

6th Japan-EU Symposium on ICT Research and Innovation

October 7th, 2016
14:00 – 17:00

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SMART CITY / SMART HOME IN THE ASPECT OF R&D, DEMONSTRATIONS, STANDARDIZATION

マーク デュラントン
Marc Duranton



→ Rapid Urbanization

By 2050 the urban population will grow to 66% an increase of 2.5 billion inhabitants ¹

Need the manage the building integrity in case of natural disasters

→ Environmental Context

Cities are responsible for 78% of energy consumption, and produce more than 60% of Greenhouse Gas ²

Implementation of regulation on the energy market

→ Building Context

Residential and commercial buildings account for 45% of final energy consumption ³

→ Technological Context

Expansion of digital : several billion of connected devices by 2020, Moore Law ⁵ ...



Credit : Vincent Callebaut - Vision Paris 2050

1: source World Urbanization Prospects 2014 United Nations

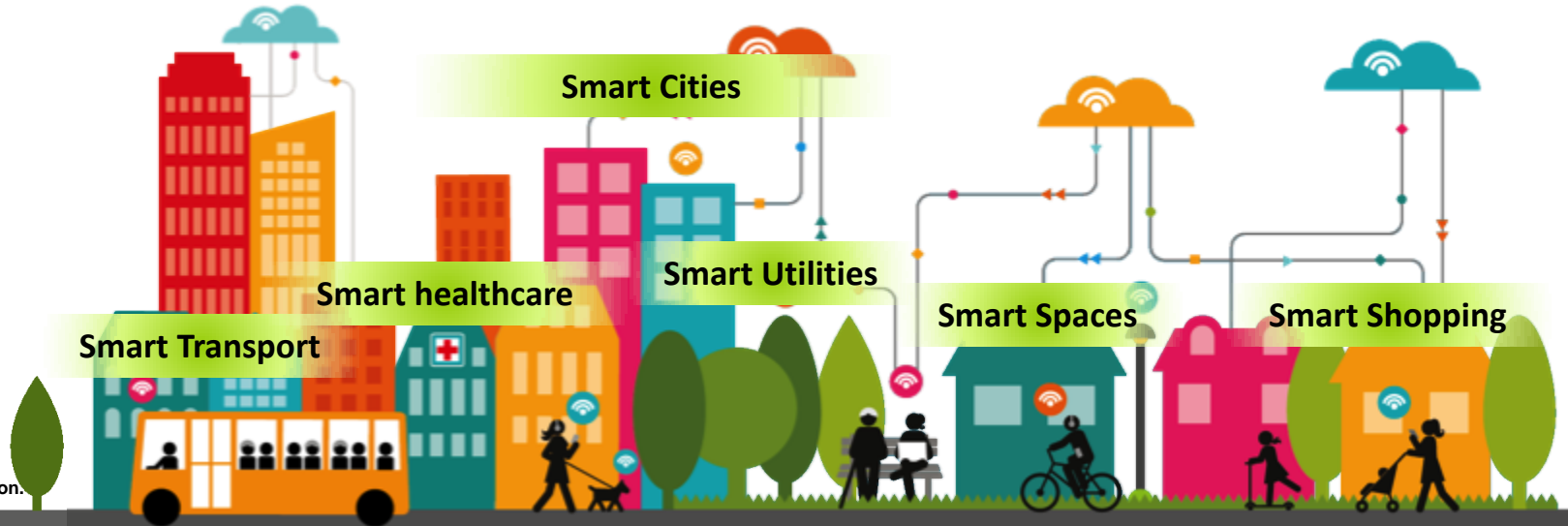
2: source UN-Habitat 2014

3: source MEDDE – SOeS 2014

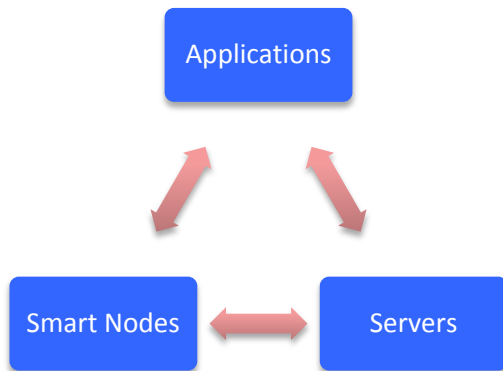
4: source Gartner 2014

5: Gordon Moore fondateur d'Intel - doublement de la puissance de calcul à cout constant tous les 18 mois – loi vérifiée depuis 50 ans

... AN ENABLER FOR SMART SOCIETY

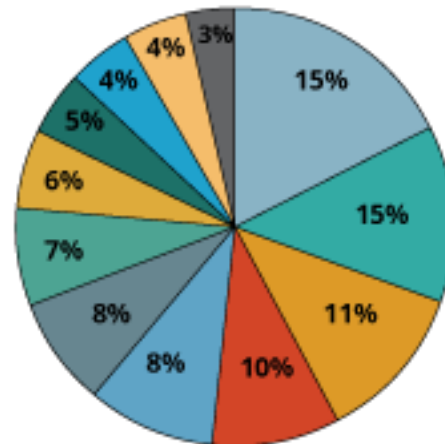


MANY OPPORTUNITIES AND CHALLENGES



Internet of Things Value Add by 2020

\$1.9 Trillion



- Manufacturing
- Government
- Healthcare Providers
- Transportation
- Insurance
- Utilities
- Banking & Securities
- Real Estate & Business Services
- Retail & Wholesale
- Agriculture
- Computing Services
- Other

Source: Gartner

What is smart city?



What is smart city?



Be responsive
Collect information
respecting privacy



What is smart city?



Analyze, reason, plan,
learn
City Artificial Intelligence



Be responsive
Collect information
respecting privacy

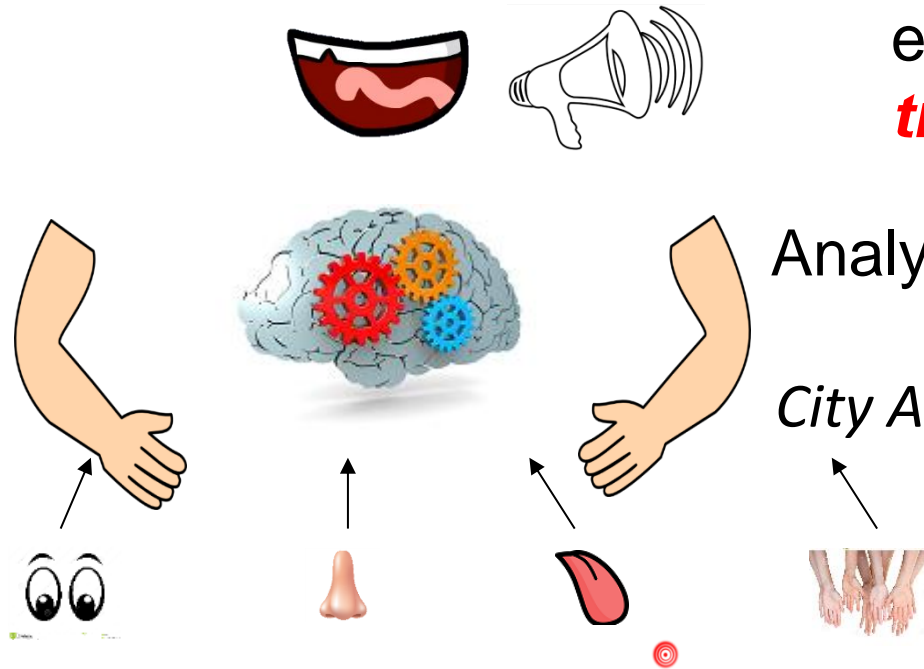


What is smart city?

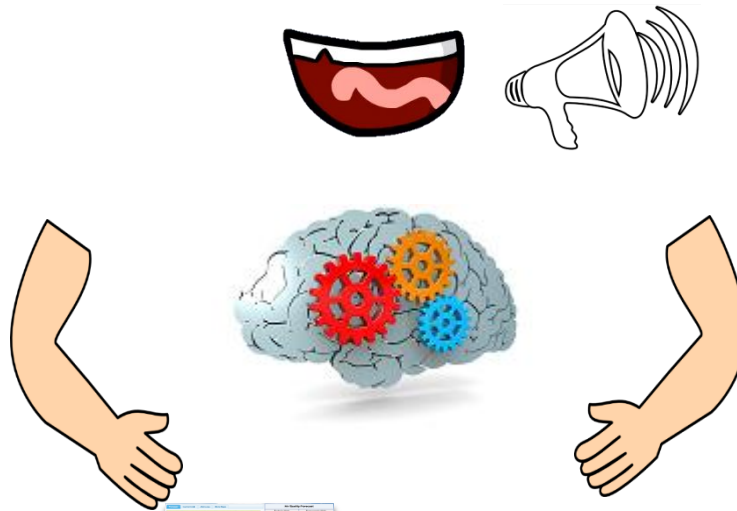
Act **rapidly** and efficiently in a **trusted** manner

Analyze, reason, plan, learn
City Artificial Intelligence

Be responsive
Collect information respecting privacy



What is smart city?



Social networks



Mobile applications



WorldWideWeb



Legacy Devices

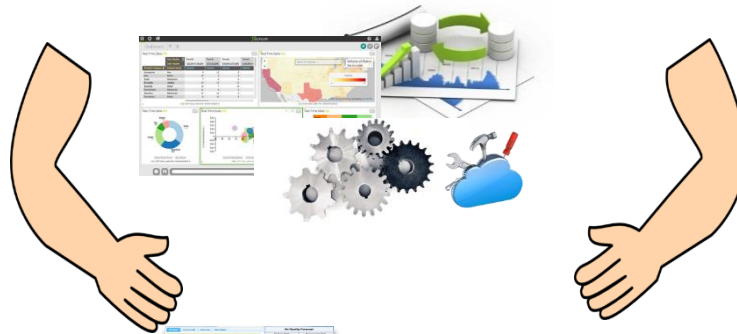


IoT Devices

City data sources
IoT



What is smart city?



Big data processing, data mining, data analytics, cloud computing, Artificial Intelligence, visualization...



Social networks



Mobile applications



WorldWideWeb



Legacy Devices



IoT Devices



What is smart city?



Actuators, dashboards,
Cyber Physical
Systems, information
systems, business
processes...



**Social
networks**



**Mobile
applications**



WorldWideWeb



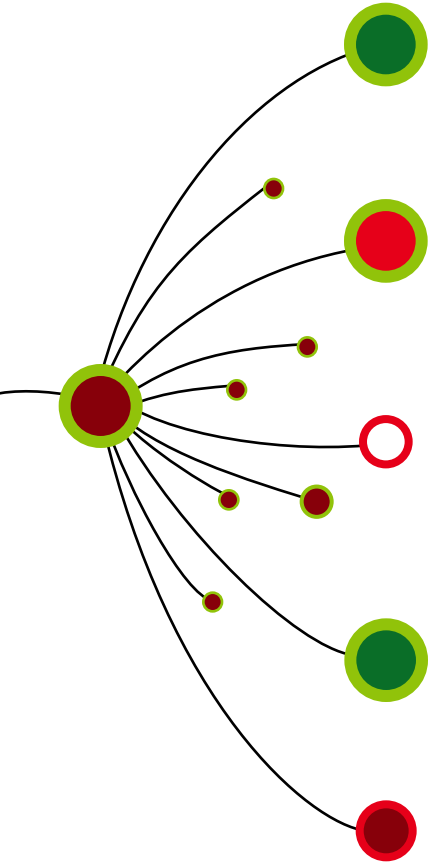
**Legacy
Devices**

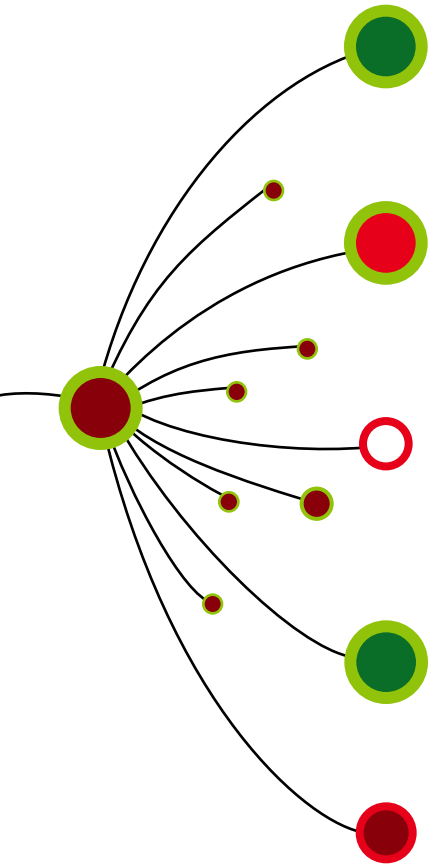


IoT Devices



Achieving true smart cities and smart homes will require to solve many challenges





Heterogeneity/Interoperability: How to handle the numerous types of devices, protocols, standards?

Home/Building



Manufacturing/ Industry Automation



Vehicular/ Transportation



Healthcare



Energy



Cities



Wearables



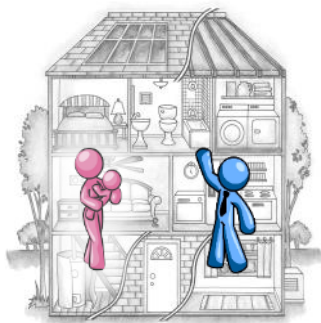
Farming/ Agrifood



Horizontal/Telecommunication

Source: AIOTI WG3 (IoT Standardisation) – Release 1.3

SmartHome



- Monitoring and controlling
- Saving energy comfortably
- Interacting with appliances
- ...

SmartHealth

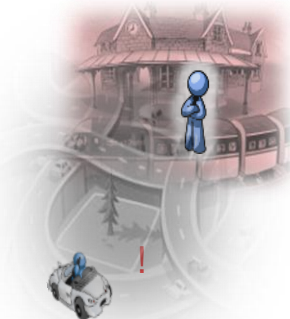
- Monitoring medicine intake
- Personalized diabetes assistance
- Providing training tips
- ...



SmartTransport

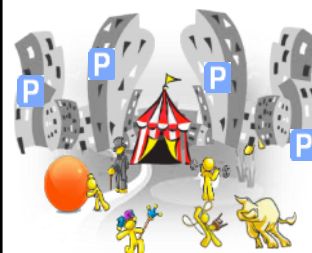


- Promoting carpooling
- Minimizing taxi delays
- Avoiding traffic jams
- ...



SmartCity

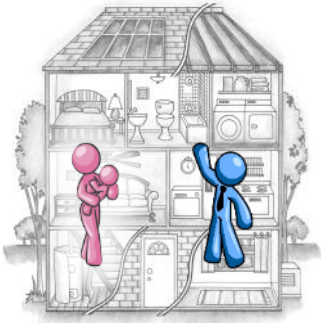
- Managing parking space
- Lighting up a city efficiently
- Monitoring Air Quality
- ...



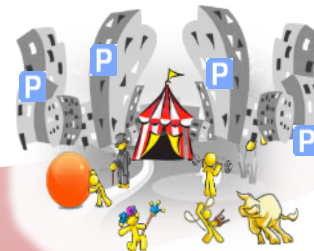
SmartShopping



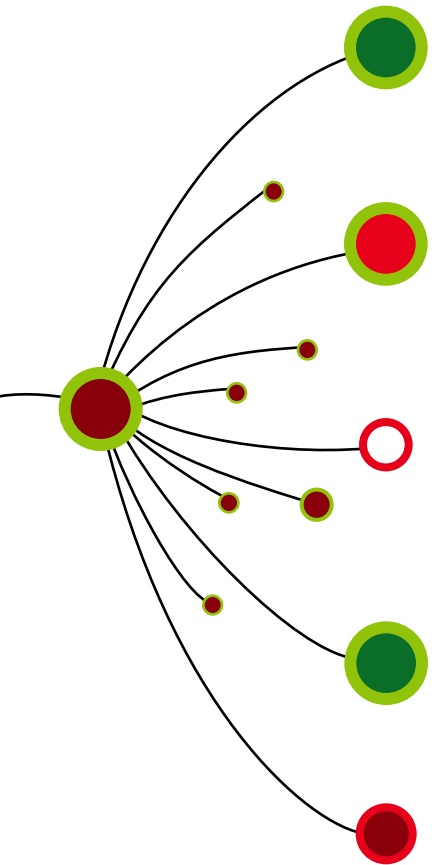
- Managing sparkdeals
- Getting advice on buying goods
- Retrieving discount
- ...



SmartLife



Illustrations from the EU FP7 BUTLER project

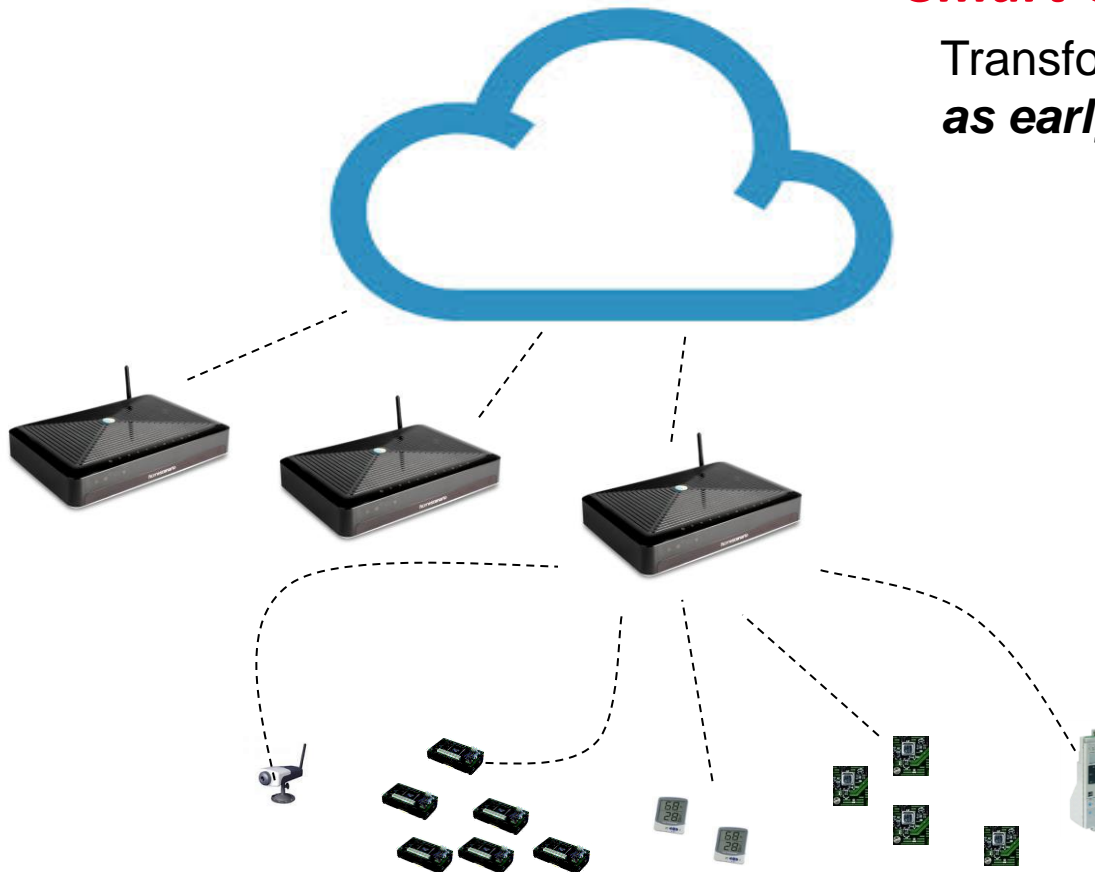



Heterogeneity/Interoperability: How to handle the numerous types of devices, protocols, standards?

Scalability: How to handle the big number of connections/big data coming from millions of devices?

Smart Computing Distribution

Transforming **data** into **information** as early as possible



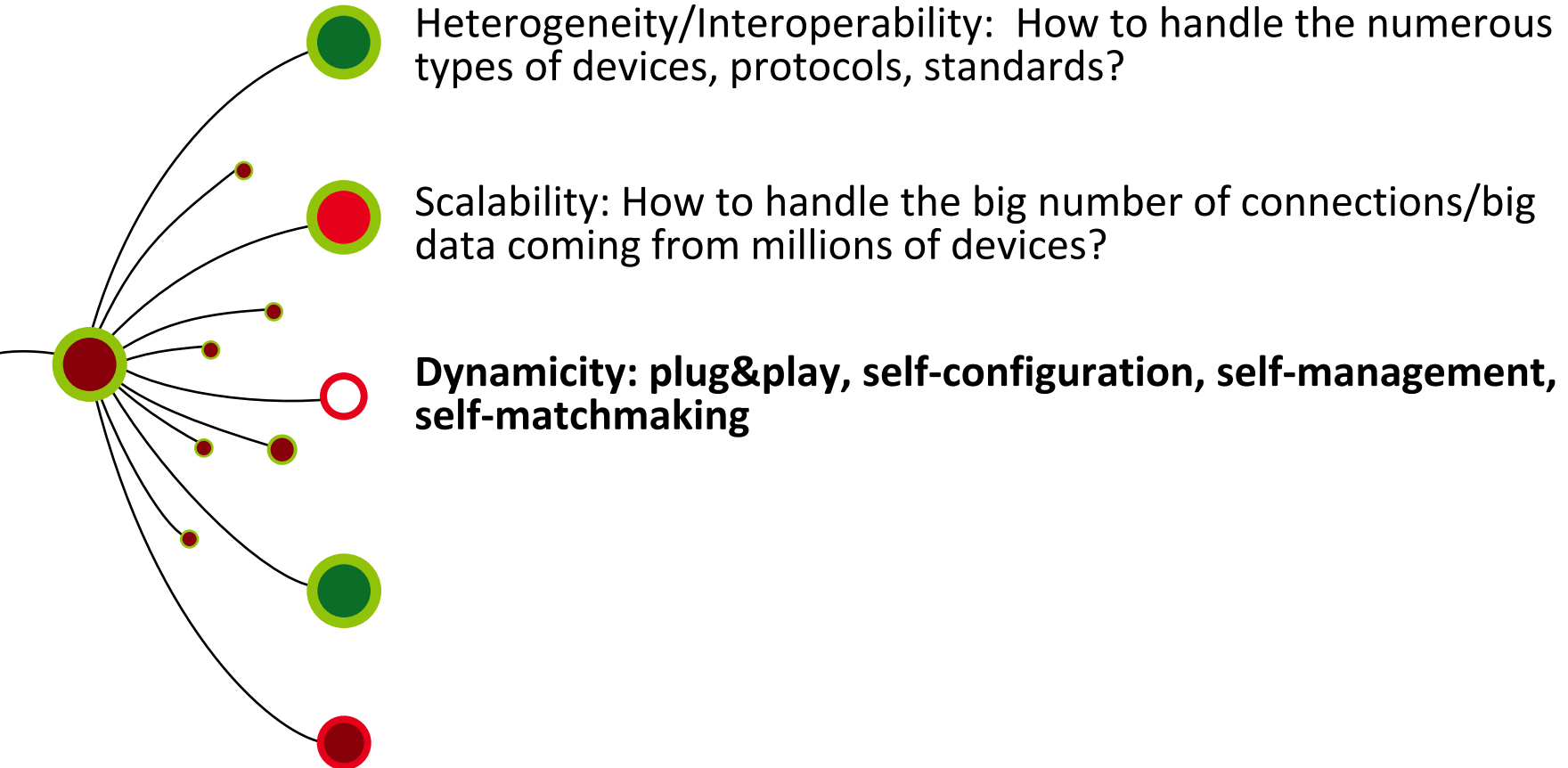
Stream data processing 

Stream data processing 

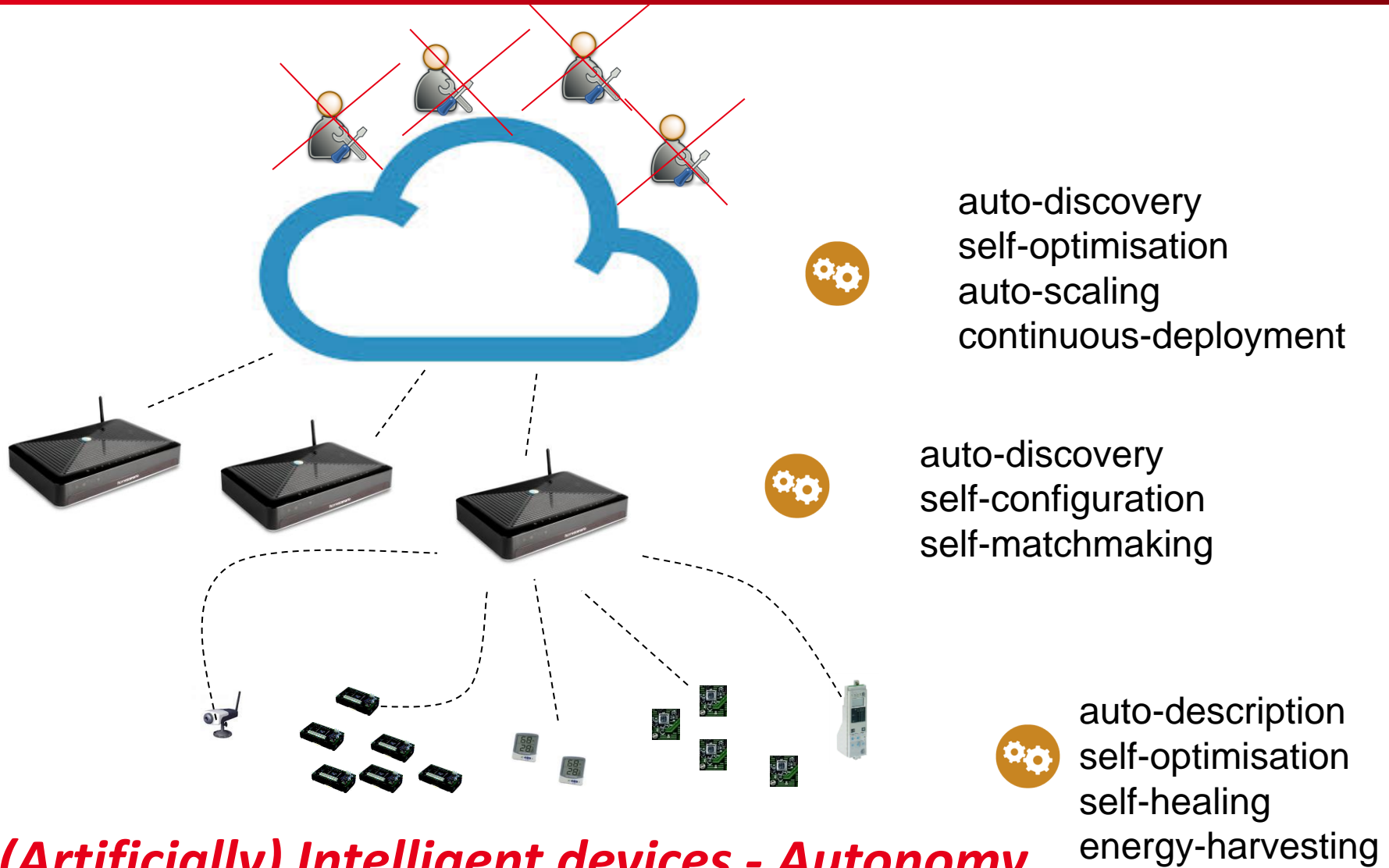
Stream data processing 

Stream data processing 

Communication costs more than computing, exploit computing capabilities as much as possible

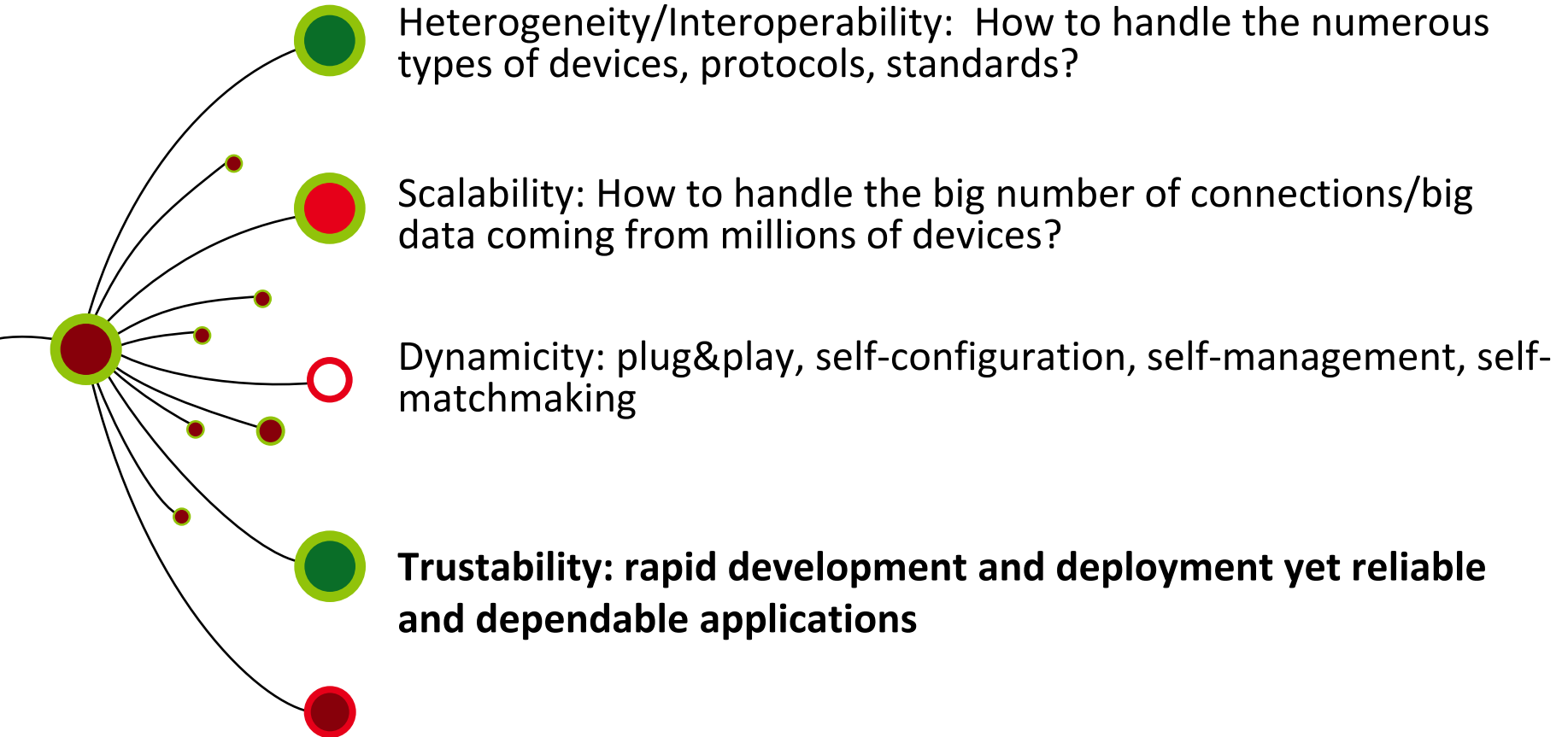


Plug&play, self-management with minimum human intervention

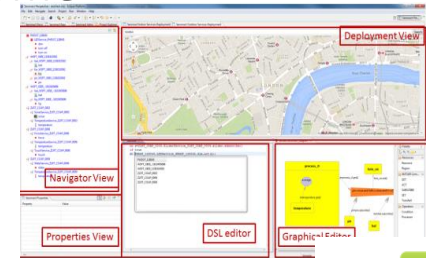
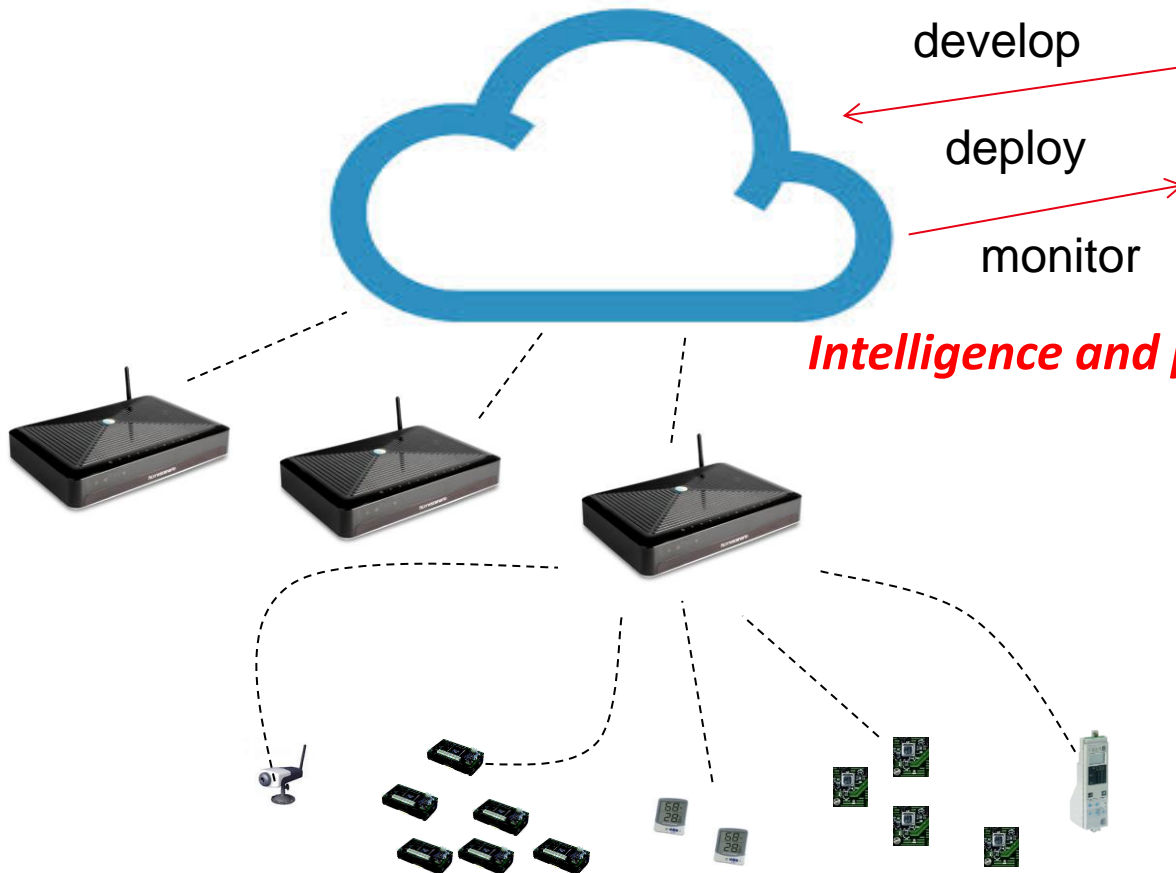


(Artificially) Intelligent devices - Autonomy

Avoiding the “black box” syndrome, IA for controlling devices access

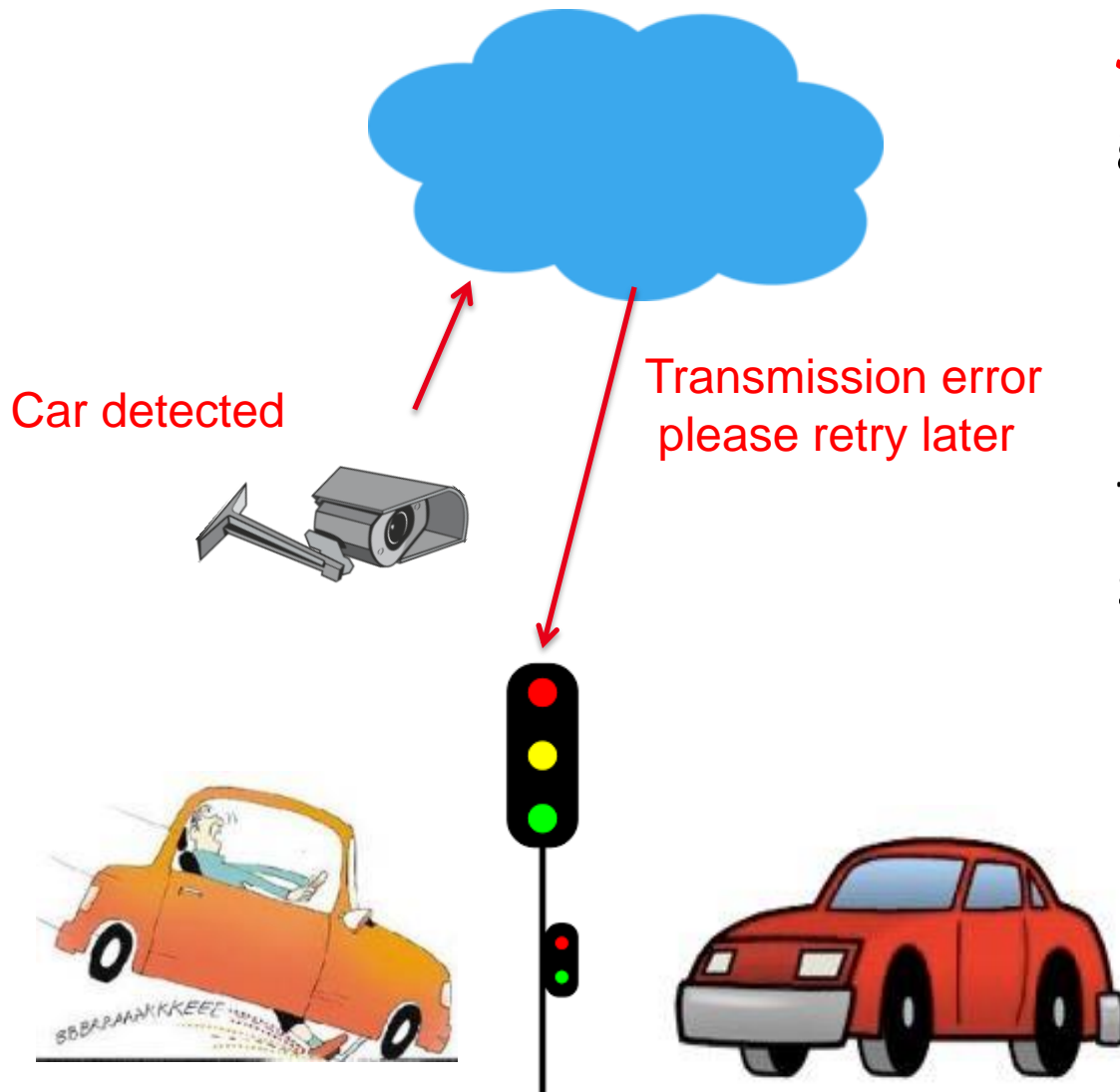


People should have **trust** in the smart city or smart home

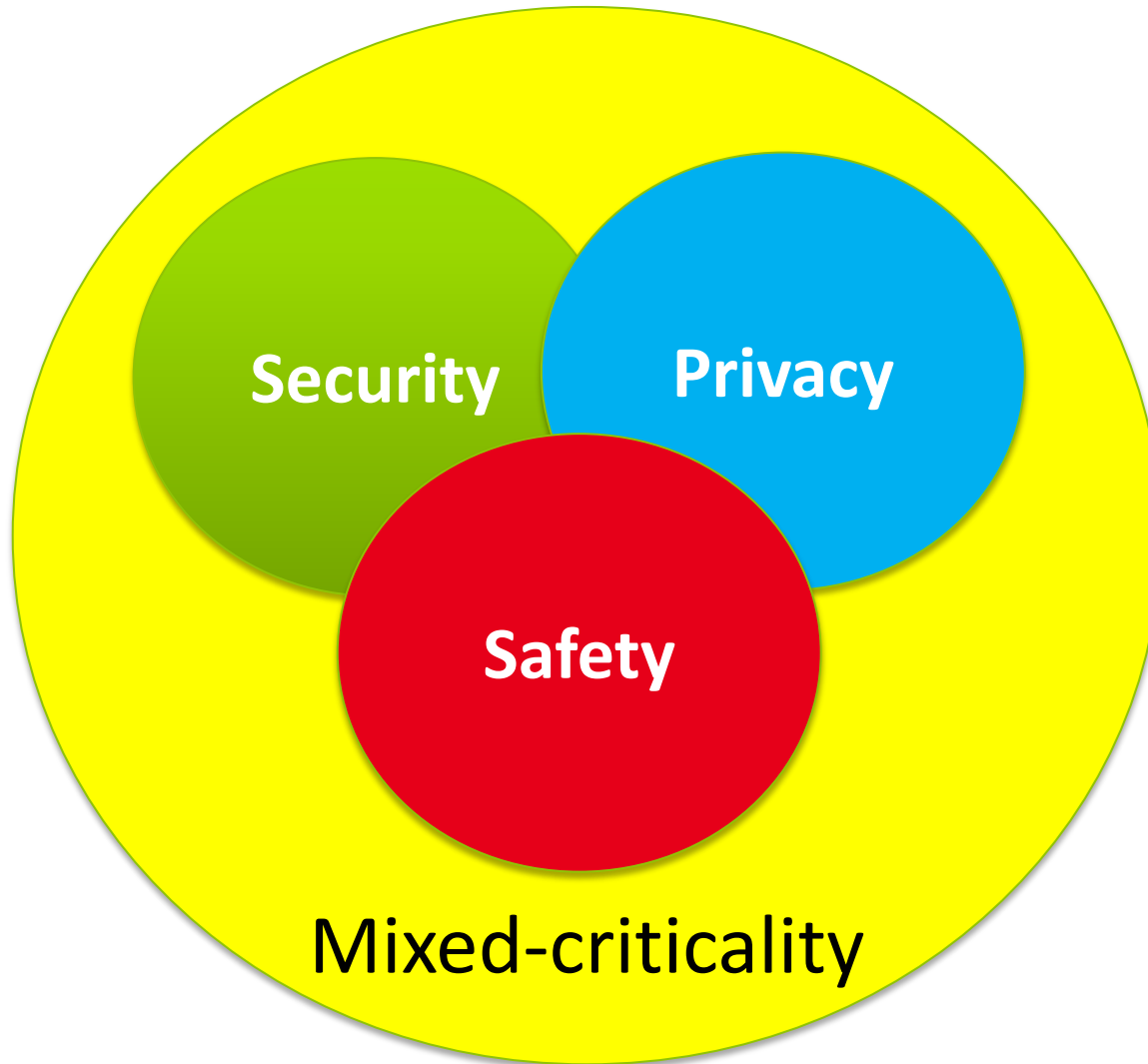


Intelligence and predictability

- Dependability
- Correctness
- Predictability
- Safety**
- Real-time
- Reliability
- Security
- Autonomy



Safety will impose guaranteed performances so that users can **TRUST** the services of the smart-city



Security \neq Privacy \neq Safety



Heterogeneity/Interoperability: How to handle the numerous types of devices, protocols, standards?

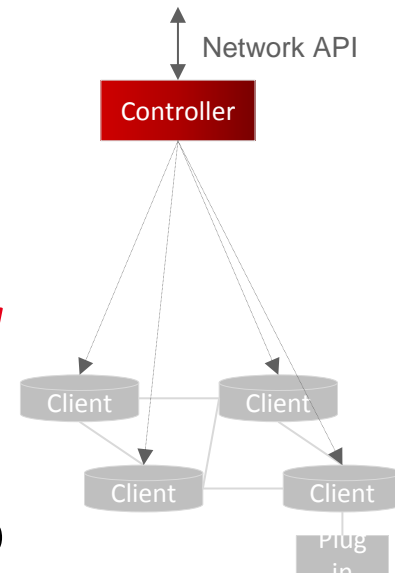
Scalability: How to handle the big number of connections/big data coming from millions of devices?

Dynamicity: plug&play, self-configuration, self-management, self-matchmaking

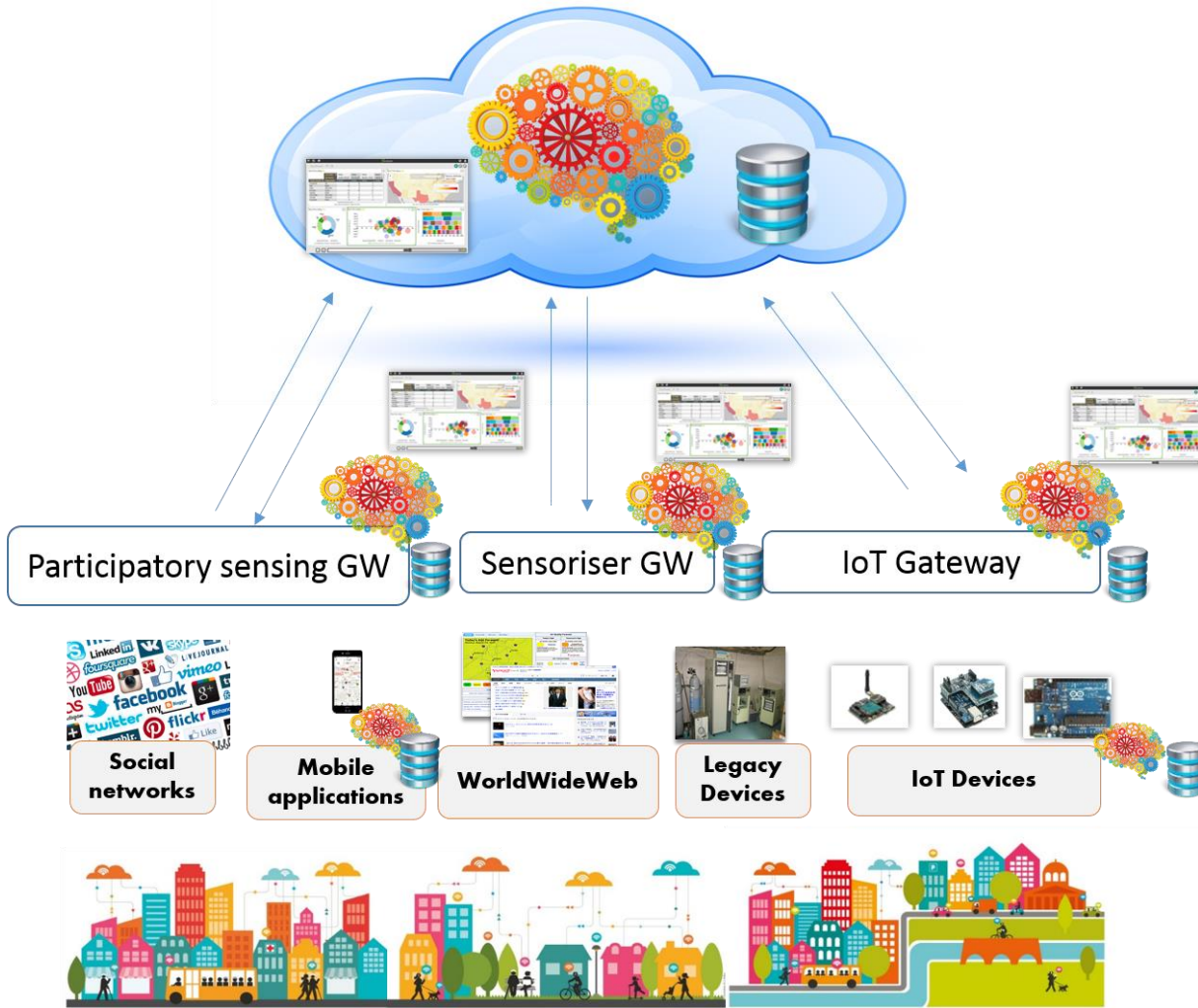
Trustability: rapid development and deployment yet reliable and dependable applications

And privacy, security and safety: Simple Efficient and Trustable (see this morning workshop)

- More **intelligent** (Cognitive) **detection and counter-measure**
 - Intrusion Detection System (IDS) that detects attacks by difference from normal behavior
 - Reconfigure the network automatically in reaction to cyberattacks
 - **Adaptive resilience** to threats from inside and outside the network
- Hide user's data "statistically": **differential privacy**
- **Homomorphic Encryption for using untrusted cloud**
- **User empowerment**: helping device owner to manage data privacy



Cloud, big data, IoT, **edge computing and Artificial Intelligence** for urban challenges with **various criticalities** (energy/water management, emergencies, civil security services, ...)



Cloud computing, analysis and visualisation on aggregated big data

Edge computing for adaptive processing, distributed intelligence and management.

Programmable city data platform including IoT and other data sources

- Japan and the European Union are two key players in the ICT field
- Scale of today's global challenges requires that we work together more closely and effectively
 - In conformity with the mutual interests and the research orientation of the EU and Japan
- Acceptance of the smart-x solutions will require collaboration, tests, validation, analysis, interoperability, dependability.
- Smart Houses and Cities are concrete enablers for active collaborative research between Japan and Europe



What to do to have smarter cities?

Understand that smart city is **not**...

Controlled world



Control of the privacy,
leak of personal information by the user

Experimentation testbed



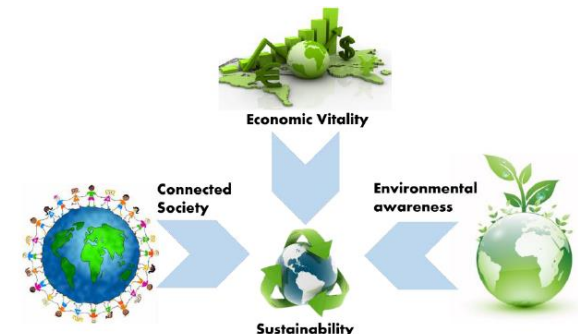
Paul Hoppe

Research object without taking real problems
into consideration

What to do to have smarter cities?

... but rather a place where citizens live, work, enjoy

- Cities belong to citizens
- Involve them in the city life (***Human in the loop***)
- Smart citizens ↗ => smarter cities





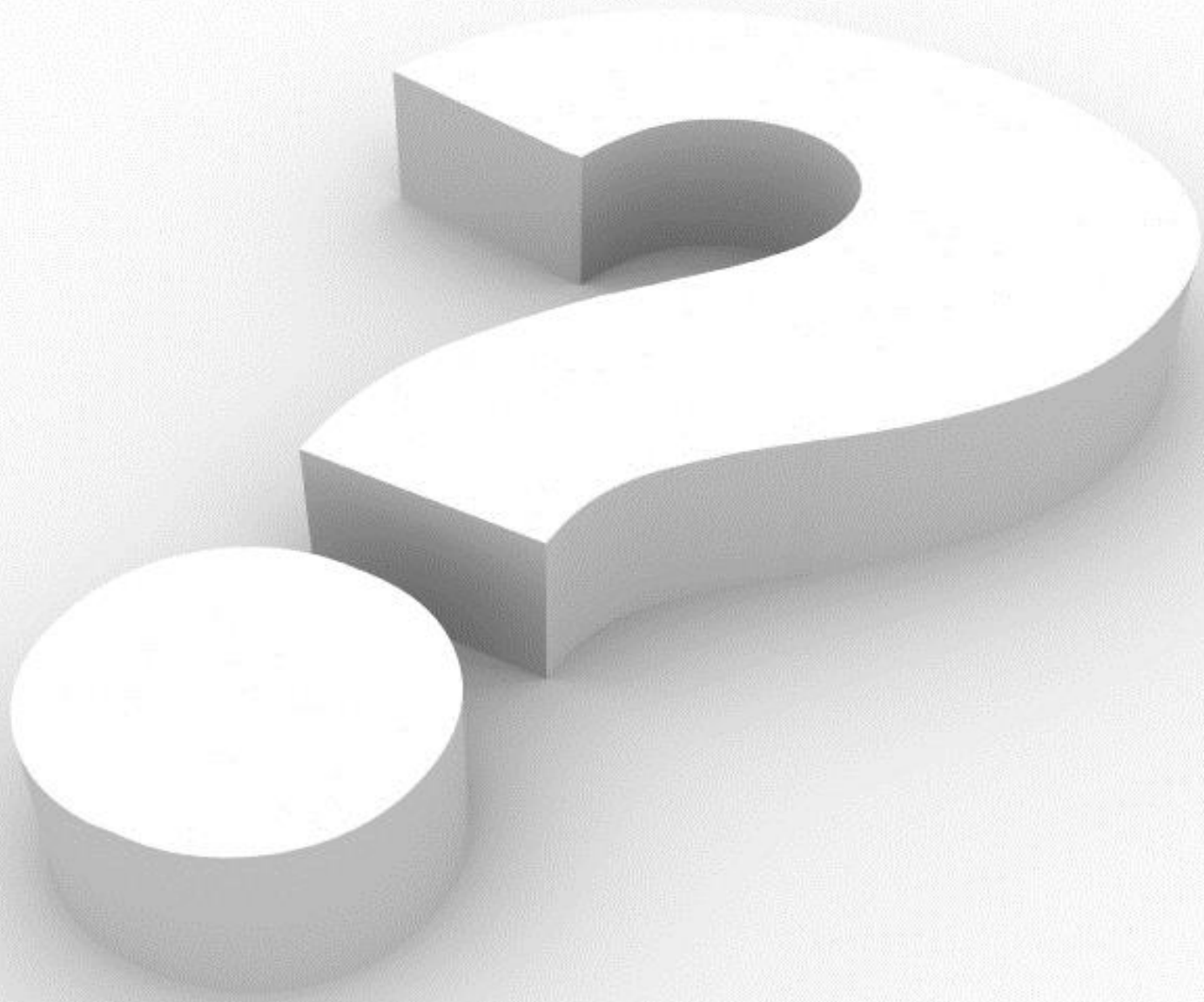
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Dynamicity: plug&play, self-configuration, self-management, self-matchmaking

Trustability: rapid development and deployment yet reliable and dependable applications

Privacy, security and safety: simple efficient and trustable





Thank you for your attention
どうもありがとうございます

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