SOFTWARE ECOSYSTEMS FOR THE INTERNET OF THINGS (IoT)

Prof. Jakob Axelsson

SICS Swedish ICT AB &

Mälardalen University
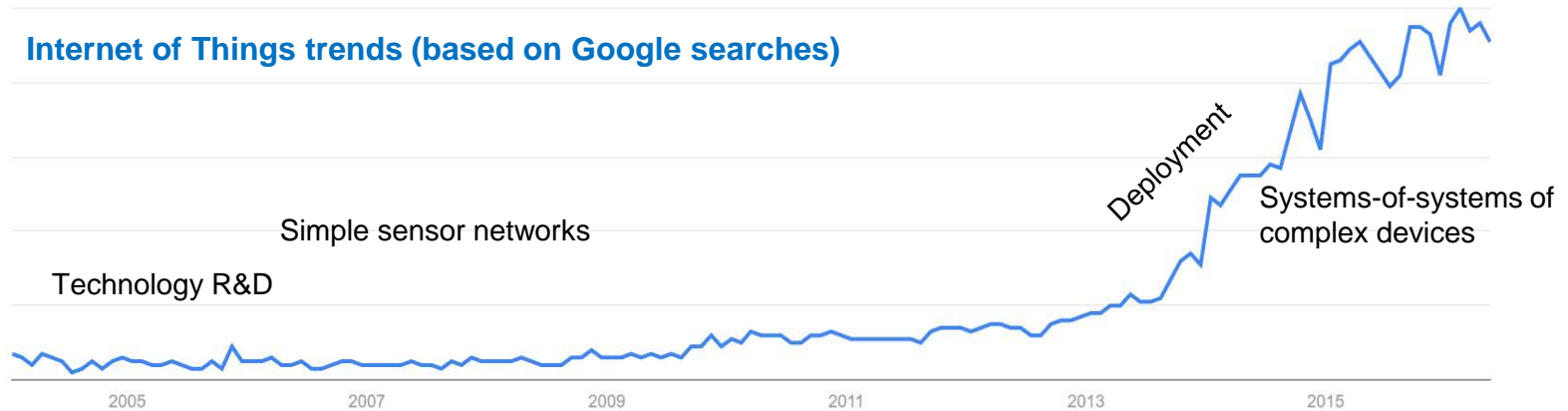
INTRODUCTION

Internet of Things trends (based on Google searches)

Deployment

Systems-of-systems of complex devices

Simple sensor networks

Technology R&D

2005   2007   2009   2011   2013   2015

- Technical and business perspectives must go hand in hand
- Software ecosystems provides a useful model

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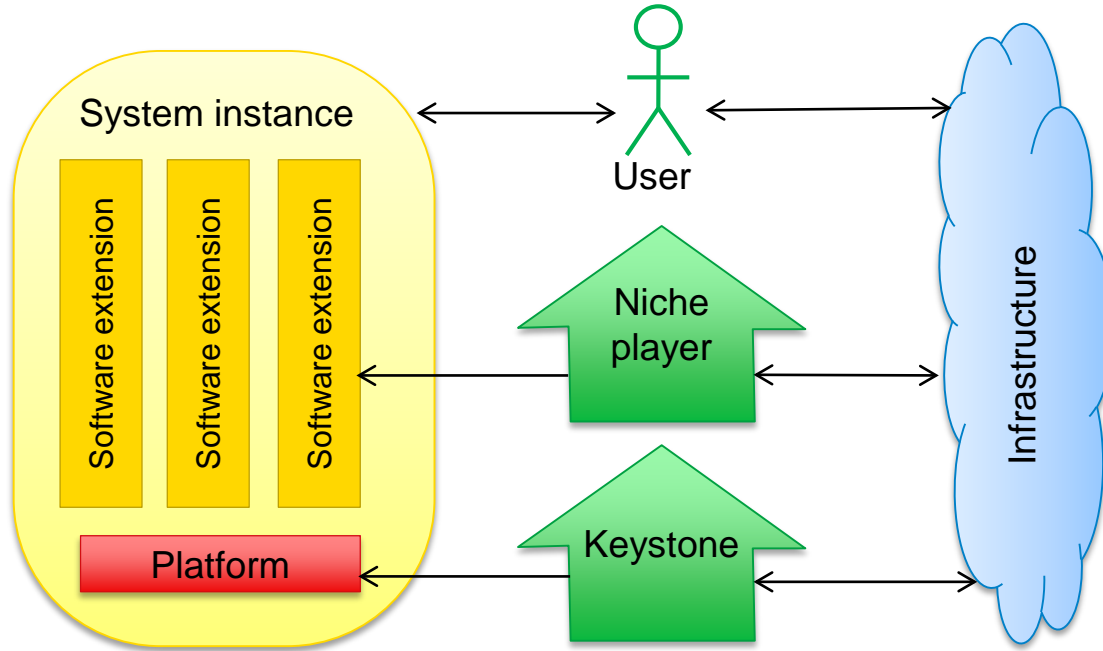
THE ECOFES PROJECT

Project facts:
- Pre-study 2012-13, main project 2013-16
- Vinnova funding: 6.8 MSEK

Main research topics:
- Business models
- Architecture
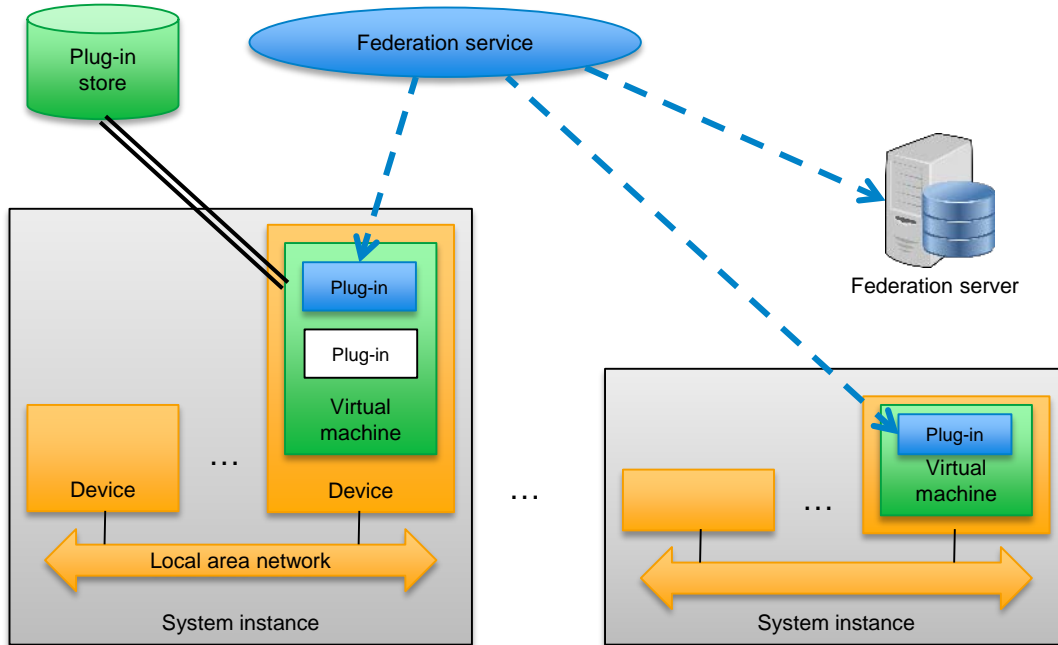- Processes, methods and tools
- Quality assurance

SOFTWARE ECOSYSTEMS

Definition:
A *software ecosystem* is the interaction of a set of actors on top of a common technological platform resulting in a number of software solutions or services
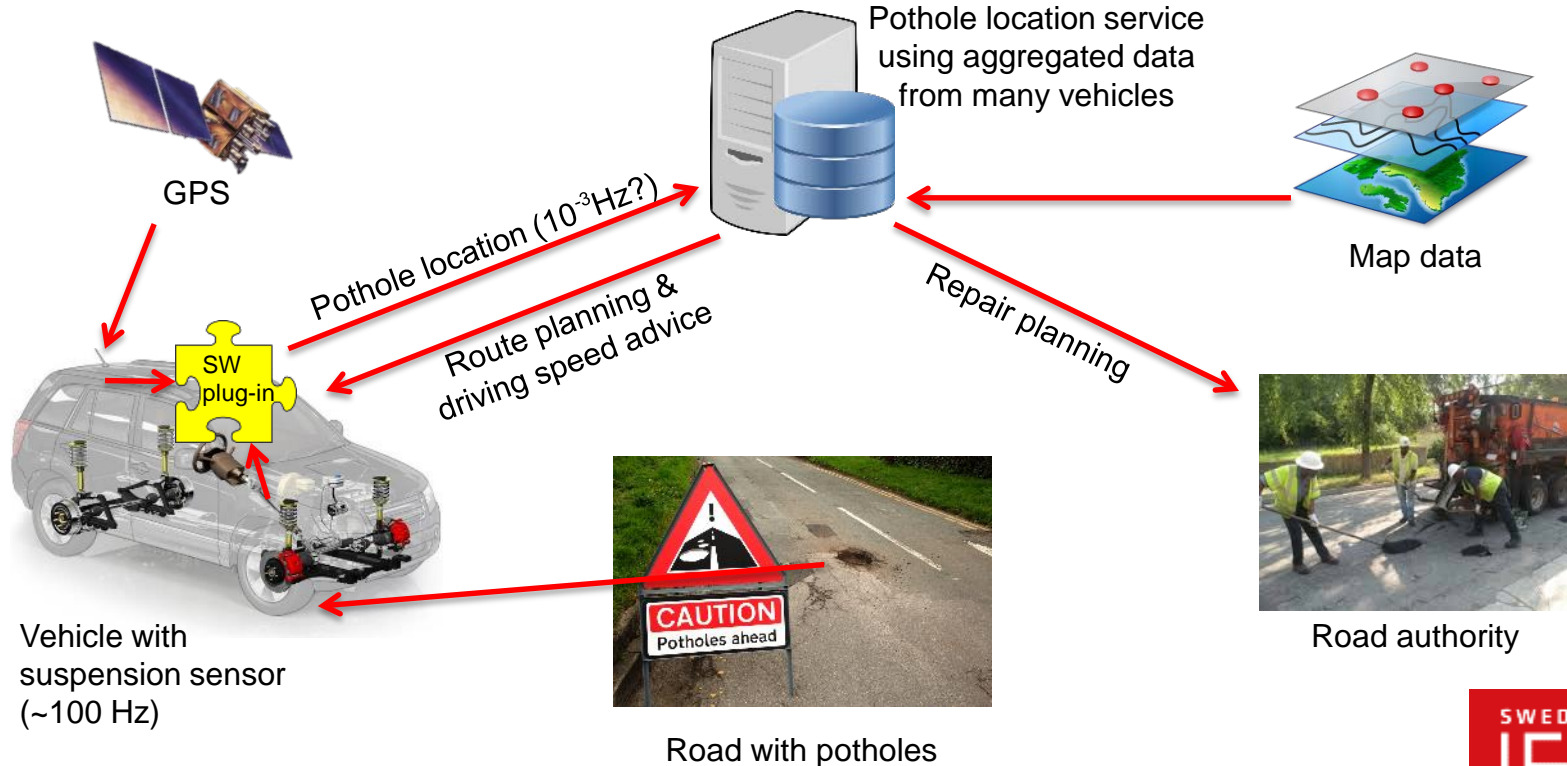
FEDERATED EMBEDDED SYSTEMS

Goals:
- Provide flexibility in embedded IoT devices
- Maintain integrity of critical built-in applications
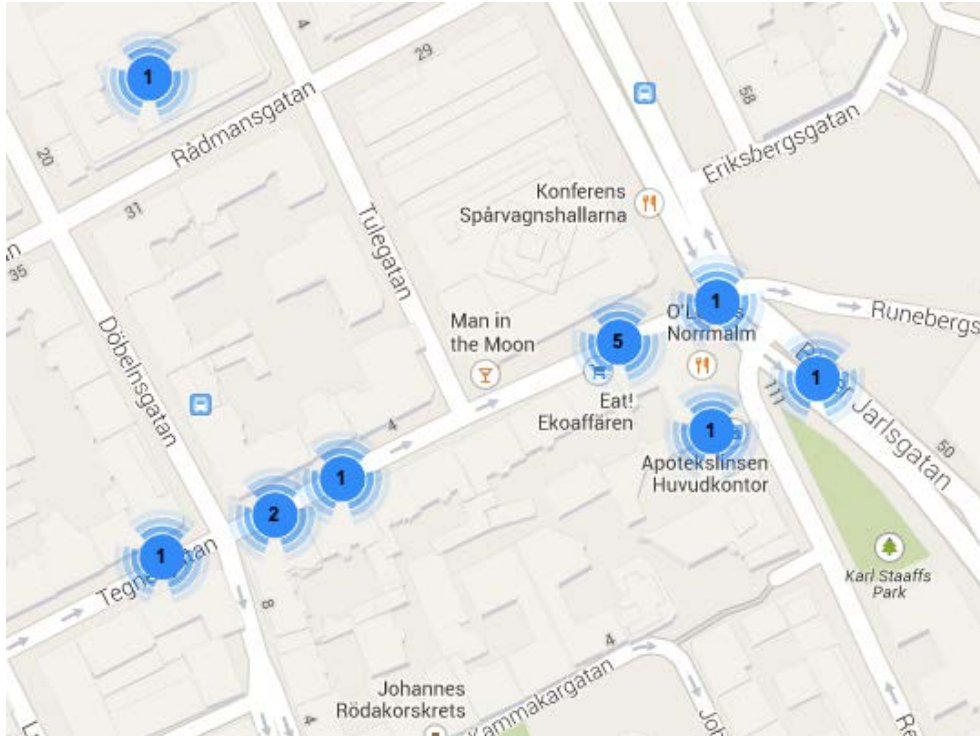- Minimize cost

Benefits:
- Shorter time to market
- SoS creation
- Open innovation
- Management of updates throughout IoT life-cycle

EXAMPLE APPLICATION

GPS

Pothole location service using aggregated data from many vehicles

Map data

Pothole location (10^{-3}Hz?)

Route planning & driving speed advice

Repair planning

SW plug-in

Vehicle with suspension sensor (~100 Hz)

Road with potholes

Road authority

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Count of potholes in reality

Telia Sense by Springworks

TYPES OF SERVICES

4. Extended

2. Process oriented

1. Product oriented

Development | Production | Operation | Maintenance

3. Life-cycle oriented
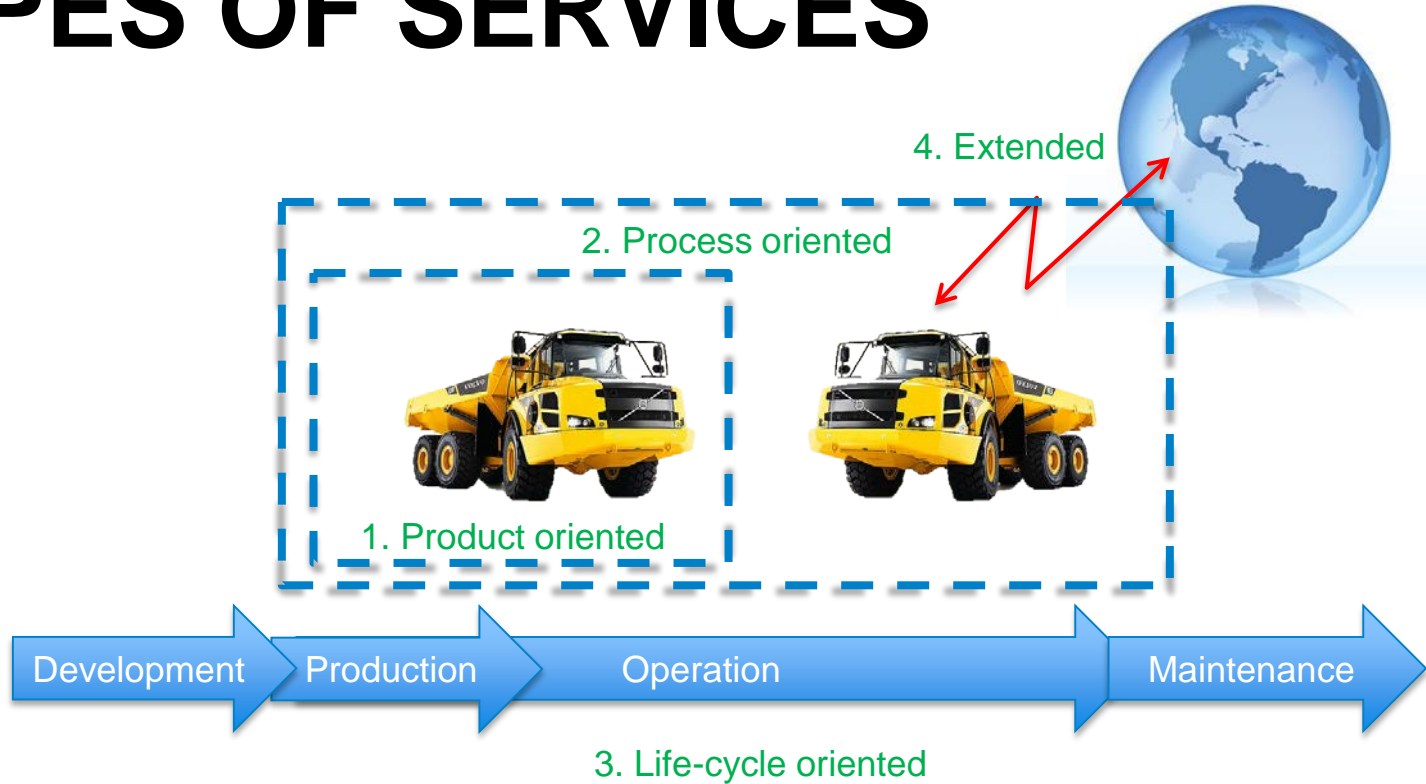
ACTORS IN THE ECOSYSTEM
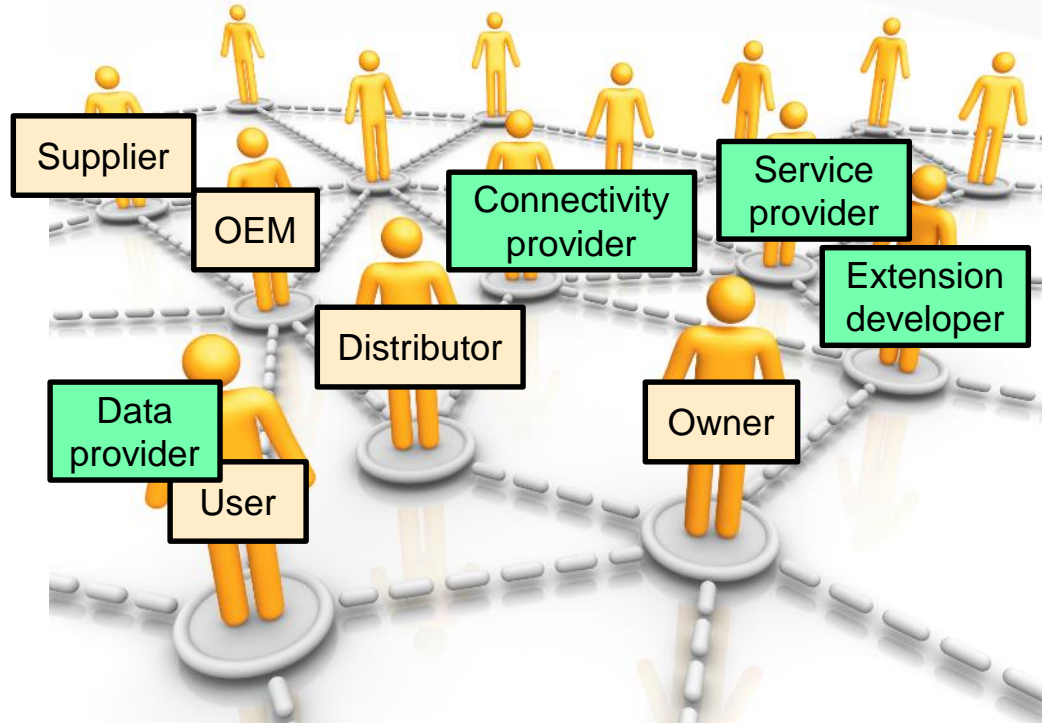
BUSINESS CHALLENGES

Trust

Value & Cost

Privacy

SYSTEM ARCHITECTURES

QUALITY ASSURANCE

Requirements	Keystone vs. niche player

Architecture — Protection & diagnostics

Design, implementation, test — Development support for keystone and niche players
Test infrastructure

Deployment — Pre-release verification

Integration — Dynamic configuration mgmt
Test suite sharing
Automated testing

Operation — On-line testing
Sharing operation knowledge

Organizational — Niche player certification

TRANSFORMING INTO AN ECOSYSTEM

Strategy

Infrastructure

Management

CONCLUSIONS

- We are at the brink of large-scale IoT introduction
- An ecosystem approach is key to dealing with IoT issues
- A flexible product platform and ecosystem infrastructure are necessary enablers

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