

FROM RESEARCH TO INDUSTRY

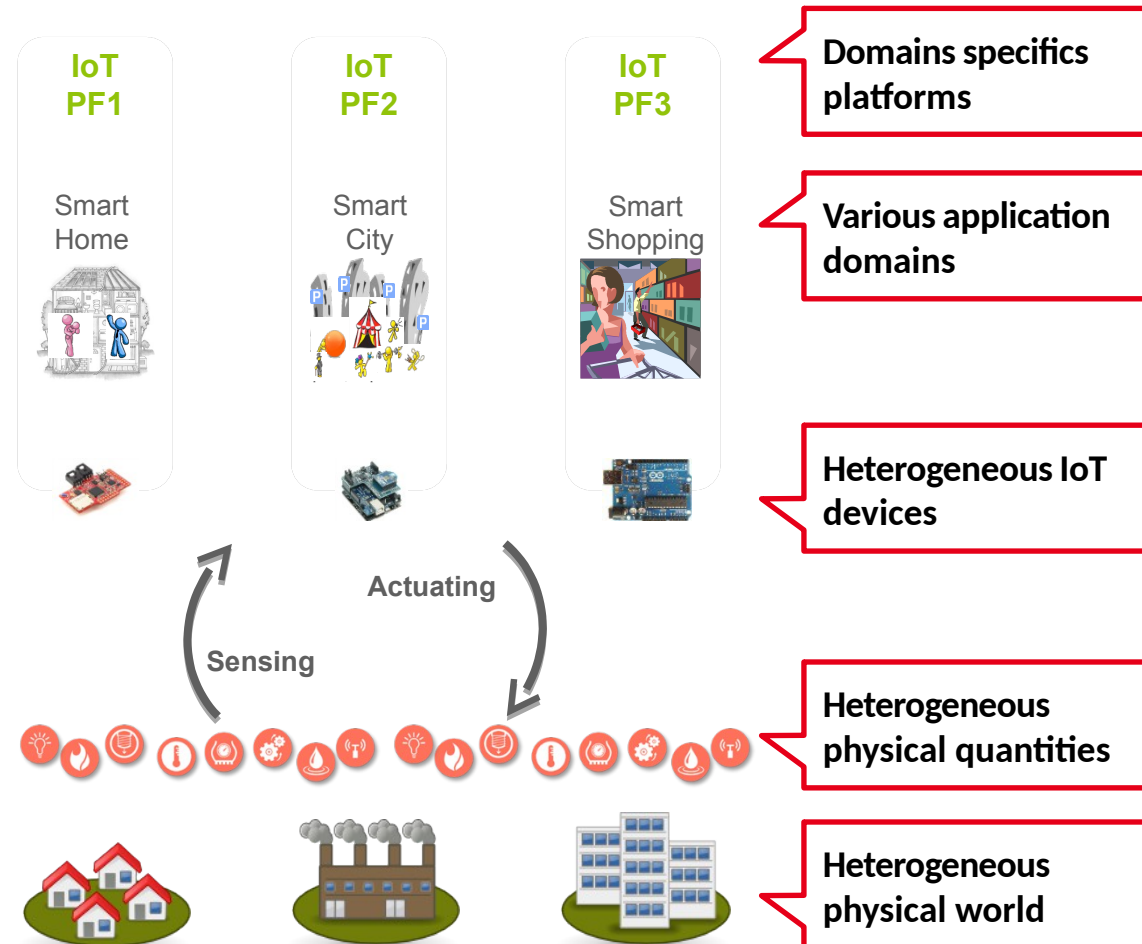
cea tech



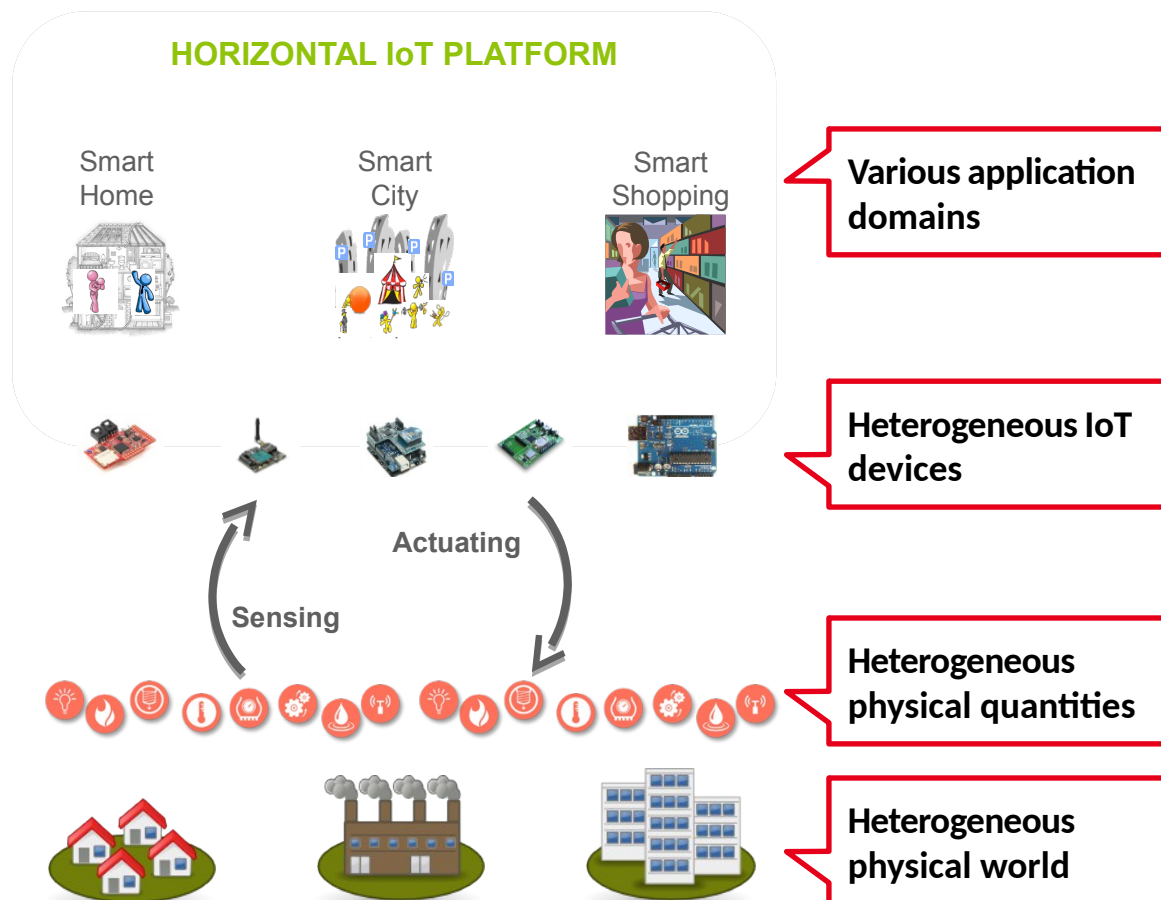
SENSINACT - HORIZONTAL OPEN PLATFORM FOR AN INTEROPERABLE IOT WORLD

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FROM VERTICAL TO HORIZONTAL IOT PLATFORMS



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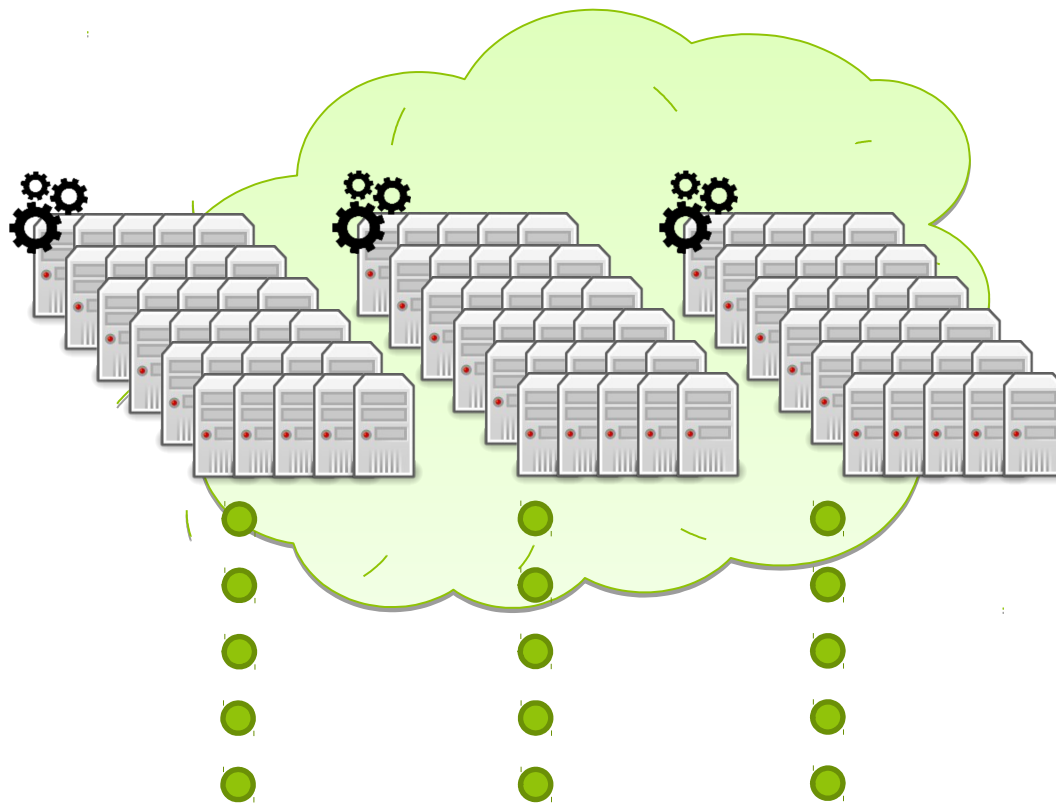
FROM THE GROUND PERSPECTIVE

- The IoT environment is divided and each protocol brings its data model.

This list is far from being exhaustive

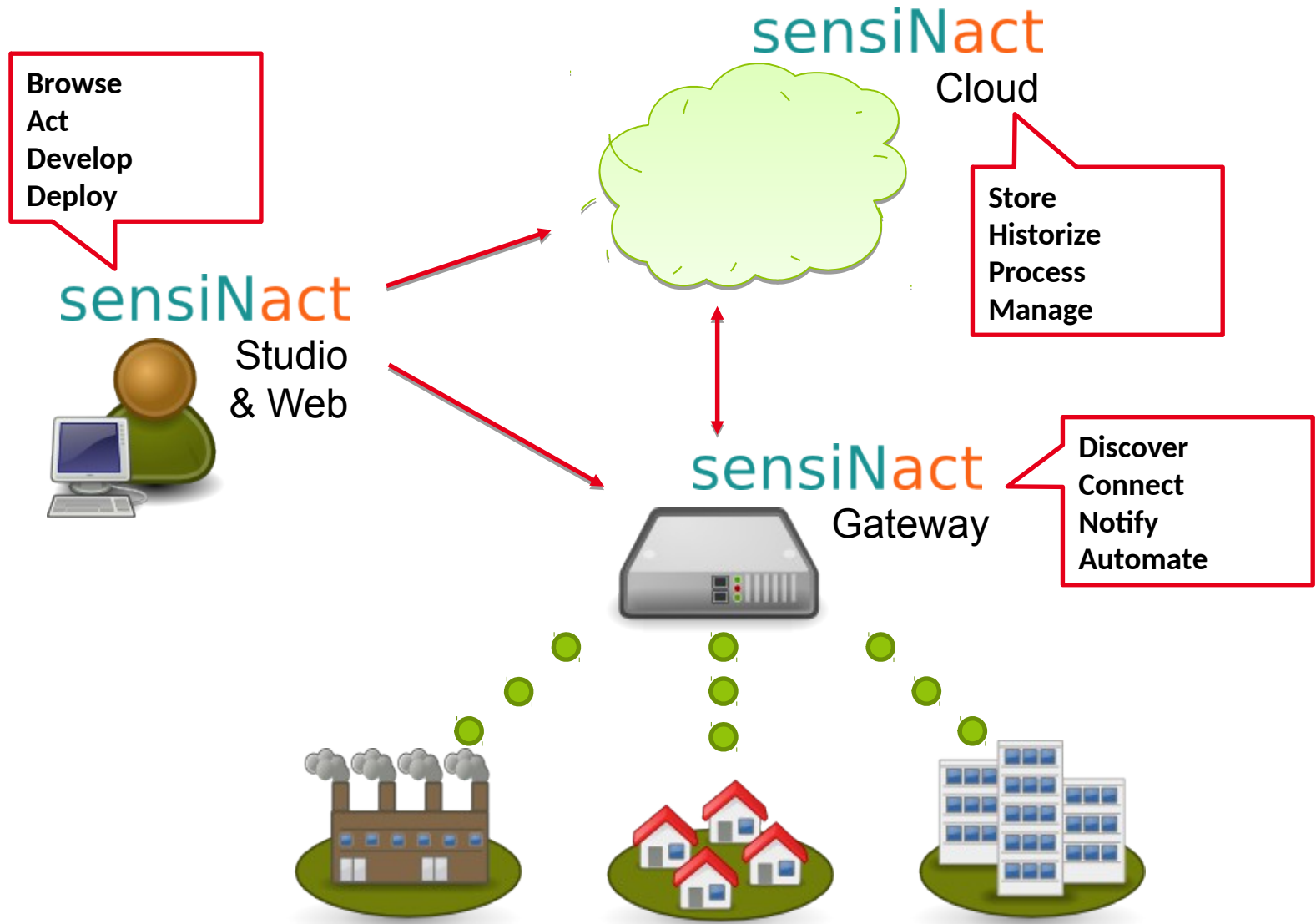


- **IoT generates lots of data that need to be processed.**
 - Centralization of data.
 - Processing far from the physical devices.



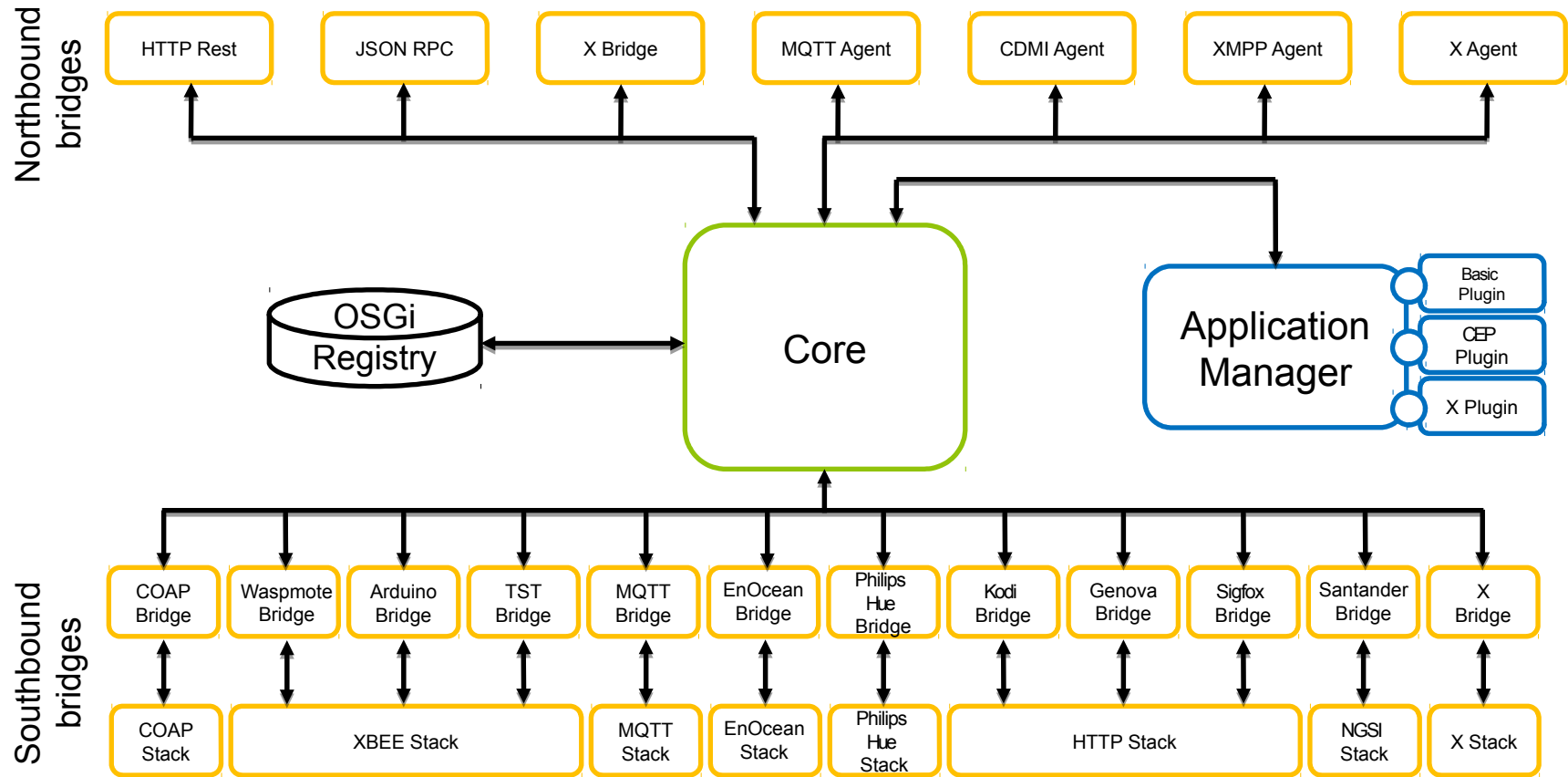
- **Handling heterogeneity of protocols**
 - Ease the development of new bridges
 - Provide an homogeneous data model
 - Provide an homogeneous access to the data
- **Process the data as far as possible in the lower layer**
 - Ease the creation of applications
 - Create “virtual” sensors using data-fusion
 - Handle event-based IoT environment
- **Providing an extensible and modular platform**
 - Ease integration of third party functionalities
 - Adapt the functionalities according to the needs

SENSINACT OVERVIEW

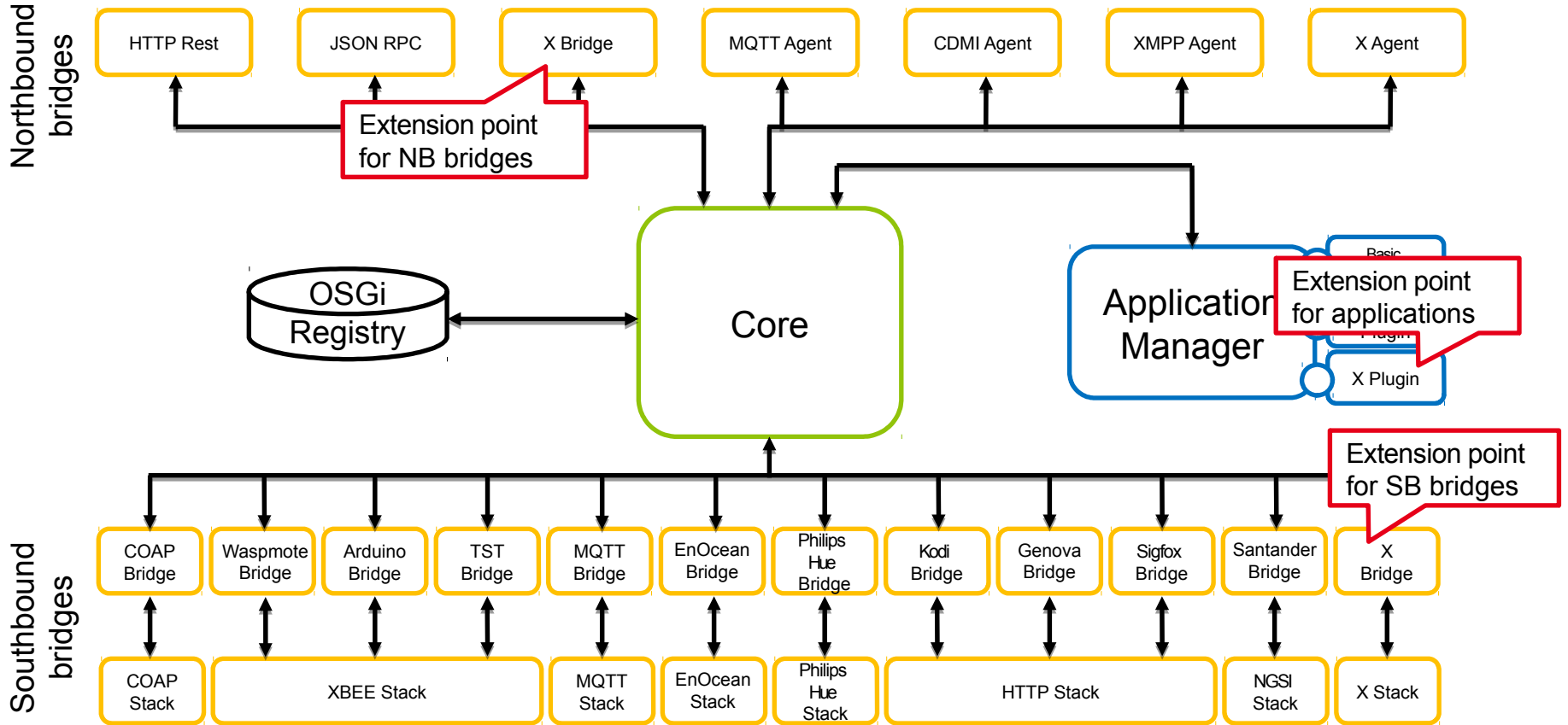


SENSINACT GATEWAY – AN OSGI-BASED IOT FRAMEWORK

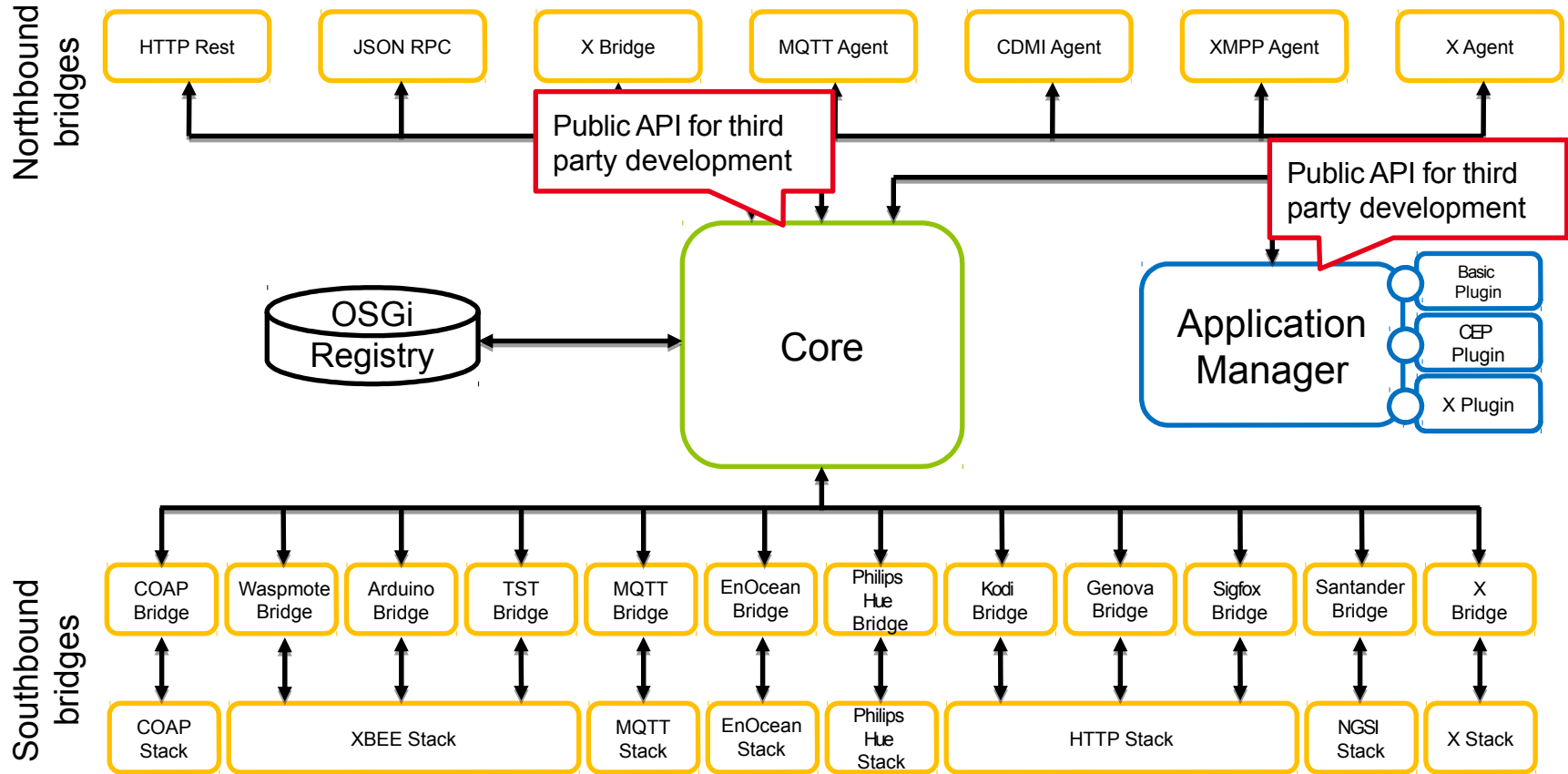
ARCHITECTURE OF THE GATEWAY



THIRD PARTY INTEGRATION



THIRD PARTY INTEGRATION

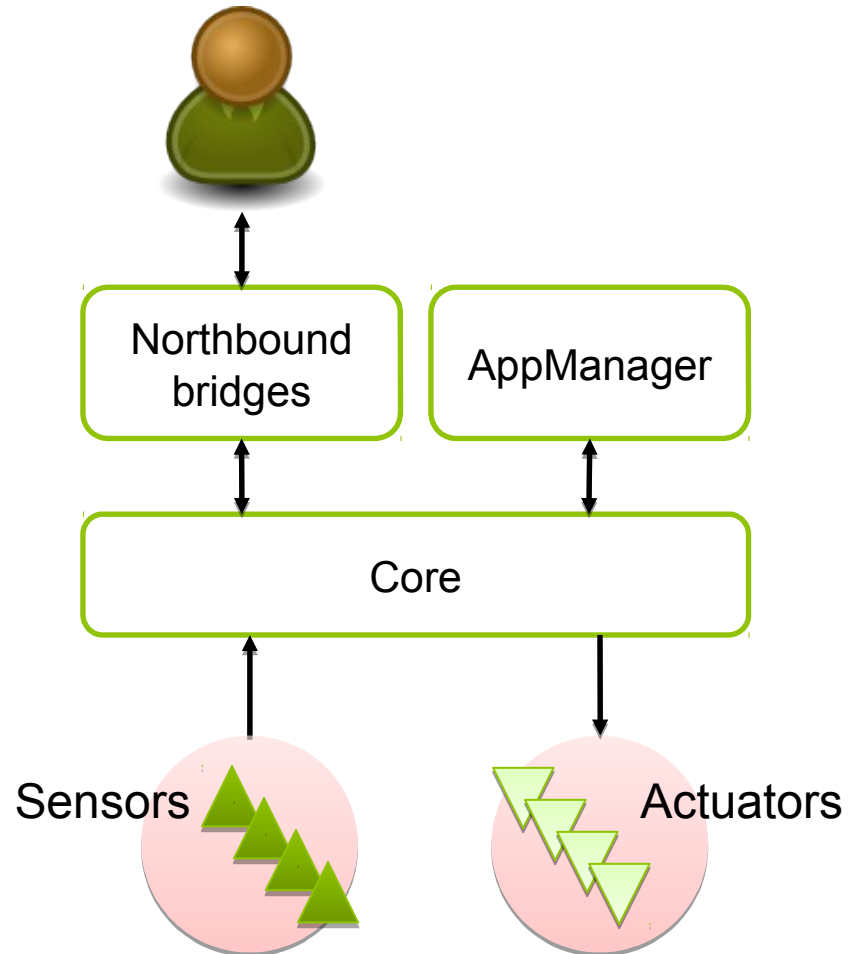


THE APPMANAGER

- The IoT environment is an event-based environment, applications are triggered on an event.
- Applications are based on the Event-Condition-Action (ECA) axiom.
 - When an event occurs, if the condition is satisfied, then the action is executed.
- An application is a processing of one or many data in order to produce a upper level data (data-fusion) or to execute actions.
- An application is a sensiNact service, with its sensors and its actuators (START, STOP, status,...). Thus, it is subject to composition by others applications.

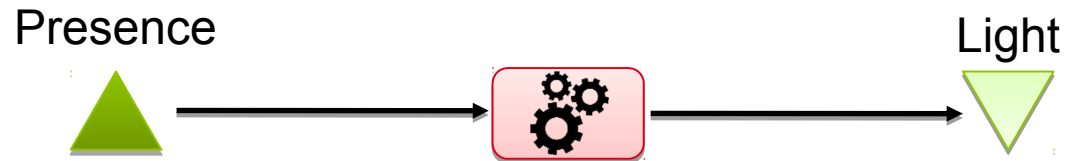
OVERVIEW OF THE APPMANAGER

- Connect sensors and actuators to automatize tasks.

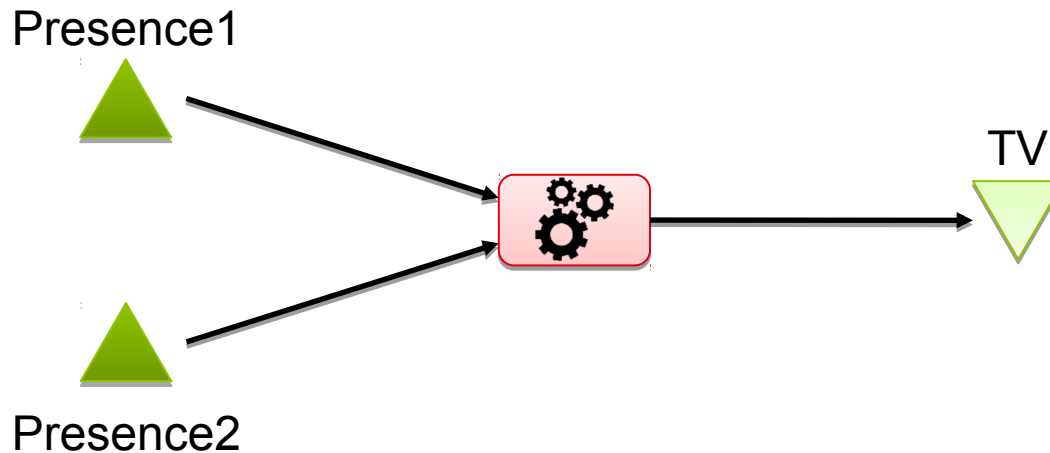


EXAMPLES OF APPLICATIONS

- Light changes on presence

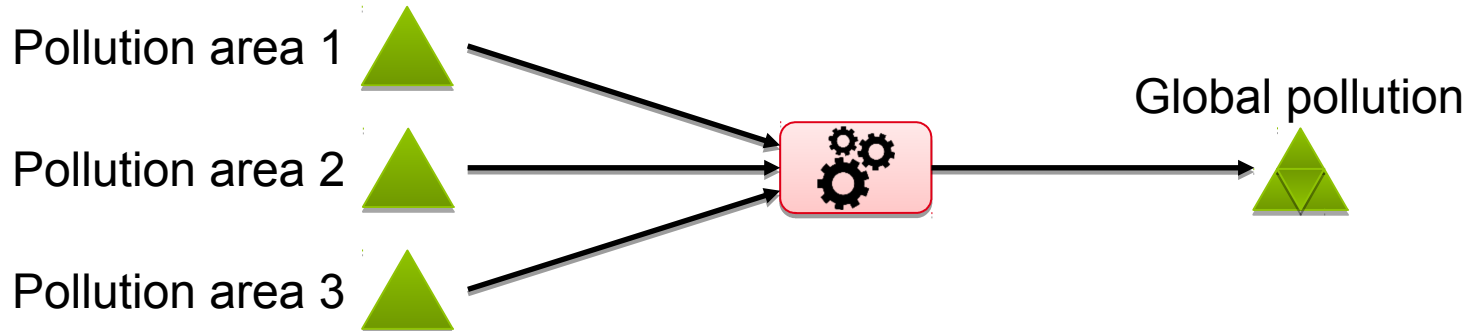


- TV pauses/resumes on presence leaving/arriving in the room

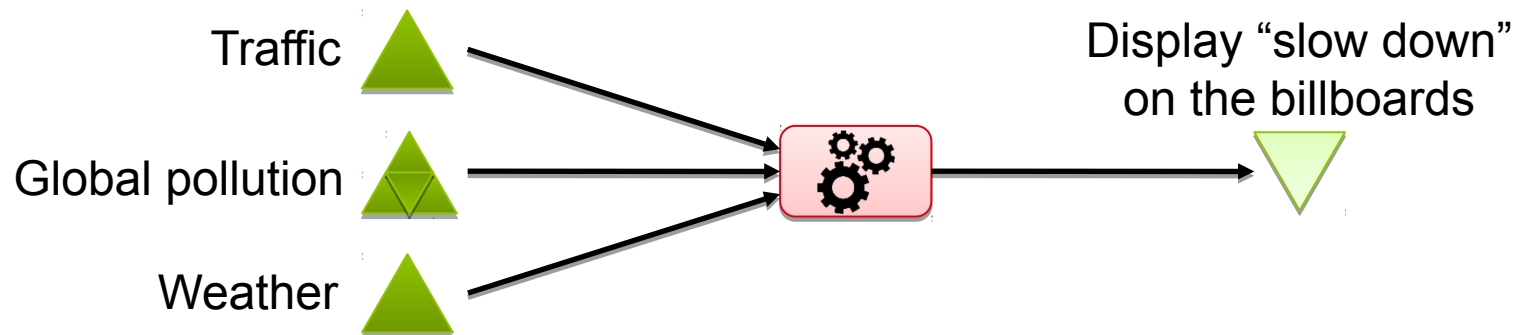


EXAMPLES OF APPLICATIONS

- Create “virtual” sensor



- Reuse “virtual” sensor



THE SNA LANGUAGE

- A *Domain Specific Language* (DSL) eases the development of the applications.

<pre>[resource <resource>]+ on <events> [if <condition> do]+ [<actions>]+ [else do]? [<actions>]?+ end if;</pre>	<pre>resource shortcutLightOn=[/URI/of/the/lightOn] resource shortcutLightOff=[/URI/of/the/lightOff] resource shortcutButton=[/URI/of/the/button] on shortcutButton.subscribe() if shortcutButton.get() == true do shortcutLightOn.act() else do shortcutLightOff.act() end if;</pre>
---	---

SENSINACT STUDIO – A RICH CLIENT PLATFORM

SENSINACT STUDIO, A RICH CLIENT

- **Goals**
 - Browse the available devices.
 - Interact with the devices.
 - Ease the development of sNa applications.
 - Ease the development of new bridges to handle new protocols.

- **The Studio is a set of Eclipse plugins.**



- A map to locate the devices

The screenshot displays the Sensinact Studio interface. On the left, the 'Device Navigator' shows a tree structure under 'clout' with various sensor services and resources. The main area is a map titled 'Outdoor Deployment' showing numerous blue location pins. A popup window for 'cloudweather_9' provides the following data:

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

At the bottom left, a 'Visualizer' panel shows a graph with 'value' on the y-axis (0-100) and 'Time' on the x-axis (01:00:00 to 01:00:00). The status 'Listener not activated' is displayed below the graph.

- A list of the service providers, services and resources

The screenshot displays the Sensinact Studio application window. The main area is a map showing numerous blue location pins representing sensors. A tooltip for a specific sensor, 'cloudweather_9', is visible, displaying the following data:

- + 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

On the left side, the 'Device Navigator' panel is highlighted with a red border. It shows a tree view of the project structure under the 'clout' folder:

- airensors_acquasola [2 service(s), 13 resource(s)]
 - admin [4 resources(s)]
 - airensors [9 resources(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]
- airensors_buenosaires [2 service(s), 11 resource(s)]
- airensors_busalla [2 service(s), 14 resource(s)]
- airensors_campora [2 service(s), 14 resource(s)]
- airensors_chiavari [2 service(s), 11 resource(s)]
- airensors_cogoleto2 [2 service(s), 13 resource(s)]
- airensors_europa [2 service(s), 12 resource(s)]
- airensors_firenze [2 service(s), 15 resource(s)]
- airensors_giovi [2 service(s), 8 resource(s)]

At the bottom left, there is a 'Visualizer' panel with a graph area and the text 'Drag and drop a resource here!'. The x-axis is labeled 'Time' with markers at 01:00:00 and 01:00:00. The y-axis is labeled 'value' with markers at 0, 50, and 100. Below the graph, it says 'Listener not activated'.

- An assistance for the creation of applications

The screenshot displays the Sensinact Studio interface. At the top, the menu bar includes File, Edit, Navigate, Search, Project, Run, Window, and Help. Below the menu is a toolbar with various icons. The main workspace is divided into several panels:

- Device Navigator:** A tree view on the left showing a project structure. The selected node is 'contact [SensorData]' under the 'a' folder. Other nodes include 'location [Property]', 'admin [5 resource(s)]', 'b [2 resource(s)]', 'Ox00877e05 [3 service(s), 13 resource(s)]', 'AppManager [1 service(s), 5 resource(s)]', 'ARD4AA67B40 [4 service(s), 21 resource(s)]', 'PhilipsHue-192_168_1_14-2 [4 service(s), 19 resource(s)]', 'sensiNact [2 service(s), 5 resource(s)]', and 'usb300 [2 service(s), 10 resource(s)]'.
- Outdoor Deployment:** A central panel showing a floor plan with several blue location pins. A tooltip for 'sido0x002588a9' is visible, listing '+ admin', '+ a', and '+ b'.
- Visualizer:** A panel at the bottom left showing a graph for 'sido/Ox002588a9/a/contact'. The y-axis is labeled 'value' (0 to 100) and the x-axis is 'Time' (01:00:00 to 01:00:00). A 'Stop listener' button is at the bottom.
- Code Editor:** A panel at the bottom right showing code for 'simple.sna'. The code is:


```

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
      
```

The status bar at the bottom right shows 'Writable', 'Insert', and '3 : 45'.

SENSINACT IN THE PROJECTS

SENSINACT IN THE PROJECTS

- **Projects**

- **Butler** (ended)
- **ClouT** (in progress)
- **OrganiCity** (in progress)
- **Festival** (in progress)
- **SocioTal** (in progress)
- **Big ClouT** (soon)
- **Wise IoT** (soon)



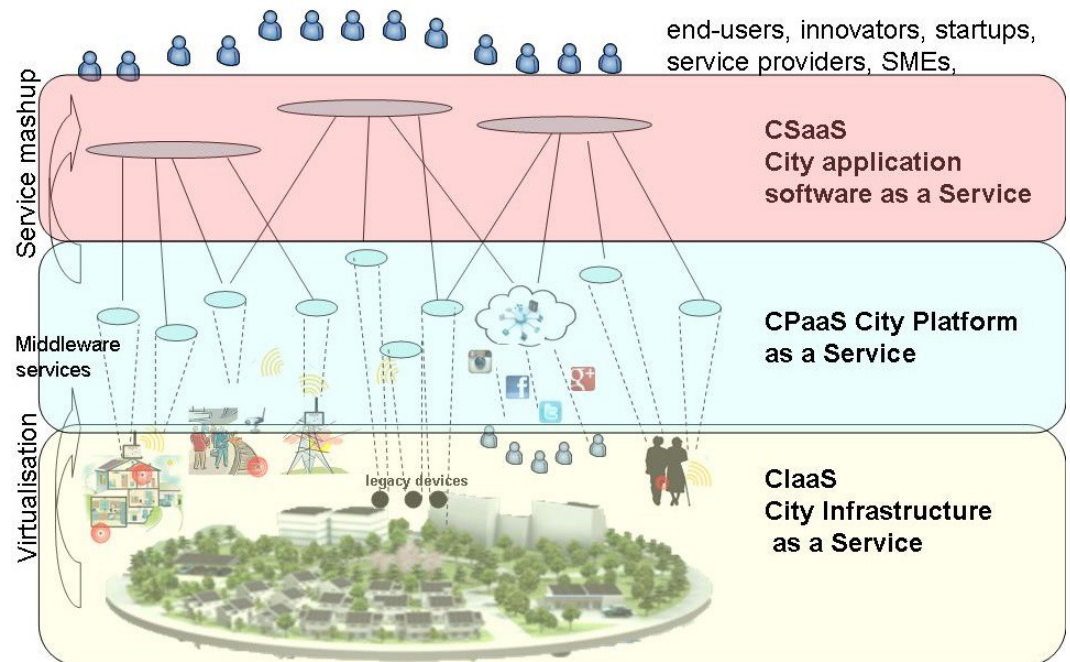
- **Number of devices**

- Aarhus (Denmark): a lot but they don't know
- Genova (Italy): ~ 100
- London (United kingdom): a lot but they don't know
- Mitaka/Fujisawa (Japan): ~ 8 000
- Santander (Spain): ~ 5 000

THE EXAMPLE OF THE CLOUT PROJECT



- ClouT's overall concept is leveraging the Cloud Computing as an enabler to bridge the Internet of Things with Internet of People via Internet of Services, to establish an efficient communication and collaboration platform exploiting all possible information sources to make the cities smarter and to help them facing the emerging challenges such as efficient energy management, economic growth and development.

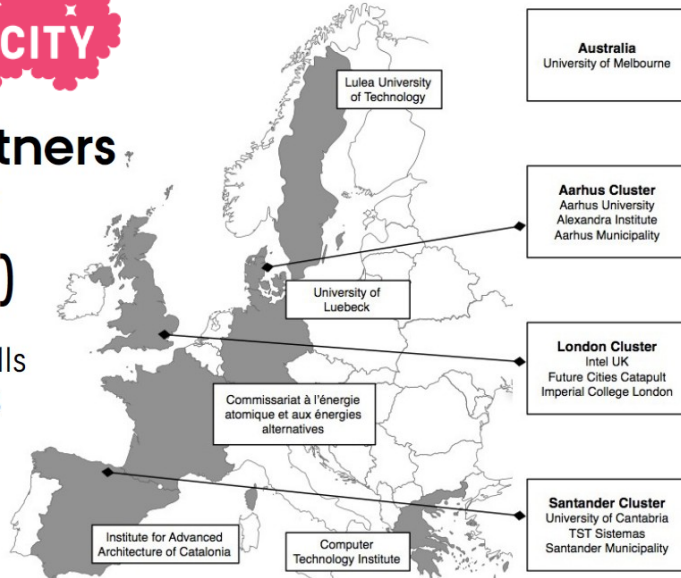


THE EXAMPLE OF THE ORGANICITY PROJECT



15 partners
€7.2 M
(€1.8 M)

2 open calls
36 months
2015-17



- OrganiCity aims at integrating the testbeds from 3 Europeans clusters (Santander, London, Aarhus) in order to provide an “*Experimentation as a Service*” platform.
- The platform provides an homogeneous access of the testbeds for the “co-creation” of services by citizens.
- *Open calls are organized to invite the SMEs to use the testbeds.*



Experimenters



Experimentation as a Service Layer

Experimentation facilities



Santander



Aarhus



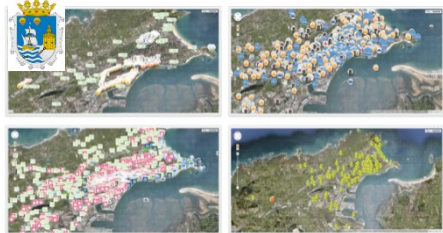
London

THE EXAMPLE OF THE FESTIVAL PROJECT



- Join forces and connect & federate EU and JP platforms for experimenters (researchers, developers, SMEs, web entrepreneurs, ...).
- Concrete, tangible smart ICT applications deployments, experimentations in the federated testbeds with real-user involvement.

Santander



GRAND LYON
MÉTROPOLE INTELLIGENTE



NICT
Smart ICT testbed
Infrastructure, testbeds,
software, internet of things

FUTURE INTERNET PPP
Software and Smart Services



Infrastructure, testbeds

IERC
European Research Cluster
on the Internet of Things

Grand Front Osaka



Osaka Train Station



Smart energy



Smart building



Smart shopping



iHouse



PTL



GFO – The Lab



Santander



TO CONCLUDE

- **For the gateway**
 - Consolidate the documentation before publishing it in open source.
 - Integrate the distribution of the gateways and of the applications.
 - Verify the consistency of the applications.
- **For the Studio**
 - Improve the web version.
 - Integrate a graphical development environment (boxes to facilitate the creation of applications).
- **For the projects**
 - Confront sensiNact with on the ground experiments.
 - Create a community around sensiNact.

Thank you

Any questions ?

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