



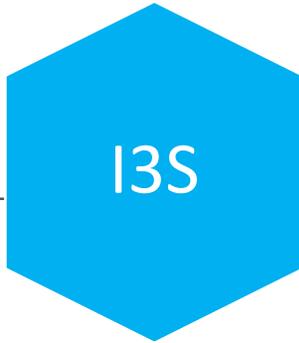
Interoperability of Tiled 3D Formats I3S, 3D Tiles and Beyond...

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Indexed 3D Scene Layers (I3S) – What is it ?

- Open specification for storage and transmission of large, heterogeneous 3D geospatial data sets
- Cloud, Web and Mobile friendly based on JSON, REST and modern web standards
- Support 3D geospatial content, various coordinate systems along with a rich set of layer types

I3S – an OGC community Standard



Scalable 3D scene content for visualization and distribution. An OGC community Standard.

<http://www.opengeospatial.org/standards/i3s>

Open Software, Standards and Data enable organizational resiliency

- Ensure access to data
- Guarantee interoperability
- Enable innovation
- Encourage usage and adoption



Getting widespread adoption in Industry

Bentley®

VRICON

PIX4D

Skyline®

nearmap

aerometrex.

SAFE SOFTWARE™



Agisoft
PhotoScan

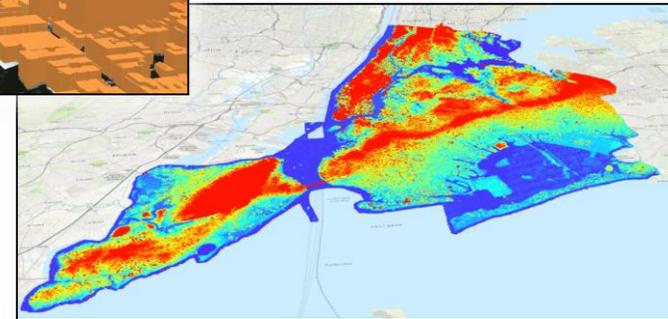
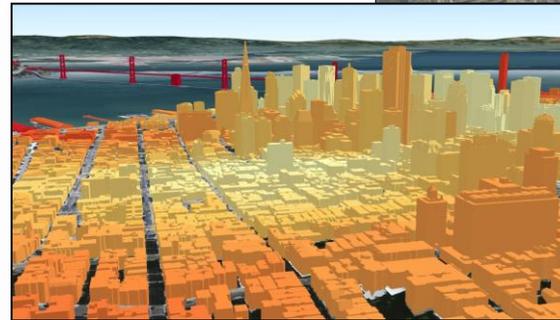
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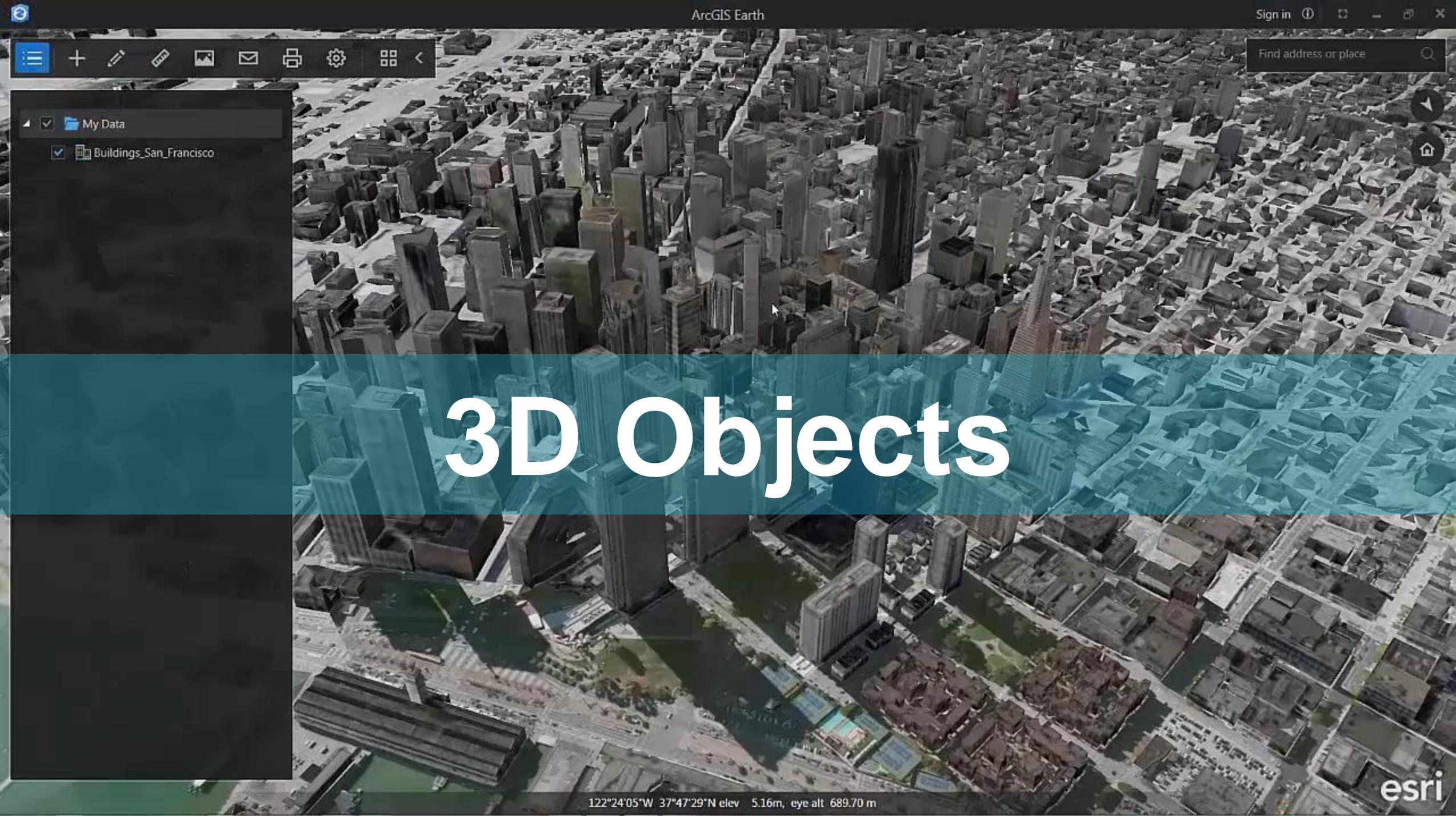
esri | THE SCIENCE OF WHERE

Scene Layer types and profiles defined in I3S

Supports different geometry types

- 3D Objects
- Integrated Meshes
- Point Clouds
- Points



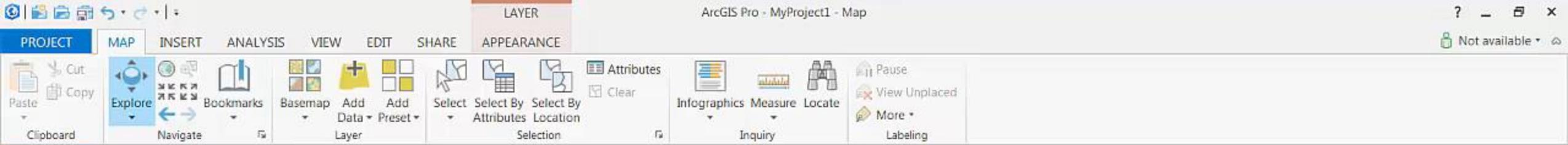


Find address or place

My Data

- Buildings_San_Francisco

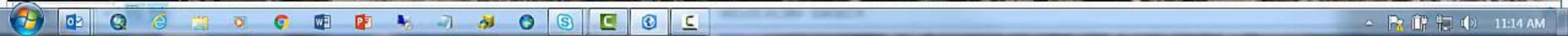
3D Objects



Scene



Integrated Mesh



An aerial view of a landscape rendered as a point cloud. A road winds through the scene, flanked by dense vegetation and trees. The sky is clear blue, and a few small, distant objects are visible. The overall aesthetic is digital and data-driven.

Point Clouds



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Indexed 3D Scene Layers (I3S) – What is it ?

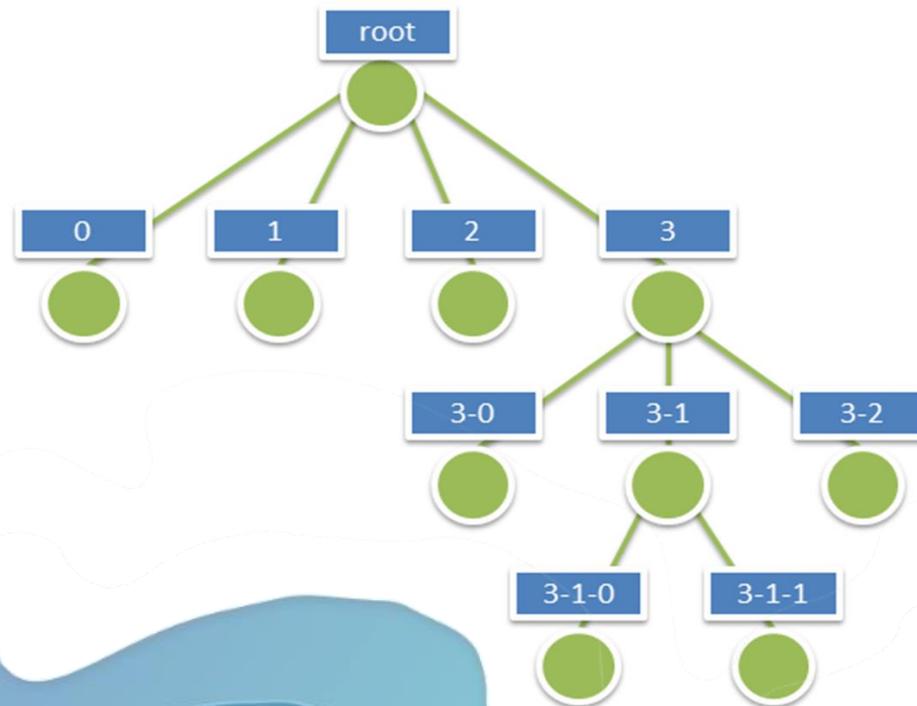
I3S Design Principals for a 3D GIS visualization format

- | | |
|---------------------|---|
| 1. Web friendly: | JSON + Typed Arrays |
| 2. Mobile friendly: | Works good with varying bandwidth |
| 3. Extensible: | Support different types of content |
| 4. Declarative: | Reduce required implicit knowledge |
| 5. Efficient: | Use spatial indexing for quick delivery |
| 6. Scalable: | Provide Level of Detail Support |
| 7. Protected: | Ensure that content is protected |
| 8. Open: | Full Specification publicly accessible |

<https://github.com/Esri/i3s-spec>

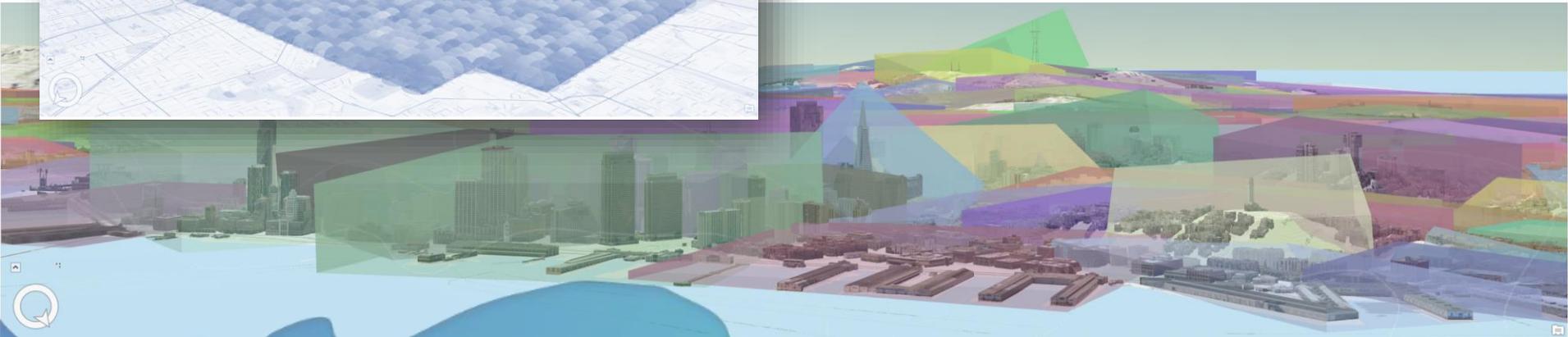
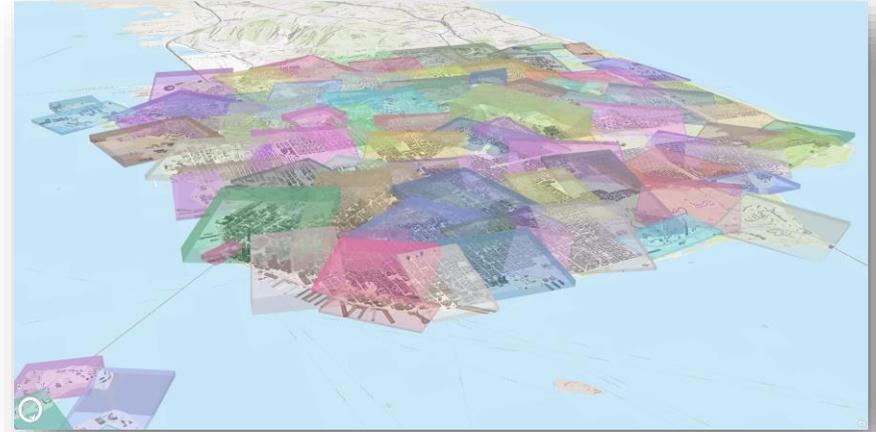
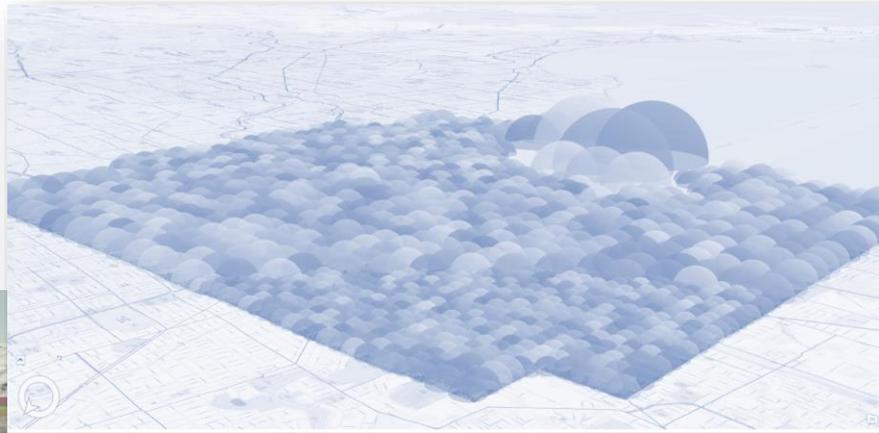
I3S: Organization and structure

- Organizes geospatial data using a hierarchical, node-based spatial index structure



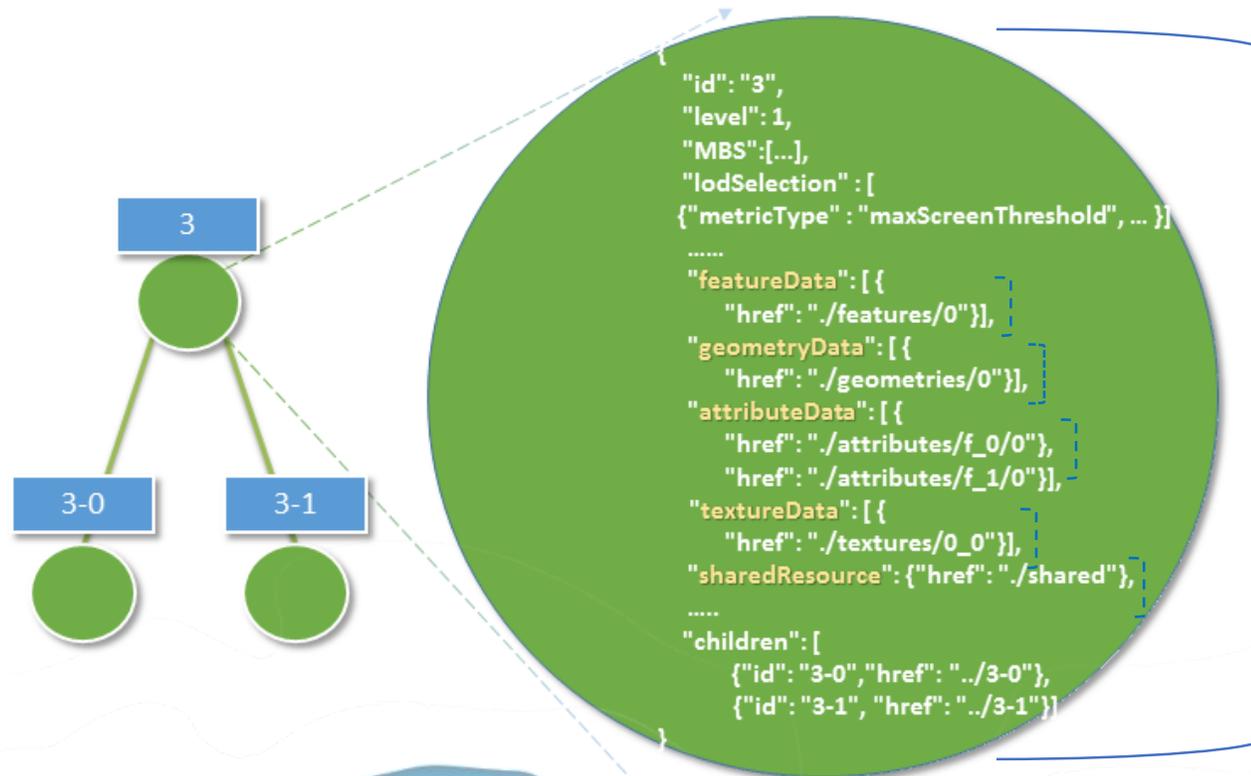
I3S: Organization and structure

- I3S is agnostic to the data partitioning scheme used (k-d trees, sparse octrees, quadtrees etc..)
- Also supports various selection criteria as well as bounding volume types (MBS, OBB...)



I3S: Organization and structure

The physical organization of information within node:

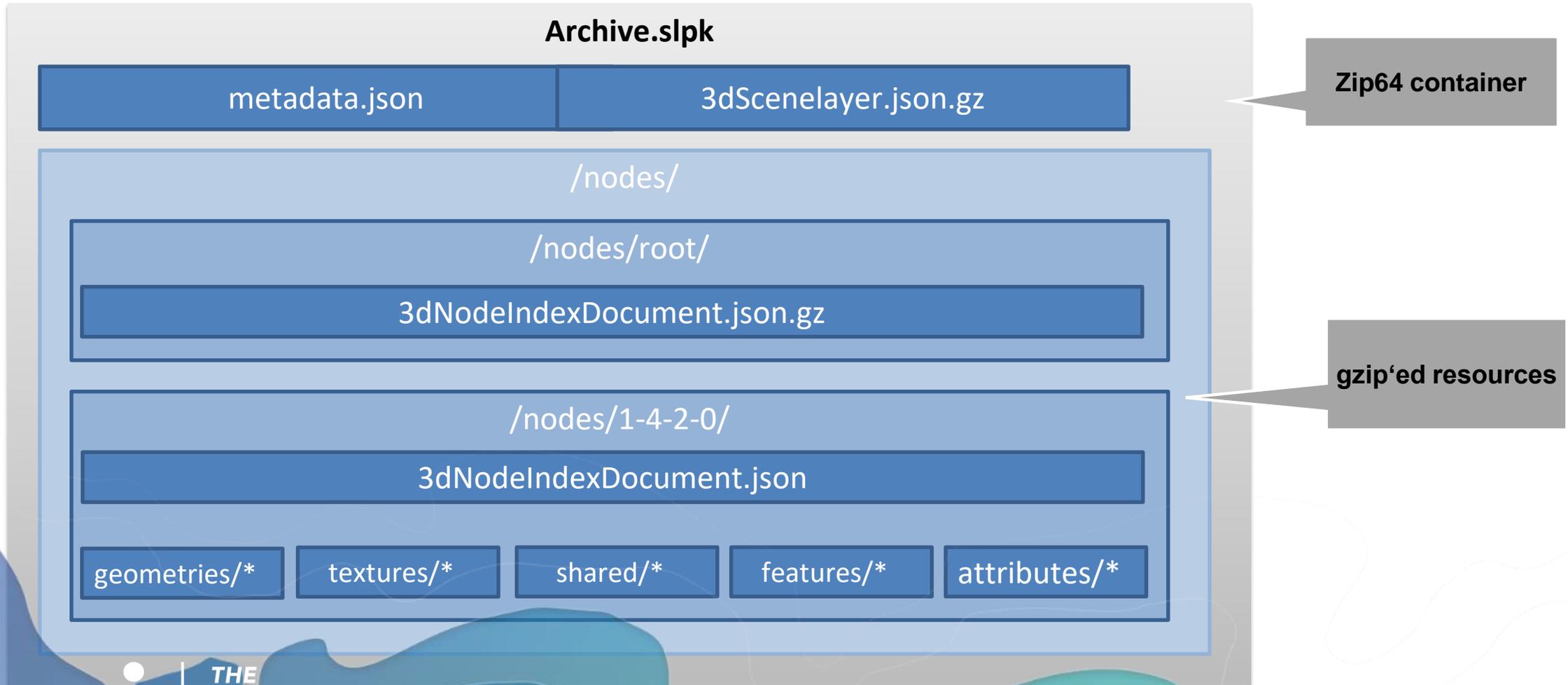


I3S: Consumption

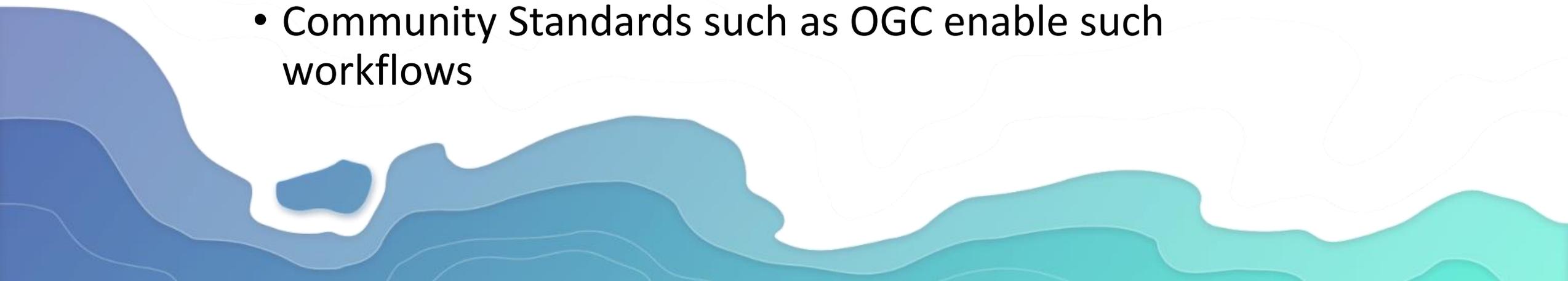
- ***As a service (via a REST API) or locally as a file system (SLPK)***

- As RESTful interfaces/services:
 - Via a RESTful interface that exposes the scene layer, its nodes and their associated resources (geometries, attributes, textures) as web addressable resources.
 - I3S resources are designed for direct access (via a unique key) from key value based cloud blob stores such as Windows Azure Blob Storage or Amazon Simple Storage (S3) using built in REST APIs of such infrastructures
- As a single large Scene Layer Package (SLPK):
 - A single file that packages the complete node tree and its resources into an archive that supports direct access to the individual nodes and resources within it.

Scene Layer Package (SLPK) and Scene Service REST API



Interoperability is Front and Center

- Geospatial users want to use I3S content in different application including Cesium
 - ArcGIS users also want to be able to use 3D Tiles in a variety of application
 - Community Standards such as OGC enable such workflows
- 

Open Call..

- For Developers and content integrators to start consuming I3S content in Cesium
 - Esri collaboration projects – Esri and HFT Stuttgart (Athanasios Koukofikis/Prof. Dr. Volker Coors) showcased consumption of I3S in Cesium
 - Community Standards such as OGC enable such workflows
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