



IDEASFORUM
Powered by people

TOGETHER. WE SHAPE. AND IMPROVE.



WE ARE THE FORUM

Based in **Monheim am Rhein**, the **IDEASFORUM** is an innovation hub that brings together **Civil Society** and **Technology**. The core values we build on are an **Open Source Culture** and strong collaboration.

1

(VIRTUAL) COLLABORATION-PLACE

We bring science, economy and society together.

2

DIGITAL DIVERSITY

We value and consider all different approaches and best practices.

3

SANDBOX PLAYGROUND

We foster virtual test environments for real-life validation of digital solutions

COMPETENCE CENTER

Living the Open Source
Culture

Smart
Cities

Smart
Energy

Smart
Mobility

CEF
Building
Blocks

Sociological & Economic Research

WE, A FIWARE IHUB

- FIWARE iHubs focus on building local communities
- Cooperation can be built both at regional and global level
- Authorities, entrepreneurs and developers jointly design innovation and digitisation journeys
- A door to open source technologies, collaborative design and development
- A way to identify technologies, tools and solutions for your challenges of today and tomorrow

If you knock on the door of a FIWARE iHub with an idea, you can be sure that you will not leave empty-handed. Rather, you will be walking with a way forward.



WHO JOINED US

Digital Energy
Strategies



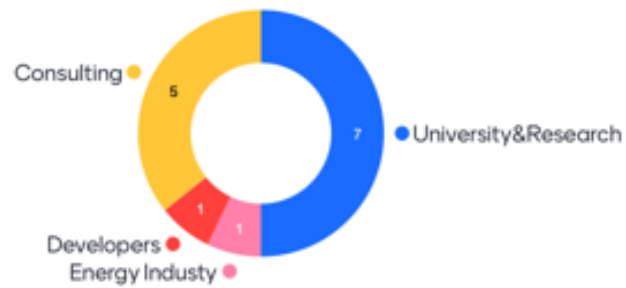
We will use Mentimeter for some interaction

- Go to **www.menti.com** and use the code **34 05 52 3**

Go to www.menti.com and use the code 34 05 52 3

Which industry are you in?

Mentimeter



The Use of FIWARE Generic Enablers in Smart Energy Applications

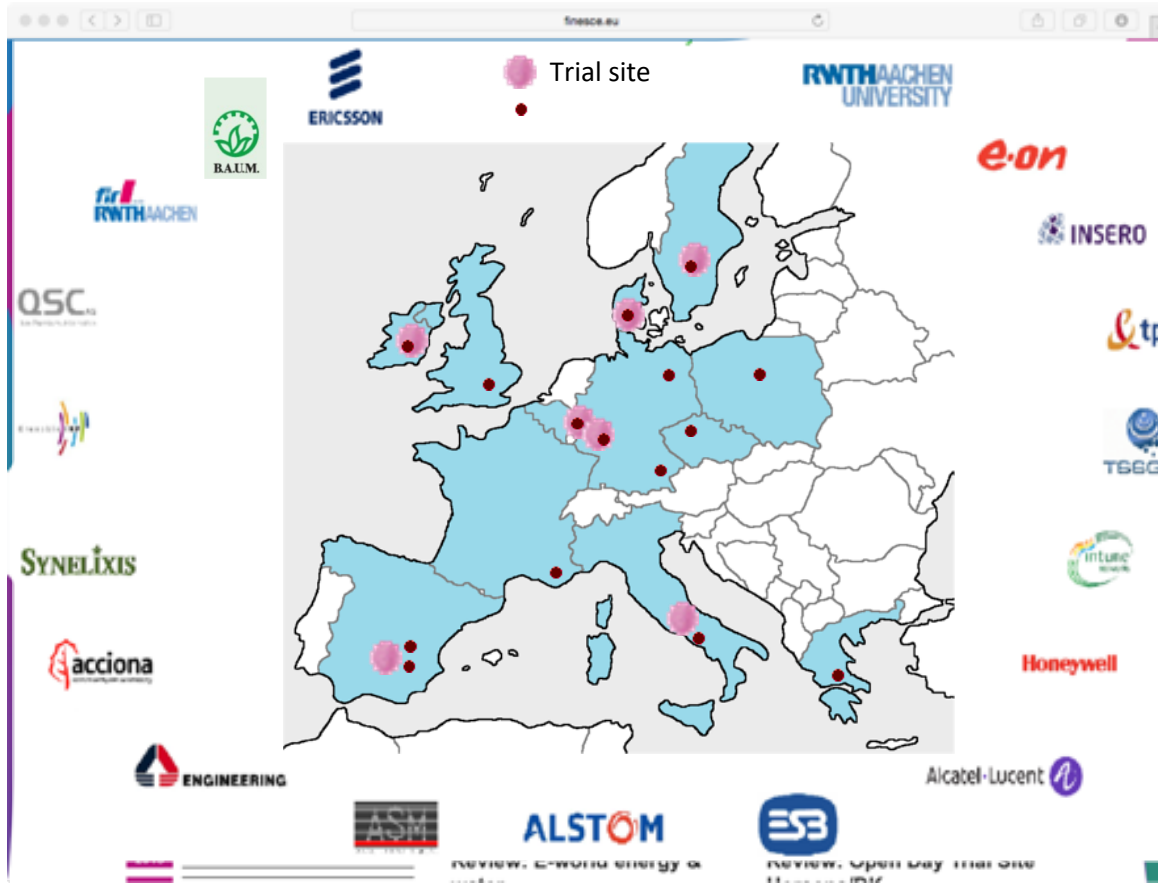


IDEASFORUM
Powered by people

ACS | Automation of Complex
Power Systems



RWTHAACHEN
UNIVERSITY



FIWARE and its catalogue



Welcome to the FIWARE Catalogue! Here you will find all the information, documentation and tools you need as a developer to start using a Generic Enabler implementation.

About the Catalogue



The FIWARE Catalogue is the central repository for implementations of Generic Enablers (GE) that are part of the FIWARE platform. Apart from the Generic Enablers, you will also find tools and best practices which will help you develop the applications of the Future Internet.

View the Enablers



No registration is necessary, simply start browsing the list of Generic Enabler implementations to see for yourself what the FIWARE platform offers.

[View Generic Enabler Implementations](#)

Tools



FIWARE offers tailor-made tools for developing applications for the Future Internet. Whether it be custom Eclipse plug-ins, software testing suites or guidelines and best practices, make sure you will find what you need.

[See the Tools](#)

Publishing a Generic Enabler



Anyone is free to create an implementation of a Generic

The FIWARE Platform



FIWARE will deliver a novel service infrastructure, building

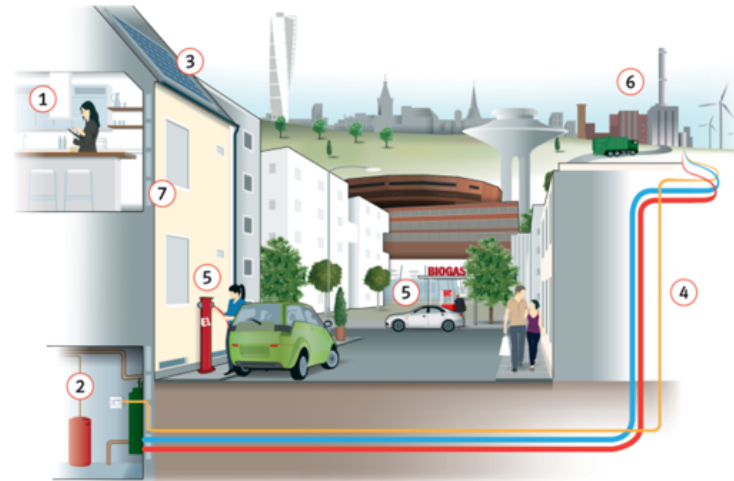


- Several hundreds members in the foundation
- More than 100 cities committed to FIWARE around the world
- Many cities also in Germany are now going in this direction



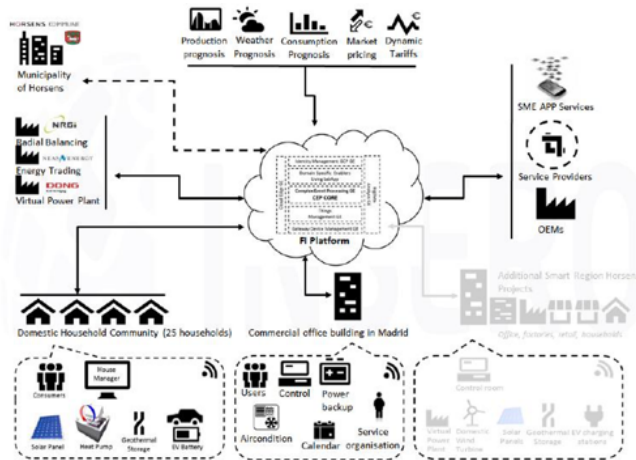
- ETSI recognized some FIWARE Key blocks as european standards
- The European Commission selected a FIWARE component in the list of key building blocks for „Connecting European Facility“ (CEF) Program

- Large demonstration implemented in the city of Malmö
- Optimization of supply and demand across different energy carriers, such as electricity, heat and cooling
- Mix of building types
- Proof of concept of distributed energy management (in individual buildings and apartments) and centralised portfolio management (overall)



FI-based Smart Village

- A full village in Denmark has been upgraded to be a Smart Village with a goal of full CO2 free operation
- Great customer involvement
- Time to Market unbelievable short thanks to the FIWARE concept

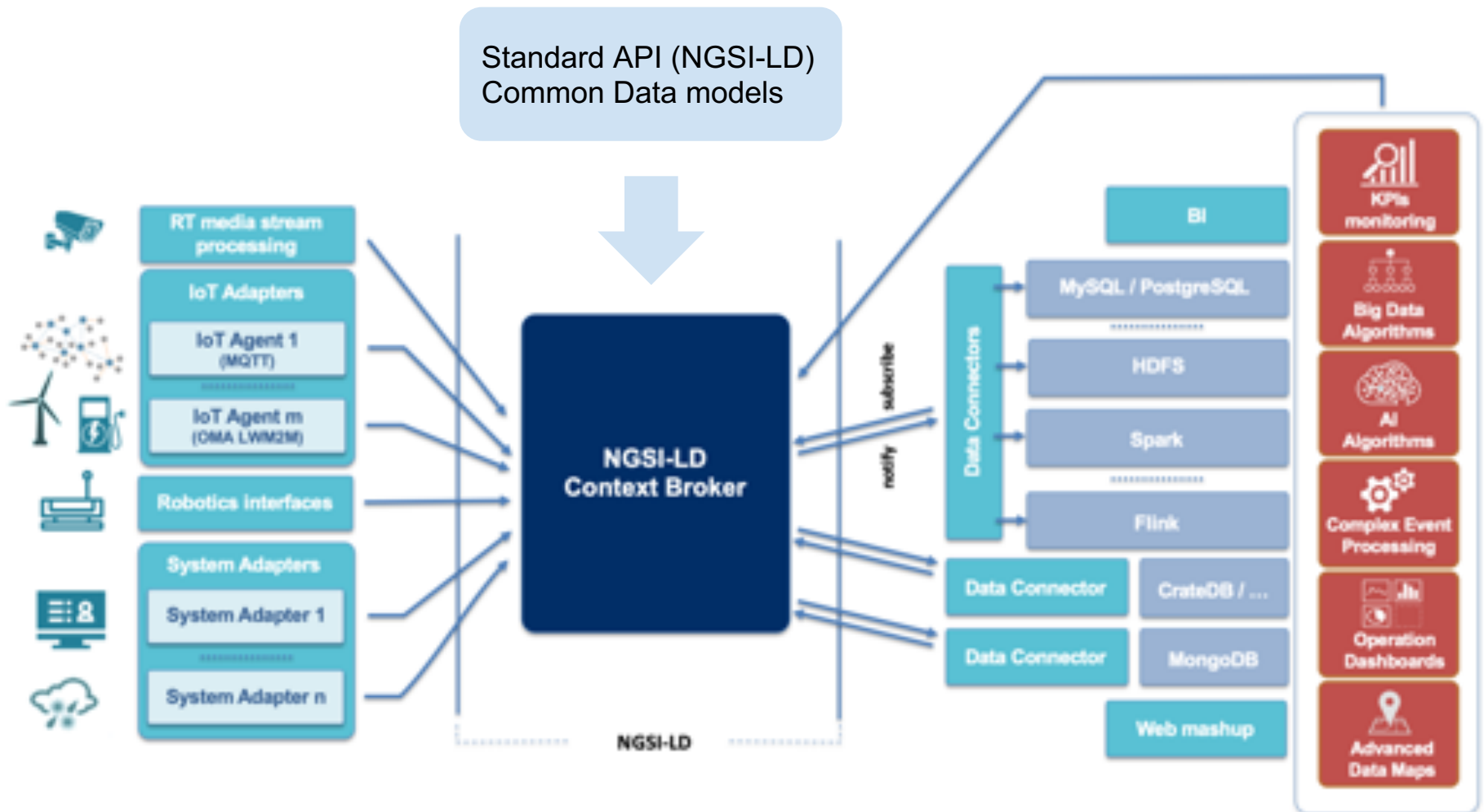


Go to www.menti.com and use the code 34 05 52 3

Have you already used FiWare software?

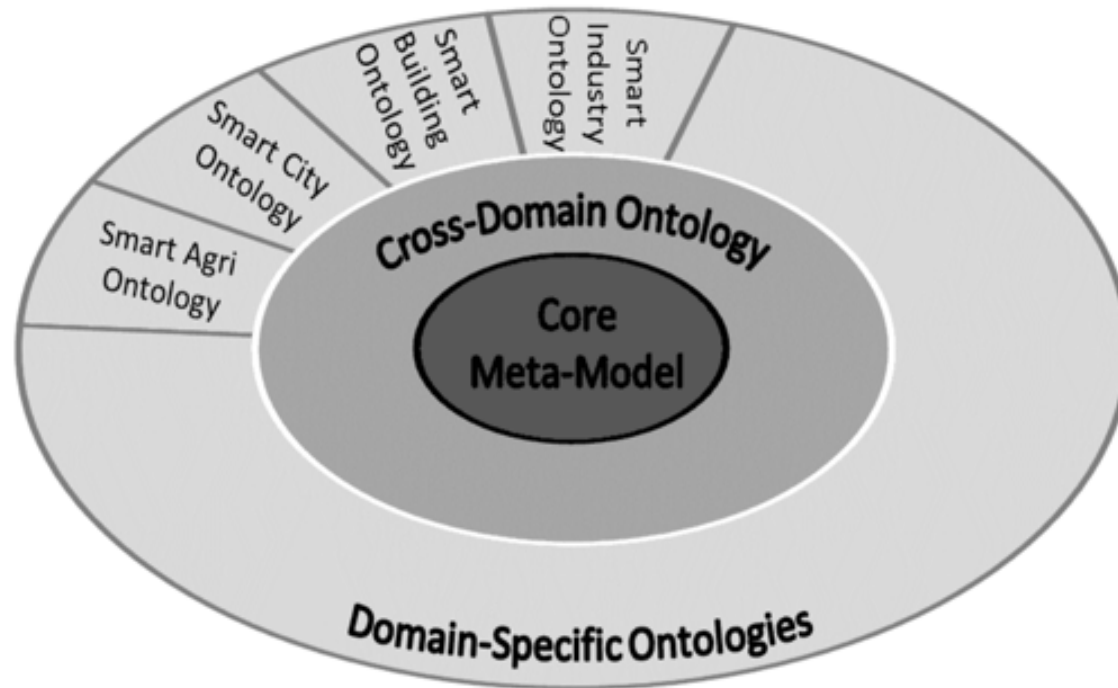
Mentimeter





NGSI-LD:

- Core Meta-Model
- Cross-Domain Ontology
- Domain-Specific Ontologies



- **Use Cases of FiWare generic enablers in Energy**

- **FiWare adapters - Bridge between Smart Cities and Smart Grids**

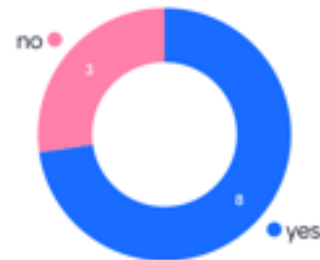
- **Smart Data Models**
 - ≡ <https://github.com/smart-data-models/SmartEnergy>
 - ≡ Include JSON-LD specification for CIM IEC61970, SAREF, IEC61850, etc.

- **Kubernetes Catalogue**
 - ≡ <https://git.rwth-aachen.de/acs/public/catalogue>
 - ≡ Preparing FiWare components for the cloud

Go to www.menti.com and use the code 34 05 52 3

Are you involved in smart grids or smart cities projects?

Mentimeter

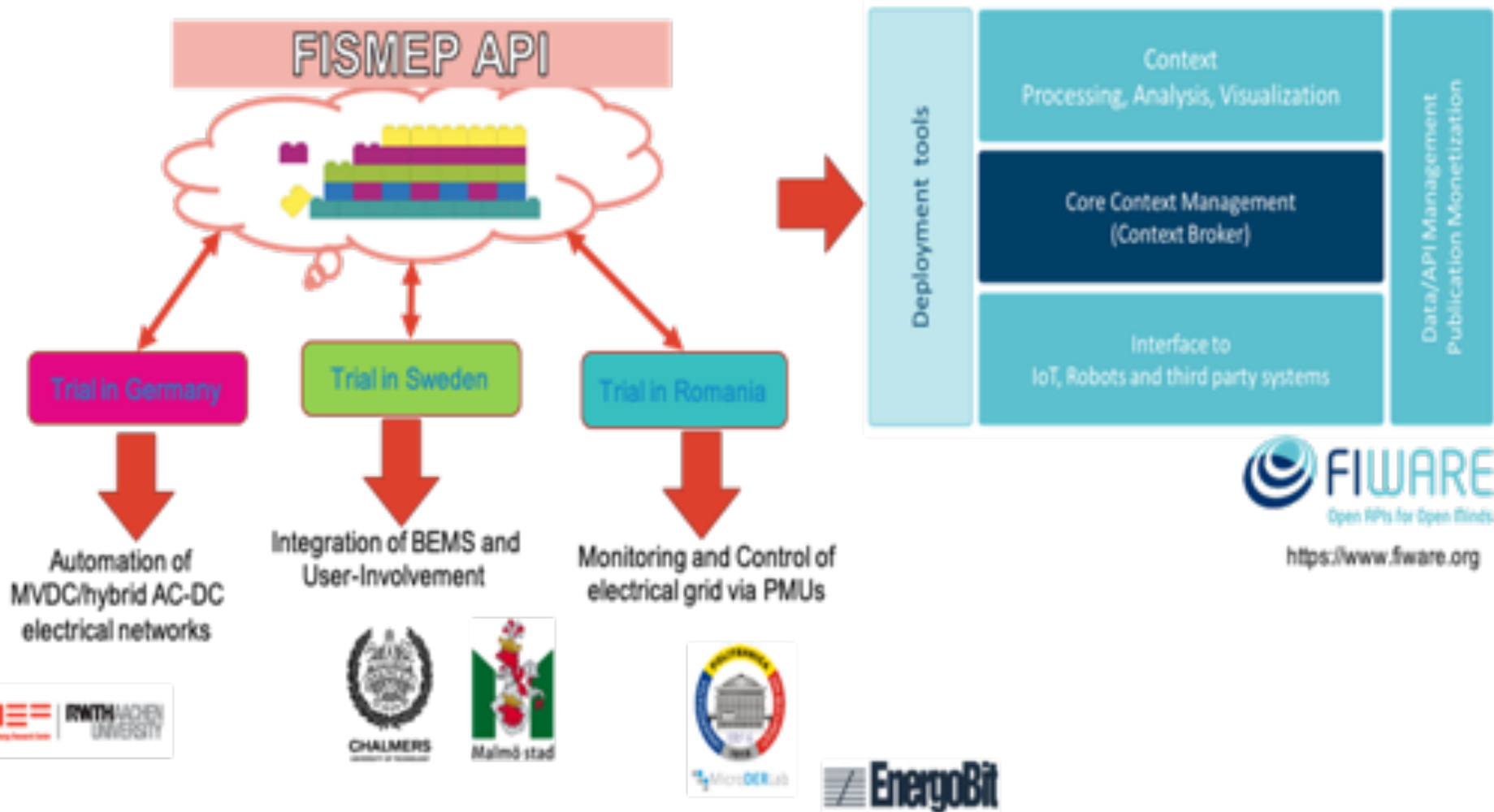


FiWare Use Cases

Name of Speaker

■ **FISMEP** (FIWARE for Smart Energy Platform)

- ≡ An open-source Cloud-based platform
- ≡ Funding in the framework of the joint programming initiative ERA-Net Smart Grids Plus, with support from the European Union's Horizon 2020
- ≡ Started 2017, ended 2020
- ≡ Partners: Sweden, Romania, German
- ≡ <http://fismep.de>

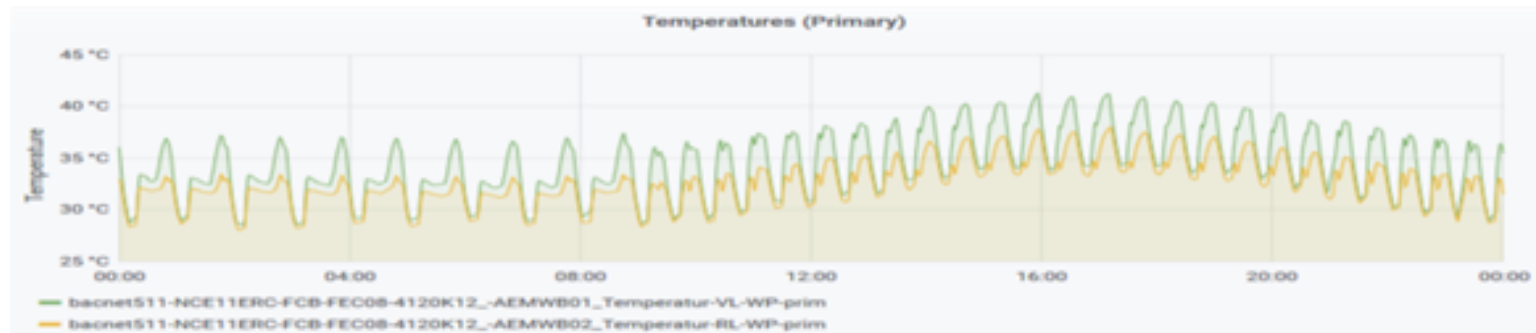
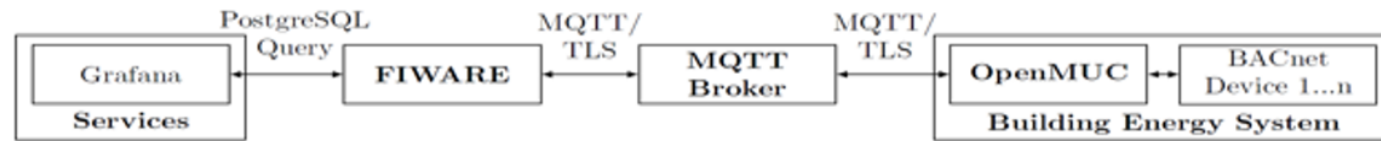
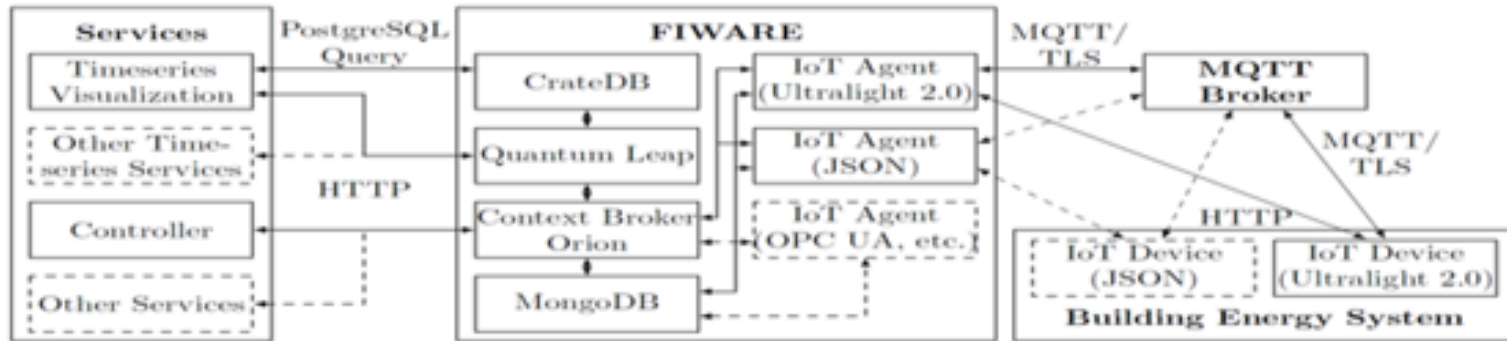


Field Test Sweden: BEMS and User Involvements

- ERO is an app for the residents of HSB Living Lab of Chalmers University (Gothenburg – SE), to plan the energy sources to use and check their access to the electricity and heating systems.
- ERO elaborates the user's activity and gives recommendations about energy usage.



- The smart grid platform CESO enables a digital connection of the customer to E.ON grid.
- CESO focuses on optimizing energy carriers' district heating, district cooling and electricity production and distribution.



Measurements are collected from PMUs according to the specific data model and provided to the FISMEP platform for further analysis and visualization purposes.



PMU STRUCTURE OF DATA

ID: "ID protocol/IP"

Type of the PMU: "Arbiter/SEL/..."

Installation time:

Reporting rate:

Location:

Substation:

Type of Cell:

GPS Coordinate:

Grid information:

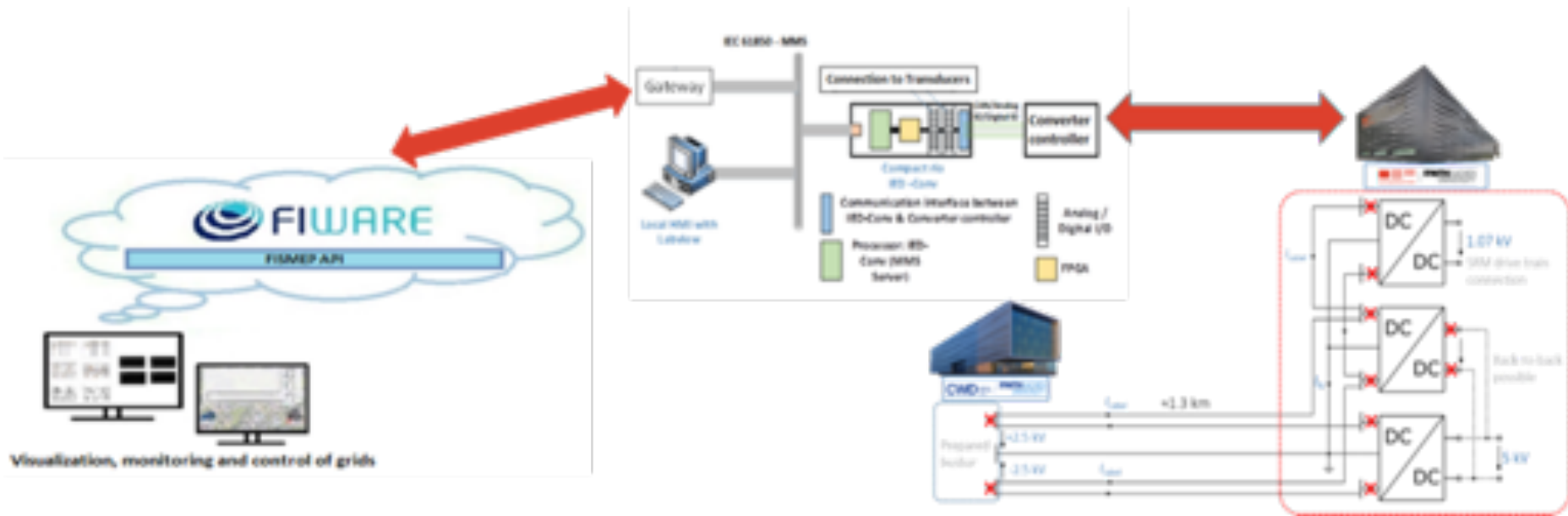
Voltage level

Voltage transformer

Current transformer

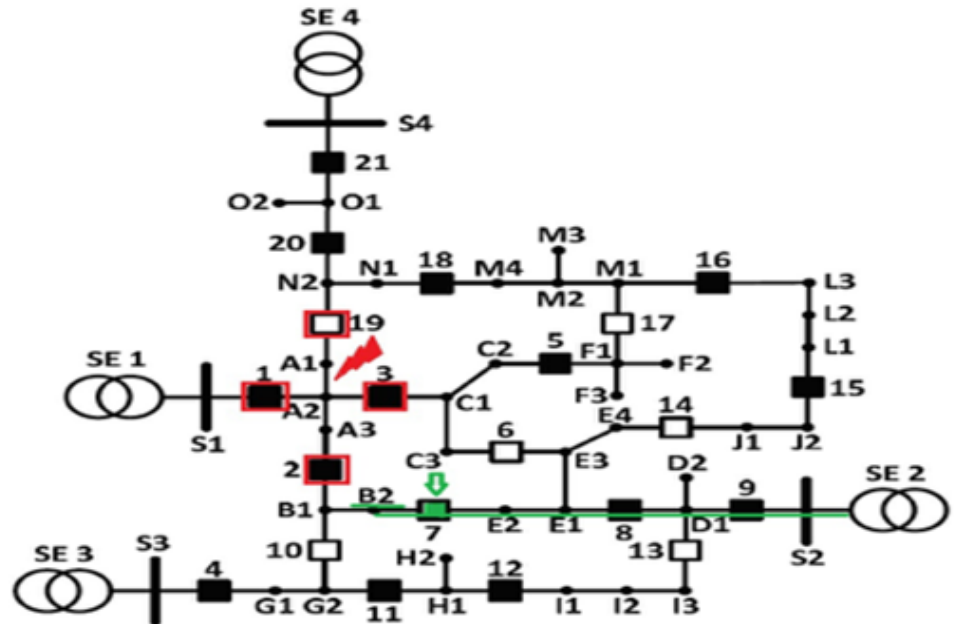
Field Test Germany: DC Grid Automation

- Virtualization of automation architecture for DC Medium Voltage research grid at 5kV, in RWTH Campus.
- The measurements from field devices, transducers and converter controllers are collected with IED and transport with MQTT.
- This use-case monitors and manages the network.



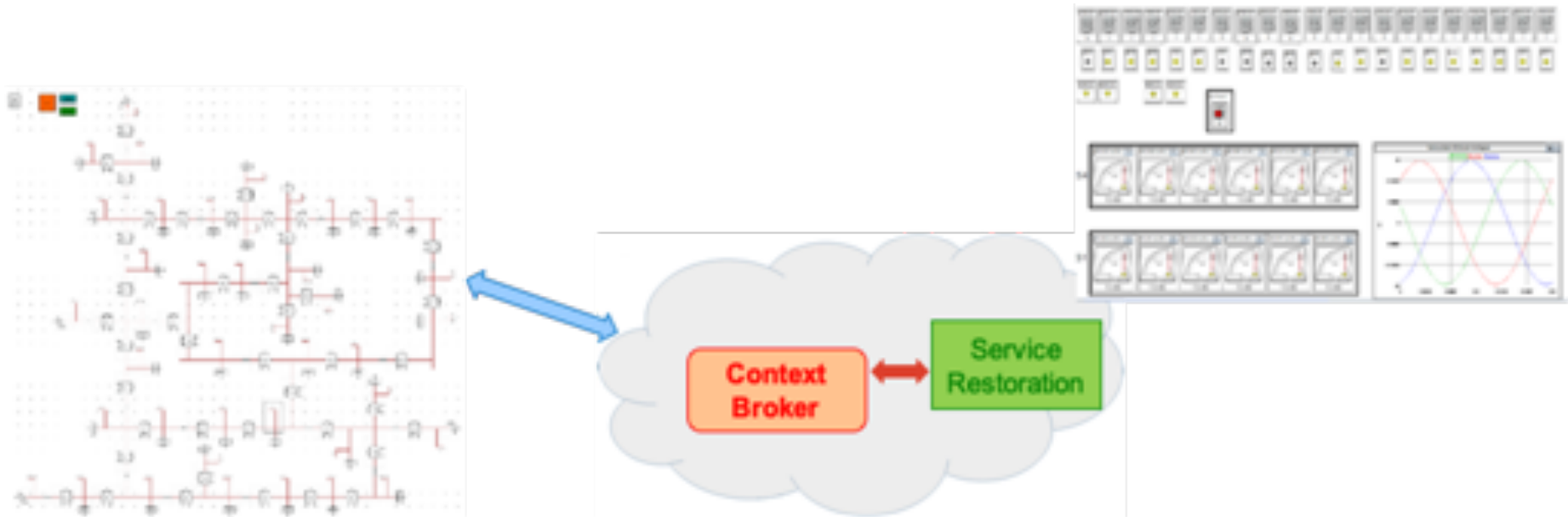
Concept:

- In case of fault on electrical grid, the protection system opens the circuit breakers upstream and downstream the fault location.
- Since the distribution grid is radial, the load downstream the faulted area are not more energized.
- Which is the normally open switch that has to be closed in order to restore the power?



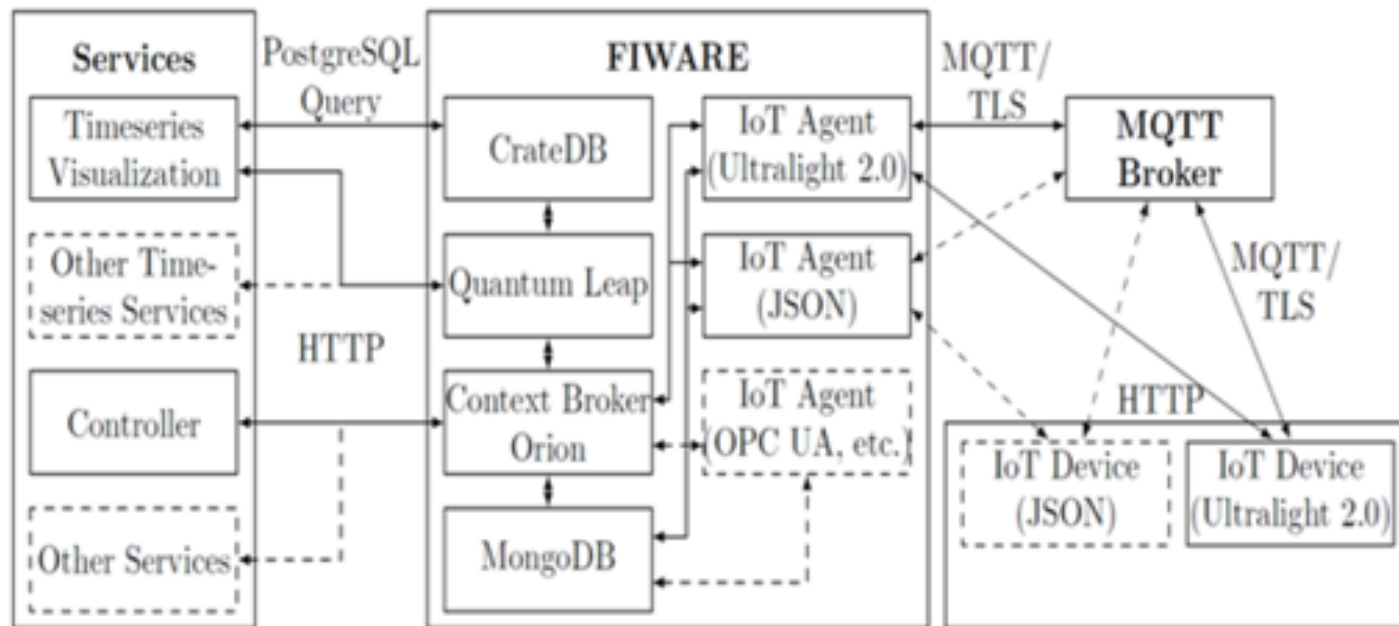
Field Test Germany: Service Restoration

- The MV Distributed Grid has been modeled with Real Time Digital Simulator (RTDS) : switches status and active/reactive power injections data are updated in real time in the Context Broker.
- The optional solution to re-energize the disconnected loads is provided to RTDS.
- This algorithm is implemented as a web service



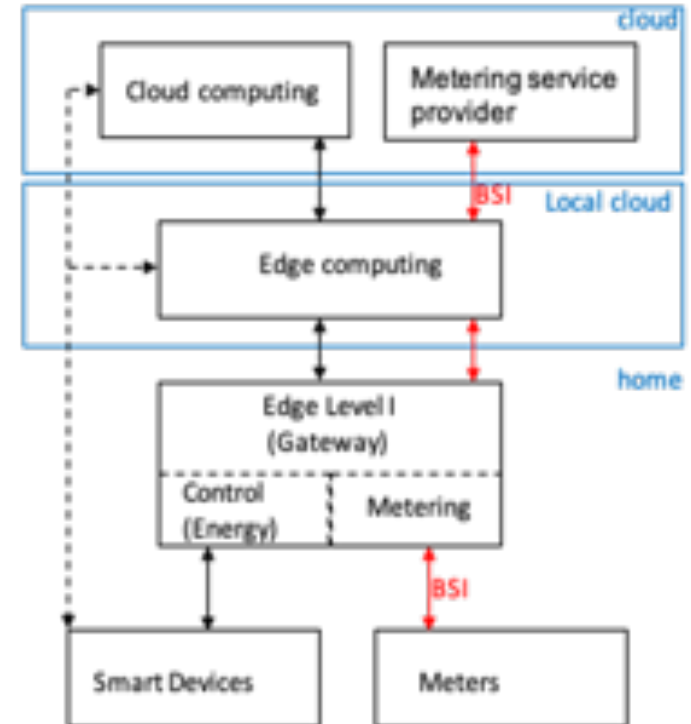
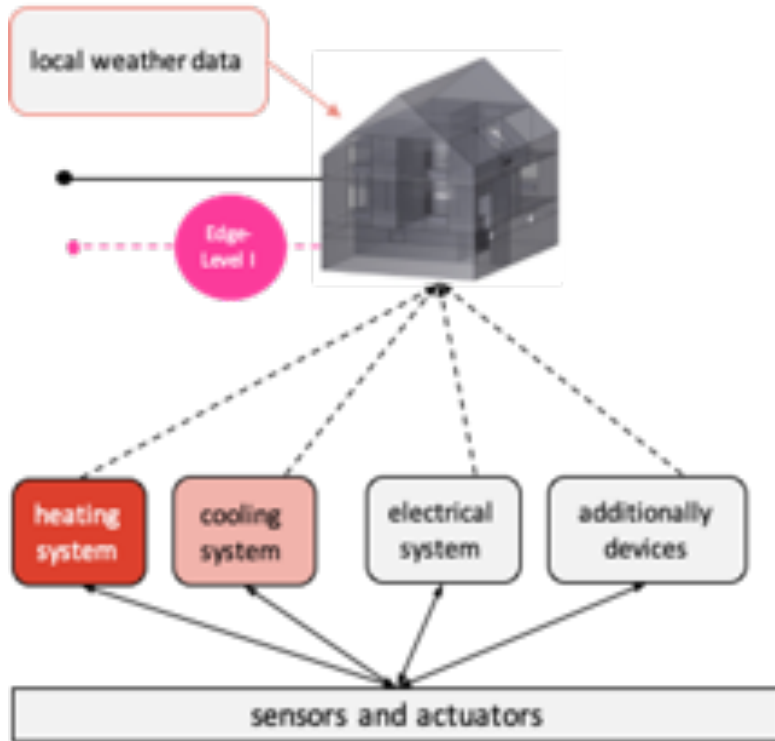
FISMEP Distributed Architecture

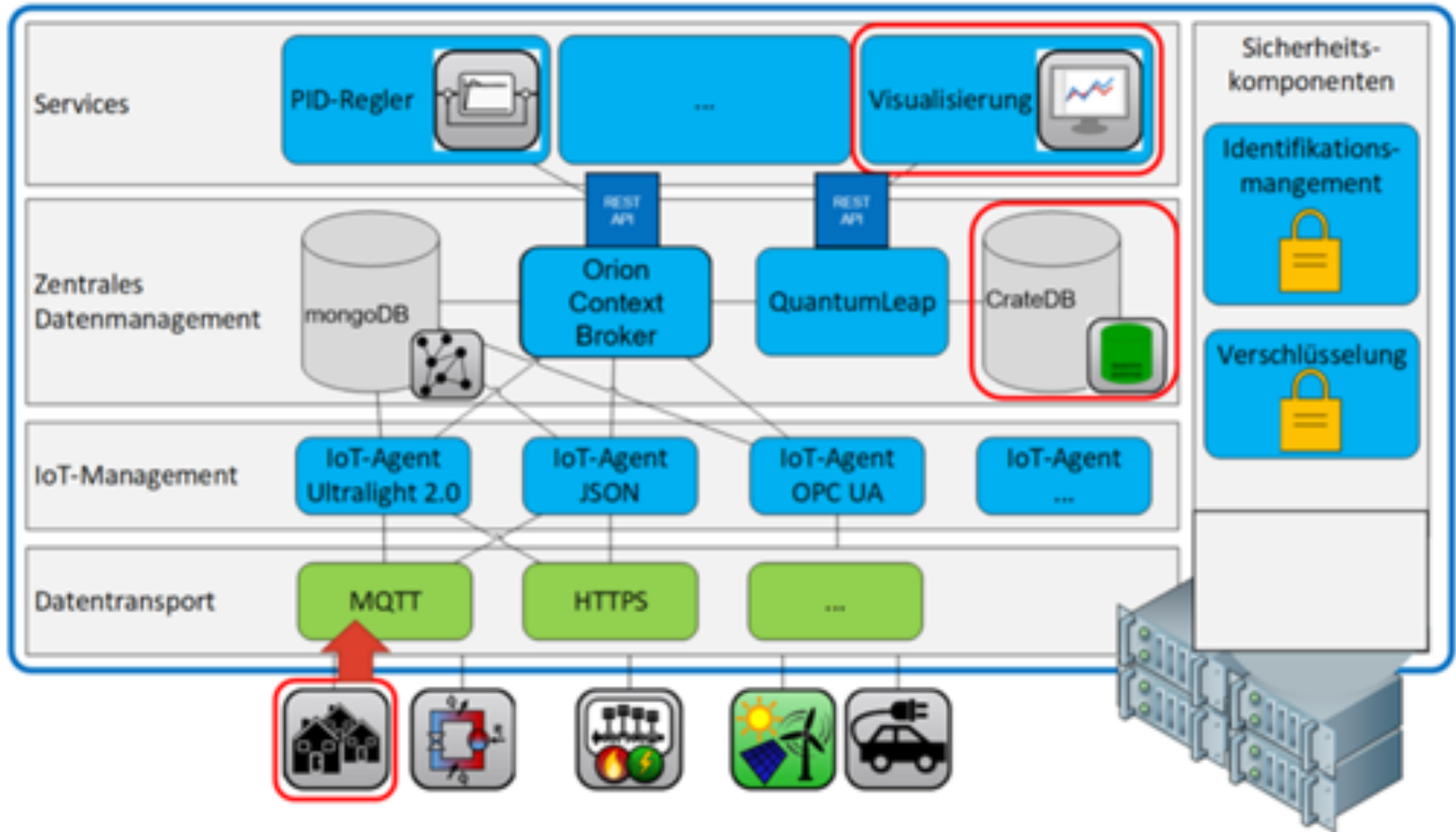
- Feasibility of a FIWARE powered platform for energy domain
- Sector coupling
- Integration of a new services for different energy sources



- **N5GEH** (National 5G Energy Hub)
 - ≡ An open-source Cloud-based platform
 - ≡ A German Funded project
 - ≡ Started 2018, ended 2028
 - ≡ Partners: TU Dresden University, RWTH Aachen University
 - ≡ <https://n5geh.com>

Subsystem Building





n

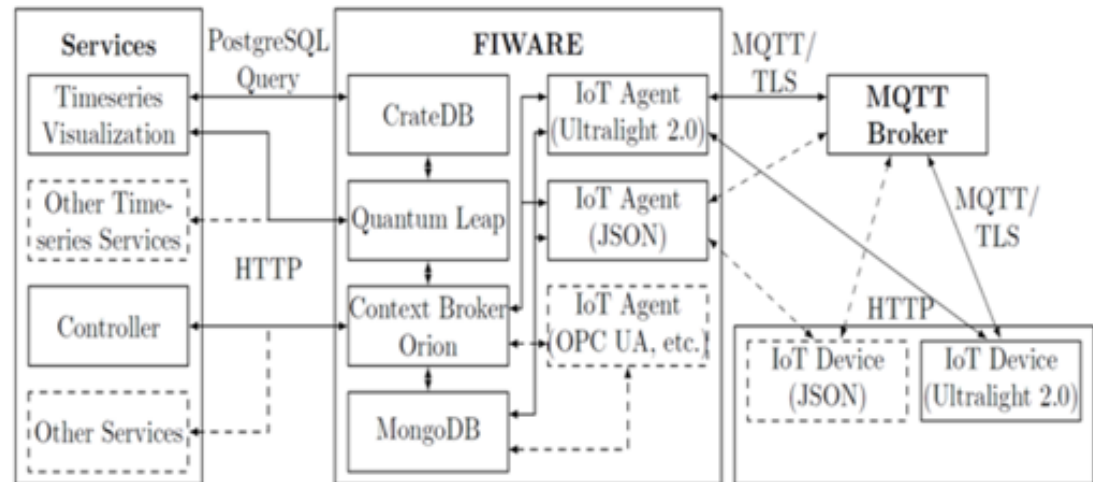
General Requirements Analysis

■ General Blocks

- ≡ To manage IoT devices -> IoT Agent
 - = Grouping
 - = Securing
 - = Provisioning
- ≡ To manage context information
 - = Orion
 - = Orion-LD
- ≡ To analyse historical data
 - = CrateDB
 - = Quantum Leap
- ≡ To visualize the data
 - = Grafana

■ Energy specific blocks

- ≡ FLISR
- ≡ PMU data visualization
- ≡ ERO: BEM with user involvement



Go to www.menti.com and use the code 34 05 52 3

What are your key take aways from the use cases presented?

 Mentimeter



From Smart Cities to Smart Grids



Towards a concept of service-oriented grid management

*Prof. Antonello Monti
RWTH Aachen University*

SOGNO services ingredients

SENSORS AND MEASUREMENTS



LoCo PMU
A-PMU

CLOUD VIRTUALIZATION OF SUBSTATION INTELLIGENCE



ViSA
(SE, PC, PQ,
FLISR and LGP
services)

5G WIRELESS COMMUNICATION



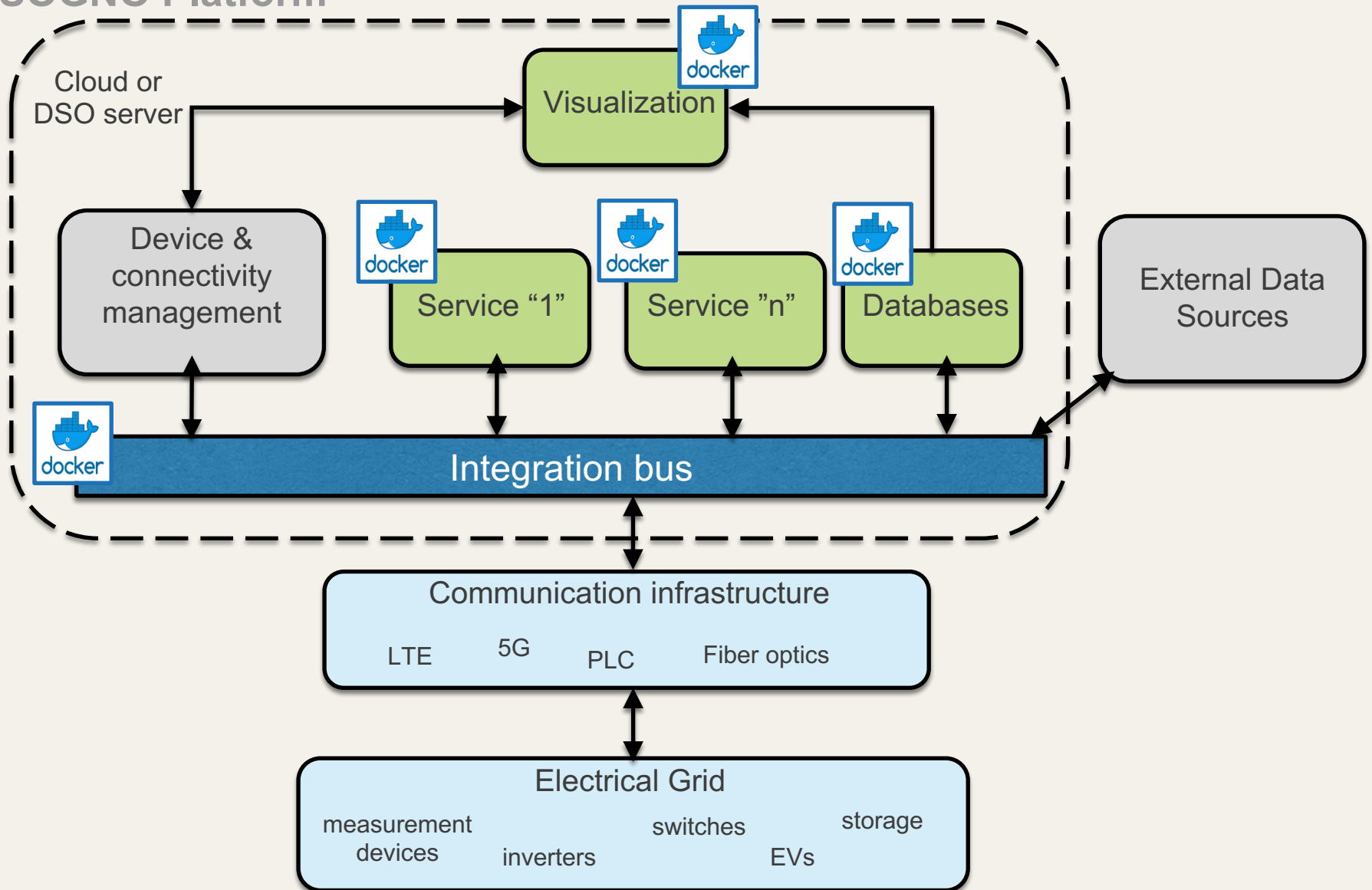
Lab tests with
Ericsson BS
SDRs

DATA ANALYTICS BASED ON DEEP LEARNING



SE, FLISR and
LGP services
using machine
learning

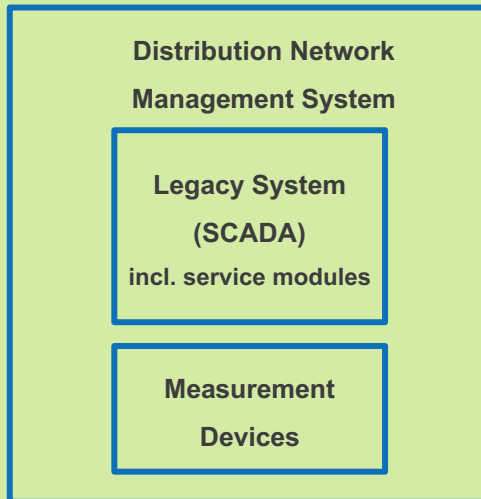
SOGNO Platform



Disruptive changes spurred by the SOGNO Solution

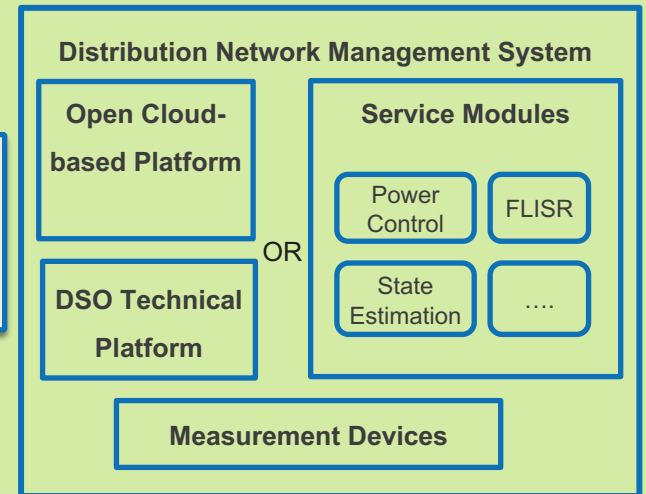
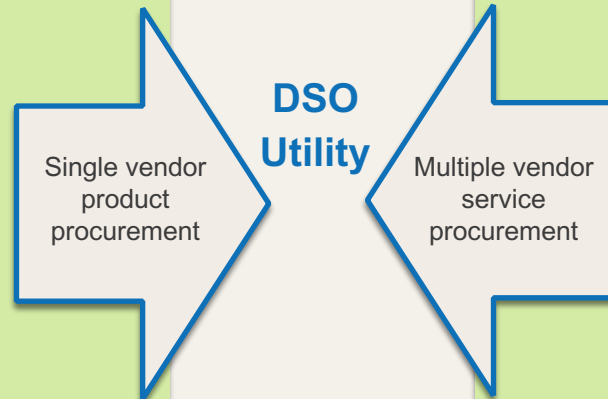
Conventional approach

- Access to system automation and awareness functions through installation of monolithic software to an existing SCADA system
- Centralised product procurement from one of few established ADMS providers



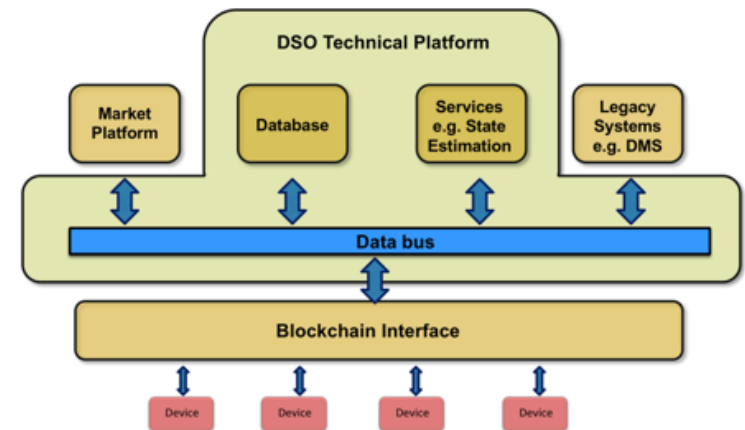
SOGNO-trialed approach

- Flexible access to system automation and awareness functions via remotely- or self-hosted IOT platforms
- Decentralised service procurement from one or more providers without vendor lock-in
- **Multiple** algorithm implementers & **Multiple** suppliers of measurement devices

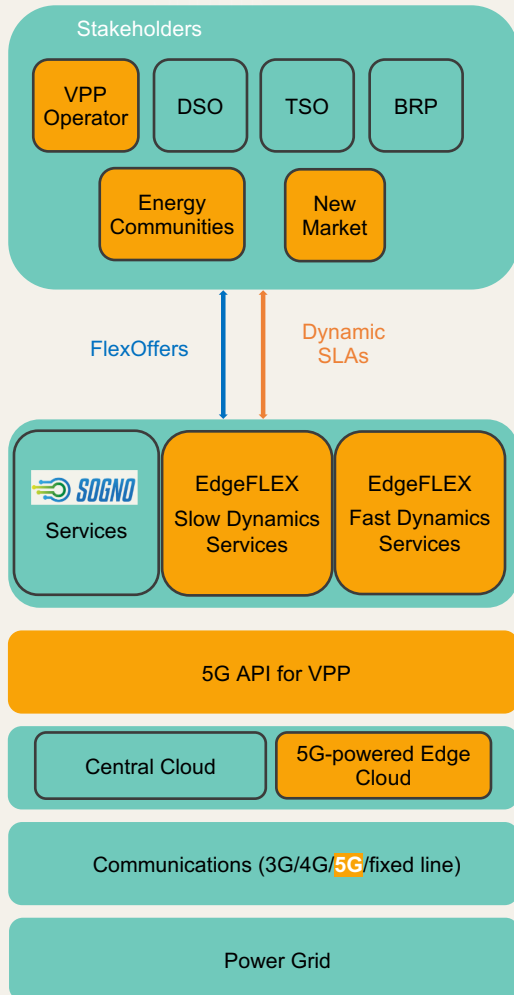


Putting all together to overcome limits of legacy solutions

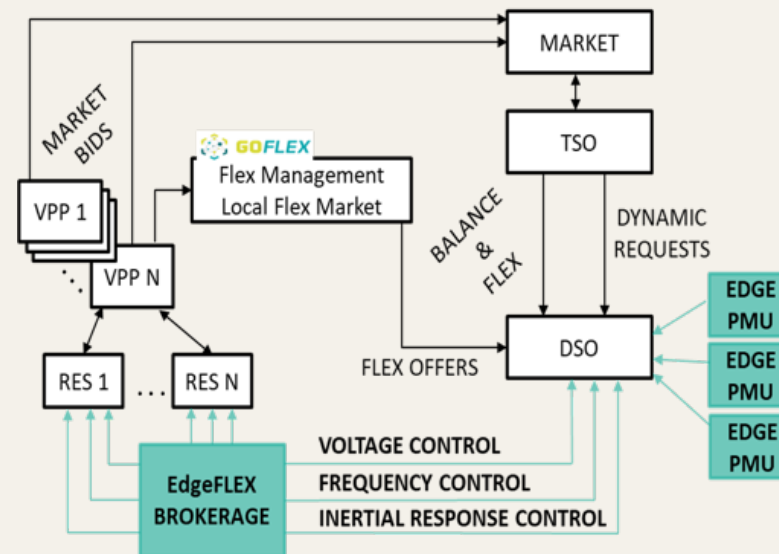
- Combining the solutions envisioned in the previous architecture, here we have:
 - Secure data link thanks to blockchain
 - Integration of legacy DMS
 - Link to market for dual use of data
 - Integrated data bus for flexible integration of new services



Extension of SOGNO platform in EdgeFLEX

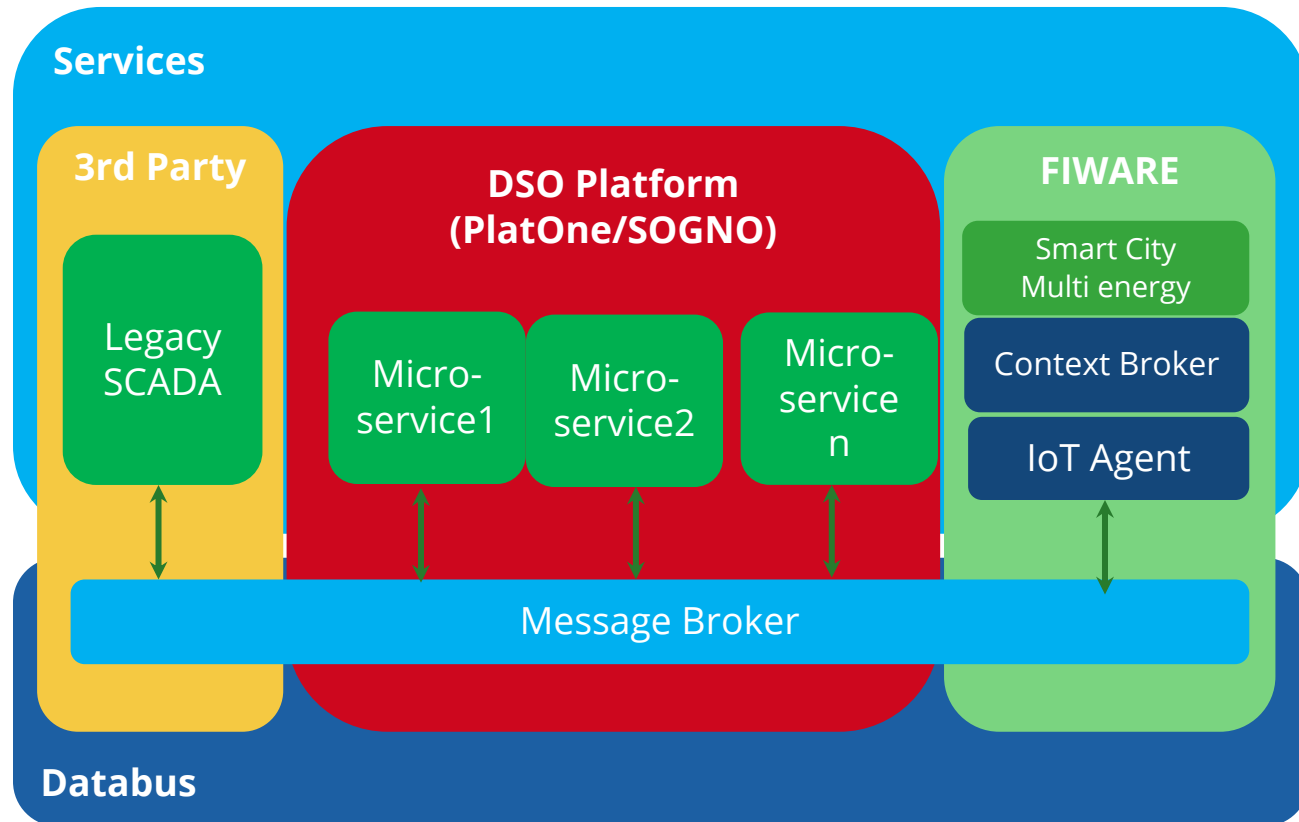


- Building upon SOGNO platform architecture, EdgeFLEX will extend the stakeholders' group, especially aiming at **Virtual Power Plants** and **Energy Communities**.
- EdgeFLEX will enable **Slow and Fast dynamics services**
 - Phasor-driven Voltage Control
 - Frequency Control
 - Inertia Provision
 - VPP assets optimization
- EdgeFLEX will foster a **local energy and flexibility market** where all involved actors will contribute to actively manage and operate the power grid



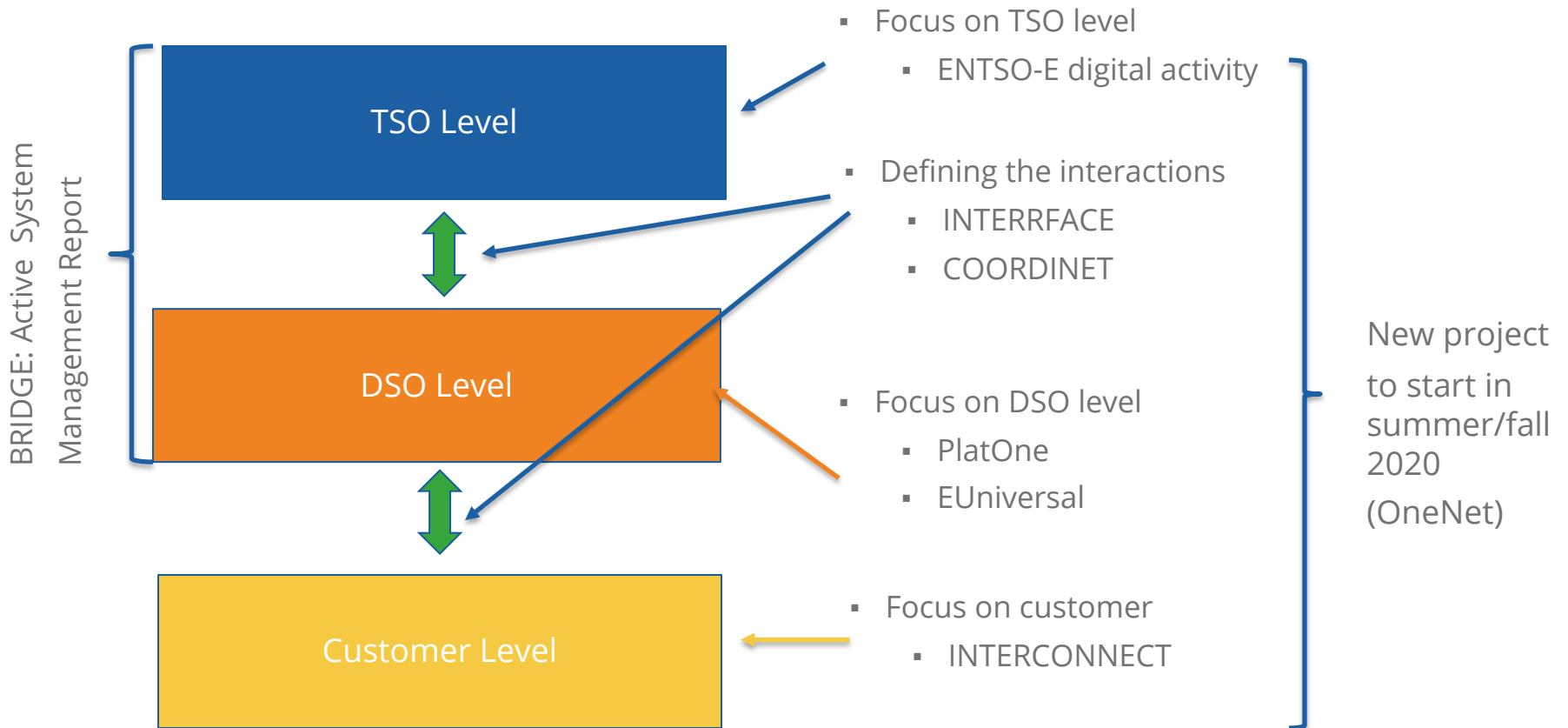
Going across sectors

- To support sector coupling and to go also in the Smart City direction, it is necessary to open energy platforms even further
- FIWARE offers a perfect solution to break the sylos and bring data together





Building the big picture



OneNet - Motivation and Objects

Motivation:

- electrical grid is moving from being a fully centralized to a highly decentralized system
- grid operators have to change their operative business to accommodate for faster reactions and adaptive exploitation of flexibility

Objects

- **Definition of a common market design for Europe**
 - standardized products and key parameters for grid services
 - Coordination among actors involving prequalification, procurement, activation and settlement
 - the settlement process for payment related to these services
 - simultaneous procurement of these services by a TSO and a DSO from assets in the connected both in the TSO and DSO network;
- **Definition of a common IT Architecture and common IT Interfaces**
 - Create an architecture as platform of platforms that fits the market requirements
 - Define a set of architectures that support the links among the platforms
 - Define appropriate approaches to data modeling for interoperability
 - Build on the available open solutions to facilitate market uptake
- **Demonstrate the previous points in system relevant demos**

Fact Sheet

▪ Begin:	01.10.2020
▪ Duration:	36 Month
▪ Contribution:	~30 Mio. €
▪ Partners:>70	
▪ Coordinator:	FIT (A. Monti)

Go to www.menti.com and use the code 34 05 52 3

Start sending your questions for the Q&A Session

 Mentimeter

How can I (as a City) contribute and what is my benefit?

can FIWARE support stream data(vedio data)?

Do you think we have the right technological framework to integrate local energy communities in our grids?

What are the pros and cons of an open source financial model? Ultimately, some organization will charge for a service in mission-critical applications.

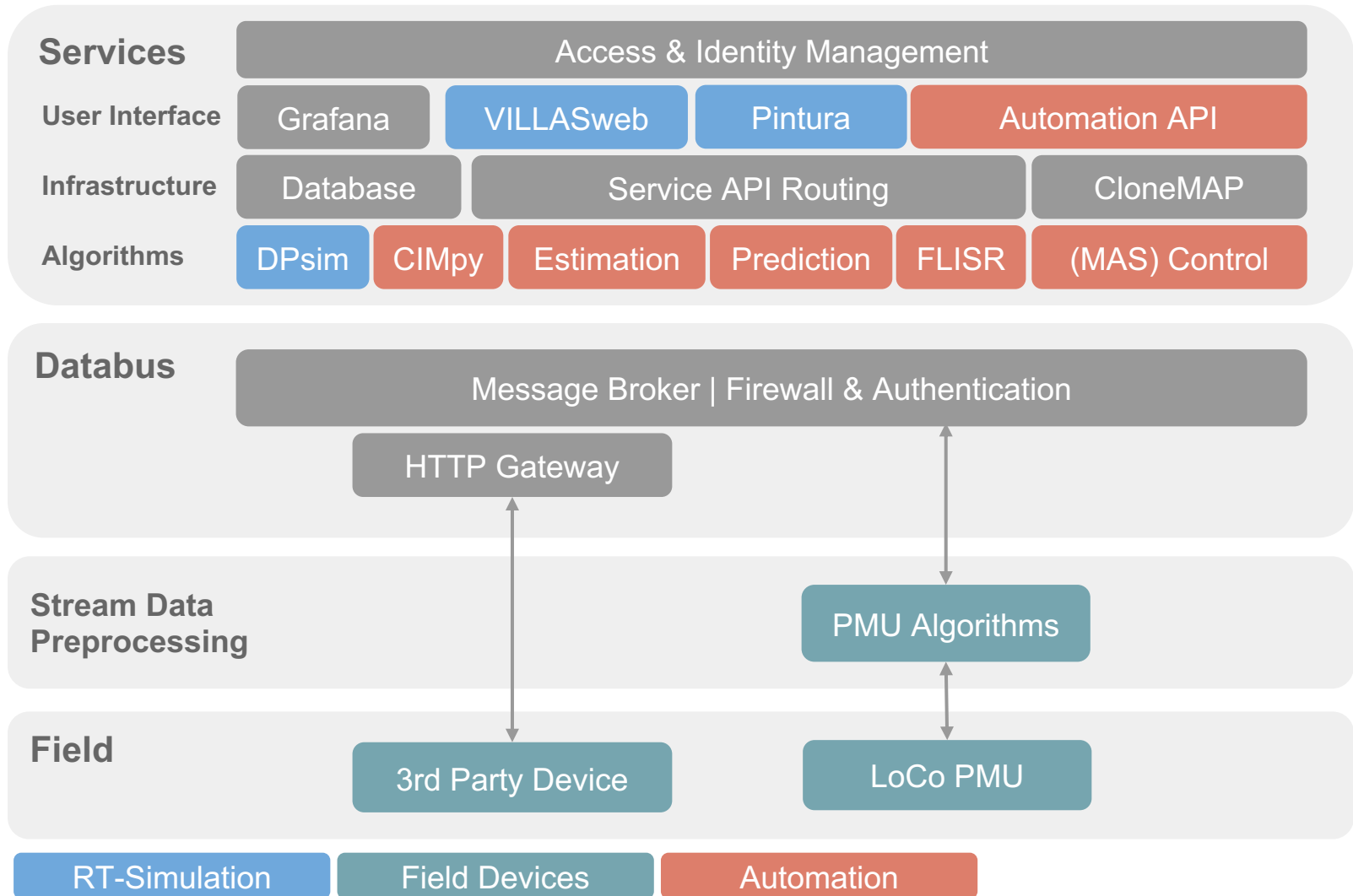
How FIWARE work with blockchain technology to achieve security?

Are any of your implementations dealing with the scenario of having a data marketplace that can handle third party data providers and third party application developers?

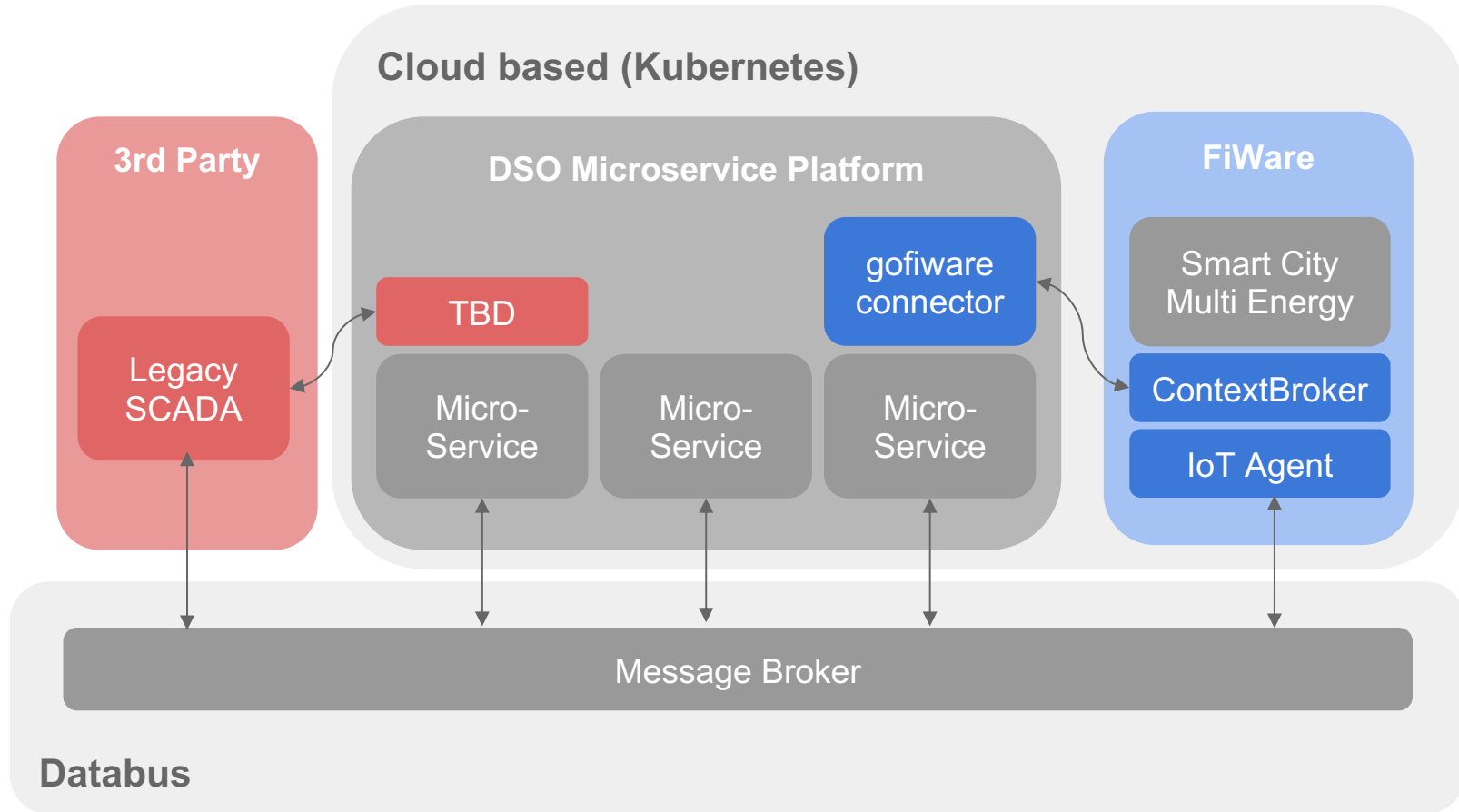
Press ENTER to pause scroll



ACS Platform - Microservices hosted in Kubernetes



ACS Platform - Going across sectors





Contact

E.ON Energy Research Center
Mathieustraße 10
52074 Aachen
Germany

ACS | Automation of Complex
Power Systems



RWTHAACHEN
UNIVERSITY

Go to www.menti.com and use the code 34 05 52 3

Start sending your questions for the Q&A Session

 Mentimeter

How can I (as a City) contribute and what is my benefit?

can FIWARE support stream data(vedio data)?

Do you think we have the right technological framework to integrate local energy communities in our grids?

What are the pros and cons of an open source financial model?
Ultimately, some organization will charge for a service in mission-critical applications.

How FIWARE work with blockchain technology to achieve security?

Are any of your implementations dealing with the scenario of having a data marketplace that can handle third party data providers and third party application developers?

Press ENTER to pause scroll



Closing Remarks

Sven Schuchardt / Cem Sentürk
Co-Founder & Managing Director umagine
GmbH



IDEASFORUM
Powered by people

OUR FUTURE EVENTS

OCT
5



The use of FIWARE Generic enablers in smart energy applications

Online event

Monday, October 5, 2020 at 2:00 PM CEST

OCT
21



Sargon - data models for energy

Online event

Wednesday, October 21, 2020 at 2:00 PM CEST

OCT
28



CIM data models for energy

Online event

Wednesday, October 28, 2020 at 2:00 PM CET

OCT
29



The Philosophy behind a "Urban Mobility platform": Florence and Wolfsburg

Online event

Thursday, October 29, 2020 at 2:00 PM CET

NOV
5



FIWARE and the Smart Data Models Initiative

Online event

Thursday, November 5, 2020 at 2:00 PM CET



Don't we all want to make this world a BETTER PLACE?

Let's JOIN FORCES and work on it!

TOGETHER we can find the way to make it happen!

THANK YOU





www.IDEASFORUM.org



<https://www.facebook.com/IDEASFORUMORG>



@IDEASFORUMORG



<https://www.linkedin.com/company/ideasforum>