



Connecting Robots with IoT using OSGi

European Robotics Forum 2016, Ljubiliana – March 22nd

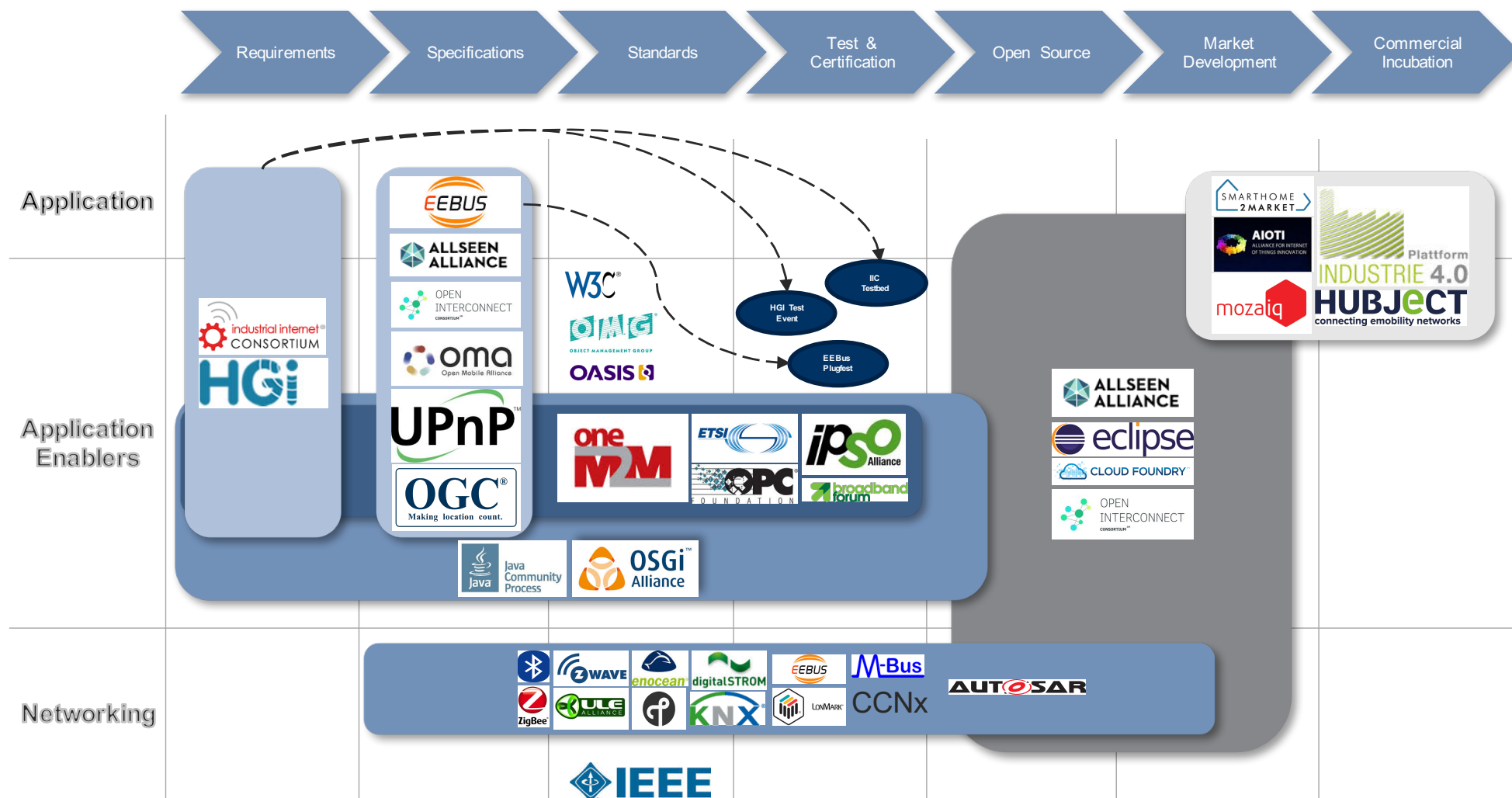
Interoperability in the IoT is hard to achieve

What are the Challenges ?

- **Many domains**
 - Energy, Industry 4.0, Health, etc.
- **Wide range of devices**
 - Starting with simple device like temperature sensors to complex manufacturing machines
- **Many protocols**
 - OPC-UA, ZigBee, Bluetooth, LORA, etc.
- **Many standards**
 - OneM2M, OMA, OSGi, ETSI, ISO, IEEE, etc.
- **No single solution can handle this complexity**
- **Device abstraction can take away only some of the complexity**
- **Complexity is increasing due to the fact that domains (Industry 4.0 and Energy) are merging**

Complexity of the IoT Landscape

Mapping of IoT Industry Alliances



OSGi Alliance

Background

Founded in 1999

**Proven, Mature
Software Architecture**

**Transparent
Development
Process**

**Strategic
Partnerships/
Collaboration**



Global Ecosystem

Best Practices

**Industry & End
User Adoption**

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OSGi Alliance

Members include



What is OSGi ?

Modularity and Services

Modular Software architecture

- Execution environment, APIs, device abstraction
- Application development framework
- Common architecture is applicable to Cloud, Enterprise, M2M & IoT architecture
- Can run locally on one device, all the way through to distributed across 1,000's of servers

Dynamic Service lifecycle enables:

- True 24/7 remote maintenance
- Remote software updates
- Aftermarket sales of upgrades and extensions

Portable and re-usable software modules enable

- Faster time-to-market
- Increased agility and reduced development effort and project risk
- Reduction in maintenance costs
- Ecosystem based solutions

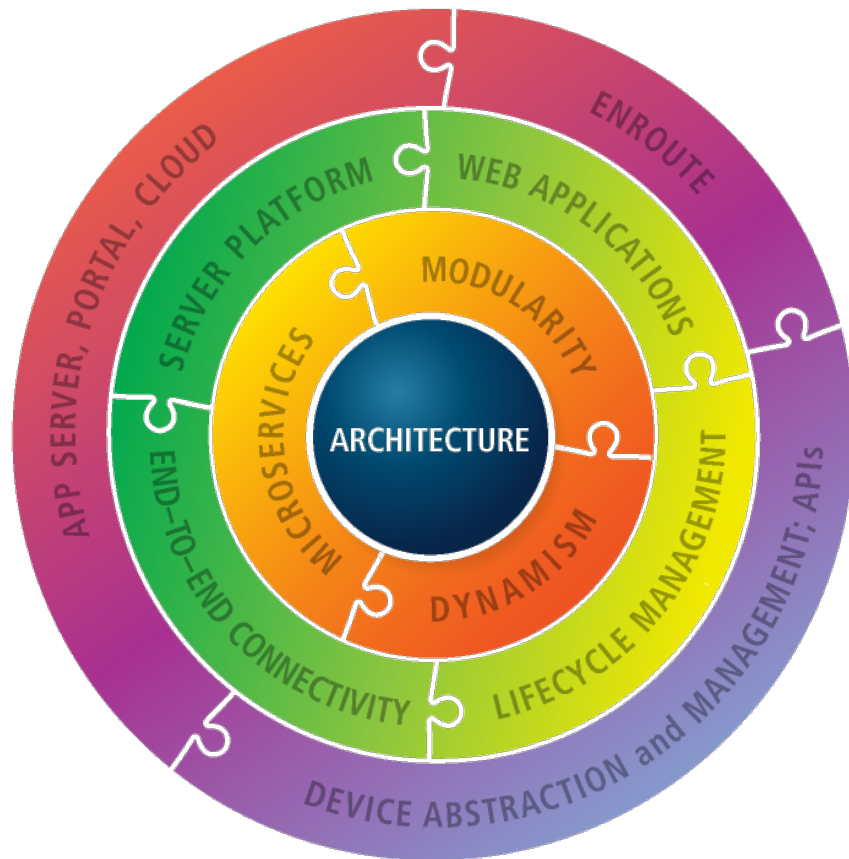


OSGi Alliance

Architecture and specifications

- **OSGi was made for IoT**
- **Founded in 1999**
- **Spec Releases**
 - <http://www.osgi.org/Specifications/HomePage>
 - Providing a modular, dynamic architecture for specific industry needs
- **OSGi IoT Expert Group**
 - launched Sept 2015
 - Collecting RFP's for new OSGi IoT specs
 - Collaboration with other industry bodies

OSGi in IoT



OSGi specifications

Cross industry adoption and membership

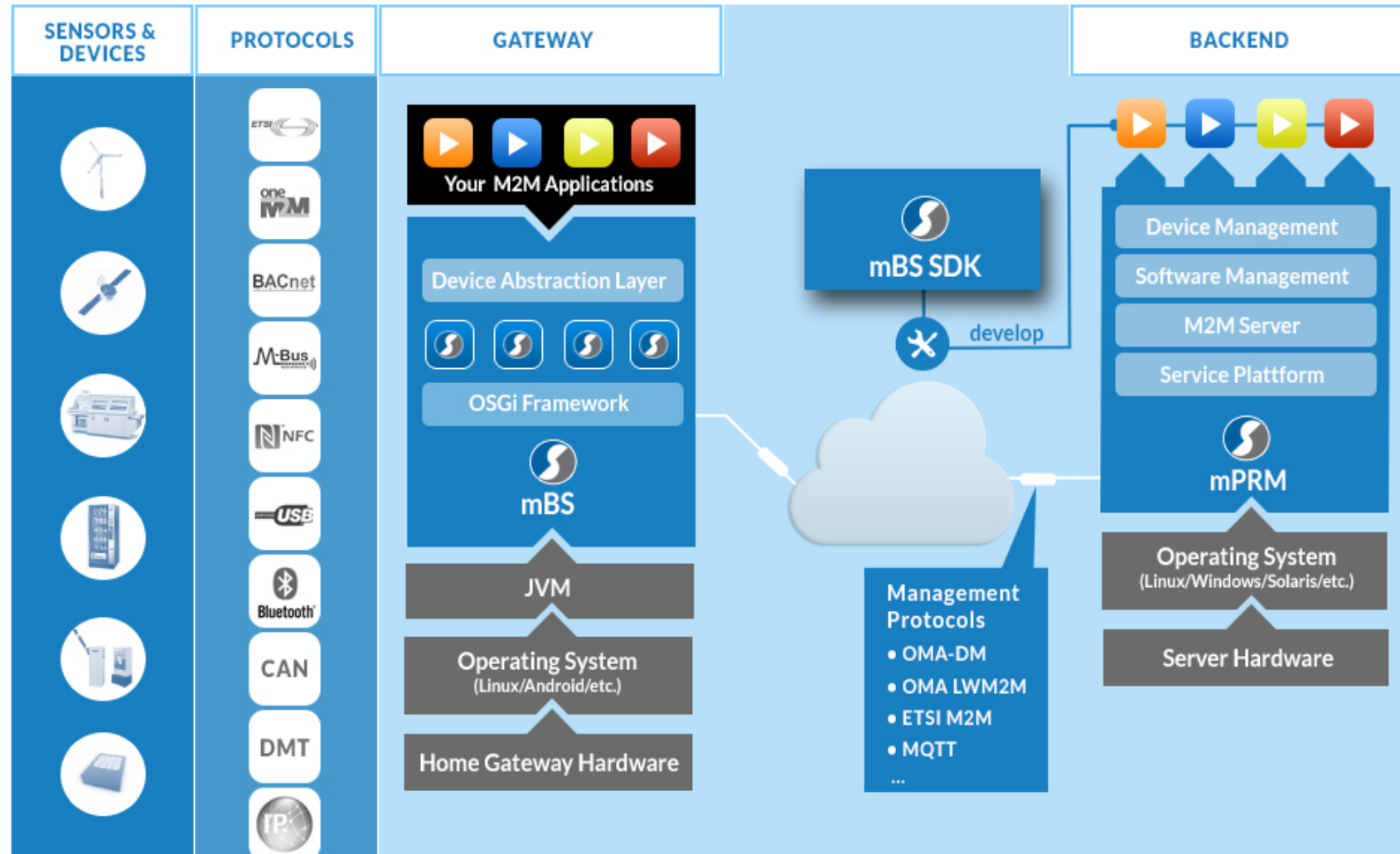
Completing the puzzle

- **Millions of product solutions**
- **Adoption in vendor solutions**
- **Adoption in open source**
 - e.g. Eclipse Foundation, Apache Foundation etc.
- **Strategic partnerships**
 - In Smart Home
 - In IoT



End-to-end IoT Solution – from Backend to Sensor

Building Open Industry 4.0 Ecosystem based on Standards



Thank you for your attention!

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