A working SDI: the Road Cadaster of Regione Friuli-Venezia Giulia

Integrated web and mobile GIS with 3D LIDAR support

Eduard Roccatello | 3DGIS CTO
About 3DGIS

- Italian GIS software house.
- **Opensource** solution provider.
- **Geospatial standards** adoption.
- Long time experience in geospatial software development.
- 3DGIS helps public and private organizations to **extract knowledge from location data.**
3DGIS helps organizations to design, build, maintain and use their SDI.

3DGIS software is based on the coordination of standard de facto open-source software and custom business logic.

SDI is a great opportunity.

Data knowledge and sharing among departments help improving processes.
Friuli-Venezia Giulia road cadaster

Tender request

• **Survey and database production** of the regional road cadaster.

• Data structure is based on DM 2001 (a specific Italian regulation), plus a few addition.

• Past **experiences of both road cadaster and 3D urban data management** have set the foundations upon which our solution proposal has been built.
Our proposal

• We wanted to take into account the complete data lifecycle of both graph and non-graph data, from collection to update, leveraging SDI.

• Survey involved a Mobile Mapping System and a Helicopter, for both imagery and LIDAR acquisition.

• A WebGIS has been developed to make 2D and 3D data work together, streaming LiDAR directly in the browser.

• An Android app has also been developed to bring data on the field.
3.380 km roads

7.082.583 events

24.250 GB imagery & LIDAR

2.000+ GCP
One aim of the project is to **enable the subsequent update of road data** and the collection of newly built roads.
Road data lifecycle

Data restitution process
Overall system design

**CARTO PLATFORM**

- PostgreSQL
- PostGIS
- Geoserver
- Geowebcache
- Geonetwork
- CKAN
- Road data processor
- LIDAR & Imagery processor
- Webservices

**BUSINESS LOGIC**

- WebGIS
- Android app
- 3D viewer

**INTERNAL**

**EXTERNAL**

- S3 API STORAGE
- QGIS
- OGC SERVICES
- REST API USERS
Designed for cloud computing

• Every business tier component is based on the **Service Oriented Architecture** paradigm.

• Every piece of the software solution is running in a **container** and is orchestrated / deployed automatically.

• Most **data storage leverages the Object Based paradigm** (S3 API).

• The platform has been named **carto**.
The carto ecosystem
Data visualisation and orchestration platform

DATA PROCESSING
- CARTO RDP
- LIDAR PROCESSOR
- IMAGERY PROCESSOR

WEBGIS
- CARTO.WEB
- CITYVU

MOBILE
- CARTO.APP
The carto ecosystem

Features worth noting

• Web-based geometric editing with access control and versioning / auditing
• 3D support + 2.5D augmentation
• Typed dynamic data model
• Road imagery and LiDAR integration
• Data analysis tool
• Mobile app
• OGC WMS / WMTS services and REST API
• OGC services relay with permission management
Road data management

• Carto manages **data acquisition and update**.

• Changes are tracked.

• Road events organized in classes.

• Road signs drawn on the map.
Imagery and LiDAR

• We had to process about 40 TB of raw data (imagery and LiDAR).
• Preprocessing is an intensive task.
• LiDAR visualization is made possible by Cityvu, which communicates with Carto using web socket.
Analysis tool

- Current geodatabase accounts for more than 2500 events per kilometer.
- Large sets of data need to be analyzed with automated tools, with user defined rules.
- We built a tool for that.
• Operators working on very large road assets could need data access directly on the field, to inspect or update road data.

• We developed an Android app that can be used to view and edit data in every place.
Next steps

• Integrated **maintenance planning** and **workforce management**.

• **Business intelligence** support for analysis tool.

• AR / VR support.

• **INSPIRE theme** for transportation data.
Conclusions

• Our solution leverages the **intrinsic power of the spatial data infrastructure**.

• Customer is planning to distribute data access to the municipalities.

• We created a **common framework for road data management**, which can be employed to support a variety of needs.

• In fact, the **system has already been extended** and now includes cyclable paths.
Q & A

Eduard Roccatello | 3DGIS CTO
eduard.roccatello@3dgis.it

www.3dgis.it