

Data Conversion to I3S for 3D Modeling from CityGML

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3D Across the ArcGIS Platform



Manage Multiscale 3D Models



3D Geodesign



ArcGIS for 3D Cities



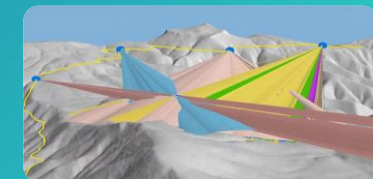
Share 3D scenes



Surface modeling



Native lidar support

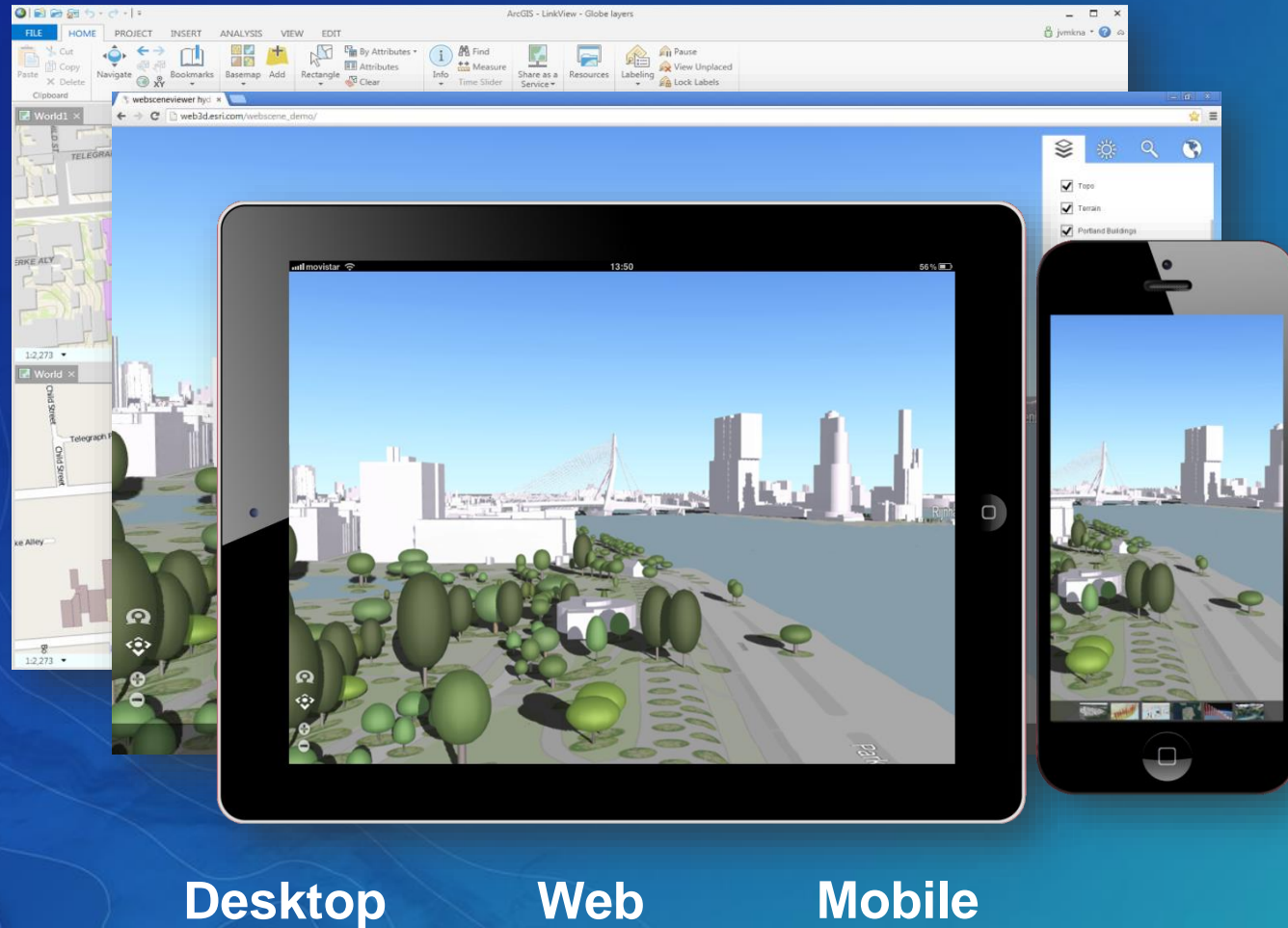


3D Analysis

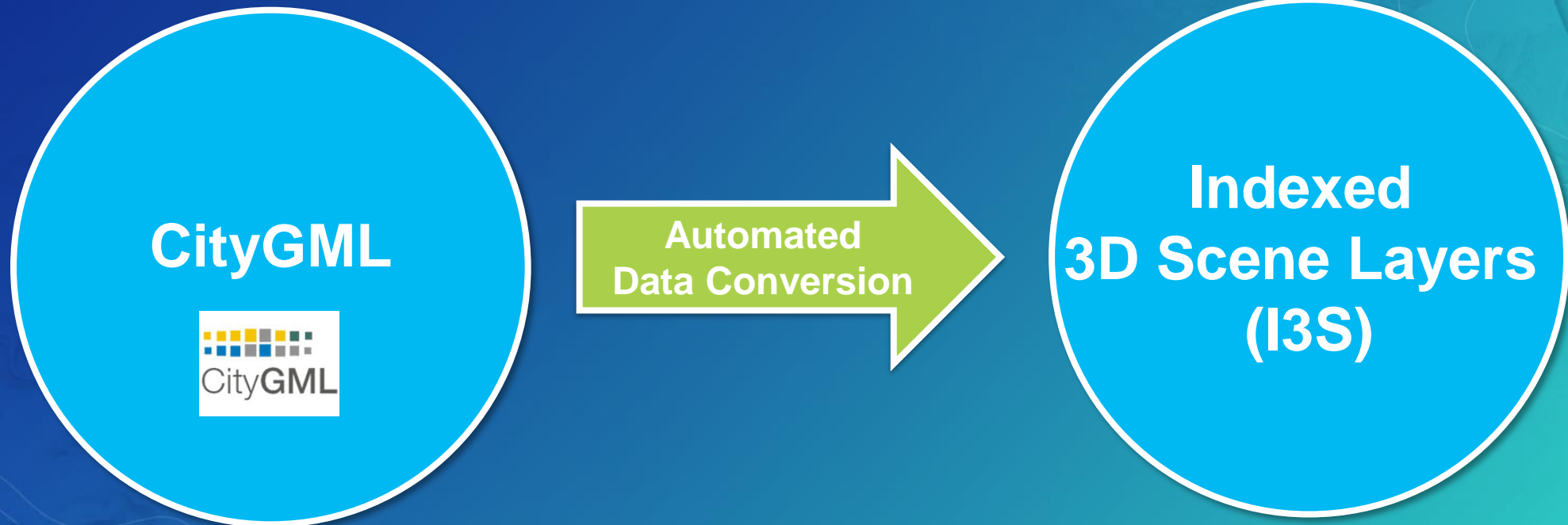


3D on all Clients

3D Across the ArcGIS Platform



This presentation is about...



Agenda

- **Introducing CityGML & I3S**
- **ETL basics (using ArcGIS Data Interop Extension)**
- **Live demonstration with customer data (City of Karlsruhe, Germany)**

The ArcGIS Platform

Interoperability and Standards

- **An Open & Interoperable Platform**
 - Supporting a thriving ecosystem of focused apps and applications.
- **A Standards Compliant Platform**
 - Supporting many relevant standards including those from ISO TC 211 and OGC.
 - CityGML, Geopackage, KML, WFS, ...



ArcGIS

CityGML

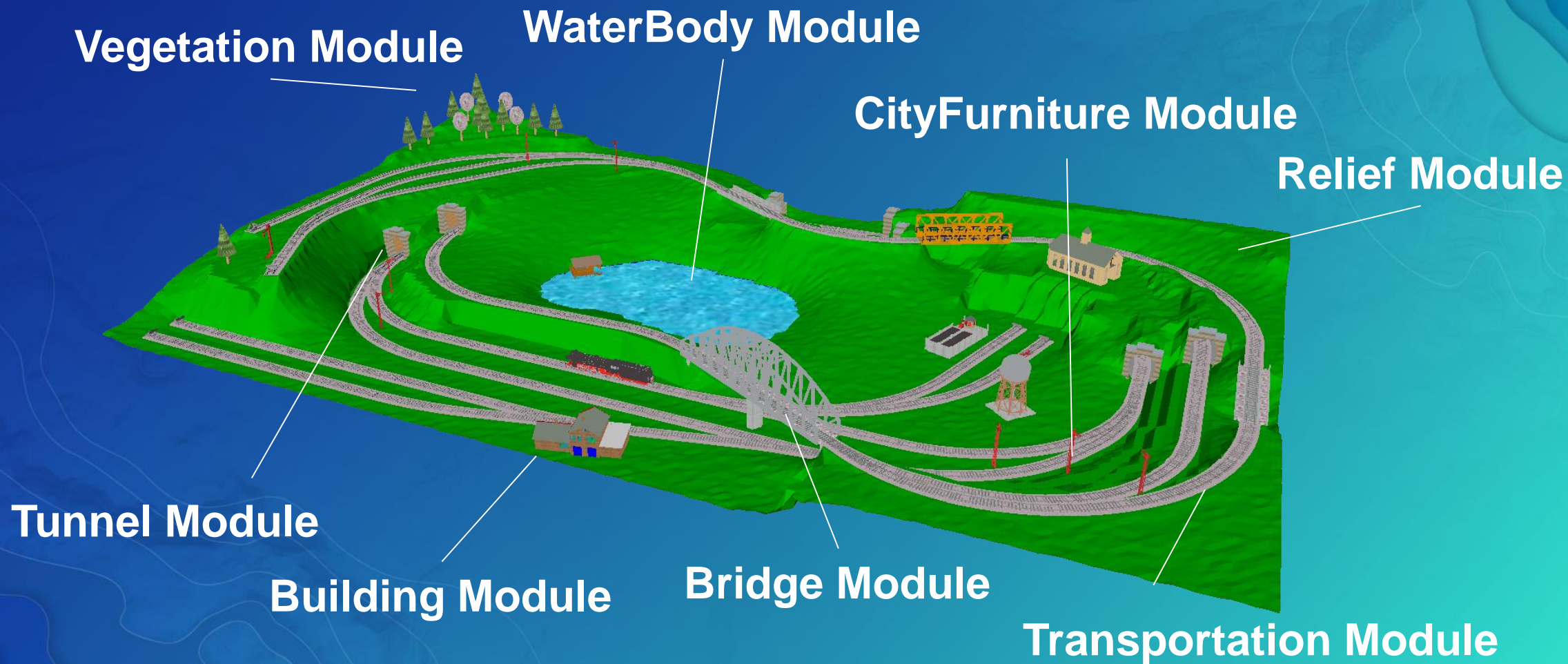
What is it?

- OGC Standard
- Data model for storing and exchanging 3D City Models
- Modeling of all relevant parts of a virtual city according to
 - Semantics
 - Geometry (and Topology)
 - Appearance
- Objects know WHAT they are and WHERE they are
- Level of Detail (LoD) concept



CityGML

Sample



Indexed 3D Scene Layers (I3S)

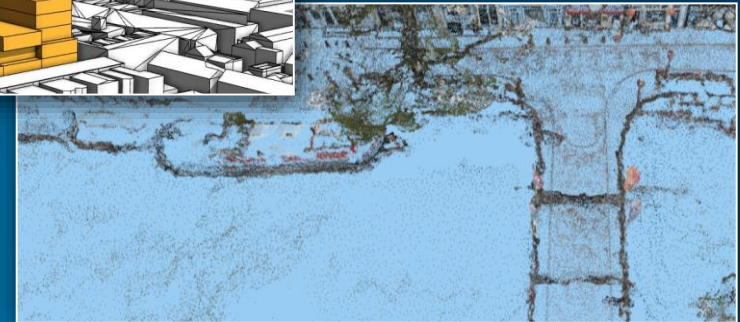
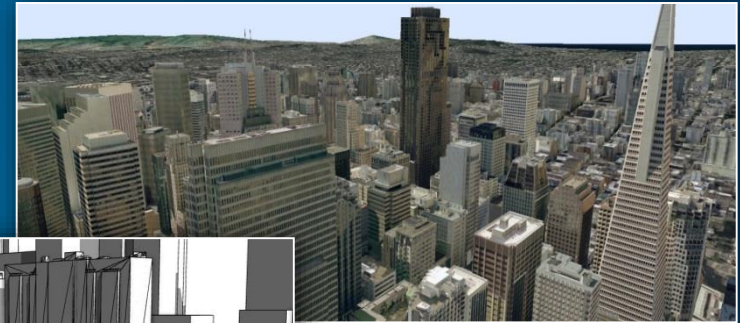
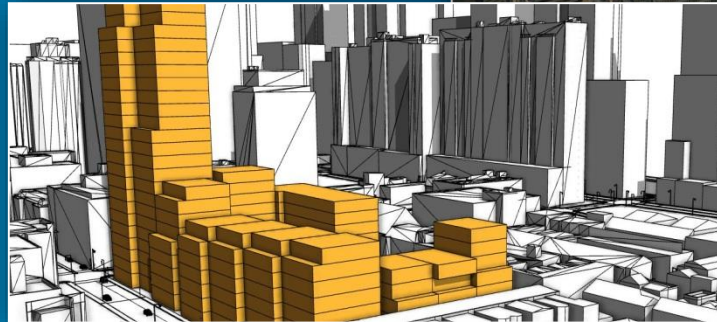
What is it?

- Open standard 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
- An I3S data set, referred to as a Scene Layer is:
 - a container for arbitrarily large amounts of heterogeneously distributed 3D geographic data

Scene Layer types and profiles

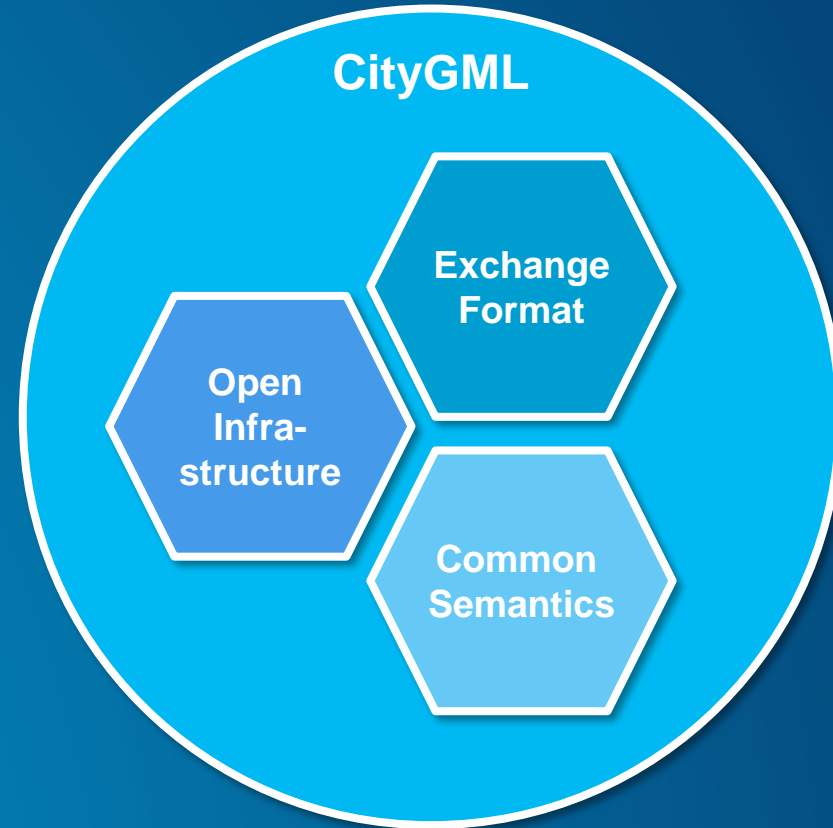
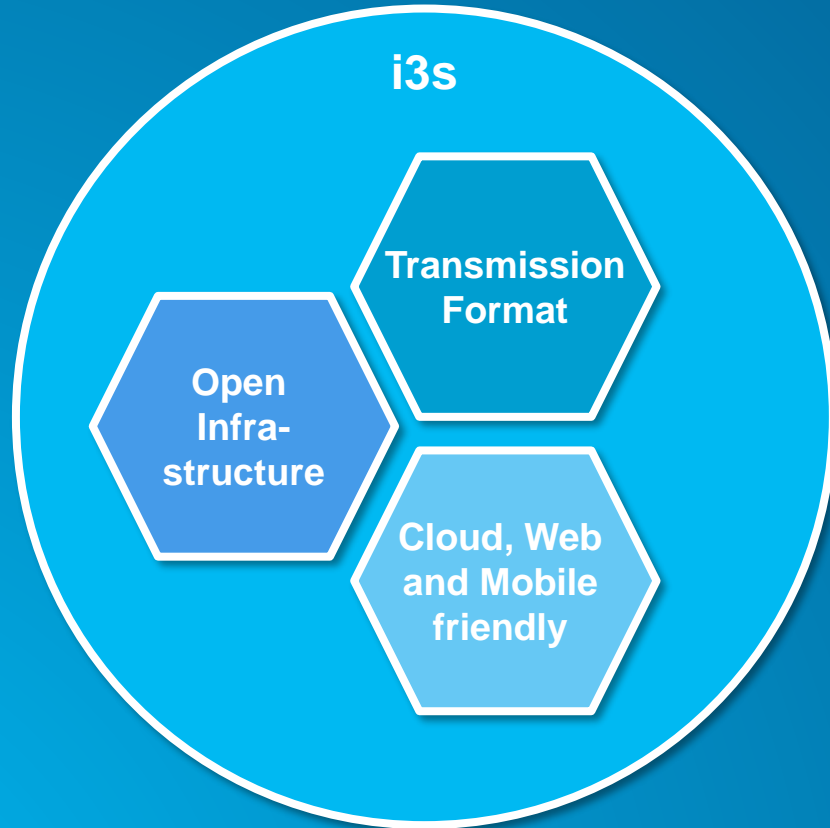
Support different geometry types

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



Comparing CityGML and I3S

Key Facts



How to convert between?



ETL Basics

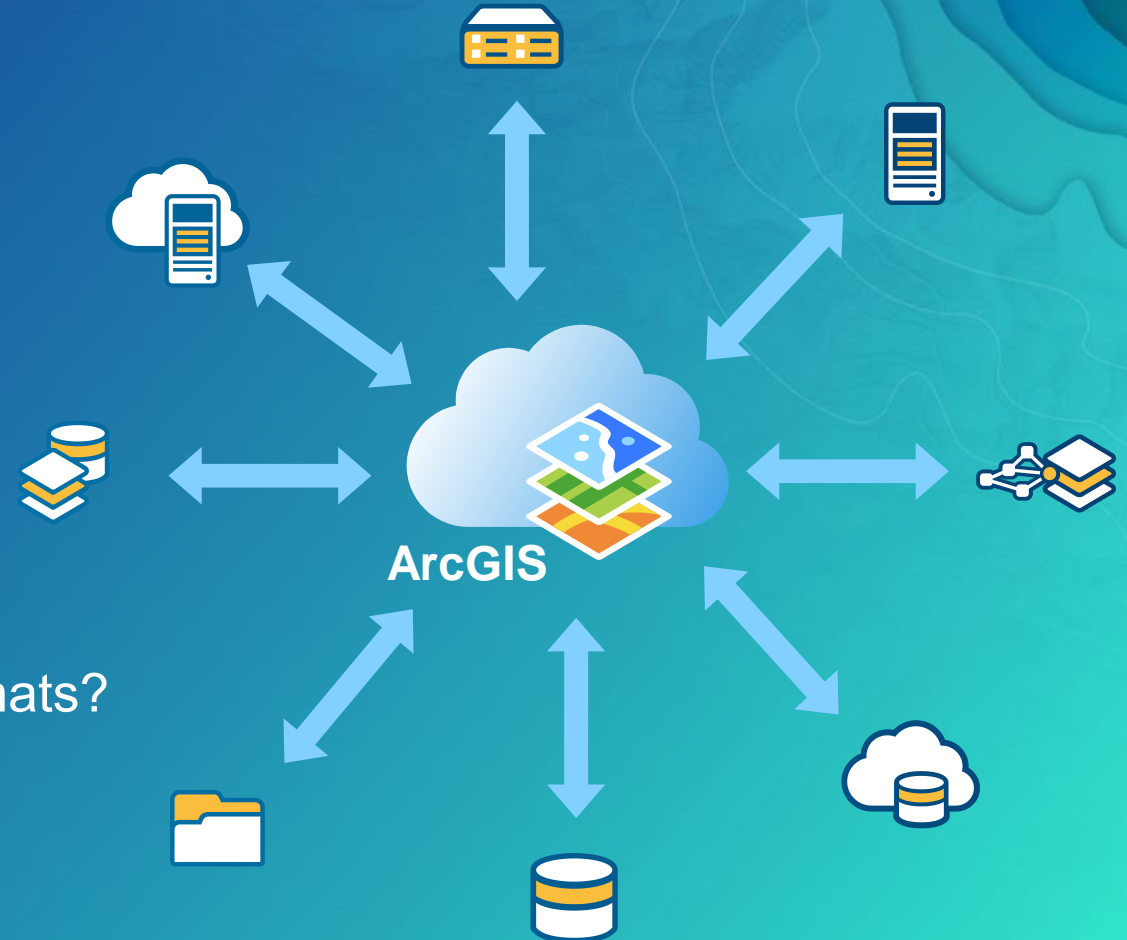
ArcGIS Data Interop Extension



Spatial ETL - Moving Data With Transformation

Extract Transform Load

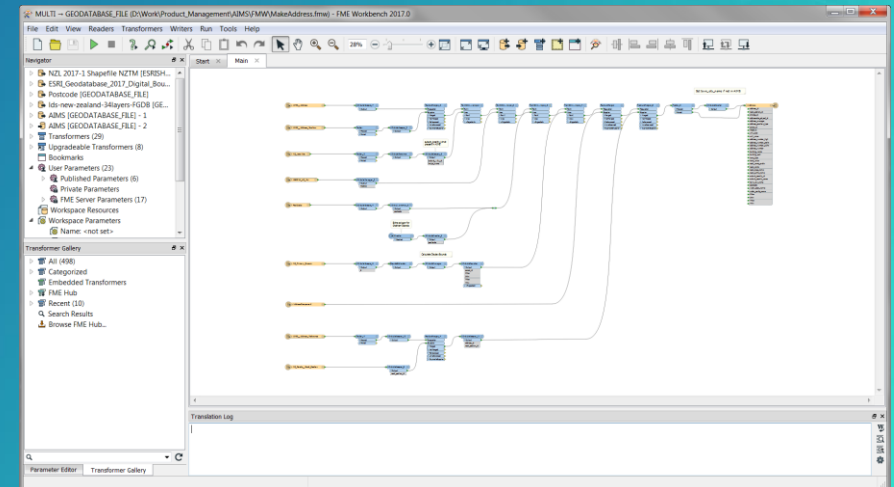
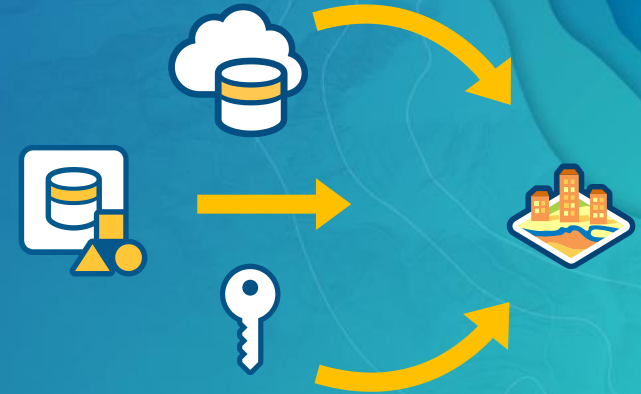
- Extract
 - Read from various spatial and non-spatial formats
 - Transform
 - Manipulate data structure and content
 - Load
 - Write data into different output formats
-
- Doesn't ArcGIS Already Read Most Useful Formats?
 - Arguably, but the details really matter



What is the Data Interoperability Extension?

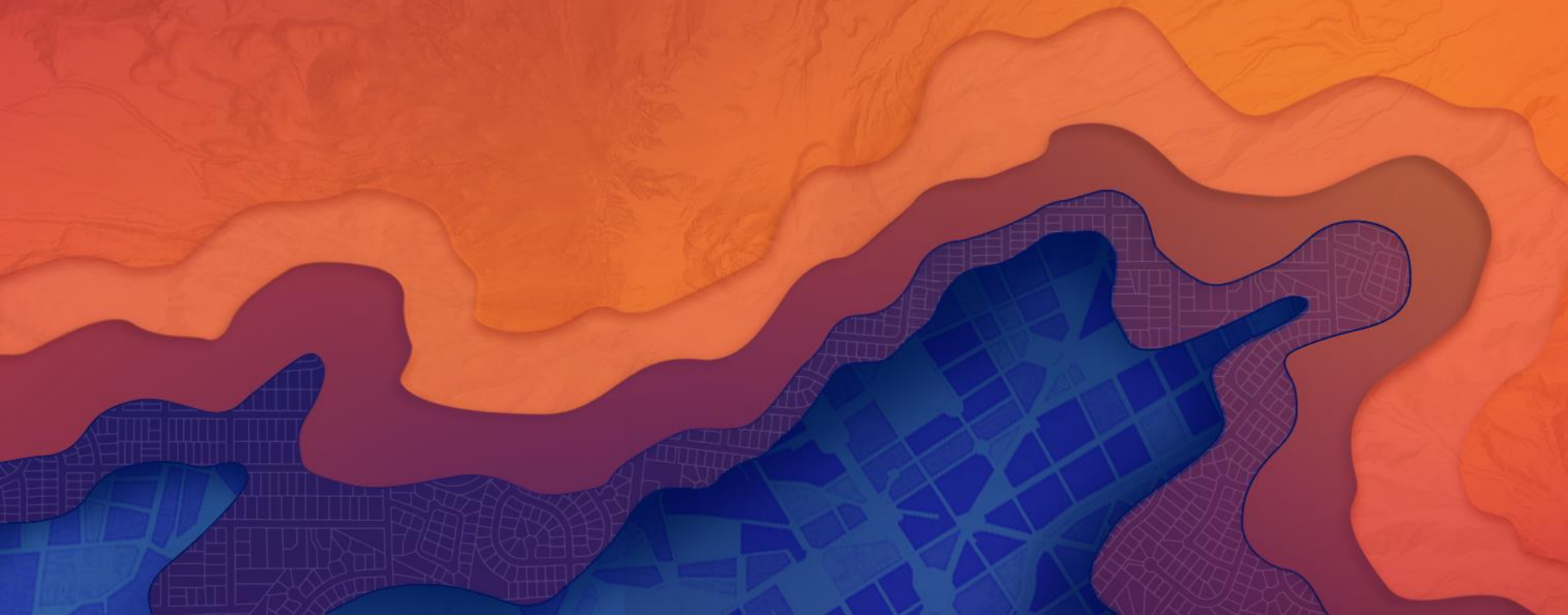
Moving data from app to app – “ETL” in industry jargon

- Data Interoperability empowers the ArcGIS data professional
 - Connectivity & Authentication (+270 formats)
 - Data Transformation & Business Rules
 - Workflow Automation
 - Sharing
- Data Interoperability Extension for ArcGIS Pro
 - ETL Tool (FME Workbench)



Going Practical

Live Demonstration



3D Project Data - City of Karlsruhe, Germany

- 3D Dataset contains
 - Buildings (LoD 1, LoD 2, LoD 3, Textures)
 - Terrain (DEM)
 - Land Use
 - Bridges & Tunnel
 - Vegetation
 - CityFurniture (traffic lights, lamps, ...)
 - Monuments
- Deliverable formats
 - **CityGML**, CAD, Shape



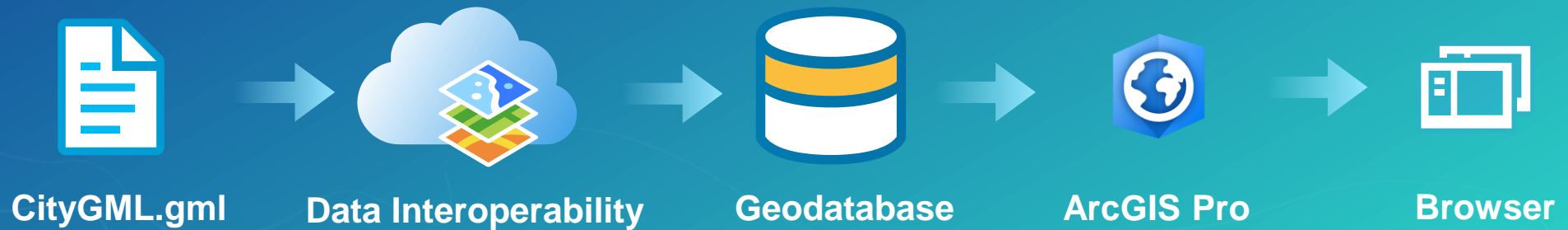
Uses cases

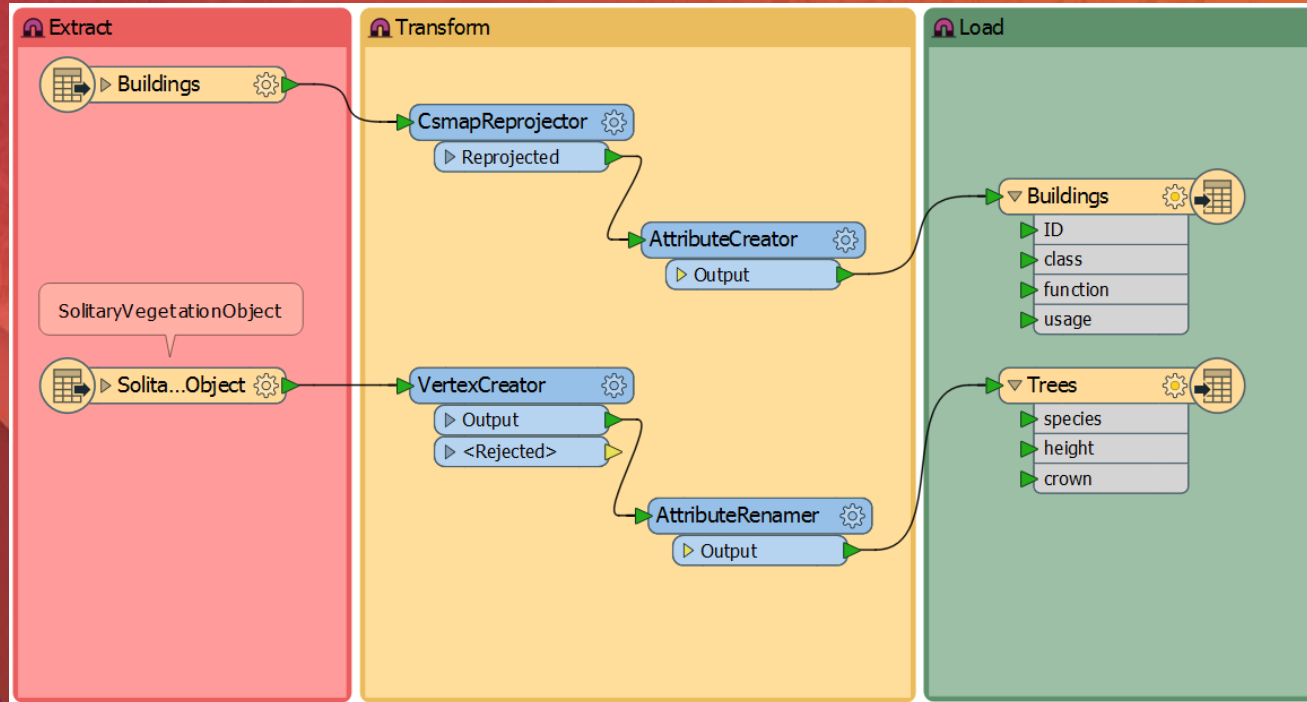
- **Publishing a 3D Scene from CityGML using Pro + Data Interoperability Extension**
- **Creating a Scene Layer Package (SLPK) from CityGML**

Publishing a 3D Scene from CityGML using Pro + Data Interoperability Extension

- **Steps**

- Extract the data (geometry, attributes) from CityGML
- Prepare data to be used in a 3D Web Scene
- Load data into a File-Geodatabase
- Share as Web Scene with Pro
- Consume Web Scene in a Browser





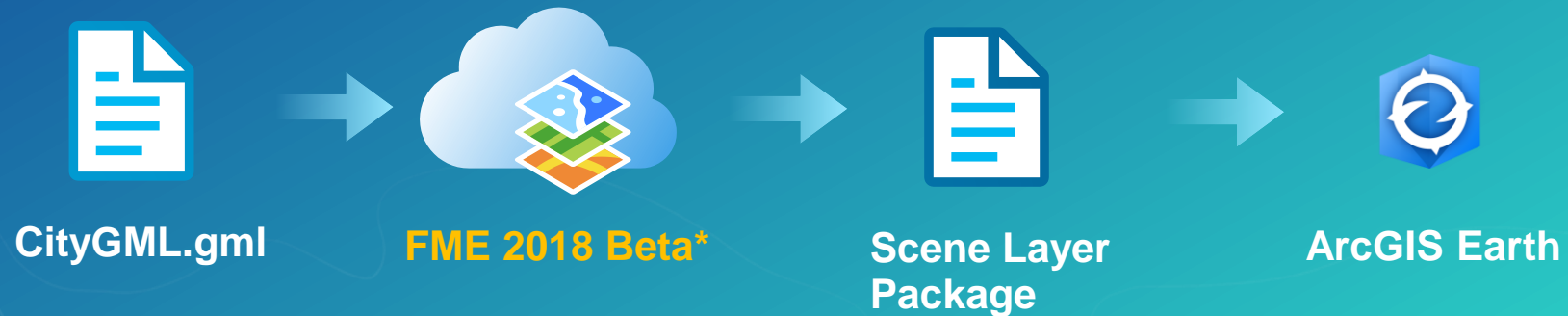
Prepare data for a 3D Scene

Using Workbench

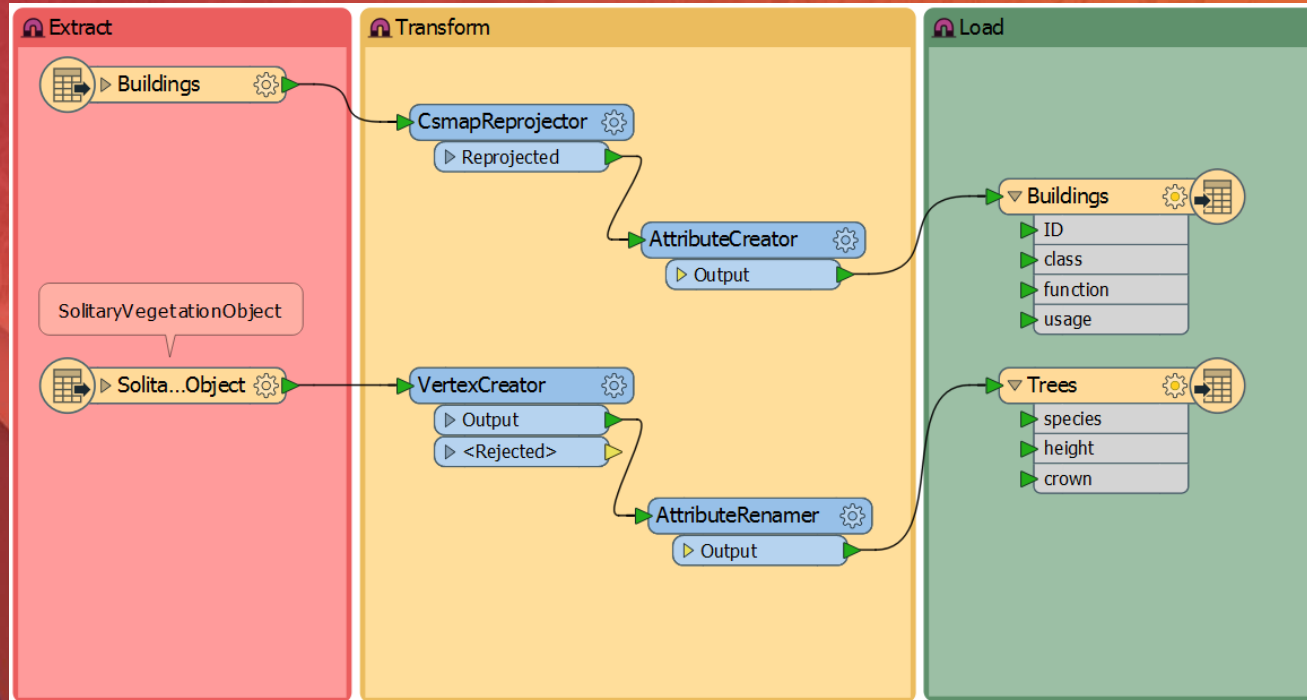
Creating a Scene Layer Package (SLPK) from CityGML

- **Steps**

- Extract the data (geometry, attributes) from CityGML
- Prepare data to be used in a 3D Web Scene
- Write data into a Scene Layer Package (SLPK)
- Consume data in ArcGIS Earth



* FME 2018 Beta Version will be available later this year



Creating a Scene Layer Package

Using Workbench (FME 2018 Beta)

I3S Writer

- **Creates Scene Layer Packages (SLPK)**
- **Available in FME 2018.0 (public betas expected by end of July)**
- **Licensed at Esri edition level.**
- **Currently supports the '3D Objects' layer type (for buildings, bridges, etc.)**
- **Other layer types in the future**
 - **Integrated Mesh - used for terrain**
 - **Point cloud**

Summary

- **CityGML is an excellent starting point for creating 3D City Models**
- **Spatial ETL (FME Workbench) provides an easy way to integrate data within the ArcGIS Platform**
- **With ArcGIS Pro and Data Interoperability Extension (3D) data preparation can be automated**
- **Futures**
 - **FME can be used to directly create I3S output (Scene Layer Packages)**



Thank You!

Any Questions? Ideas? Comments?

Visit us at Booth #719A!

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esri

THE
SCIENCE
OF
WHERE