FIWARE: supporting an (IoT) Cloud for RDA in Europe

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FIWARE: Definition of Smart Solution

Smart Solutions gather data from many different sources (including but not limited to IoT) to build a “picture” of the real world and then process and analyze that information in order to implement the desired intelligent behavior (which may imply changing the real world)

Data = Context Information

Capture

Actuate

Process

CONTEXT MATTERS
Implementing Smart Solutions requires gathering and managing context information at large scale.

# Smart Cities

- **Shop**
  - Location
  - Business name
  - Franchise
  - Offerings

- **Bus**
  - Location
  - No. passengers
  - Driver
  - Licence plate

- **Citizen**
  - Birthday
  - Preferences
  - Location
  - ToDo list
Implementing Smart Solutions requires gathering and managing context information at large scale.

# Smart Industry

- **Gas Tank**
  - Station
  - Max Volume
  - Current Level
  - Min Threshold
  - Temperature

- **Station**
  - Location
  - Owner
  - SLA

- **Tanker**
  - Driver
  - Location
  - Max Volume
  - Current Level
  - Speed
  - Direction
Implementing Smart Solutions requires gathering and managing context information at large scale.

# Smart Agro

- **Crop**
  - Humidity
  - Leaf area
  - Age

- **Tractor**
  - Location
  - Speed
  - Direction

- **Drone**
  - Location
  - Battery level
  - Speed
  - Direction
What if ... there were a standard API for accessing context information?
Context Information Management in FIWARE

- The OMA NGSI-9/10 API is a simple yet powerful public, royalty-free standard API for managing Context information.
- The FIWARE NGSI API is the Restful binding of OMA NGSI and uses JSON: any web/backend programmer gets quickly used to it.
- FIWARE NGSI supports geo-queries, soon Linked Data (JSON-LD).

**Application/Service**

**FIWARE NGSI API**

**Context Broker**

- **Bus**
  - Location
  - No. passengers
  - Driver
  - Licence plate

- **Citizen**
  - Name-Surname
  - Birthday
  - Preferences
  - Location
  - ToDo list

- **Shop**
  - Location
  - Business name
  - Franchise
  - offerings
Integration with sensor networks (1/2)

- FIWARE NGSI is capable to deal with the wide variety of IoT protocols today
- Rather than trying to solve the battle of standards at IoT level, it brings a standard where no standard exists today: context information management
IoT would be an enabler, no barriers because of complexity

“I don’t care what low-level IoT protocol is used”

“I should not need to handle connectivity with IoT devices”

GET <Oauth token>/V1/contextEntities/crop1/attributes/humidity

Context Broker

Standard API

Reading the value provided by a sensor should be as easy as reading an attribute of an entity
IoT would be an enabler, no barriers because of complexity

“I don’t care what low-level IoT protocol is used”

“I should not need to handle connectivity with IoT devices”

Actuation on a device should come as a side effect derived from updating the attribute of an entity

PUT <Oauth token>/V1/contextEntities/crop1/attributes/watering “on”

Context Broker

Standard API
Once context information is gathered, other useful FIWARE enablers can be used:

- Advanced Web-based UI (AR, 3D)
- Open data publication
- Data/Apps visualization
- IoT-enabled Context Information Management
- Complex Event Processing
- Multimedia processing
- Big Data Analysis
FIWARE is at the center of major de-jure and de-facto standardization efforts

The GSMA has published a Reference Architecture for IoT Big Data Ecosystem which recommends to mobile operators

FIWARE NGSIv2 should be supported by implementers delivering the IoT Big Data ecosystem

TM Forum, the global industry association for digital business, is working with FIWARE to deliver the key building blocks for enabling and connecting Smart City ecosystems.

TM Forum is supporting FIWARE NGSI REST-based APIs for real-time access to contextual information for cities.

ETSI has announced the creation of a new Industry Specification Group on cross-sector Context Information Management (ISG CIM) for smart cities applications and beyond.

FIWARE NGSIv2 is the starting point for the CIM API to be specified
FIWARE Lab
FIWARE Lab data portal
Producing first common information models

- **Alarms**: Events related to risk or warning conditions which require action taking.
- **Environment**: Enable to monitor air quality and other environmental conditions for a healthier living.
- **Civic Issue tracking**: Data models for civic issue tracking interoperable with the de-facto standard Open311.
- **Device**: IoT devices (sensors, actuators, wearables, etc.) with their characteristics and dynamic status.
- **Indicators**: Key performance indicators intended to measure the success of an organization or of a particular activity in which it engages.
- **Parking**: Real-time and static parking data (on street and off street) interoperable with the EU standard DATEX II.
- **Weather**: Weather observed, weather forecasted or warnings about potential extreme weather conditions.
- **Waste Management**: Enable efficient, recyclable, and cost-saving waste management.
- **Point of Interest**: Specific point locations that someone may find useful or interesting. For instance, weather stations, tourist landmarks, etc.
- **Street Lighting**: Modeling street lights and equipment towards energy and urban illuminance.
- **Transportation**: Transportation data enabling efficient management.

[https://www.fiware.org/data-models](https://www.fiware.org/data-models)
FIWARE data models

**Alarms**
Events related to risk or warning conditions which require action taking.

**Environment**
Enable to monitor air quality and other environmental conditions for a healthier living.

**Parks & Gardens**
Data models intended to make an efficient, effective and sustainable management of green areas.

**Point of Interest**
Specific point locations that someone may find useful or interesting. For instance, weather stations, touristic landmarks, etc.

**Civic Issue tracking**
Data models for civic issue tracking interoperable with the de-facto standard Open311.

**Street Lighting**
Modeling street lights and all their controlling equipment towards energy-efficient and effective urban illuminance.
FIWARE data models

Device
IoT devices (sensors, actuators, wearables, etc.) with their characteristics and dynamic status.

Indicators
Key performance indicators intended to measure the success of an organization or of a particular activity in which it engages.

Transportation
Transportation data models for smart mobility and efficient management of municipal services.

Waste Management
Enable efficient, recycling friendly, municipal or industrial waste management using containers, litters, etc.

Parking
Real time and static parking data (on street and off street) interoperable with the EU standard DATEX II.

Weather
Weather observed, weather forecasted or warnings about potential extreme weather conditions.
The journey from more efficient cities into engines of growth as enablers of the Data Economy
Front-runner Cities initiative

- Host an Advanced Open Data Portal on FIWARE Lab where front-runner cities connect and publish data
  - Managing NGSI API queries as “dynamic” datasets
  - Assignment of Access Rights Policies to datasets
  - Managing Access Rights acquisition
  - Binding pricing to datasets (acquisition and access)

- Open Data Publication framework based on:
  - Extended CKAN
  - FIWARE Biz Framework components relying on TM Forum Business Open APIs for monetization
FIWARE meet the requirements of the Industrial Data Space initiative.
FIWARE meet the requirements of the Industrial Data Space initiative

- **Decentralization**
  - Federated Architecture

- **Sovereignty**
  - Data and Services

- **Security**
  - Data Exchange

- **Governance**
  - Common Rules of the Game

- **Trustworthiness**
  - Certified Members

- **Openness**
  - Neutral and User-Driven

- **Scalability**
  - Network Effects

- **Ecosystem**
  - Platform and Services

Source: Fraunhofer / IDS
FIWARE will bring a first open source implementation of the IDS Architecture

Basic functionality dealing with registration of Docker files enabling automated deployment and configuration of Data Apps may rely on Docker Hub services.

Proposed standard vocabularies are being proposed at https://www.fiware.org/data-models

Data Apps map to NGSI adapters or Apps processing context information

You can deploy Internal Context Broker instances or handle access by enforcing defined access policies

The FIWARE NGSI API is used as interface between IDS Connectors.
Thoughts for food

- FIWARE brings a standard for context information management:
  - simple model for representing context information: entity-attribute-value
  - decentralized distributed architecture
  - standard open API for getting access to context information
  - support to data sovereignty and economy of data concepts

- Context data (current and history) may not comprise all kind of data but a rather relevant part, so a standard for context information management may be useful:
  - 75-80% of data scientists time is lost with data integration/management work
  - 60% of costs of data intensive projects is spent in pure integration tasks

- FIWARE Lab may emerge as a sandbox environment where:
  - valuable context data for research can be hosted and access policies enforced
  - a directory enabling searching of valuable context data can be hosted

- Major issue is still sustainability for such an environment
FIWARE: Technology but much more

- **Mission:** build an open sustainable ecosystem around public, royalty-free and implementation-driven software platform standards that will ease the development of new Smart Applications in multiple sectors

- **Pillars:**
  - the open source platform of choice for developing smart applications
  - a meeting point where innovation happens and users can experiment with the technology
  - activate funds and accelerate the business of entrepreneurs using the technology
  - reach a global footprint, opening to regions that share the same vision and ambition
  - support development of the community at local level, bringing support, training, certification
Thank you!

http://fiware.org
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