



Why commercially viable cross-domain use cases will drive innovation and horizontalization of IoT-enabled smart cities

Building IoT Cross-Domain and Cross-Platform Interoperability
IoT Week, Bilbao

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Outline

- What is Cross-Domain?
- What is Commercial Viability?
- Sources of Best Practises in Cross-Domain Use Cases
- Examples of Cross-Domain Use Cases
- Recommendations

Motivation

“the objective is to build a case for a future proof horizontal approach that brings value to cities and citizens and derive related requirements which can drive future work on guidelines”

– Omar Elloumi

What is Cross-Domain (or Cross-Application)?

Cross-domain uses cases require access to information from different domains that is normally held in separate silos



Which use cases are commercially viable or economically sustainable?

- Is there a real city-driven need for the solution defined by the use case?
- Is the solution deployed in a city (or preferably more than one city) today?
- Does the solution have real users (rather than test users)? Roughly how many are there? Are they paying to use the solution?
- Is the solution economically sustainable? Who is providing the funding (what type of stakeholder) to maintain the service and how is the revenue shared?
- What is the value proposition? Could it be funded from a mixture of private and public funding? Is there a regulation that provides the need for this use case?
- What is impact on the CAPEX/OPEX of the stakeholders in a smart city?
- What is the commercial complexity, in terms of the different suppliers and service providers, that need to come together to offer the solution?
- Who are the actors providing data necessary to offer the solution?
- Is the solution future-proof (e.g. does it rely on a network solution that is due to be phased out) and is it sustainable?

Best Practises: H2020 Smart City Lighthouse Projects



Best Practises: H2020 IoT Large Scale Pilots



- Management of Networked IoT Wearables – Very Large Scale Demonstration of Cultural and Security Applications – www.monica-project.eu



- ACTivating InnoVative IoT smart living environments for AGEing well - www.activageproject.eu



- AUTOMated driving Progressed by Internet Of Things – www.autopilot-project.eu



- Internet of Food and Farm 2020 - www.iof2020.eu



- Delivering an IoT enabled Digital Single Market for Europe and Beyond – www.synchronicity-iot.eu



- User Engagement for Large Scale Pilots in the Internet of Things - www.u4iot.eu



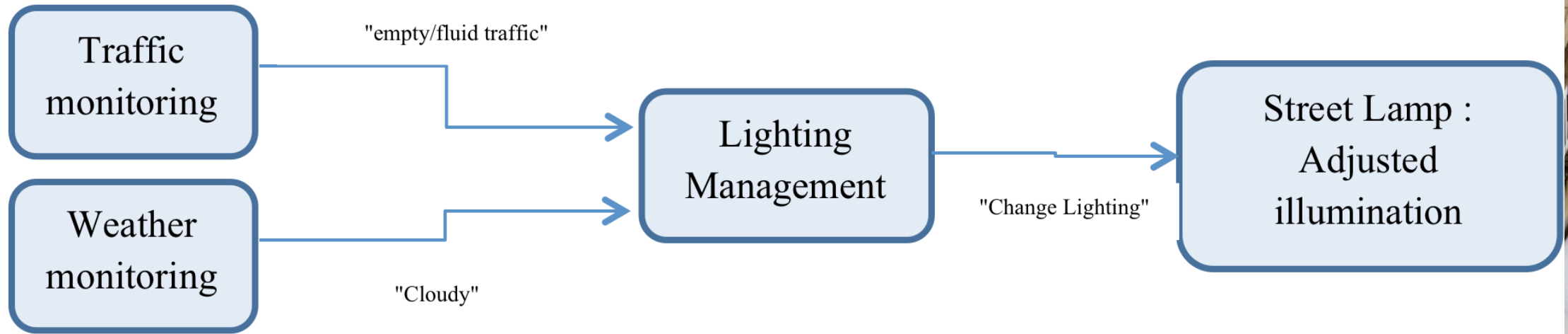
- **CR**oss **FE**ertilisation through **Al**ignmen**T**, Synchronisation and **E**xchanges for **IoT** – www.create-iot.eu

www.european-iot-pilots.eu

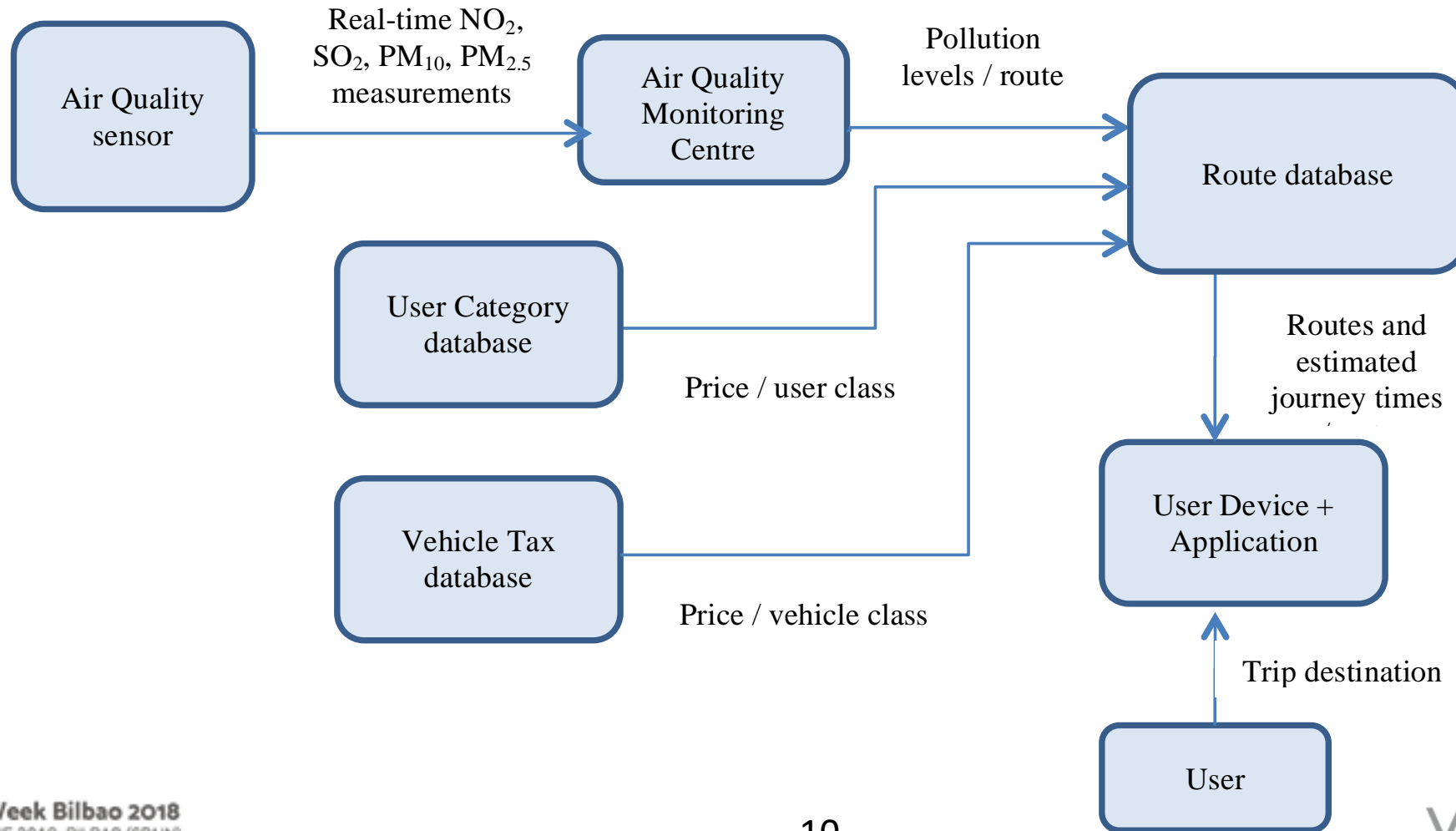
AIOTI WG08 Cross-Domain Use Cases

- Smart lighting so that street lighting is only provided when needed.
- Air Quality Monitoring, Traffic Routing and Road Pricing (VICINITY)
- Monitoring assisted persons outside the home (ACTIVAGE).
- Smart Parking and Assisted Living (VICINITY).
- Smart Street Lighting, Air Quality Monitoring and Pedestrian Safety (Madrid).
- Mobility inside the City (REPLICATE).
- Next Generation Emergency Services Crowd Control and Emergency Response (NGES).
- Mobility as a Service (SynchroniCity).

Smart Street Lighting (Eeniend, Cambridge, Bordeaux)



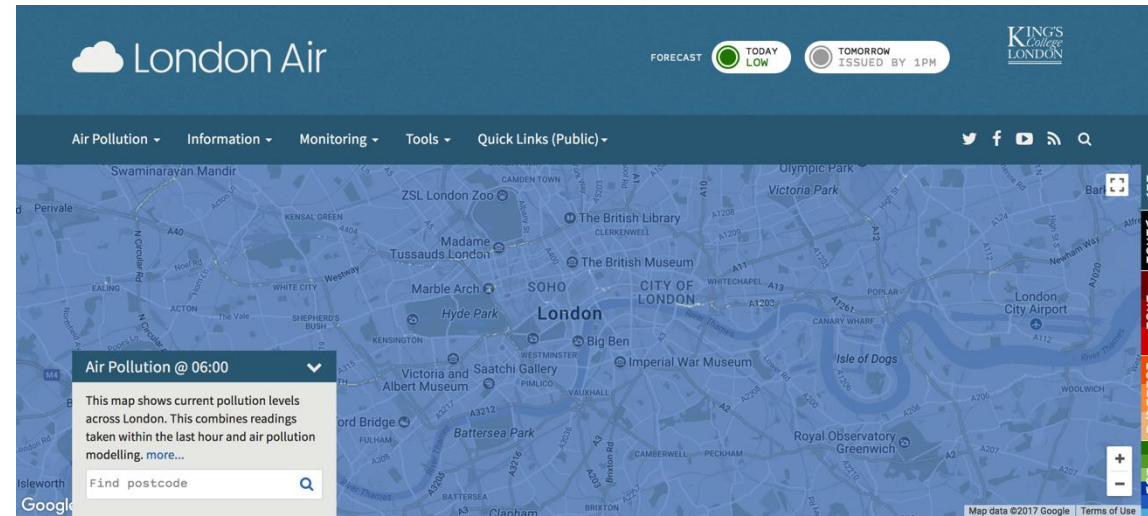
Air Quality Monitoring, Traffic Routing and Road Pricing (adapted from VICINITY)



Data Sources



Smartphone with built in air quality sensor



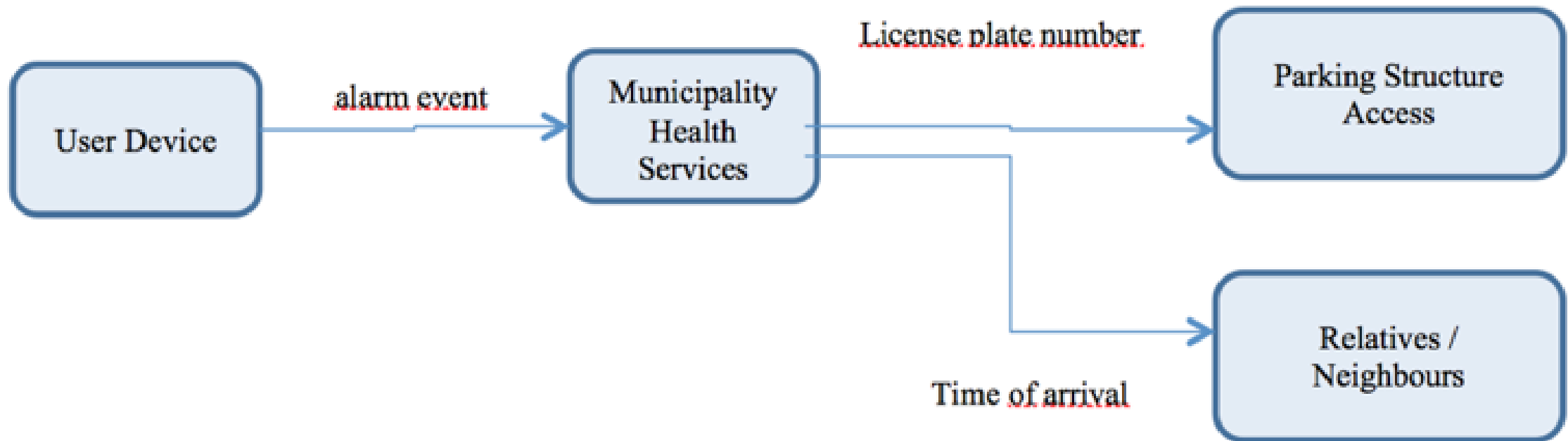
Air Quality database



SatNav adapted to provide air quality-based routing

Vehicle Tax database

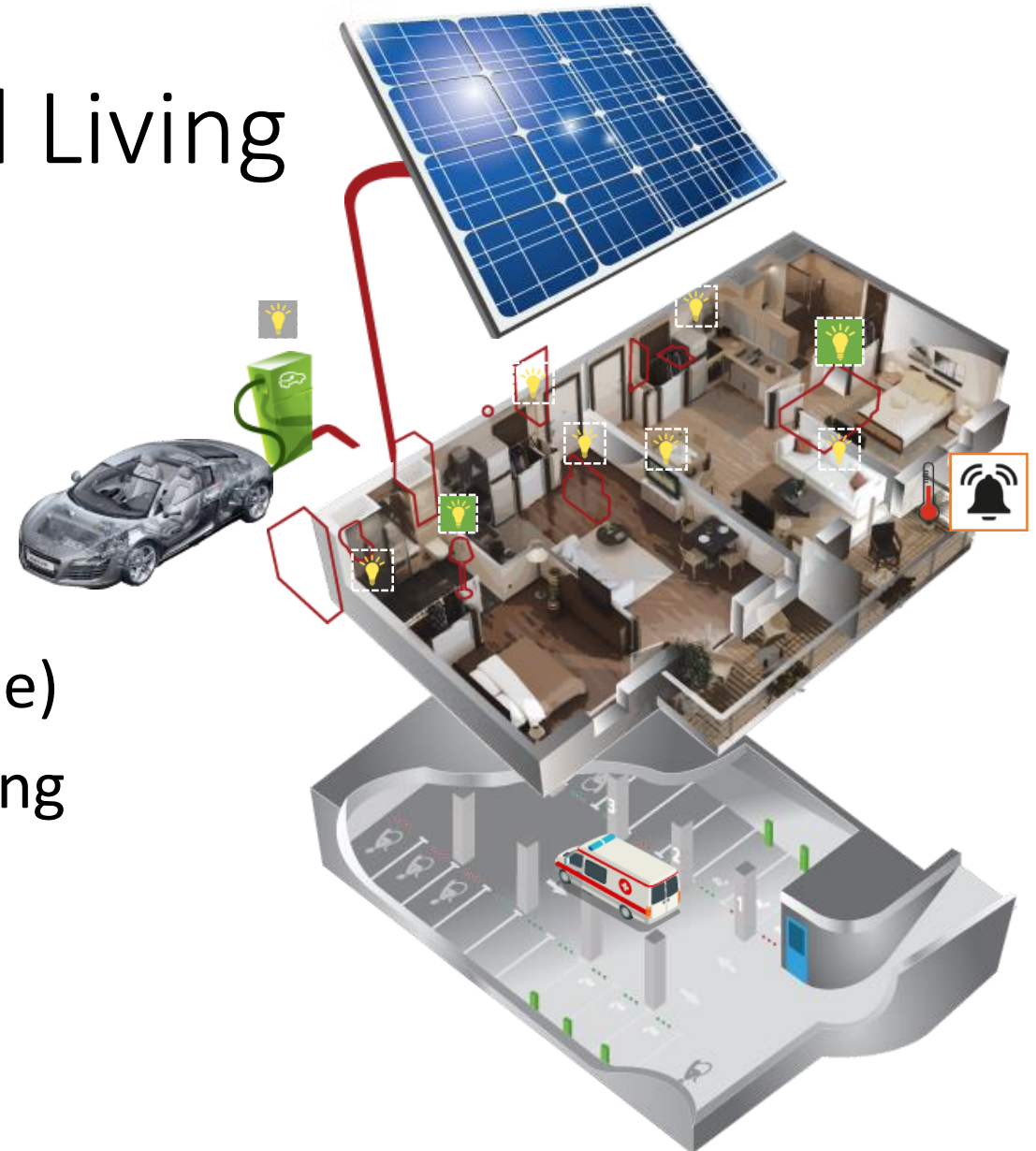
Smart Parking and Assisted Living (VICINITY)



Smart Parking / Assisted Living

If an event is triggered from a wide range of data sources:

- Assign parking space (booking, occupied, sign)
- Notify health care personnel (mobile)
- Whitelist licence plate of approaching car (ALPR)
- Generate estimated time to arrival
- Inform neighbours or carers



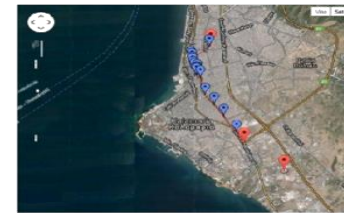
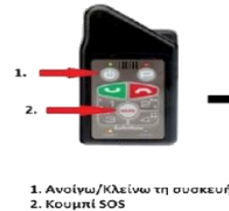
Data Sources



Communication device with automated dialling to a call centre



Weight monitoring device and pressure monitoring device



Wearable GPS positioning device for elderly people with dementia



Wearable "Panic Button" and integrated fall detection

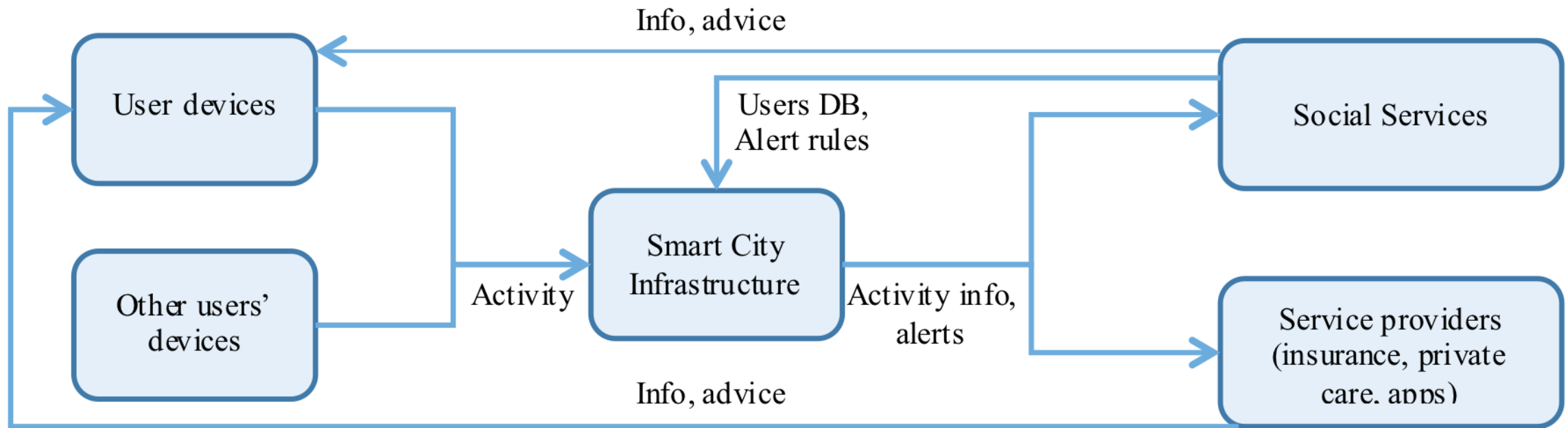


"Smart" IoT connected drug dispenser and smart appliances (fridge, oven), allowing monitoring of elderly people activity within assisted living scenarios

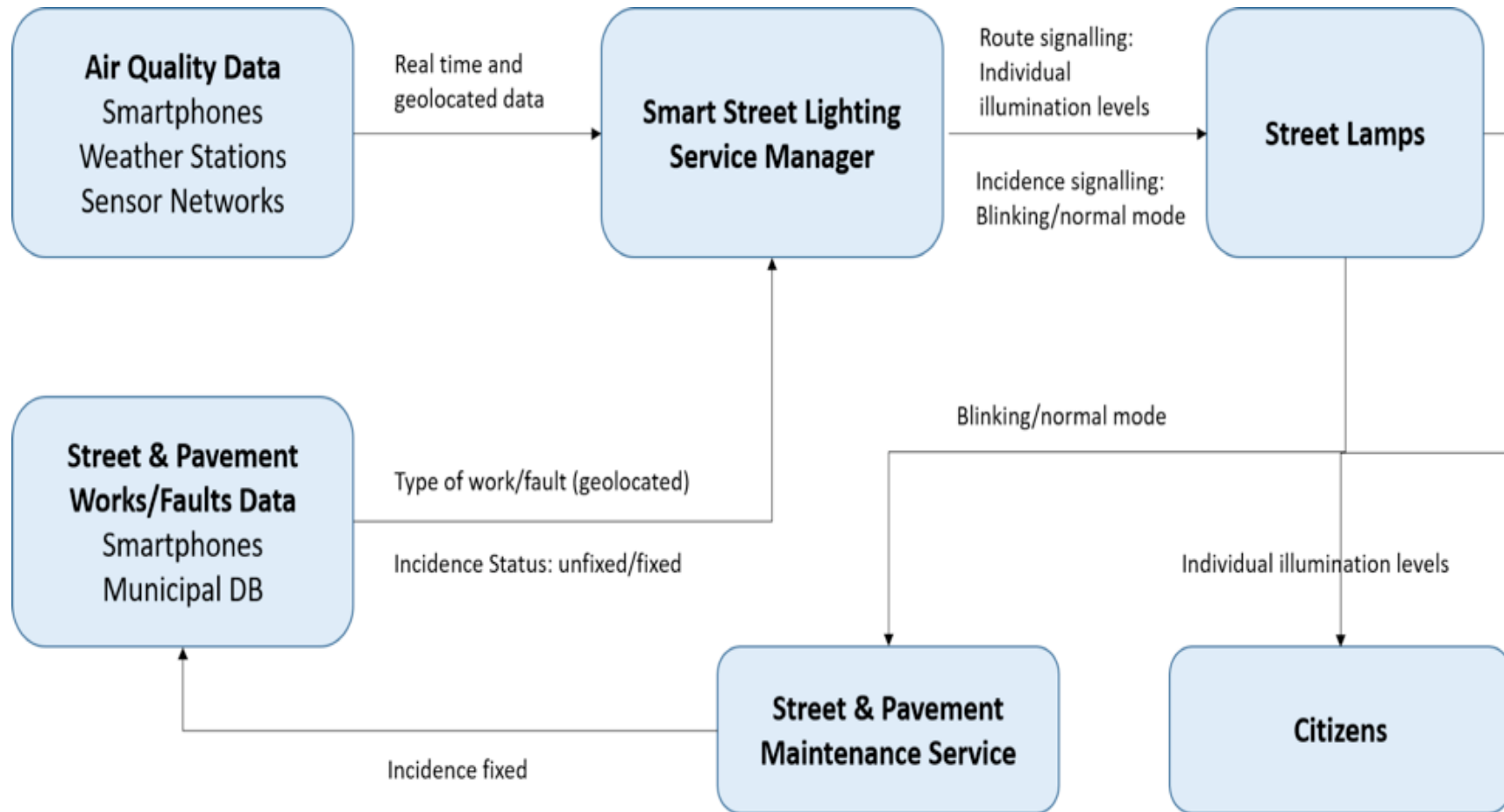


Occupancy tracking devices for monitoring elderly people activities in house

Monitoring assisted persons outside home (ACTIVAGE)



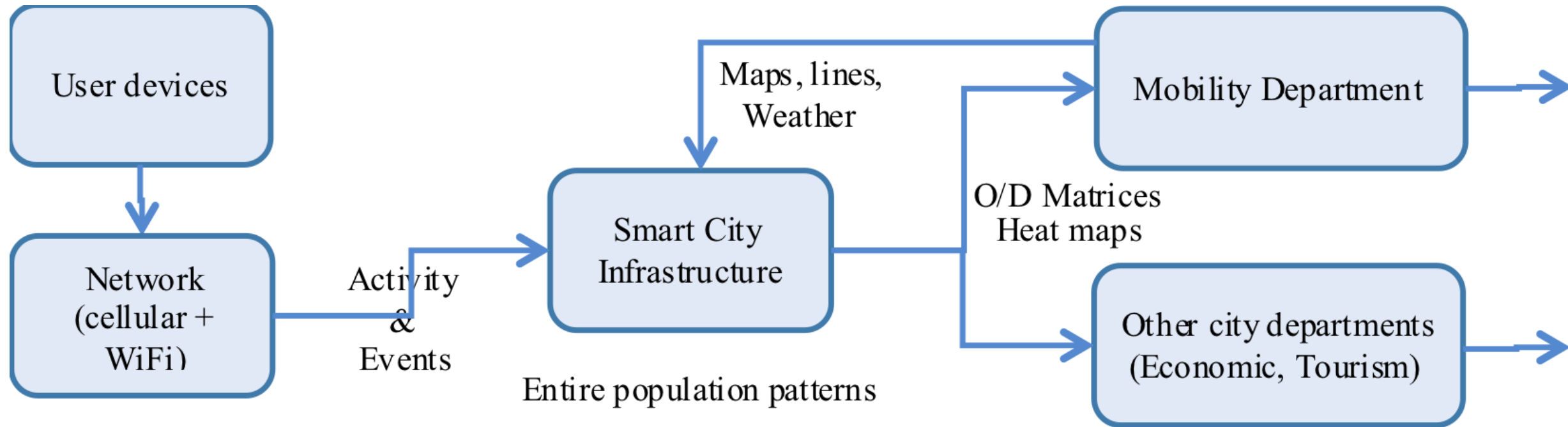
Smart Street Lighting, Air Quality Monitoring and Pedestrian Safety (Madrid)



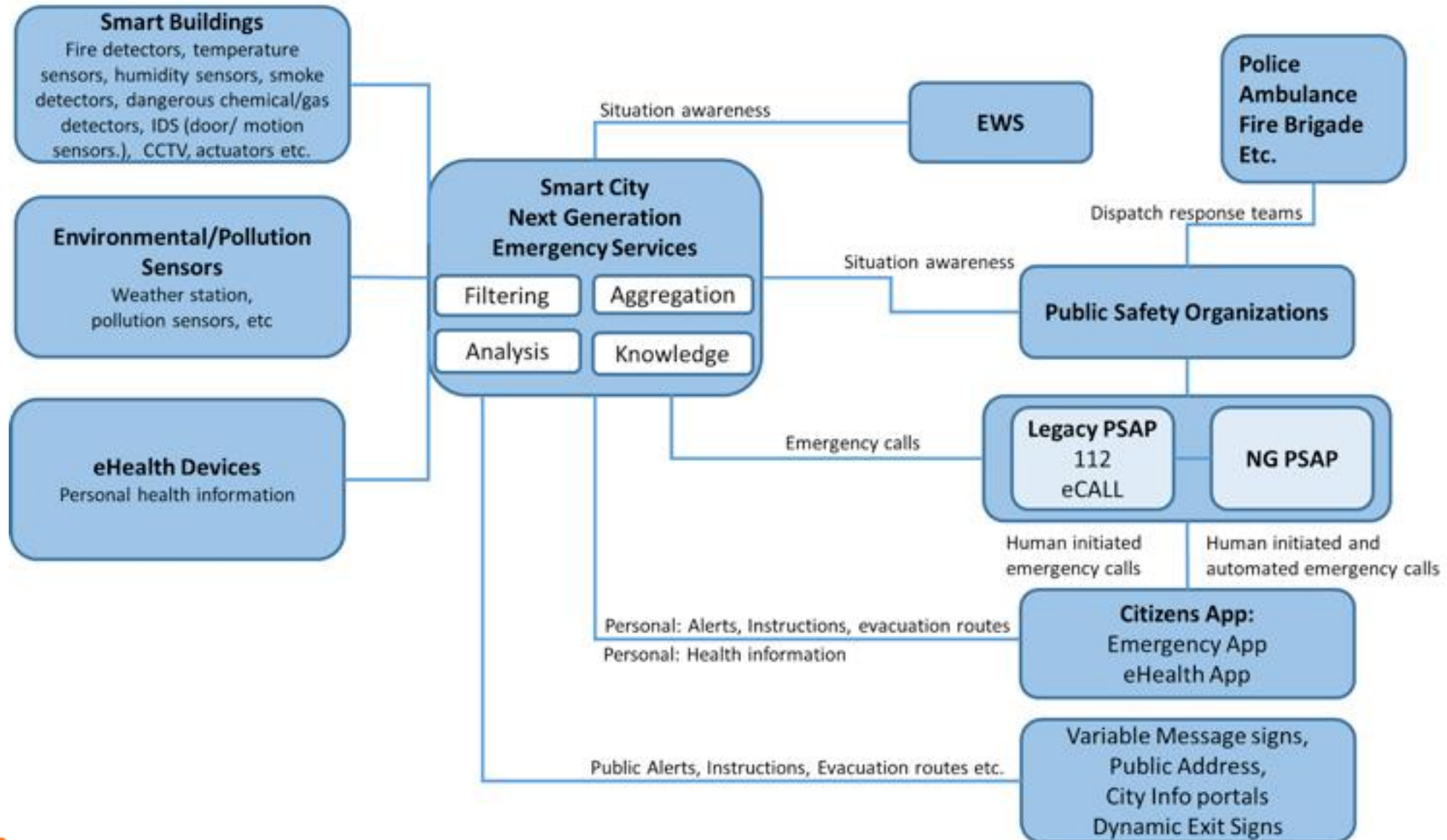
Data Sources

- Weather stations capable of monitoring, among others, air quality parameters such as CO₂ or NO₂.
- Air Quality wireless sensors equipped with ozone, particulate matter, carbon monoxide, sulphur dioxide, and nitrous oxide sensors.
- Smartphones with two different applications: a) to continuously monitor and send air quality data; b) to register and send works/faults at streets and pavement.
- LED street lamps equipped with communication and control devices.

Mobility inside the city (REPLICATE)



Next Generation Emergency Services (NGES)



Data Sources

- Smart buildings: Fire/smoke detectors, temperature sensors, humidity sensors, chemicals/gas detectors, intrusion detection systems, CCTV, actuators etc.
- Environmental and pollution detection: wind speed, temperature, humidity, rain fall, ice, pollution, air quality, water levels etc.
- eHealth devices: Personal health information.
- Citizens Apps: Information from emergency area, personalised information.

Recommendations

- Cities need to think horizontally during procurement, only then can they master the total cost of ownership for IoT use cases that are increasingly cross-application and cross-domain.
- Proving a clear business case can be challenging for new innovations for which little historic evidence is available. As a consequence, replication and experience sharing among cities are key to overcome the long learning curves needed to understand the cost/benefits of such use cases.
- Ultimately a horizontal approach is about building a robust data infrastructure which provides the necessary conditions for a wide range of applications to be deployed and to create value to the city in many ways.

Bibliography

- ETSI TR 103 290 “Machine-to-Machine communications (M2M); Impact of Smart City Activity on IoT Environment”
- Draft ETSI GR CIM 002 “Context Information Management (CIM): Use Cases”
- VICINITY D1.3 “Report on Pilot Sites and Operational Requirements”
- Delivering an IoT enabled Digital Single Market for Europe and Beyond – www.synchronicity-iot.eu
- <http://www.smartcities-infosystem.eu/sites-projects/projects>
- EC DG Energy “Analysing the potential for wide scale roll out of integrated Smart Cities and Communities solutions”