Web of Things for Connected Vehicles

Soumya Kanti Datta
Communication Systems Department
Email: Soumya-Kanti.Datta@eurecom.fr

Roadmap

- **Introduction**

- **Web of Things (WoT) Architecture & Components**

- **Prototyping Experiences**

- **Role of W3C**

- **Conclusion**

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Internet of Things - Landscape

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Web of Things - Motivation

- ## Web of Things (WoT) concept is becoming more popular

  - ➢ Leverage web standards and technologies to interconnect all types of devices.

  - ➢ Expose functionalities using RESTful APIs making them easier to access and use.

  - ➢ Provide truly open, flexible, scalable and interoperable services.

Source: http://webofthings.org/

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Connected Vehicles

- **Equipped with Internet access**

- **Has on-board things (sensors and actuators) that can connect to devices, networks and services external to the vehicle**
 - Other vehicles, infrastructures etc.

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Sensors in Vehicles
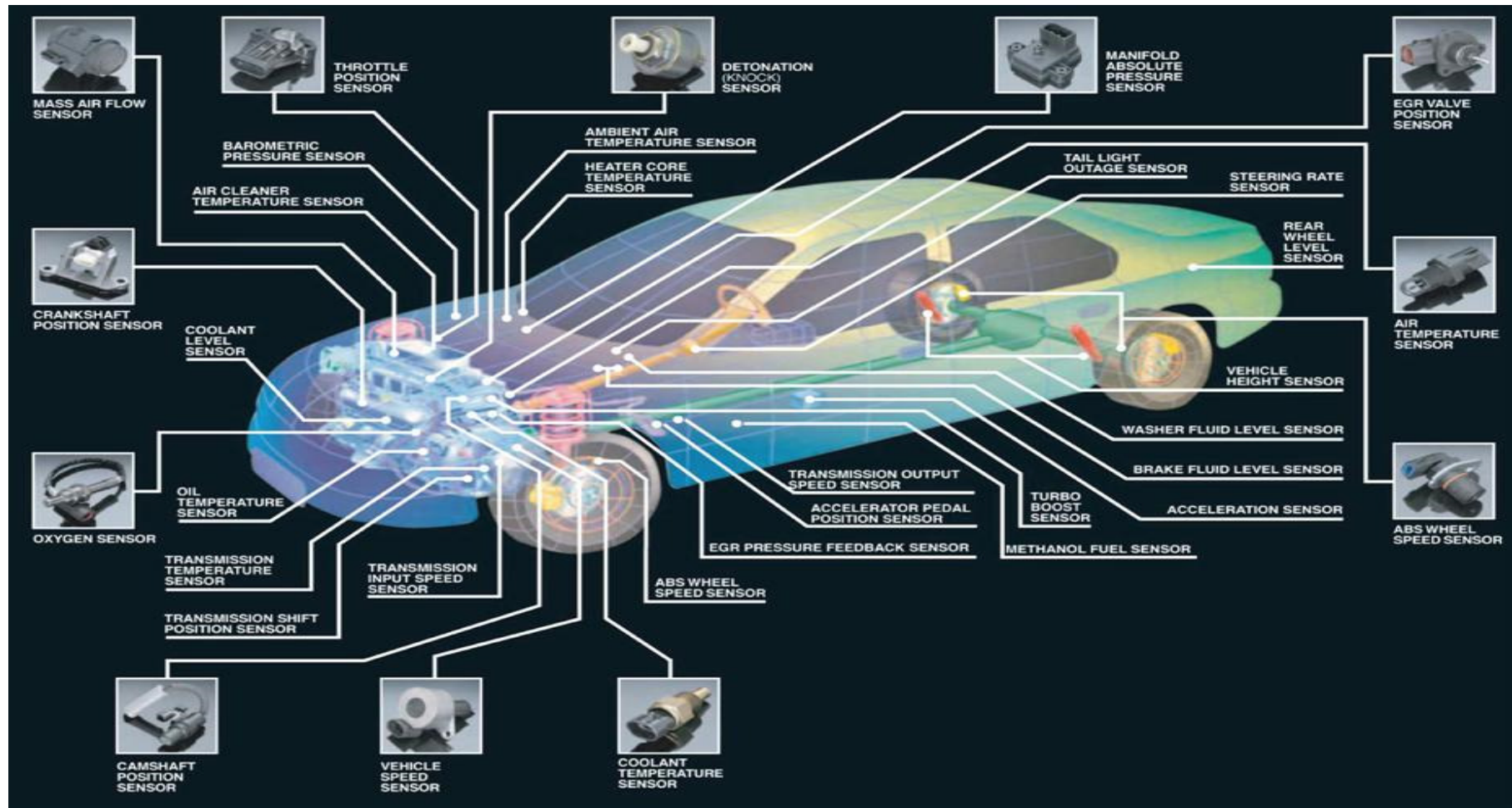
Source: sensormag.com

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WoT for Connected Vehicles

- **Utilize the best practices of both WoT and IoT worlds to enable connected vehicles scenarios**
  - Vehicular data collection using a uniform mechanism
  - Support a wide range of communication technologies
  - Deriving actionable intelligence from raw vehicular sensor data
  - Disseminate actionable intelligence using notifications

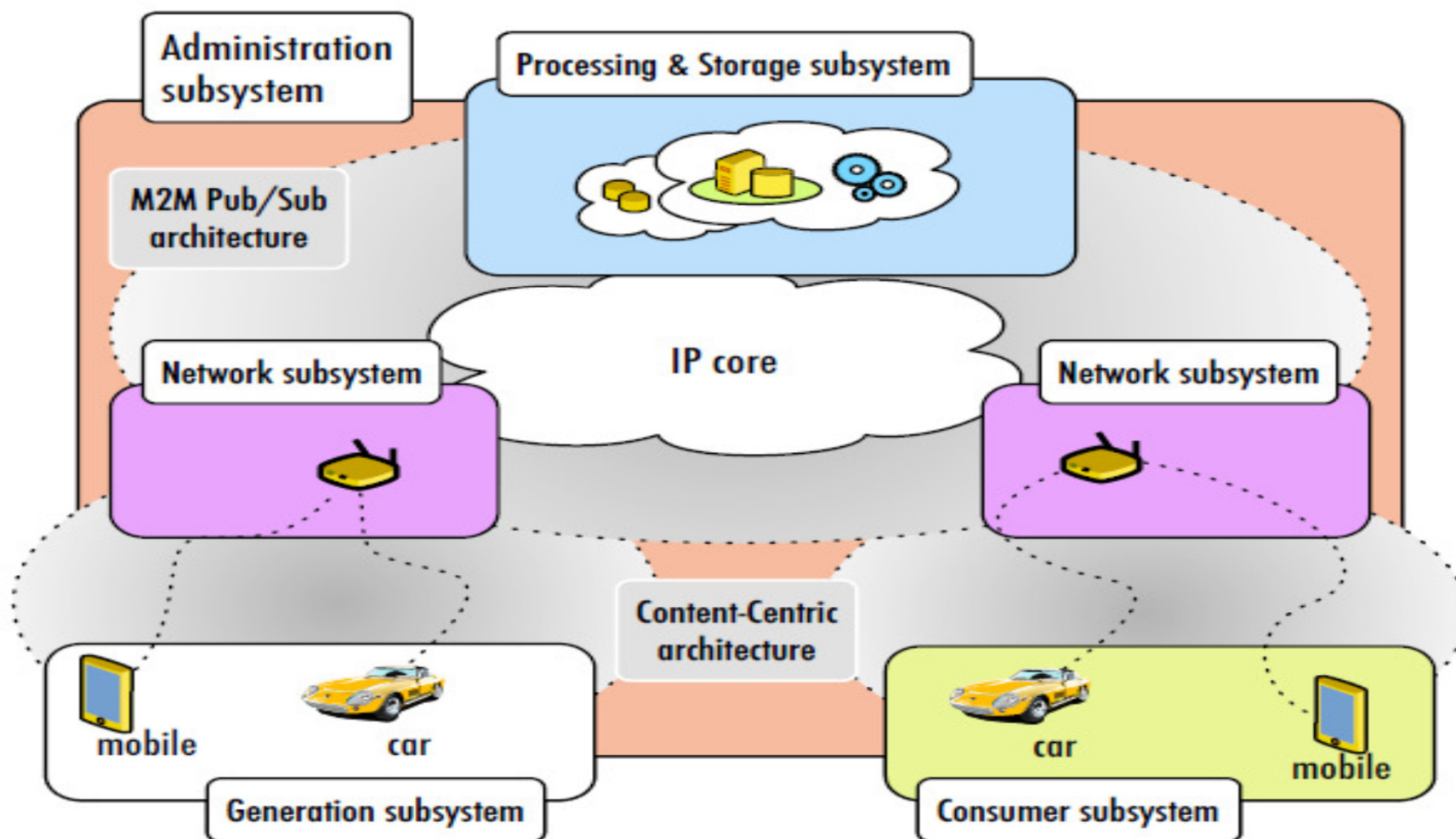EURECOM

WoT Architecture – Data Driven
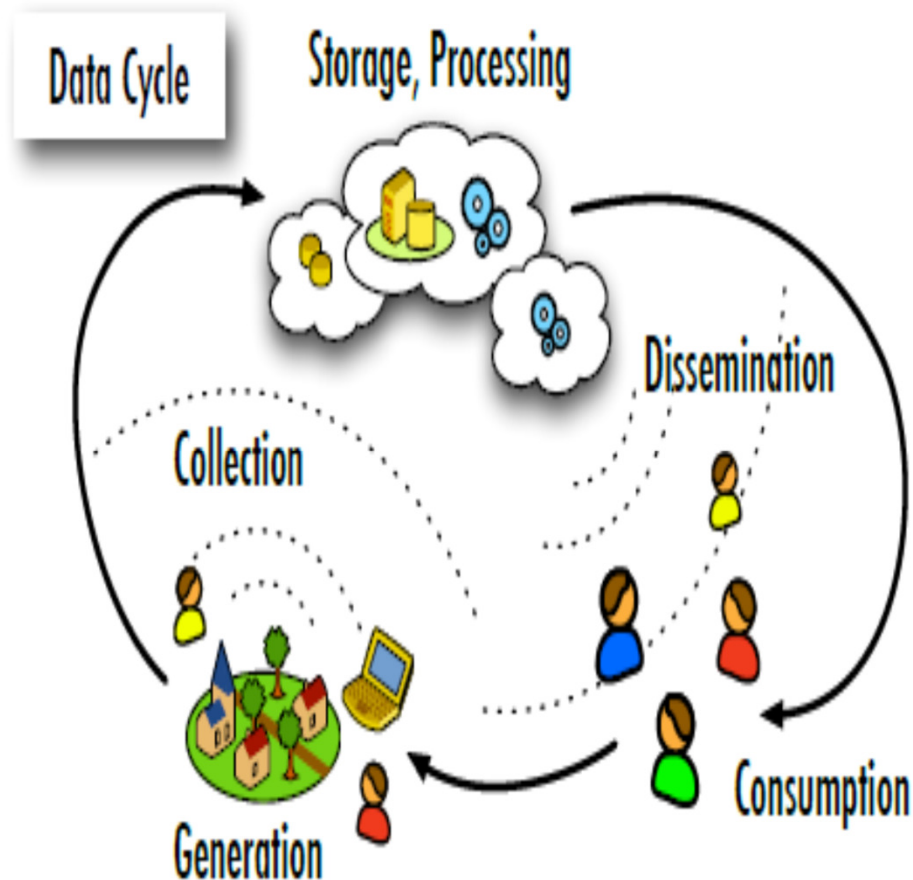
- **Data collection service**

- **Data dissemination service**
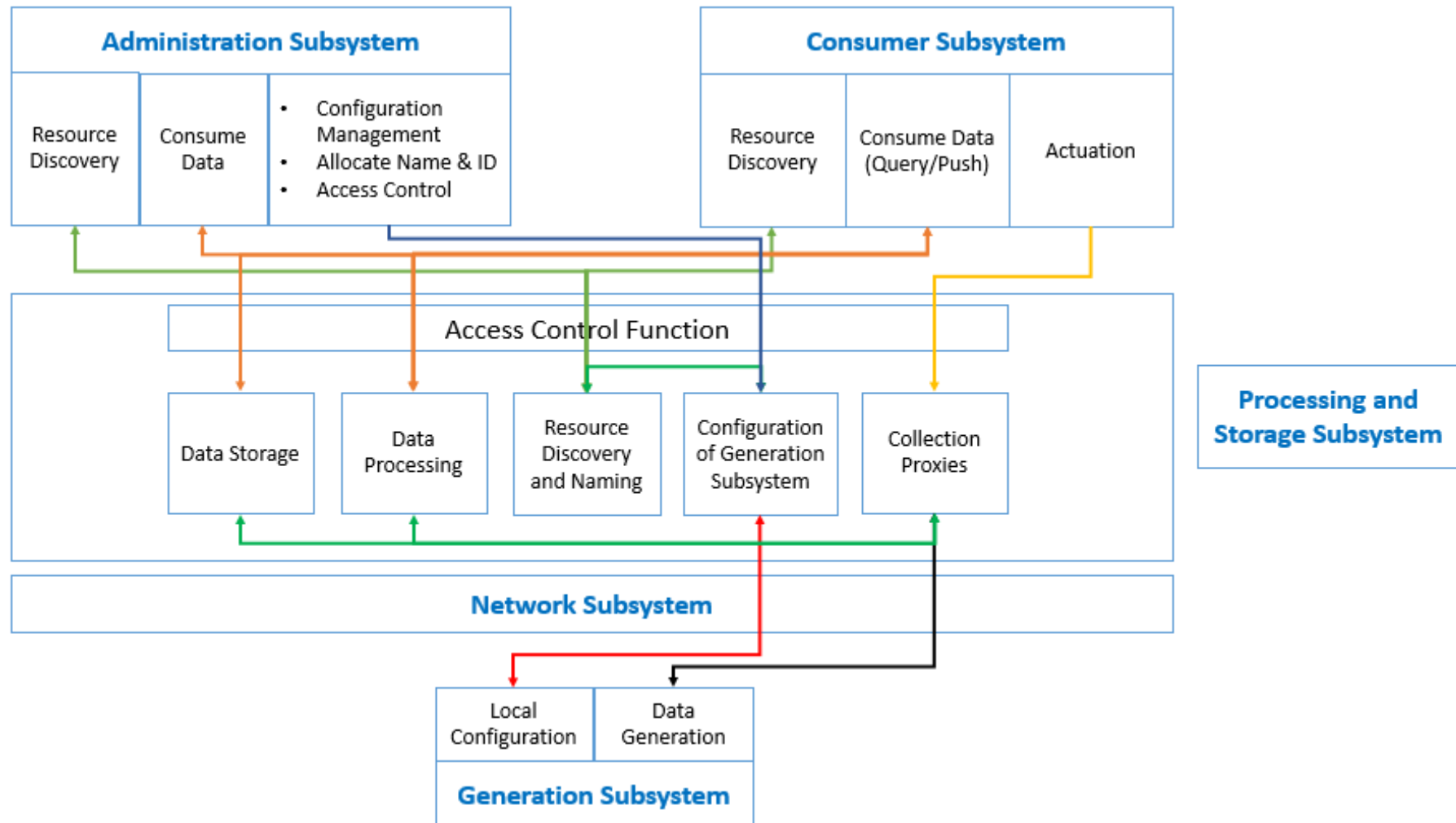
- **Data consumption service**

- **Configuration management service**

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Functional Architecture

Administration subsystem

Processing & Storage subsystem

M2M Pub/Sub architecture

IP core

Network subsystem

Network subsystem

Content-Centric architecture

mobile

car

Generation subsystem

car

mobile

Consumer subsystem

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Subsystems and Elements

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Mapping of Architecture Components

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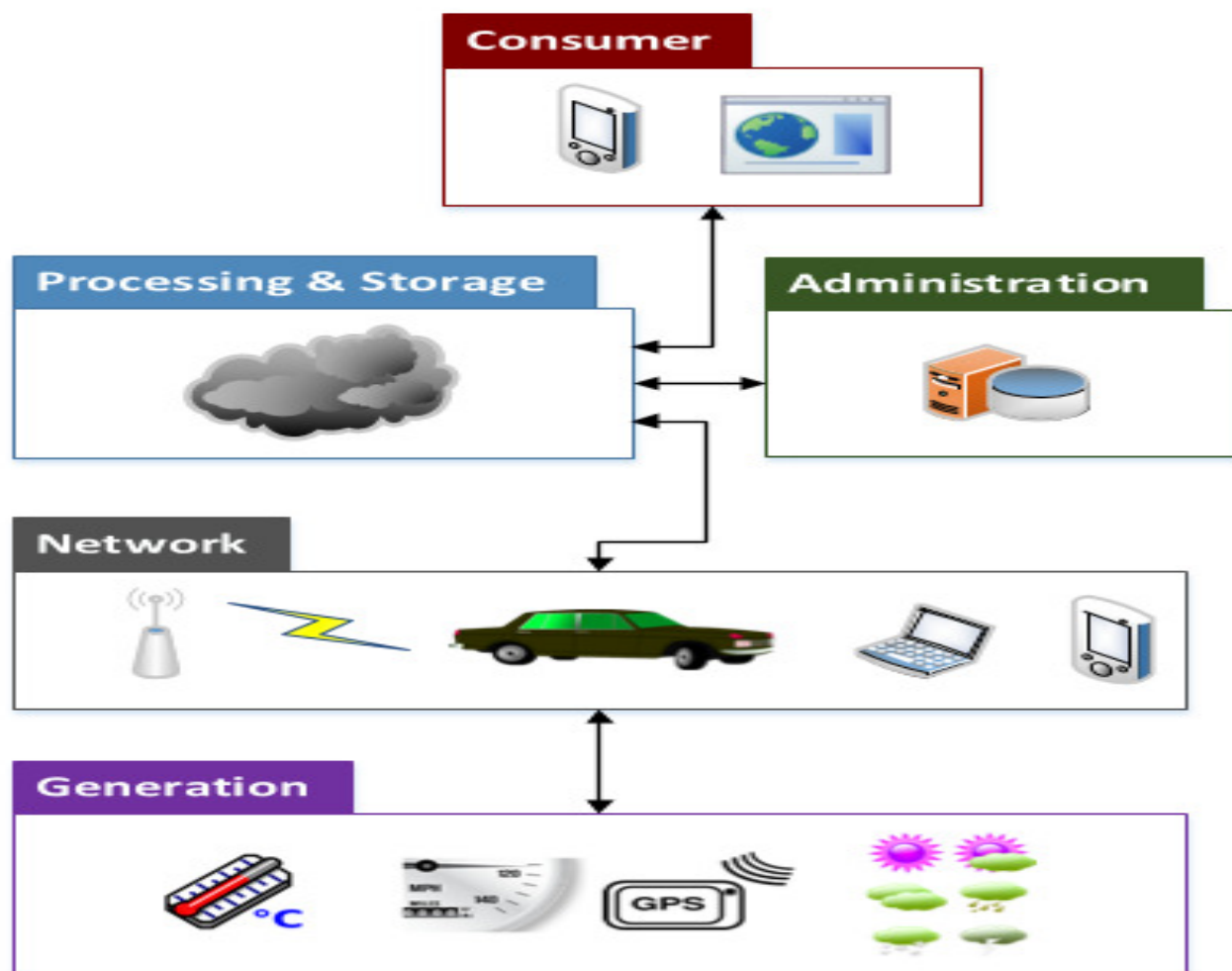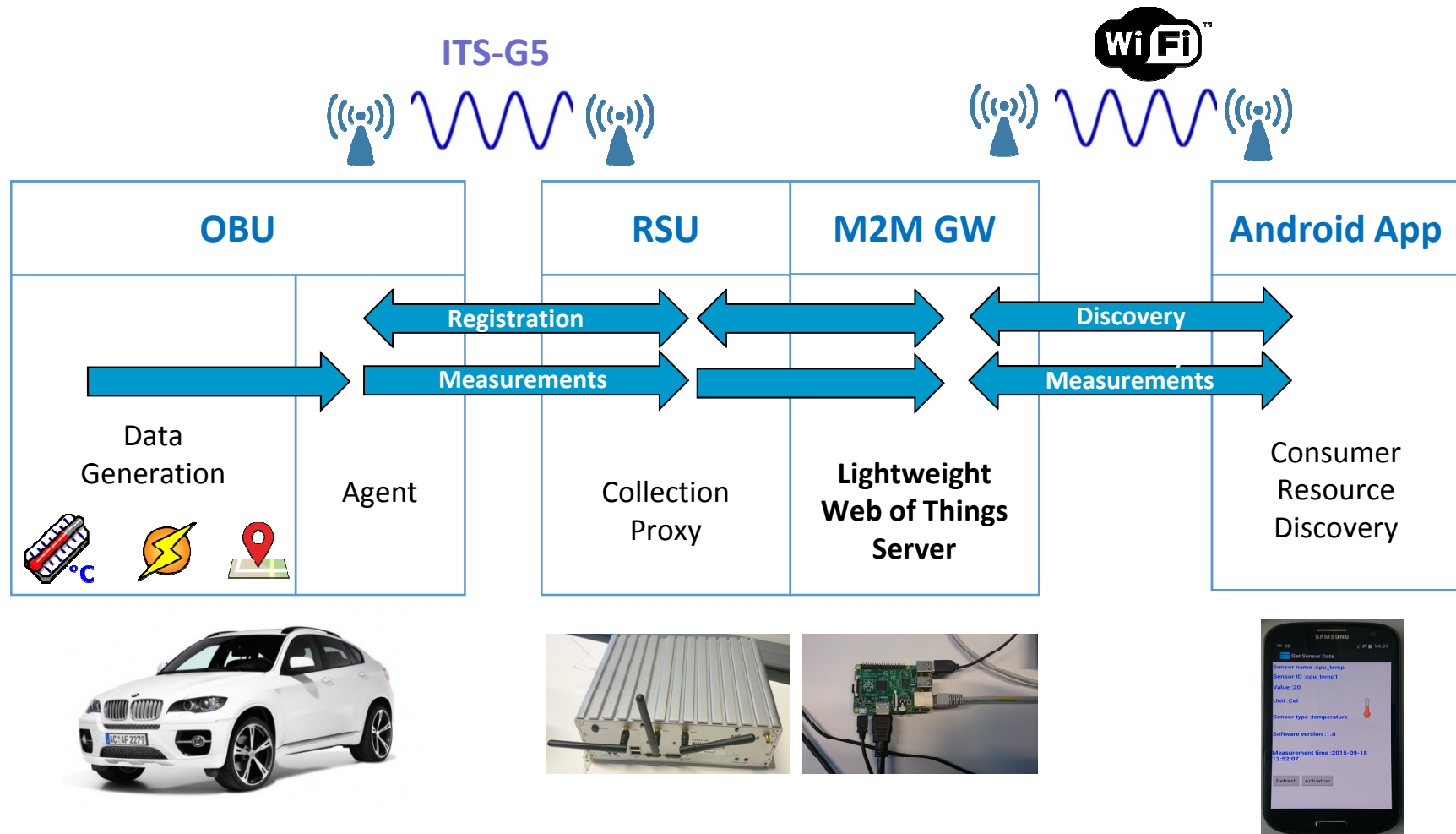- **Prototyping Experiences**

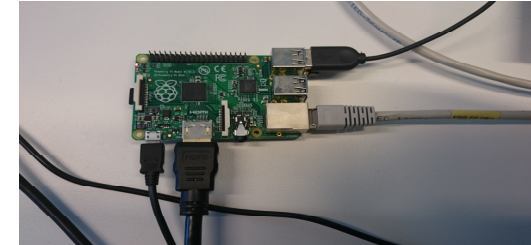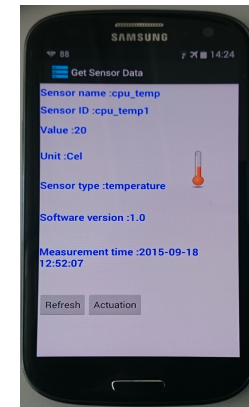- **Role of W3C**

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Prototyping Scenario

Components (1/2)

- **Hardware**
  - Nexcomm VTC-6201 – 1x OBU (vehicle) and 1x RSU (base-station)
    - IEEE 802.11p radio (5.9GHz), GPS, Wi-Fi and Ethernet.
    - ITS-G5 stack protocols embedded.
  - Raspberry Pi acting as M2M gateway
    - Supports Discovery, Registration and Data Collection
  - Android phone acting as client.

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Components (2/2)

- **Software**
  - OBU and RSU
    - Ubuntu 12.04 with ITS-G5 stack protocols and DSRC logic interface.
    - Gpsd and ntpd for GPS data manipulation.
    - Data generation, Proxy and Agent modules implemented in C.
  - **M2M Gateway running Lightweight WoT server**
    - SQLite database for sensor data storage.
    - Python language for developing the web services.
  - Android Application
    - Consumer application

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Role of W3C

- **Web of Things Interest Group (WoT IG)**
  - More details - https://www.w3.org/WoT/IG/wiki/Main_Page
  - Task forces on
    - Thing description and metadata
    - Scripting API and binding to protocols
    - Discovery and provisioning
    - Security, privacy and resilliance
  - Exploring creation of a WoT Working Group (WG)

- **Automotive WG**
  - More details - https://www.w3.org/auto/wg/wiki/Main_Page
  - Specifications
    - Vehicular Information Access API
    - Vehicular Data Spec

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Concluding Notes

- **In a nutshell -**
  - Examining the intersection of WoT and connected vehicles
  - WoT architecture to integrate vehicles as resources
  - Describing our prototyping experiences
  - Outlining the role of W3C in WoT and Automotive WG

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감사합니다 Natick

Grazie Danke Ευχαριστίες Dalu

Obrigado

Thank You Köszönöm

Tack

Спасибо Dank Gracias

谢谢 Merci Seé ありがとう

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Thank you!

- **Email: Soumya-Kanti.Datta@eurecom.fr**
- **Twitter: @skdatta2010**

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