# OGC API - 3D GeoVolumes Quick Intro ...

**12 July 2022**

# Overview

- Intro to OGC API - 3D GeoVolumes

- Code Sprint Focus - Test nD Tiles Access Method
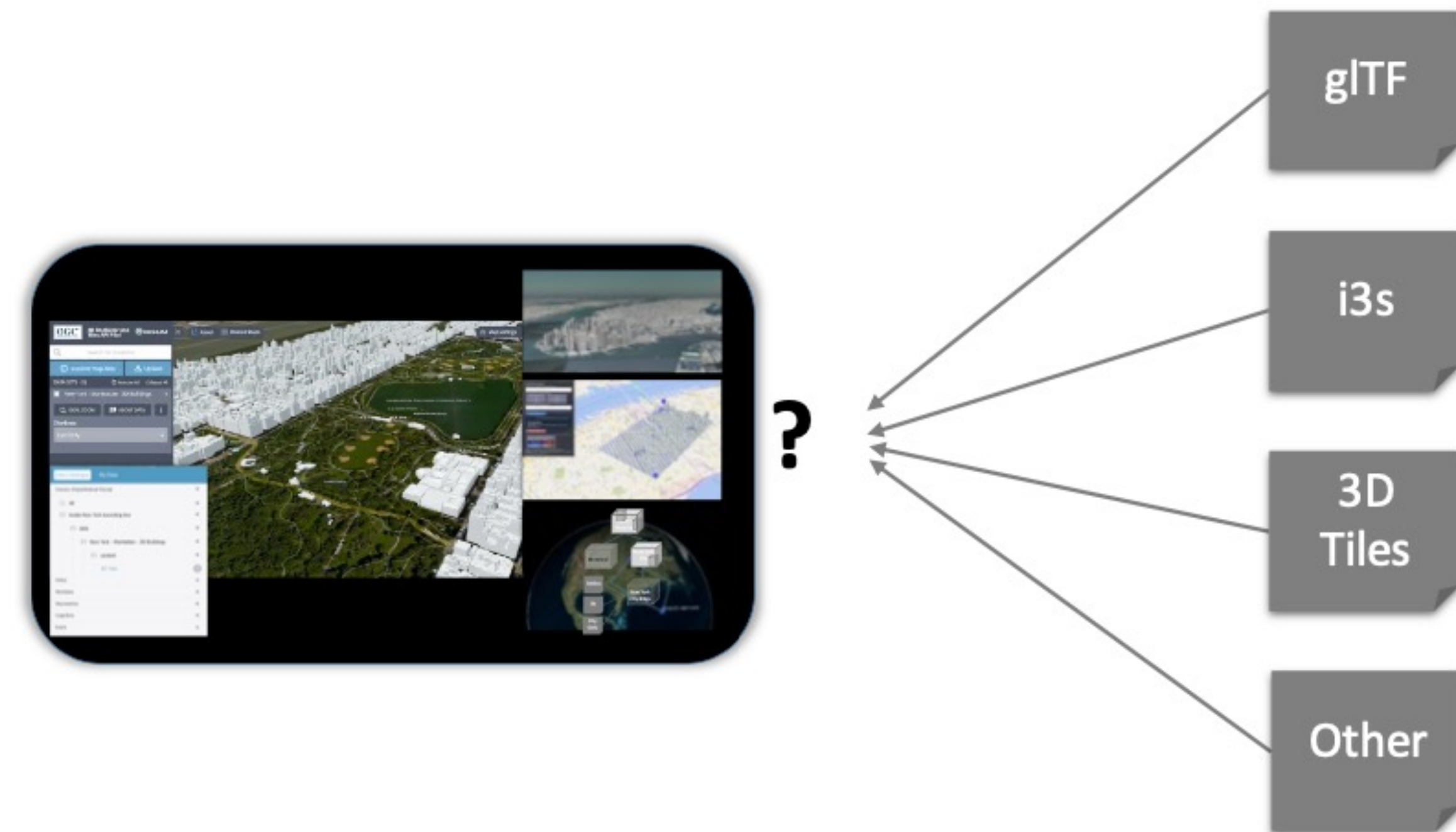
# OGC API - 3D GeoVolumes Overview

- Access Methods to 3D Content

  ✓Static, link-following ✓bbox query

  ✓Tile coordinate (proposed)

- Informed by emerging OGCAPI best practices and prior API standards - defines core API functions with HTTP Methods (GET, POST, PUT, DELETE) applied to 3D GeoVolumes resources, Uses relation type and media type

- Coordinates with 3D Tiles and i3s OGC Community Standards, OGC API - Tiles, to use implicit tiling based on OGC TileMatrixSets with nD extensions as method of access

- Deliverables of the SWG...A final version of the "OGCAPI– 3D GeoVolumes - Part 1: Core" document for submission to TC



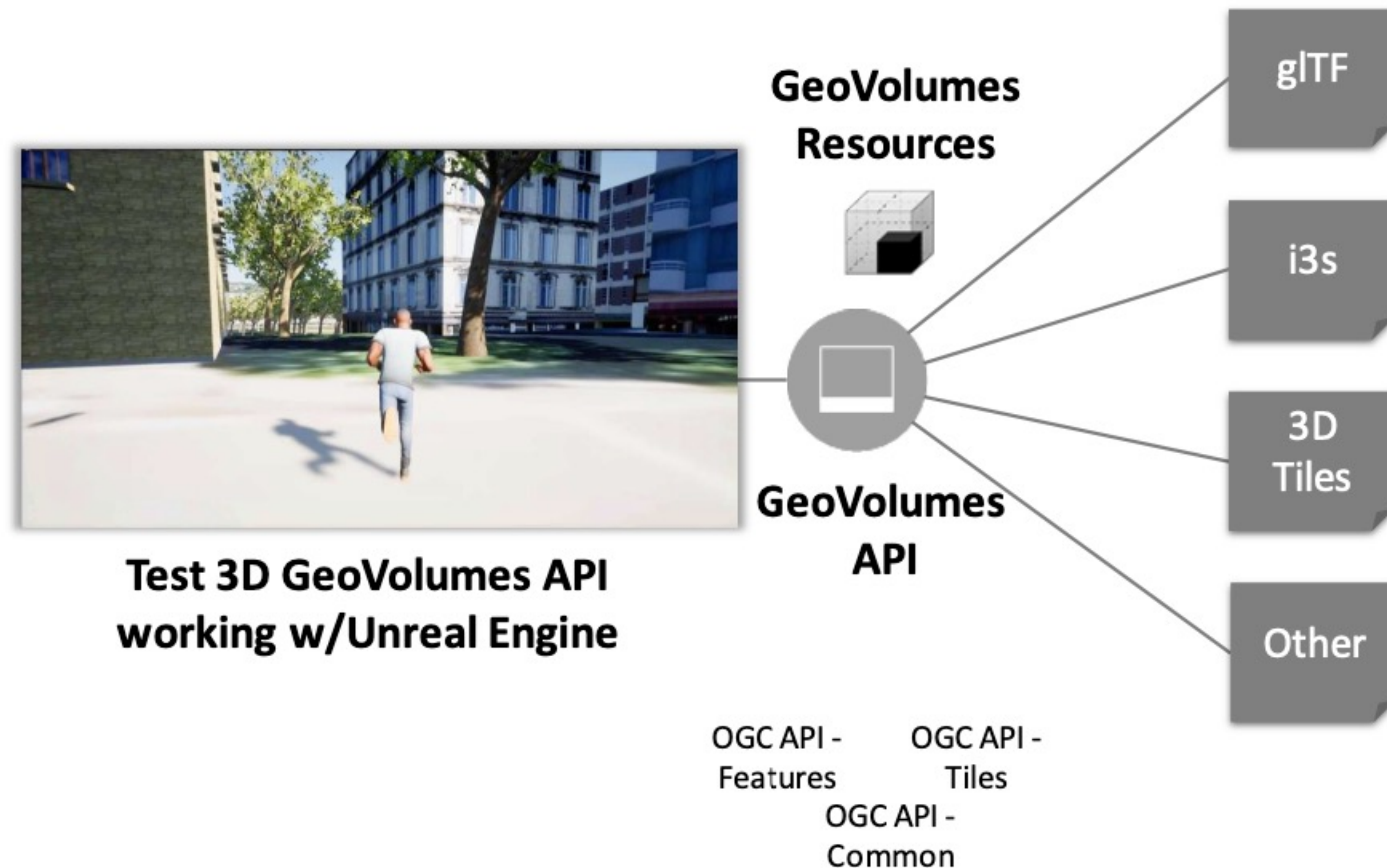3D GeoVolumes API
w/bbox query method

# Challenge

- Multiple standards to access and transfer 3D geospatial content (3D Tiles, I3S, glTF, CityGML, etc)... Developed for various technical/commercial reasons.

- Standards use different distribution mechanisms... Are optimized for user requirements and bandwidth situations.

- Each of these co-existing solutions binds users to an approach... Making it challenging to access 3D content from different providers.

# Opportunity

- OGC API - 3D GeoVolumes addresses this challenge by developing a resource model and corresponding API to integrate multiple approaches into single, open standards-based approach.

- Draft OGC API - 3D GeoVolumes and resource model allows efficient access to 3D content in multiple formats.

- Based on OGC API – Common and OGC API family of standards.



**GeoVolumes Resources**

**GeoVolumes API**

Test 3D GeoVolumes API working w/Unreal Engine

glTF

i3s

3D Tiles

Other

OGC API - Features

OGC API - Tiles

OGC API - Common

# Not Replacing Existing Methods – Enabling Interoperability

- Goal of the proposed API and resource model is not to replace existing distribution methods and models for 3D content...

- ...But to extend and enable interoperability between them.
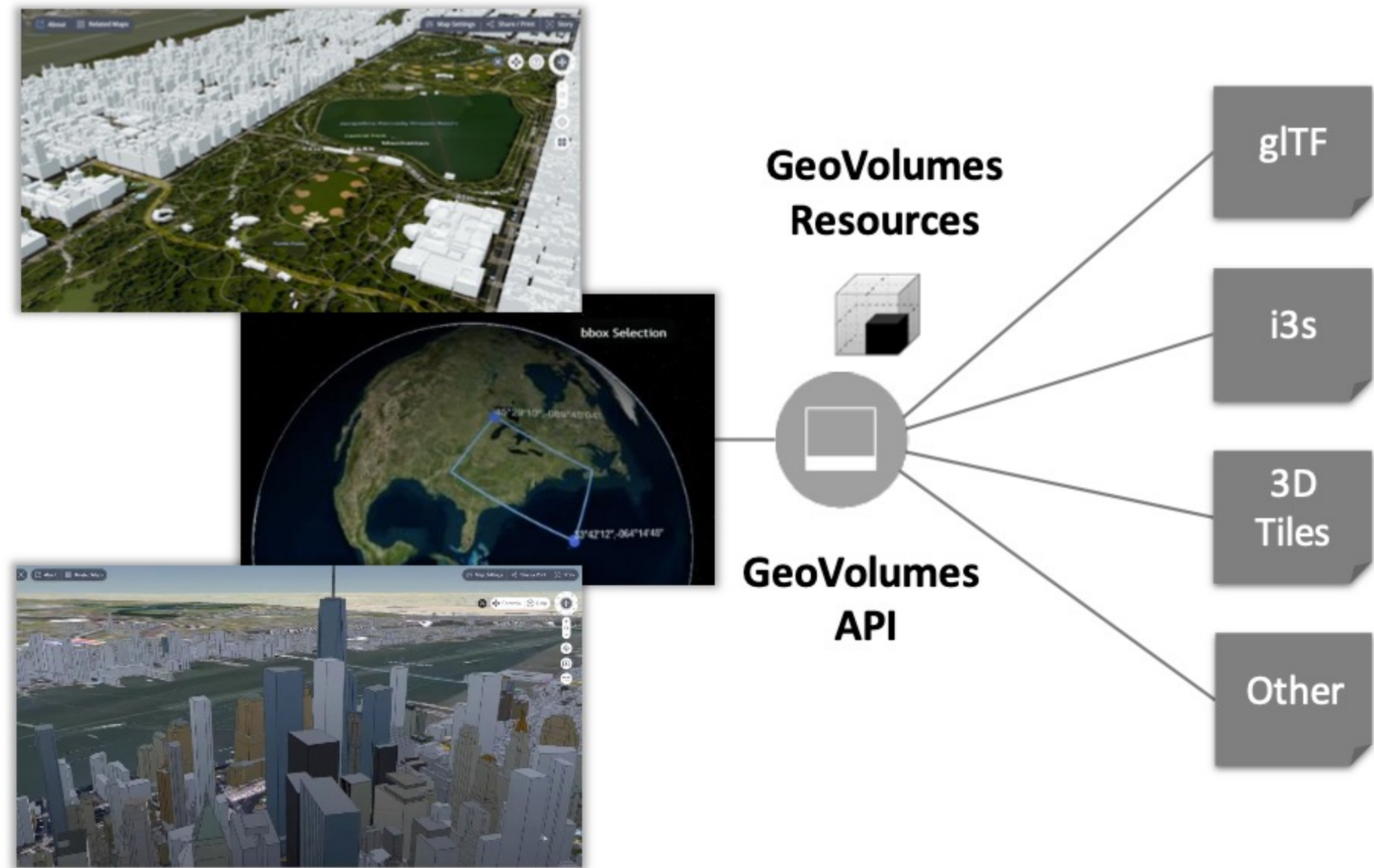
# Key Point - Common Organization of Space

- In general, proposed API and resource model will follow a common organization of space... which is a collection of spaces where a space may contain either sub-spaces or a set of objects.

- This representation of a space is called a

- Bounding Volume.

- Bounding Volumes have also been called 'partitions of spacetime'
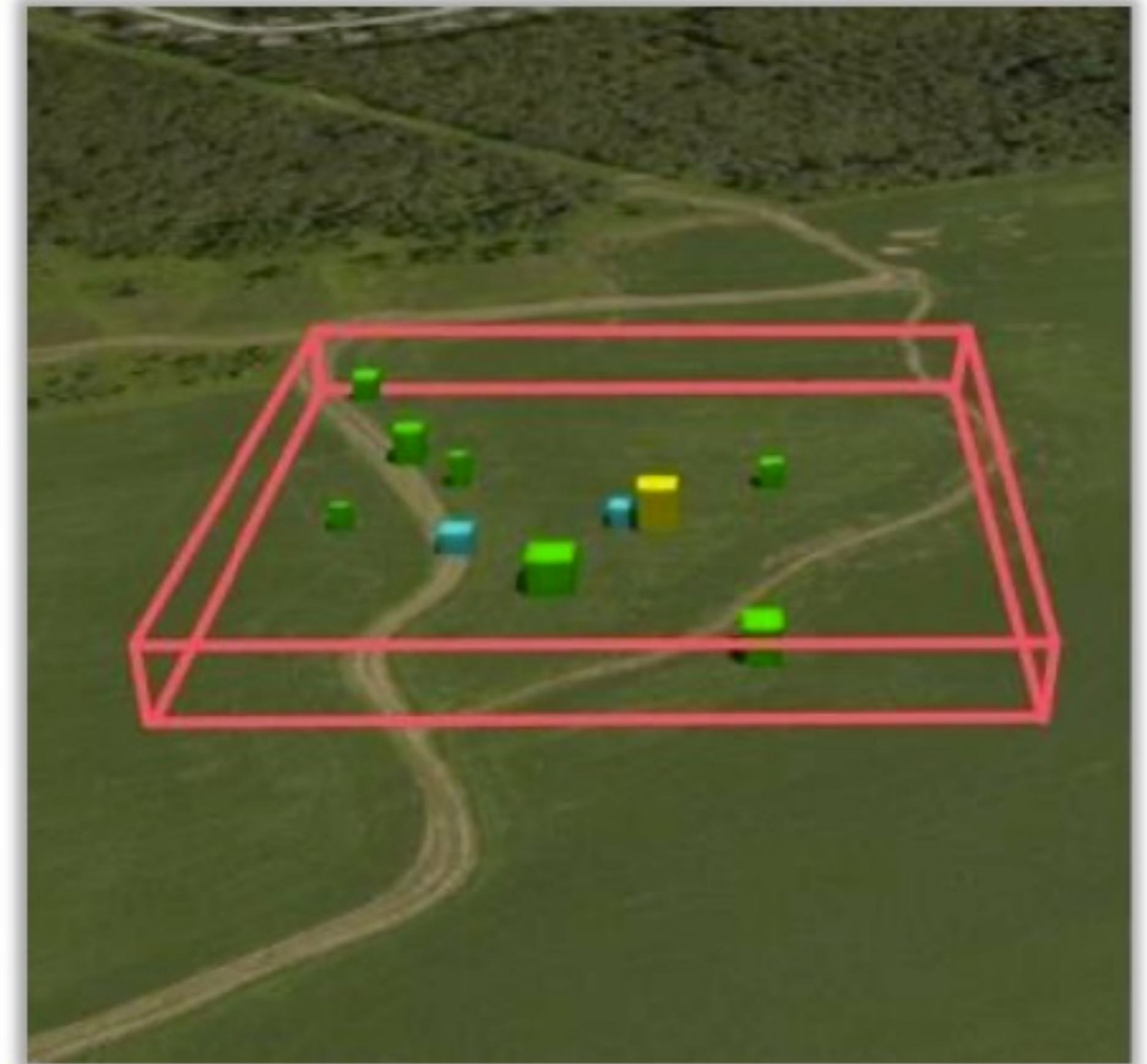


**Bounding Volume with set of objects**

# Developed Through Hands-On, Collaborative Testing

- Concept of a 3D GeoVolumes API developed and demonstrated in OGC 3D Data Container and Tiles API Pilot, and tested in OGC Interoperable Simulation & Gaming Sprints 1 and 2

- We're building on those preliminary efforts - developing and documenting OGC API - 3D GeoVolumes draft candidate standard that provides modern, common and consistent interface to 3D content
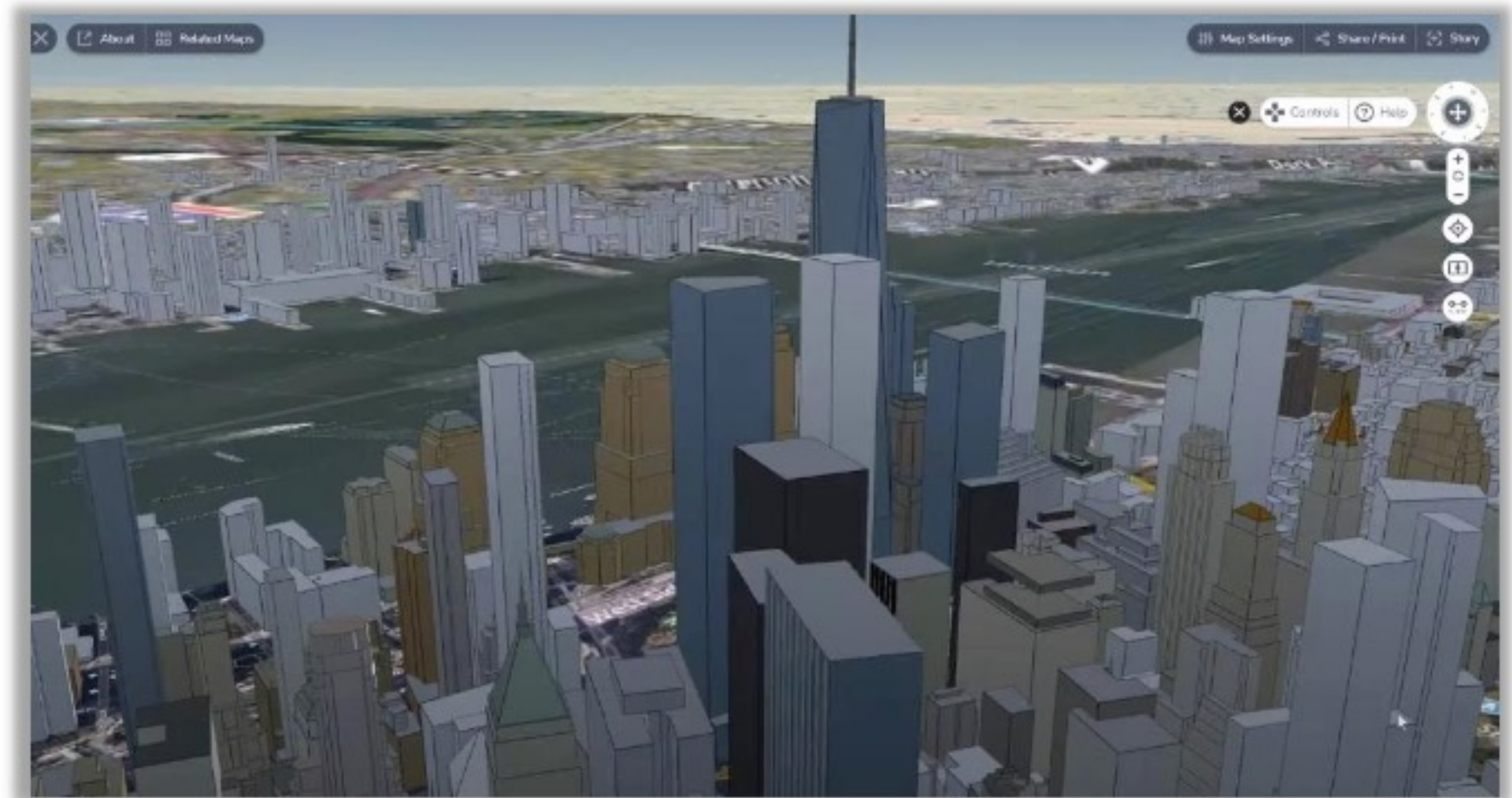


**Draft 3D GeoVolumes API accessing global OSM buildings**

# Existing Work was our Starting Point

| OGC 15-001r4 | OGC 3D Portrayal Service https://docs.opengeospatial.org/is/15-001r4/15-001r4.html | 1.0 | 13SEP2017 |
|---|---|---|---|
| OGC 17-014r7 | OGC Indexed 3D Scene Layer (I3S) and Scene Layer Package Format Specification https://www.ogc.org/standards/i3s | 1.1 | 08FEB2020 |
| OGC 17-046 | OGC Testbed 13: 3D Tiles and I3S Interoperability and Performance Engineering Report http://www.opengis.net/doc/PER/t13-NG002 | N/A | 5MAR2018 |
| OGC 17-069r3 | OGC® API – Features – Part 1: Core http://www.opengis.net/doc/IS/ogcapi-features-1/1.0 | 1.0 | 14OCT2019 |
| OGC 18-053r2 | 3D Tiles Specification 1.0 https://www.ogc.org/standards/3DTiles | 1.0 | 31JAN2019 |
| OGC 19-010r2 | OGC Testbed-15: Styles API Engineering Report http://www.opengis.net/doc/PER/t15-D012 | N/A | 12DEC2019 |
| OGC 19-041r3 | OGC Routing Pilot Engineering Report http://www.opengis.net/doc/PER/routing-pilot-er | N/A | 8JAN2020 |
| OGC 19-069 | OGC Testbed-15: Maps and Tiles API Engineering Report http://www.opengis.net/doc/PER/t15-D014 | N/A | 22NOV2019 |
| | OpenAPI Specification https://github.com/OAI/OpenAPI-Specification/blob/main/versions/3.0.0.md | 3.0.0 | 16FEB2021 |
| OGC 19-072 | OGC® API – Common – Part 1: Core http://docs.ogc.org/DRAFTS/19-072.html | 1.0 | 23AUG2021 |
| OGC 20-024 | OGC® API – Common – Part 2: Geospatial Data http://docs.ogc.org/DRAFTS/20-024.html | 1.0 | 06OCT2021 |
| OGC 17-083r3 | OGC® Two Dimensional Tile Matrix Set and Tile Set Metadata Standard http://www.ogc.org/standards/requests/240.html | 1.0 | 03DEC2021 |
| | 3D Tiles Next https://github.com/CesiumGS/3d-tiles/tree/3d-tiles-next/extensions/3DTILES_implicit_tiling/ | | |



Test 3D GeoVolumes API demo scenario - pandemic response

# Code Sprint Focus – Test 'nD Tiles' Access Method

- 'nD Tiles' first described in Annex to OGC API - Tiles

- Discussions advanced in mid-2022 with CoverageJSON folks to the following point...

  - Assess 'Use Case #1' at Code Sprint - Basic technical test of nD Tiles access method and OGC API – 3D GeoVolumes

  - 'Give me CoverageJSON or glTF for this specific partition of spacetime' - Implies a particular resolution

  - Describe those partitions of spacetime available in the TileSet metadata (that's what Annex is doing: http://docs.ogc.org/DRAFTS/17- 083r4.html#annex-extending-additional-dimensions)

  - May test weather data at multiple resolutions accessible by nD Tiles in a GeoVolumes API Global - lowest resolution, Regional, Local, Block by block - highest resolution

  - May be of interest to many groups and organizations ...

  - Our own stakeholders, Cesium, Army Geospatial Center, NGA, technical GIS companies, UK Met Office, NOAA, startups, and others

# Thank You

## Community

500+ International Members

110+ Member Meetings

60+ Alliance and Liaison partners

50+ Standards Working Groups

45+ Domain Working Groups

25+ Years of Not for Profit Work

10+ Regional and Country Forums

## Innovation

120+ Innovation Initiatives

380+ Technical reports

Quarterly Tech Trends monitoring

## Standards

65+ Adopted Standards

300+ products with 1000+ certified implementations

1,700,000+ Operational Data Sets

Using OGC Standards