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
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
- 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

EcoBus map

Sensor data
- Sulfur dioxide SO2: 8 ppm
- Carbon monoxide CO: 93 ppm
- Nitrogen dioxide NO2: 5.1 ppm
- Carbon dioxide CO2: 1485 ppm
- Temperature: 17 °C
- Humidity: 91.9%
- Pressure: 873 kPa

Updated: 30 Mar 2010 00:30:24
Location: 44.01021, 20.45534

EcoBus
Tracker
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