
ITU

\Orchestrating a brighter world NEC

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Cross-domain data utilization via FIWARE as data-exchange platform

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About NEC

About NEC Corporation

Group companies
217

Employees
98,726

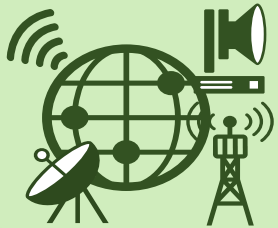
Countries
160

Net Sales
US$ 25b

Enterprise Business
For Manufacturing, Retail and Logistics

Public Business
For Government, Public, Healthcare, Finance and Media

Telecom Carrier Business



System Platform Business
Hardware, Software, Services, Enterprise networks solutions

About FIWARE

What is FIWARE? (portal www.fiware.org)

FROM 2010
(a public-private partnership)

Brand Name of a completed 2x300M€ EU **Research & Innovation programme** for a Future Internet platform and its core elements (so-called generic enablers, GEs)

Name of the completed **Future Internet Core Platform**, its related elements and the ecosystem around it: FIWARE Lab, FIWARE Ops, FIWARE Mundus, FIWARE iHubs, …

TO 2017
(open-source ecosystem)

Name of an **open-source community** that shall advance the FIWARE platform

Name of a non-profit **FIWARE Foundation** for governance and promotion of global usage of the FIWARE platform (NEC is member)

WHAT DOES FIWARE OFFER?

FIWARE Ecosystem

1 FIWARE REFERENCE ARCHITECTURE

Set of components (Generic Enablers) that eases the creation of Smart Internet Applications by providing APIs that are public and royalty free, supported by open source reference implementations. They offer reusable and common shared functions serving multiple use cases in various sectors. They are available and ready to use in the FIWARE Catalogue.

2 FIWARE Lab

The FIWARE Lab is an example of FIWARE instance available as a free experimentation environment where developers can build their applications using available FIWARE GEI instances, or dedicated instances they can deploy on their own. It not only allows them to experiment with FIWARE technologies, but test and showcase their applications with real data and users, making it easier to draw the attention of potential customers and investors.

FIWARE Lab

3 FIWARE Operations

FIWARE Ops is the suite of tools that will ease the creation and operation of FIWARE instances based on the federation of FIWARE nodes. It has been used to build and to support the expansion of FIWARE Lab worldwide.

FIWARE Ops

4 FIWARE Academy

The FIWARE eLearning Platform is a good place to start. Here you will find **webcasts, tutorials and other training material** about FIWARE Generic Enablers.

5 CITIES AS ENGINES OF INNOVATION

Making a city become "smart" means the organic adoption and further development of a common set of standard APIs, data models and open data platforms which will ultimately fuel city-driven innovation and transform cities into hearts of economic growth and enablers of sustainable well-being of citizens. Thanks to the FIWARE open standard platform and the sustainable ecosystem around FIWARE Lab, cities can make their Open Data available to cities, communities and developers worldwide for free experimentation based on open licenses.

6 FIWARE INNOVATION HUBS

To encourage the growth of European digital economy FIWARE enables European business hubs to enrich their services and to accelerate the creation of new Internet-based business. The starting point is the initial network of EIT ICT Labs nodes. These Hubs have been selected to expand the reach of FIWARE technologies, so that as many companies as possible can have an easy first contact with FIWARE and take full advantage of it.

7 FIWARE Mundus

Paving the path to a Global Ecosystem

With the growth of the FIWARE ecosystem, corporation opportunities increasingly arise all around the globe, as well as the need to share the know-how of FIWARE and establish new FIWARE lab nodes. FIWARE Mundus aims to facilitate the growth of a global ecosystem by mobilizing policy makers and innovation initiatives in EU regions and countries outside Europe, where the uptake of Future Internet technologies can rapidly occur and create impact on local markets. Current leads include a dozen of EU and international regions including Mexico, Chile, Brazil, US, Canada, and some African countries.

FIWARE Mundus

8 COACHING AND MENTORING

The FIWARE Accelerator Programme, co-funded by the European Commission, provides mentoring and distributes a total amount of 80 million euros among the most innovative and SMEs projects with a higher potential!

FIWARE Impact (see http://map.fiware.org/)

993 SMEs, 22 Hubs, 16 Accelerators, 89 Cities, 21 Labs .... on 20170227

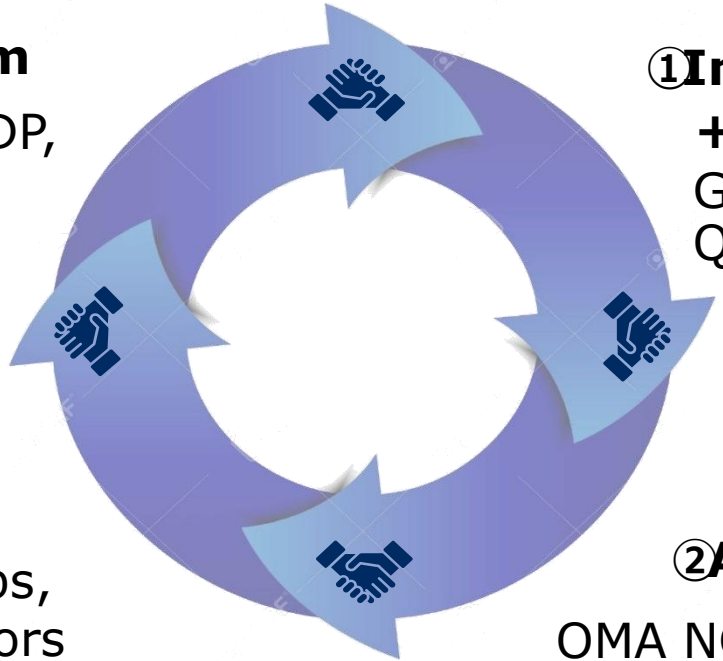
Advantages of FIWARE Ecosystem

Open innovation platform in data economy era with open specification (standardization) and open source software (OSS)

④Partner Ecosystem

EC, NIST, OASC, EDP, GSMA, TM Forum

EC : European Commission
NIST : National Institute of Standards and Technology
IIC : Industrial Internet Consortium
TM Forum : TeleManagement Forum
GSMA : GSM Association
EDP : European Data Portal
OASC : Open & Agile Smart Cities initiative



①Implementation as OSS + Quality improvement

GE (generic enabler)
QA (quality assurance)*

③Promotion

FIWARE Labs, iHubs, Mundus, Accelerators

②API (dejure standard)

OMA NGSI → update → ETSI ISG CIM

* FIWARE Quality Assurance Chapter
https://forge.fiware.org/plugins/mediawiki/wiki/fiware/index.php/FIWARE_QA_Chapter

FIWARE Technical Approach

Open Standard Platform

FIWARE
OPEN APIs FOR OPEN MINDS

Sustainable Open Innovation Ecosystem

FIWARE Lab
Spark your imagination

FIWARE Ops
Easing your operations

FIWARE **publishes:**

- **Technical specifications** of Future Internet Generic Enablers (**GE**)
- **API specifications** for interactions with the GEs and between the **GE**s
- A Modular **Reference Architecture** explaining how the GEs are combined

Technical content of FIWARE is divided into **seven chapters**

NEXT PAGE

FIWARE **provides**:

- **Open-Source reference implementations** of Generic Enablers → available in **FIWARE Catalogue**
- Publicly accessible running instances of GE implementations **(FIWARE LAB)**
- A **cloud environment** where users can deploy their own instances of GEs with a few clicks **(FIWARE LAB)**
- **FIWARE OPS:** A software suite allowing infrastructure providers to setup own (public, private, or commercial) instances of the FIWARE Cloud environment

FIWARE Chapters (technical areas)

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

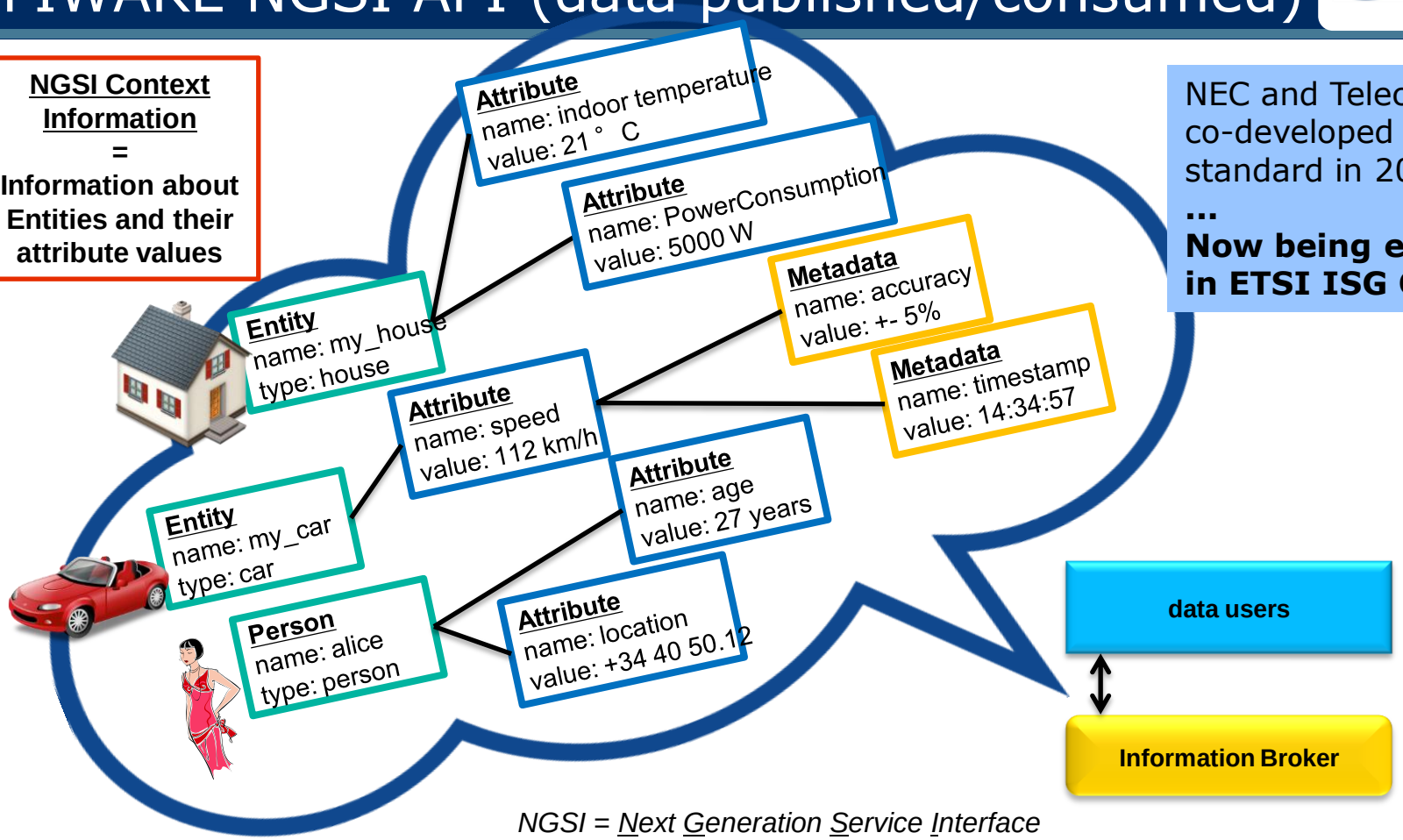
NGSI API is key

NEC co-developed

NEXT PAGE

FIWARE NGSI API (data published/consumed)

NGSI Context Information
=
Information about Entities and their attribute values



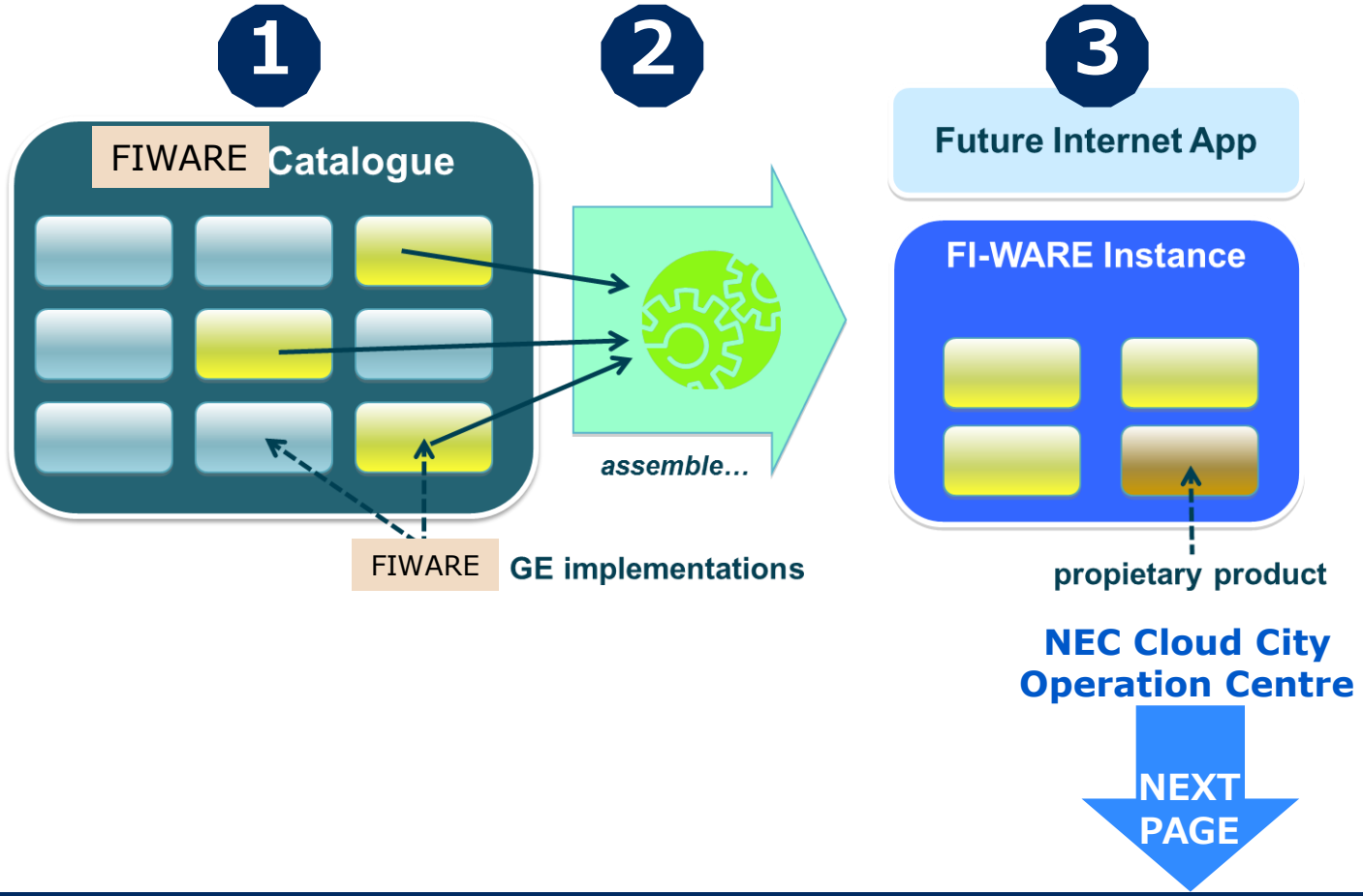
NEC and Telecom Italia co-developed the standard in 2010 in **OMA**
...
Now being enhanced in ETSI ISG CIM

NGSI = Next Generation Service Interface

What can be achieved with FIWARE ?

NEC examples

How to create applications with FIWARE (today)



NEC Cloud City Operation Center

FIWARE OPEN APIs FOR OPEN MINDS enabled product

Dashboard

Application Developers

Applications

Platform Operator

Platform Management Portal

CityModel APIs

City Model Server

Big Data Repository

CouchDB or Hadoop

indexes

views

Internal Processing

documents

HDFS

Big Data Processing

External Processing (batch+stream)

Spark

Compute & Data Nodes

HDFS & Spark are deployed within the same cluster

NGSI APIs

Data/JSON

IoT Broker

IoT Discovery

NGSI APIs

Semi-Structured Data (JSON data)

IoT-Agents

data sources

Others

Unstructured Data (text/image/video)

FIWARE-based Products in NEC

NEC Iberica

- Cloud City Operation Center
- Smart Waste
- Smart Street Light

NEC New Zealand

- Sensing City Backbone
  (PoC+Service in Wellington)
- Pedestrian Mobility
- KITE (sensor platform)

NEC Singapore

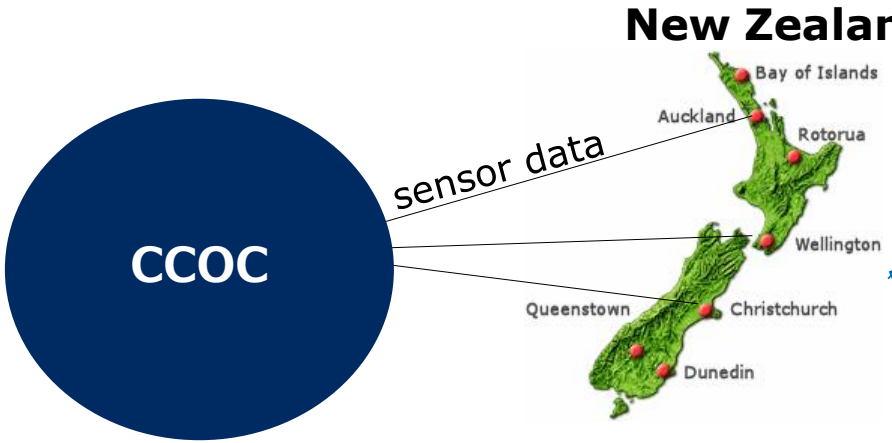
- Interagency Collaboration
  - Project Einstein, MAG1C BUS

NEC Iberica: Waste Management

- Just-in-time waste collection service uses machine-to-machine sensors that record the volume of rubbish in the bins
- Data is relayed by data collectors, repeaters and the mobile network to the FIWARE-based control center
- The city street sweeping team and citizens can use the "Cuida Santander" app to report problems with illegal dumping

NEC New Zealand: Measure the Health of a City

Global Overview: data from anywhere



NEC Cloud City Operation Centre (Dashboard), collects data, displays on demand (e.g. Wellington)

NEC "KITE": a sensor platform for Smart Cities

http://nz.nec.com/en_NZ/solutions/smartcity/kite.html

Short video to be played here

NOTE – The file is provided separately

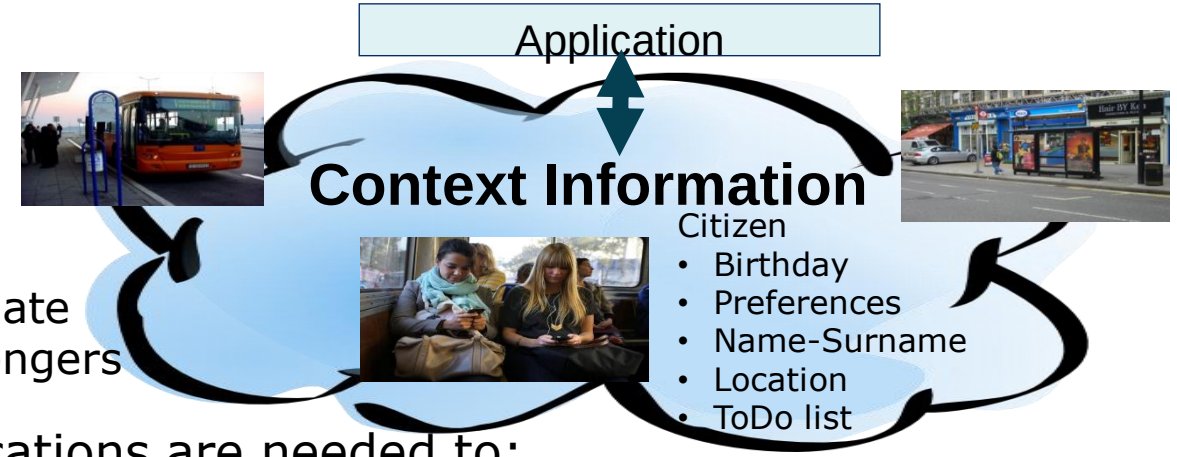
Cross-Domain Data Utilization via FIWARE

Now developing in ETSI ISG CIM
(Context Information Management)

https://portal.etsi.org/CIM

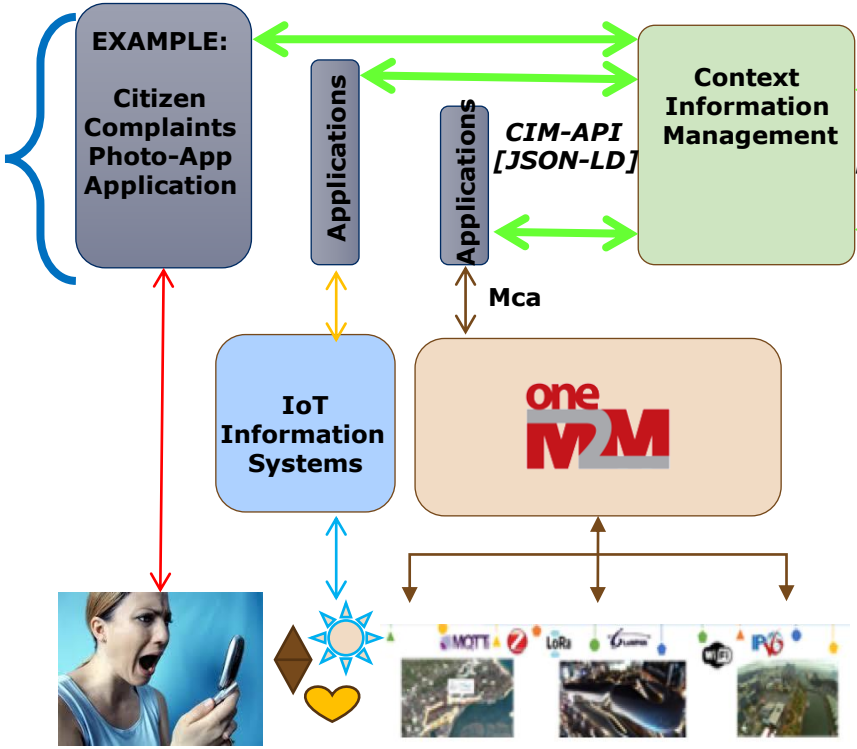
Why CIM specifications are needed

- Smart Digital Services need to share Context Information



- Specifications are needed to:
  - ensure vendor neutrality for users such as Cities
  - reduce technological barriers to development and deployment
  - enable a community of entrepreneurs to build innovative services
- Solutions: traffic, pollution, parking, water, power (efficiency), crime ...

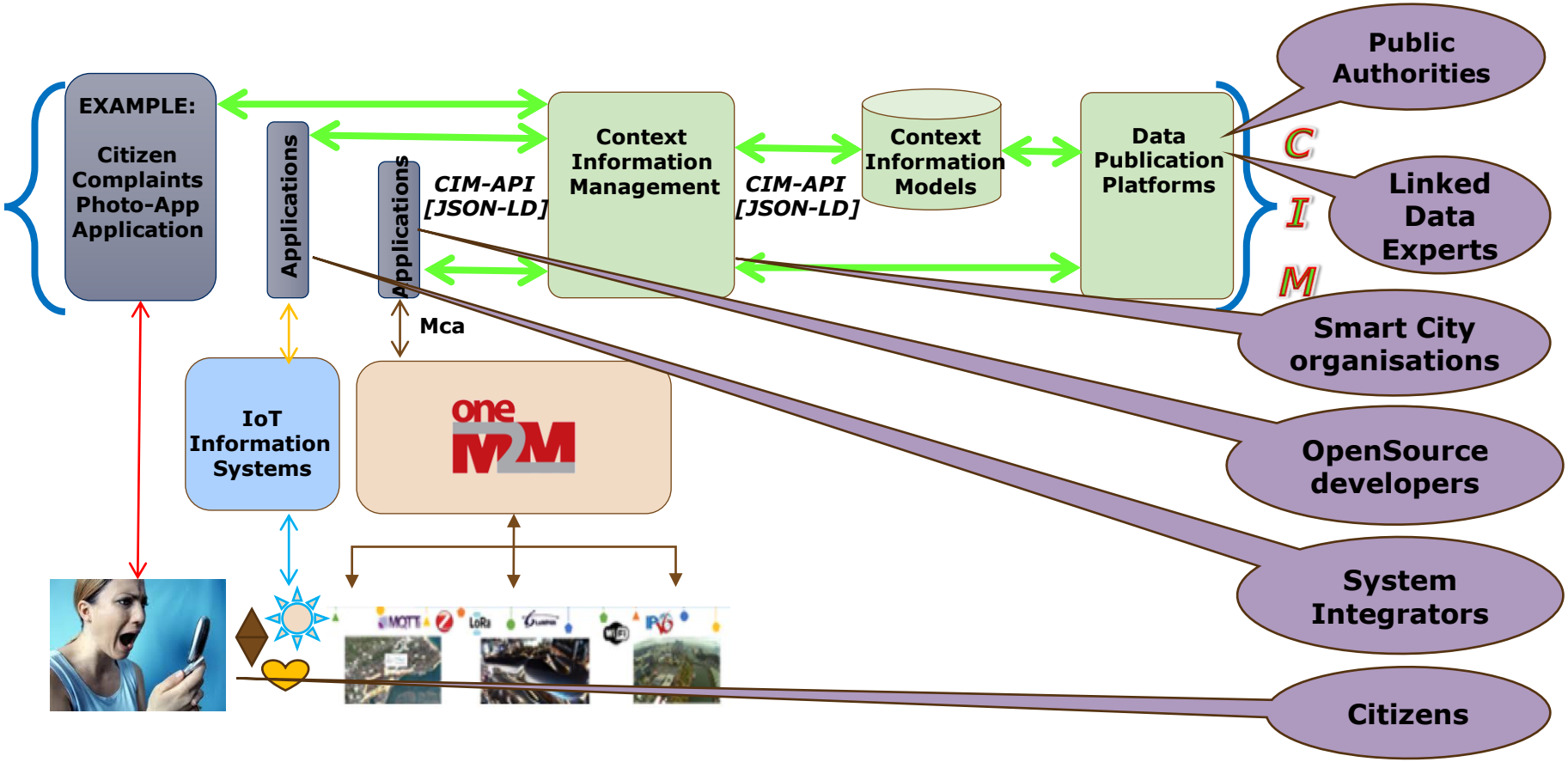
Creating a cross-domain Context Information Layer



ETSI ISG CIM MISSION

- Overview of use cases for Smart City, Smart Agri-Food, Smart Industry
- Compare OMA NGSI (starting point for cross-domain info exchange) with other protocols, and potential enhancements
- Consult city administrators, database experts
- Identify cross-cutting data exchange API (maybe with needed enhancements)
- Create example data models
- Collaborate with open-source implementations

Cross-domain Context Information Layer: numerous stakeholders



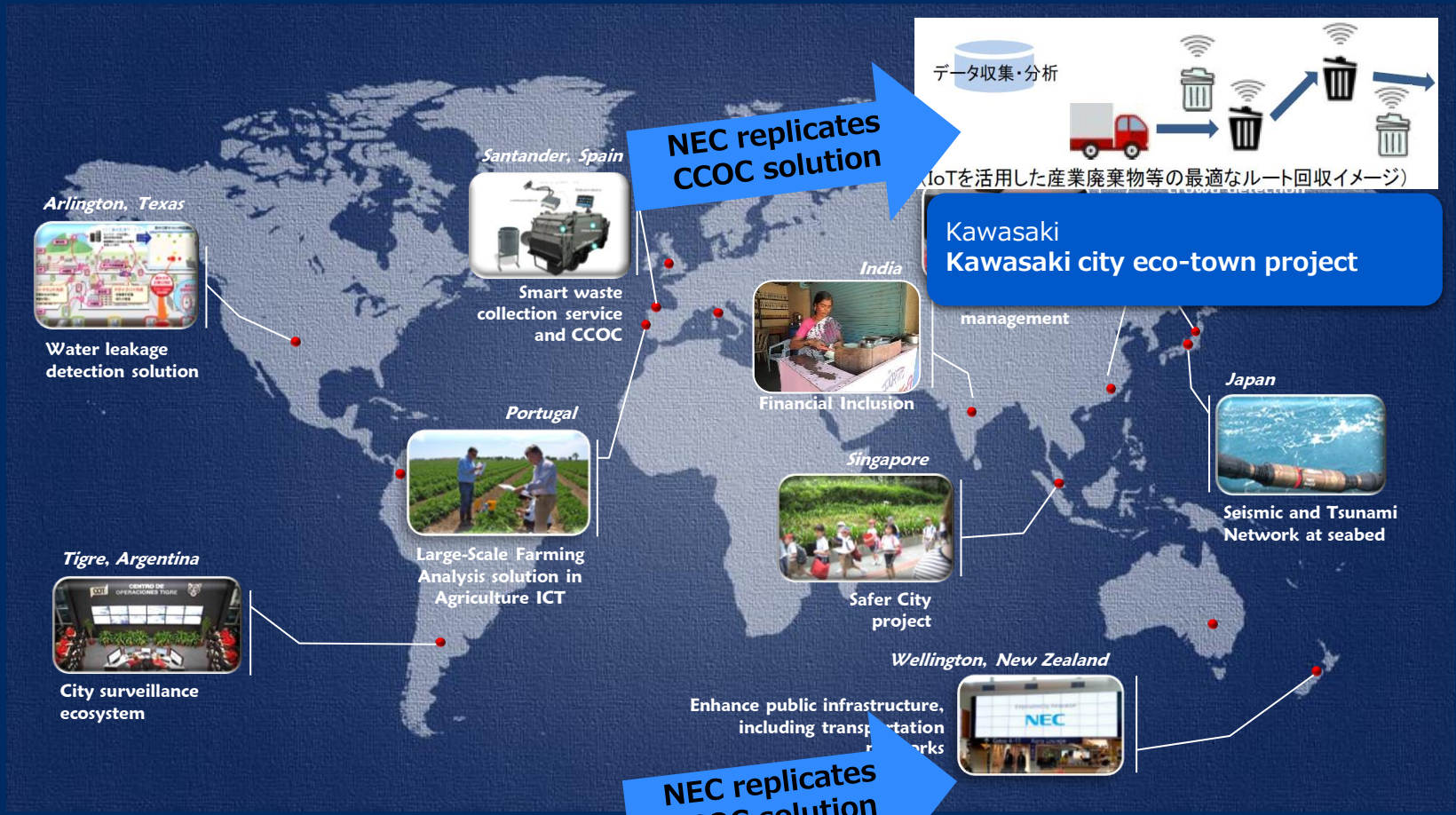
Outlook

Towards Society 5.0

Outlook

- FIWARE has developed from a PPP for the Future Internet
  … to an eco-system of platforms, technologies & support
- FIWARE is not a standard or a set of standards
  ... it is an Open Source Ecosystem
- FIWARE ecosystem is expanding globally
- FIWARE allows replication of Smart City solutions

NEC ... Replicating Smart City Solutions

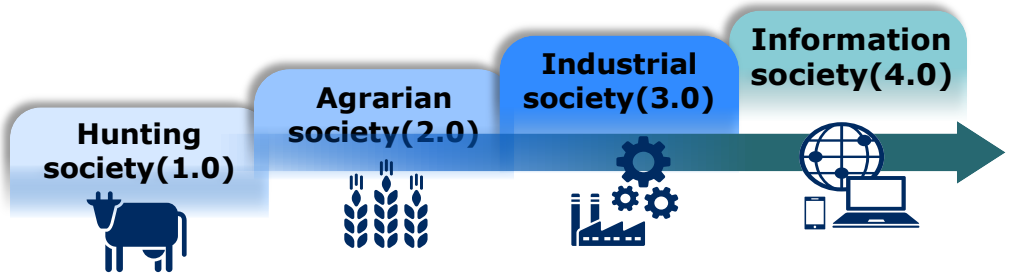


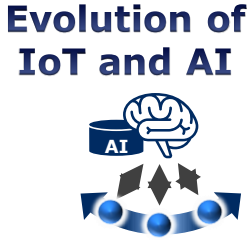
The goal is Society 5.0

(Source: Comprehensive Strategy on Science, Technology and Innovation 2016)

"Society 5.0": Japan Government's Science and Technology Strategy emphasizing **Human-centric super-smart society**

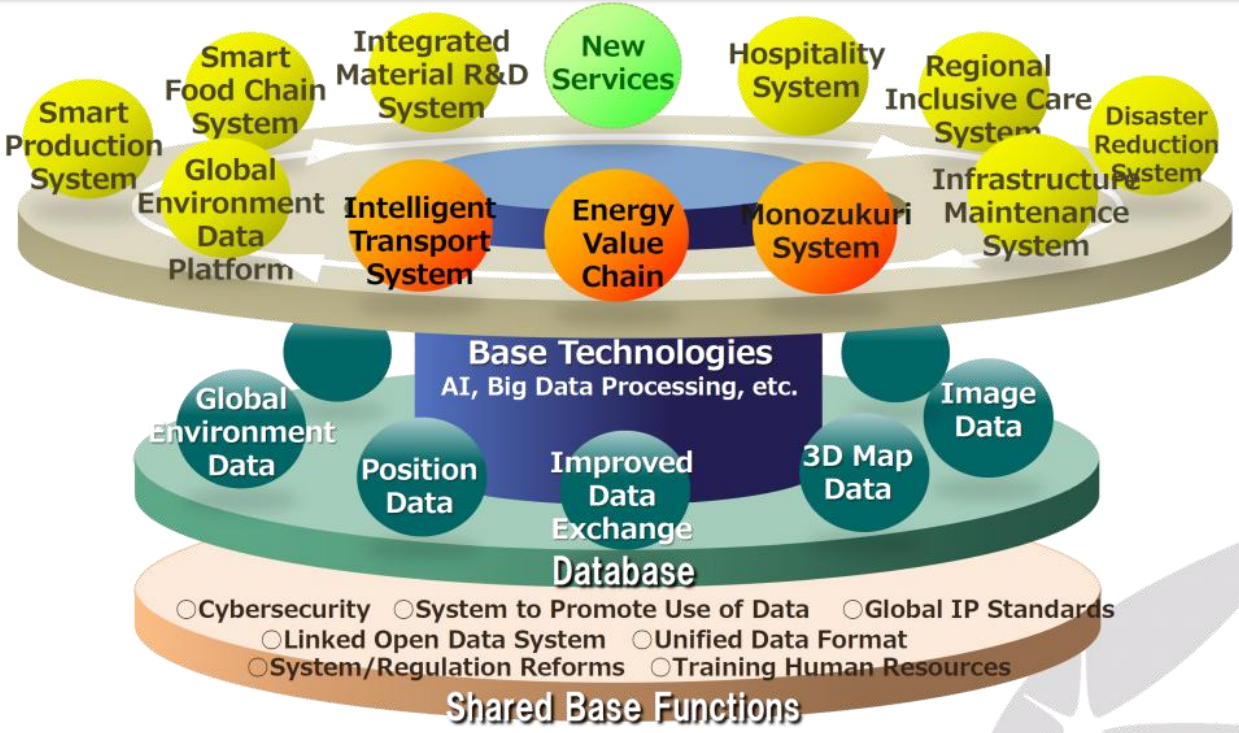
- innovation-driven growth of economy
- creation of new social/community services
- cross-domain usage of data in data-centric platform





Society 5.0 Data-centric Platform

Cross domain data utilization as key enabler of Society 5.0



Source: Harayama, Y., "600 Trillion Yen GDP Target STI Policies for Moving Toward Society 5.0!," July 2016
http://fpcj.jp/wp/wp-content/uploads/2016/07/f2d3eec7bf7678840f8adf2ca8000b05.pdf

NEC will work to realize innovative services in various industry sectors by cross-domain utilization of data using FIWARE as data-exchange platform

Thank you for your attention

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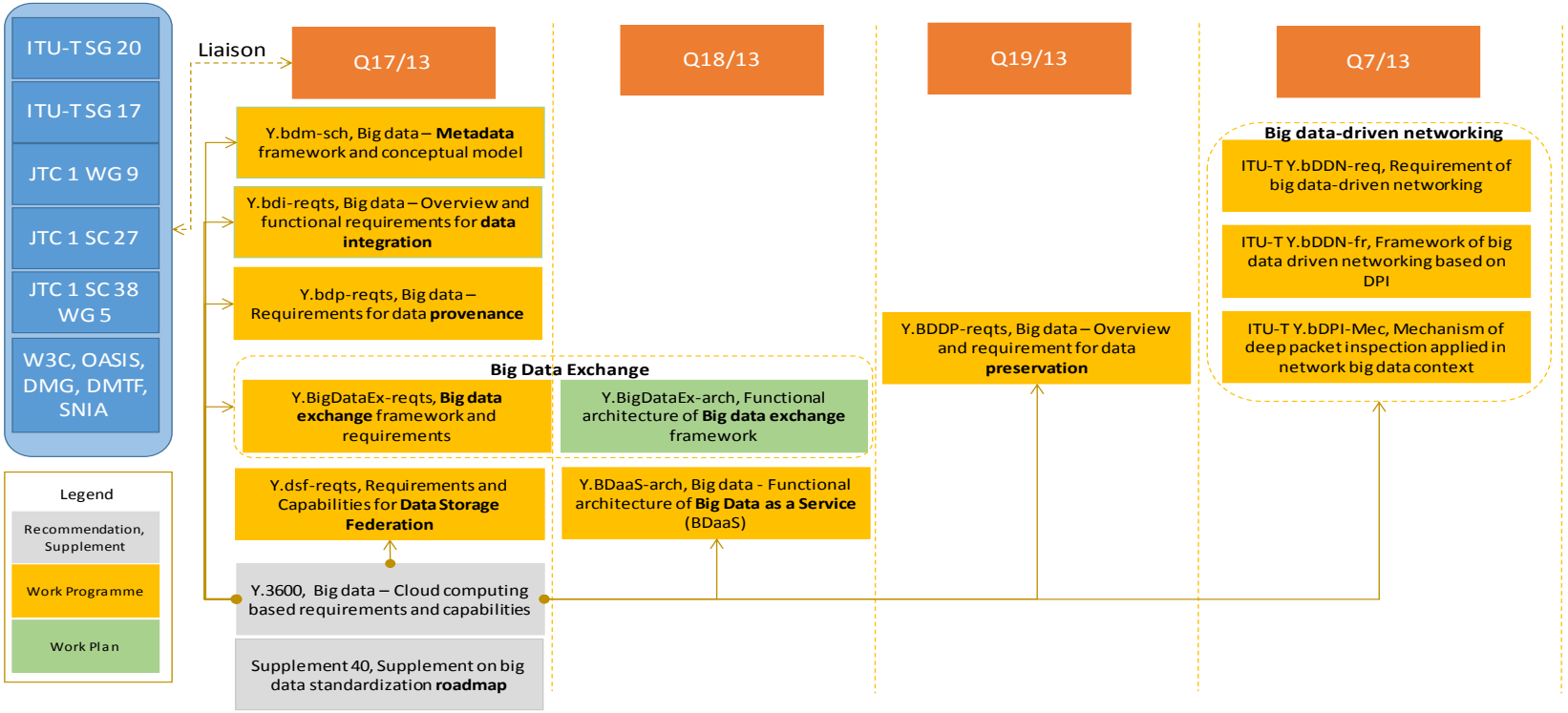
+33 6 64047454

Backup information (out of scope of this presentation)

Some (ONLY SOME) relevant ITU-T activities on Big Data

Big Data related activities in ITU-T SG13 – Feb 2017 status

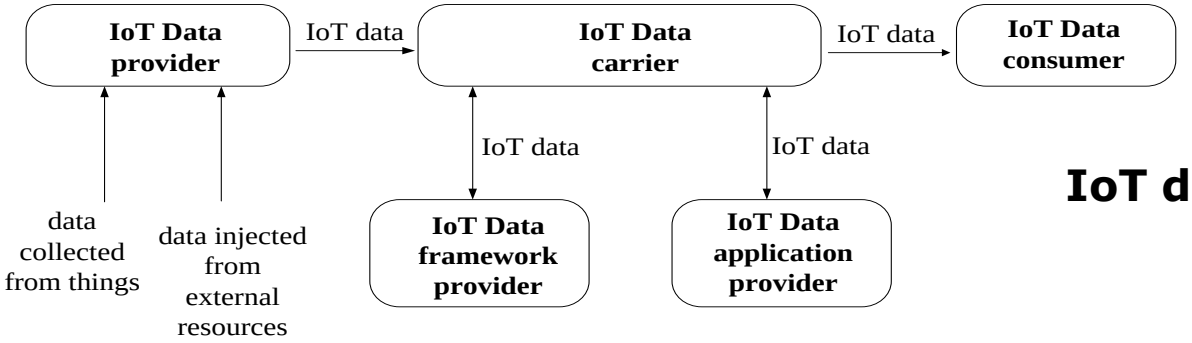


Overall development diagram of big data in ITU-T SG13

ITU-T Y.4114 consented at the March 2017 SG20 meeting

Y.4114 (ex-Y.IoT-BigData-Reqts) "Specific requirements and capabilities of the Internet of Things for Big Data"

- Developed within Q2/20
- It complements the developments on common requirements and functional framework of the IoT [ITU-T Y.2066] [ITU-T Y.2068] in terms of the specific requirements and capabilities that the IoT is expected to support in order to address the challenges related to Big Data
- A basis for further standardization work (e.g. functional entities, APIs and protocols) concerning Big Data in the IoT



IoT data roles

ITU-T FG DPM – created at the March 2017 SG20 meeting

ITU-T Focus Group on "Data Processing and Management to support IoT and Smart Cities & Communities"

- To study and survey existing technologies, platforms, guidelines and standards for data processing and management including data format and meta-data in support of the mandate of SG20
- To promote establishment of data management frameworks
- To study security and trust within data management frameworks, to study data protection techniques
- To facilitate cross-cutting data interoperability
- To investigate emerging technologies and trends to support data management including blockchain
- To identify challenges in the standardization activities for data processing and management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