Introduction to FIWARE Open Ecosystem

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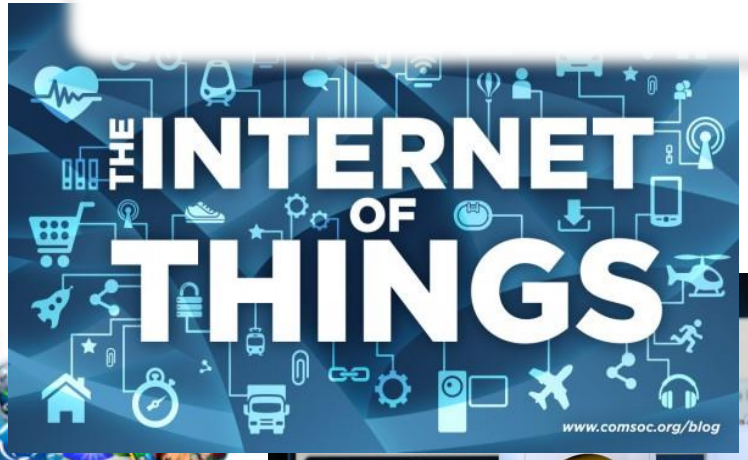
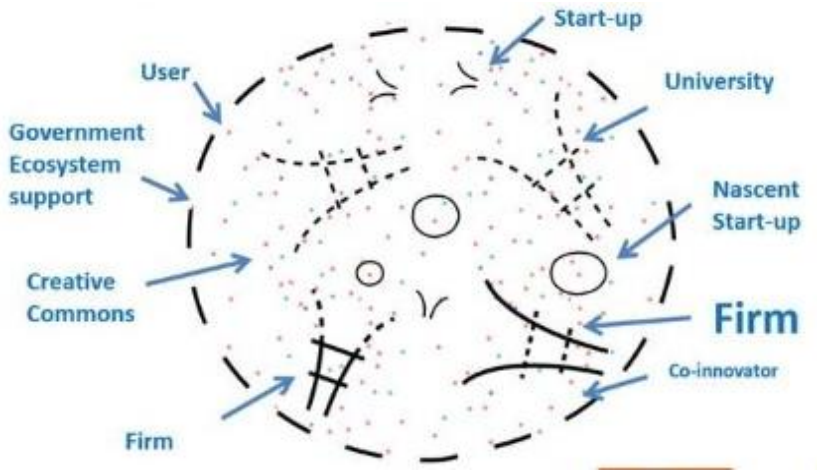
http://tinyurl.com/fiware-open-ecosystem

The Internet will again transform the daily life of individuals and businesses

The Next Computer



Ecosystem and platform: two tied concepts



Open Standard Platform

ecosystem

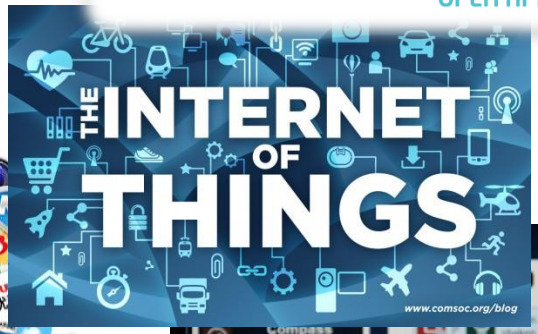
open sustainable global

FIWARE

OPEN APIs FOR OPEN MINDS

FIWARE = advanced OpenStack-based Cloud + rich library of Generic Enablers

FIWARE
OPEN APIs FOR OPEN MINDS



Driven by implementation

Sustainability ensured

Why an open standard platform is required

- Avoid vendor lock-in:
  - Standard Southbound APIs for sensor providers.
  - Standard Northbound APIs offered to applications.
  - Portability among platform providers.
  - Interoperability of solutions enabled by the platform.

- Larger community of developers
  - True innovation.
  - Better prices.

- Not any standard is enough
  - Modularity.
  - Allow different business models.
  - Integration with standard open data platform.
  - Non-intrusive.

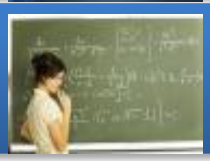
FIWARE Generic Enablers (GEs)

- A FIWARE Generic Enabler (GE):
  - Set of general-purpose **platform functions** available through **APIs.**
  - Building with other GEs a **FIWARE Reference Architecture**.
- **FIWARE GE Specifications are open** (public and royalty-free).
- **FIWARE GE implementation (FIWARE GEi):**
  - Platform product that implements a given GE Open Spec.
  - There might be multiple compliant GEis of each GE Open Spec.

- **At least one open source reference implementation** of FIWARE GEs (FIWARE GEris):
  - Well-known open source license.
  - Publicly available **Technical Roadmap** updated in every release.

- Available FIWARE GEis, GEris and incubated enablers published on the **FIWARE Catalogue.**

FIWARE major differential features

Cloud		• Federation of infrastructures (private/public regions) • Automated GE deployment
Data		• Complete Context Management Platform • Integration of Data and Media Content
IoT		• Easy plug&play of devices using multiple protocols • Automated Measurements/Action ←→Context updates
Apps		• Visualization of data (operation dashboards) • Publication of data sets/services
Web UI		• Easy support of UIs with advanced web-based 3D and AR capabilities • Visual representation of context information.
I2ND		• Advanced networking capabilities (SDN) and Middleware • Interface to robots
Security		• Security Monitoring • Built-in Identity/Access/Privacy Management

FIWARE Lab: going beyond technology, the “meeting point” where innovation takes place

App Customers and Data providers

- Connect to entrepreneurs
- Put their data at work
- Bring new innovative services to end users
- Be more efficient
- Social Reputation

Entrepreneurs, Developers

- Develop once for a large market
- Easily meet potential customers
- Marketing, promotion
- Ability to test with real data and end users
- Simple yet powerful APIs that accelerate product development

FIWARE Lab

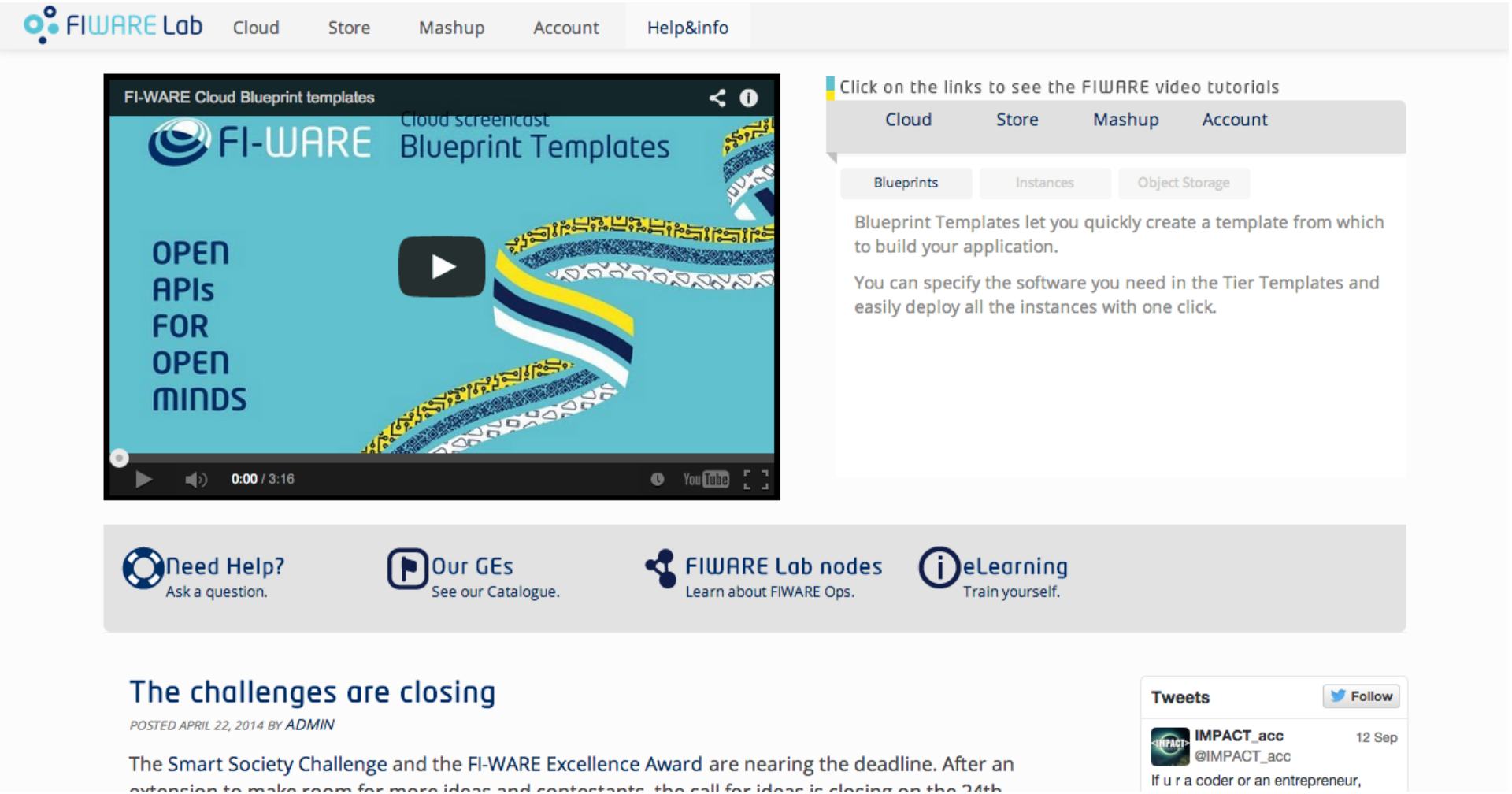
Spark your imagination

FIWARE Technology Providers

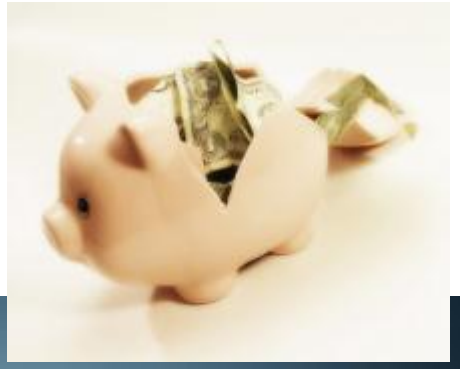
- “Competitive” approach
- Connect to entrepreneurs: jointly exploit the opportunities

- 4,2 M€ promotion campaign
  - Campus Party events
  - Startup Weekend events
  - Chambers of Commerce
  - 870 K€ in prizes
- 100 M€ of funding devoted to entrepreneurs in phase 3 of the FIWARE program

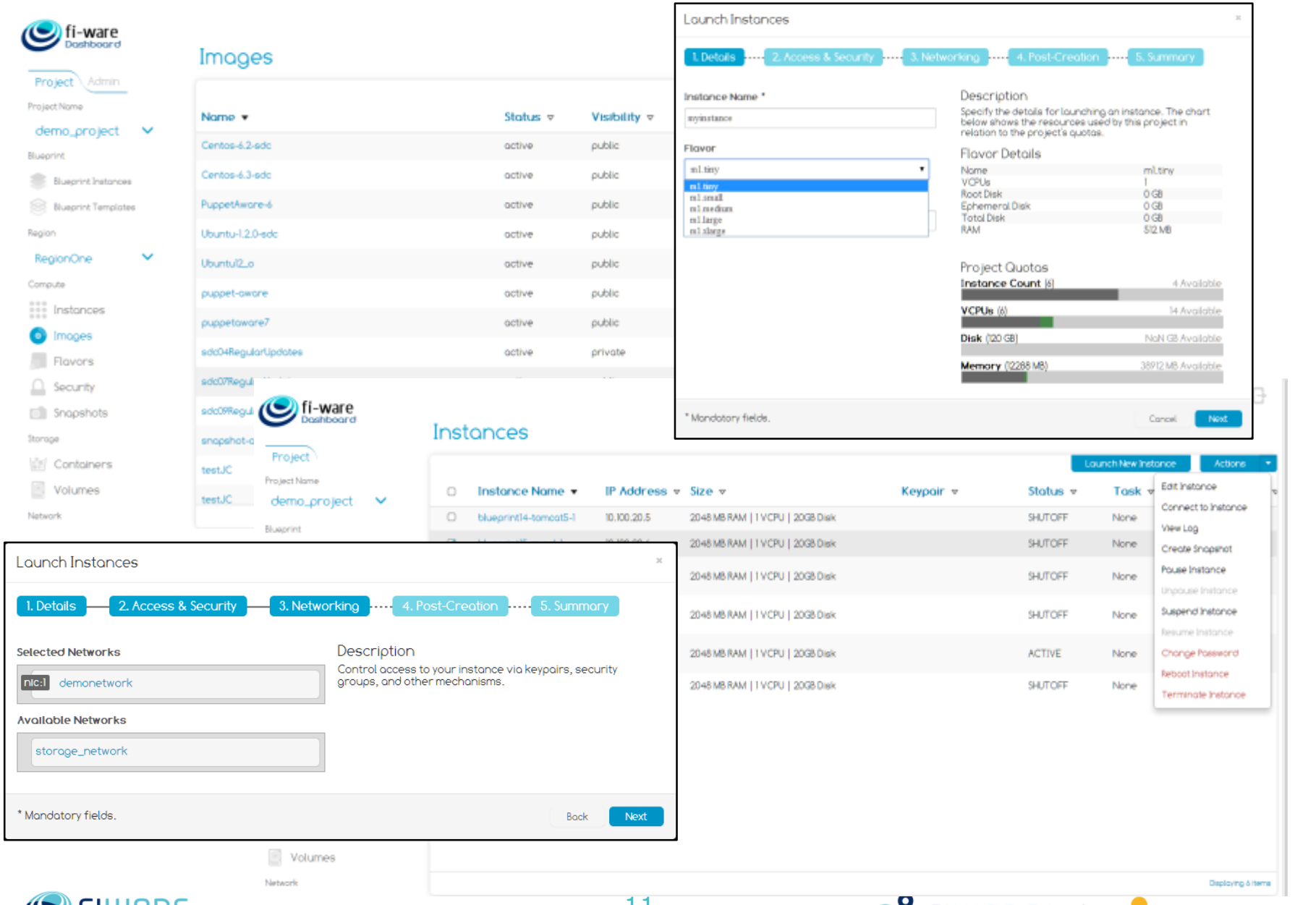
FIWARE Lab (http://lab.fiware.org)



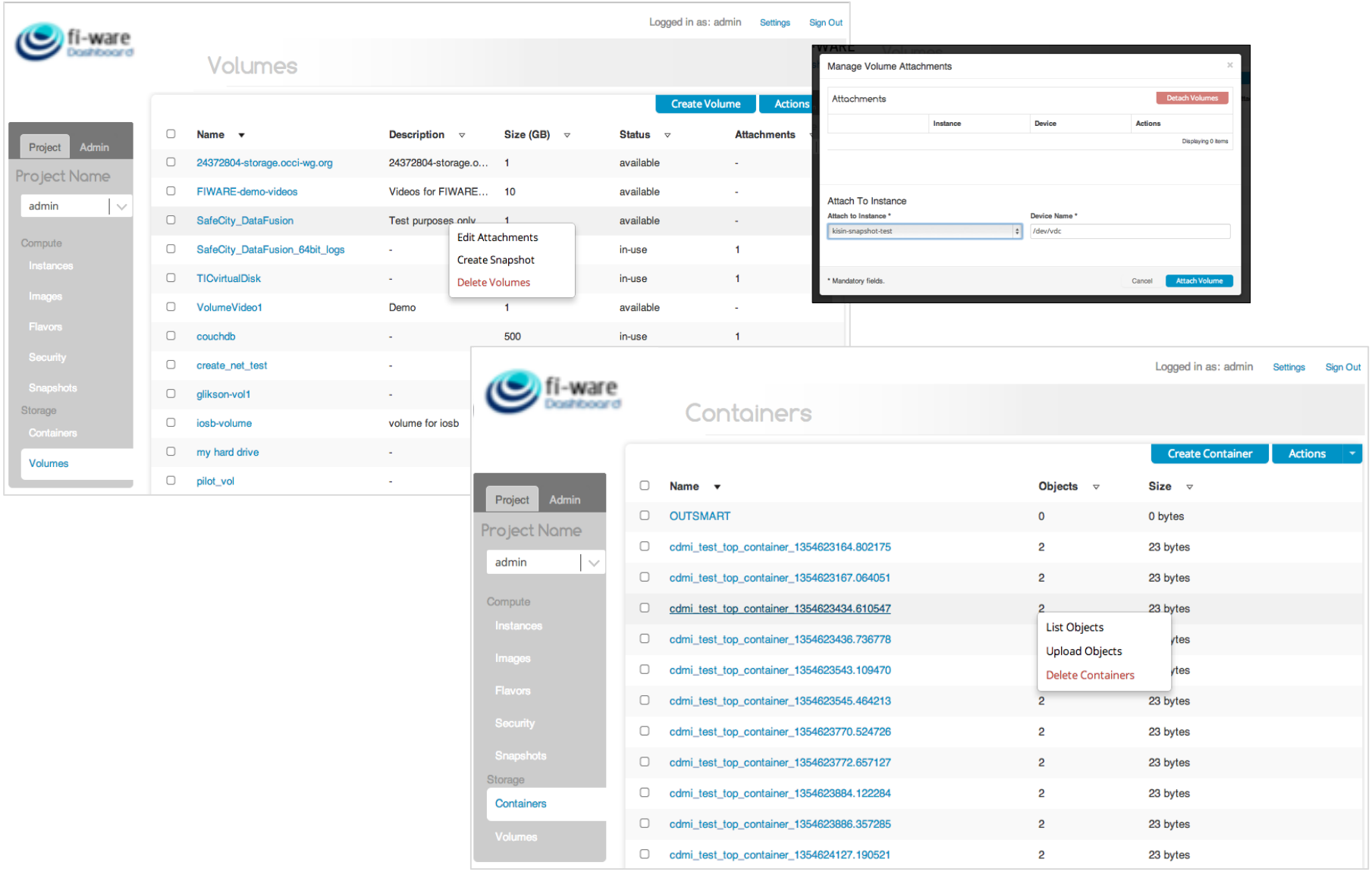
Take the most of infrastructures while keeping costs lower and under control



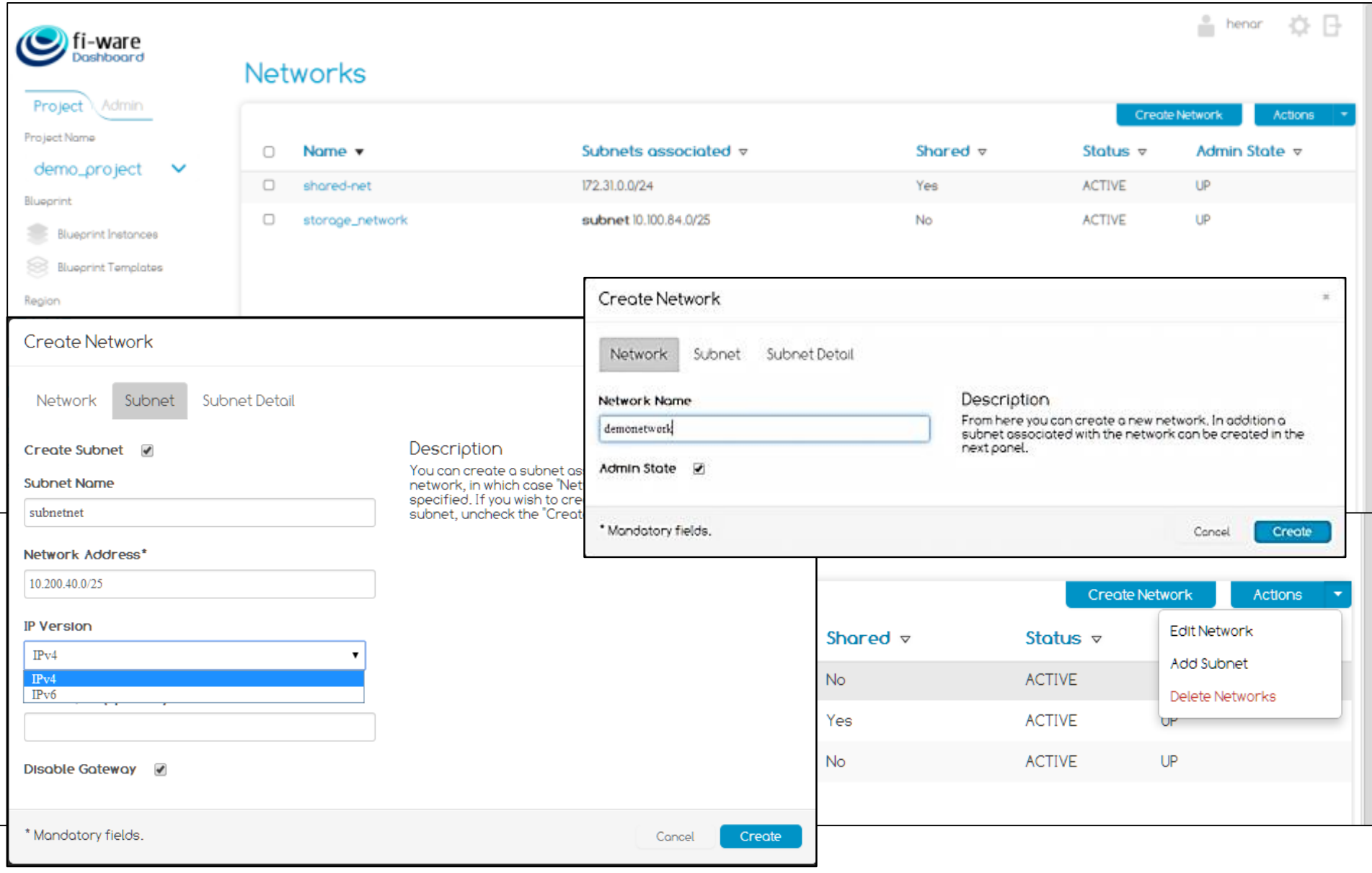
VM provisioning



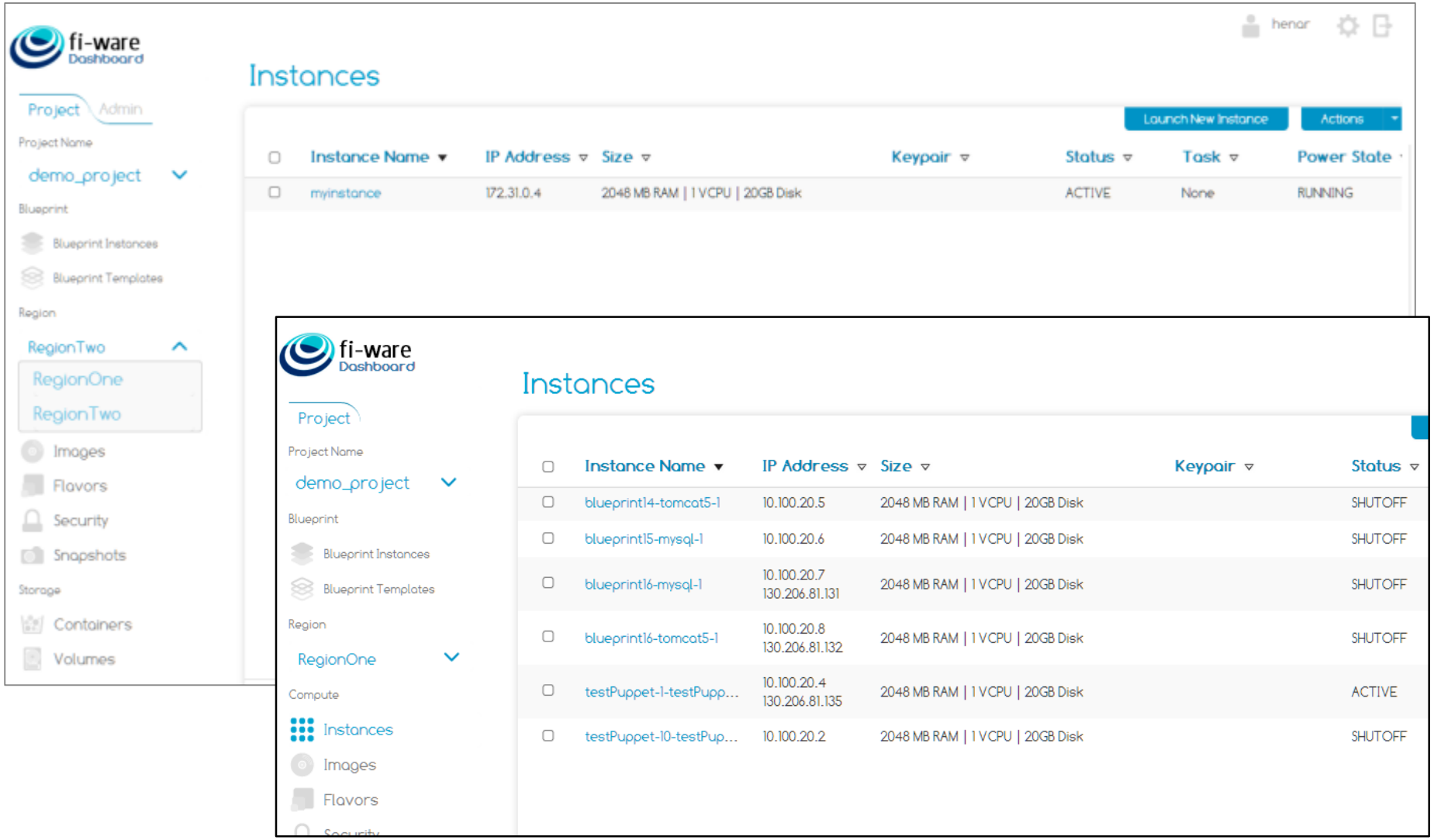
Storage provisioning



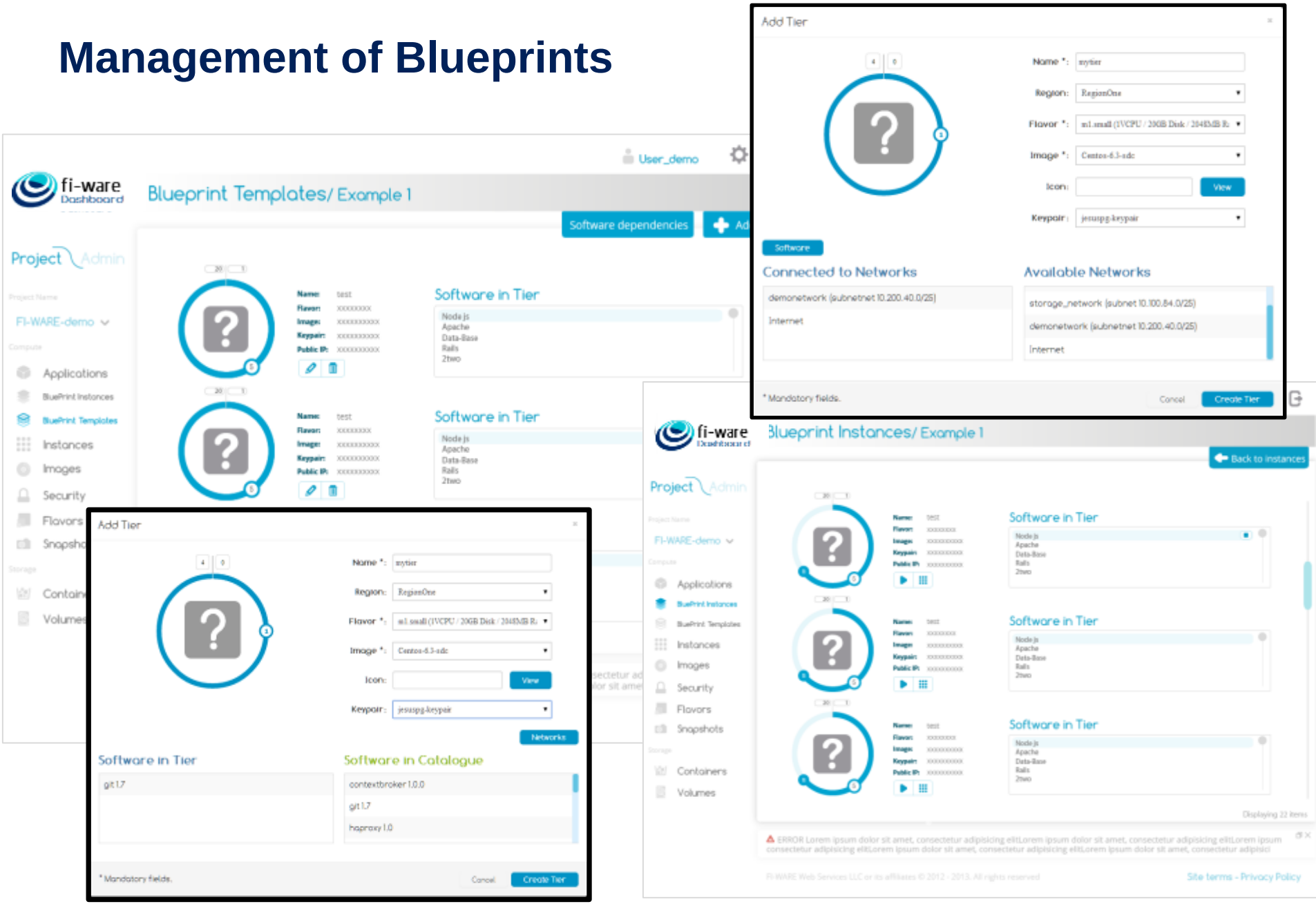
Network provisioning



Multi-Region Management



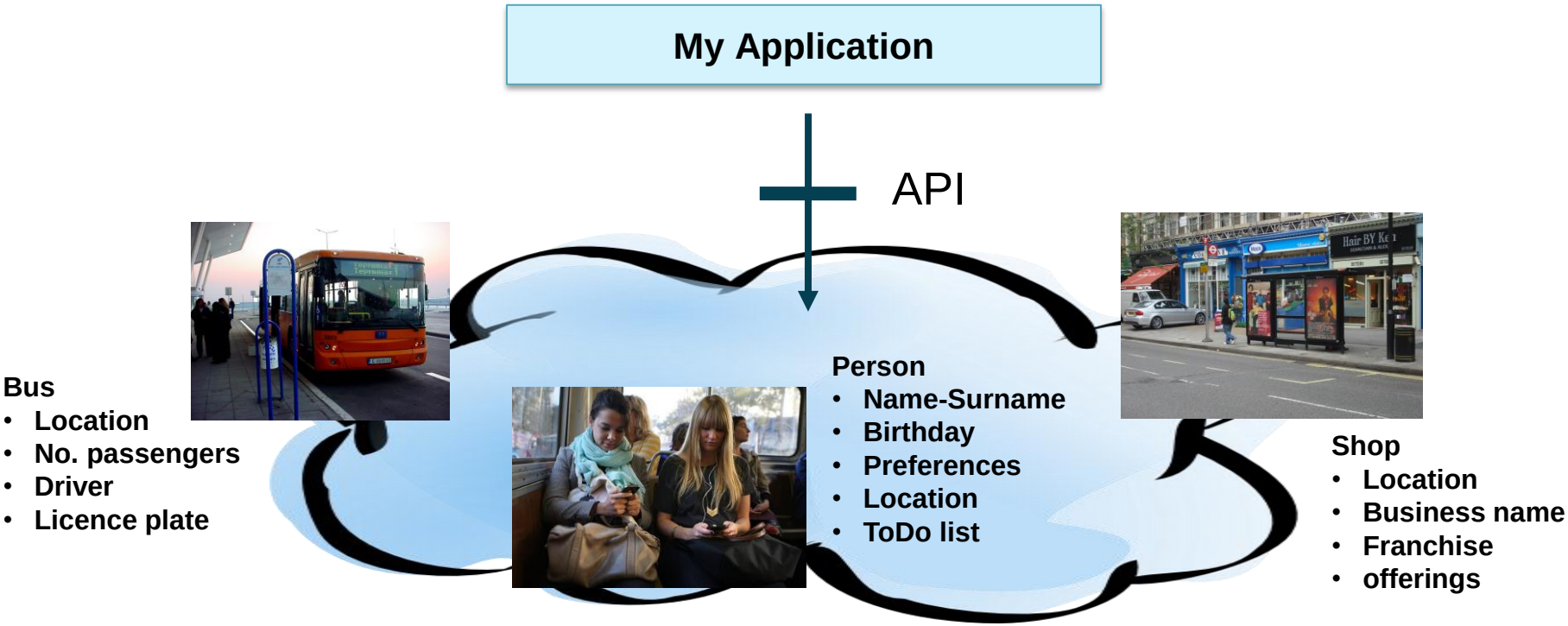
Management of Blueprints



Gathering, publishing, processing and analyzing private and open data at large scale

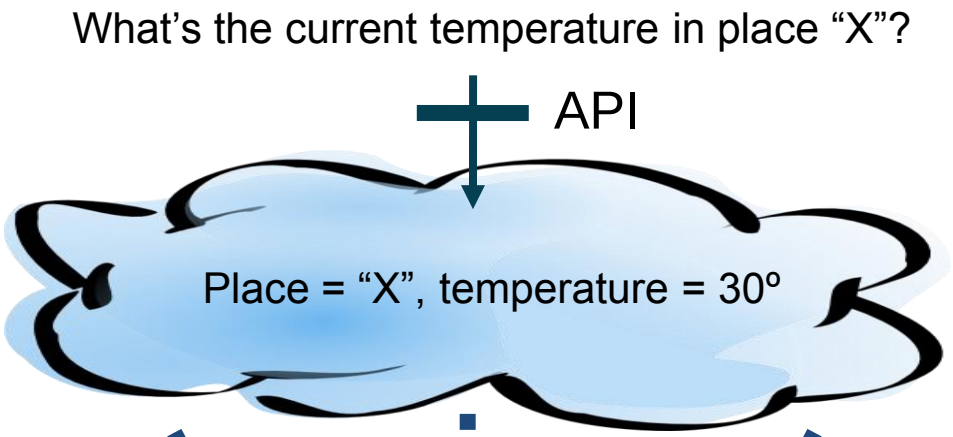
Context Management in FIWARE

- A simple yet powerful standard API should be defined that helps programmers to manage Context information.
- Context information refers to the values of attributes characterizing entities relevant to applications

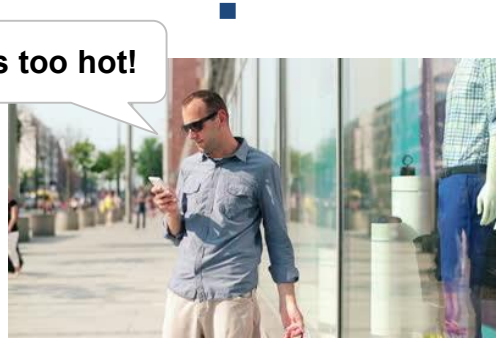


Context Management in FIWARE

- Context information may come from many sources using different interfaces and protocols … but programmers should just care about entities and their attributes …



A sensor in a pedestrian street



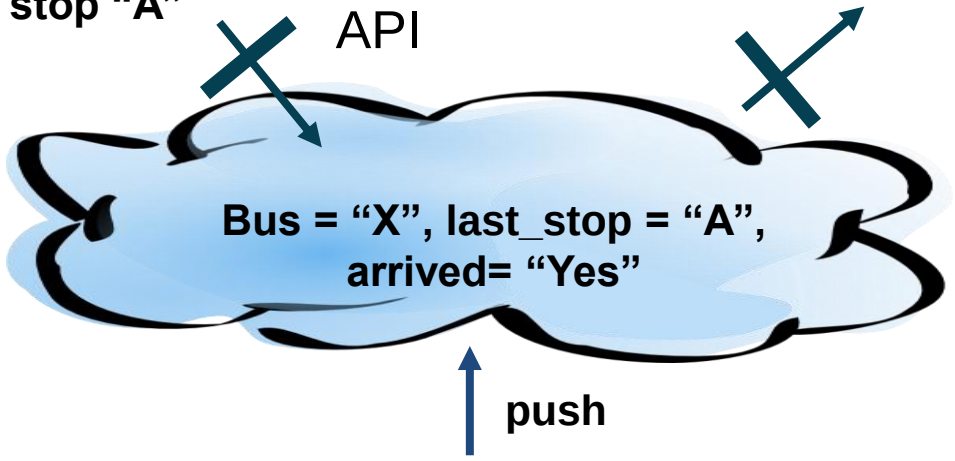
A person from his smartphone

The Public Bus Transport Management system

Context Management in FIWARE

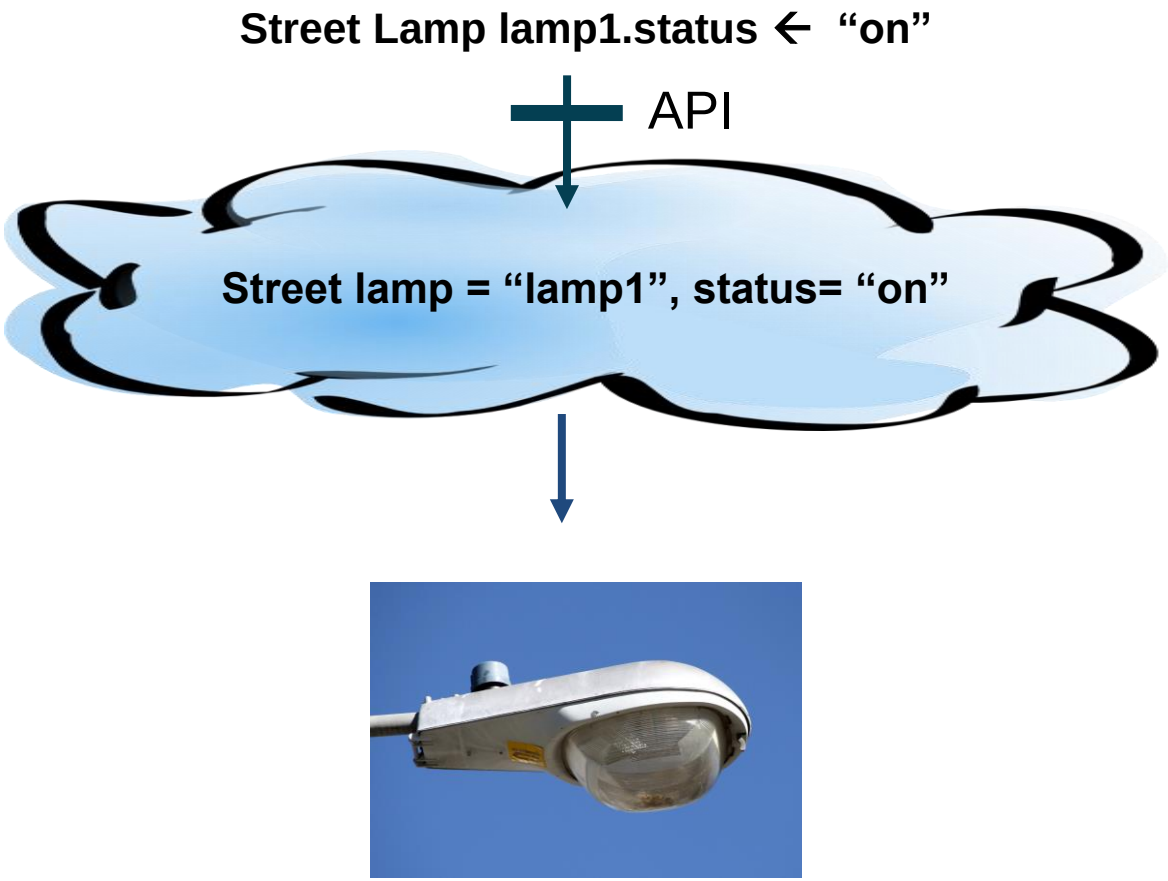
- Programmers may want to get notified when an update on context information takes place …

Notify me when bus "X" arrives at the bus stop "A"



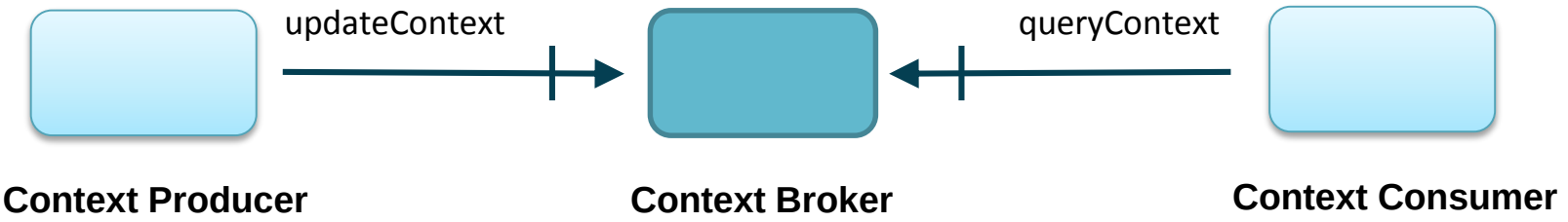
Context Management in FIWARE

- Acting on certain devices should be as easy as to change the value of attributes linked to certain entities



Basic Context Broker operations (1)

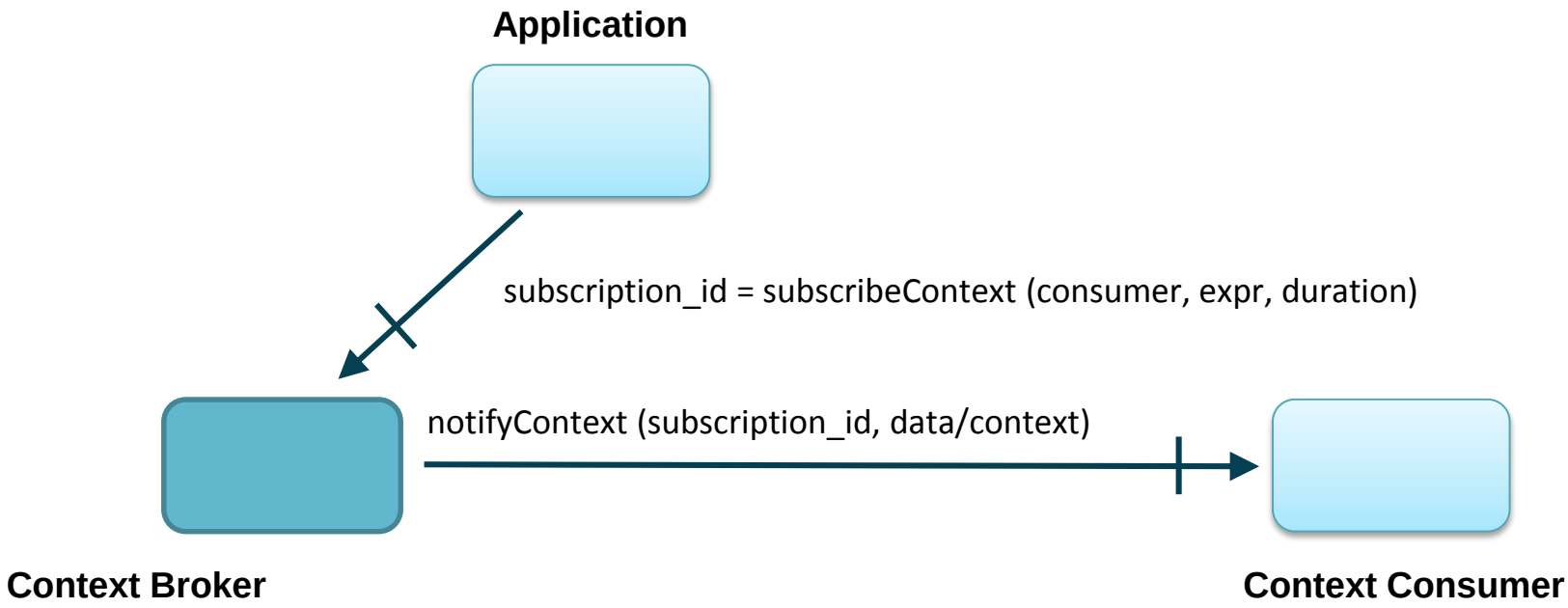
- **Context Producers** publish data/context elements by invoking the **updateContext** operation on a Context Broker.
- **Context Consumers** can retrieve data/context elements by invoking the **queryContext** operation on a Context Broker



Basic entities and operations (2)

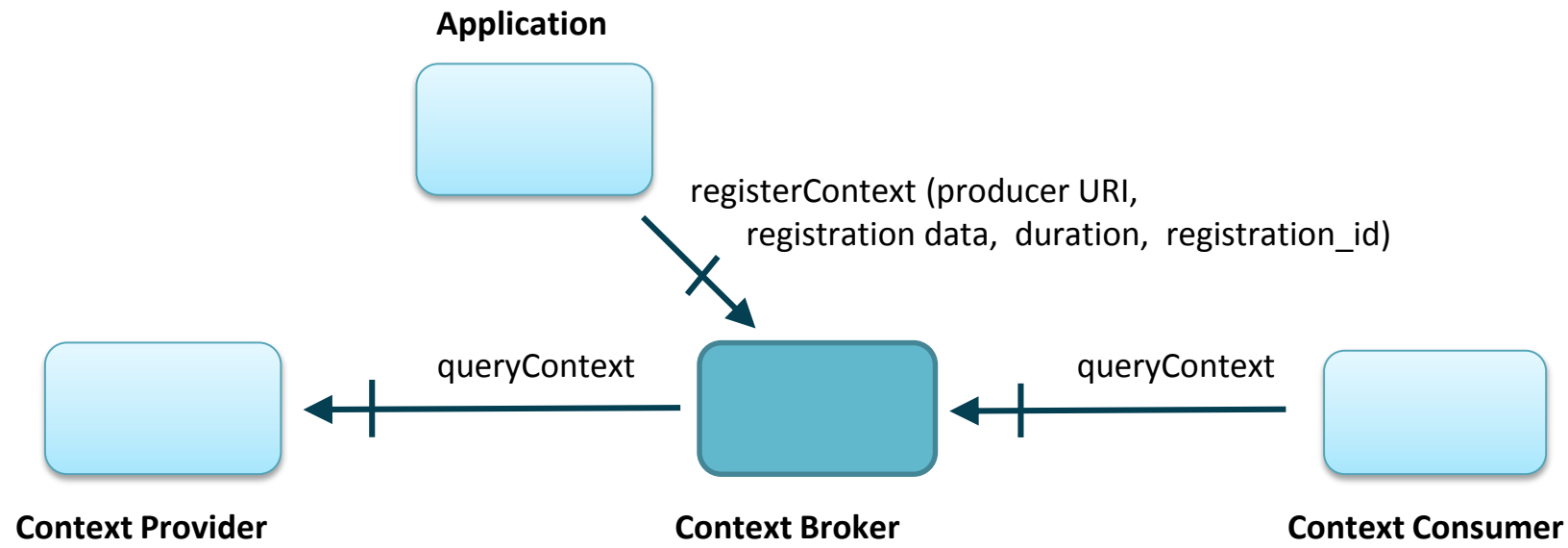
- **Context Consumers** can be subscribed to reception of context information complying with certain conditions, using the **subscribeContext** operation a ContextBroker exports. Such subscriptions may have a duration.

- The Context Broker notifies updates on context information to subscribed Context Consumers by invoking the **notifyContext** operation they export



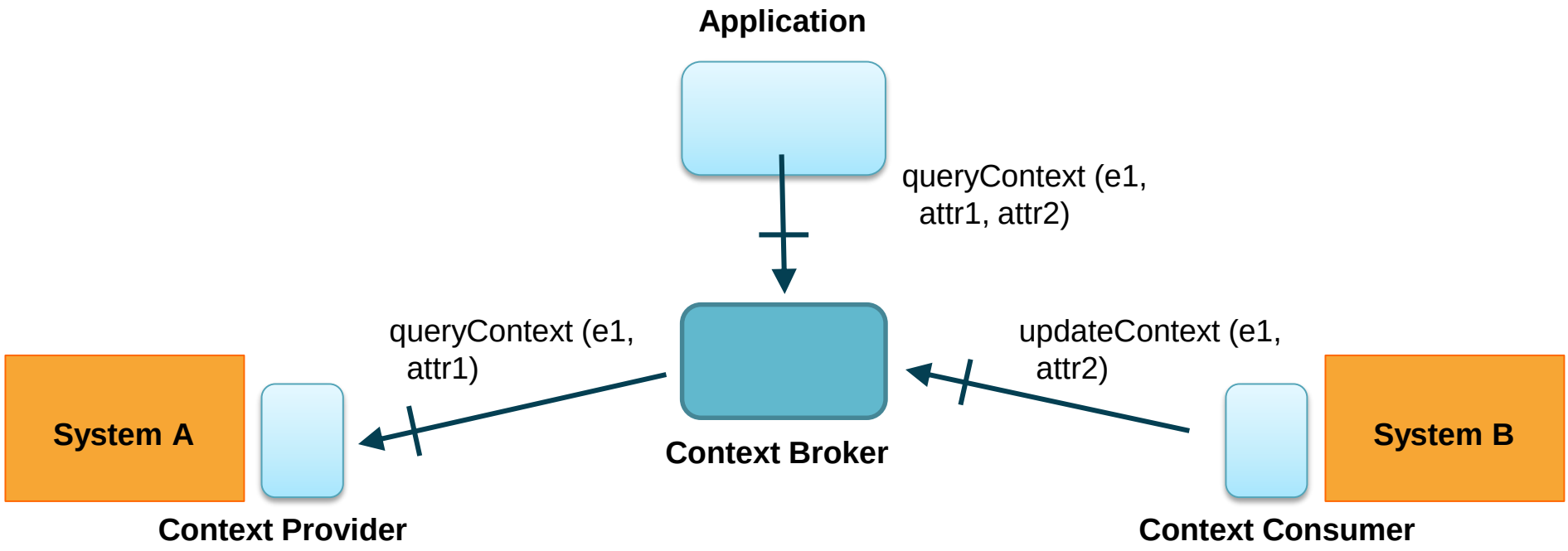
Basic entities and operations (3)

- Context Providers can be registered to the Context Broker linked to certain context information.
- A Context Broker will invoke the queryContext operation exported by Context Providers whenever they are queried for context information or have to notify updates in context information



Integration with existing systems

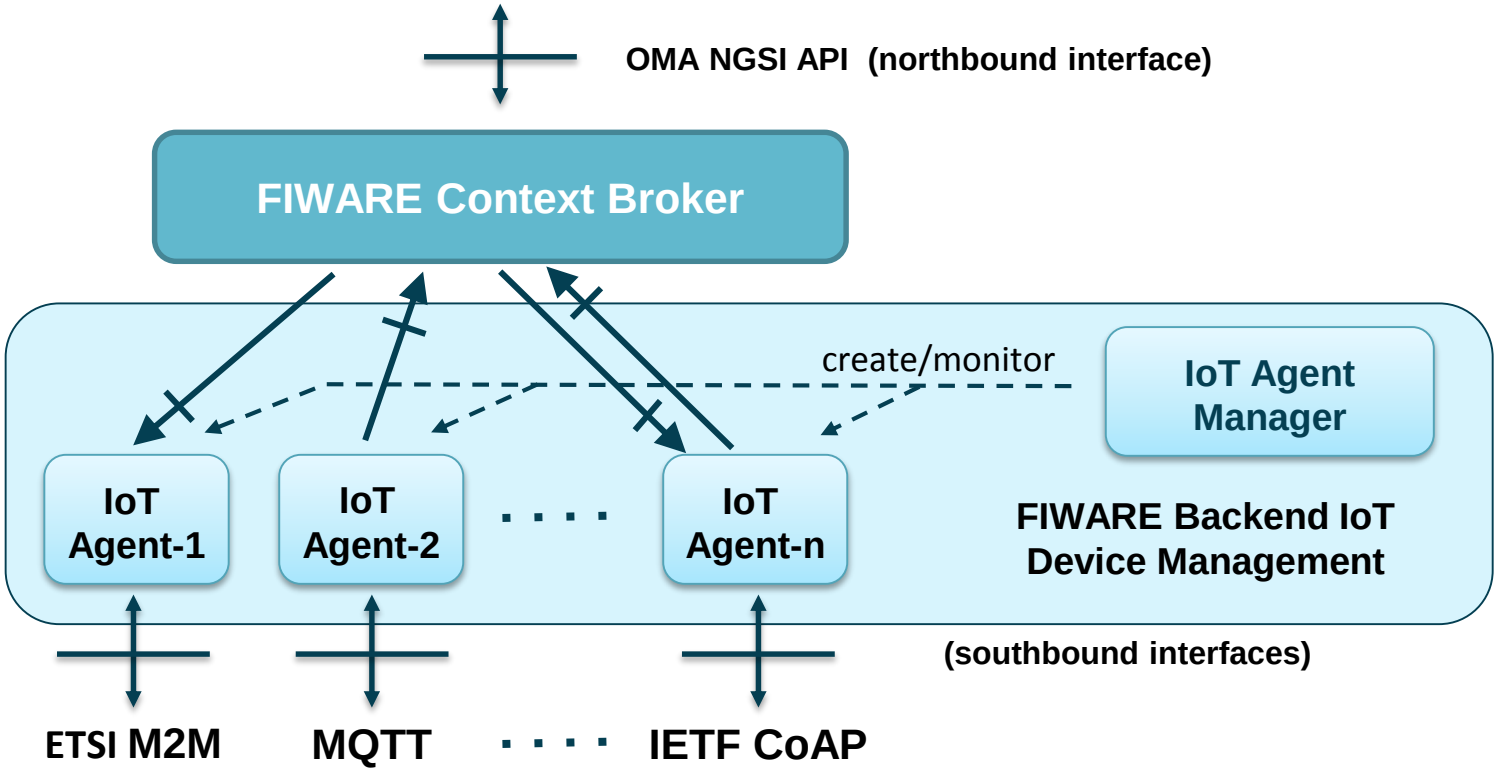
- Context adapters will be developed to interface with existing systems (e.g., municipal services management systems in a smart city) acting as Context Providers, Context Producers, or both
- Some attributes from a given entity may be linked to a Context Provider while other attributes may be linked to Context Producers



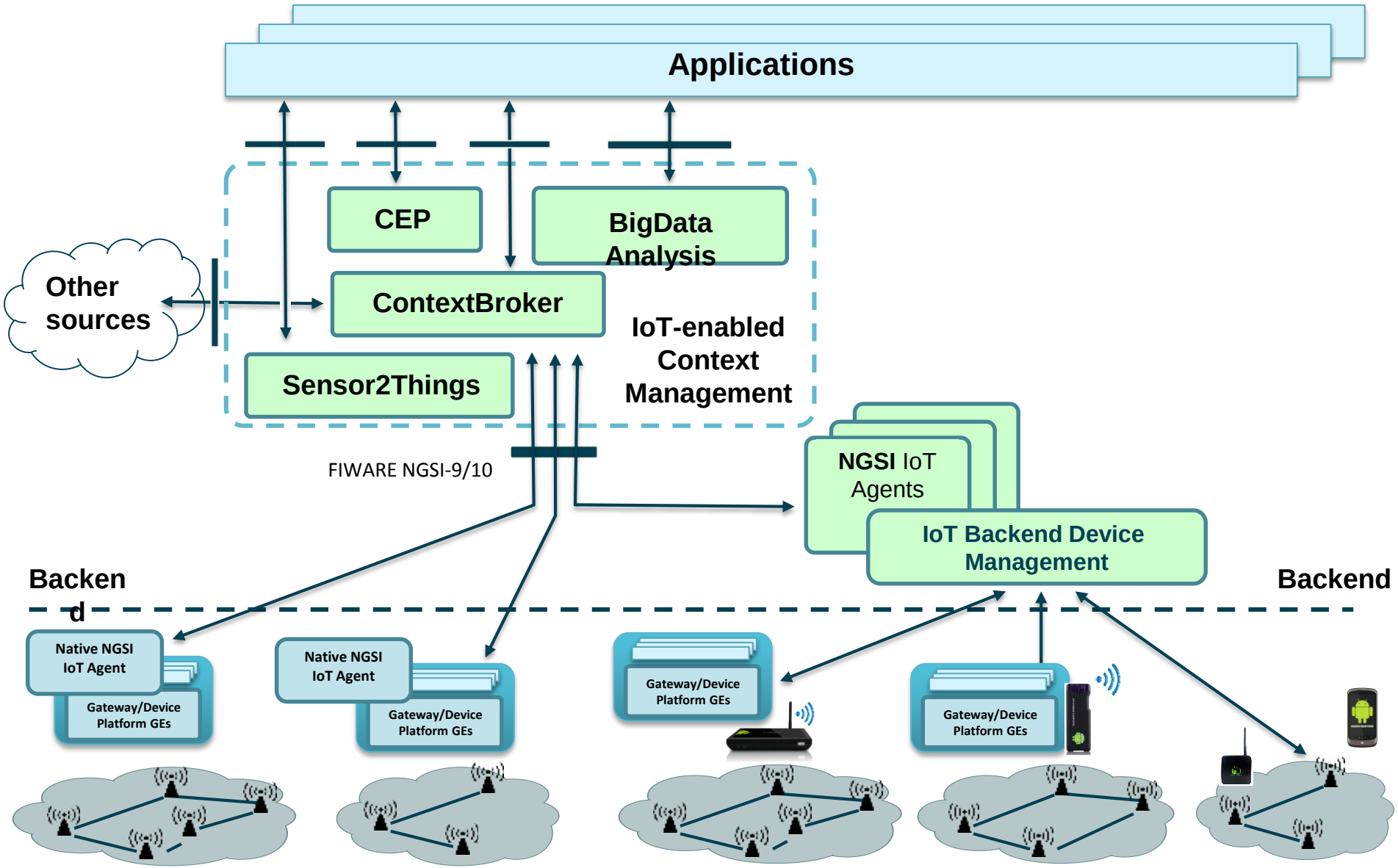
Easing connection to the physical world

Integration with sensor networks

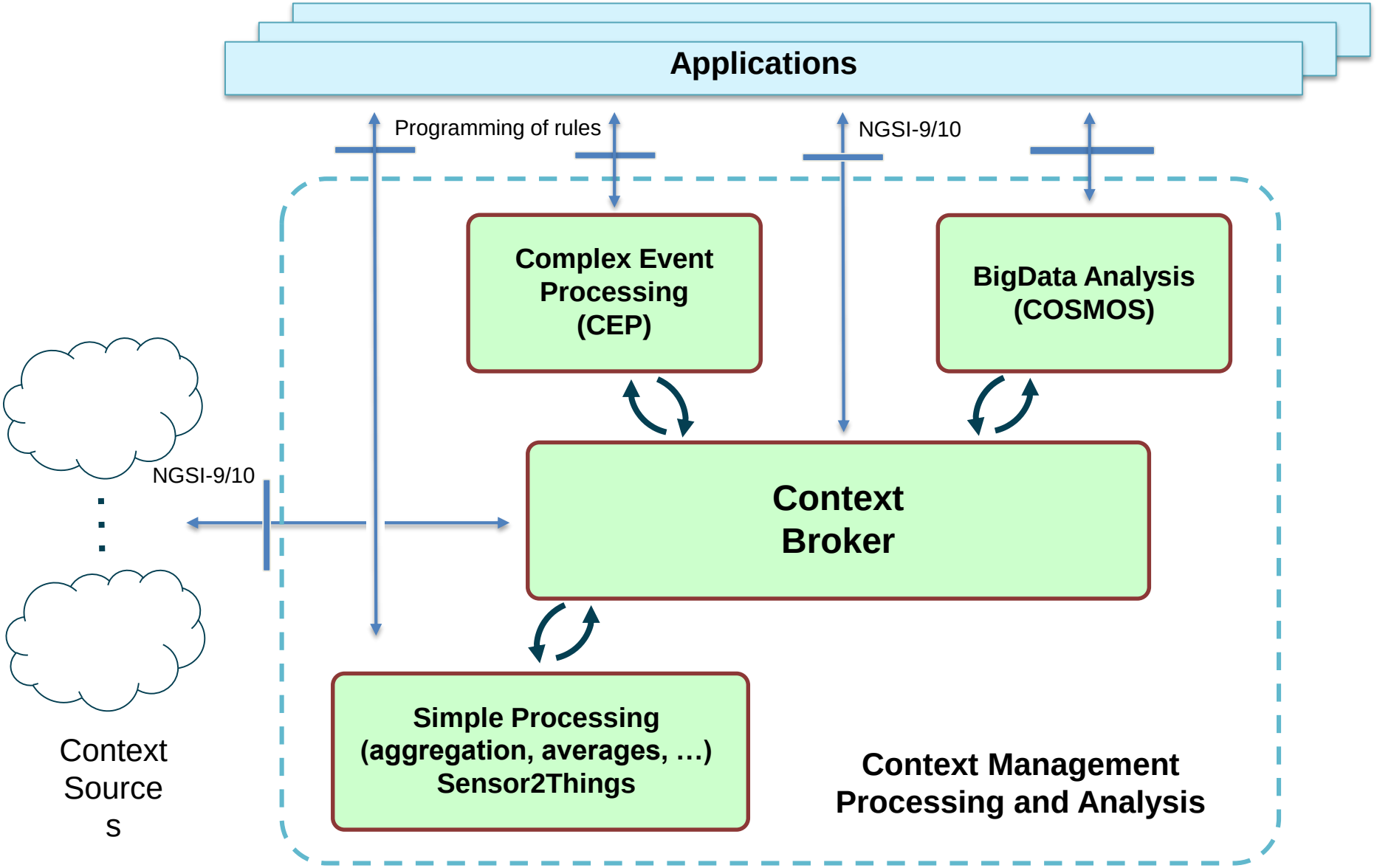
- The backend IoT Device Management GE enables creation and configuration of NGSI IoT Agents that connect to sensor networks
- Each NGSI IoT Agent can behave as Context Consumers or Context Providers, or both



FIWARE IoT-M2M & Context/Management altogether

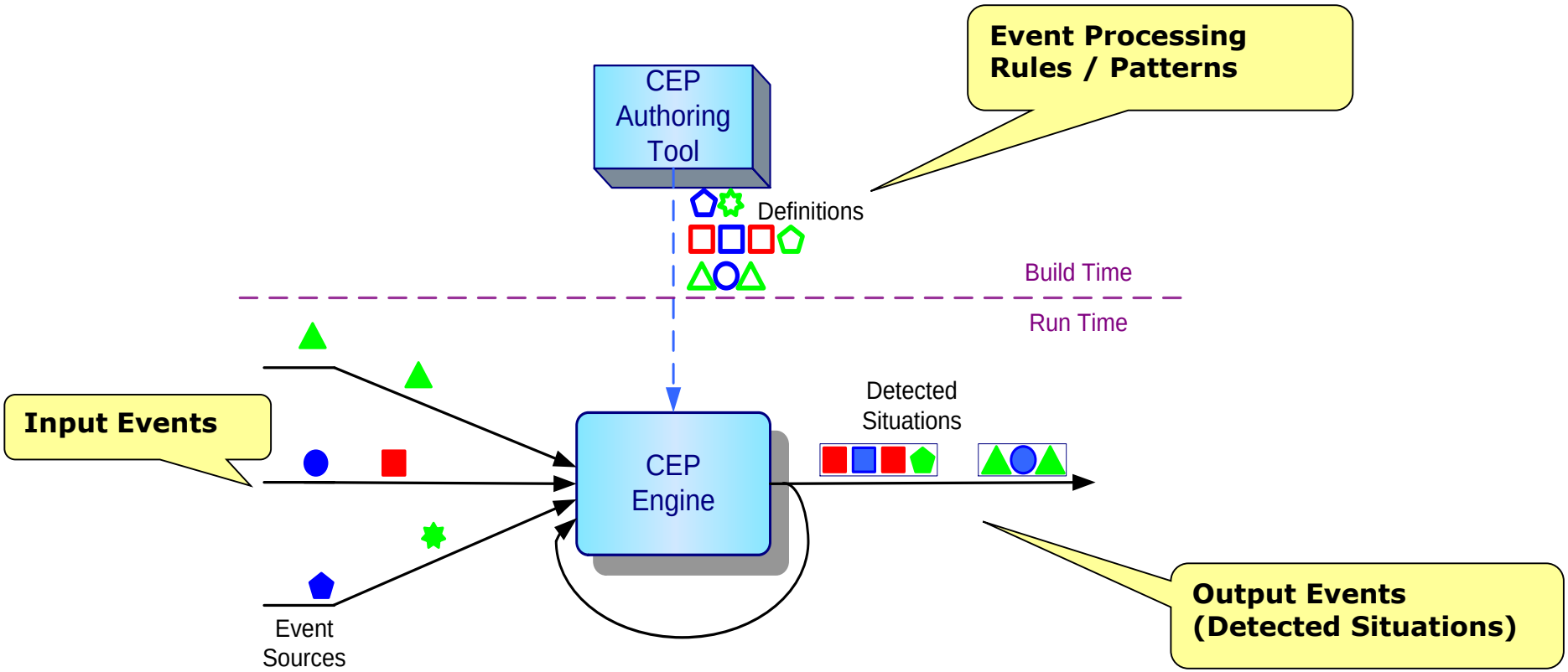


Context Processing and Analysis



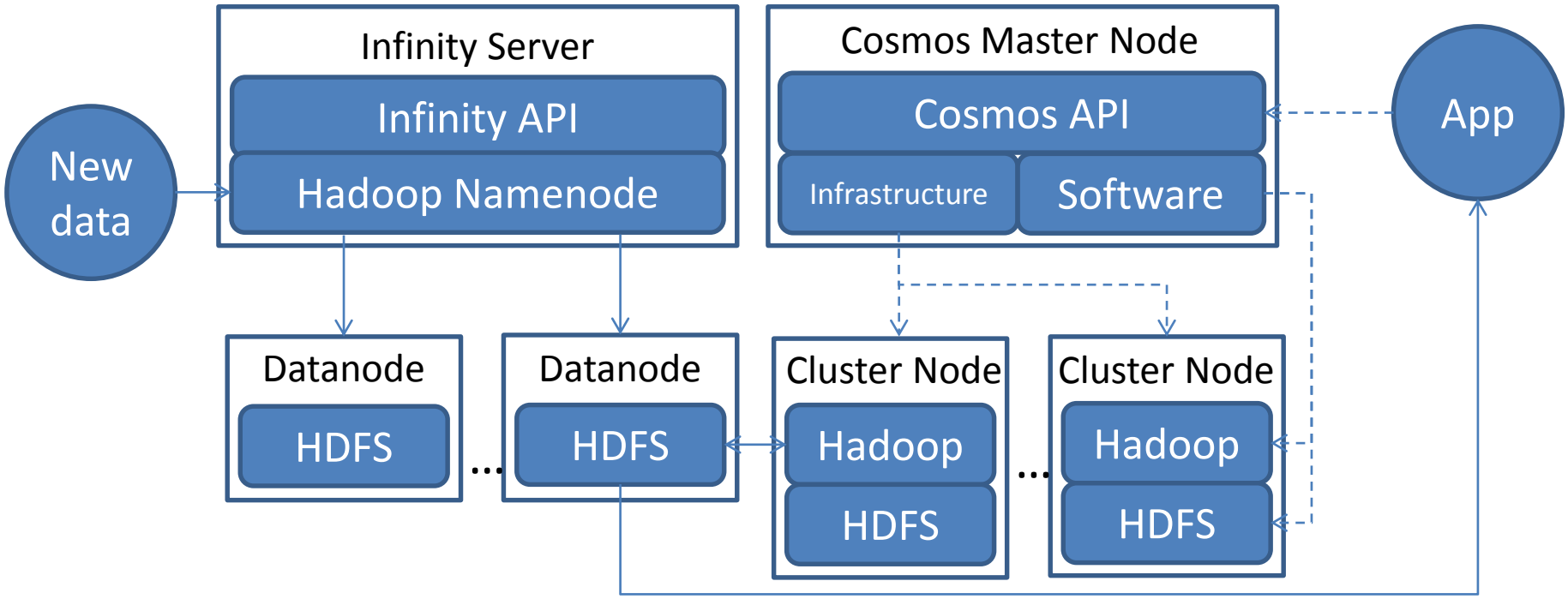
CEP Technology – expanding the ECA paradigm

- From Event-Condition-Action to Pattern-Condition-Action
- In certain scenarios, single events are insignificant, a CEP engine can detect combinations of events which are meaningful, called situations, and generate derived events.

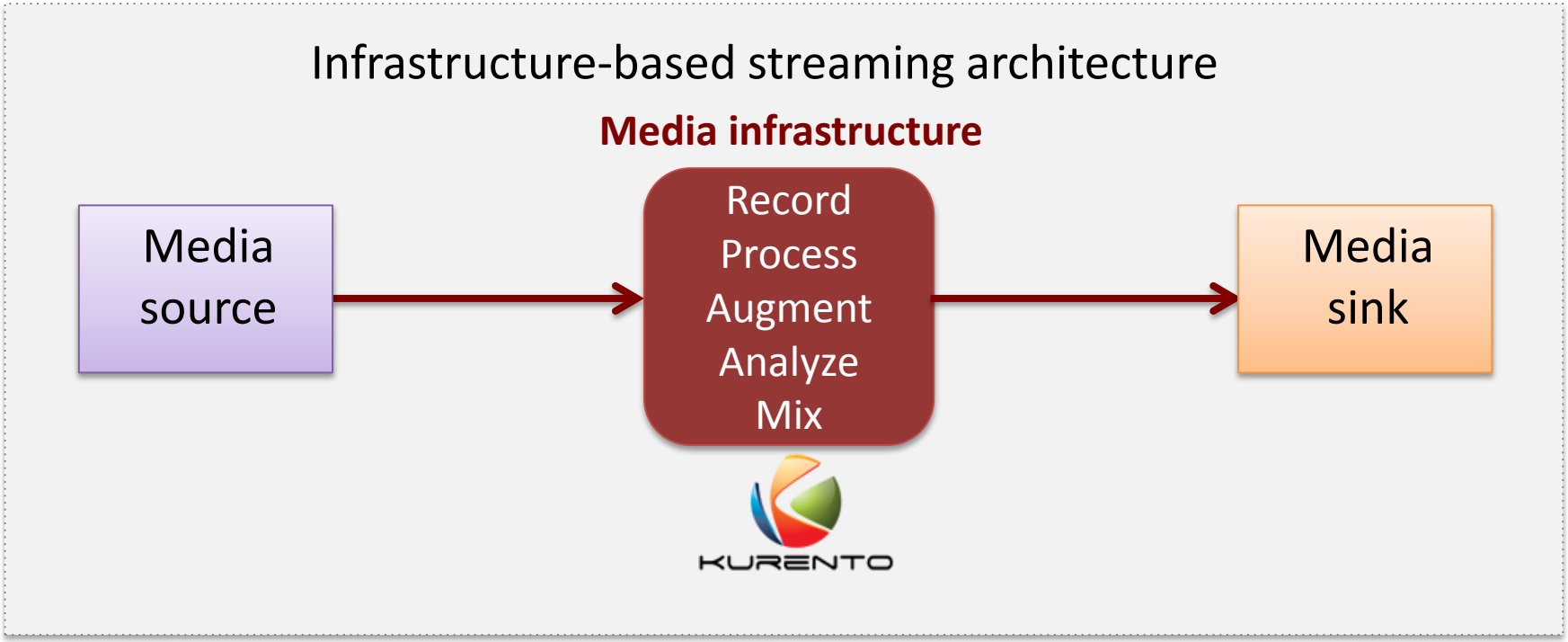


Cosmos / Big Data overview

- Cosmos + Infinity
  - Ephemeral private Hadoop computing clusters management
  - Security enhanced HDFS-based permanent storage



The Stream Oriented Generic Enabler



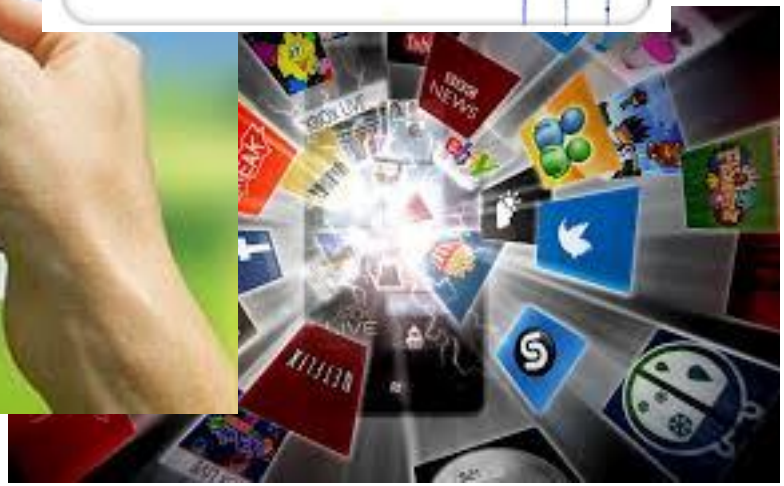
- Most important protocols and codecs (WebRTC, H.264)
- Real Time communications (B2B UA, MCU router and mixer)
- VoD: Media recording & Media playing
- Seamless Computer Vision algorithms: detection, tracking...
- 2D Agumented reality: 2D overlays, alpha blending,...

ckan (Open) Data Platform

- Search & Discover Data:
  - keywords, browse by facets, previews & visualization
  - REST/Json APIs to access data and metadata
- Data Management for publishers
  - Easy store & update of metadata.
  - Worflows & authorization
  - Support of private datasets acquisition from FIWARE Store & Data Portal.

Offering rich web-based user interfaces

Data/Applications Visualization and Delivery



Reaching target users, monetize

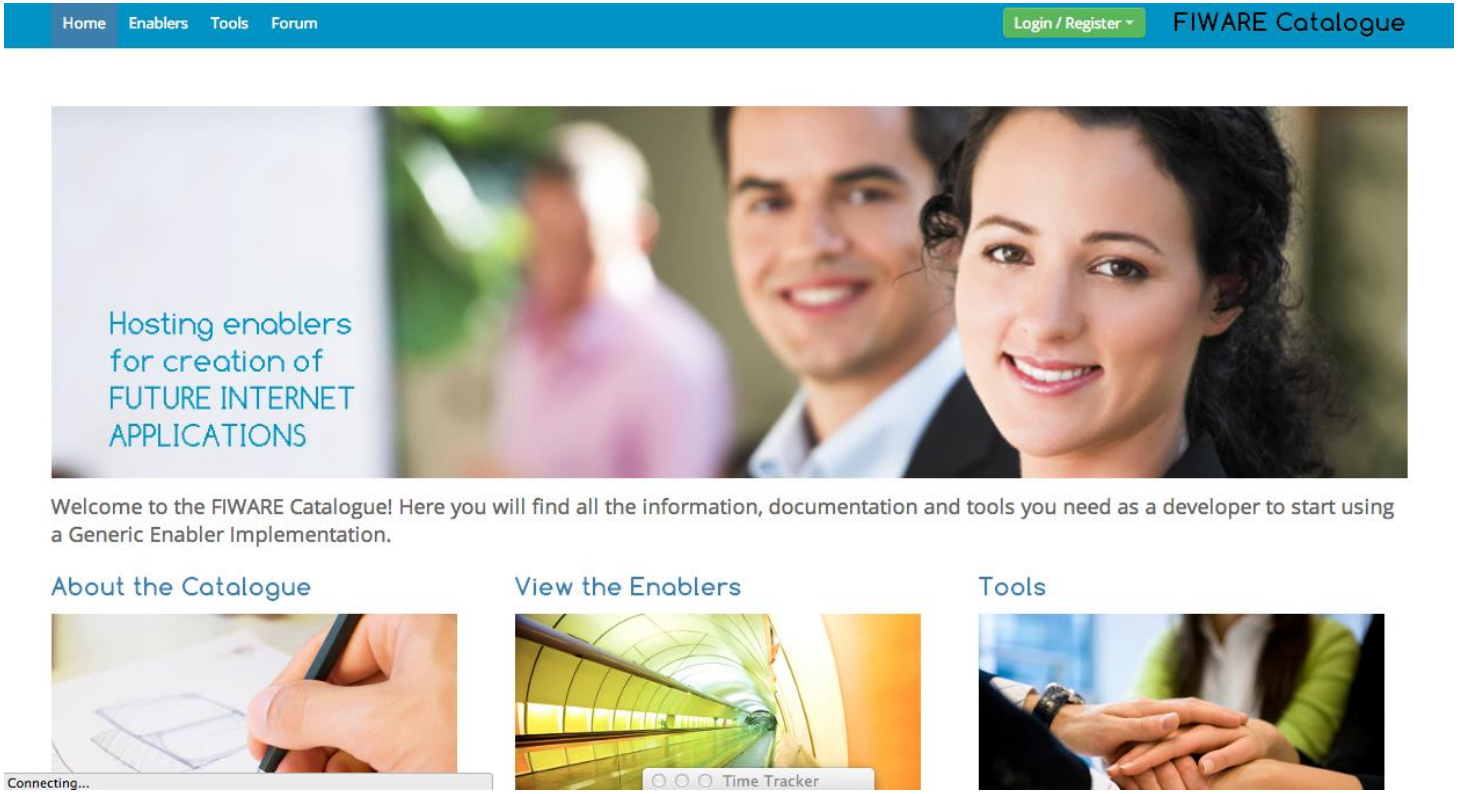
Ensuring Privacy, Security and Trust

Access from everywhere, taking the most of the network and capabilities of devices

OpenFlow

Open EPC
Evolved Packet Core

FIWARE Catalogue (http://catalogue.fiware.org)



FIWARE Catalogue (http://catalogue.fiware.org)

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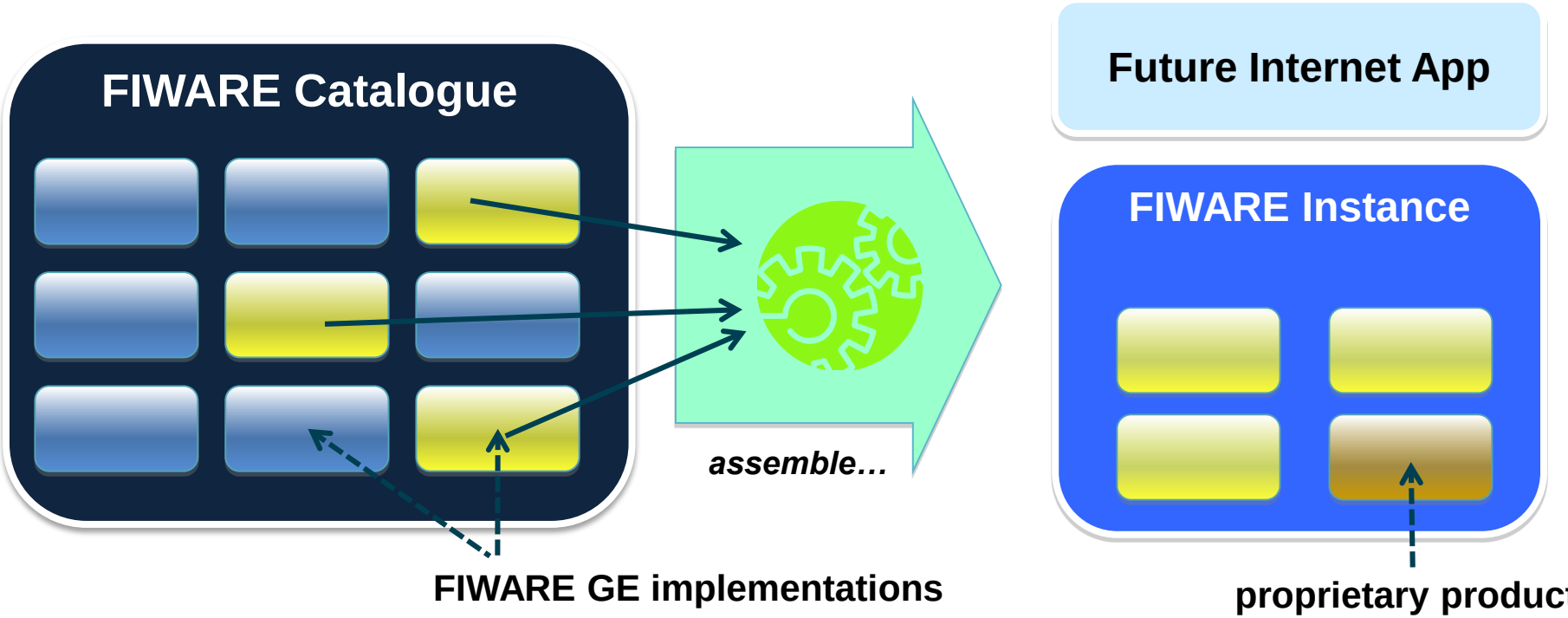
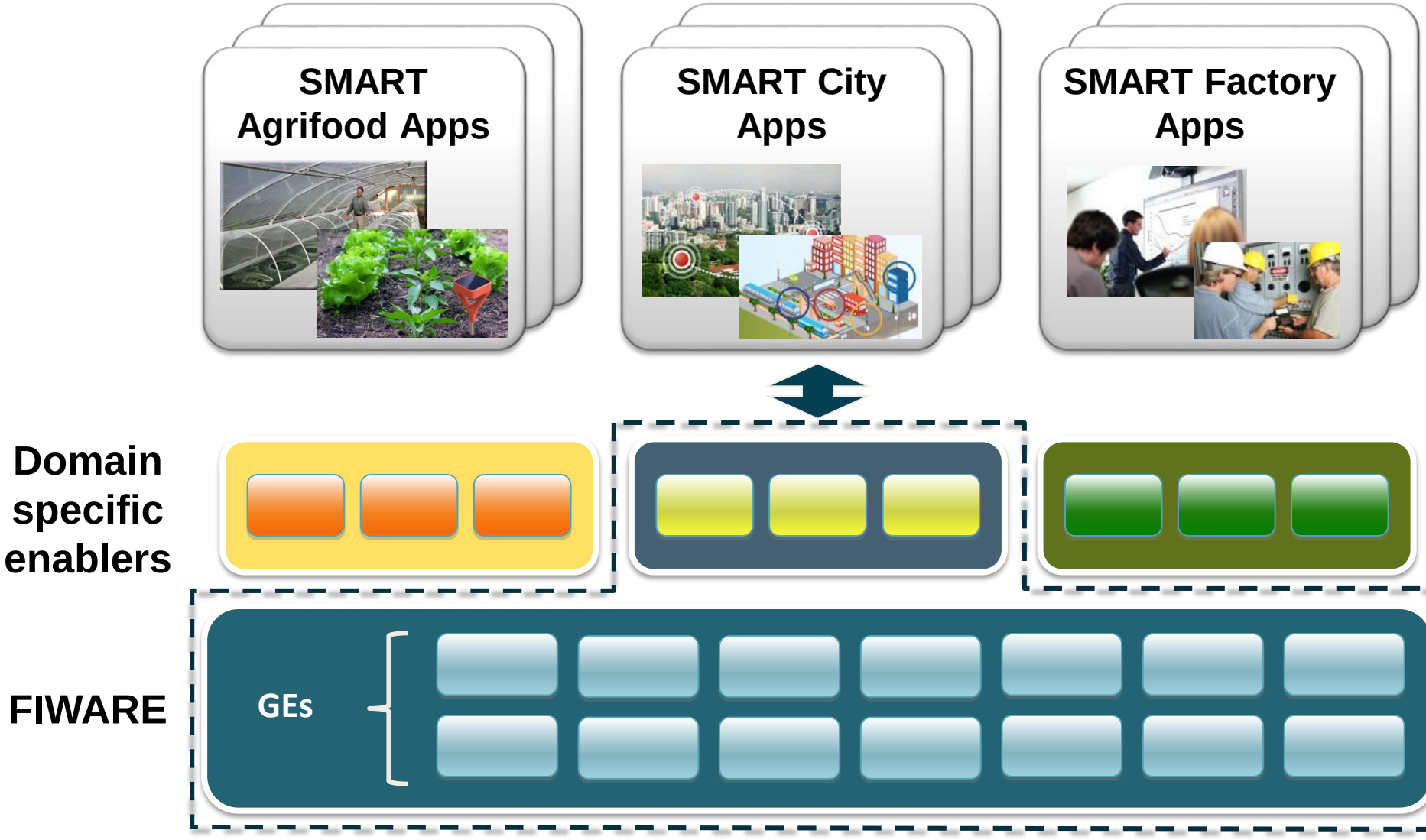
FIWARE Instances

- Future Internet Applications run on top of “FIWARE Instances” that are built by “FIWARE Instance Providers” upon:
  - selection of FIWARE GEis (products) from the FIWARE Catalogue.
  - assembly of selected FIWARE GEis with proprietary added-value products.

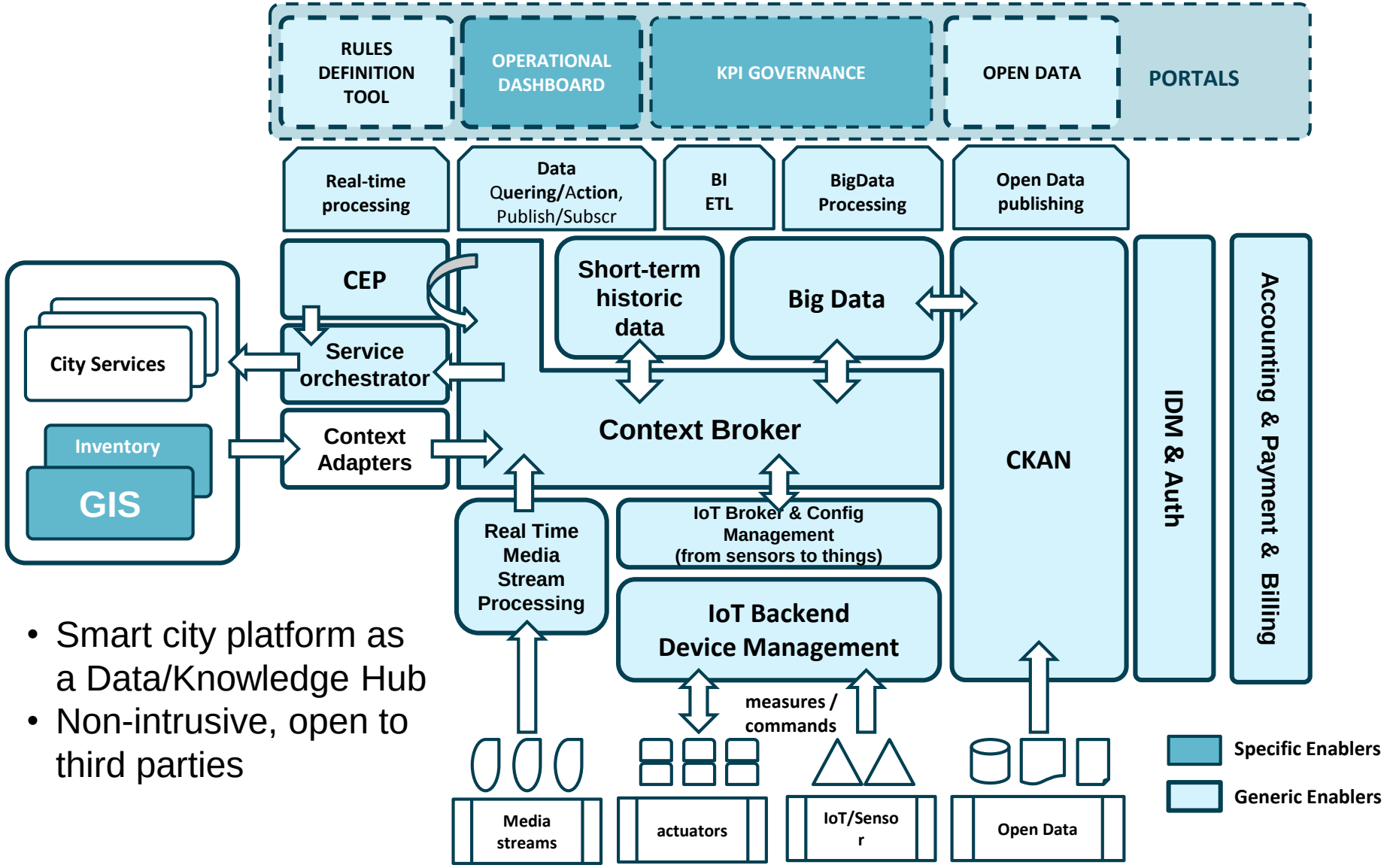


FIWARE University (http://edu.fi-ware.org)

Domain-specific platforms = FIWARE + specific enablers

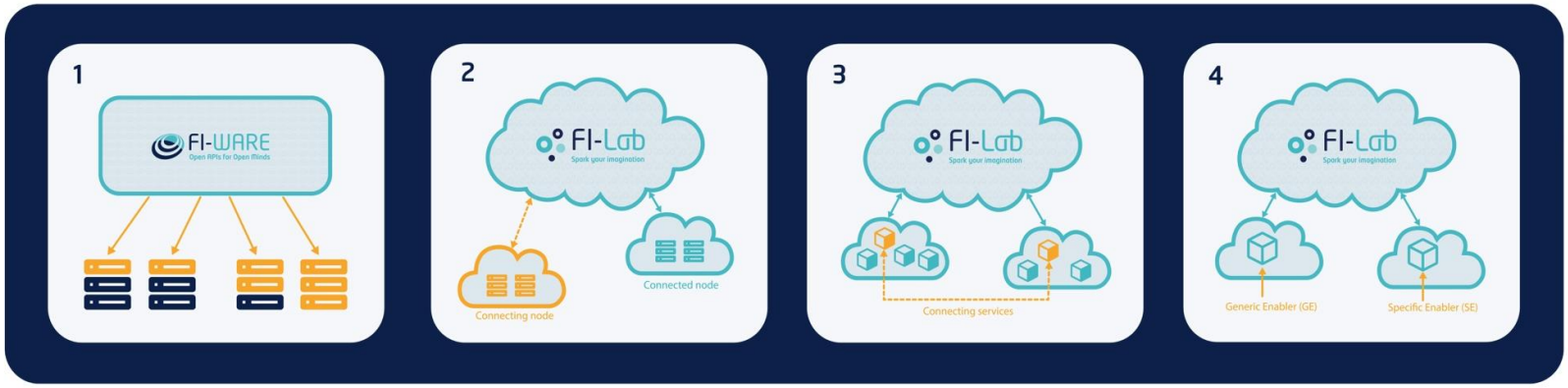


Envisioned target Smart City platform



- Smart city platform as a Data/Knowledge Hub
- Non-intrusive, open to third parties

FIWARE Ops: paving the way for FIWARE providers



Deployment

Deployment of basic Cloud Hosting GEs and Monitoring Adapters in a FIWARE node

Federation Management

Federate a new FIWARE node within a given FIWARE instance (e.g., the FIWARE Lab)

Connectivity Management

Manage connectivity of services across FIWARE nodes of a FIWARE instance

Service Offert Management

Registration and deployment of additional Generic Enablers, Specific Enablers and complementary Future Internet Facilities

Thanks!

Join us!

www.lab.fiware.org
www.fiware.org
@Fiware

BACKUP SLIDES

Internet: a transformation engine

Navigation, Calling a taxi (Uber), Recruiting (Linkedin)…

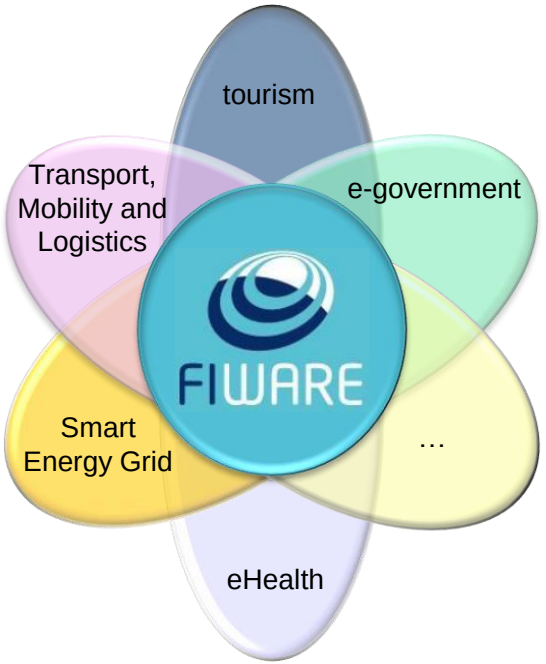
The FIWARE Program (formerly known as Future Internet PPP)

- **Goal**: capture opportunities derived from the new wave of digitalization of life and businesses

- **Strategy**: Build a ecosystem that will work as catalyst for capturing the opportunities. Lead standards for Smart Cities and APIs for IoT (Internet of Things)

- **Pillars**:
  - FIWARE: a generic, open standard platform which serve the needs of developers in multiple domains
  - FIWARE Lab: a meeting point where innovation takes place, an opportunities can be incubated
  - FIWARE Accelerate: a program that funds developers and entrepreneurs, and ignites roll-out of the ecosystem
  - FIWARE Ops: the suite of tools easing deployment and operation of FI-WARE instance nodes

- **Global footprint**: open to regions sharing the ambition



How can the new opportunities be captured and ultimately translated into local economy growth and creation of jobs?

App Sponsors and Data providers

- Connect to entrepreneurs
- Put their data at work
- Bring new innovative services to end users
- Be more efficient
- Social Reputation

Entrepreneurs, Developers

- Develop once for a large market
- Easily meet potential customers
- Marketing, promotion
- Ability to test with real data and end users
- Simple yet powerful APIs that accelerate product development

Technology Providers

- Ability to “coopete”
- Connect to entrepreneurs: jointly exploit the opportunities

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ecosystem

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ecosystem

open sustainable global

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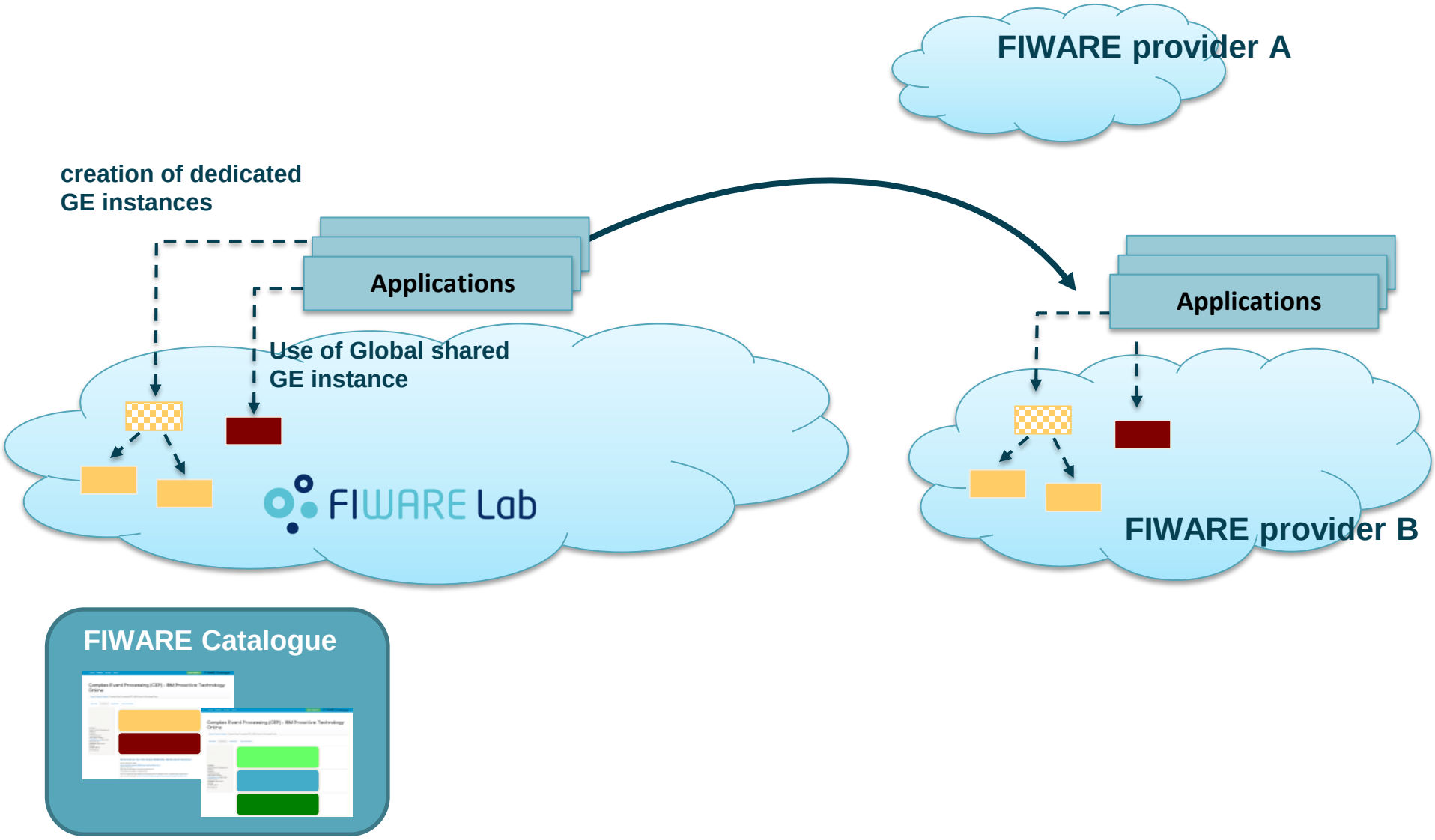
Building the FIWARE ecosystem: the vision



How the ecosystem is actually emerging: the case of Smart Cities

- Some cities already connecting to FIWARE Lab:
  - Italy: Trento, Torino, Veneto
  - Spain: Valencia, Sevilla, Málaga, Santander, Logroño, Vigo, Lleida, Sabadell, …
  - Finland: Helsinki, Espoo
  - Netherlands: Amsterdam
  - Portugal: Lisbon
  - Discussion with cities in other countries ongoing

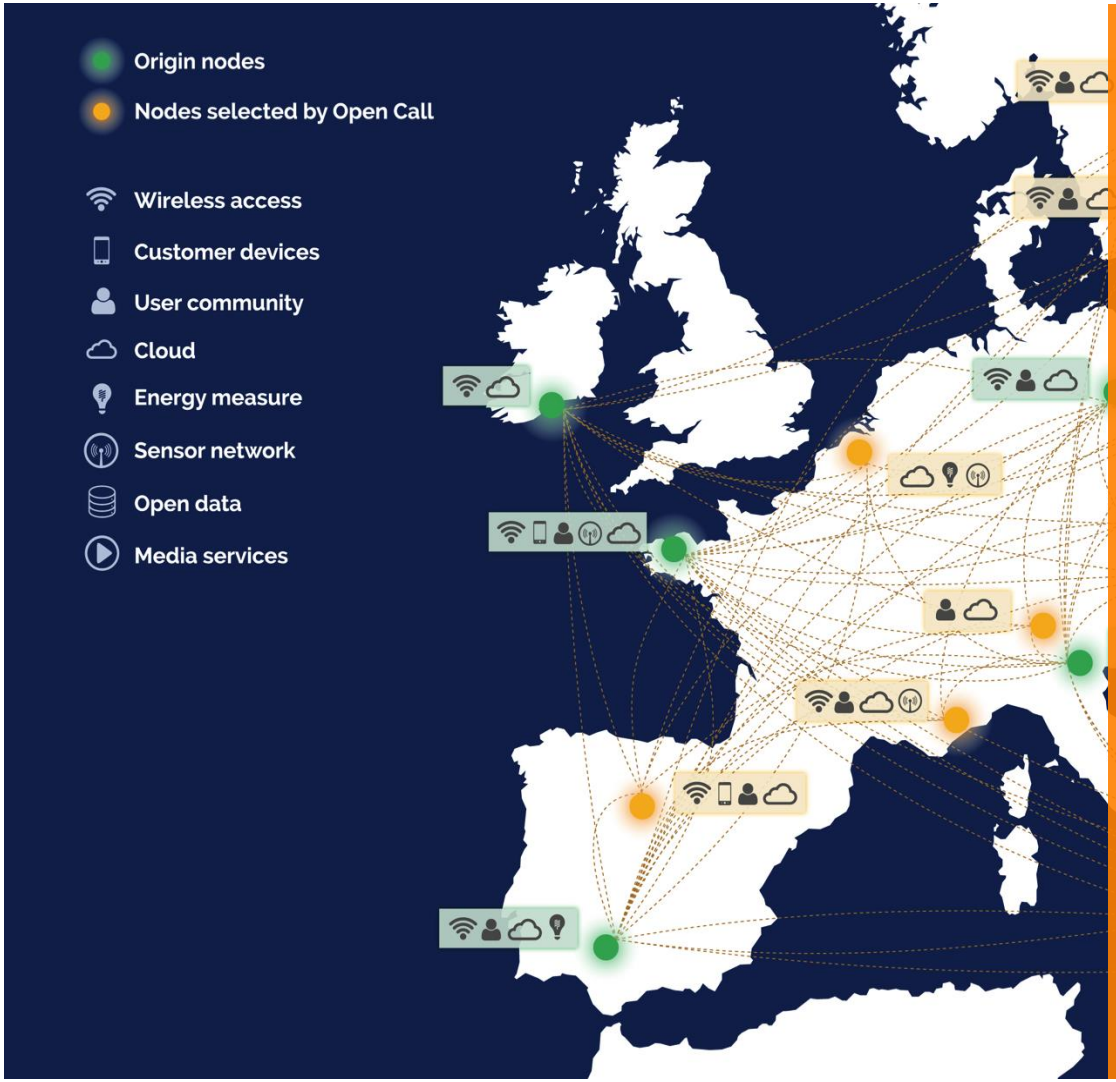
- FIWARE Challenge on Smart Cities:
  - Launched end of October
  - 300+ teams (individuals, startups, SMEs – few researchers) applied to the challenge (ES, EN)
  - 20 final teams run the final in CPBR 14
  - quite amazing results!

Why FIWARE

Driver	What is needed?	What does FIWARE bring?
Technology	Open, driven by implementation, specs (open source reference implemenation) Sustainable investment over time	Open specifications backed by open source reference implementations (see [1], [2]) 100+ M€ of investment (2011-2016)
Experimental environment	Ability to experiment with real data coming from cities (not just open historic datasets but real-time dat). Free Cloud capacity enabling entrepreneurs to test and host a permanent showcase of their applications.	15 cities (7 in Spain) already working on setting up a connection to FIWARE Lab [3] 3000+ cores, 16Tb RAM and 750+ Tb HD will be the free computing capacity provided by the FIWARE Lab Cloud across 16 nodes distributed in Europe
Incentives for creating the ecosystem	Engagement of technology providers, entrepreneurs, data providers, customers Funding for first entrepreneurs joining the ecosystem. Invesment in promotion and dissemination activities	52 partners, 13 countries (just FIWARE) 100 M€ devoted to fund entrepreneurs in 2014-2016. Additional opportunities in Horizon 2020. 6,2+ M€ devoted to dissemination
Global footprint	Helping entrepreneurs and technology providers to create opportunities not just in Europe but other regions (Latam, Asia and, why not, USA)	FIWARE Lab nodes in Mexico and Brazil. Conversations between EC and public authorities in Mexico and Brazil to explore collaboration opportunities

[1] – http://wiki.fi-ware.org/Summary_of_FIWARE_Open_Specifications
[2] – http://catalogue.fi-ware.org
[3] – http://lab.fi-ware.org

Extending the FIWARE Lab offering for service providers and developers



- Availability of 5 nodes (end of March 2014) with 500+ cores, 1TB+ Ram, 100TB+ HD
- Additional 12 nodes (April / September 2014) up to 3000+ cores, 16TB+ Ram, 750TB+ HD
- Level 1 and Level 2 support for the nodes
- Showcases for developers, infrastructures, smart businesses