SMARTSANTANDER
A SMART CITY EXAMPLE

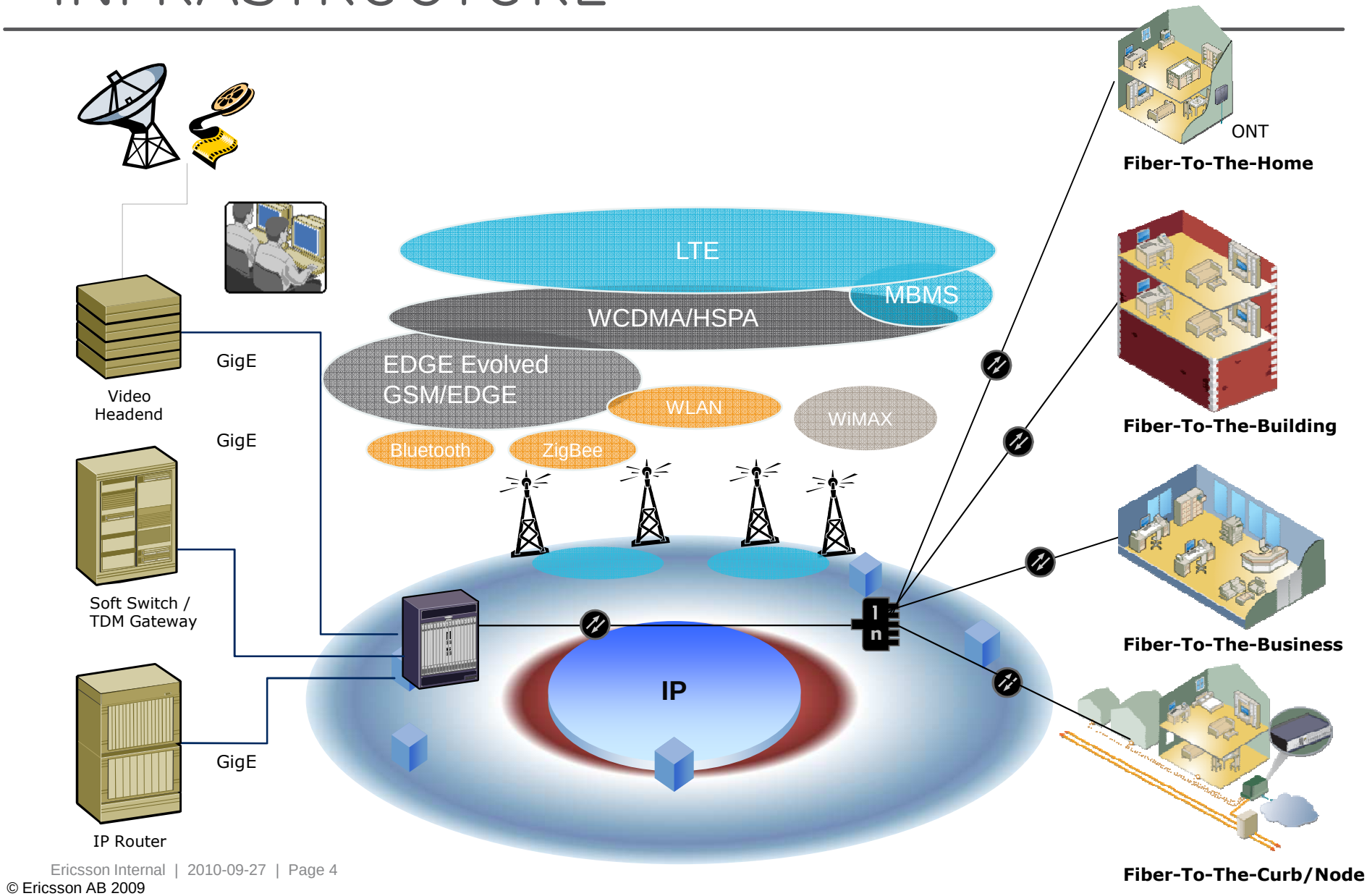
DR SRĐAN KRČO

WHY SMART CITIES NOW?

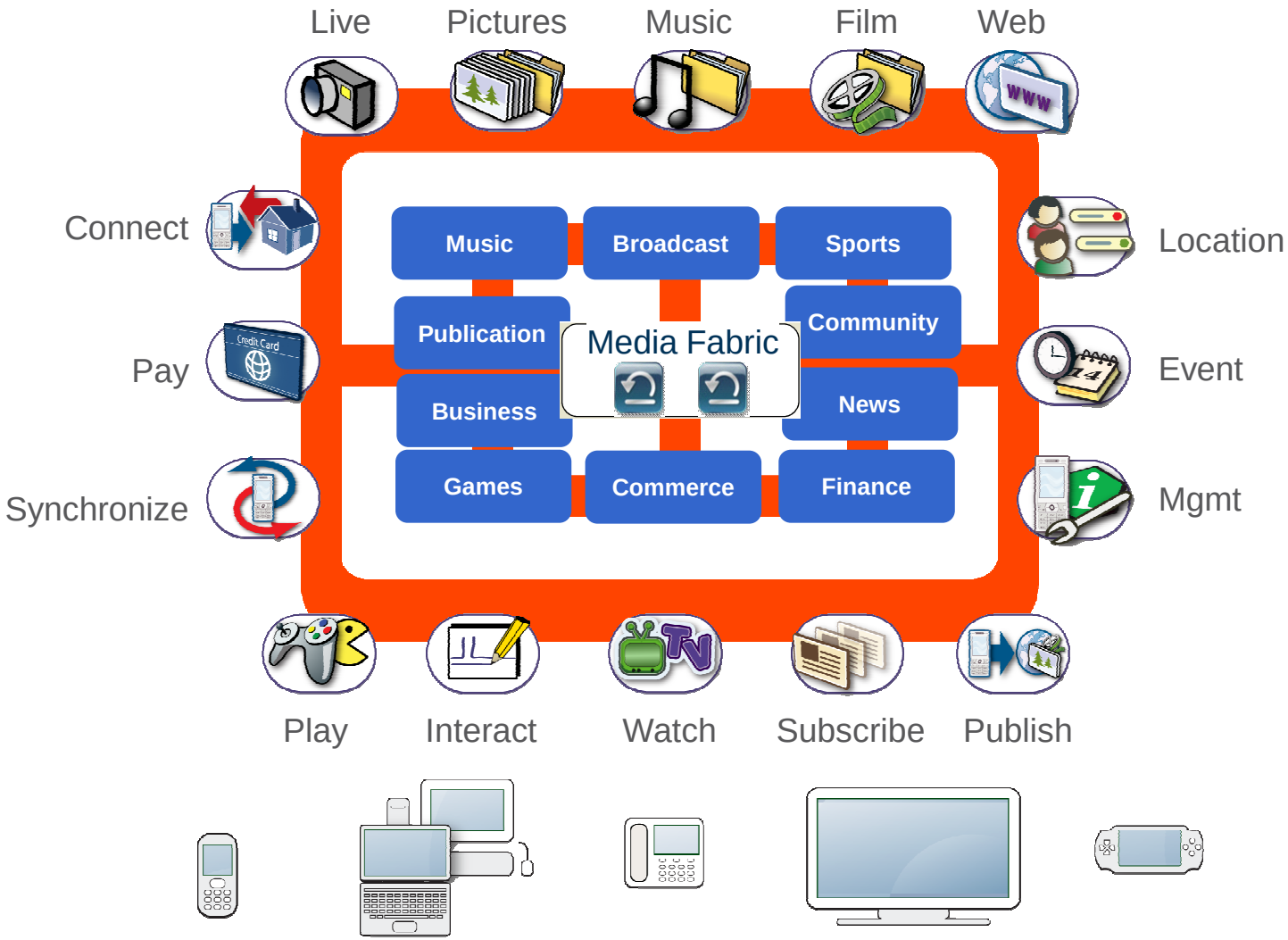
- 50% of the world population lives in a city
  - 2010-2050: Urban population will almost double
- Cities occupy 2% of the world's geography but account for 75% of the world's greenhouse gas emissions
- 1.2 billion cars on the road by 2015 (1 car / 6 people)

MAIN ICT BUILDING BLOCKS OF A SMART CITY

UBIQUITOUS HIGH-SPEED INTERNET INFRASTRUCTURE

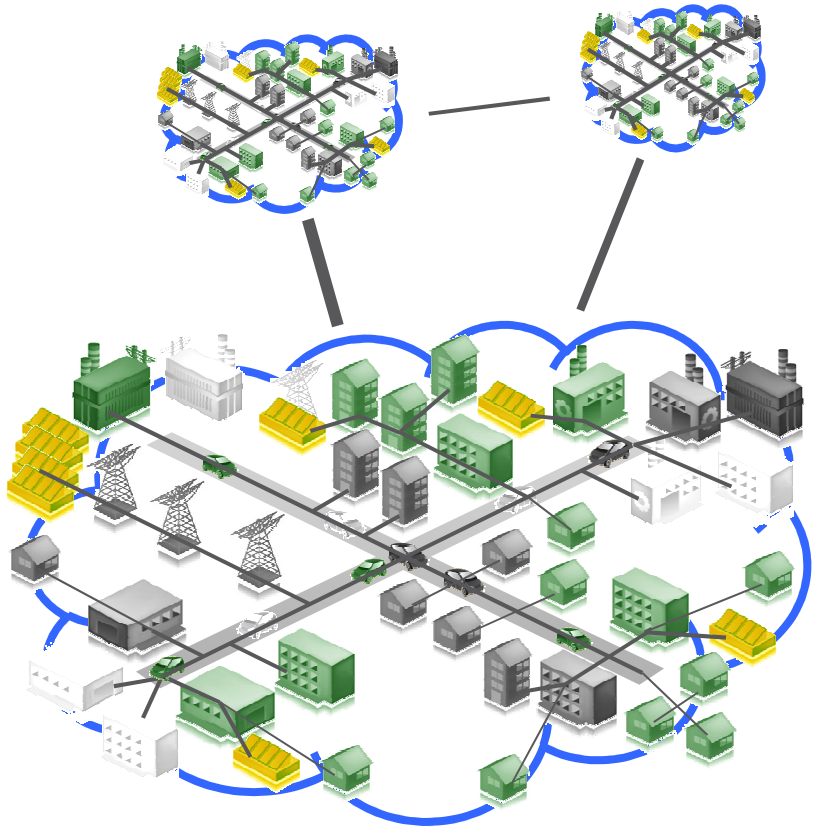


SMART MEDIA SERVICE TECHNOLOGIES



SENSOR AND ACTUATOR INSTRUMENTATION

- Instrument all components of the city infrastructure with sensors, actuators, tags and readers
  - utility infrastructures
    - power, water, gas, waste
  - buildings and houses
  - fixed transport infrastructure
    - roads, rails, interexchange points,...
  - mobile infrastructure
    - vehicles, goods, people,...
- Connect it all to the common IP infrastructure
  - via the existing access infrastructures in buildings, cellular, radio meshed networks...



CITY WIDE ACCESS TO SENSOR INFORMATION

- Common sensor and actuator information infrastructure across the city
  - secure and reliable access to sensor and actuator information services for multiple players
  - information efficiently shared across ”verticals”
- Technical challenges
  - vast amount of data
  - high degree of automation
  - concurrent optimizations
  - real time control
  - unified access to data

- Sensor information enablement
  - aggregation and collection of data
  - directory services
  - data brokering and service composition
  - information federation
  - privacy and integrity protection
  - accounting and revenue,....

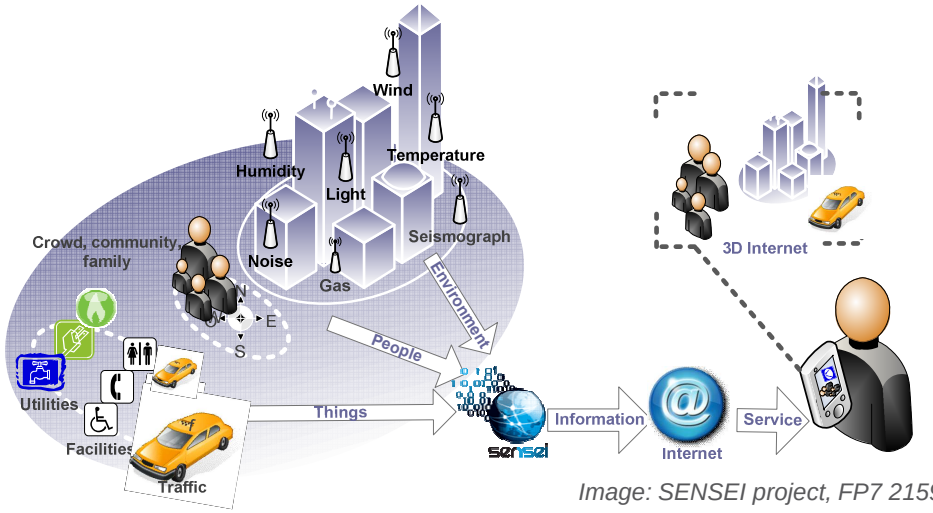


Image: SENSEI project, FP7 215923

SMART SANTANDER

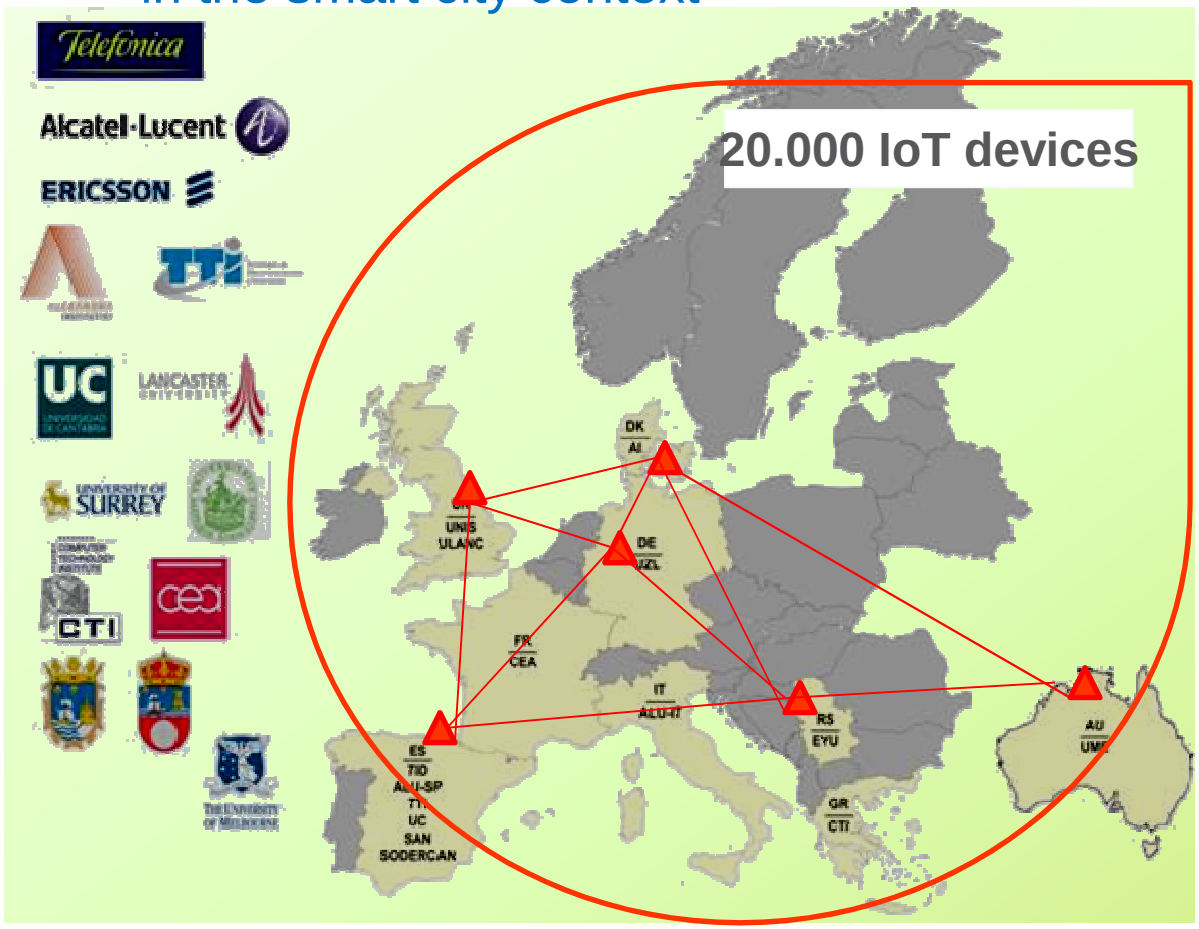
Call FP7-ICT-2009-5

Proposal Number: 257992

Objective ICT-2009.1.6: Future Internet experimental facility and experimentally driven research

SMARTSANTANDER

› European, large-scale experimental test facility for IoT
  – in the smart city context



Smart Santander Highlights

- **Targeting:**
  - Researchers
  - End users
  - Service providers
- **Duration**
  36 months
- **Consortium**
  15 Organisations
  8 EU countries + AU
- **Budget / Funding**
  8.67 M€ /6.69 M€
- **Resources**
  854.9 PM

WHY A CITY CONTEXT?

- Scale and heterogeneity of the environment
  - Ideal ground for enabling a broad range of very different experiments
  - A huge number of challenging functional and non-functional requirements
  - A variety of problem and application domains
  - → An excellent catalyst for IoT research!
- Allows evaluation of social acceptance of IoT technologies and services via real world pilots

THE MAIN OBJECTIVES

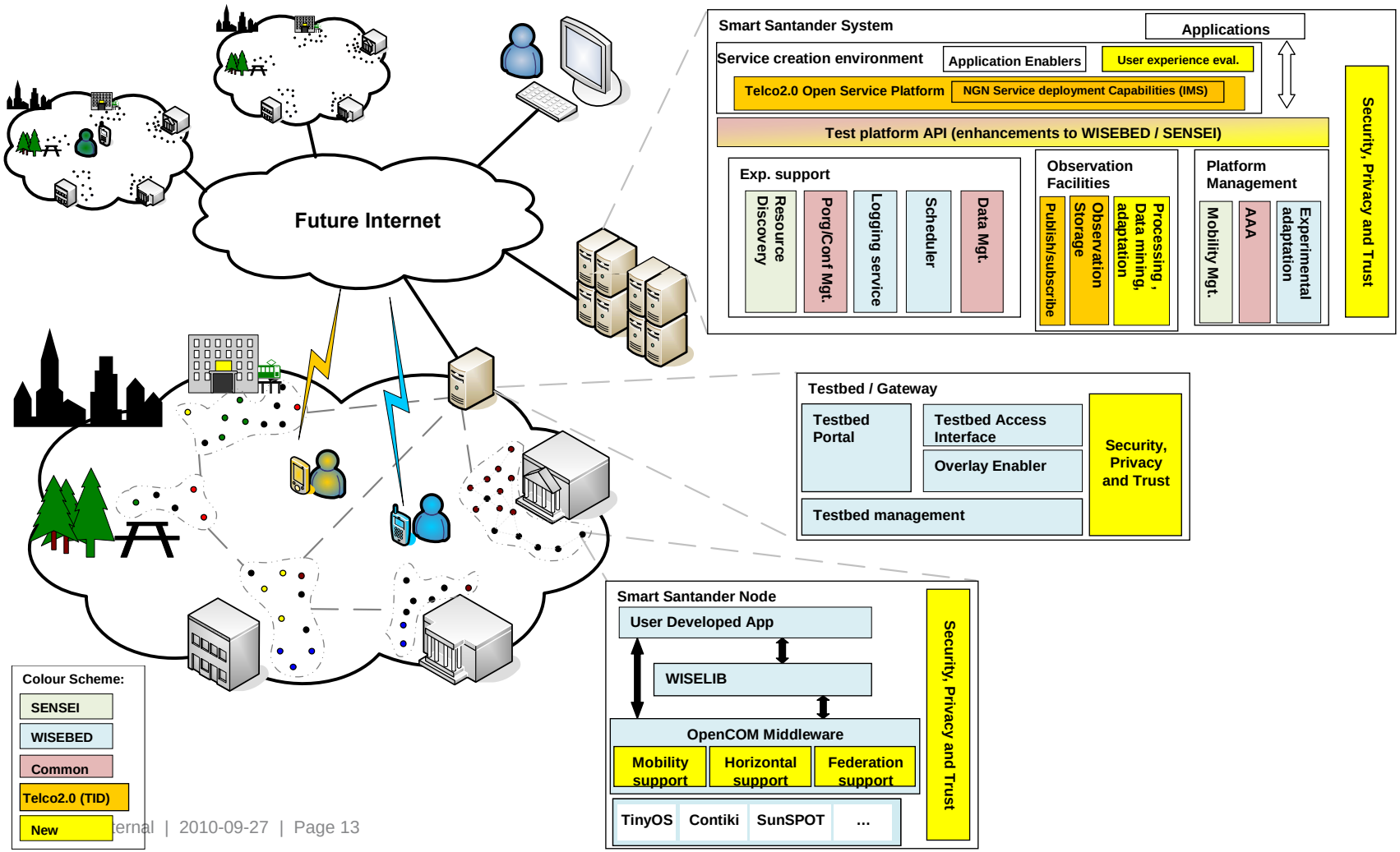
- Large scale IoT experimentation and evaluation under realistic operational conditions
  - 20000 devices in the context of the smart city
- European experimental test facility for research and experimentation of
  - architectures, key enabling technologies, services and applications for IoT

TYPICAL USERS

- Researchers
  - Future Internet/IoT
- End users
  - social impact
- Service providers
  - Pilot installations

ARCHITECTURE

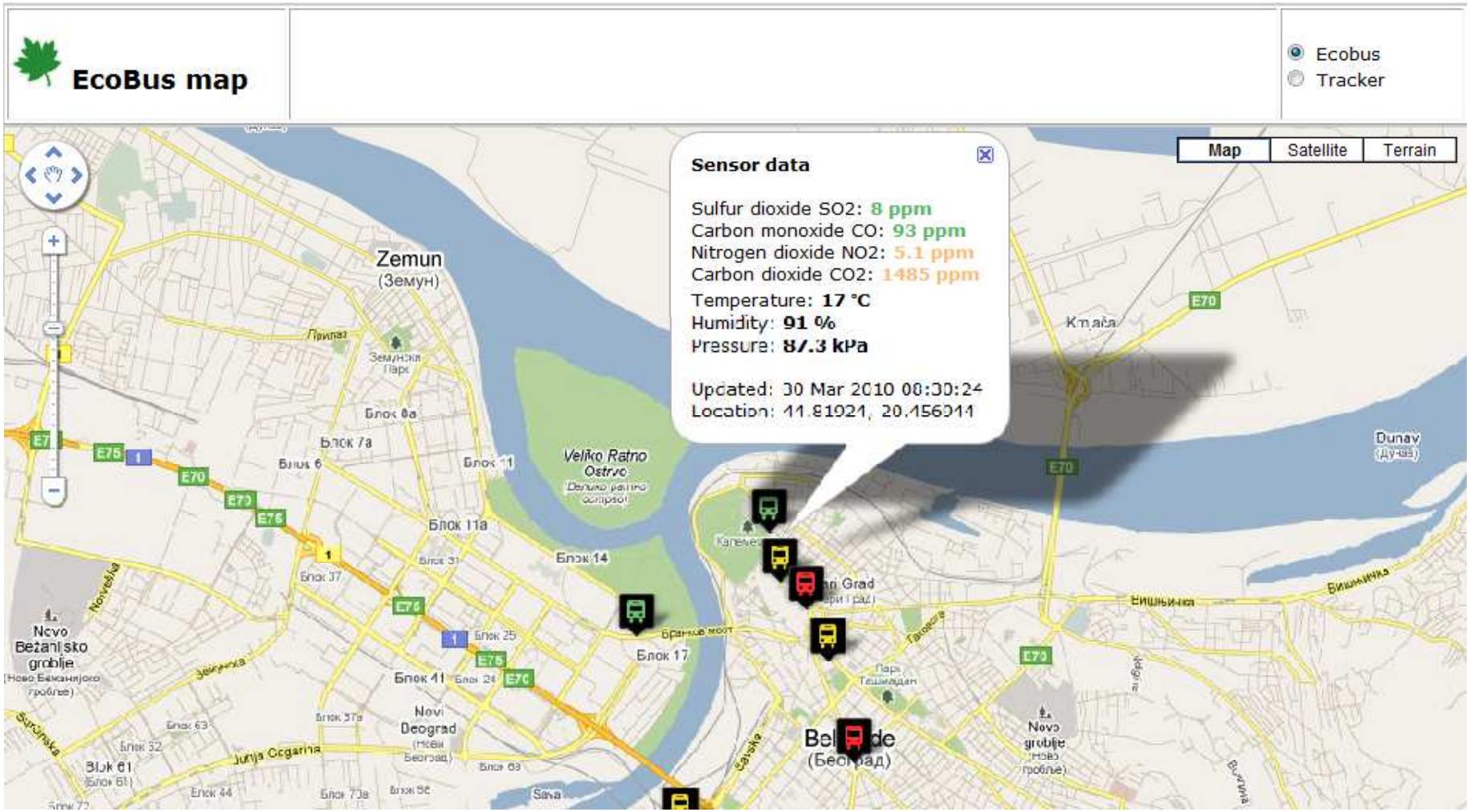
› Combines SENSEI and WISEBED project outputs



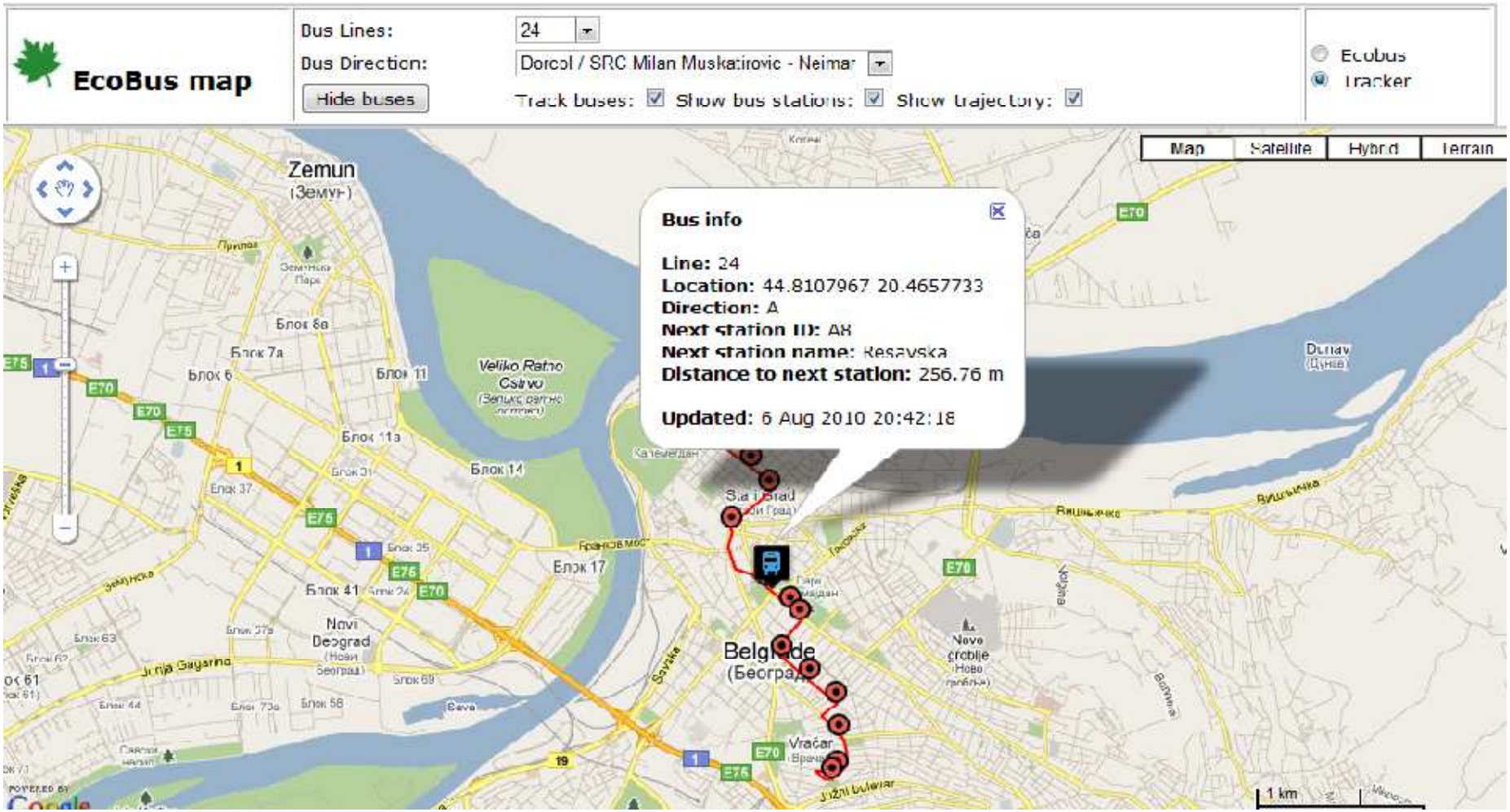
SCENARIOS ENVISIONED

- Environmental monitoring
  - Design of a dynamic map of the environment
  - Users: the project, city officials, medical professionals, citizens, etc.

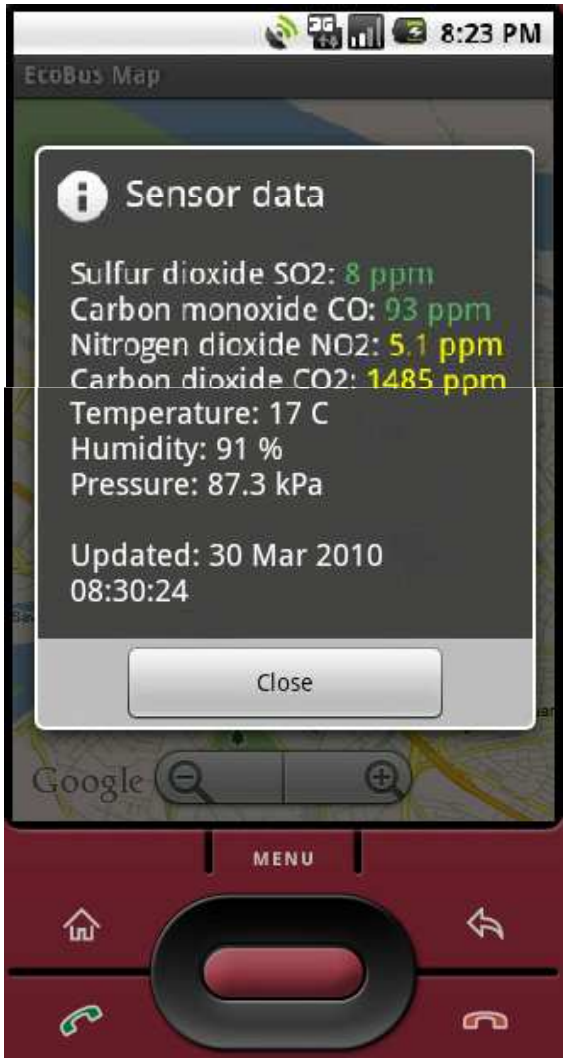
EKOBUS – WEB APPLICATION



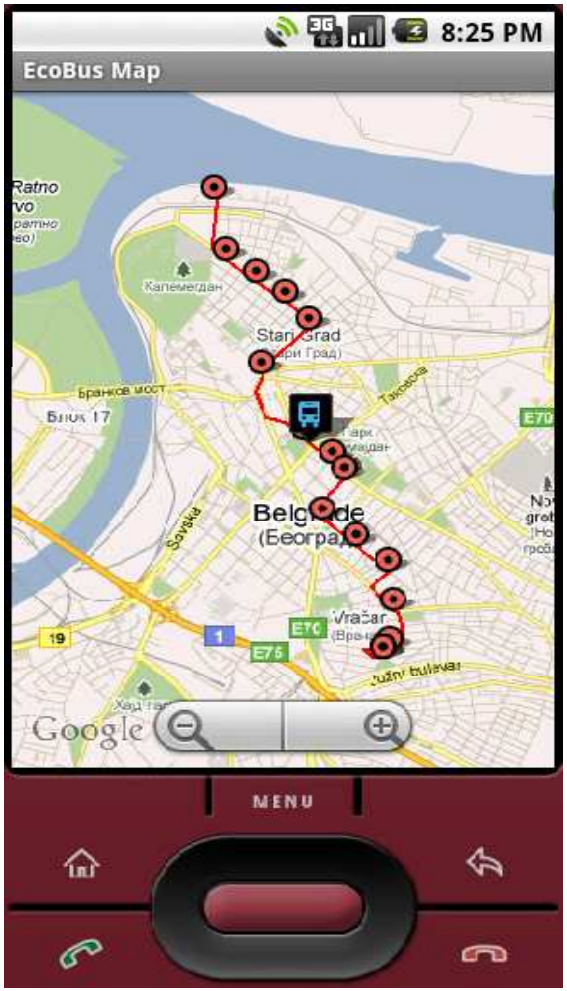
BUS TRACKING



EKOBUS MOBILE APPLICATION



BUS TRACKING ON MOBILE



SCENARIOS ENVISIONED

- Traffic control
  - Dynamic map of occupied parking places in an area, including places for disabled people
  - Determine the rate occupancy and timing in the areas for load/unload destined to industrial vehicles
  - Determine average intensity of traffic in the city and get dynamic traffic maps updated every 15 minutes

SCENARIOS ENVISIONED

- Public Transportation
  - Control of the buses and taxis stops (number of people traveling on a bus, number of people waiting at the bus stops)
  - Monitoring of public bicycles (position of public bicycles in real time)

SCENARIOS ENVISIONED

- Urban waste management
  - How full are the containers and bins.
  - Location of containers and bins
  - Location of collection vehicles

FIRST PHASE

- By month 9 (May 2011)
  - 3000 devices deployed
  - 61km distance if all devices deployed in a linear topology
- A lot of challenges
  - Power supply
  - Weather-proof
  - Theft-proof
  - Where to fix, how to connect
  - Time consuming

ERICSSON