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Open Geospatial Consortium

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TECHNICAL PAPER

CANDIDATE SWG DRAFT

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KEYWORDS

The following are keywords to be used by search engines and document catalogues.

OGC, GeoSPARQL, 3D

PREFACE

To come...

SECURITY CONSIDERATIONS

The following security considerations apply...

IV SUBMITTING ORGANIZATIONS

The following organizations submitted this Document to the Open Geospatial Consortium (OGC):

- Organization one
- Organization two
- Organization three

V SUBMITTERS

NAME	AFFILIATION	OGC MEMBER
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1 SCOPE

1 SCOPE

2 CONFORMANCE

2 CONFORMANCE

3

NORMATIVE REFERENCES

3 NORMATIVE REFERENCES

There are no normative references in this document.

4 TERMS AND DEFINITIONS

4 TERMS AND DEFINITIONS

No terms and definitions are listed in this document.

5

ABSTRACT

5 ABSTRACT

To come...

6 KEYWORDS

6 KEYWORDS

To come...

7 CONVENTIONS

7 CONVENTIONS

8 INTRODUCTION

8 INTRODUCTION

9

BENEFICIARIES AND BENEFITS

9 BENEFICIARIES AND BENEFITS

This section describes the beneficiaries and benefits of representing data, including geospatial data, using semantic and graph technologies. Furthermore, a collection of use cases demonstrate how semantic and graph technologies are used together with spatial data to tackle real world problems.

9.1. Beneficiaries

9.1.1. Beneficiary 1: Someone who benefits

9.2. Benefits

The benefits of semantic and graph technologies are outlined below.

9.2.1. Benefit B1: My benefit

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CURRENT CAPABILITIES

10 CURRENT CAPABILITIES

10.1. GeoSPARQL

GeoSPARQL is the most common geospatial extension of SPARQL. It was accepted as an OGC standard in 2012 and revised as GeoSPARQL 1.1 in 2024.

According to the standard document, “The OGC GeoSPARQL standard supports representing and querying geospatial data on the Semantic Web. GeoSPARQL defines a vocabulary for representing geospatial data in RDF, and it defines an extension to the SPARQL query language for processing geospatial data”.

10.1.1. Requirements addressed

GeoSPARQL addresses the following requirements with regards to 3D.

10.1.2. Adoption of GeoSPARQL 1.1

11

REQUIREMENTS FOR GEOSPARQL 3D

11 REQUIREMENTS FOR GEOSPARQL 3D

This section provides an overview of feedback received on the current version of the GeoSPARQL standard (version 1.1) regarding 3D usage. This feedback helps to identify some of the barriers to use, and to outline requirements that have not been addressed that may encourage greater uptake.

11.1. Proposed extensions for GeoSPARQL 3D

11.1.1. Extension 1: 3D representations

11.1.1.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/583

11.1.1.2. Category

Semantic improvement

11.1.1.3. Description

GeoSPARQL should include ways to represent 3D data in a knowledge graph.

3D data should be included in common 3D formats and 3D data should be includable as a text literal and a file representation.

Some common formats which could be considered for inclusion are:

- Polygon File Format (PLY)
- Wavefront OBJ Format (OBJ)
- GLTF Format (GLTF)
- X3D Format

11.1.2. Extension 2: Relations of 3D geometries

11.1.2.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/416

11.1.2.2. Category

Semantic improvement

11.1.2.3. Description

GeoSPARQL should include ways to represent relations between 3D geometries and relations between 3D geometries and geometries of lower dimensions. The relations should be expressable in property relations and should be queryable using SPARQL extension functions.

11.1.3. Extension 3: Appearance of 3D geometries

11.1.3.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/592

11.1.3.2. Category

Semantic improvement

11.1.3.3. Description

GeoSPARQL should include ways to represent materials and textures of 3D geometries, so that geometries can be styled accordingly. Materials include:

- Colors of surfaces with light diffusion parameters
- Images as textures, which are associated with surfaces of the 3D object

11.1.4. Extension 4: Multi-component 3D geometries

11.1.4.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/591

11.1.4.2. Category

Semantic improvement

11.1.4.3. Description

GeoSPARQL should include ways to define multi-component 3D geometries, whereas each component expresses its own semantics. For example, parts of a building could have different semantics according to the function of the building components and would be classified as such in an RDF graph.

11.1.5. Extension 5: Alignments of GeoSPARQL 3D

11.1.5.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/590https://github.com/opengeospatial/ogc-geosparql/issues/574

11.1.5.2. Category

Semantic improvement

11.1.5.3. Description

GeoSPARQL 3D should be aligned to other vocabularies and standard which currently provide 3D support in different knowledge domains. Especially alignments to ifcOWL and the X3D vocabulary would position the GeoSPARQL vocabulary as a link between these different standards.

11.1.6. Extension 6: Alignments of Engineering CRS to Geospatial CRS

11.1.6.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/586

11.1.6.2. Category

Semantic improvement

11.1.6.3. Description

GeoSPARQL 3D should provide the opportunity to align a local coordinate system in which most 3D geometries are defined with a coordinate reference. While this work might only be partially done within the scope of GeoSPARQL itself, GeoSPARQL should be aligned with the emerging Ontology CRS developments of OGC and provide necessary functions or properties to create the link.

11.1.7. Extension 7: Geometry Extrusion

11.1.7.1. GitHub Issue URI

https://github.com/opengeospatial/ogc-geosparql/issues/556https://github.com/opengeospatial/ogc-geosparql/issues/547

11.1.7.2. Category

Semantic improvement

11.1.7.3. Description

GeoSPARQL 3D should provide the opportunity to extrude 2D geometries to 3D geometries and vice versa.

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ANNEX N: N

12 ANNEX N: N

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ANNEX O: HISTORY

13 ANNEX O: HISTORY

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BIBLIOGRAPHY

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TTL	World Wide Web Consortium, *RDF 1.1 Turtle Terse RDF Triple Language*, W3C Recommendation (25 February 2014). https://www.w3.org/TR/turtle