

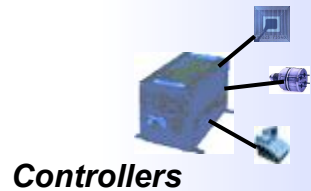
# **OSGi Alliance Community Event**

## **Data Capture in IBM WebSphere Premises Server™**

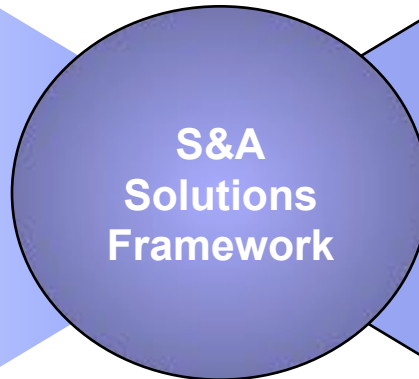
**Aldo Eisma, IBM**



# IBM Sensor and Actuator Solutions



Networked devices deliver new data & act upon insights

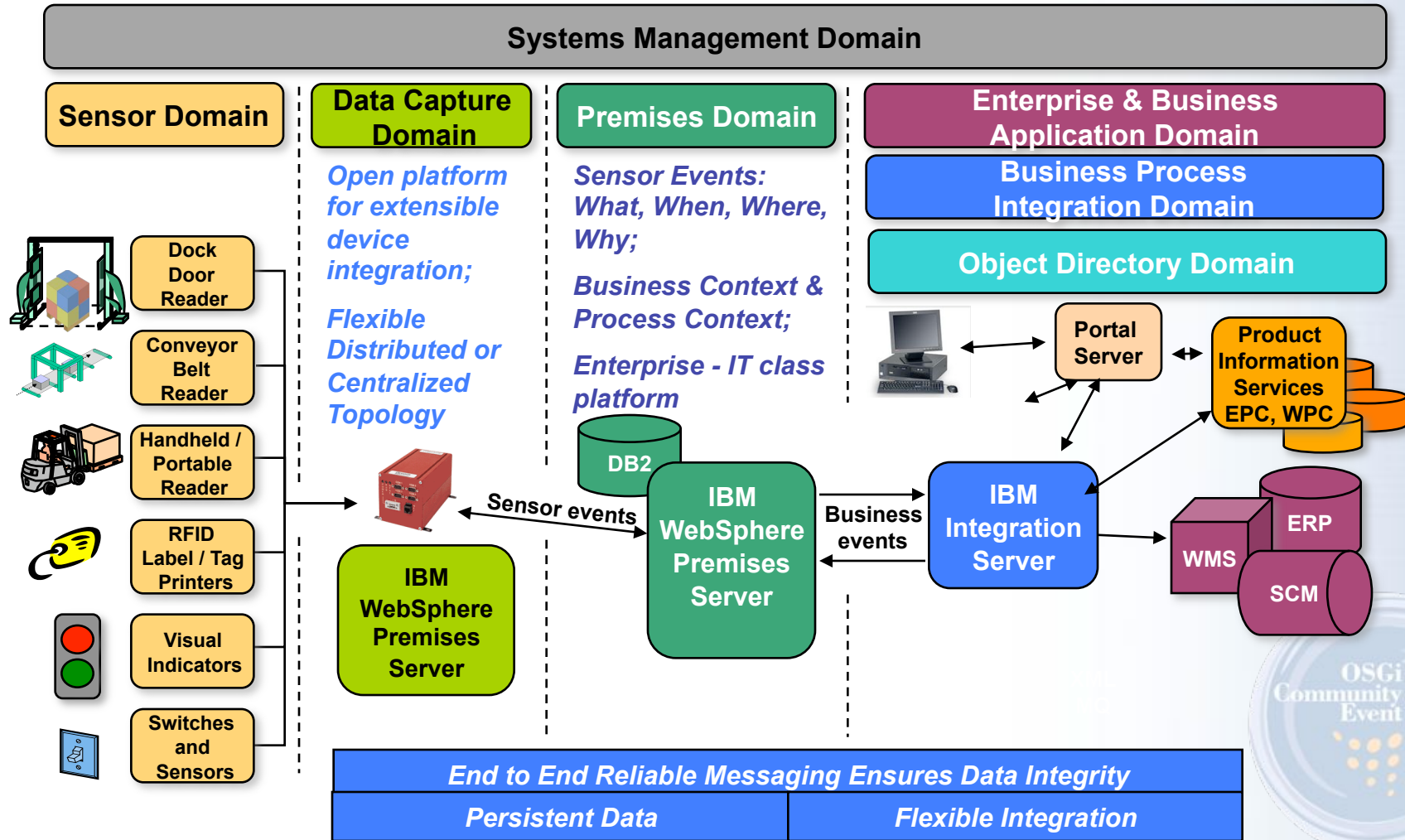


Enabling process and business transformation from new operational insights



*New Data* → *New Insight* → *Process Innovation*

# The IBM Sensor & Actuator Solutions Framework



## Some Solution Proof Points in 2007



**Airbus**  
Industrial Tracking & Visibility  
for Supply Chain Manufacturing (JIT/JIS)



**Baxter**  
Pharmaceutical Track and Trace  
for High Value Drugs

"IBM definitely is ahead of the others, because they're actually out there co-inventing with the customers."

*Michael Liard, ABI Research October 2007, InternetNews.com. August 13. 2007*

**Gerry Weber**  
Retail Supply Chain & Logistics  
for High Value Goods Tracking



**McLane**  
Distribution Supply Chain & Visibility  
For Reusable Asset Tracking



"...IBM is a leader in the RFID middleware and software market. The Sensors and Actuators division offers a full stack software and services solution for RFID. Comprising middleware, local, and networked server and enterprise-wide software, IBM's WebSphere RFID Premises Server 6.0 provides a service-oriented architecture, enabling strong automation capabilities that maximize the value of RFID."

*Frost & Sullivan quote - North American RFID Middleware and Software Markets, June 2007*

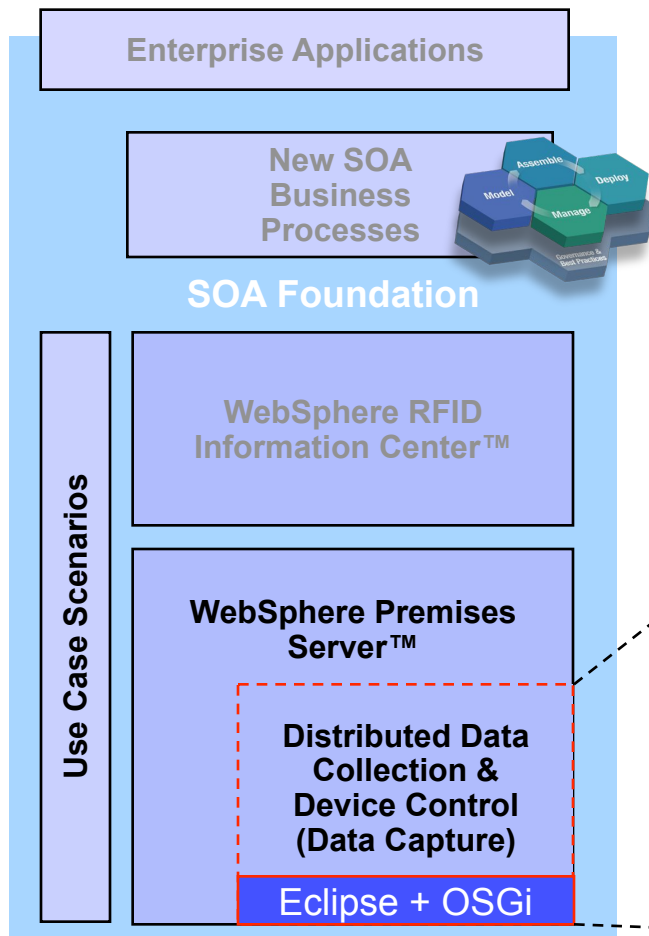
**Honda Italia**  
Industrial Tracking & Visibility  
for Manufacturing WIP Visibility



**Metro**  
Retail Supply Chain & Logistics  
For Supply Chain Visibility

# IBM WebSphere Sensor Software

## Using OSGi to turn data into new operational insights

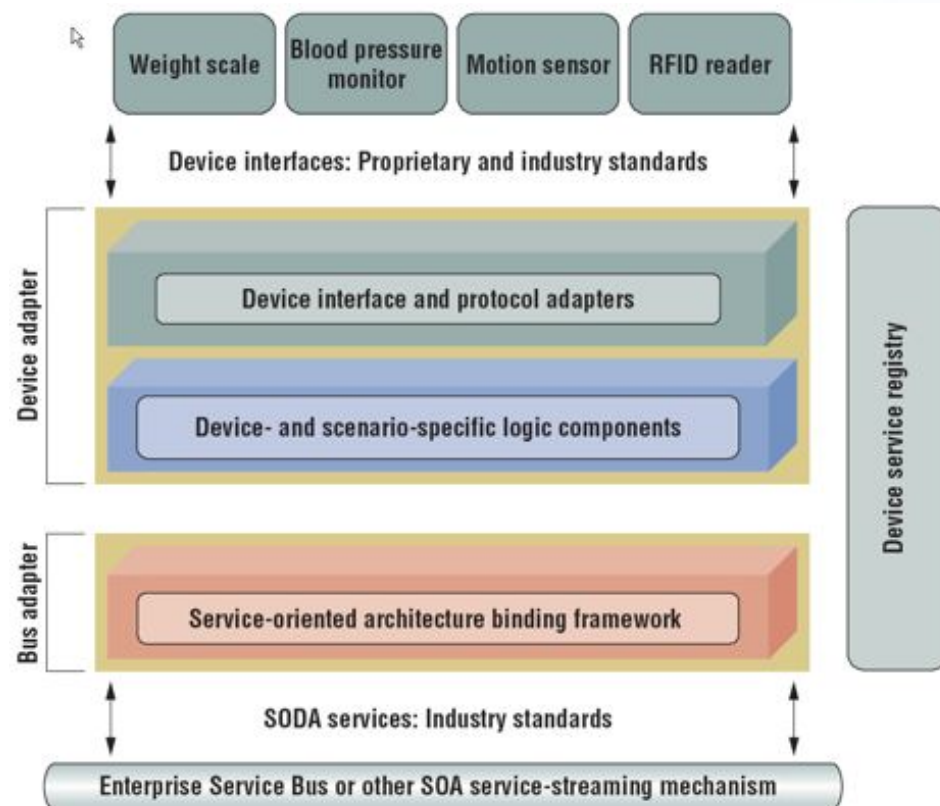


- Enable a flexible, scaleable, manageable and extensible integration model for data capture.
- Extend the solutions ecosystem with device manufacturers and ISVs.



# SODA - Service Oriented Device Architecture

Exposing device interfaces as SOA services over a network

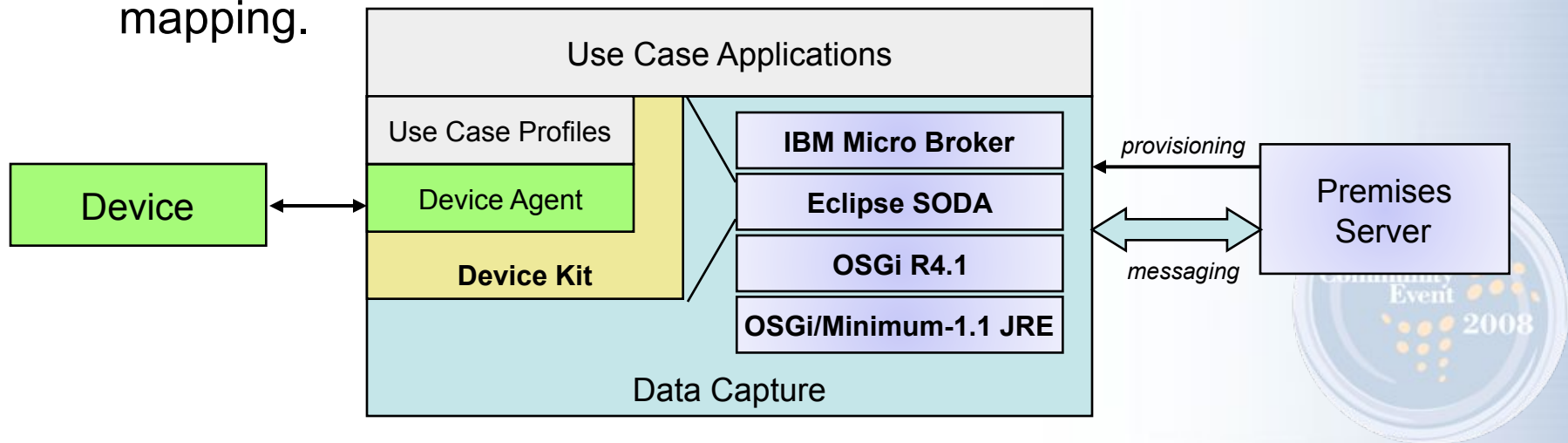


See "SODA: Service Oriented Device Architecture"  
in IEEE Pervasive Computing



# What does Data Capture do?

1. Provides a common service oriented interface to sensor devices.
2. Manages communication protocol and data format mapping.
3. Establishes a communication bus to Premises Server.



## Where is Data Capture deployed?

- Deployed on distributed devices (smart devices or controllers).
- Can also be deployed on the Premises Server OSGi runtime.
- Supported environments are independent of runtime hardware.
- Runtimes + applications are in the range of 50 to 100 bundles.



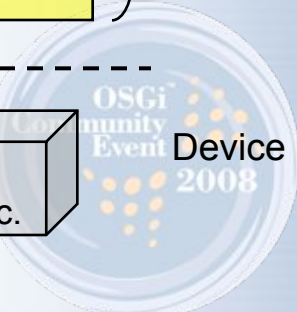
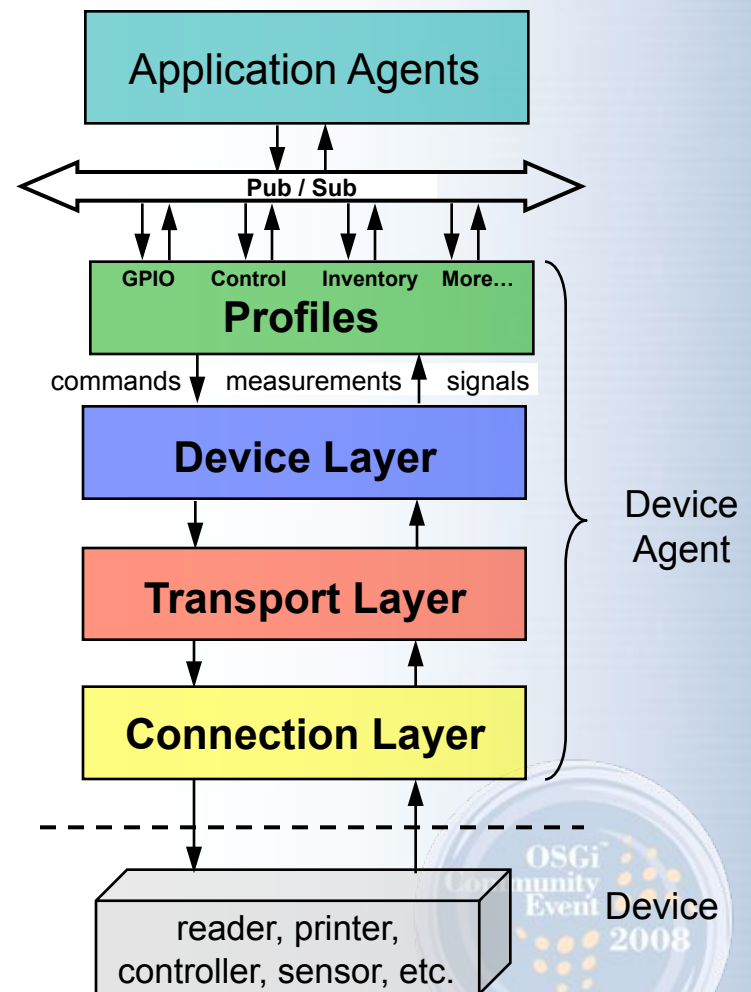
## The Eclipse OHF SODA technology project

- Open Healthcare Framework.
  - Addresses interoperability between applications and systems within and across healthcare organizations.
- IBM contributed SODA to Eclipse OHF in March 2007:
  - Device Kit.
  - Service Activator Toolkit (SAT).

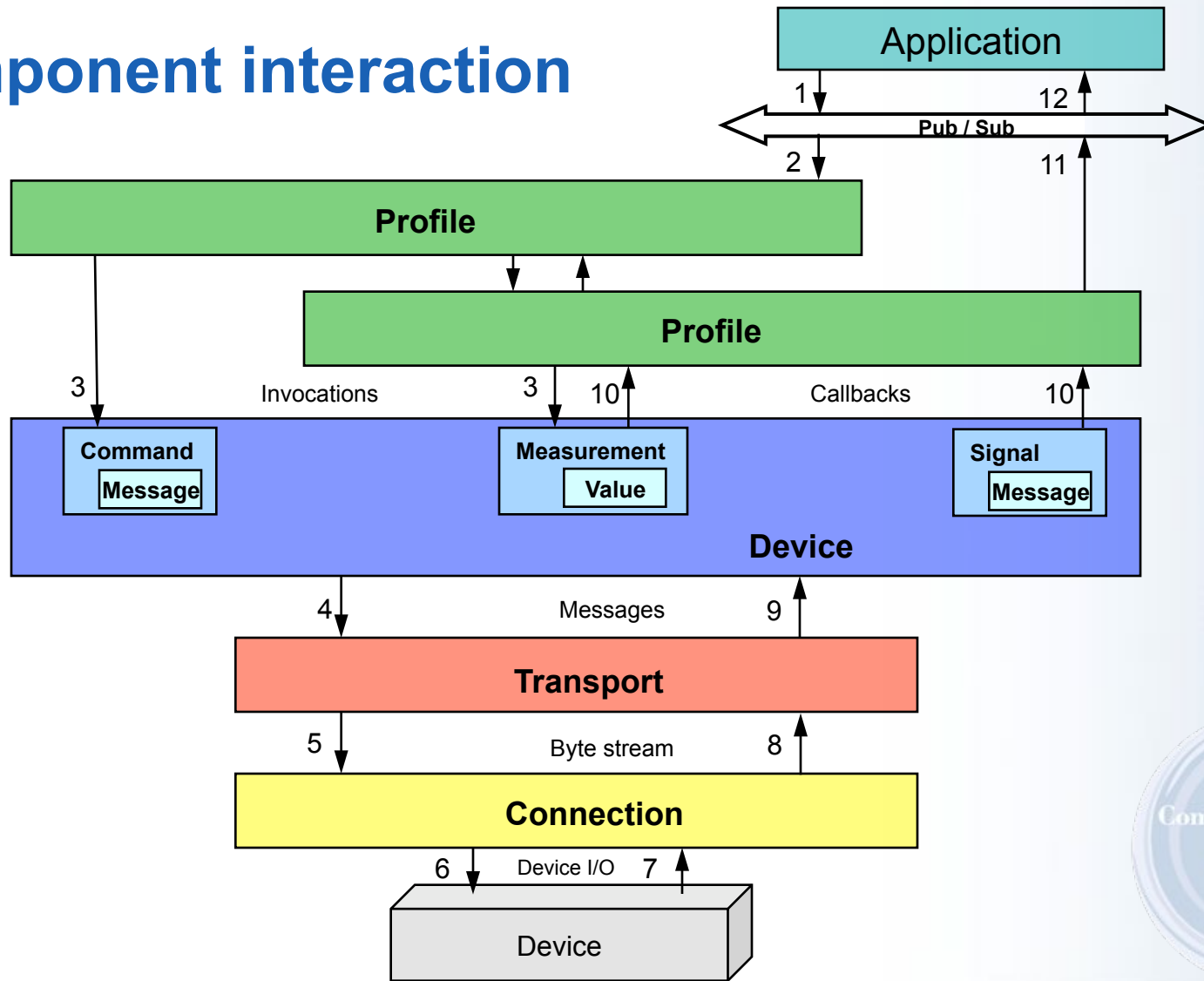


# What is the Device Kit?

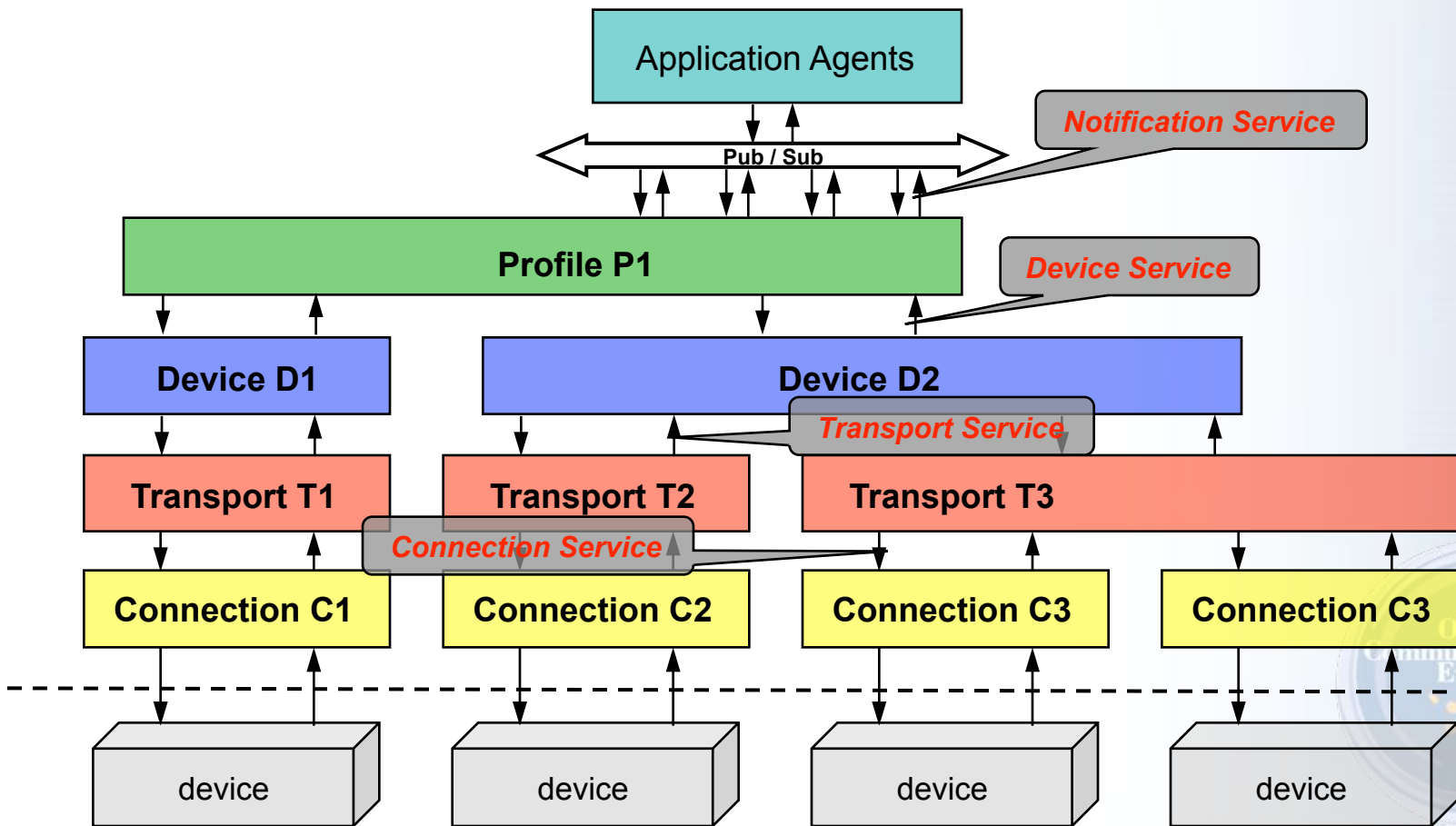
- Enabling technology for Data Capture.
- It provides a framework for developing device agents.
  - Eclipse tooling for generating the components required to interface with a hardware device.
  - Generated code is “built out” to provide a fully functional device agent.
- Provides a uniform method of interfacing to hardware devices.
- A set of runtime components.
- Installed as an Eclipse feature.



# Component interaction

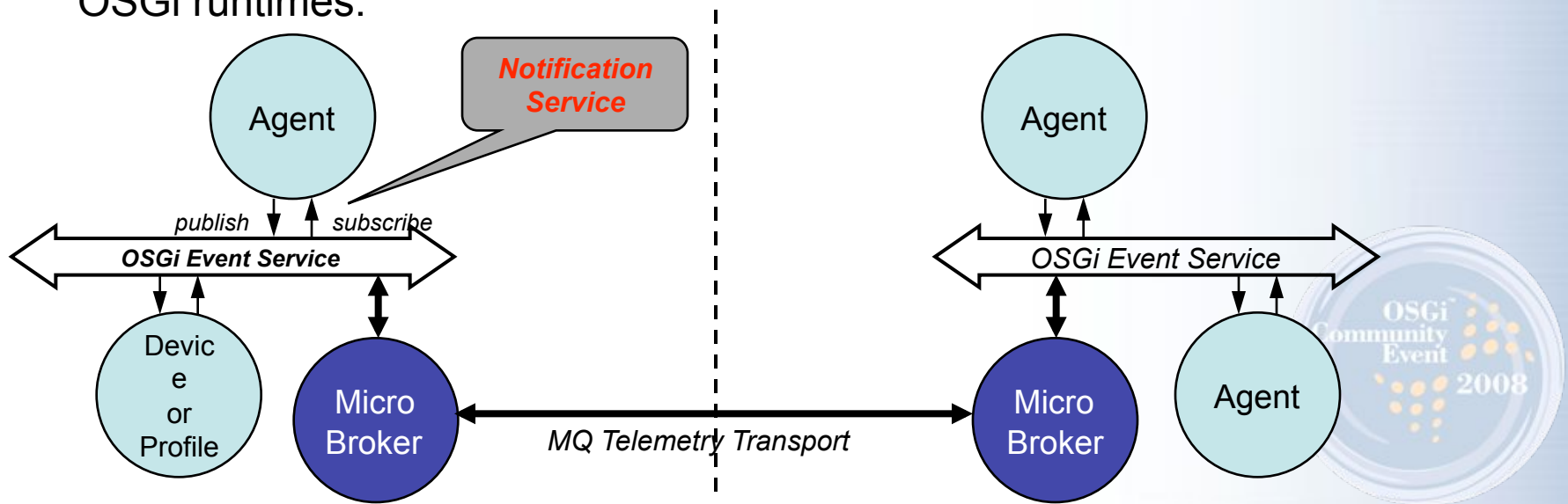


# Layers are loosely coupled and can be used independently



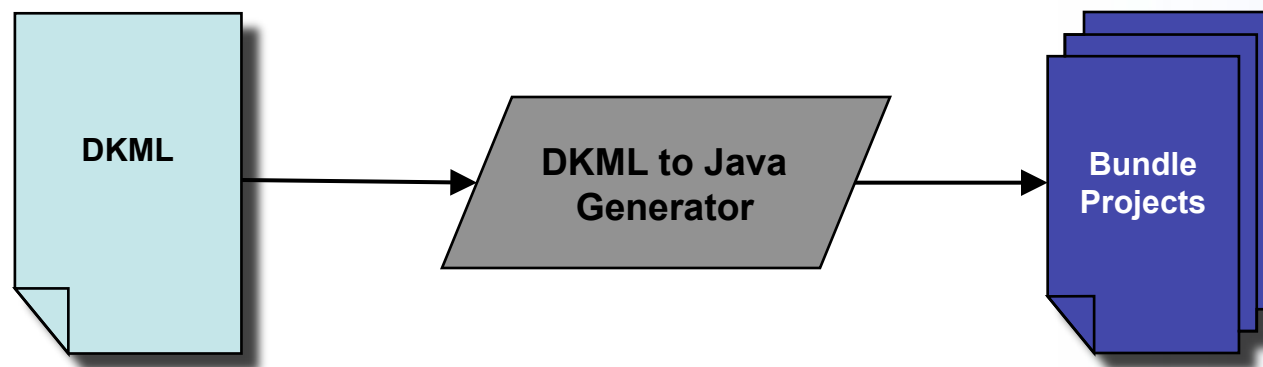
# Distributed messaging in the Device Kit

- Device Kit provides a publish/subscribe notification service.
- An application registers itself specifying the topics in which it is interested and publishes.
- Micro Broker bridges messages between Data Capture and Premises OSGi runtimes.



## The Device Kit Markup Language (DKML)

- XML markup language that defines the device controls, messages and configuration settings used by the device agent to communicate with and control the hardware device.
- Transports, devices, adapters and profiles all have associated DKML files.
- Device Kit tooling generates transport, device, adapter and profile code from their respective DKML files.



## Adding a temperature sensor to a tag read location

- Example: USB dongle from EclipseCon Device Kit tutorial:
  - Temperature sensor.
  - 2 LEDs.
  - Push-button.
- Access via serial port.
- Command specification:
  - Send 'i', device will reply 'id: usb-gpio-v1'.
  - Send 't', device will reply with 'temp: 25.23'.
  - Send 'b', device will reply with button state: 'button: 0' or 'button: 1'.
  - Button will send asynchronous button: messages above.
  - *etc.*

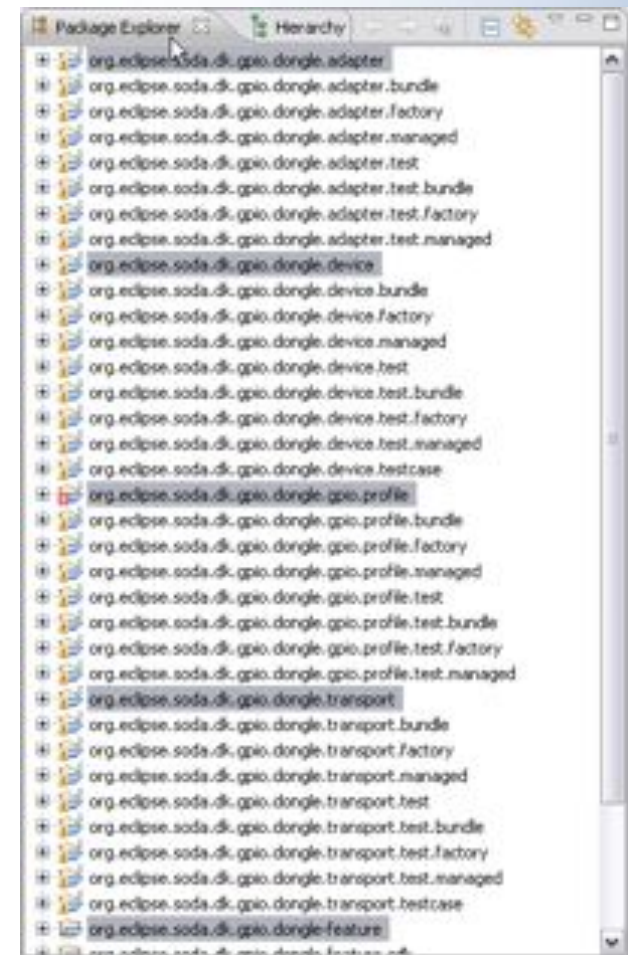
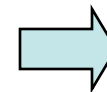
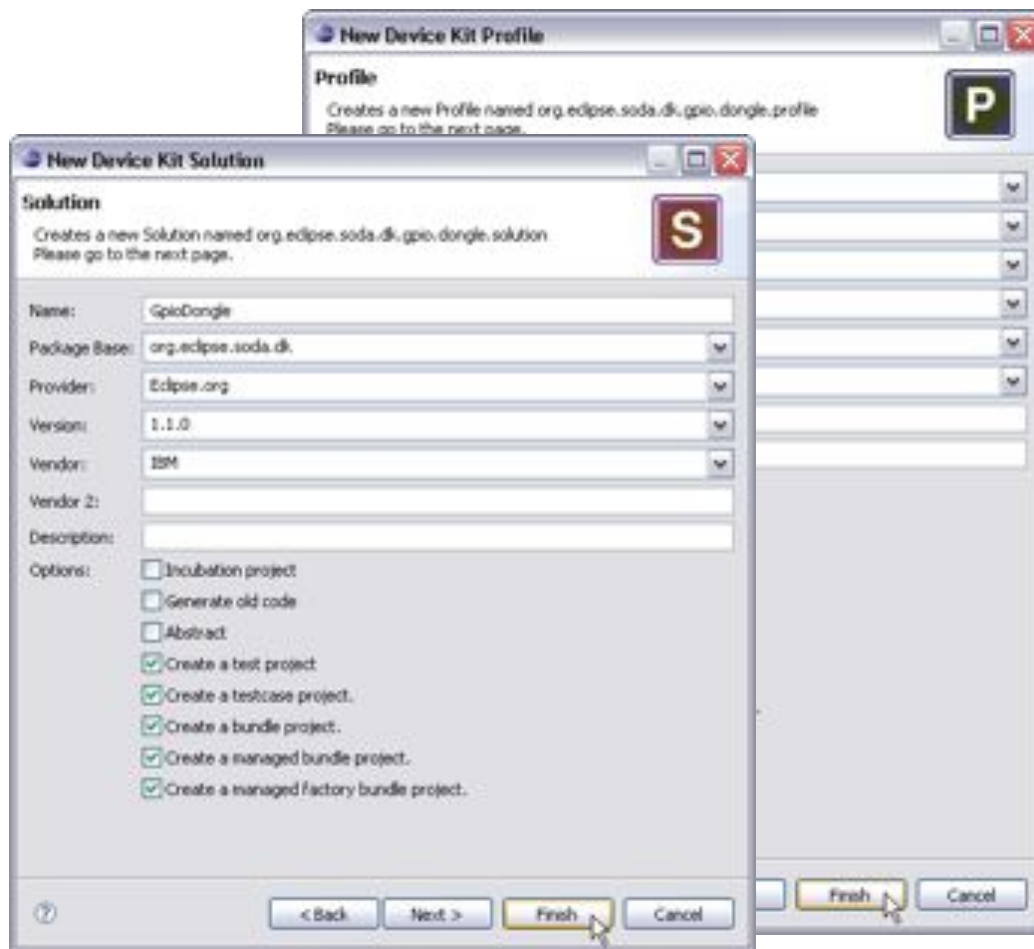


## Using the Device Kit tooling to develop a new adapter

1. Generate skeleton bundle projects using Device Kit wizards.
2. Write DKML device and profile specification.
3. Regenerate and complete transport and profile implementation.
  - Generated transport and profile require manual coding, device code does not.
4. Test the new adapter for profile compliance.
5. Export, publish and then deploy feature on Premises Server for provisioning to Data Capture.



## Step 1: Generate skeleton bundle projects using Device Kit wizards

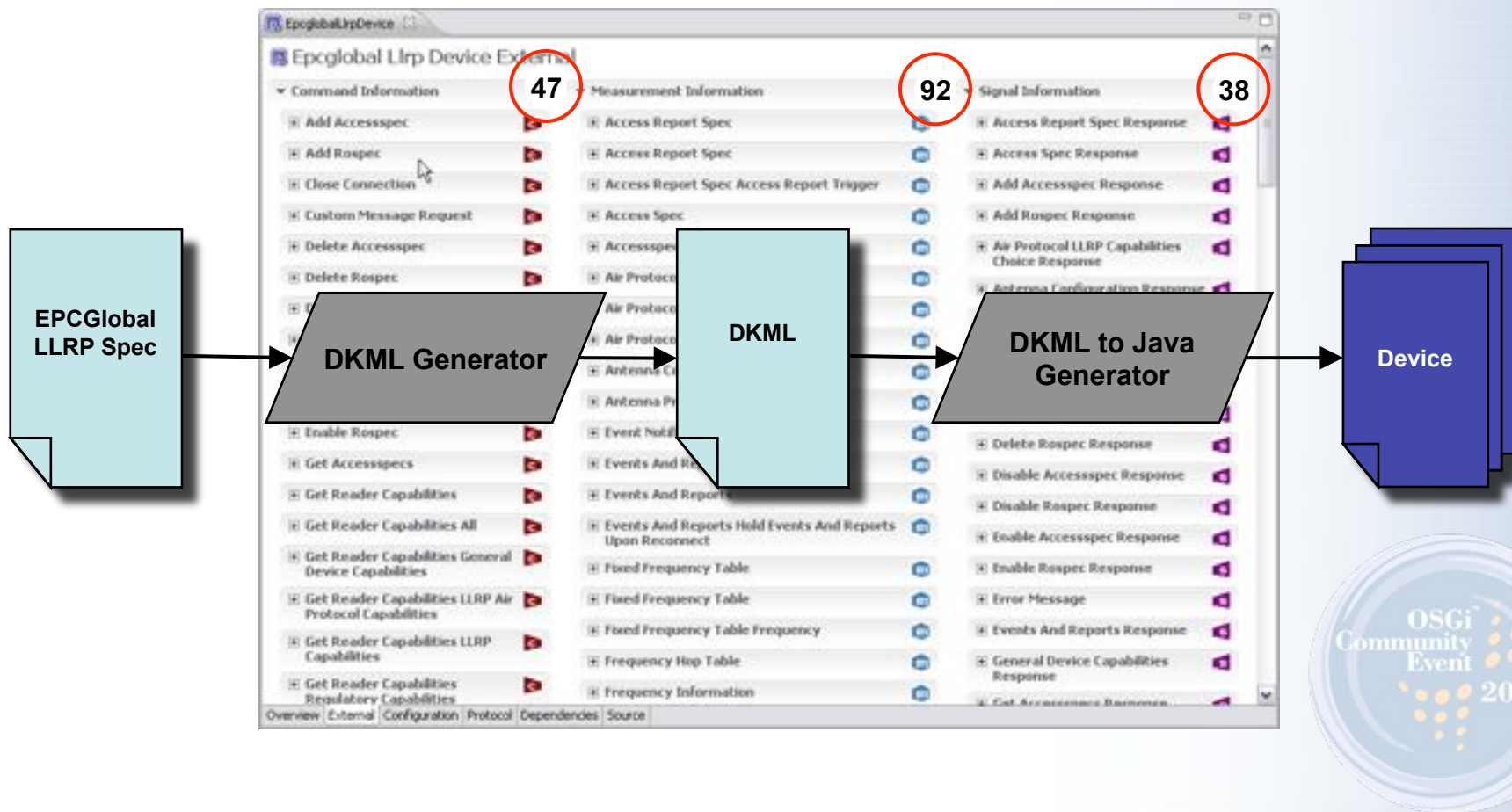


## Step 2: Write DKML device and profile specification

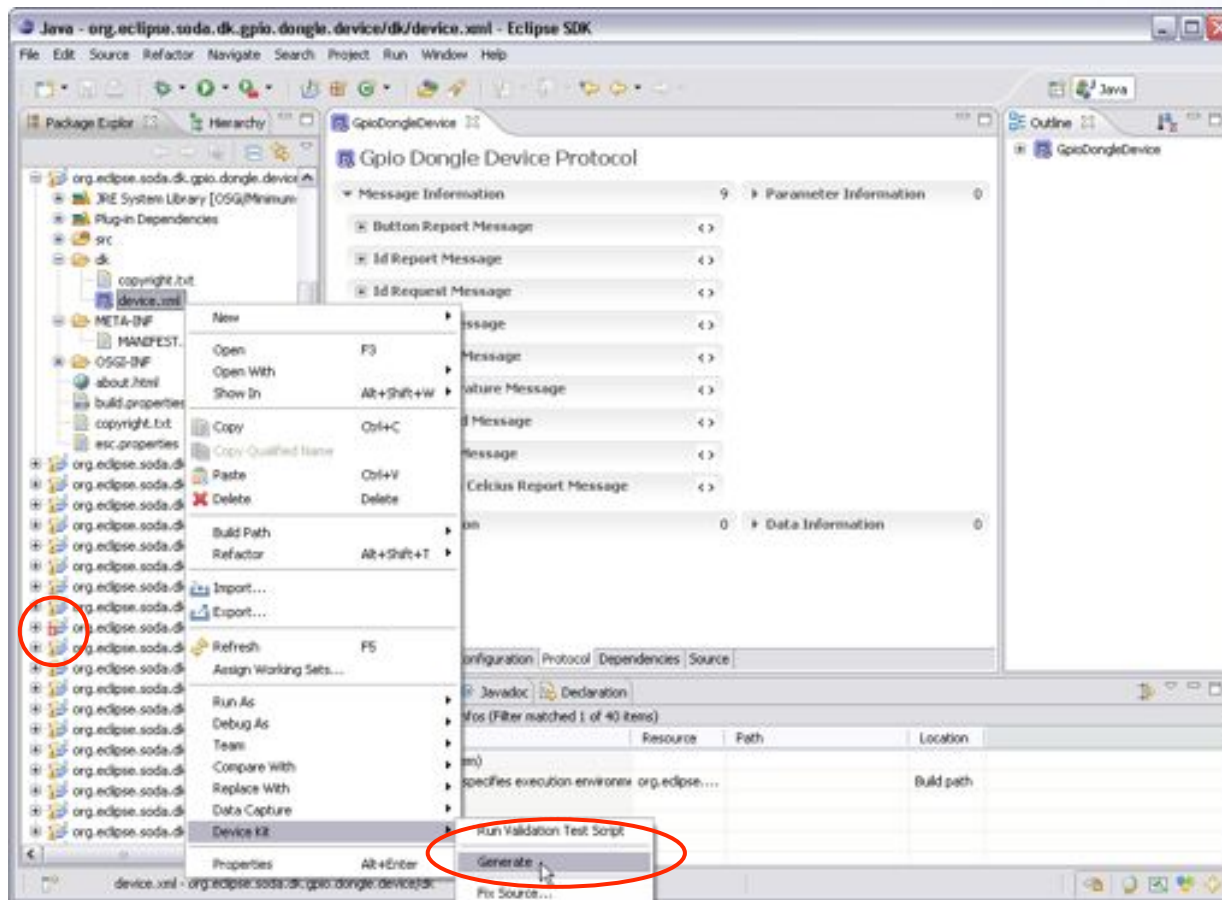
```
<dkml>
  <device id="GpioDongleDevice" packagebase="org.eclipse.soda.dk">
    <command id="ReadTemperature">
      <message>
        <ascii>t</ascii>
      </message>
    </command>
    <signal id="TemperatureCelciusReport">
      <message>
        <ascii>temp: </ascii>
        <tokens>\r\n</tokens>
        <parameter type="string">
          <key>DegreesCelcius</key>
          <index>6</index>
        </parameter>
        <filter>
          <bytes format="hex">FF, FF, FF, FF, FF</bytes>
        </filter>
      </message>
    </signal>
    ...
  </device>
</dkml>
```



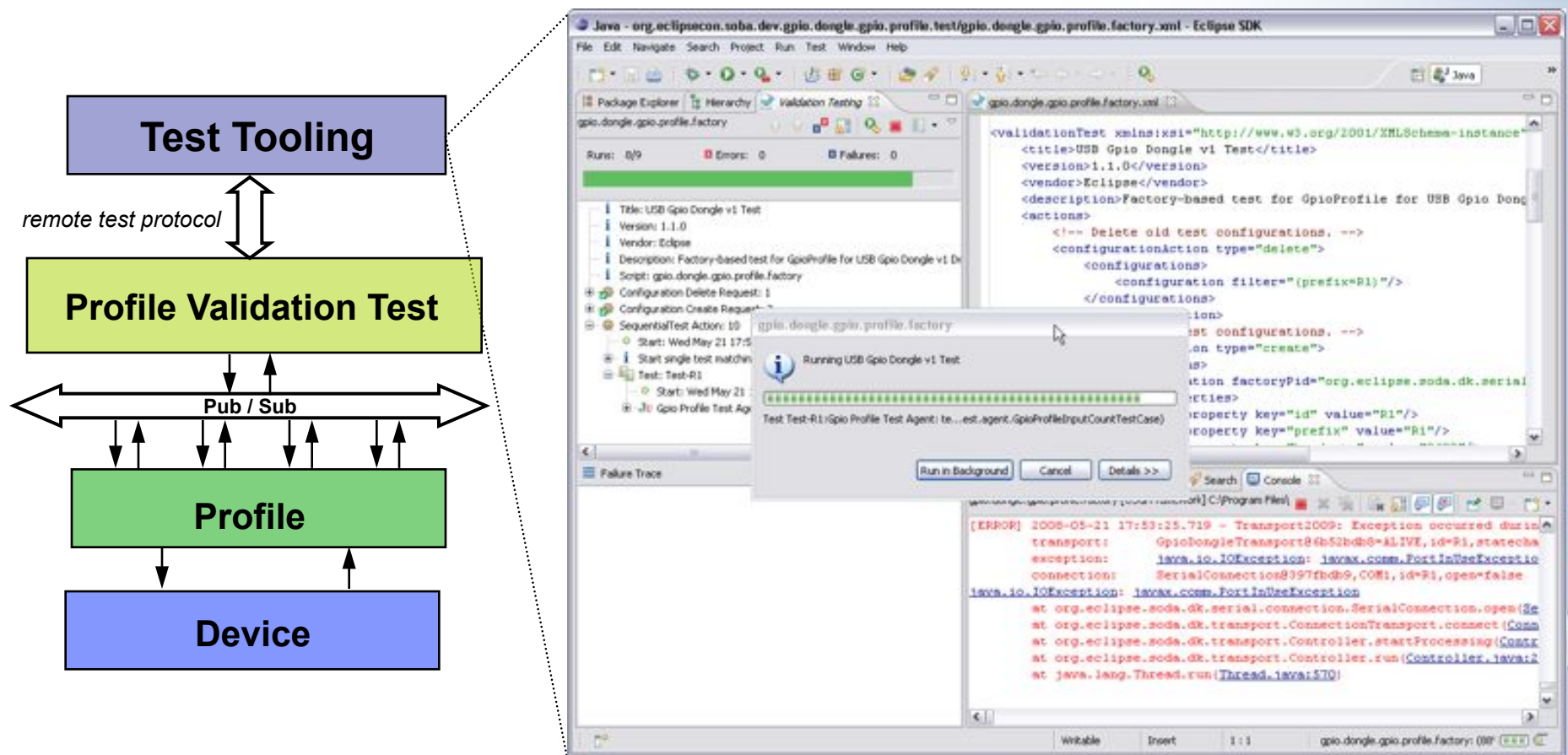
# Sometimes DKML can be generated from a specification



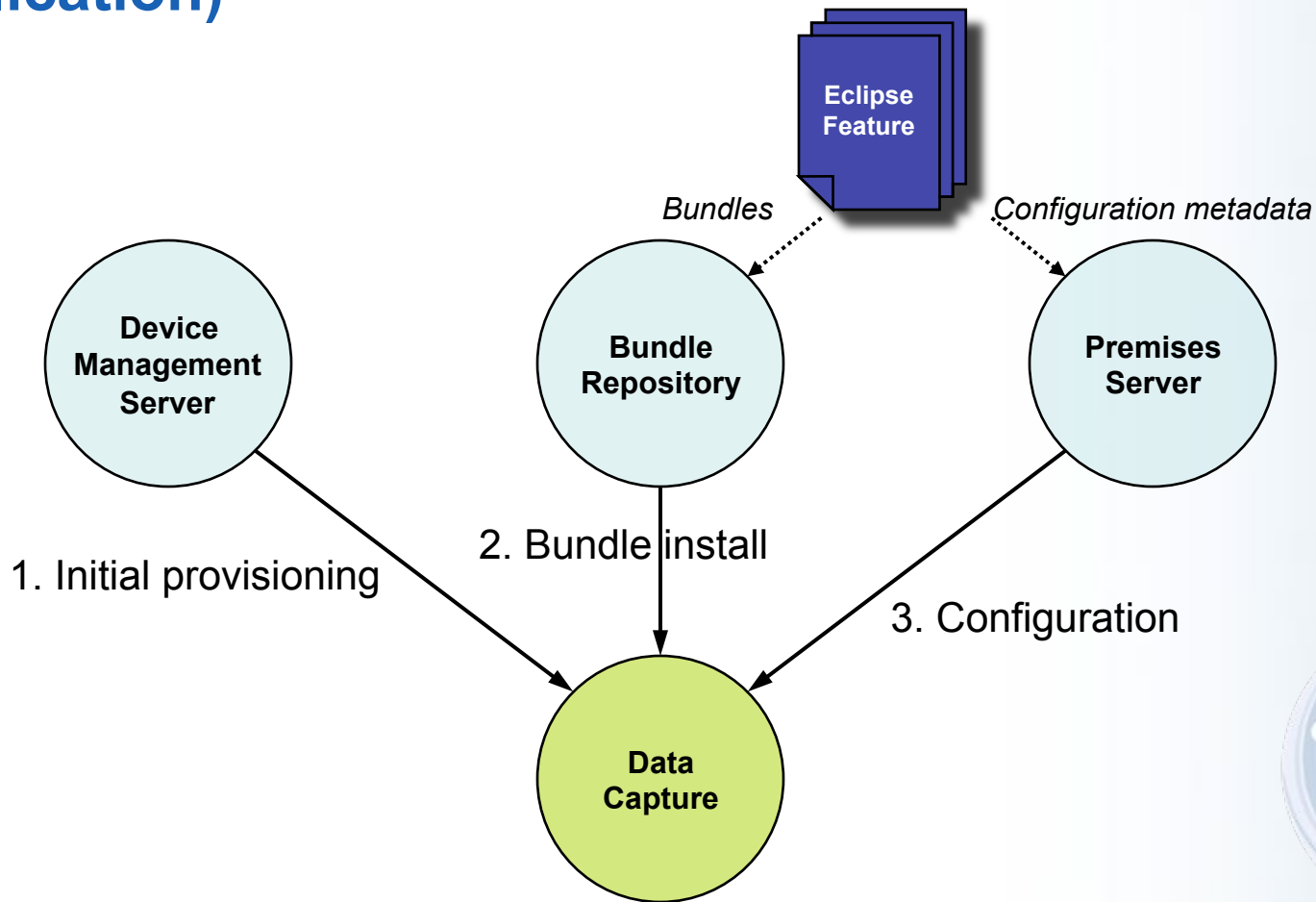
## Step 3: Regenerate and complete transport and profile implementation



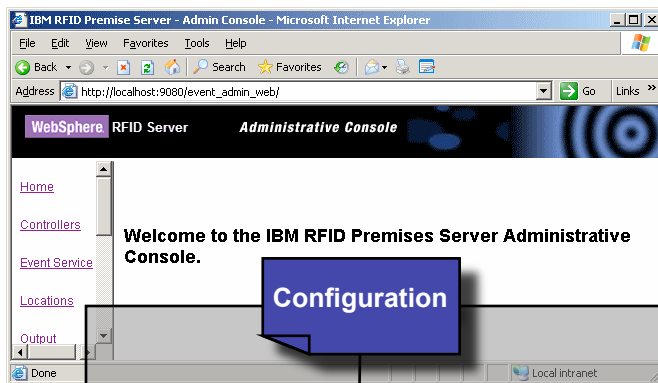
## Step 4: Test the new adapter for profile compliance



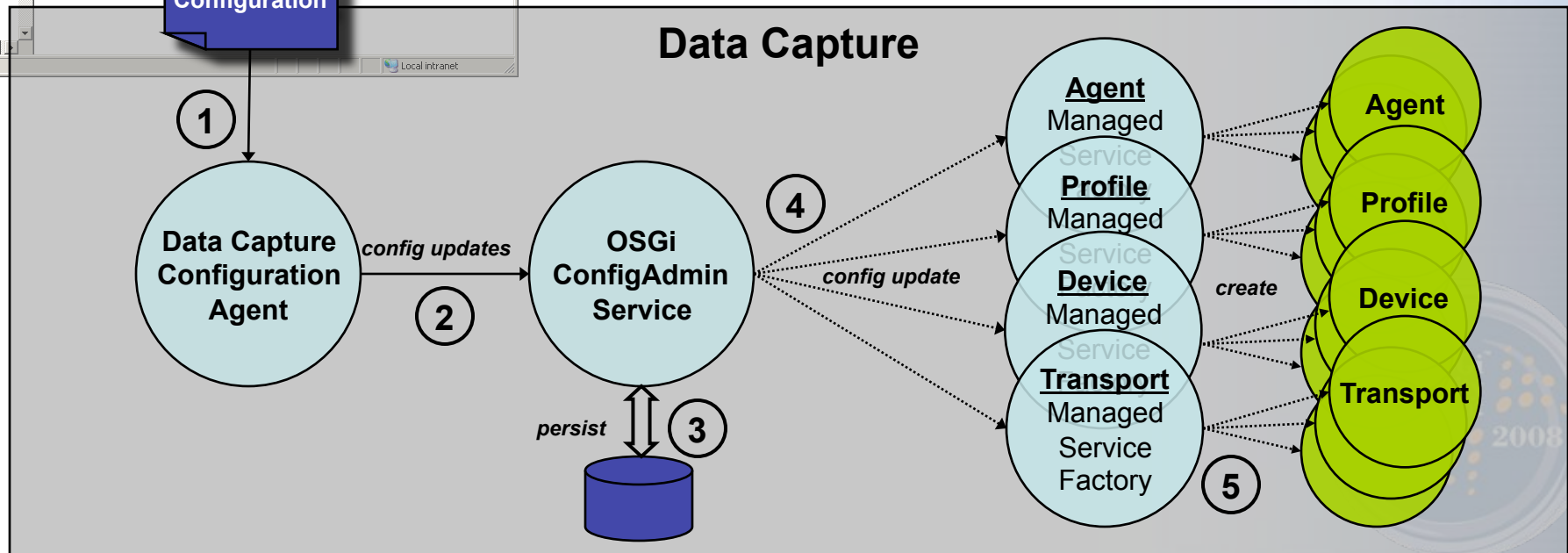
## Step 5: Deploy and provision the new adapter (and application)



# Service are dynamically created and configured using the OSGi *ManagedServiceFactory* concept

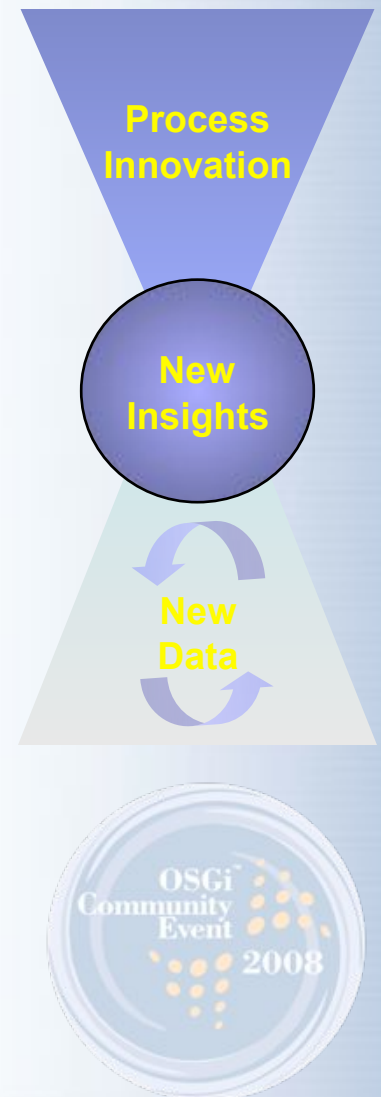


- Premises Server and Device Kit test tooling generate create, update and delete actions for ConfigAdmin.
- Service Activator Toolkit supports a declarative services and factories.



## Summary

- Build upon an *service oriented* platform for flexible business process innovation:
  - OSGi.
  - Web Services + Business Process Execution Language.
- Leverage *open standards* across the end to end solution:
  - Eclipse, Apache, OSGi.
- Dynamic partner *value network* provides the domain expertise and differentiating capabilities that can be leveraged to meet specific solution needs.



## Links and references

- IBM WebSphere Premises Server  
[http://www.ibm.com/software/integration/premises\\_server/](http://www.ibm.com/software/integration/premises_server/)
- Open Healthcare Framework (OHF) Project SODA, Device Kit, & Service Activator Toolkit  
<http://www.eclipse.org/ohf/components/soda/>
- SODA Update Site for Eclipse 3.3.1.1  
<http://download.eclipse.org/technology/ohf/soda/dk/update-site/weekly/>
- Building Service Oriented Bundle Architectures  
<http://www.eclipsecon.org/2007/index.php?page=sub/&id=3630>
- Where's the Data? A Device Kit Tutorial  
<http://www.eclipsecon.org/2008/index.php?page=sub/&id=285>
- SAT Blog  
<http://eclipse-sat.blogspot.com/>
- SODA Forum <http://sensorplatform.org/soda/forum/>
- SODA: Service Oriented Device Architecture, IEEE Pervasive Computing, Vol. 5, No. 3, July–September 2006.

