

## Linking Geospatial Data Workshop

3D representation for Smart City initiative

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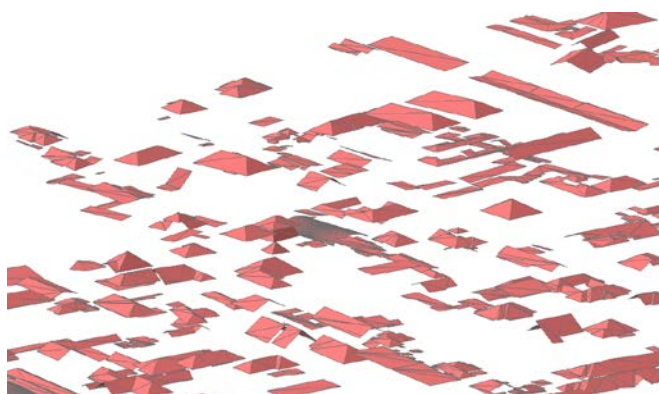
### ***Introduction***

CSI-Piemonte (Consortium for Information Systems), is a large ICT organisation specialised in projects for the public administration sector with more than 36 years of experience, about 130 M€ turnover, more than 1100 employees and 110 stakeholders among the Piedmont Region Public Administrations.

In the process of bringing Piedmont to a real eGovernment European best practice, CSI-Piemonte plays a fundamental role for Piedmont's public administration as the leading ICT public agency supporting the strategy definition process and planning, leveraging the citizens impression and participation towards a new way of policymaking, and managing the evolving needs of citizens towards a truly reformed public administration.

CSI-Piemonte supports the Piedmont PA to achieve the priority goals of simplification, transparency and sharing, helping the administrative organisation to improve its internal processes in order to guarantee efficiency and to create a new system that integrates all public services under the umbrella of interoperability, to provide the ideal conditions for data and information exchange and global systems development.

CSI delivers more than 1900 services (320 on institutional portals), with an audience of 4,3 M citizens, 500.000 businesses, over 1300 PAs and authorities, over 1000 operational databases and manages a significant amount of geo-referenced data.



*Roofs 3D model, Vercelli*



*3D city model based on the LiDAR data, Turin*

CSI supports Piedmont PA by covering the entire lifecycle of geographical data and metadata: from conceptual modeling to the acquisition up to visualization, ensuring complete interoperability.

## *Smart City Dashboard*

Under the Smart City Initiative, the City of Turin has designed solutions for producing advanced technology, reducing energy consumption of buildings, promoting clean transportation and reducing carbon emissions in order to improve the quality of life of inhabitants.

On behalf of the City of Turin, CSI-Piemonte developed the prototype of a decision-making dashboard that aims to provide government with a model for dynamic, open and collaborative monitoring and management of the Smart City project.

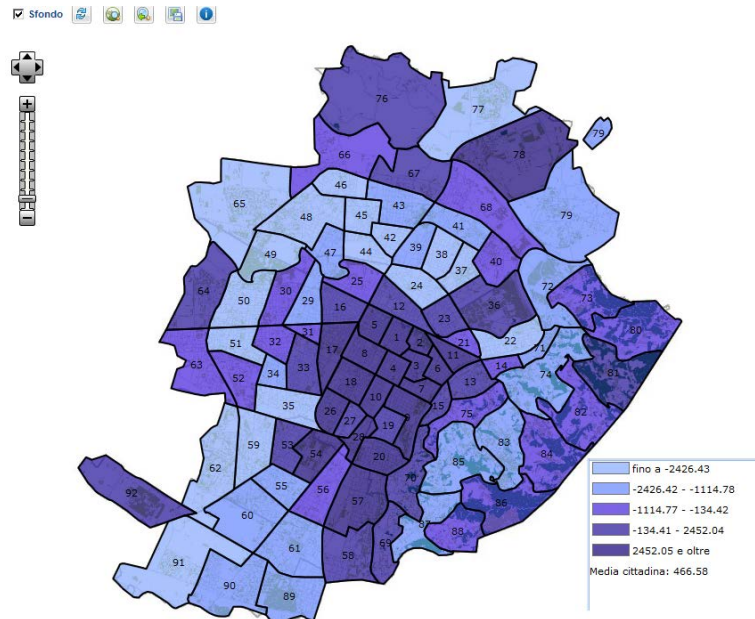
Using *Turin Smart City Dashboard* it is possible to analyse dynamic and geo-referenced indicators, indexes and to model scenarios to support the “Turin Smart City” Strategic Plan. This Dashboard allows to link, monitor and compare subjects of very different origin, as an example: effects of public investments and energy efficiency policies. The *Turin Smart City Dashboard* expanded with the Energy related issues allows for analysis of building energy efficiency, modeling the energy consumption of public owned building stocks and for carrying out scenario analysis for energy efficiency interventions. This system is a valuable support for the City of Turin in the implementation of a Sustainable Energy Action Plan.



*Turin Smart City Dashboard, 3D view, (area Variante 200), Gas consumption*

The application *Turin Smart City Dashboard* is developed using web technology for browsing a decisional database and giving a snapshot of urban phenomena. The aim is to acquire, elaborate and display data and information of different nature, from different sources. The Dashboard data warehouse includes data that is used to keep under control different aspects of the phenomenon: crime-related, territorial, social, social and demographic, housing-related and economics.

The indicators are displayed through a normal easily exportable tabular representations. Moreover data is displayed in cartographical mode: it is possible to have a dynamic interface to the GIS world.



Map of the City of Turin divided into statistical areas

### ***The technological view***

In the Dashboard's map the 2D data representation was performed on a good level. WMS and WFS services functioned as bitmaps and GML and GeoJSON visualized by a slightly customized OpenLayers frontend. However 3D formats at the time of development could offer only one affordable visualizer, the Google Earth plugin. Static and animated 3D data was represented by KML format.

In our experience we can underline that the issue of processing and adaptation of original data formats into standard for the visualization in a web browser output formats become a new technological challenge.

When the data is acquired and processed, you have to choose a proper format of publication; while standard 2D formats are old and rock solid, the 3D output at the time could offer KML and X3D standards, but only the former with a consolidated visualizer

Moreover linking of geospatial data, even open ones, has to face the poor offer of standard (and "linkable") formats, that comes in SHP, DOC, XLS and PDF formats, not linkable without further processing

### ***Work in progress***

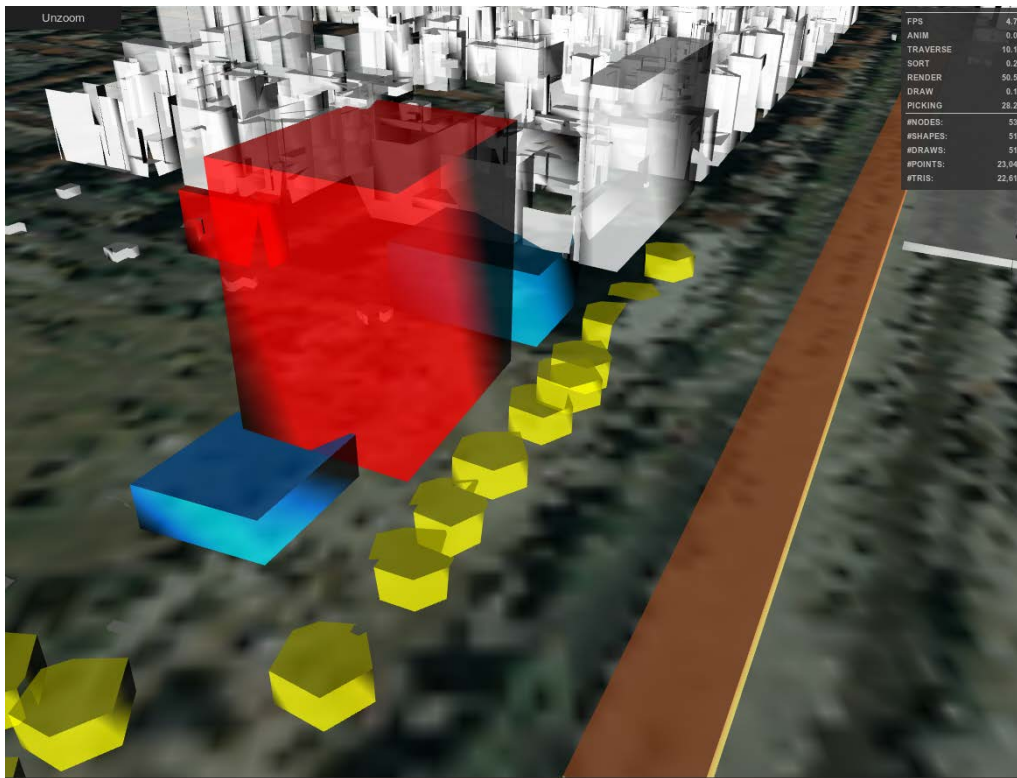
At the moment we are exploring other data formats for 3D representation such as X3D standard XML-based file format and the related interoperability services to provide the data. We are interested to use W3DS which is currently discussed at the Open Geospatial Consortium (OGC).

The main challenge of the Dashboard is the need to represent a great amount of complex data in a simple and common environment like a web browser. At the beginning of our work the developer couldn't (or *shouldn't*) put more than some hundreds of active elements on the client browser without degrading his use experience.

The rise of Html5 is a great technological step forward: we can now mix the 3D data in the page without additional plugins and we can now open our publications formats to X3D via the W3DS OGC draft initiative.



Visualization of data using X3DOM (<http://www.x3dom.org/>) has shown a very good results. A special attention is given to the promising OL3 (<http://ol3js.org/>).



*A screenshot of the X3D format*

During these years of continuous experimental work and development of Dashboard, the CSI-Piemonte knowledge on this issues has improved significantly. By adopting standard data formats, the tool remains active and “young” and has considerably developed during the time. It is expected that the Dashboard can be adopted by different Italian PA with minimum additional effort.

Our new challenge is visualization of sensors data in real time, visualization of thousands electoral results aggregates, analysis of urban dynamics like the recent Turin urban regenerations of a post-industrial city.

Some issues to discuss:

- with Html5 3D in a browser is a reality, the 3D view can render as well as the 2D version, there is still some problems because the user is not ready to use properly the 3D scene with a mouse
- interoperability with sensors and real time data on the back ends is good with standard technology, when the data is real time 3D something is missing, the attention is focused on Rest3D (<http://rest3d.wordpress.com/>) initiative

**Key words:** Smart City, Dashboard, Open Data, geo data, 3D, X3D, W3DS