

Research Opportunities

within InterSCity and your institution

São Paulo Advanced School on Smart Cities

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INCT - Future Internet for Smart Cities

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To Appear in ACM Computing Surveys

*Software platforms for smart cities:
Concepts, requirements, challenge,
and a
unified reference architecture*

Santana et al. 2017.



Functional requirements

- With the goal of facilitating the development of applications and controlling the city devices
 - Data Management
 - Sensor network management
 - Service management
 - Data processing
 - Data accessing
 - Environment for application execution
 - Software Engineering tools
 - Definitions of City Models

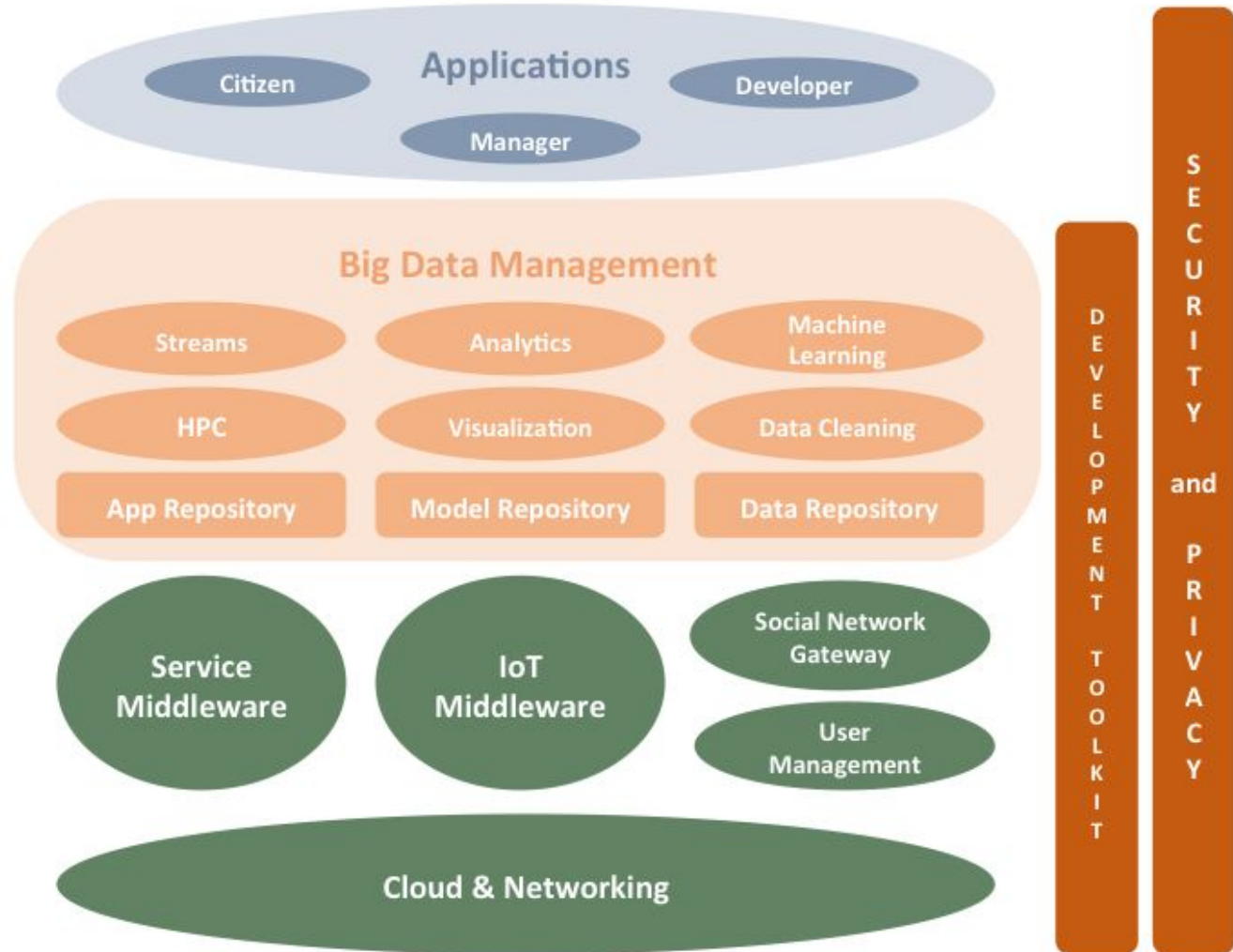


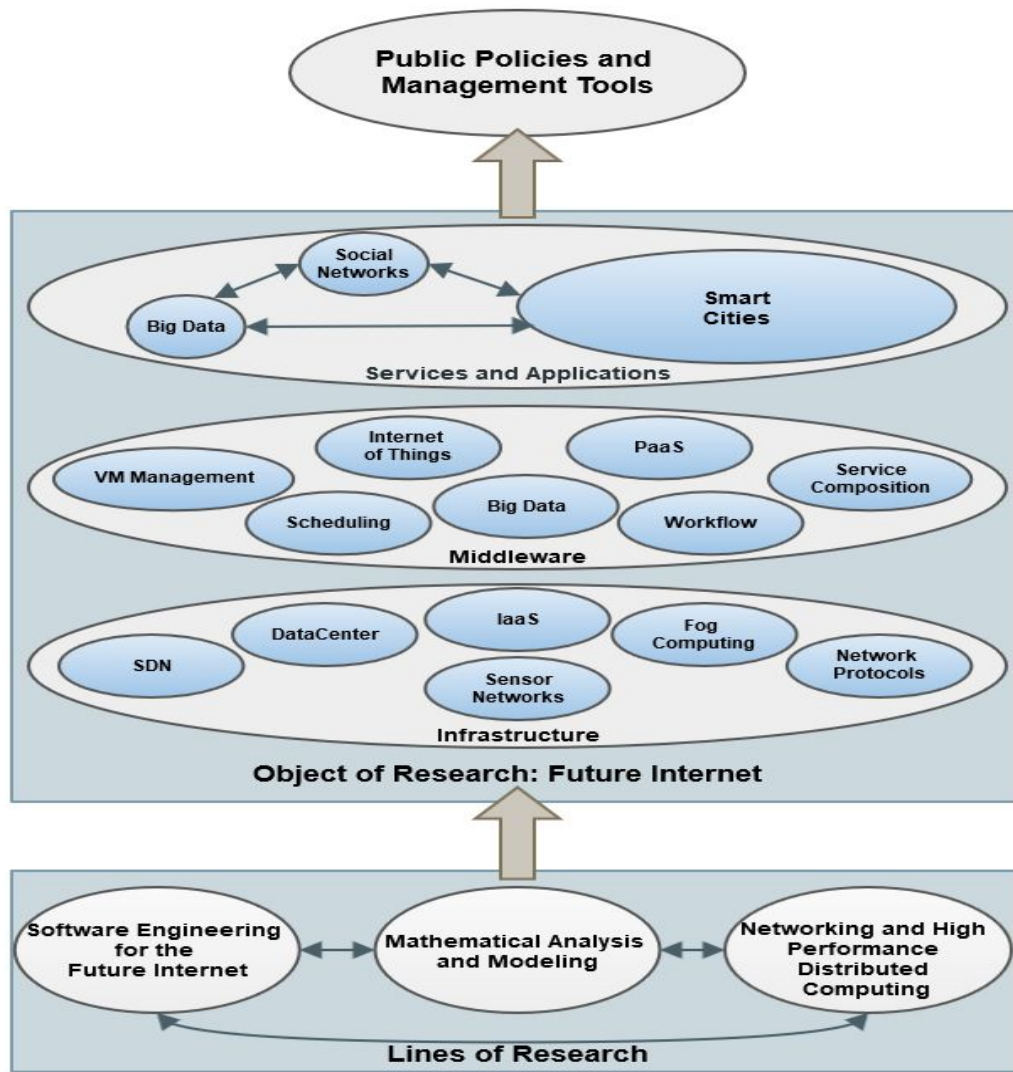
Non-Functional requirements

- Most of them related to large scale systems:
 - Interoperability
 - Scalability
 - Elasticity
 - Adaptability
 - Configurability
- Security and privacy of citizens
- Context-Awareness



Reference Architecture





Top 7 InterSCity research opportunities



For MS and PhD students and post-docs

1 - Machine Learning

Using existing machine learning techniques
& Developing new machine learning techniques

To

- Create models of behavior within cities
- Detect
- Predict the impact of changes in the city
- Provide tools for Urban Planners (long term planning)
- Provide tools for city officials (real-time)

2 - Big Data Manipulation and Visualization

Using existing visualization techniques

& Developing new visualization and manipulation learning techniques

To

- Deal with City Big Data

Providing tools for

- researchers
- urban planners
- public servants

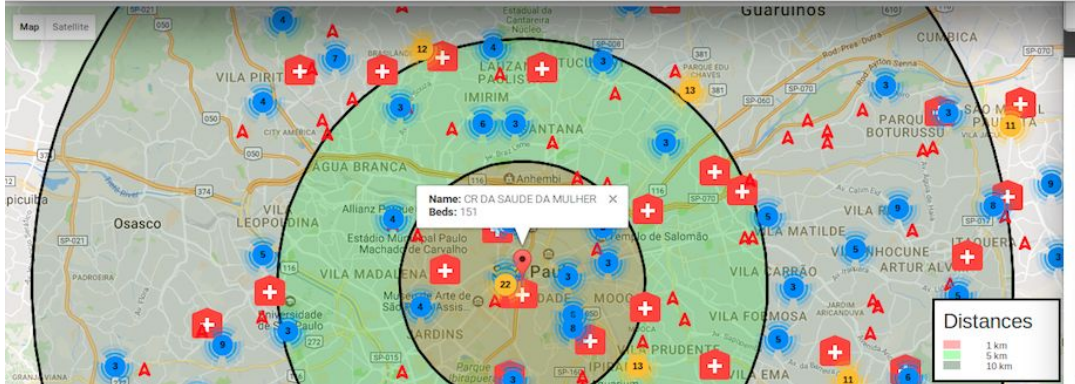
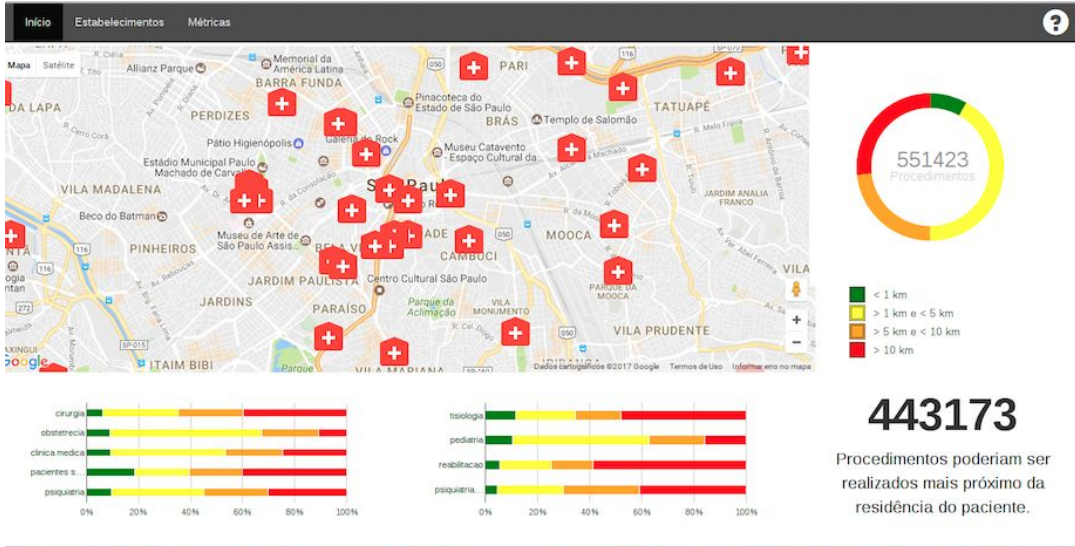
3 - Big Data Management

Developing novel infrastructure support for

- Collecting
- Transmitting
- Storing
- Processing

Big Data

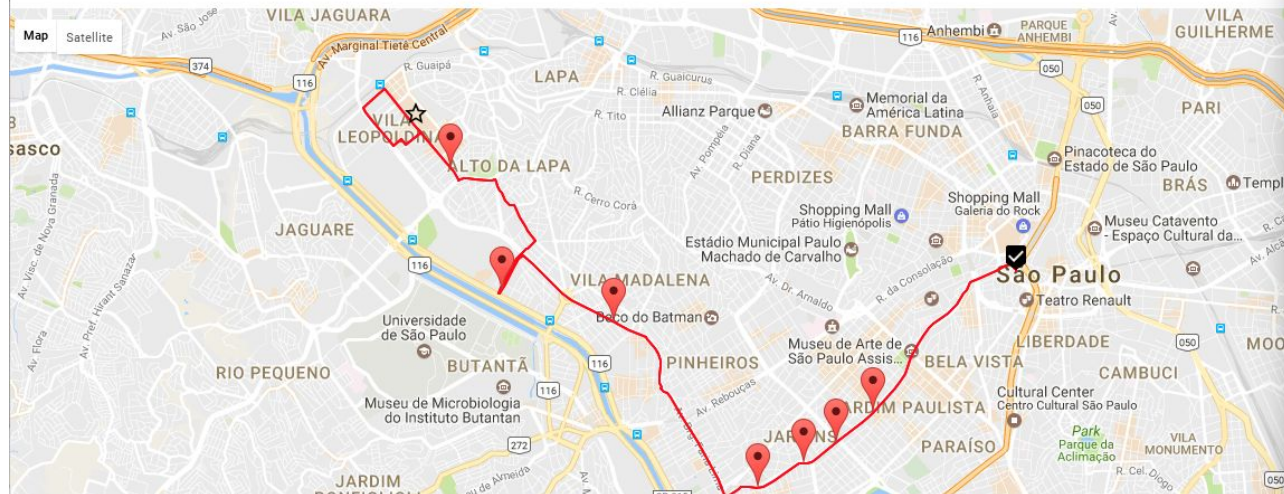
4 - Health Dashboard



5 - Public Transportation

Número de carros: 7

Horário: 13:20:00

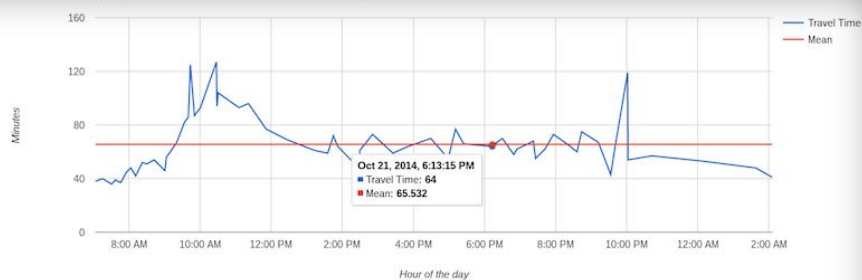


All Trips (2204)

Search

-  1015-10 Terminal Jd. Britania
-  1016-10 Center Norte
-  1016-10 Cemiterio Do Horto
-  1017-10 Vila Iorio

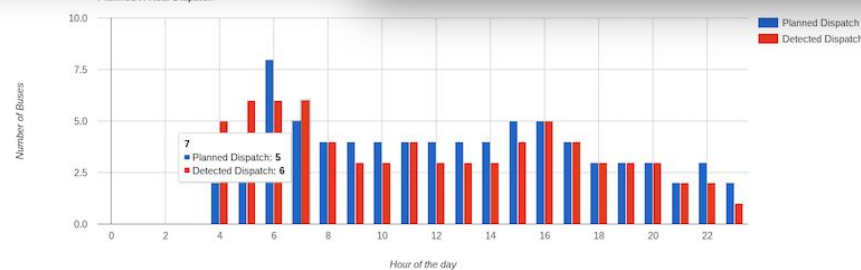
Travel Time in a line



Travel time in a line

The travel time graphic plots not only the travel time for buses of a chosen line but also a red line that represents the mean travel time of the day. Then, if the travel line is above the average, the trip takes longer than expected. If it is under, takes less than expected.

Planned X Real Dispatch



Planned versus Real dispatch

In the chart is possible to see the number of planned buses to dispatch versus the real dispatch done by the terminal. So, comparing both columns is possible to see if the contract is being fulfilled or not. Ideally both should be at the same level. If the blue column is higher than the red one, the terminal dispatched less buses than it should. If the red one is higher, the opposite happened.

6 - Privacy

A - How to apply existing techniques to the context of Smart Cities

B- Development of new techniques based on the specific necessities of citizens in a Smart City

7 - Simulation

Large-scale simulation of cities

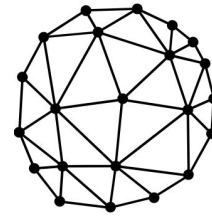
Millions of

Cities, vehicles, sensors, actuators

Useful for planning, impact analysis, tool for reflection

Involves: HPC, distributed computing, actors, domain modelling

Thank you!



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