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Web of Things for Connected Vehicles

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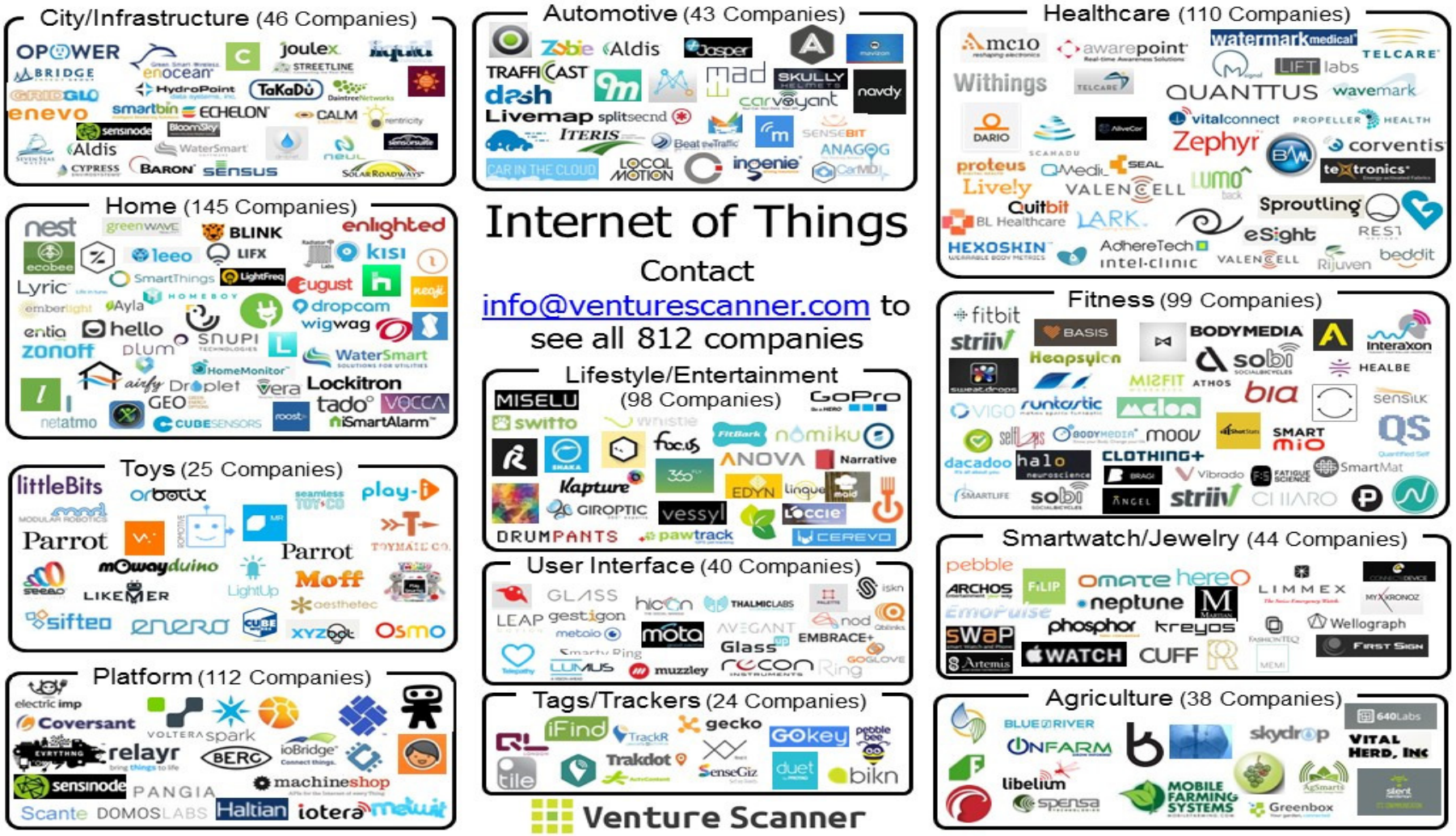
Roadmap

- Introduction
- Web of Things (WoT) Architecture & Components
- Prototyping Experiences
- Demonstration
- Conclusion

Internet of Things - Landscape



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Web of Things - Motivation

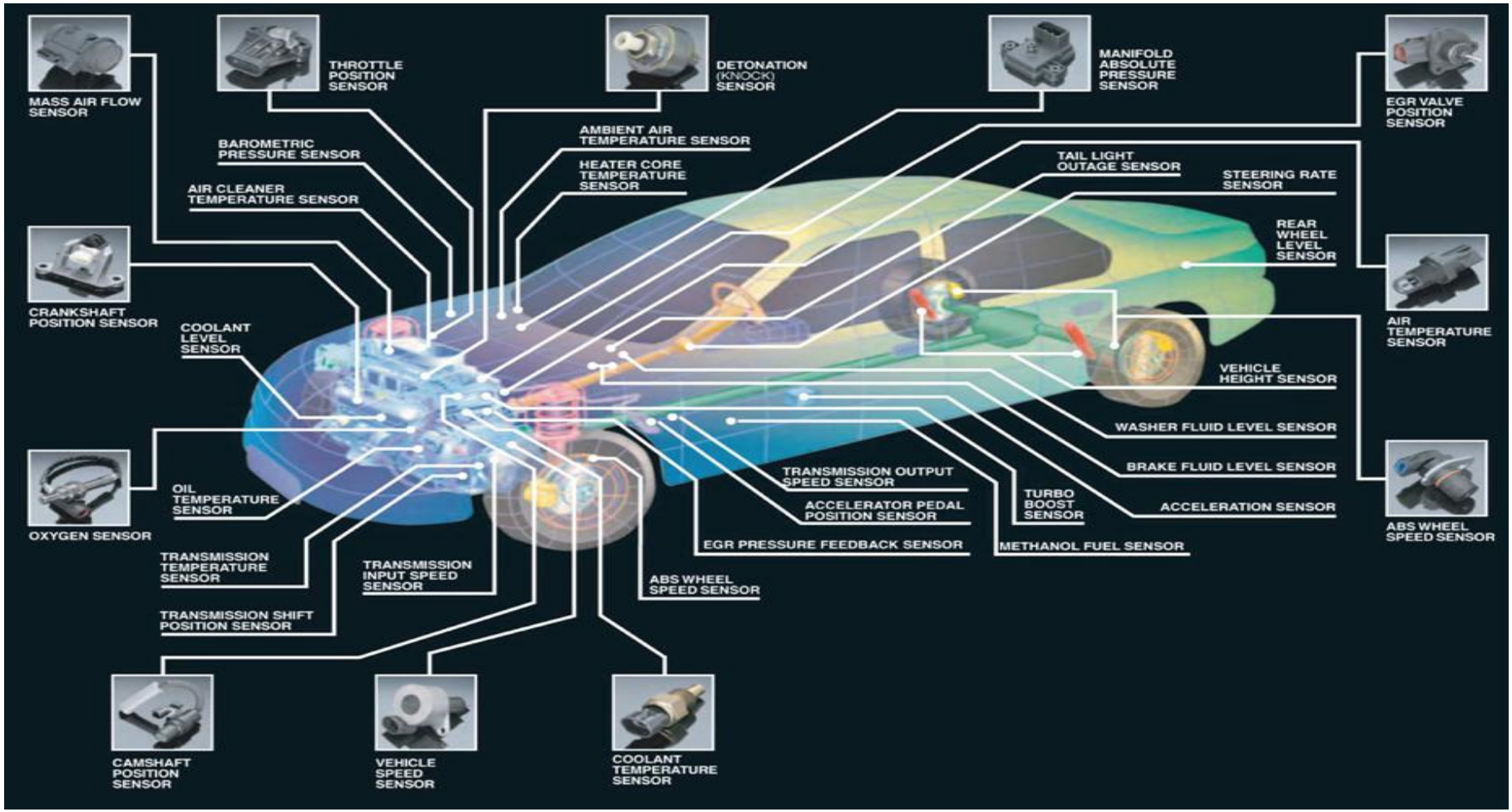
- **Web of Things (WoT) concept is becoming more popular**
  - Leverage web standards and technologies to interconnect all types of devices.
  - Expose functionalities using RESTful APIs making them easier to access and use.
  - Provide truly open, flexible, scalable and interoperable services.

Source: http://webofthings.org/

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.

Sensors in Vehicles

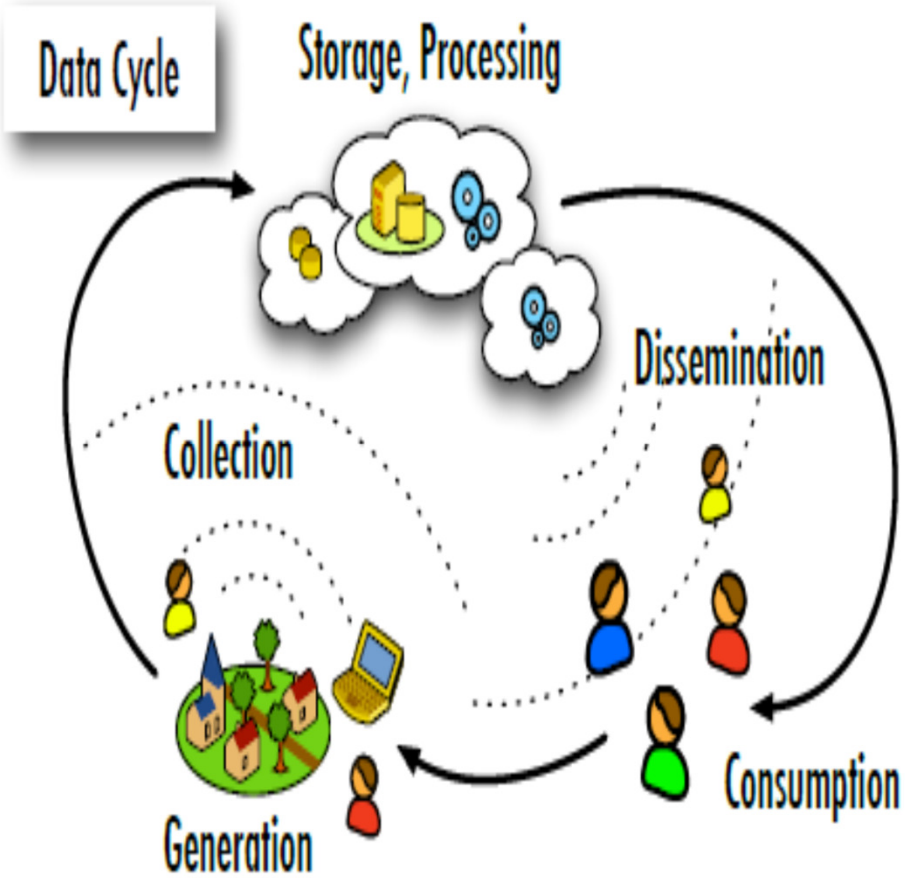


Source: sensormag.com

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

WoT Architecture – Data Driven



- **Data collection service**
- **Data dissemination service**
- **Data consumption service**
- **Configuration management service**

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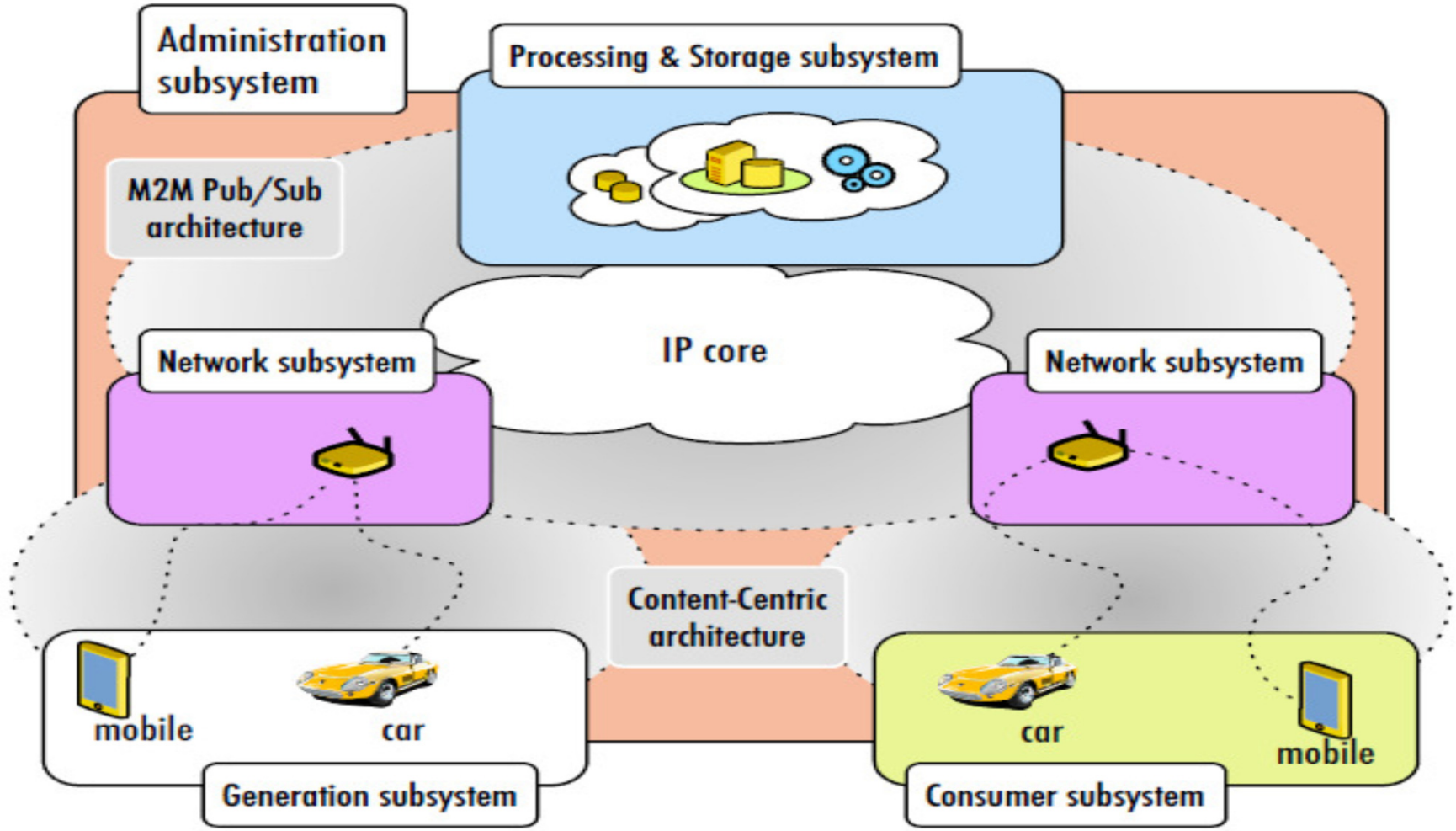
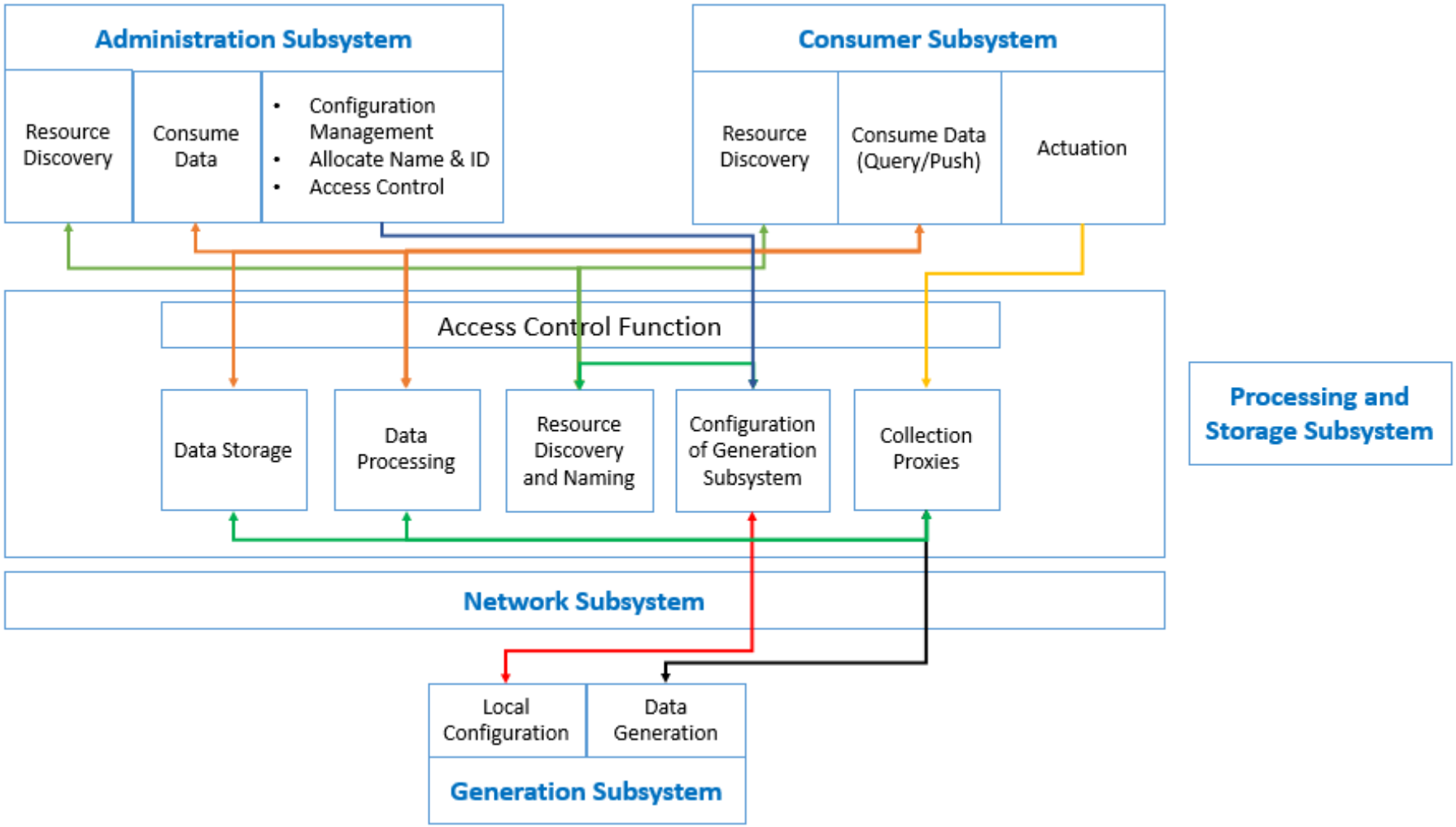
Functional Architecture



Subsystems and Elements



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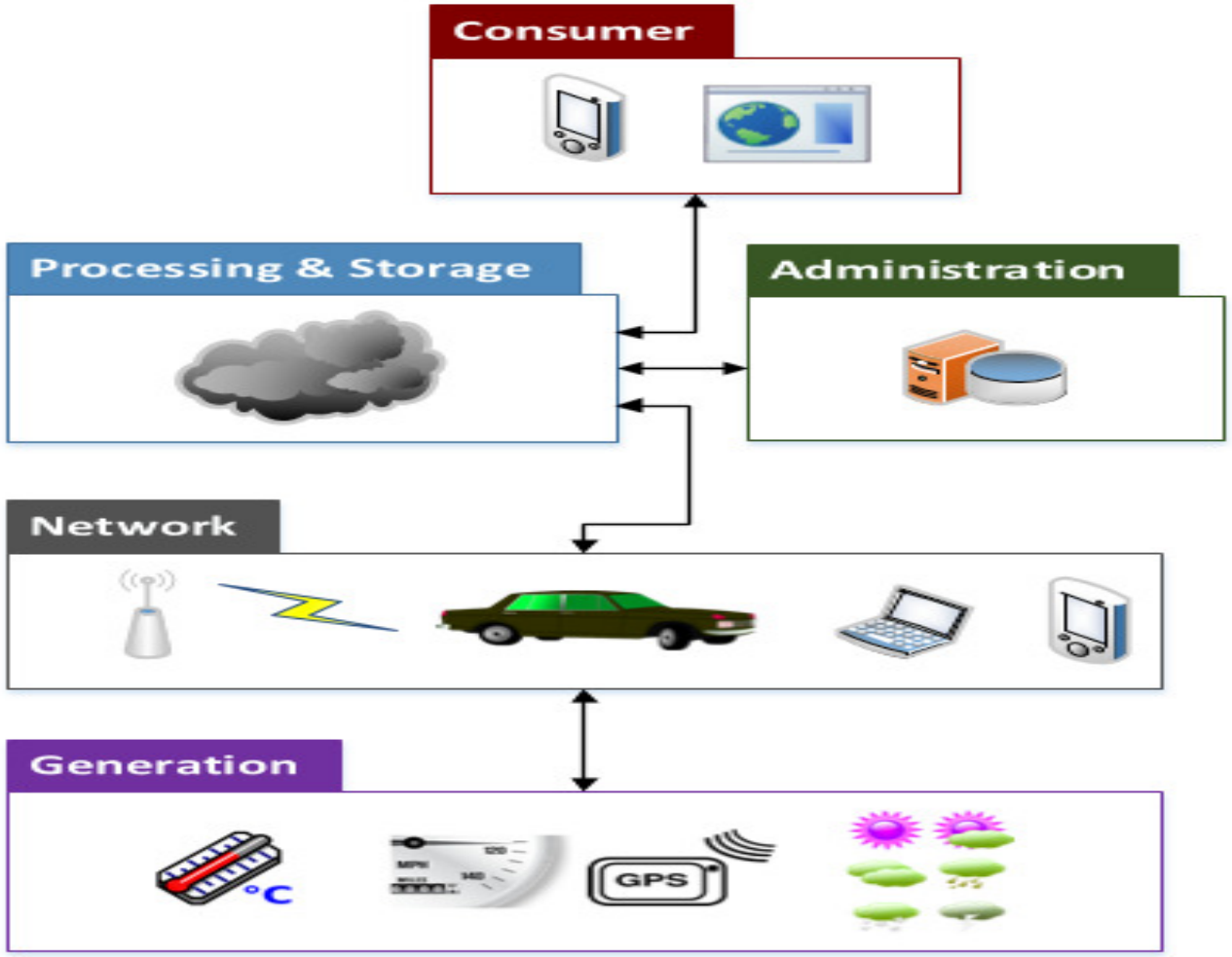
Mapping of Architecture Components



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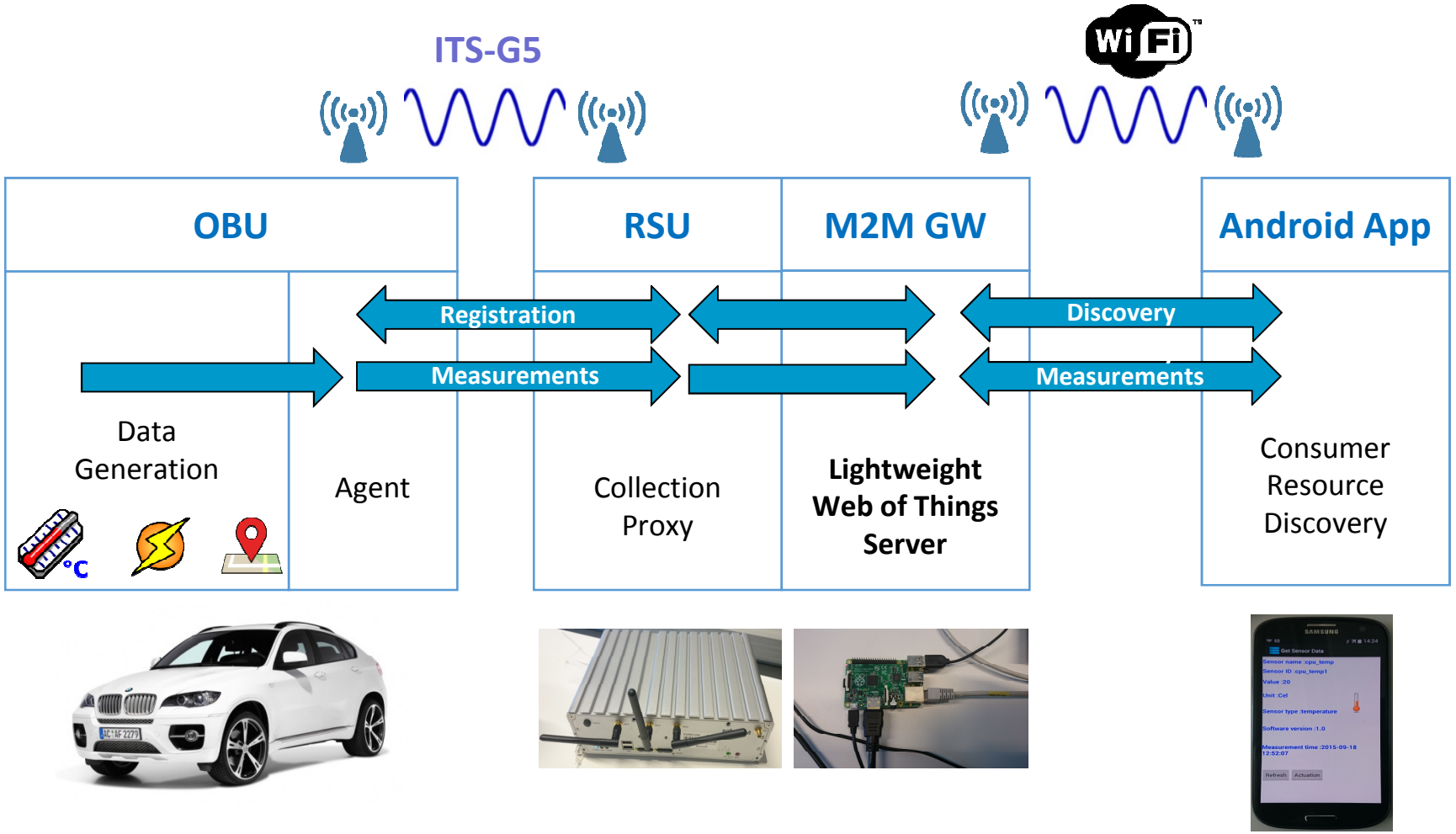
Prototyping Scenario



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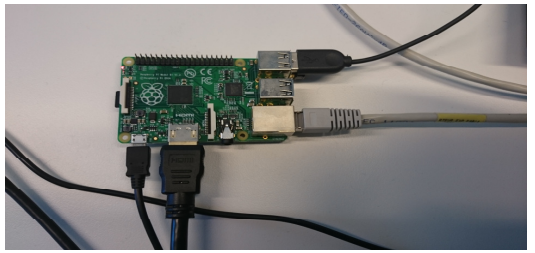
Components (1/2)

- **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.



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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Demo

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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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Thank you!

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