Handling Web of Objects interoperability issues

Web of Objects project

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Customers' issue

Clients' issues

Heterogeneous ecosystem of devices management

Today's **connected-objects** (sensors, actuators, industrial devices…)

are communicating, but often in different languages.

The number and diversity of communication protocols between these devices are for any industrial system a real Babel tower:

smartEngine is Sogeti HighTech's solution to clients critical issue.

A solution to :

➔ **Provide communication between heterogeneous devices** with or without local/remote management system.

➔ **Manage heterogeneous data** and events.

➔ **Configure** devices remotely.

➔ **Call services** remotely.

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smartEngine - Enabling the ecosystem of everything

Sogeti HighTech **smartEngine** is a solution to this issue (and others) developed during ITEA2 WoO : **A versatile generic engine to manage and process Internet of Things /M2M devices, data, events & services**

- **Agnostic to business domain**
- **Multi-OS**
  - Linux.
  - Windows 32/64 bits.
  - Mac OS.
  - Portable on other OSes
- **Multi-hardware targets**
  - X64, x86, ARM, …
  - PC, Smartphones, tablets, embedded systems…
- **A scalabe architecture**
  - Modular by plugins.
- **Built to be embeddable**
  - Small footprint to fit to smallest customer's environment &products, but adaptable to all target size.

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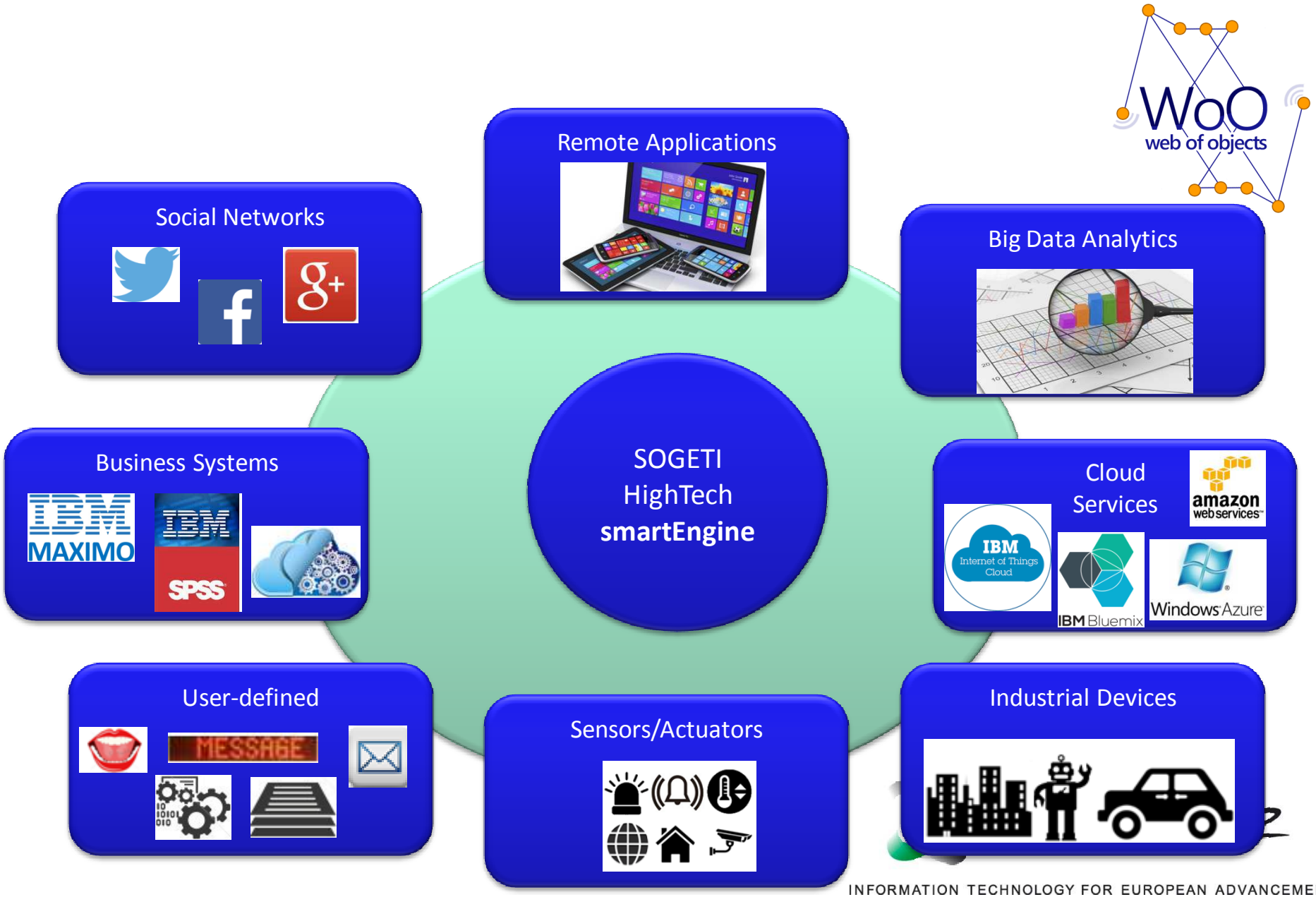
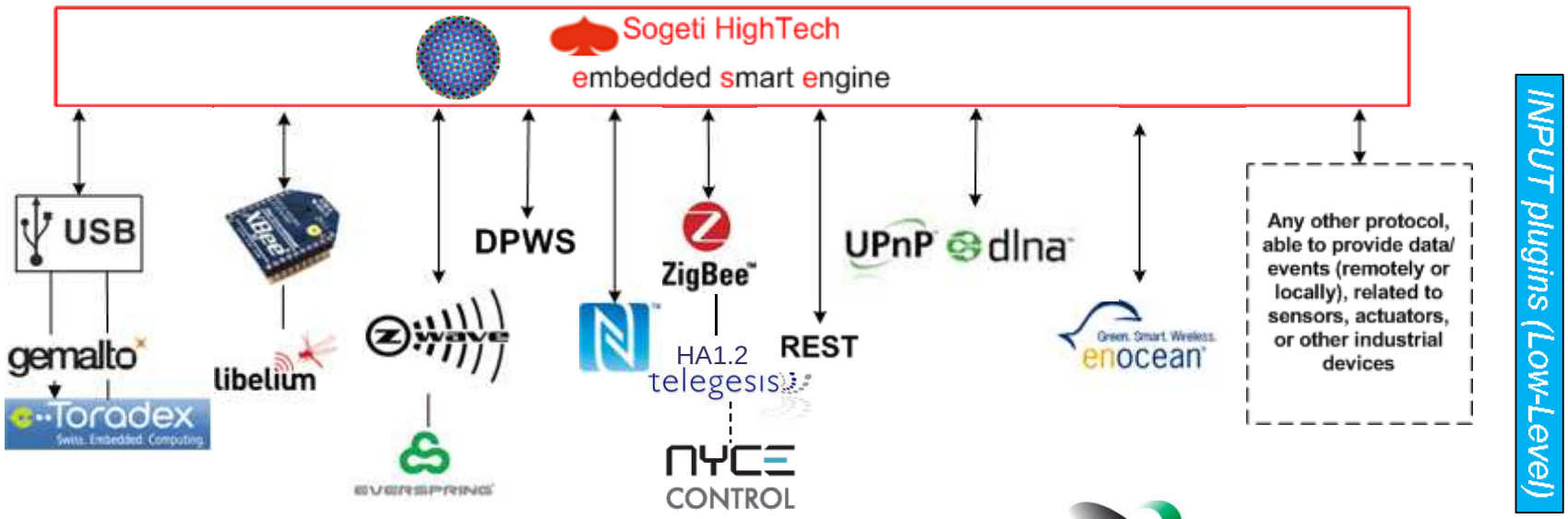
smartEngine features



smartEngine Plugins

Communicating between external entities to the Core application (core input)

- Input plugins dedicated to dialog with specific devices (sensors, actuators…)
- Communication with core (data, events, services… synchronous/asynchronous).
- Provide specific & logical business services View for devices.
- Allow remote clients to call/configure these services & devices.

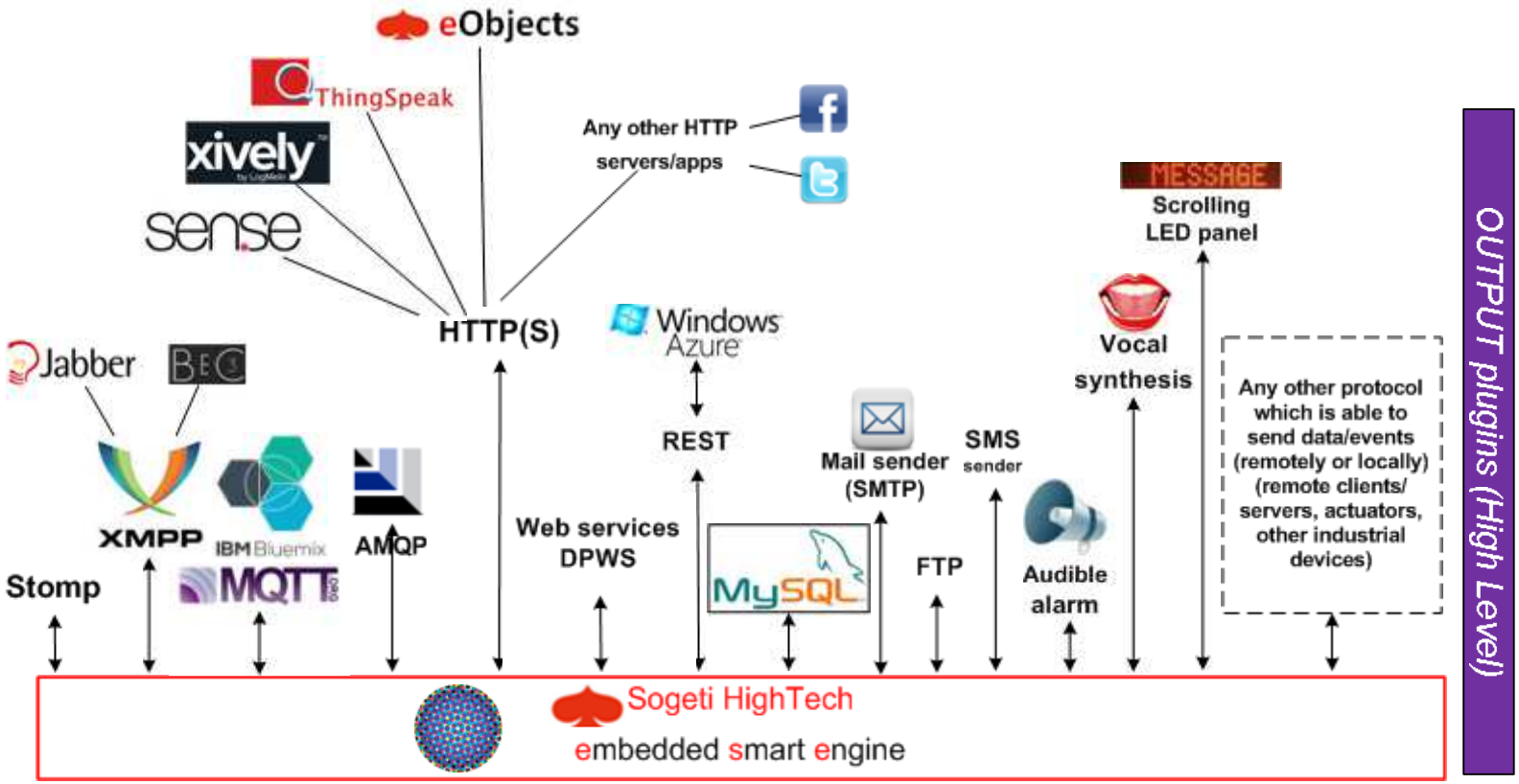


Input plugins examples

- **Industrial devices / smart-*:** web services, DPWS, modbus, KNX, profibus, …
- **Geolocation:** GPS coordinates, RFID tag,
- **Home automation :** Zigbee HA, Xbee, USB, IRDA, wifi, ZWave (door opening, presence detection…)
- **Multimedia:** camera, microphone, Kinect, UPnP, DLNA devices, mouse, keyboard…

- **Automotive:** OBDII, CAN, …
- **Health:** HL7 (Continua) …
- **Security:** HTTP, TCP, UDP, …frame sniffers.
- **Reactive to external websites:** Twitter thread, RSS…
- **Misc. sensors:** accelerometer, compass, gas, QRCode reader, radiation sensor management…

smartEngine Plugins



Communicating from Core to remote entities

- Send data to remote entities (sensors, actuators, databases, remote apps…)
- Can embed behavior to transform raw data/events on the fly
- Provide a way to remote devices to call services provided by input plugins (embedded in devices).

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Output plugins examples

- **Heterogeneous devices / Communication Protocols:** MQTT, AMQP, XMPP, stomp, HTTP, FTP, Web services, …
- **Social networks & web sites:** twitter, facebook, Google map…
- **Databases:** mySQL, mariaDB, …
- **Cloud :** Amazon web services, Microsoft windows Azure…
- **Image processing:** Face detection, image plate detection, crowd motion detection...
- **Backends for IoT data:** IBM IoT Foundation, Thingspeak…
- …

Handling IoT interoperability issues

High integration & evolution capabilities

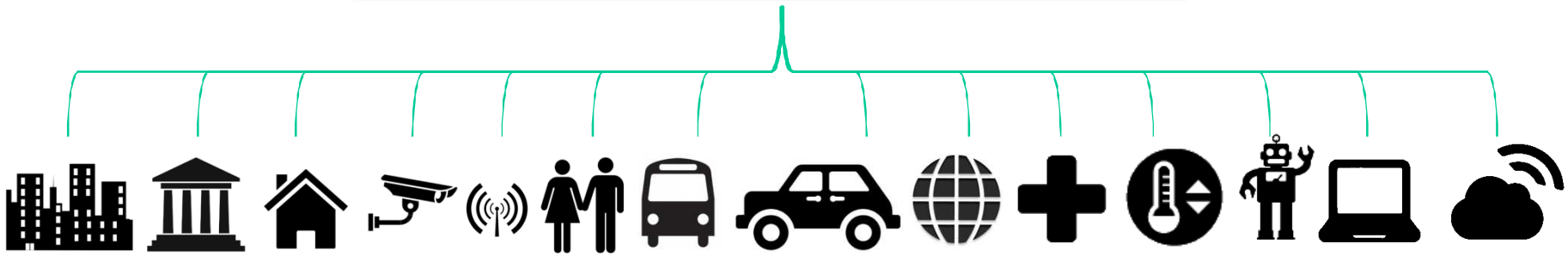
Easy interoperability

Powerful analytics

Unified vision

Sogeti HighTech smartEngine

Smarter actions



Internet of Things/M2M devices, sensors, actuators, mobile, and applications

Connect everything, everywhere, easily.

Help you Acquire, Aggregate, Analyze, Assign & Act according to your needs

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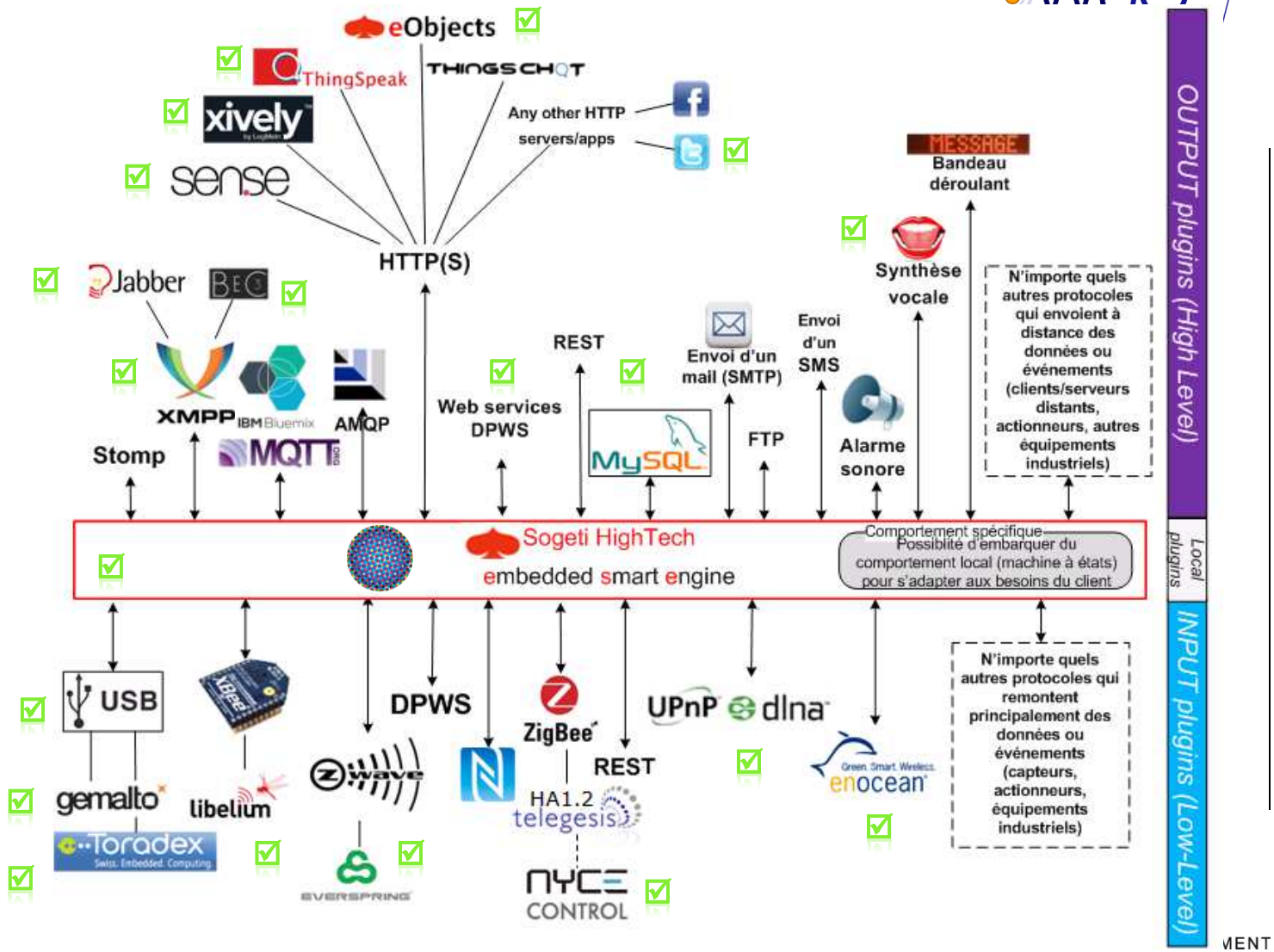
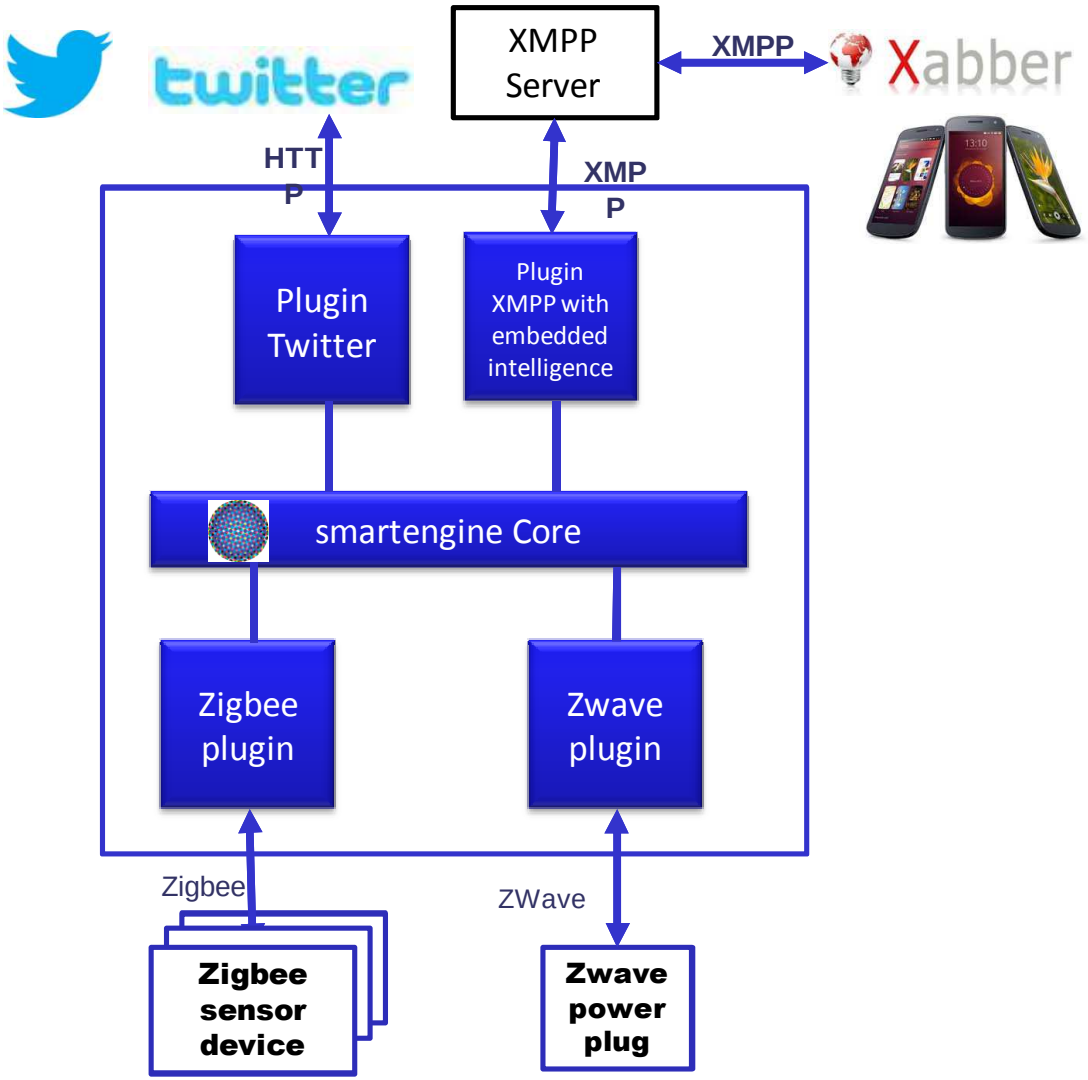
smart Engine – Big Picture

Connect everything, everywhere, easily.

Create your own plugins, for your own devices, with smartEngine SDK



Example #1 – Let devices being social



WoO web of objects

Inform user by:

- Its Twitter thread: of the different sensors status.
- A smartphone/tablet app : when an intrusion is detected (thanks to real time correlation of sensor data).

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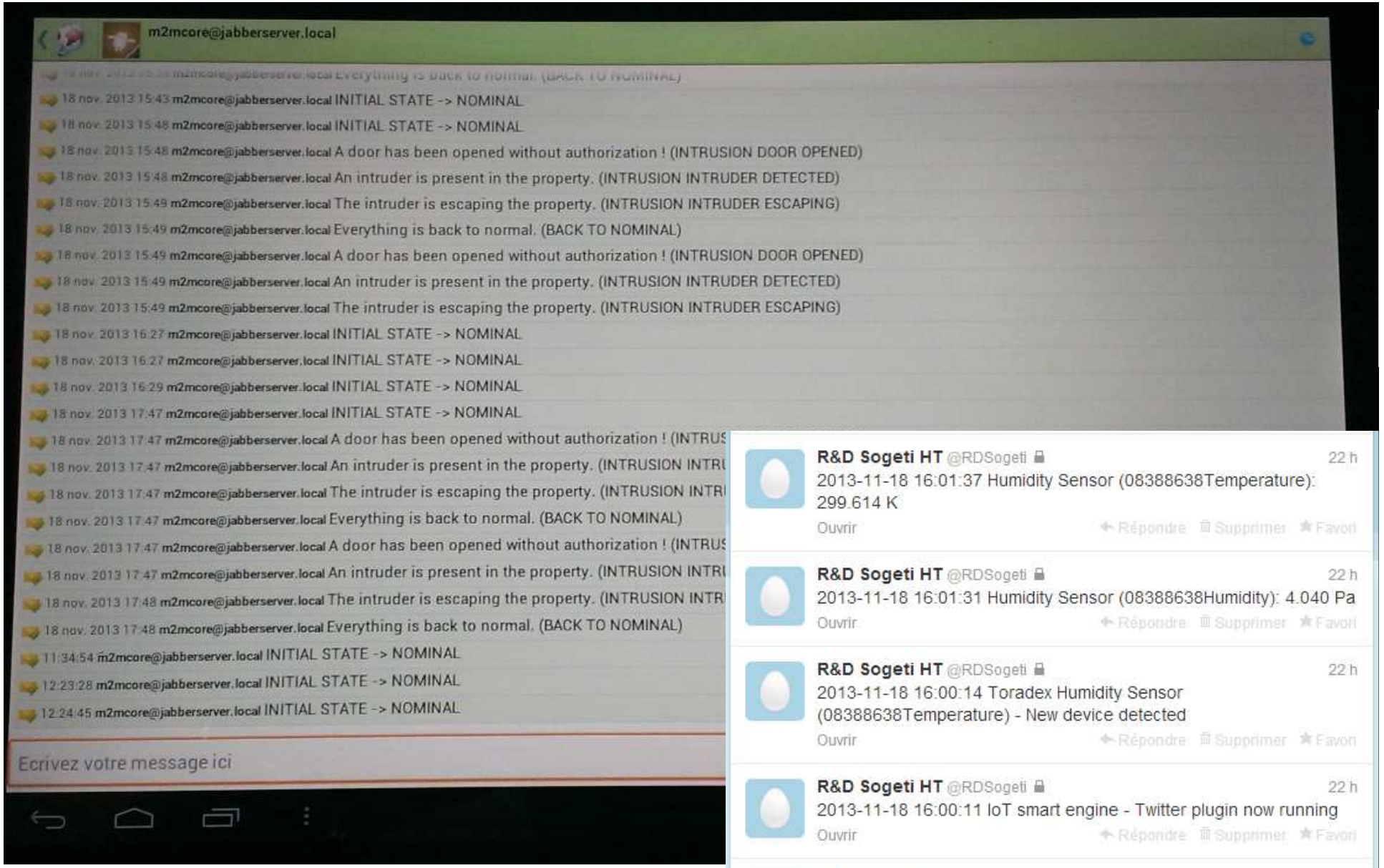
m2mcore@jabberserver.local
18 nov. 2013 15:43 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 15:48 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 15:48 m2mcore@jabberserver.local A door has been opened without authorization ! (INTRUSION DOOR OPENED)
18 nov. 2013 15:48 m2mcore@jabberserver.local An intruder is present in the property. (INTRUSION INTRUDER DETECTED)
18 nov. 2013 15:49 m2mcore@jabberserver.local The intruder is escaping the property. (INTRUSION INTRUDER ESCAPING)
18 nov. 2013 15:49 m2mcore@jabberserver.local Everything is back to normal. (BACK TO NOMINAL)
18 nov. 2013 15:49 m2mcore@jabberserver.local A door has been opened without authorization ! (INTRUSION DOOR OPENED)
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18 nov. 2013 15:49 m2mcore@jabberserver.local The intruder is escaping the property. (INTRUSION INTRUDER ESCAPING)
18 nov. 2013 16:27 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 16:27 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 16:29 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 17:47 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
18 nov. 2013 17:47 m2mcore@jabberserver.local A door has been opened without authorization ! (INTRUS
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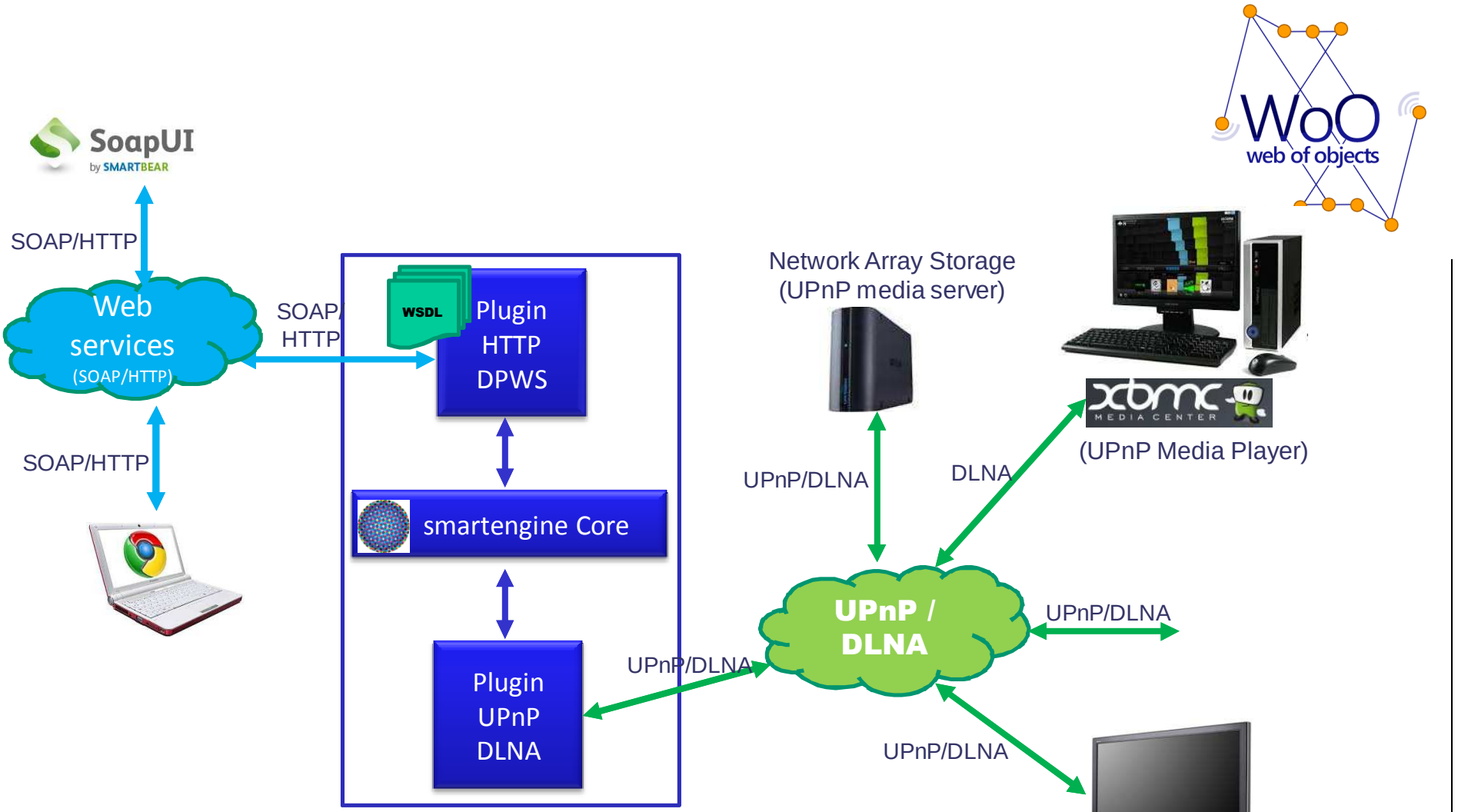
18 nov. 2013 17:48 m2mcore@jabberserver.local The intruder is escaping the property. (INTRUSION INTRU
18 nov. 2013 17:48 m2mcore@jabberserver.local Everything is back to normal. (BACK TO NOMINAL)
11:34:54 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
12:23:28 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
12:24:45 m2mcore@jabberserver.local INITIAL STATE -> NOMINAL
Ecrivez votre message ici
R&D Sogeti HT @RDSogeti 22 h
2013-11-18 16:01:37 Humidity Sensor (08388638Temperature): 299.614 K
Ouvrir Répondre Supprimer Favori
R&D Sogeti HT @RDSogeti 22 h
2013-11-18 16:01:31 Humidity Sensor (08388638Humidity): 4.040 Pa
Ouvrir Répondre Supprimer Favori
R&D Sogeti HT @RDSogeti 22 h
2013-11-18 16:00:14 Toradex Humidity Sensor (08388638Temperature) - New device detected
Ouvrir Répondre Supprimer Favori
R&D Sogeti HT @RDSogeti 22 h
2013-11-18 16:00:11 IoT smart engine - Twitter plugin now running
Ouvrir Répondre Supprimer Favori
R&D Sogeti HT @RDSogeti 22 h
2013-11-18 16:00:05 Hello, I am the IoT smart engine - Twitter plugin initialisation OK
Ouvrir Répondre Supprimer Favori

➔ Video

Example #2 – Control UPnP/DLNA devices with pure Web Services



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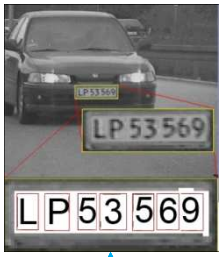
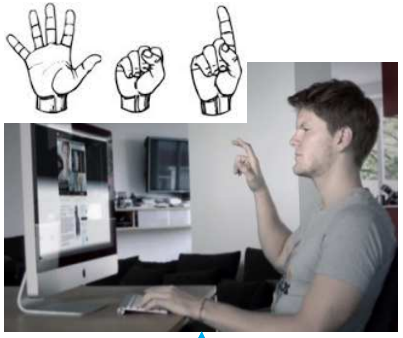
Example #3 - Picture/Video processing plugins





Plugin License plate detection

Plugin Face detection

Plugin Crowd motion detection

Plugin Counting number of people

Plugin Hand gesture recognition

smartengine core

Plugin webcam

Video flow

Configuration

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smart engine - Benchmarks

Core size - smartEngine v2

OS	Flash size required
Linux / Arm (Raspberry Pi)	142 kB
Linux 32 bits	139 kB
Windows 7 64 bits	82 kB
eCos (STM32 – core + plugins)	132 kB

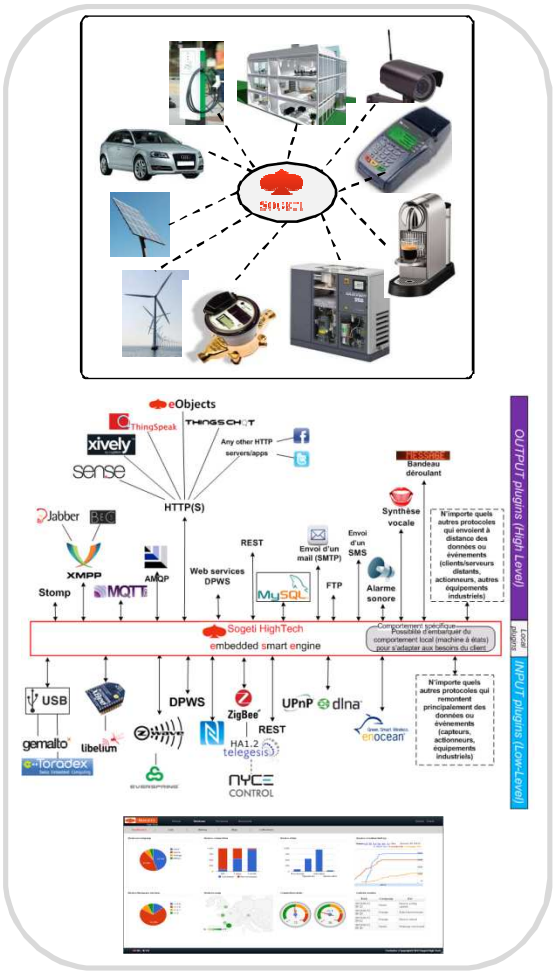
Performance benchmarks - smartEngine v2

Target	OS	CPU	Nb cores	RAM	Core Speed Processing (dsc=data/sec/core)	CSP (bitmaps) (64 0x480) 307ko	CSP (800x600) 480 ko	CSP *Full HD* (1920x1080) >2Mo
laptop Lenovo T530	Win7 64 bits	Intel Core i7 *3720QM@2.6GHz (Q2 2012)*	4 cores 8 threads	8 GB	**1.801.775** data/sec/core **(up to 14 Millions data/sec on 8 threads)**	**3284** bmp/sec/core	**2110** bmp/s/core	**415** bitmaps/sec/core
PC Dell	Win7 32bits	Intel Core2 *Duo E6550 @ 2GHz (Q3 2007)*	2	2 GB	**847.230** d.s.c	**1451** bmp/sec/core	**903** bmp/s/core	**174** bitmaps/sec/core
PC Dell Optiplex 745	Linux Debian 7.4 32bits	Intel Core2 *6400@2.13GHz (Q3 2006)*	2	2 GB	**685.837** d.s.c	**456** bmp/sec/core	**293** bmp/s/core	**60** bitmaps/sec/core
PC Dell Optiplex 745	Linux Ubuntu 3.11 32bits	Intel Core2 *6400@2.13GHz (Q3 2006)*	2	2 GB	**683.400** d.s.c	**423** bmp/sec/core	**274** bmp/s/core	**60** bitmaps/sec/core
Raspberry Pi model B	Linux Raspbian	Broadcom BCM2835 *ARM1176JZF-S (ARMv6)@700 MHz*	1	512MB	**64.000** data/sec	**36** bmp/sec.	**23** bmp/sec.	**5** bitmaps/sec.
STM32F4 Discovery	eCos	STM32F4 *ARM Cortex-M4 @168Mhz max.*	1	192kB 1MB Flash	**21.768** data/sec	**33** bmp/sec.	**21** bmp/sec.	1920x1080: N/A 1024x768: **13** bmp/sec

SOGETI HighTech smartEngine

Context & Issues

One of the main issues of Internet of Things is the numbers of communication protocols available and used, coming from various business domains: industry, automotive, multimedia, home automation, IT…. These protocols are not interoperable and using heterogeneous devices (based on various protocoles) create barriers ("silos") between devices, prevent providing a fully interoperable devices ecosystem, and add complexity to integrate them in M2M projects.



SOGETI achievements

Sogeti HT has designed a end-to-end IoT/M2M solution, realizing an innovative engine dedicated to routing, analysis, and processing of data from the Internet of Things. Our smartEngine is modular and tailored to be embeddable in industrial and logistics facilities.

This platform allows to make interoperable incompatible devices of today. Heterogeneous data from sensor networks, are captured, analyzed and transmitted to remote entities whatever communication protocol , relying on plugins developed specifically for each standard or set of devices.

Plugins "lower layers" are used to connect objects mode USB, Bluetooth, Zigbee, 6LoWPAN ...

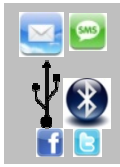
Plugins "upper layers" allow the implementation of services such as email, SMS, Twitter, video on NAS ...

The platform is operational and allows the monitoring and administration of remote objects for the management of their deployment or monitoring. It is ready to be customized for your projects with the shortest Time-To-Market, in a secure vertical solution.

Design | Build | Run

Embeddable Intermediation Platform

Smart objects



Multiple communication protocols

On Shore

2014

Processing power of the engine:

- **1.802.000 data per second** per core on Intel **Core i7** cpu (**up to 14 Millions** data per second on a 3720QM@2.6GHz).
- **64.000 data/sec**.on **RaspberryPi.**
- **22.000 data/sec**. on a **STM32F4**.

Thank you! Questions ?

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