Next Challenges for IoT Experiment Platform

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Expectation and Issues in IoT

- ## Expectation
  - – Realize Smarter City
    - • Various application possibilities

- ## Issues
  - – Business model
    - • Sustainability
  - – Citizen Engagement
    - • Are Citizen's problems properly solved?
    - • Are privacy issues properly handled?

BigBerry

https://www.youtube.com/watch?v=v7y5-YzUHAY

Placemeter

https://vimeo.com/69091237

Smart City development and testing platform is required

EU-JP Collaborative Project: FESTIVAL

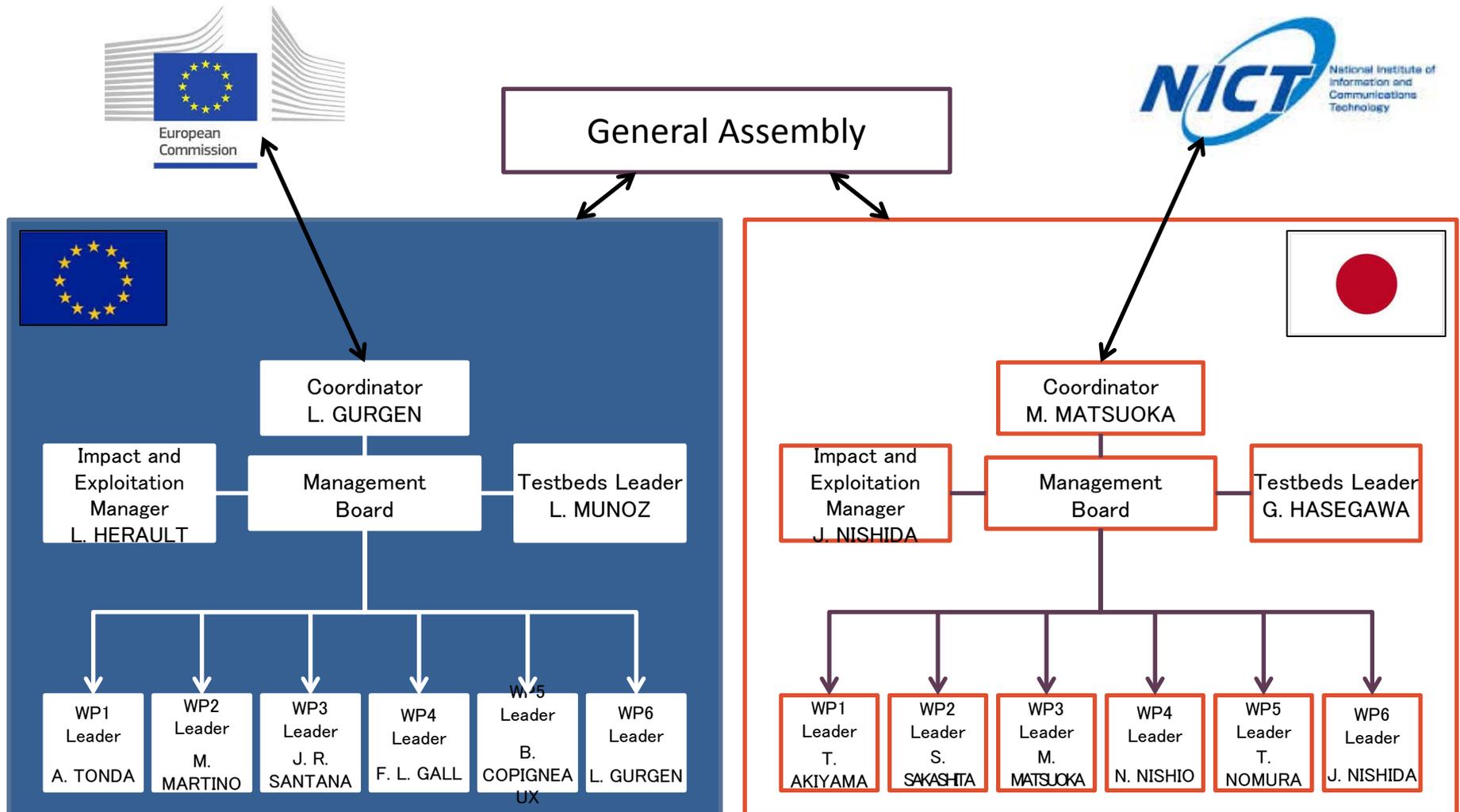**construction of Smart ICT experiment platform & field trials of Smart ICT applications**

FESTIVAL

Experimentation

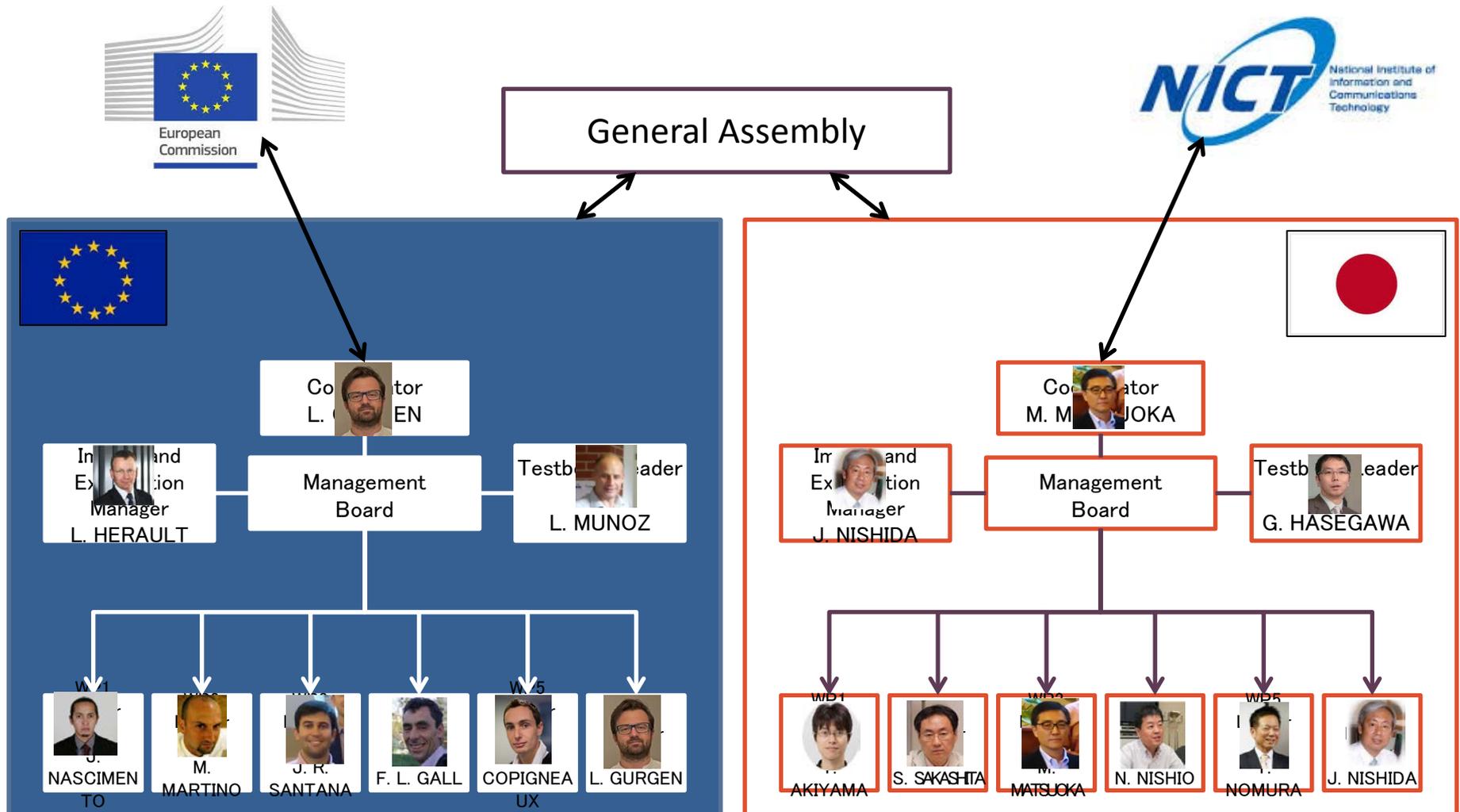**FE**derated interoperable **S**mar**T** **I**CT services de**V**elopment **A**nd testing p**L**atform

Real-life testbeds, field trials
Japan: Osaka, Kansai

An Overview of FESTIVAL Project

- Start up date
  - October 2014

- Funding
  - EU Side: receive funding from Horizon 2020 Programme
  - JP Side: receive funding from NICT

FESTIVAL management structure

General Assembly

European Union side:

Coordinator
L. GURGEN

Impact and Exploitation Manager L. HERAULT	Management Board	Testbeds Leader L. MUNOZ

WP1 Leader A. TONDA	WP2 Leader M. MARTINO	WP3 Leader J. R. SANTANA	WP4 Leader F. L. GALL	WP5 Leader B. COPIGNEAUX	WP6 Leader L. GURGEN

Japan side:

Coordinator
M. MATSUOKA

Impact and Exploitation Manager J. NISHIDA	Management Board	Testbeds Leader G. HASEGAWA

WP1 Leader T. AKIYAMA	WP2 Leader S. SAKASHITA	WP3 Leader M. MATSUOKA	WP4 Leader N. NISHIO	WP5 Leader T. NOMURA	WP6 Leader J. NISHIDA

FESTIVAL management structure

General Assembly

European Union side:
- Coordinator L. GUGEN
- Impact and Exploitation Manager L. HERAULT
- Management Board
- Testbed Leader L. MUNOZ
- WP1 J. NASCIMENTO
- M. MARTINO
- J. R. SANTANA
- F. L. GALL
- WP5 COPIGNEAUX
- L. GURGEN

Japan side:
- Coordinator M. MATSUOKA
- Impact and Exploitation Manager J. NISHIDA
- Management Board
- Testbed Leader G. HASEGAWA
- WP1 AKIYAMA
- S. SAKASHITA
- WP3 M. MATSUOKA
- N. NISHIO
- WP5 NOMURA
- J. NISHIDA

Requirements for Smart ICT experiment platform

(1) Provide ICT Infrastructure

- IoT/M2M Messaging
- Sensor data storage/analysis
- Visualization/actuator control

Application use case survey

Extracting common API

Existing **testbed** survey

(2) Provide reference procedures of stakeholder coordination

- e.g. Terms and conditions for personal information collection

(3) Provide reference conditions for secondary use of experiment data

- e.g. Terms and conditions for sensor data and analysis results sharing

Points

How to federate existing testbeds?

How to involve stakeholders in decision making for Smart ICT development?

Knowledge creation base like **TUBA** and **Knowledge Capital** plays important role

3 target application domains

Smart energy

Smart building
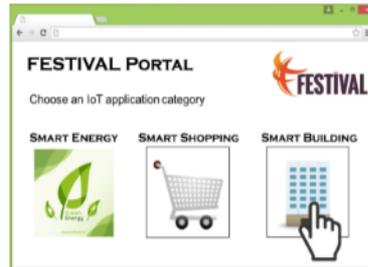
Smart shopping

| iHouse 🇯🇵 | PTL 🇪🇺 | GFO – The Lab 🇯🇵 | Santander 🇪🇺 |

FESTIVAL Architecture

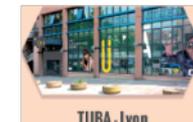**FESTIVAL Portal**
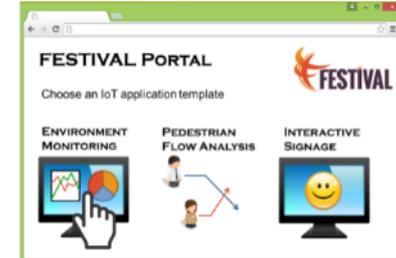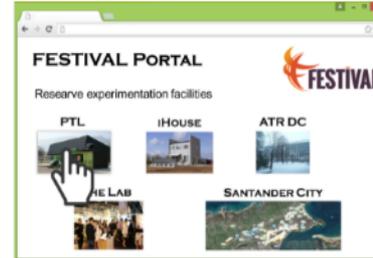
Experiment based federation

Federation through Experimentation as a Service

EaaS

Resource based federation

Open Data Federation

IoT Gateway

IT Resource Manager

Living Lab Manager

Resources

Experimentation Facilities

Platforms

Living Labs

Testbeds

DATA · SANTANDER · PTL · SmartSantander Large scale smart city · JOSE · FIWARE Lab by ENGINEERING · TUBA - Lyon · The Lab - Osaka · iHouse · ATR DC

Data

Fields Sensors

Servers

People

Design and implementation of EaaS APIs

Functional acceptance testing
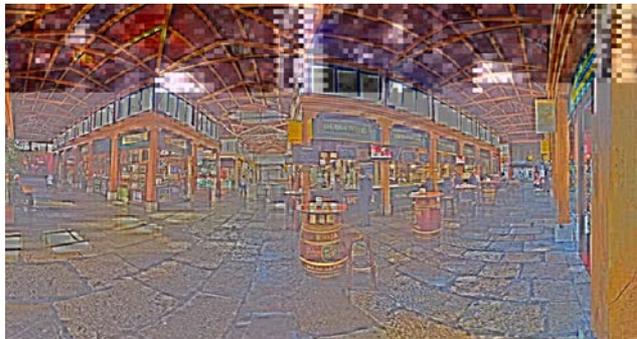*EaaS platform level*
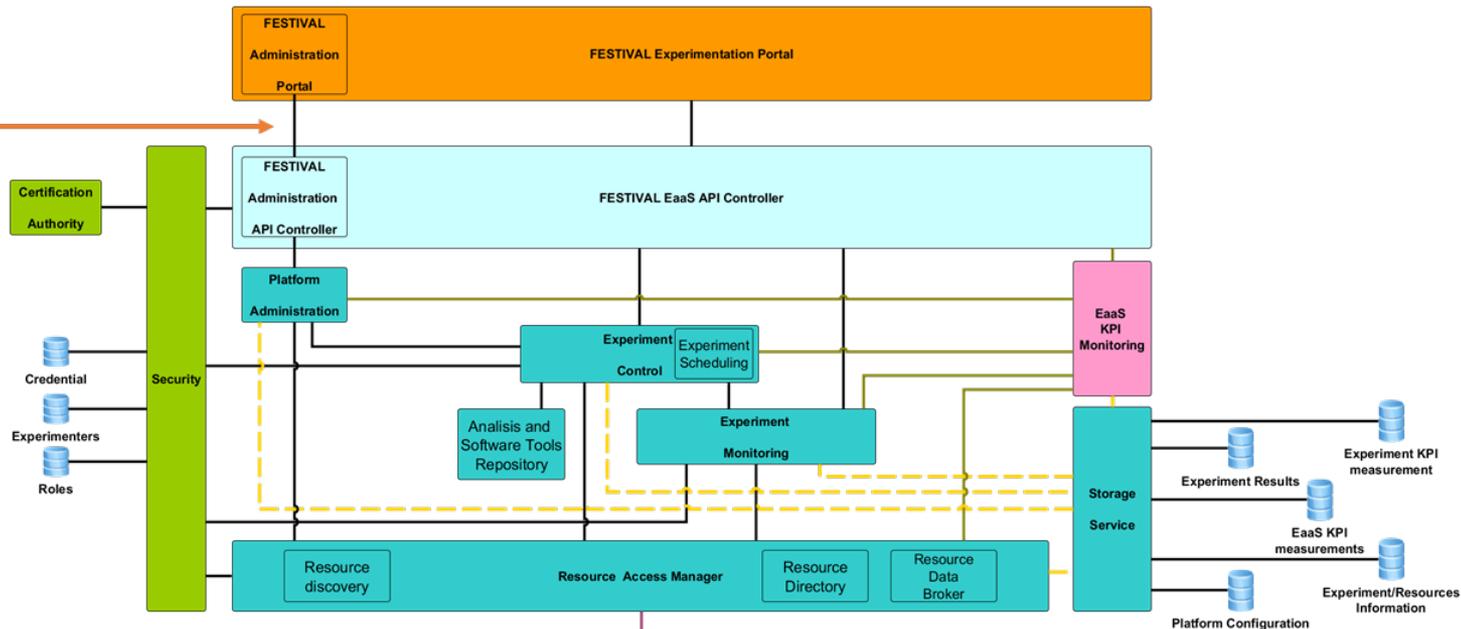
Integration testing
Driver level
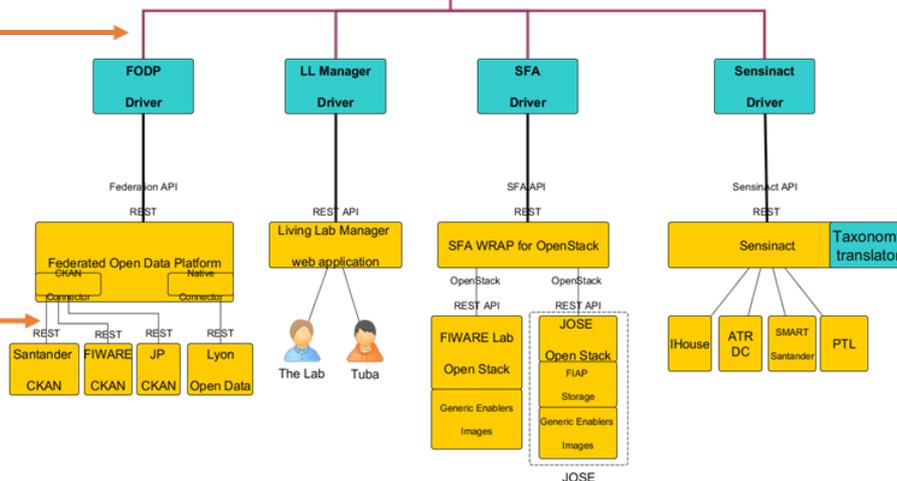
Conformance testing
Testbed level
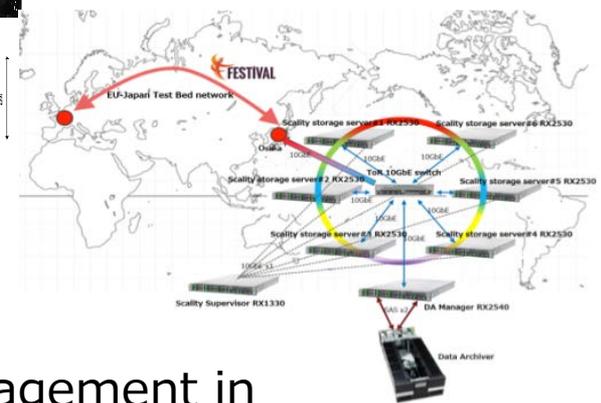
Selected applications and experiments

@Santander
Mercado del Este
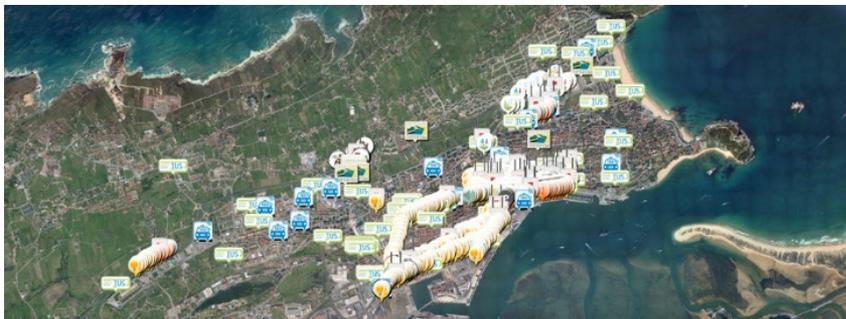Connected shop
Advertised premium discount

@Tokyo ATR Data Center
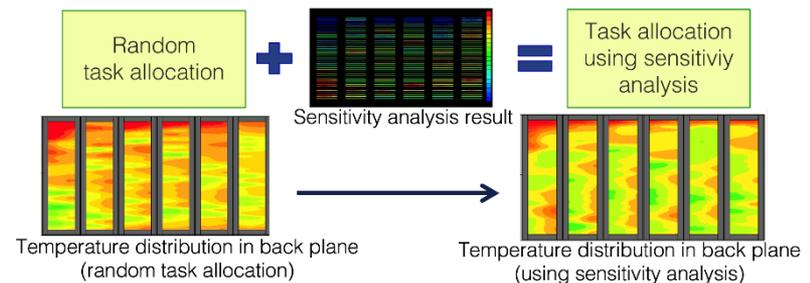Smart Data Center

Cold Storage Geo-replication

@Santander SmartSantander
Sensor data from SmartSantander
are provided as Open Data

Energy Management in Data Center (xEMS)

Random task allocation + Sensitivity analysis result = Task allocation using sensitiviy analysis

Temperature distribution in back plane (random task allocation) → Temperature distribution in back plane (using sensitivity analysis)

Selected applications and experiments

@Grenoble, PTL
Smart Energy Management in Experimental Smart House

@Ishikawa, iHouse
Energy Management in Protocol Agnostic Smart House
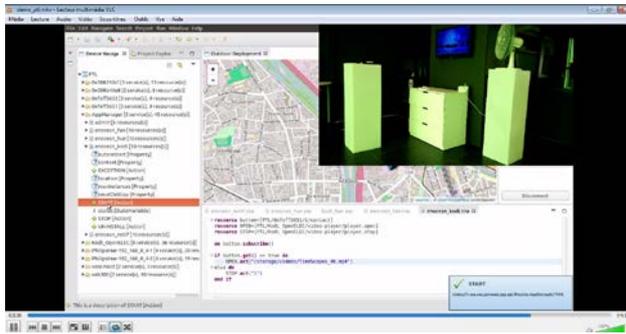
@Kobe, Minato Kanko (Bus company)
Safe driving support system

@Osaka, The Lab.
Recommendation analysis system
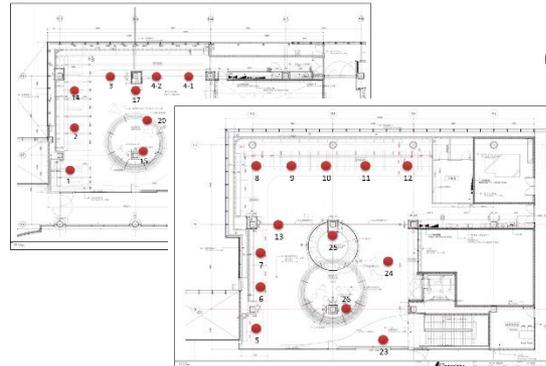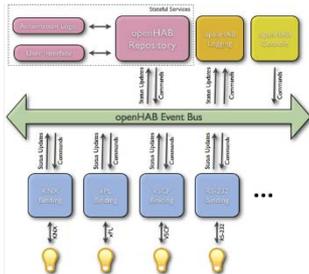
@Kobe & Kyoto, Maya, Kameoka Station (JR)
Environmental monitoring using digital signage space

Several other applications will start up soon

Next Challenges

- Experiment field extension

- Introducing market mechanism into sensor data exchange

- End-user domain federation

- Further call for experimentation

Experiment Field Extension

- Importance of "geographical scalability"
  - Experiment results deeply depend on the location in several applications
  - Providing a chance to have the experiment in a different location is important to extend the service as global

- Difficulty of stakeholder coordination
  - Field extension requires the same stakeholder coordination as deploying a new IoT application

> Sufficient amount of time must be spent for extending experiment fields
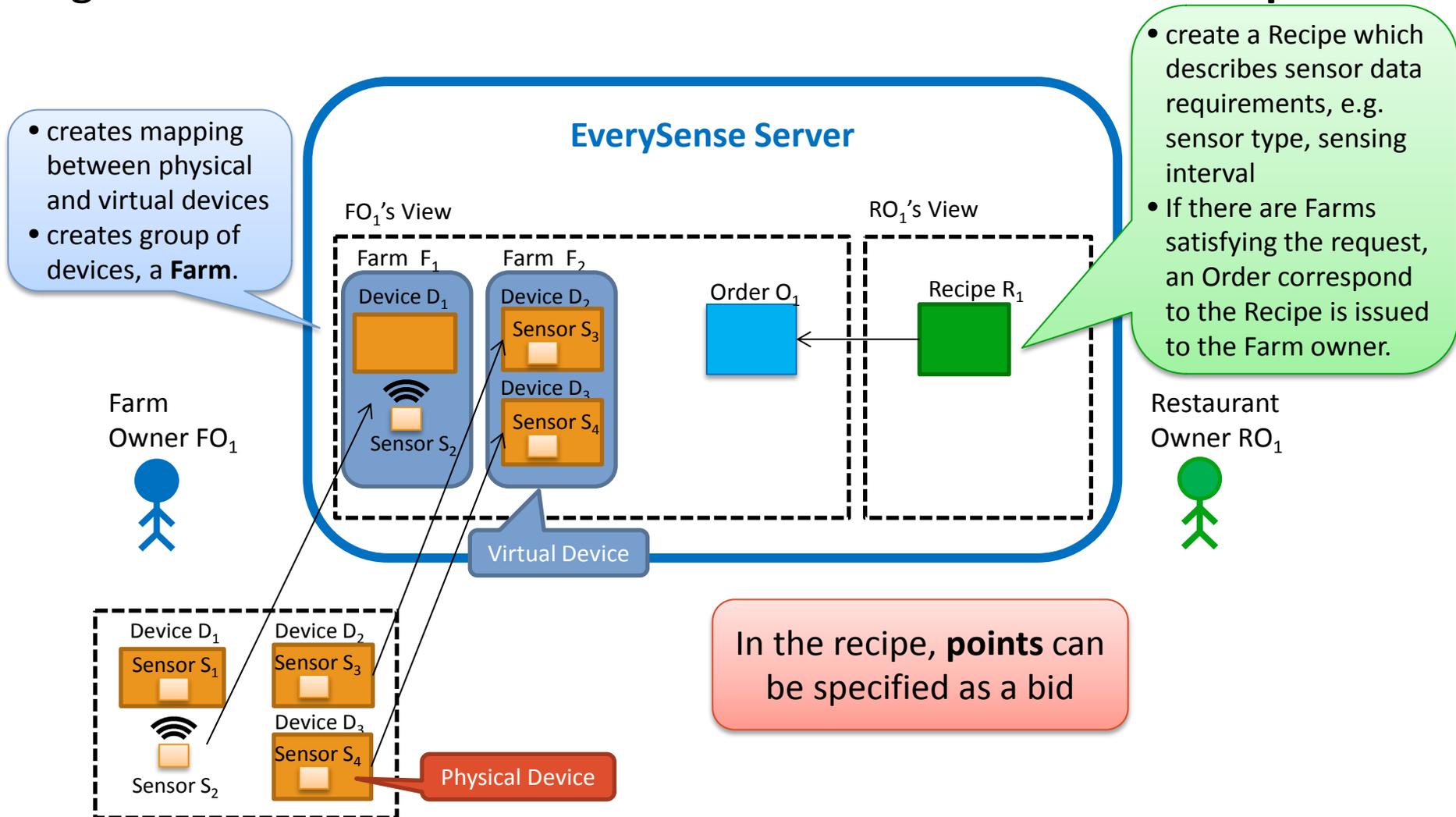
Introducing market mechanism into sensor data exchange

- Another approach to collect sensor data from widely distributed area
  - Motivate end-users to upload and share their own sensor data by providing profit
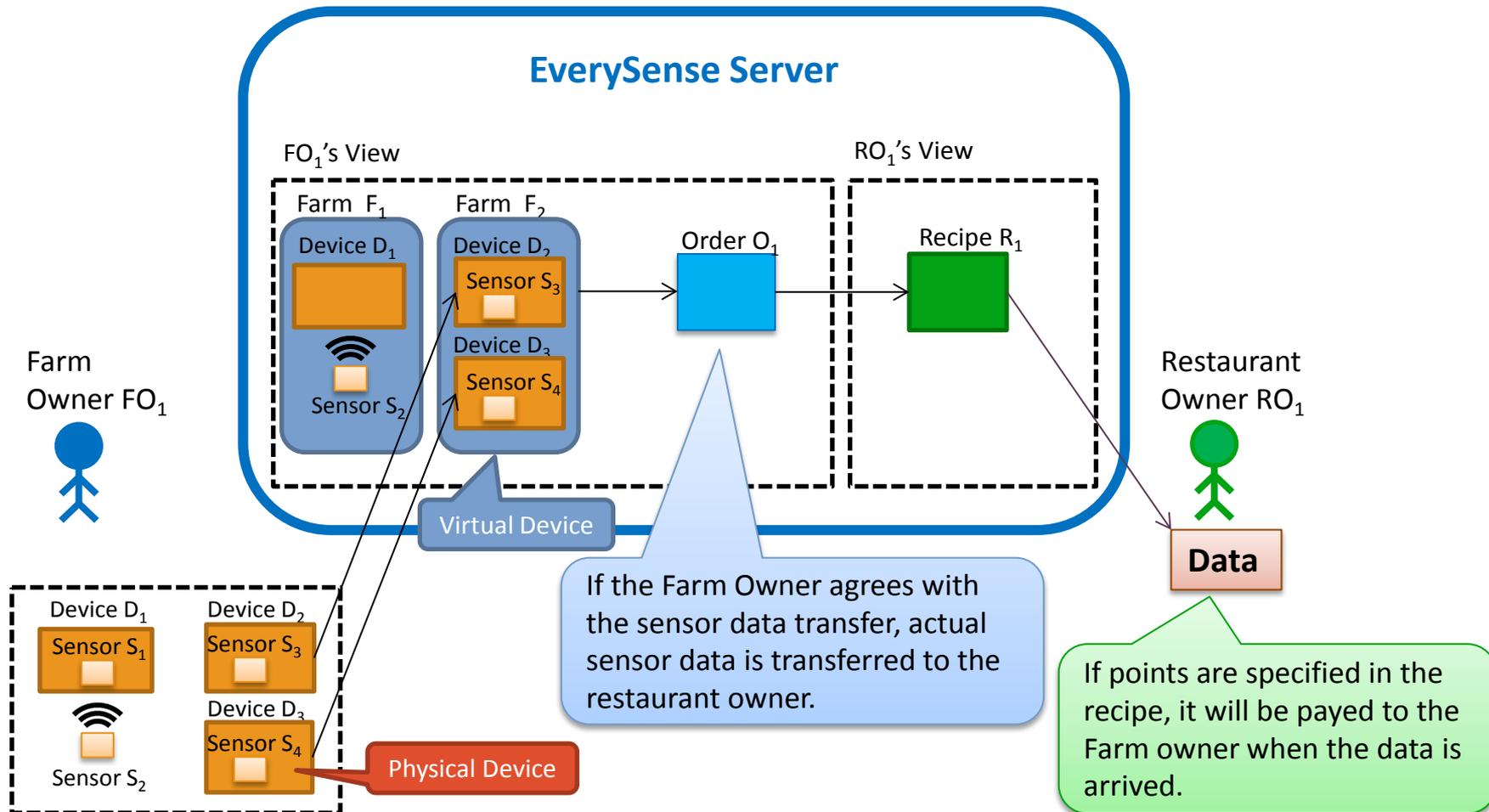 - EverySense is one of the such kind of services

OverView of EverySense Service (2)

Order acceptance and sensor data transfer

End-user domain federation

- How to interact with external cloud services
  - End-user credentials must not be stored inside the platform (EaaS Modules)
  - Such a federation must be done by end-users
- How to reduce end-user federation cost
  - Reduce the learning cost of APIs and protocols by using messaging tools
    - e.g. fluentd, Node-RED
  - Reduce the learning cost of configurations for middleware by using IT automation tool
    - e.g. Chef, Ansible, Puppet
    - It requires investigations of sufficient amount of typical applications

Further call for experimentation

- Experiment field extension
  - Require good example applications to persuade the stakeholders

- Introducing market mechanism into sensor data exchange
  - Require field trials to find suitable marketing approach

- End-user domain federation
  - Require example federations in real applications

More experiments must be investigated!

FESTIVAL Call for Experimenters

FESTIVAL offers key IoT resources in Europe and Japan

- **For who?** Researchers, SMEs, startups, innovators, developers...
- **For what?** To experiment with FESTIVAL testbeds in Europe and in Japan from smart building, smart energy, smart shopping and smart city domains.
- **How?** Through federated FESTIVAL Platform with easy-to-use APIs and the Experimenters Portal

> **The experimenters will benefit from the state of the art IoT testbeds and access to large quantity of IoT devices, open data repositories and computing resources in Europe and in Japan.**
> **A Kit for Experimenters will be available on the FESTIVAL website from November!**

- **Call remains open from Nov. 2016 to April. 2017, New applicants will be selected every month**
- **No financial support, Support will be provided to experiments through the online documentation, webinars and a helpdesk**

Contact : enduser@festival-project.eu
Web link : http://www.festival-project.eu/en/?page_id=849
Twitter : @Festival_EU_JP

THANK YOU FOR YOUR ATTENTION!
ご清聴ありがとうございます!