OGC Geospatial to the Edge Plugfest Engineering Report

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Publication Date: YYYY-MM-DD

Approval Date: YYYY-MM-DD

Submission Date: YYYY-MM-DD

Reference number of this document: OGC 18-XXX

Reference URL for this document: http://www.opengis.net/doc/PER/t14-D003

Category: Public Engineering Report

Editor: Luis Bermudez

Title: OGC Geospatial to the Edge Plugfest Engineering Report

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OGC Engineering Report

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Chapter 1. Summary

The Geospatial to the Edge Interoperability Plugfest, co-sponsored by Army Geospatial Center and the National Geospatial-Intelligence Agency (NGA/CIO&T) brought together technology implementers and data providers to advance the interoperability of geospatial products and services based on OGC profiles.

1.1. Motivation

The geospatial communities supporting defense, emergency response, and intelligence rely on geospatial data and open standards to accomplish their mission. To make sharing of data meet their specific needs, they used profiles. Profiles provide strict implementation guidance to ensure interoperability of geospatial systems in these highly specialized and demanding environments. Non-compliance to open standards profiles prohibits mission critical operations from executing effectively and efficiently.

A plugfest, an initiative of the OGC Innovation Program [http://www.opengeospatial.org/ogc/programs/ip], provides the right venue for sponsors and technology implementers to come together in a collaborative agile process to solve geospatial challenges. The Plugfest assisted tool enhancement and provided guidance to improve the delivery of enterprise geospatial data to end users. In this initiative, the plugfest was used to bring more than ten data/service producers and clients of data following NSG profiles. It help discovered implementation issues and advance executable test suites.

1.2. Prior-After Comparison

Before the Plugfest very few implementations were able to interact with NGS profiles. After the plugfest more implementations were available.

The executable test suites were also improved as a results of feedback form the participants.

1.3. Recommendations for Future Work

Activities like this plugest should be performed for new profiles allowing participating to come together and tests to be advanced.

1.4. Document contributor contact points

All questions regarding this document should be directed to the editor or the contributors:

Contacts

Name	Organization
Luis Bermudez	OGC

Name	Organization
contributor	from org

1.5. Foreword

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. The Open Geospatial Consortium shall not be held responsible for identifying any or all such patent rights.

Recipients of this document are requested to submit, with their comments, notification of any relevant patent claims or other intellectual property rights of which they may be aware that might be infringed by any implementation of the standard set forth in this document, and to provide supporting documentation.

Chapter 2. References

The following normative documents are referenced in this document.

NOTE: ⬚nly normative standards are referenced here, e.g. OGC, ISO or other SDO standards. All other references are listed in the bibliography. Example:

- NSG GeoPackage 2.1 (raster and vector data), based on the OGC GeoPakage 1.1 standard: https://nsgreg.nga.mil/doc/view?i=4379

- NSG WMS 1.0 (raster data), based on the OGC WMS 1.3 standard: https://nsgreg.nga.mil/doc/view?i=4209&month=11&day=13&year=2017

- NSG WMTS 1.1 (raster data), based on the OGC WMS 1.0 standard: https://nsgreg.nga.mil/doc/view?i=4448

- NSG WFS 1.0 (vector data), based on the OGC WFS 2.0 standard: https://nsgreg.nga.mil/doc/view?i=4388&month=11&day=17&year=2017

Chapter 3. Terms and definitions

For the purposes of this report, the definitions specified in Clause 4 of the OWS Common Implementation Standard OGC 06-121r9 [https://portal.opengeospatial.org/files/?artifact_id=38867& version=2] shall apply. In addition, the following terms and definitions apply.

- term name

```
text of the definition
```

- term name|synonym

```
text of the definition
```

3.1. Abbreviated terms

NOTE: The abbreviated terms clause gives a list of the abbreviated terms and the symbols necessary for understanding this document. All symbols should be listed in alphabetical order. Some more frequently used abbreviated terms are provided below as examples.

- CFP Call for Participation

- NSG …

Chapter 4. Overview

This Plugfest, co-sponsored by Army Geospatial Center and the National Geospatial-Intelligence Agency (NGA/CIO&T), will bring together technology implementers and data providers to advance the interoperability of geospatial products and services based on community profiles. The Plugfest will assist tool enhancement and provide guidance to improve the delivery of enterprise geospatial data to end users.

Examples of how end user communities will benefit are:

- First responders, relief workers and fire fighters preparing for and operating in austere network environments.

- Emergency planners and managers supporting hurricane, wildfire, and earthquake preparedness, relief/response activities and damage assessment.

- Soldiers/warfighters during planning and executing operations specifically in disconnected, intermittent, and limited network environments.

The geospatial communities supporting defense, emergency response, and intelligence rely on geospatial data and open standards to accomplish their mission. To make sharing of data meet their specific needs, they used profiles. Profiles provide strict implementation guidance to ensure interoperability of geospatial systems in these highly specialized and demanding environments. Non-compliance to open standards profiles prohibits mission critical operations from executing effectively and efficiently.

Additionally, members of the IC, DoD, non-DoD/IC Federal agency members of the NSG, international partners, state/local municipalities, and Native American tribal organizations that are responsible for the operation, acquisition and/or development of systems and applications which collect, procure, produce, serve, exchange, or use GEOINT data are mandated to comply NSG implementation standards (NSGM 3202). The support of these profiles affect government acquisition decisions to ensure that all systems within the government can communicate appropriately. [From GEOINT Functional Manager Standards Assessment (GFMSA) Program Manual, NSGM 3202, June 2016]

A plugfest, an initiative of the OGC Innovation Program [http://www.opengeospatial.org/ogc/programs/ip] provides the right venue for sponsors and technology implementers to come together in a collaborative agile process to solve geospatial challenges. A plugfest provides the scenarios and testing environment to advance implementation of profiles in commercial and open source software products. A plugfest allows organizations to test and validate that their software products can interoperate with other products implementing the same standards.

Chapter 5. Results and Recommendations

5.1. WMS

5.1.1. Axis Order

Data providers should treat properly urn:ogc:def:crs:epsg::4326 (or EPSG:4326) depending on the specification they are implementing. EPSG:4326 AXIS order is YX. Here is the guideline:

- OGC WMS 1.1.1 mandates XY - ordering
- OGC WMS 1.3 mandates official axis ordering. If EPSG:4326 is being used the axis order should be YX

Related issue:

- https://github.com/opengeospatial/geoedge-plugfest/issues/15

5.2. WFS

5.2.1. Complex Queries

Some queries seem difficult to execute. Several clients reported that Query 10 can't be executed:

```
Query 10: Find the administrative subdivision that contains the building
"Cuerpo de Bomberos de Orocovis"
```

The process might involve a 2 step process:

```
Select the layer
Run a query inside that layer: select * from BUILDING_P WHERE
ZI005_FNA="Cuerpo de Bomberos de Orocovis";
```

```
select * from BUILDING_P WHERE ZI005_FNA="Cuerpo de Bomberos de Orocovis";
```


Related issue:

- https://github.com/opengeospatial/geoedge-plugfest/issues/88
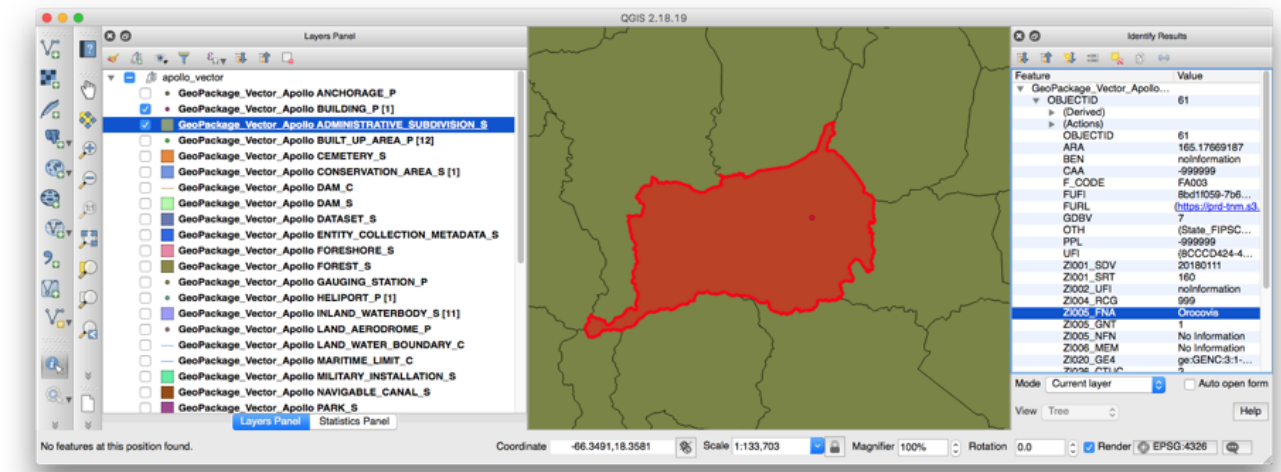
5.3. WMS Recommendations

5.3.1. Axis Order

Data providers should treat properly urn:ogc:def:crs:epsg::4326 (or EPSG:4326) depending on the specification they are implementing. EPSG:4326 AXIS order is YX. Here is the guideline:

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Related issue:

- https://github.com/opengeospatial/geoedge-plugfest/issues/15

5.4. GeoPackage Results

5.4.1. Raster and vector files in one file

The initiative tested the capability of including both raster and vector data in one file. One file size was 5 GB which included high resolution data.

5.4.2. Sort Attributes in SQLite schema

Sort attributes alphabetically in the SQLite schema. If not, it is hard to find attributes in user interfaces to select features to filter.

Related issues:

- https://github.com/opengeospatial/geoedge-plugfest/issues/21

5.4.3. Remove local links

If GeoPackage files contain links to data producer local file system, some data (e.g styles) might not be accessible.

Related issues:

- https://github.com/opengeospatial/geoedge-plugfest/issues/22
- https://github.com/opengeospatial/geoedge-plugfest/issues/71

5.4.4. Investigate further GDAL Validation issues

Several GDAL validation issues were reported that require further investigation with GDAL developers:

Related issues:

- https://github.com/opengeospatial/geoedge-plugfest/issues/70

- https://github.com/opengeospatial/geoedge-plugfest/issues/69

- https://github.com/opengeospatial/geoedge-plugfest/issues/72

- https://github.com/opengeospatial/geoedge-plugfest/issues/73

5.4.5. Investigate further GeoPackage performance

Some files >600 MB were slower to load. Need to investigate further the raw causes of such behavior.

Two files in Sprint 1 with raster data were 1 GB and 5 GB. Raster queries were easy to perform.

Related issues:

- https://github.com/opengeospatial/geoedge-plugfest/issues/22

5.4.6. Investigate further transparency

Some clients reported apparent transparency in raster layers.

Related issues:

- https://github.com/opengeospatial/geoedge-plugfest/issues/82

5.4.7. GeoPackage convenience packaging both raster and vector data

One participant provided a GeoPackage file containing both raster and vector data. Various clients were able to open the file. The GeoPackage contained high resolution satellite images and elevation data in the 2D gridded coverage extension schema. Tile-based, pyramidal, floating-point raster data is a distinguishing feature of GeoPackage.
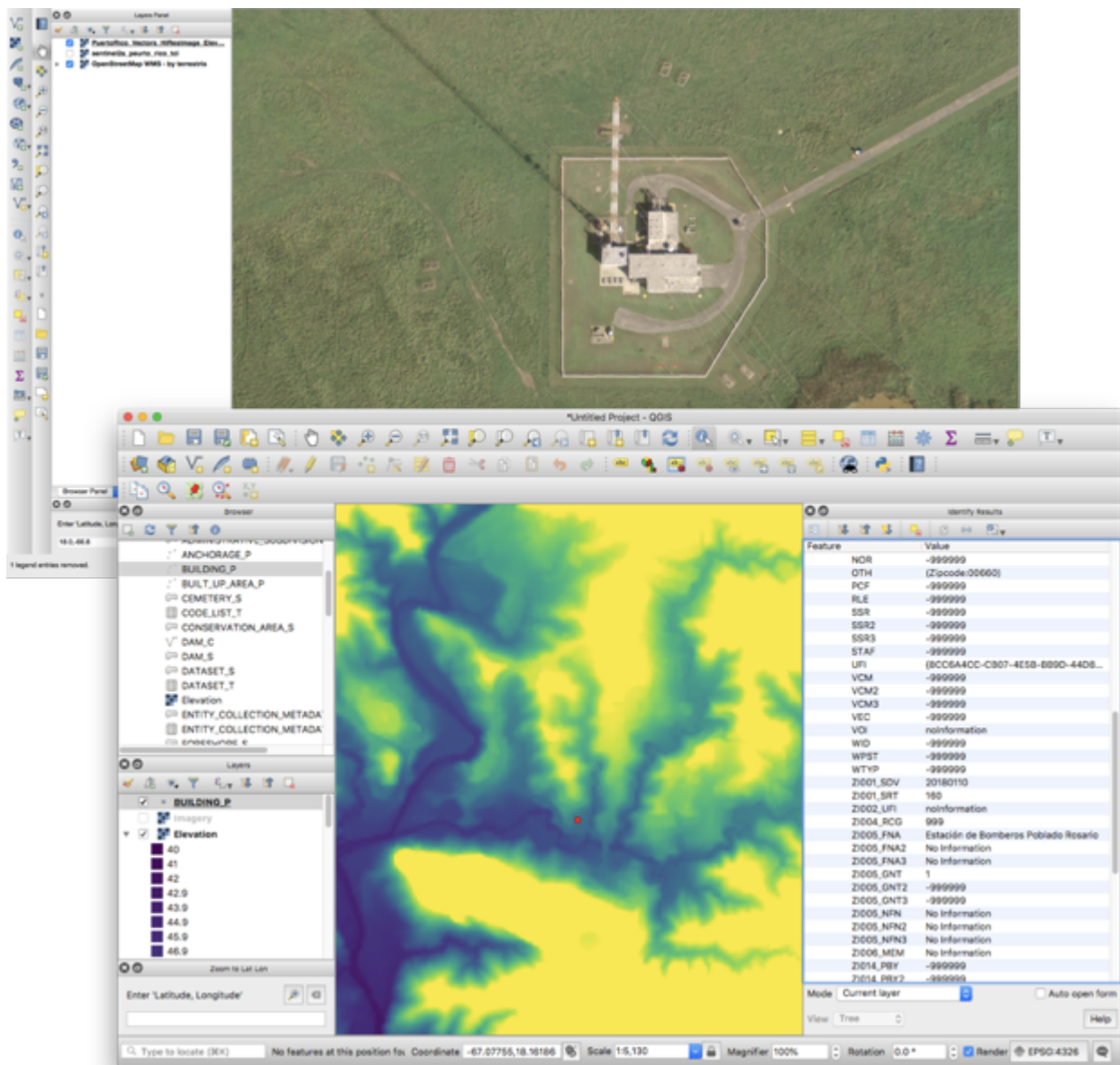
Appendix A: Sprint 1

Sprint 2

Appendix B: Revision History

Date	Editor	Release	Primary clauses modified	Descriptions
Aug 10 2018	L Bermudez	.1	all	initial version

Table 1. Revision History

Appendix C: Bibliography

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