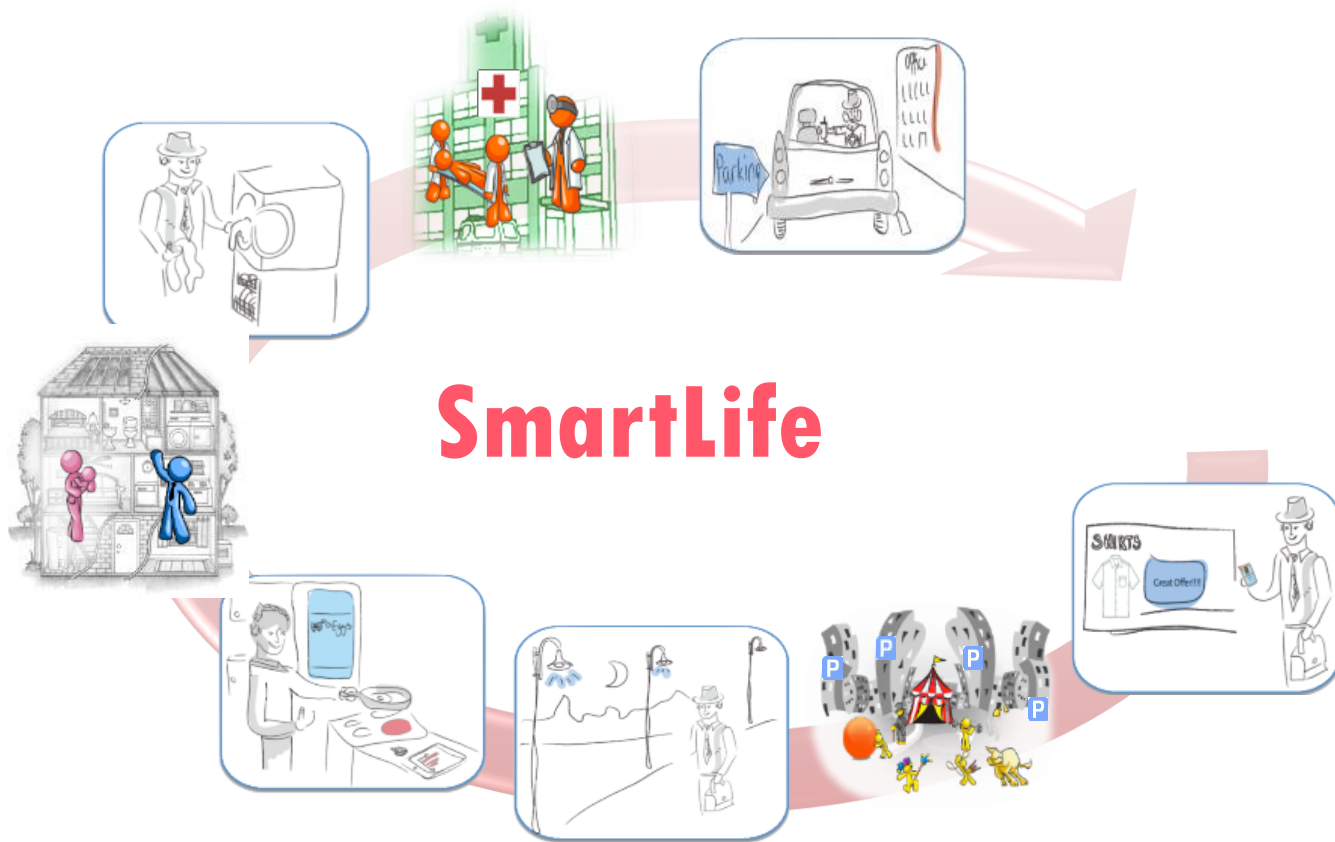
- Managing parking space
- Lighting up a city efficiently
- Monitoring Air Quality
- ...



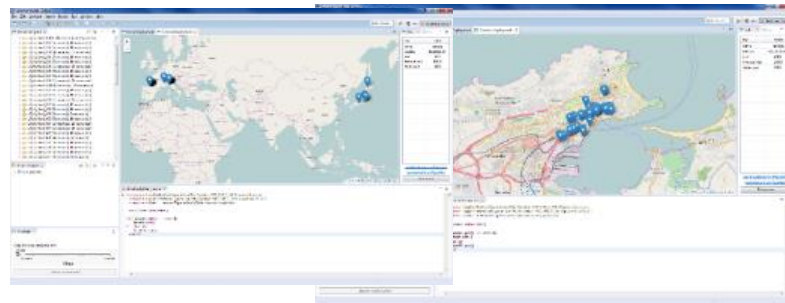
SmartShopping



- Managing deals
- Getting advice on buying goods
- Retrieving discount
- ...



sensiNact Studio



Tool for **rapid and dependable** application building

Various **northbound** protocols

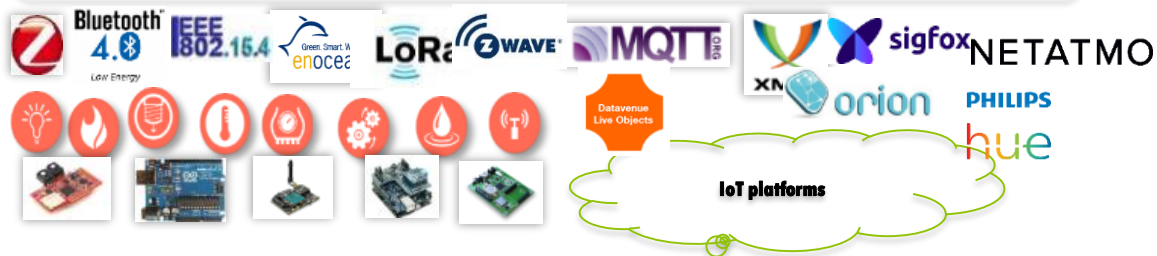
Homogeneous Access
- to **real-time data**: on-demand, periodically, event-based
- **historic data**

Various **IoT** protocols and platforms

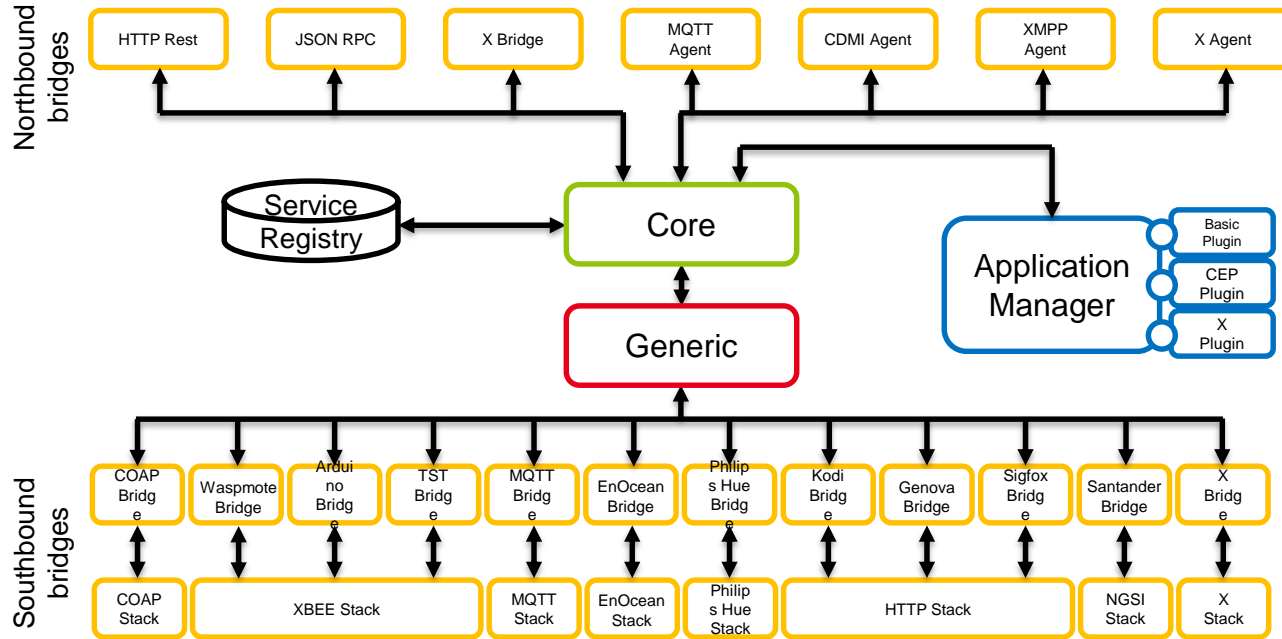
Heterogeneous IoT devices and platforms



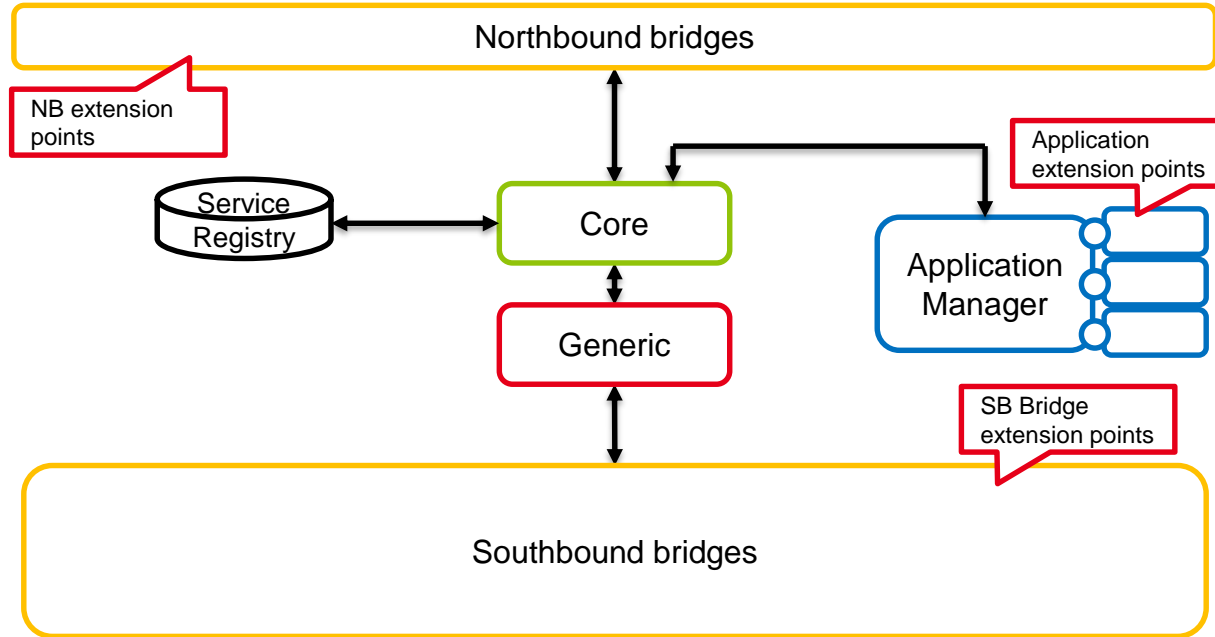
sensiNact Platform



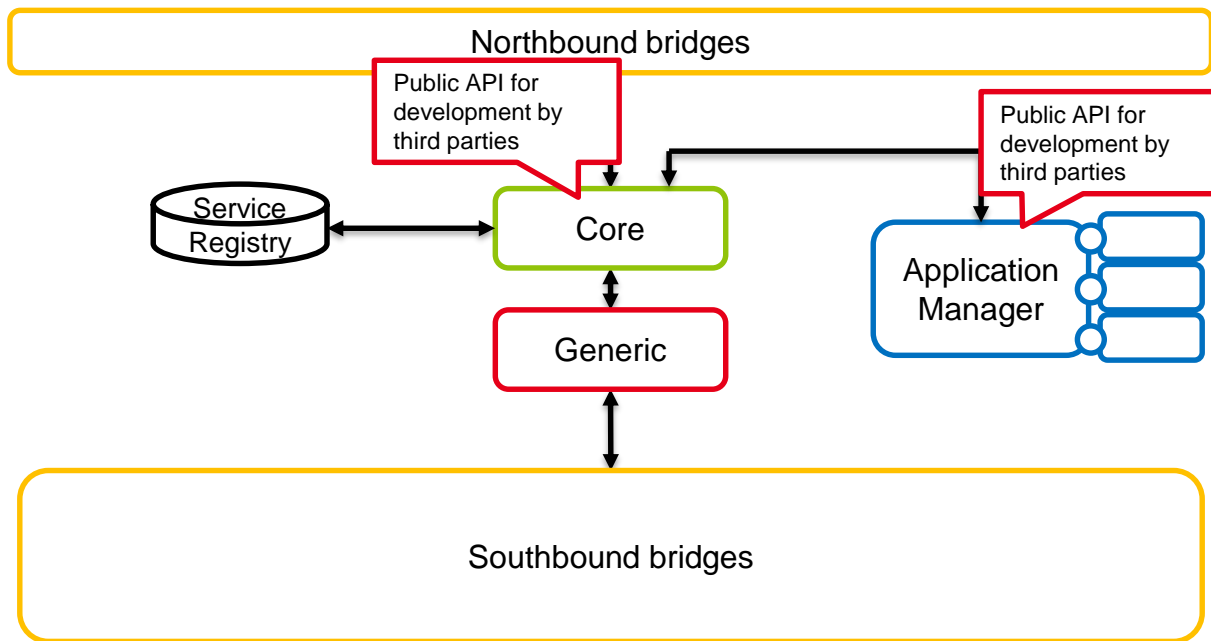
MODULAR ARCHITECTURE



EXTENSION POINTS



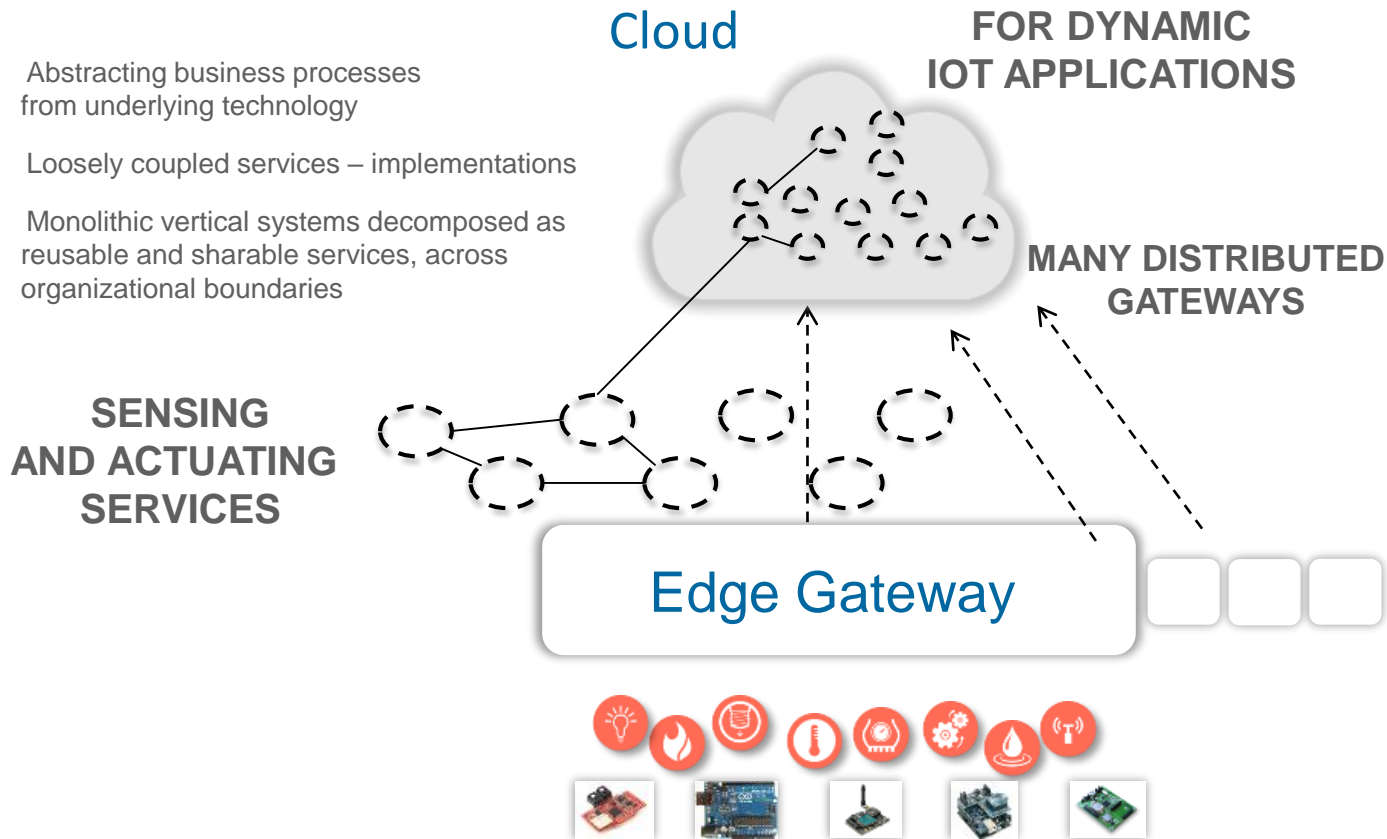
OPEN APIs FOR THIRD PARTY DEVELOPERS



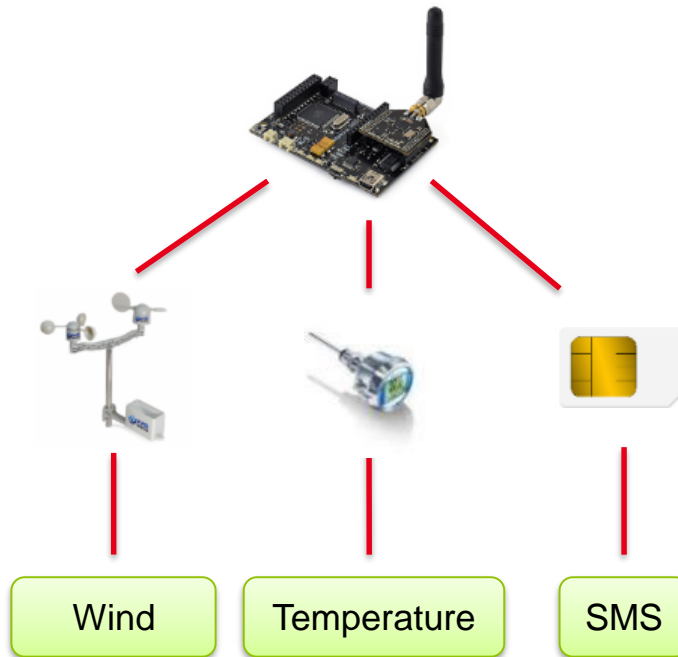
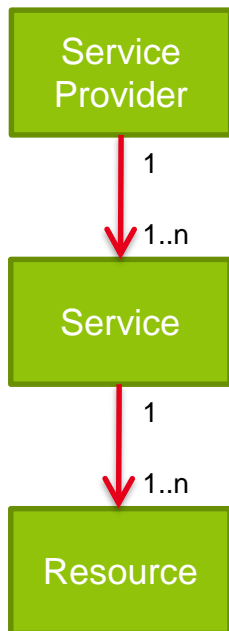
SERVICE-ORIENTED APPROACH

- Abstracting business processes from underlying technology
- Loosely coupled services – implementations
- Monolithic vertical systems decomposed as reusable and sharable services, across organizational boundaries

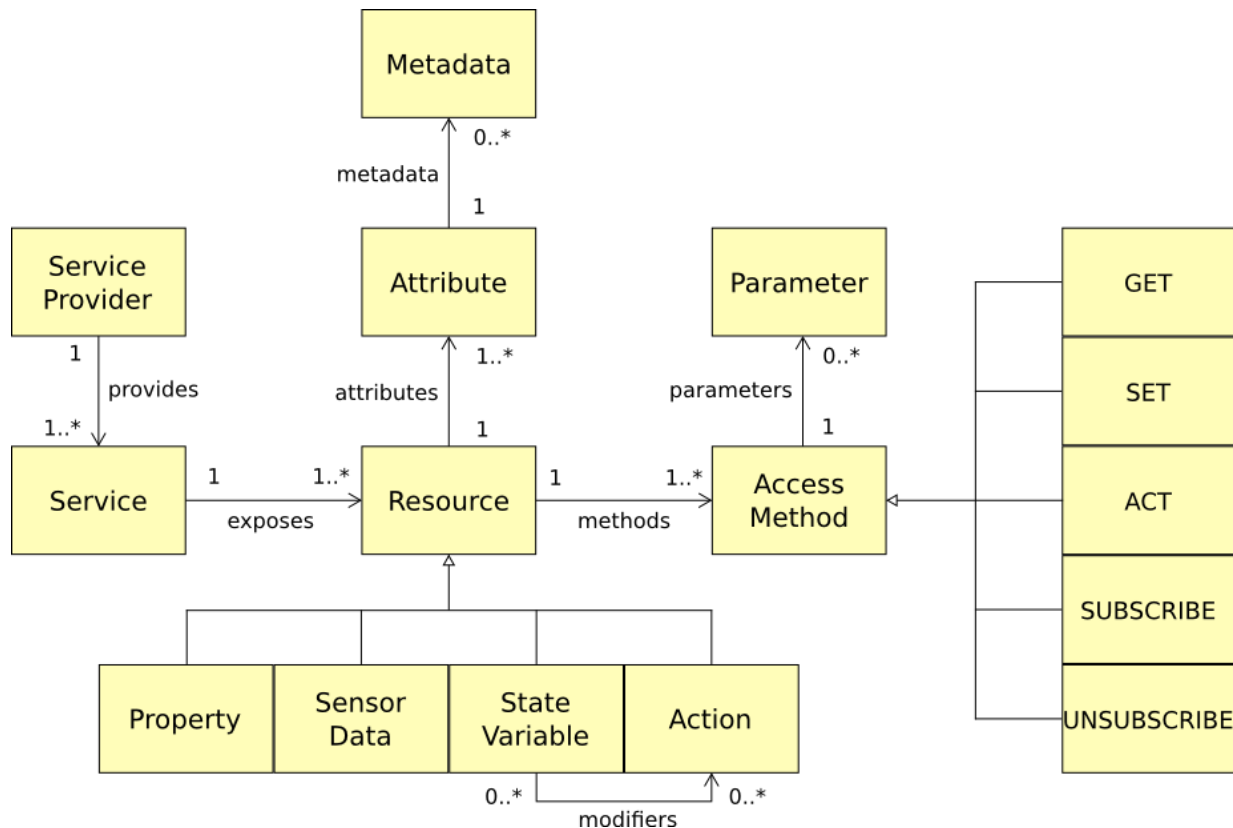
COMPOSITION OF SERVICES FOR DYNAMIC IOT APPLICATIONS



EXAMPLE SENSINACT SERVICE PROVIDER



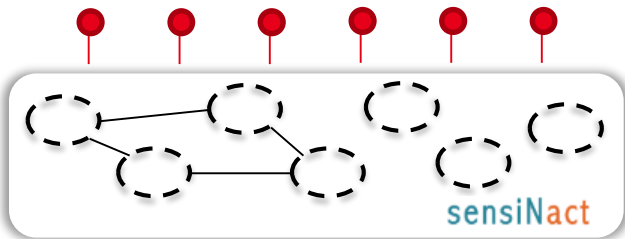
SENSINACT SERVICE MODEL





DEVELOPPERS

develop, deploy,
monitor,
manage



APIs





DEVELOPPERS

develop, deploy,
monitor,
manage



sensiNact **smart city platform has joined**  eclipse

<https://projects.eclipse.org/projects/technology.sensinact>

Eclipse sensiNact

Overview Downloads Who's Involved Developer Resources Governance

The Eclipse sensiNact project consists of a software platform enabling the collection data relevant to improving the quality of life of urban citizens, programming interface to data (on-demand, periodic, historic, etc.) and application development and deployment innovative applications on top of the platform.

Here a quick look to the existing data available via sensiNact platform from various Fujisawa and Osaka (click the "+" button and click "Add" accepting the default gateway)

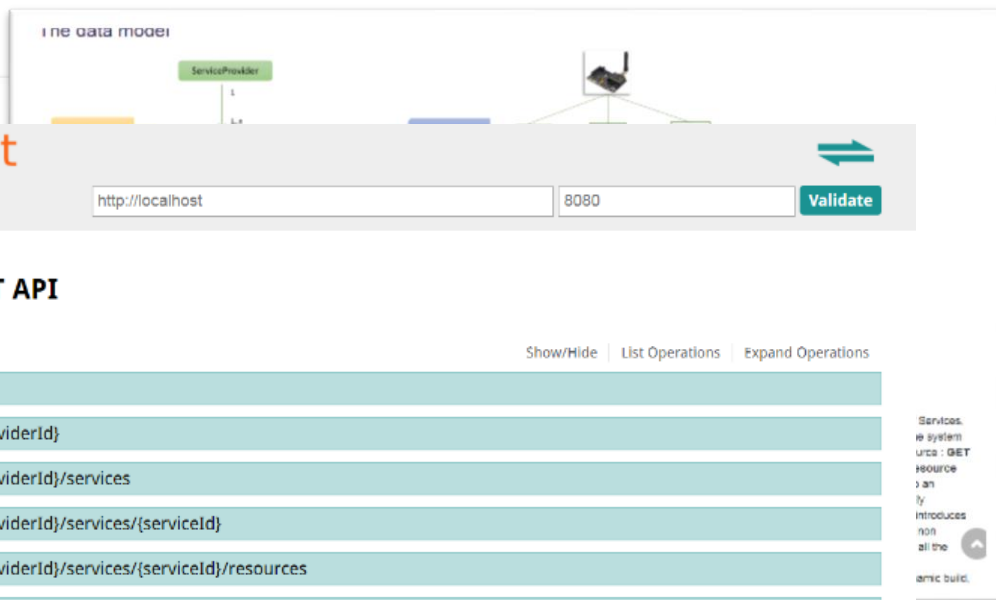
At the heart of sensiNact lies its service-oriented approach in which IoT devices expose functionalities in terms of services (temperature service, presence detection service, quality monitoring service, alarm service, etc.). Each service then exposes one or several resources such as sensor data or actions. Building applications thus become a matter of composing sensing services with actuation services. Loosely coupling between the devices and the services they implement makes the composition of services more dynamic, adaptable to the changing context, not only in the software environment (increasing memory usage, low battery, reducing quality of measures, etc.) but also in the physical environment (replacing sensors, changing localization, etc.).

sensiNact particularly deals with the following 4 topics.

Connectivity

Heterogeneity of data is today's reality in every urban environment. Emerging IoT devices, number of social networks, mobile applications, open data repositories and web data sources. sensiNact thus provides connectivity support to those data sources including such as LoRa, Zigbee, IEEE 802.15.4, Sigfox, enOcean, MQTT, XMPP, NGSI, HTTP, CoAP. Connectivity support for new protocols can be rapidly developed and dynamically adapted.

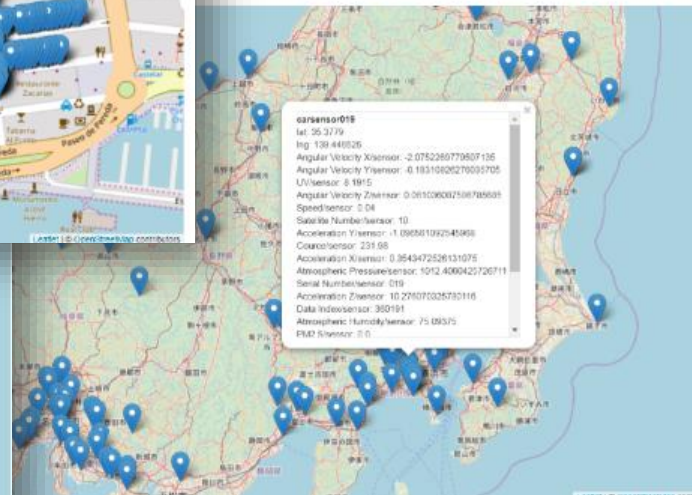
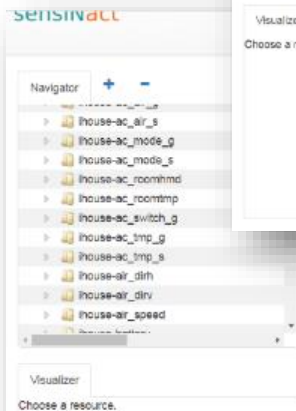
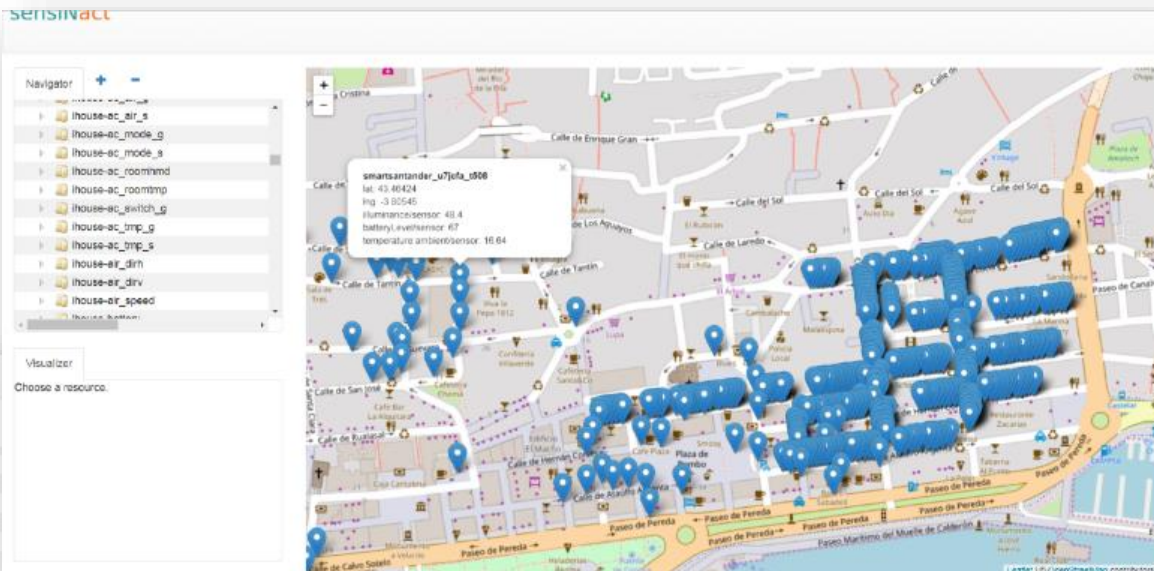
Interoperability

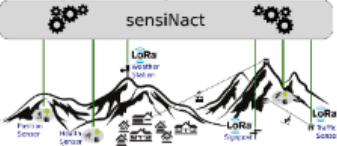


The screenshot displays the Eclipse sensiNact REST API interface. At the top, there is a 'Validate' button and a URL input field containing 'http://localhost' and a port input field containing '8080'. Below this, the 'default' section lists various REST API endpoints. The endpoints are categorized by HTTP method: GET (light blue) and POST (orange). The endpoints include:

- GET /providers
- GET /providers/{providerId}
- GET /providers/{providerId}/services
- GET /providers/{providerId}/services/{serviceId}
- GET /providers/{providerId}/services/{serviceId}/resources
- GET /providers/{providerId}/services/{serviceId}/resources/{resourceId}
- GET /providers/{providerId}/services/{serviceId}/resources/{resourceId}/GET
- POST /providers/{providerId}/services/{serviceId}/resources/{resourceId}/SET
- POST /providers/{providerId}/services/{serviceId}/resources/{resourceId}/ACT
- POST /providers/{providerId}/services/{serviceId}/resources/{resourceId}/SUBSCRIBE
- POST /providers/{providerId}/services/{serviceId}/resources/{resourceId}/UNSUBSCRIBE

On the right side of the interface, there are links for 'Show/Hide', 'List Operations', and 'Expand Operations'. A small inset window on the far right shows a 'Services' section with a 'GET' button and a 'Validate' button.





Chamrousse
,
PyongChan
g

smart ski
station

Smart home



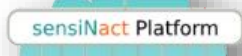
iHouse



smart train
station

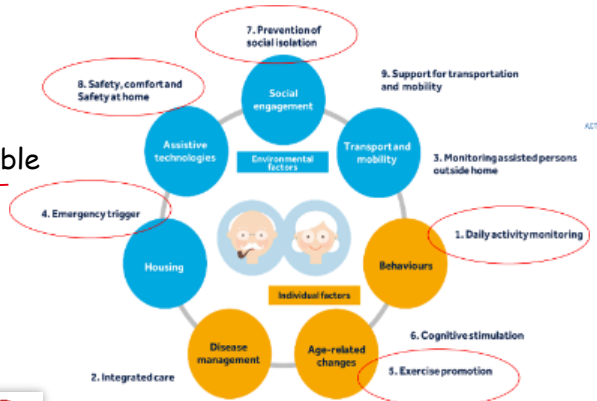


Kameoka, Maya, Osaka



Smart living &
well-ageing

Grenoble



Smart
farming



Bordeaux,
Dubourdieu
Wineyard

Smart city



Genova, Santander, Mitaka, Fujisawa, Grenoble, Tsukuba, Bristol, London, Aarhus

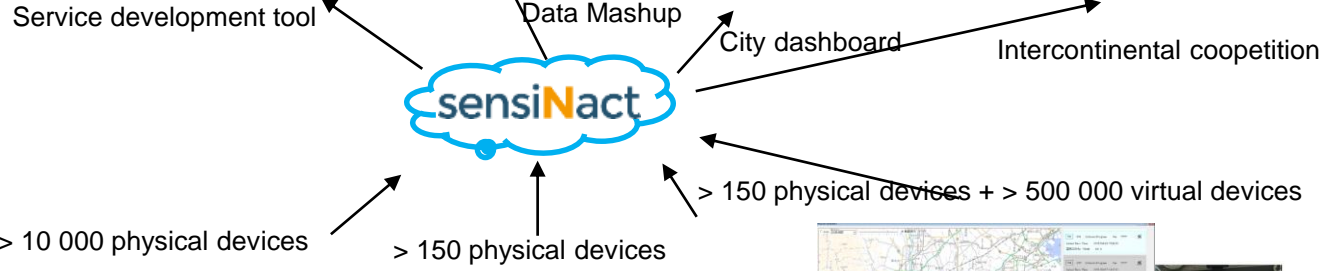
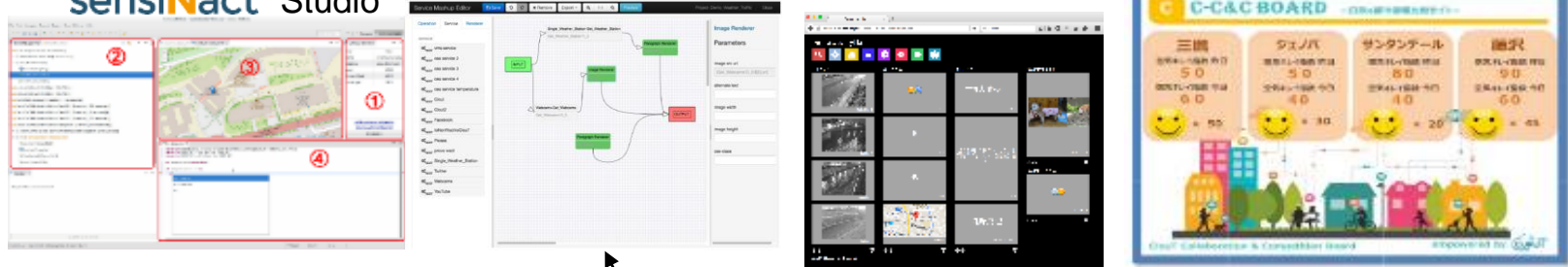




Cloud of Things for empowering the citizen cloud in smart cities



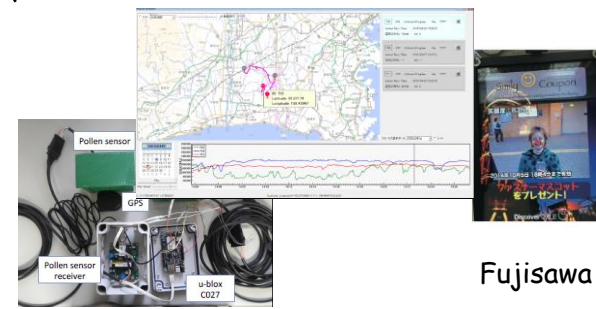
sensiNact Studio



Santander



Genova

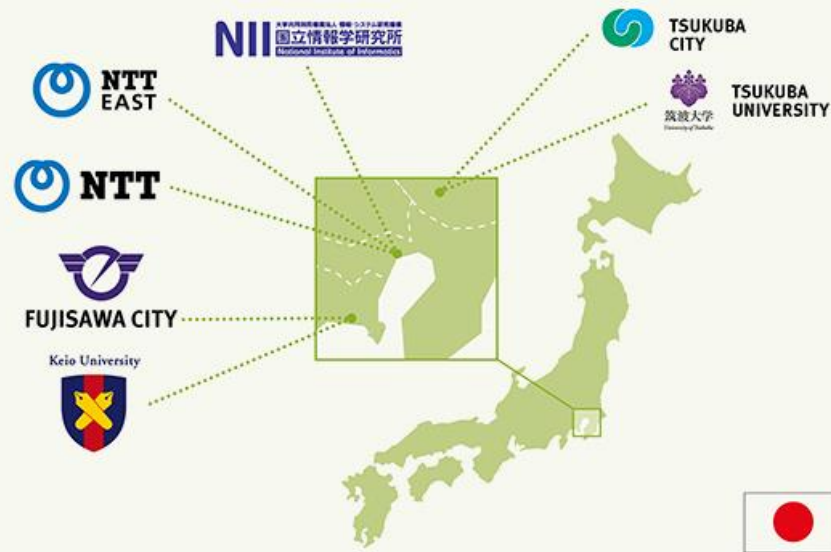


Mitaka

Fujisawa

BIGCLOUT: BIG DATA MEETING CLOUD OF THINGS

[HTTP://BIGCLOUT.EU](http://bigclout.eu)



leti



TRIALS PLANNING IN PILOT CITIES



GRENOBLE



Business Tourism
Monitoring



Industrial Estates
Monitoring



Smart Energy



Mobility
Prediction



BRISTOL



FUJISAWA



CrowdSensing



City Infrastructure
Management

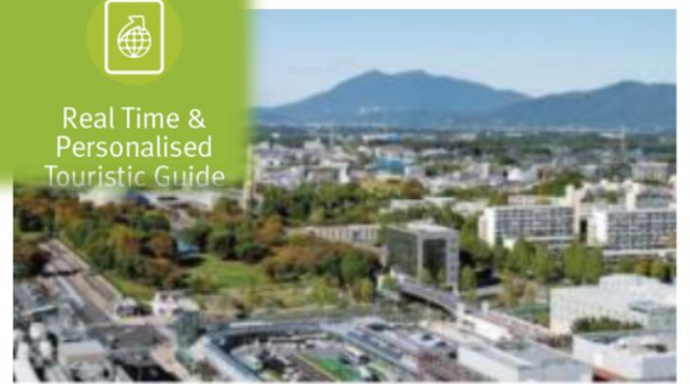


Multilingual
Concierge
Service

TSUKUBA



Real Time &
Personalised
Touristic Guide





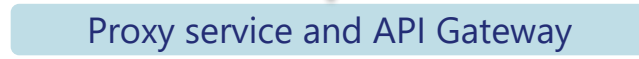
GRENOBLE TRIAL ARCHITECTURE



MyIno App
Easy to use application for citizens



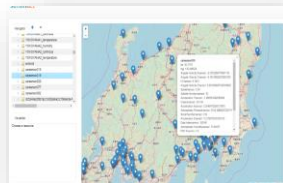
InoVallée SI
Enrich data with companies directory, event management,...



API Gateway
API inline with InoVallée Custom needs



Eclipse sensiNact
Unified Data Model



Tool for monitoring, and for **rapid and dependable** application building



Events



Restaurants



Mobility

Heterogeneous data sources
Heterogeneous data models

Device Navig Project Explo Deployment

type filter text

- ▶ C38_10627
- ▶ C38_10634
- ▶ C38_10635
- ▶ C38_10636
- ▶ C38_10637
- ▶ C38_10640
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- ▶ C38_10680
- ▶ C38_10681
- ▶ C38_10682

Quick Access Resource Sensinact Studio

Metro/SEM_1120
+ admin
- station

```

label: GRENOBLE, ABBE GREGOIRE
lines: SEM 12
next: {"times":[{"scheduledArrival":346}]}
zone: SEM_GENABBEGREG
code: SEM_1120
pmr: true
    
```

- ▶ SEM_1120
- ▶ SEM_1129
- ▶ SEM_1130
- ▶ SEM_1131
- ▶ SEM_1133
- ▶ SEM_1134
- ▶ SEM_1138
- ▶ SEM_1139
- ▶ SEM_1140

Federation through an Uniform Access Layer offering **Experimentation as a Service**

Open Data
Federation



› Access to city data sets

IoT Gateway
sensiNact

Experimentation
Facilities



iHouse



› Experimental SmartHouse

› Experimental datacenter facility



PTL



› Advanced Microelectronics
› Integration Testbed

ATRDC

IT Resource
Manager

Platforms



› Cloud Environment
› Manage Virtual Machines
› Access Generic Enablers



› Japan-wide
› Open Testbed
› Wireless Sensors

› SDN capabilities
› Cloud resources

Living Lab Manager

Living Labs



TUBA - Lyon



The Lab - Osaka

› Access to large base of end users
› Co creation processes
› Feedback from citizens

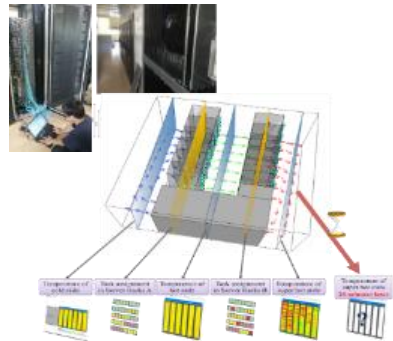


Smart Station



Maya, Kameoka, Osaka stations

Smart Energy Management



Art & Science



Grenoble <-> Osaka

Privacy friendly person tracking



PTL - Grenoble

Smart home



iHouse - Japan

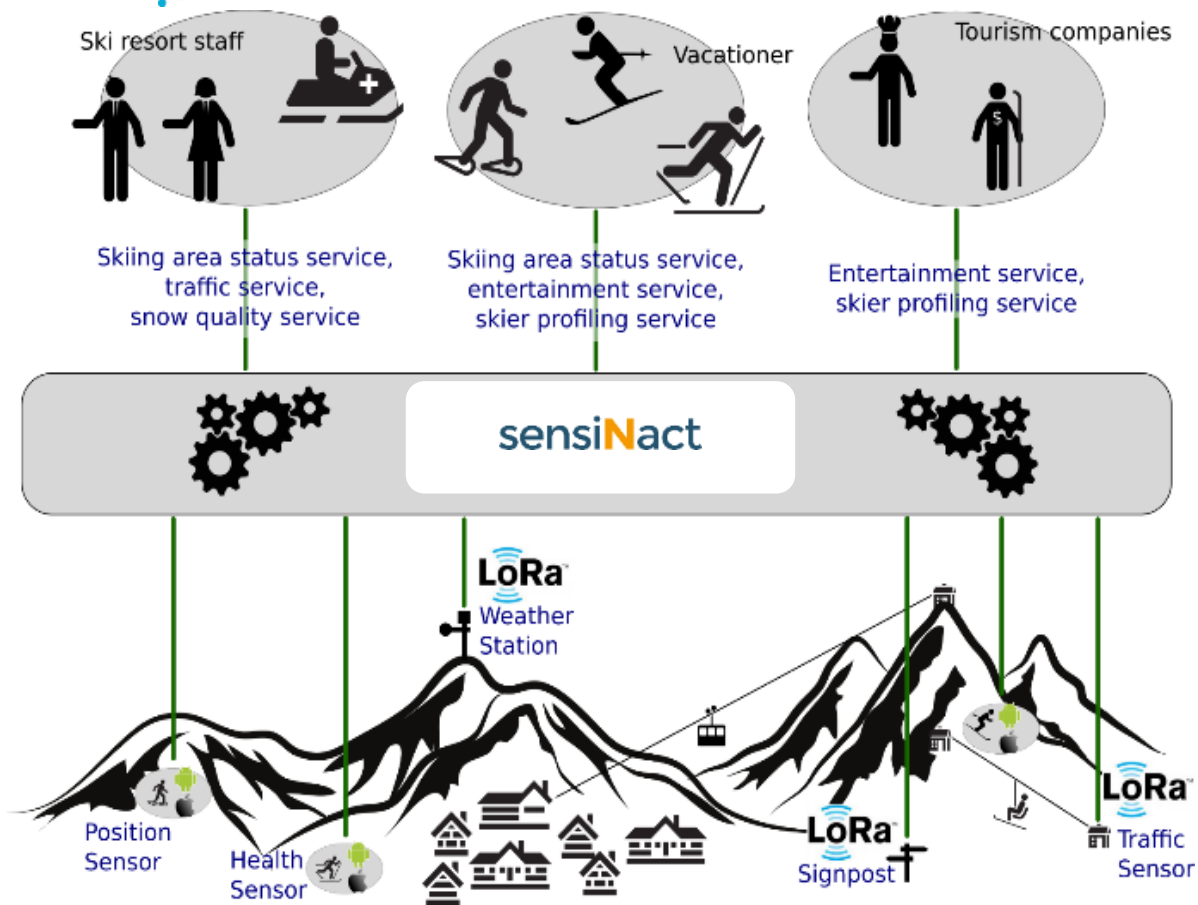
Smart Shopping



Route Recommendation







LoRa band

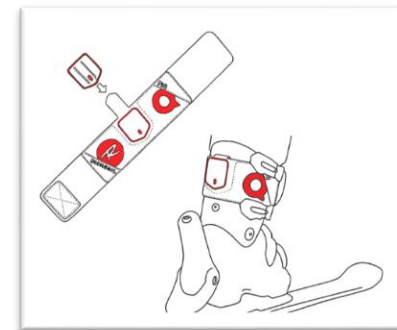
- GPS location

PIQ Robot

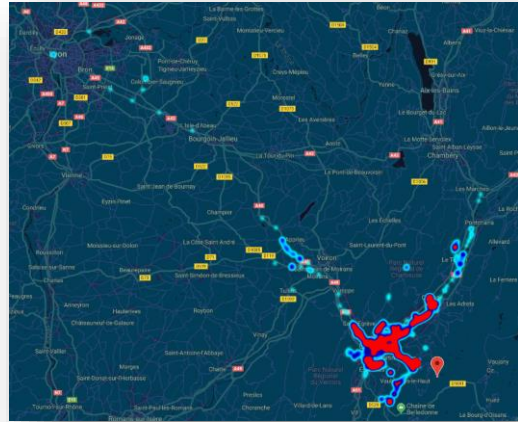
- Number of turns with maximum angle ski
- Maximum angle of the skier from the vertical
- Number of turns with maximum velocity
- Maximum speed of entry into the turn of the skier
- Number of jump with maximum air time
- Maximum air time
- Number of jump with best score rotation
- Complexity of the jump
- Descent height

Crowd detector

- Number of persons in a given area

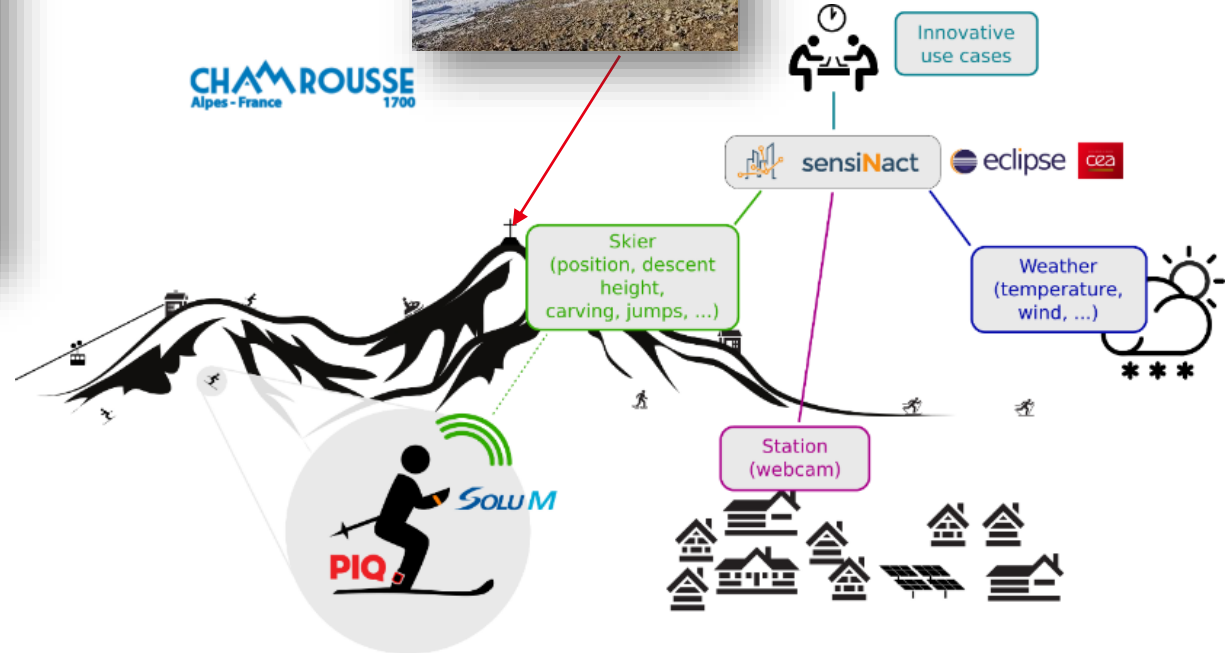


IOT INFRASTRUCTURE

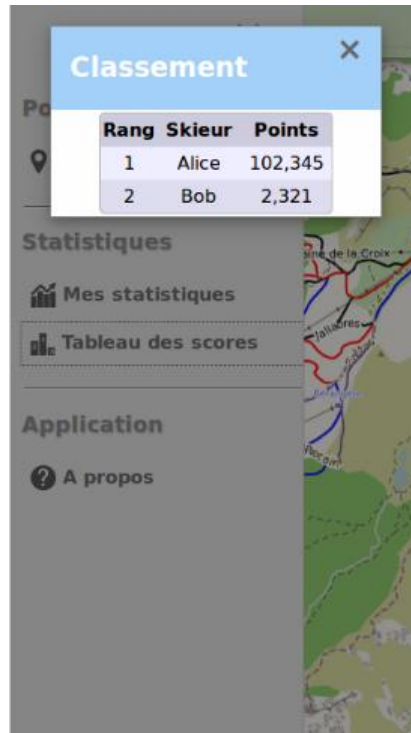
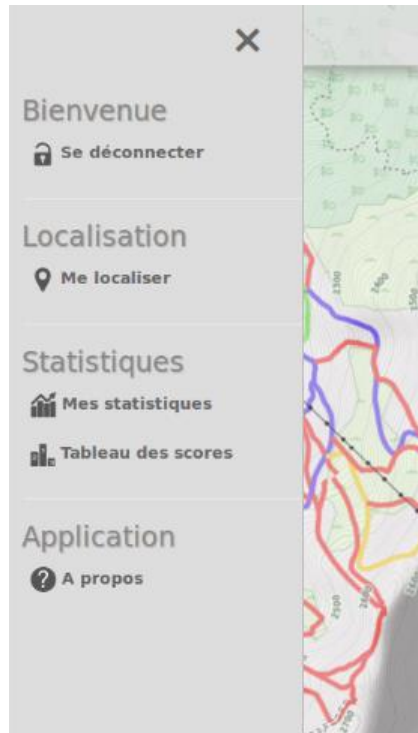
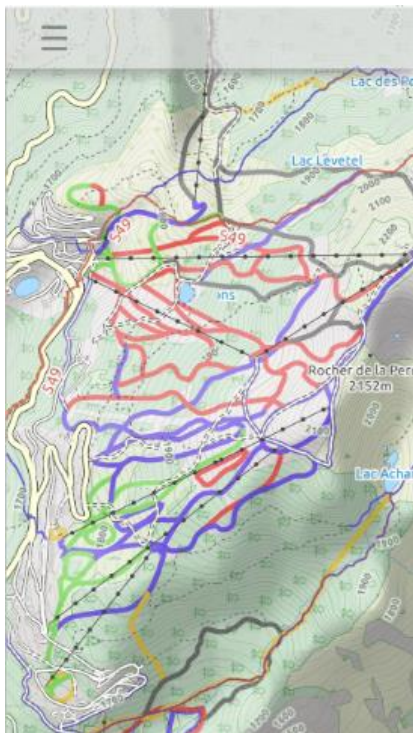


LoRa Gateway

CHAMROUSSE
Alpes - France 1700



THE APPLICATION



HACKATHON ORGANIZED AT ECLIPSE IOT DAYS 2018



Transfo part en station imaginer la Station du Futur à Chamrousse

Start-up et développeurs participent à un Hackaton et à un Ideathon.

Le Hackathon Eclipse IoT Days : développer et tester des nouvelles applications et technologies autour de la plateforme Eclipse sensiNact en s'appuyant sur un réseau LoRa dédié aux objets connectés

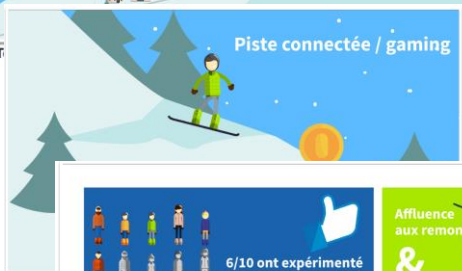
L'ideathon : ouvert aux start-up et acteurs qui souhaitent imaginer des innovations et tester les nouveaux usages de la station du futur. Les participants auront la liberté de chausser les skis pour tester leurs prototypes in situ, le long des pistes, sur le snowpark auprès des skieurs/snowboarders de la station.

Remise de prix et ski nocturne.



Winning idea: Dynamic slope ranking
PRICE: 1 year ski-pass in Chamrousse

DEMONSTRATION / VIDEO



+10% de clients par rapport au week-end précédent
6/10 ont expérimenté les nouvelles activités et en sont satisfaits
3/10 départs de secouristes ont été lancés par les bracelets connectés
Affluence aux remontées et dysfonctionnements du jour



IoF2020: Internet of Food and Farm 2020



- **Improve the vine yield and wine production** by defining, and implementing an IoT system able to gather the data, coming from different vineyards and cellars, to perform data analysis, system and risk management, and decision making.
- **Provide** to middle and small winegrowers and producers **new tools to optimize resources** (manpower, fertilizers, materials, electricity, water, etc.) and preserve the environment by reducing the use of pesticides, carbon print, etc.
- Deploy a cost effective precision viticulture management and a global vineyard control system in order to **increase competitiveness**.
- **Optimize** the use of inputs in wine-making by controlling **all environmental factors affecting the process** (temperatures, humidity, oxygen, etc.).



DENIS DUBOURDIEU DOMAINES

— Vignerons à Bordeaux depuis 1794 —



The forest in the area of the IOT application



The Reynon vineyard with some elevation points

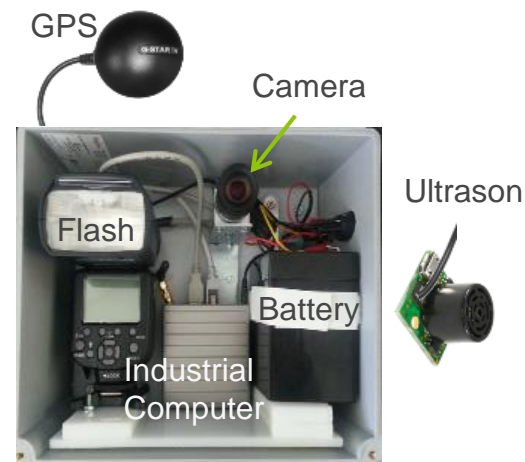
- Sensors for monitoring weather conditions: distributed in 5 vineyards of 125 hectares, with a density of at least 1 device every 2.5 hectare.
 - ✓ 9 Weather stations sensing Temperature, Hygrometry, Barometric pressure, Wind speed and direction, Solar radiation, Rainfall.
 - ✓ 35 sensors for Temperature and Hygrometry
- Sensors for monitoring winery conditions.
 - ✓ 27 sensors for Temperature and Hygrometry.
 - ✓ 26 Water meter readers.
 - ✓ 9 Electricity meter readers.



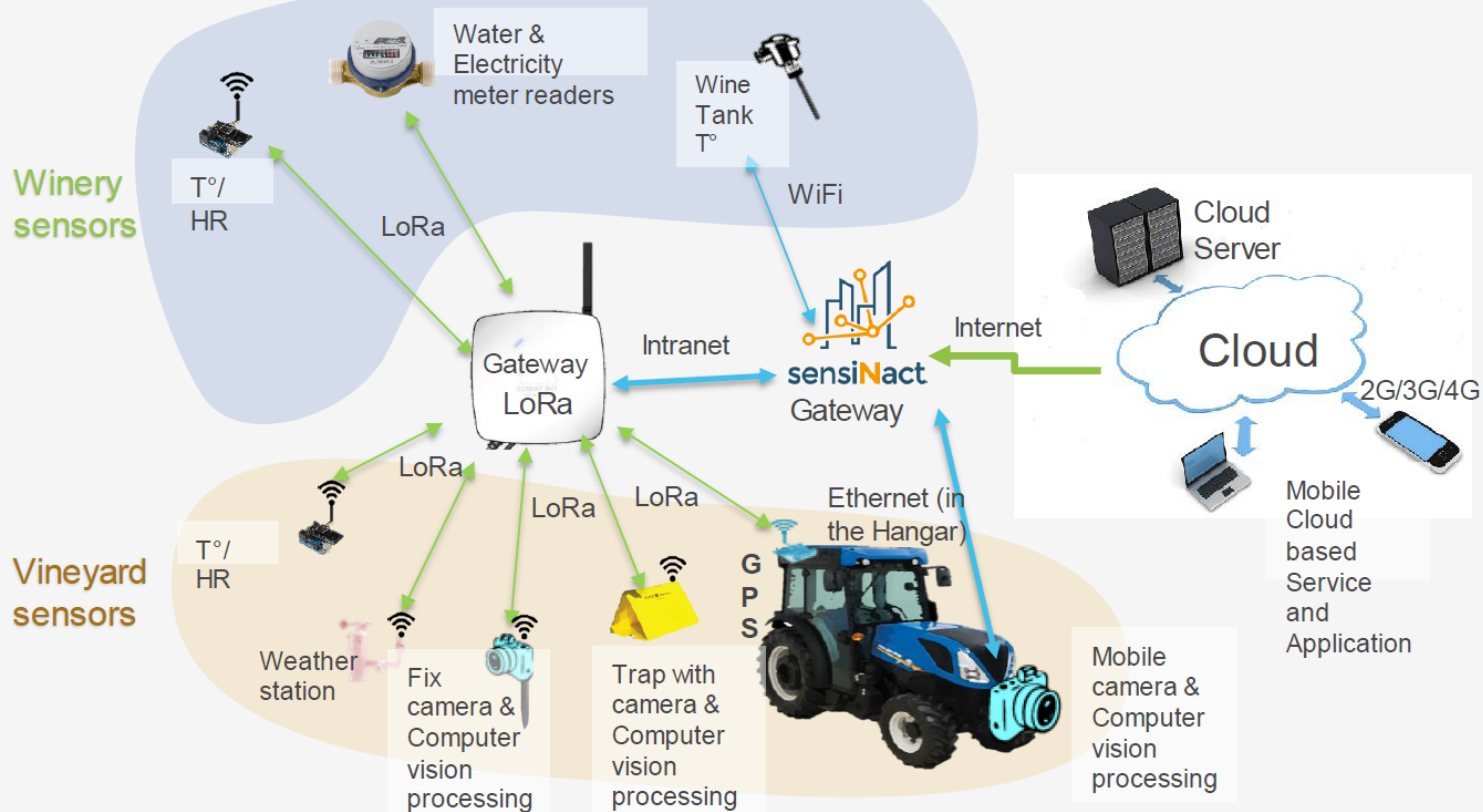
- Fixed sensors monitor, night after night, the evolution of the vine.
 - ✓ Specific camera and lighting for visible and near Infra Red images of the vine. On board processing reduces drastically the data length sent to the gateway.
 - ✓ Low spatial density but high temporal density.
- Data collected:
 - ✓ Phenological stages.
 - ✓ Disease symptoms.
- Low cost technologies for large distribution in the vineyard.
- A variation of this sensor exists for counting bugs in traps.

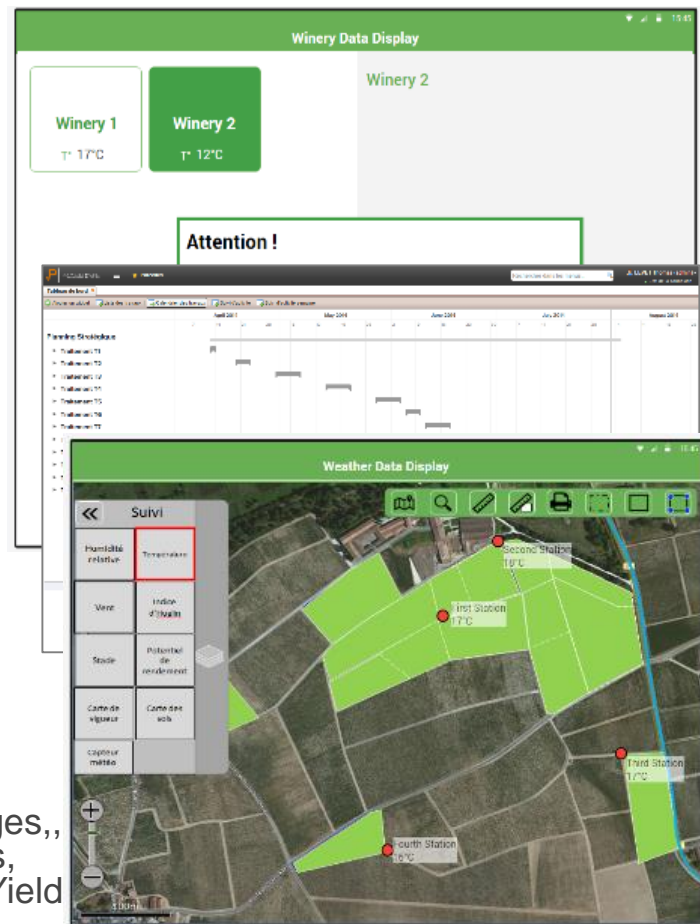
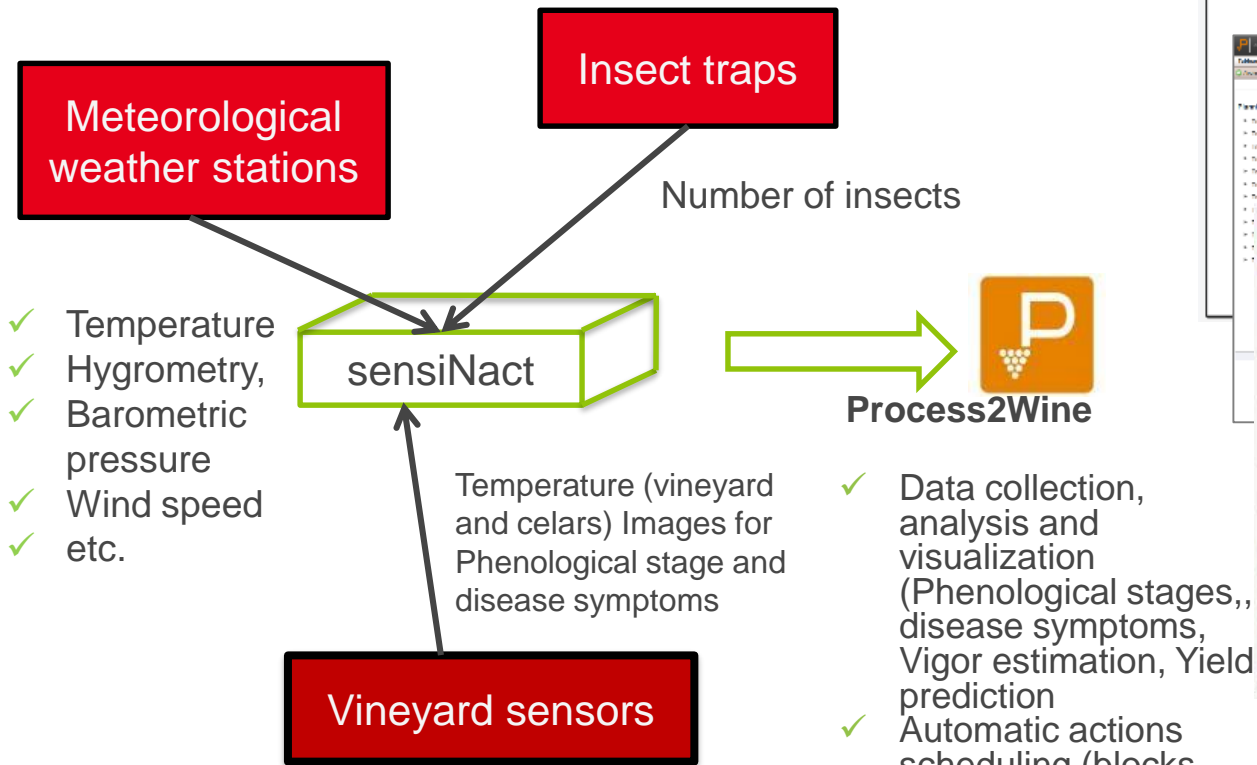


- Mobile sensors are mounted on tractors.
- They acquire images every meter along the tractor track with a dedicated camera.
- Images are stored on board all along the trip and transferred to gateway via WiFi once in the hangar.
- Data collected:
 - Phenological stages.
 - Vine vigor estimation.
 - Yield prediction.
- Data with high spatial density and low time density are then acquire.



OVERALL DEPLOYMENT ARCHITECTURE







Smart living and well-ageing

ACTivating Innovative IoT smart living environments for AGEing well



49 partners



7 countries



9 Deployment Sites



10k users

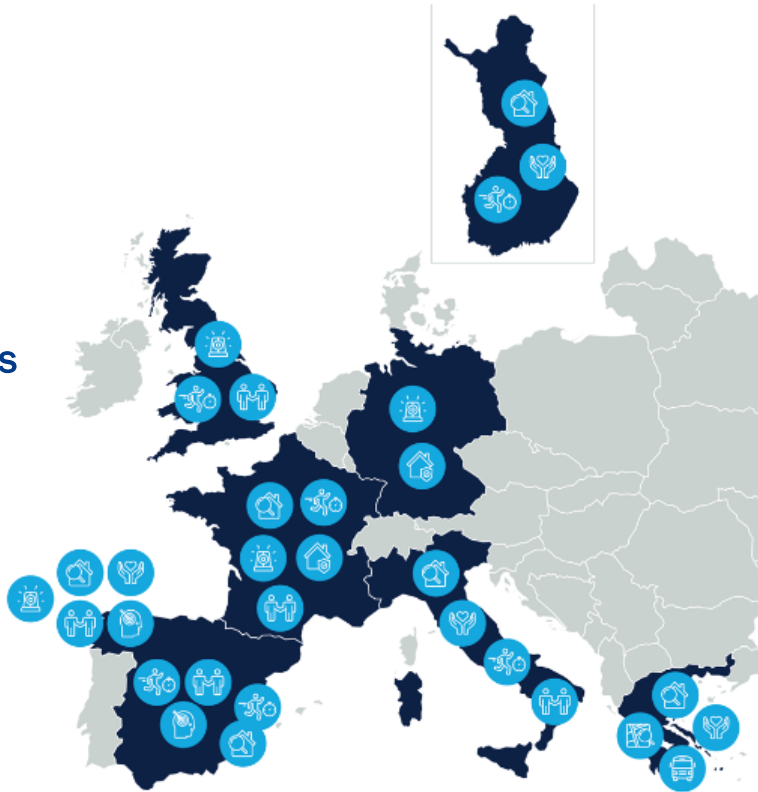


9 Use Cases



43k sensors

25M€ budget



Daily activity monitoring at home



Integrated care for chronic conditions



Monitoring outside home



Emergency trigger



Exercise promotion



Cognitive stimulation



Prevention of social isolation



Safety, comfort and security at home



Support for transportation and mobility

Deployment Site Context



Goal

To Create a **continuum of care** that combines **human and technical assistance**, bridging the different moments in elderly person's life to limit the loss of autonomy and avoid unnecessary hospitalization.



Isère, France
13 cities & Alps villages



3 Panels – 5 Use Cases



Daily activity monitoring



Emergency trigger



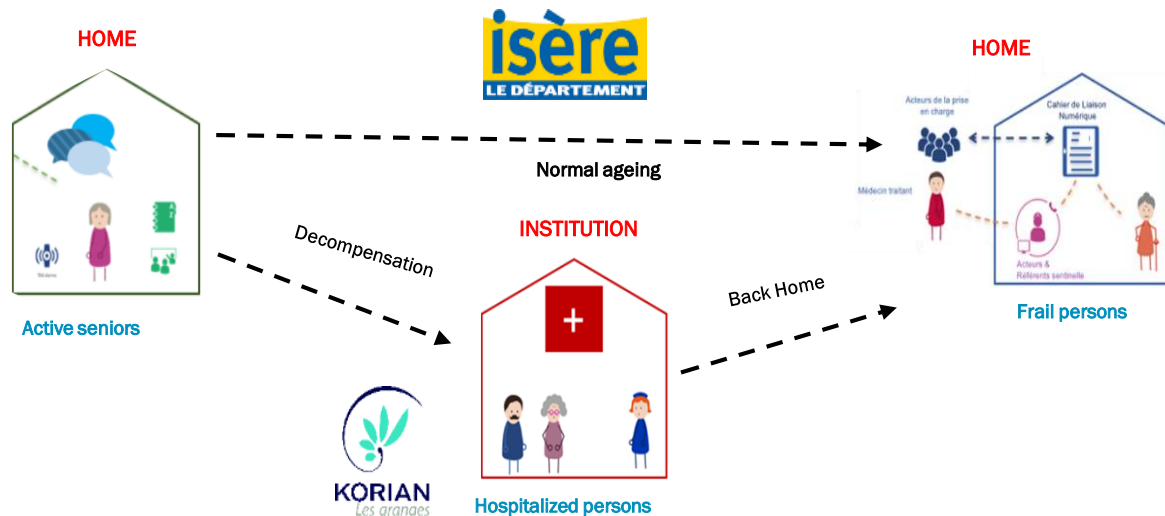
Exercise promotion



Prevention of social isolation

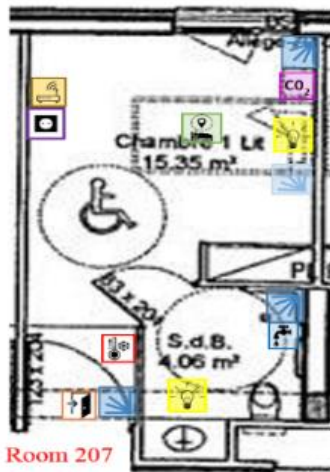


Safety, comfort, Security at home



Isère deployment

-  Motion sensor
Height 2.20m
-  Motion sensor
Height 0.10m
-  Bed sensor
-  Opening contact
-  Connected plug
-  Controlled light
-  Thermostat
-  Water consumption
-  CO₂ sensor
-  Box



10 Partners



Targets for deployment



70 Homes



140 Elderly



10 Clinic rooms



1200 IoT Devices





BRAIN-IoT

model-Based fRamework for dependable sensing
and Actuation in INtelligent decentralized IoT systems



Eclipse Papyrus and Eclipse sensiNact in BRAIN-IoT

Levent Gürgen

CEA LETI

WHAT IS PYPYRUS?



Eclipse Project for UML & its DSMLs.

The screenshot shows the Papyrus Modeling environment website. At the top, there are navigation links: Home, Applications, Technologies, Downloads, Documentation, and Community. The main heading is "Papyrus Modeling environment". Below this is a screenshot of the Papyrus software interface showing a UML diagram. To the right, there are news items: "Papyrus 4.2.0 2018-12 Released" (Posted Dec 19, 2018) and "Papyrus 4.2.0 Nightly RCP" (Posted Oct 25, 2018). A quote from Patrick Lesert, Associate Professor at ESTACA, states: "Papyrus has been chosen by ESTACA, a French engineering school, for teaching and research." At the bottom, there are three icons with text: "Standard based" (with a ribbon icon), "Domain Specific" (with a code icon), and "Enabler" (with a gear icon). The "Standard based" section lists implemented standards: UML 2.5, SysML 1.1 & 1.4, IUML 1.2.1, ALF 1.0.1, MARTE 1.1, BPMNProfile 1.0, BMM 1.3, SMM 1.1, PSCS 1.0, PSSM 1.0b, FMI 2.0 and ISO/IEC 42010. The "Domain Specific" section says: "To address any specific domain, every part of Papyrus may be customized: UML profile, model explorer, diagram notation and style, properties views, palette and creation menus, and much more...". The "Enabler" section says: "Papyrus enables model-based techniques: model-based simulation, model-based formal testing, safety analysis, performance/trade-offs analysis, architecture exploration...".

Few figures:

- Started in 2007
- Eclipse project in 2010
- >100 m.year effort
- >2,5 millions LoC, 150 modules, 20k unitary and functional tests
- >30k downloads worldwide, each update

F. Noyrit et al., "Facade-Metamodel: Masking UML", proc of Models 2012.

S. Gérard et al., "Papyrus: A UML2 Tool For Domain-specific Language Modeling Model-based Engineering Of Embedded Real-time Systems", 2011.

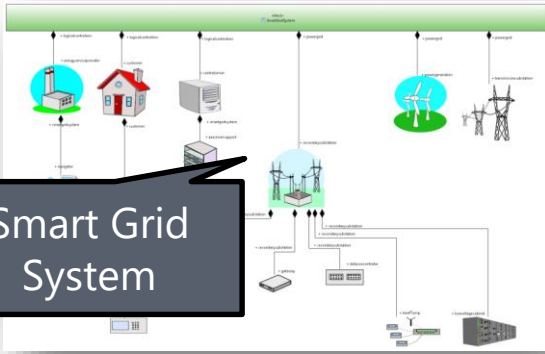


PAPYRUS MODELING

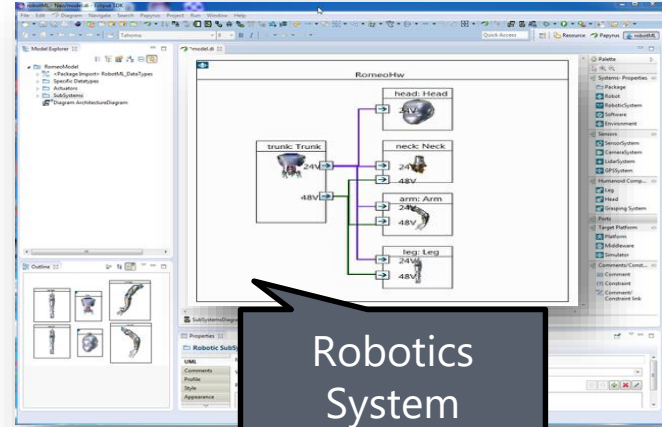


(<http://www.eclipse.org/papyrus>)

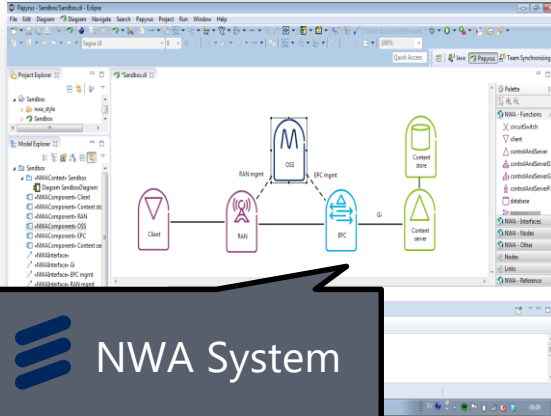
PAPYRUS CUSTOMIZATION FOR DOMAIN-SPECIFIC MODELING



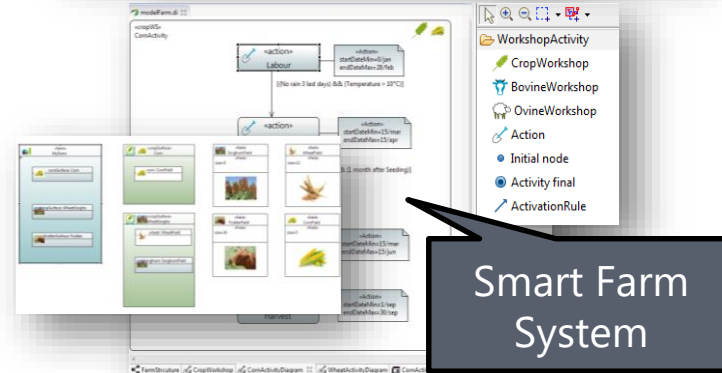
Smart Grid System



Robotics System

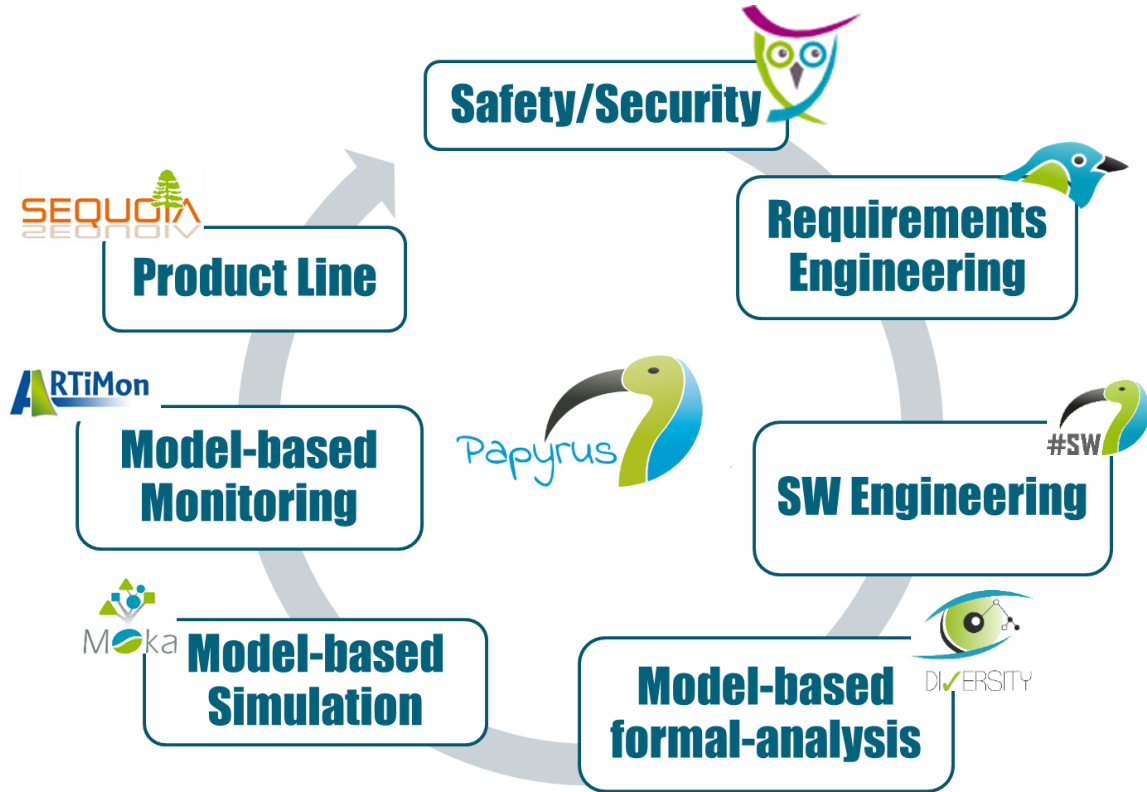


NWA System



Smart Farm System

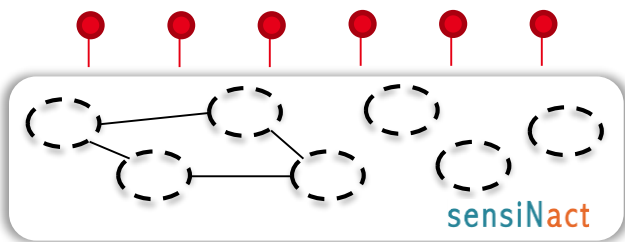
PAPYRUS ECO-SYSTEM





DEVELOPPERS

develop, deploy,
monitor,
manage



APIs





DEVELOPPERS

develop, deploy,
monitor,
manage

The screenshot displays the Sensinact Studio development environment. It features a central map view showing a city area with several blue location pins. To the left, there is a sidebar with a 'Navigator' panel displaying a tree structure of 'ECA Rules' and 'Visualizer' graphs. The 'Visualizer' panel shows a line graph with the y-axis labeled 'power' and the x-axis labeled 'Time'. The top of the interface has a menu bar with options like 'File', 'Edit', 'View', 'Project', 'Run', 'Monitor', 'Help'. The bottom-right panel contains code or configuration text.

SENSINACT STUDIO: TOOL FOR IOT APPLICATION DEVELOPMENT AND DEPLOYMENT

The screenshot displays the Sensinact Studio interface with several key components highlighted by red boxes and labels:

- Deployment View:** Located at the top right, it shows a map of London with various locations marked, including Covent Garden, Embankment, and the River Thames.
- Navigator View:** Located on the left side, it displays a hierarchical tree of project components, including services like PHDGT_128045, WSP_T_XBEE, and ZLRT_COAP_0003.
- Properties View:** Located at the bottom left, it shows a table for managing properties, with columns for Property and Value.
- DSL editor:** Located in the center, it contains a code editor with DSL (Domain Specific Language) code for configuring services and sensors.
- Graphical Editor:** Located at the bottom right, it shows a visual flow diagram with nodes for 'process_0', 'temperature', 'turn_on', 'pir', and 'hal', connected by arrows representing data flow and actions.

SENSINACT STUDIO: TOOL FOR IOT APPLICATION DEVELOPMENT AND DEPLOYMENT

<Sensinact Studio> - testAppManager/simple.sna - Sensinact Studio

File Edit Navigate Search Project Run Window Help

Quick Access <Sensinact Studio> Java

Device Navigator | Project Explorer

- clout
- air sensors_acquasola [2 service(s), 13 resource(s)]
- admin [4 resource(s)]
- air sensors [9 resource(s)]
 - location [Property]
 - NO2_Concentration [Property]
 - NO2_Concentration_1 [Property]
 - NO2_Concentration_2 [Property]
 - O3_Concentration [Property]
 - O3_Concentration_1 [Property]
 - O3_Concentration_2 [Property]
 - SO2_Concentration [Property]
 - SO2_Concentration_1 [Property]
- air sensors_buenosaires [2 service(s), 11 resource(s)]
- air sensors_busalla [2 service(s), 14 resource(s)]
- air sensors_campora [2 service(s), 14 resource(s)]
- air sensors_chiavari [2 service(s), 11 resource(s)]
- air sensors_cogoleto2 [2 service(s), 13 resource(s)]
- air sensors_europa [2 service(s), 12 resource(s)]
- air sensors_firenze [2 service(s), 15 resource(s)]
- air sensors_giovi [2 service(s), 8 resource(s)]

Outdoor Deployment

cloudweather_9
 + admin
 - weather
 location: 44.4378,8.8769
 rainfall: 0
 pressure: 1015.2
 wind-speed: 8
 temperature: 15.7
 wind-orientation: 169
 dew-point: 12
 humidity: 82
 wind-chill: 12.1

Visualizer

Drag and drop a resource here!

value

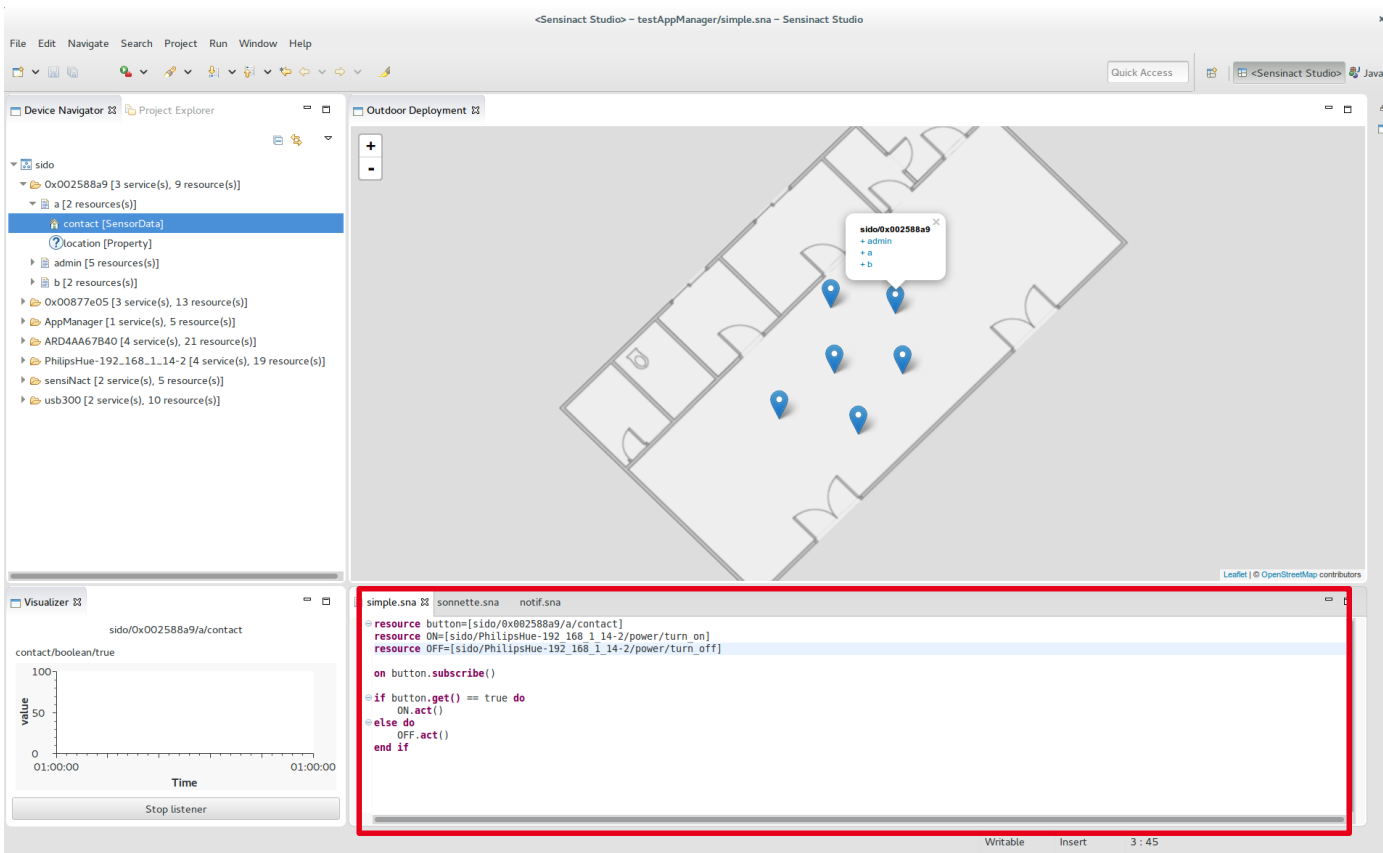
100
50
0

01:00:00 Time 01:00:00

Listener not activated

Leaflet | © OpenStreetMap contributors

SENSINACT STUDIO: TOOL FOR IOT APPLICATION DEVELOPMENT AND DEPLOYMENT



The screenshot displays the Sensinact Studio IDE with the following components:

- Device Navigator / Project Explorer:** Shows a project tree for 'sido' containing various services and resources such as 'Ox002588a9', 'a', 'contact', 'admin', 'b', 'Ox00877e05', 'AppManager', 'ARD4AA67B40', 'PhilipsHue-192_168_1_14-2', 'sensinact', and 'usb300'.
- Outdoor Deployment:** A map view showing a floor plan with several blue location pins. A tooltip for 'sido/Ox002588a9' is visible, listing resources '+ admin', '+ a', and '+ b'.
- Visualizer:** A graph titled 'sido/Ox002588a9/a/contact' showing a 'value' of 100 (boolean/true) over 'Time' from 01:00:00 to 01:00:00. A 'Stop listener' button is at the bottom.
- Code Editor:** Displays the following code in 'simple.sna':


```

simple.sna sonnette.sna notif.sna
resource button=[sido/Ox002588a9/a/contact]
resource ON=[sido/PhilipsHue-192_168_1_14-2/power/turn_on]
resource OFF=[sido/PhilipsHue-192_168_1_14-2/power/turn_off]

on button.subscribe()

if button.get() == true do
  ON.act()
else do
  OFF.act()
end if
      
```

- A DSL for building IoT applications based on Event Condition Action rules
- ON Event IF Condition DO Action

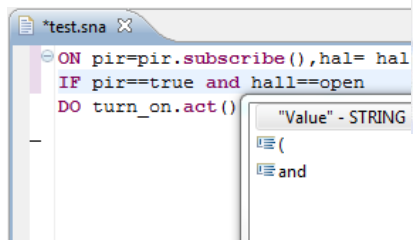
ON presence=PIRService.pir.**subscribe()**

IF presence==true

DO LightService.lightOn.**act()**;

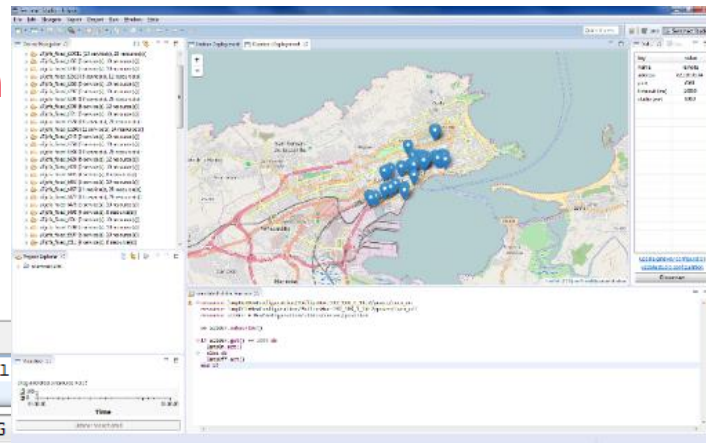
ELSE

DO LightService.lightOff.**act()**;



```

ON pir=pir.subscribe(),hal= hal
IF pir==true and hall==open
DO turn_on.act()
  
```



ON presence=**during**(PIRService1.pir.**subscribe()**==true,
PIRService2.pir.**subscribe()**==true,
3)

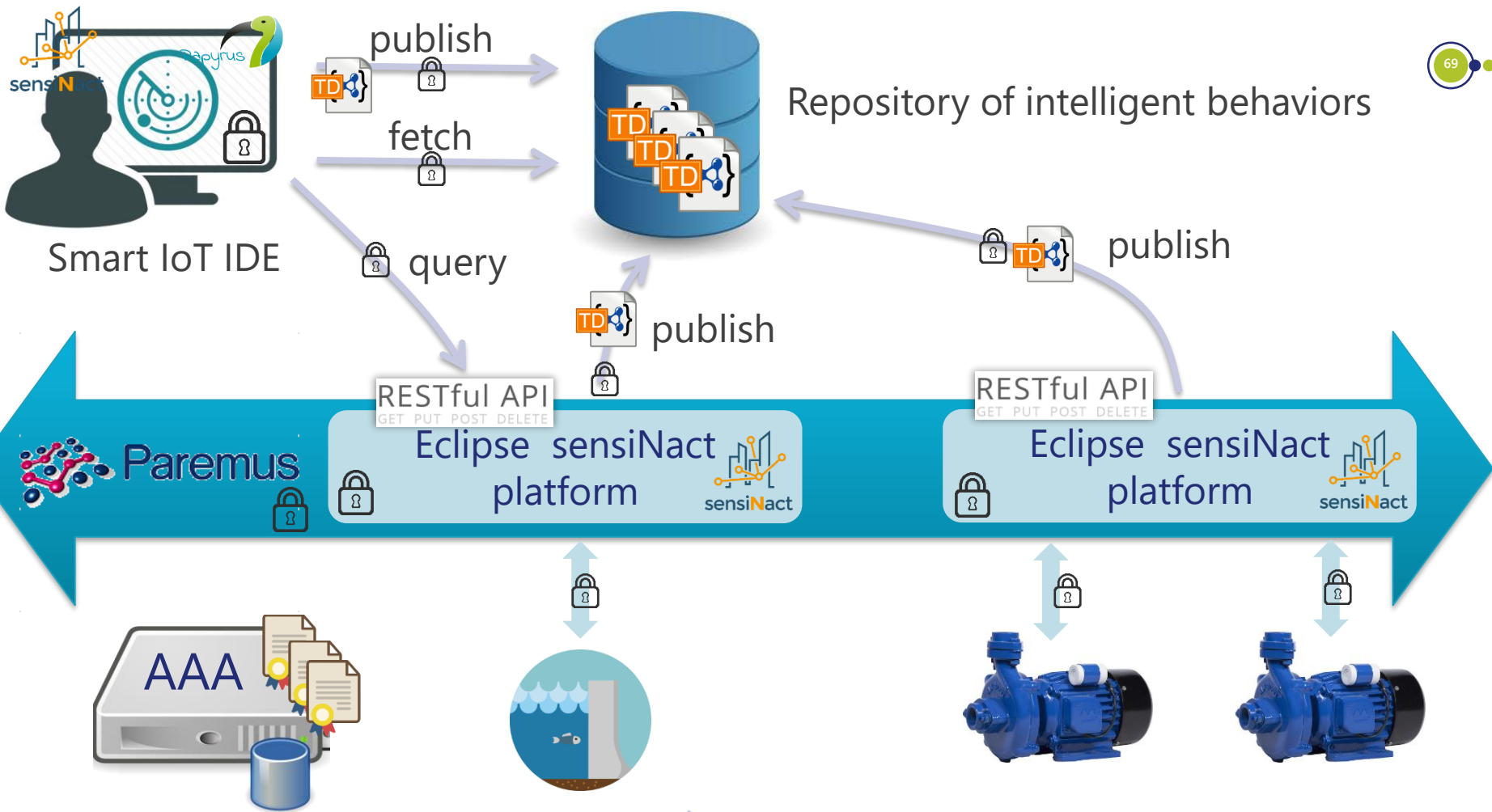
IF presence==true

DO LightService.lightOn.**act()**;

ELSE

DO LightService.lightOff.**act()**;





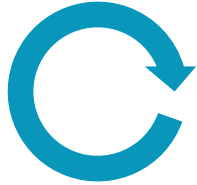
SMART IOT IDE POWERED BY SENSINACT AND PAPYRUS



IoT-ML model
(developer view)

synchronize

- Resources
- States
- Tasks
- Historic data



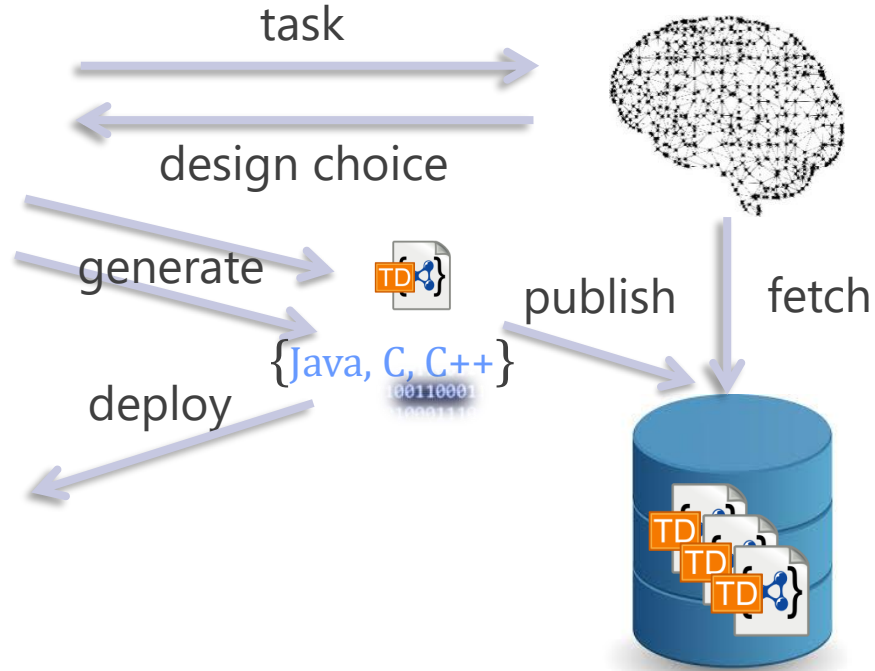
sensiNact data model
(advanced user view)

query

- deploy
- control
- monitor



Human or meta-learner



Repository of intelligent behaviors



CONTACTS

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CEA LIST

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 780089.



Institut Supérieur de Mécatronique et de Robotique



Paremus



SIEMENS



BRAIN-IoT

model-Based fRamework for dependable sensing
and Actuation in INtelligent decentralized IoT systems



Urban Technology Alliance

Worldwide testing environment for smart city solutions



UTA provides city scale testbeds

Smart city solutions need technical, economic, social validation before large scale deployment



UTA provides a matchmaking platform

Cities need neutral guidance, industry needs testing environment, researchers need real requirements



UTA provides best practices among cities all around the globe

Yes, each city is unique; yet, today's worldwide urban challenges are very similar

What is UTA's main mission?

Bringing relevant stakeholders together to

test and validate smart city solutions

Cities come with their **problems** and **experimentation space**

Small and large companies come with their **innovative solutions**

Researchers and NPOs come with their **expertise and neutral guidance**

**JOIN FORCES AND ORGANIZE SMART CITY
DEPLOYMENTS, PROVIDE RECOMMENDATIONS AND**

UTA current members

A vibrant community with important international actors

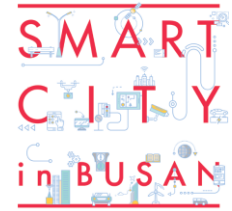
Initial testbed cities: **Grenoble, Taipei, Busan, Daejeon, Sejong, Santander, Bordeaux, Fujisawa, Saitama, Tsukuba, Bristol, Belfast, West Midlands, Lodz, Hong Kong, Vancouver, etc.** and many others are joining in the coming days



Grenoble Capital of the Alps
Capital of Innovation



Smart ski resort in
Chamrousse



Prestigious institutions, experts in smart cities: CEA, KAIST, Keio University, Knowledge Capital, KETI, University of Tsukuba, Osaka University, University of Grenoble-Alpes, U. of Cantabria, etc.
Continuously growing community...

Large international tech companies, network operators, device vendors, integrators, innovative SMEs and startups, law firms, consulting firms, insurance companies, artists, designers, etc.

Thank you for your attention!

JOIN US

Interested in being part of the UTA's vibrant community?

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UTA

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