NASA WorldWind: virtual globe for an open smart city

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Introduction

✓ Sustainability is a rising issue that must be addressed.

✓ “OpenCitySmart” provides a set of tools to benefit city operations to increase sustainability and the quality of urban life. All the material is under open license and designed to be extended by others. (More detailed information: https://wiki.osgeo.org/wiki/Opencitysmart)

✓ Technologies available in OpenCitySmart:
  ✓ NASA WorldWind (Java, iOS, Android)
  ✓ NASA Web WorldWind (JavaScript)
  ✓ PoliCrowd 2.0
  ✓ i-locate
  ✓ GRASS GIS
  ✓ QGIS…
Virtual Globes

- NASA WorldWind (initially relied on .NET and then Java) in 2004 and Google Earth in 2005

- NASA Web WorldWind, based on Web technologies (JavaScript, WebGL, HTML5) is released almost a year ago.
  - has graphical capabilities, such as display of placemarks, text, polygons, shapefiles, and imagery (JPEG, PNG and GeoTIFF)
  - supports OGC standards: WMS, WMTS, KML
  - supports Collada
  - examples: https://webworldwind.org/
  - source code: https://github.com/NASAWorldWind/WebWorldWind/
Modern Virtual Globes

- Two notable examples are NASA Web WorldWind and Cesium.

- Both frameworks display the data via Web standards, but Web WorldWind is focusing more on formats used by United States Department of Defense.

- Web WorldWind uses a geographic interface for configuring the objects, while Cesium’s primary interface is 3D-centric.

- Web WorldWind uses WCS and DTED for elevation data, whereas Cesium uses proprietary data.

- Cesium has a “Pro” version, on the other hand Web WorldWind offers all functionalities free of charge.
NASA Web WorldWind API based VGI platform

✓ The virtual globe (http://viaregina3.como.polimi.it/WorldWind/), developed using NASA Web WorldWind API is able to display data stored in the ODK Aggregate server of Via Regina project and in the CouchDB database of a cross-platform application (Via Regina), both on desktop and on mobile browsers, as long as WebGL is supported.

✓ The general look of the virtual globe, where yellow markers represent the ODK POIs and red ones represent the CouchDB POIs is on the right. The area of the Via Regina project’s scope is highlighted with red borders.
NASA Web WorldWind API based VGI platform

- The data of each POI is displayed inside a popup upon clicking the marker.

Available at http://viaregina3.como.polimi.it/WorldWind/
NASA Web WorldWind API based VGI platform - architecture
ODK (Open Data Kit)
ODK Collect (Via Regina)

✓ Main menu of the application

![Main Menu Image]

ODK Collect 1.4.3 (1041)
Data collection made easier...

- Fill Blank Form
- Edit Saved Form
- Send Finalized Form
- **Get Blank Form**
- Delete Saved Form

![Get Blank Form Image]

Server Requires Authentication

Please enter username and password for server:
http://georep.como.polimi.it/ODKAgregate/formList

Username: demo
Password: 

Cancel OK

![Get Selected Image]

I Cammini della Regina
ID: regina_v9

Detailed instructions:
ODK Collect (Via Regina)

- Form compilation

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Detailed instructions:
Cross-platform VGI application

✓ Available on desktop and mobile browsers: http://viaregina3.como.polimi.it/app.

✓ The apk for Android devices can be downloaded from:
  http://viaregina3.como.polimi.it/app/viaregina.apk

✓ The app is also available on Android and iOS online stores, named as “Via Regina”.

✓ Main features:
  ✓ offline data collection
  ✓ POI rating
  ✓ integrated maps showing collected POIs
Cross-platform VGI application - architecture
Cross-platform VGI application

- Report of a POI: setting the class and rating

Available at http://viaregina3.como.polimi.it/app/
Cross-platform VGI application

- Report of a POI: take/upload a picture of it

- Available at http://viaregina3.como.polimi.it/app/
Cross-platform VGI application

✓ The map of POIs added by you or by all the users

✓ Available at http://viaregina3.como.polimi.it/app/
Cross-platform VGI application

- Query of a POI and the app info

- Available at http://viaregina3.como.polimi.it/app/
Conclusions

✓ ODK Collect and a cross-platform application (Via Regina) is used to collect geographical information.

✓ The collected information is displayed on a NASA Web WorldWind based virtual globe in the scope of OpenCitySmart.

✓ The application can be used to involve citizens in the decision-making processes, as a result to empower citizens and foster the development of smart cities.

✓ The capacity of a powerful framework, NASA Web WorldWind, that can be used in many fields is demonstrated.
Thanks for your attention!