Large-scale IoT Data Analytics and Smart City use cases

FIA Workshop, March 17 2014, Athens

Cities as Big Data problems

ICT is part of our daily life and strategic agenda for city managers

- – Avalanche of uncorrelated data
- – Huge silos of historical applications
- – Pressing demand for predictive solutions
- – Unpredictable effects of planning
- – Close to impossible to estimate the impact of a local street work for example

CityPulse– a quick snapshot

- support the integration of dynamic data sources and context-dependent on-demand adaptations of processing chains during run-time.

- bridge the gap between the application technologies on the IoT and real world data streams.

- use Cyber-Physical and Social data, employ big data analytics and intelligent methods to aggregate, interpret and extract meaningful knowledge and perceptions from large sets of heterogeneous data streams.

An Integrated Approach
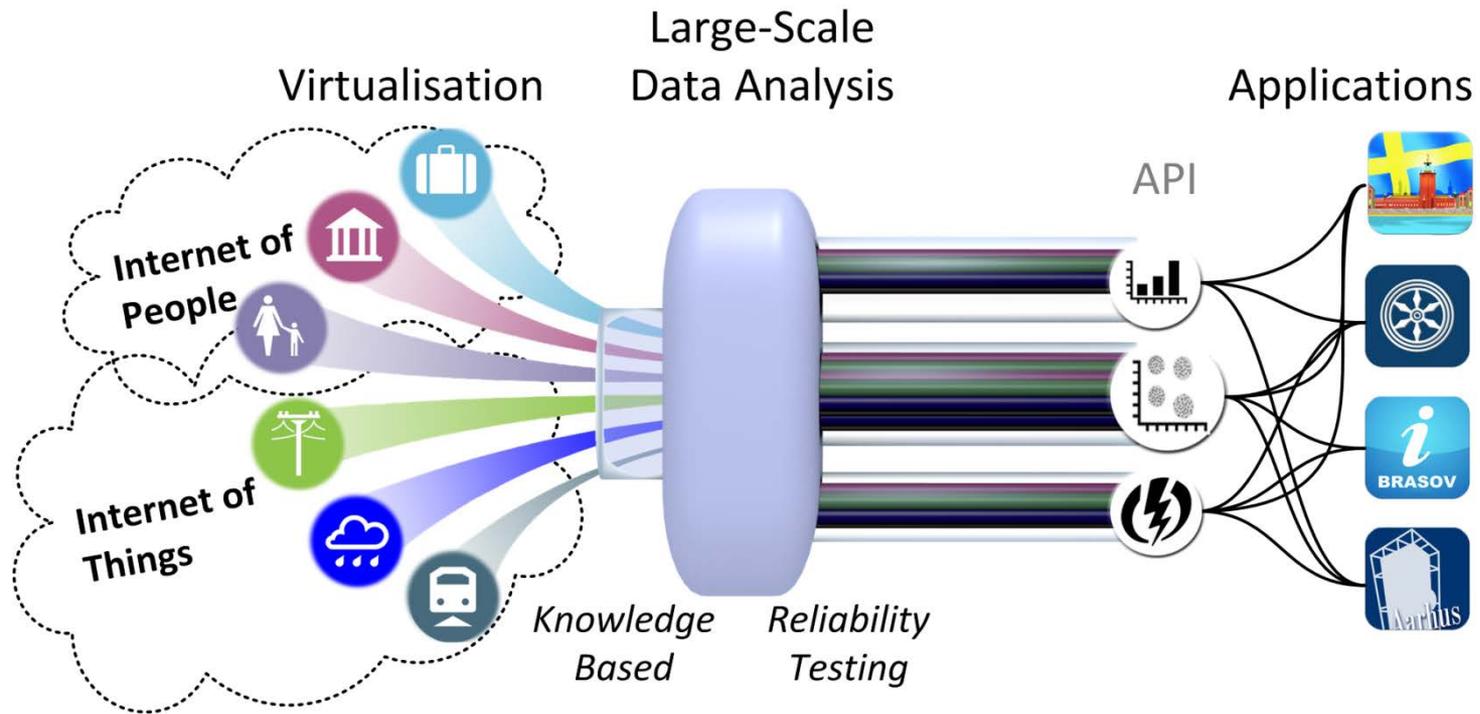
The Key issues addressed

- **Virtualisation:** Semantic annotation of heterogeneous data
- **Federation:** On demand integration of heterogeneous Cyber-Physical-Social sources
- **Aggregation:** Large-scale data analytics
- **Smart Adaptation:** Real-Time interpretation and data analytics control
- **User centric decision support:** Context aware customized IoT information extraction
- **Reliable Information Processing:** Testing and monitoring accuracy and trust
- **Smart City Applications:** Application programming interface for rapid prototyping

City Stakeholder Group

CityPulse organize regular phone conferences/meetings with the City Stakeholder group to get them involved right from the start

- City stakeholder group: 4 cities will be involved; Aarhus (partner), Brasov (partner), Osnabrueck, Stockholm;
- the local partners (UOASA, ERIC) are responsible to liaise with the cities with the non-partner cities;

Availability of appropriate city data

- The approach taken to the availability of data to the project is two-fold

  - Cities explore existing and suitable data
  - The need for data is to a large extent driven by use cases. We work on understanding the use cases that drive their needs and based on that we can proactively help sensor deployments.

Type and Amount of Data

- University of Surrey Smart Campus
  - more than 200 nodes
  - more than 1200 sensors (temperature, noise, light, motion)
  - Link to SmartSantander testbed
  - Services and web access

City of Aarhus

- Actual datasets on the platform as of now (26 dataset)
  - Real time transaction data from public libraries in Aarhus
  - Inventory at Aarhus public libraries
  - Building and housing register
  - Number of Citizens in Aarhus
  - Buildings worthy of preservation in Aarhus
  - Corporate production units
  - Coordinates of addresses in Aarhus
  - Register of buildings
  - Raw materials in the region of central Jutland
  - Citizenship and origin in Aarhus
  - Street names and street codes
  - Geodata on hiking, forests and parks, campfires, running routes, mountainbike routes, forests where dogs are allowed and workout areas.
  - District plans
  - Parking possibilities for disabled people, motorcycles, tourist busses and trucks

City of Aarhus

- Datasets on their way
  - Real-time data on smoke from waste facilities
  - Garbage collection routines
  - Data from the electricity grid, maintenance, facility
  - Location of glass and paper containers
  - Replacement of soil
  - Road soil
  - Truck Weighings
  - Traffic measuring (manual and real time)
  - Parking zones
  - Cycle counts
  - Cycle tracks
  - Winter duty
  - Website statistics (www.aarhus.dk)
  - Phone duty
  - Pasport queue data
  - Playgrounds
  - Sewage and water in surrounding areas
  - Areas of protected nature
  - New materials at the public libraries in Aarhus
  - Various data from the water supply of Aarhus (Aarhus Vand)
    - Temperature and flow in Aarhus å (small river running through the centre of Aarhus)
  - Geodata on general practitioners in central Jutland

City of Brasov

- Integrated fleet management system (whole bus fleet on GPS monitoring)
- Automated ticket machines
- Electronic information panels
- Intelligent public lighting correlated with traffic management