Contribution ID: **3** Type: **Oral Presentation**

Cagliari 2020: exploiting open data and LHC computing techniques for Smart Cities

Friday, 24 March 2023 09:00 (30 minutes)

CAGLIARI 2020 is a 25 million euro project funded within the framework of the National Operational Program for Research and Competitiveness – Smart Cities & Communities of the Italian Ministry of Education University and Research.
The project started in 2017 and ended in 2022 developing a pilot system for monitoring traffic and air quality providing innovative and environmentally friendly solutions for urban mobility.
The system exploited data acquisition and computing techniques developed in the context of the LHC experiments.
The partnership includes public and private organisms of the South Sardinia for the development of ICT technologies aimed at optimizing the usage of the "city system" and improving the quality of life for people working and living in the city.
The developed system aims at answering the ever increasing need of innovative tools and technological solutions for the optimization of urban mobility. The approach is based on collecting data traffic flow as well as environmental parameters merging data from different sources and combining them in order to obtain increased security lower travel times and improved air quality. These data are open and available both to operators and managers as well as to citizens. Critical events management is also included. Integration of data from different sources and availability to multiple users are key points in the project.
The pilot system developed consists of a sensors network comprised of:
1. Fixed sensors for the tracking of vehicles. These sensors allow real-time and/or historical analysis, especially helpful in gathering the information required to manage traffic lights systems and sending routing optimization information to interested users;
2. fixed and mobile sensors for the collection of environmental data. Such data will be used to feed decision-making models for the reduction of carbon emissions and the consequent improvement of air quality in the urban area.
3. Mobile devices for the acquisition of the motion habits of people.
The integration of environmental models and smart systems for the management of urban mobility allows optimizing public and private traffic flows as well as to reduce carbon emissions.
CAGLIARI 2020 concept is related to the application of the "netcentric" paradigm by means of a dynamic and pervasive net (the urban information grid) whose nodes can be both fixed and mobile. This feature allows the sensorial integration of the devices distributed in the urban area and turns public transport buses into "mobile platforms" for the urban road system monitoring thanks to the continuous gathering of traffic, carbon emissions and noise pollution data. It is therefore possible to develop models for the analysis of environmental parameters and to provide support tools to policies aimed at curbing traffic flows, energy consumptions, and carbon emissions within urban areas.
Merging of data from multiple sources processing them and making them interoperable and usable to multiple clients is a core element in the Project.
The integration between the aforementioned information and the people's traveling habits (by means of the anonymous tracking of their mobile phones) allows for the creation of people's mobility maps.
Cloud services play a key role within the project in supporting the applications dedicated to data traffic monitoring and analysis. A mixed cloud approach has been adopted with data acquisition services and mediation layer on private cloud and analysis and data fusion on commercial cloud. A micro services approach has been adopted and it is currently operational. The system is scalable and fully interoperable.

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Session Classification: Physics and Engineering Applications

Track Classification: Track 1: Physics and Engineering Applications