Data Conversion to I3S for 3D Modeling from CityGML

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3D Across the ArcGIS Platform

- Manage Multiscale 3D Models
- Share 3D scenes
- 3D on all Clients
- ArcGIS for 3D Cities
- 3D Geodesign
- Surface modeling
- Native lidar support
- 3D Analysis
3D Across the ArcGIS Platform
This presentation is about…

CityGML → Automated Data Conversion → Indexed 3D Scene Layers (I3S)
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, …
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
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

**i3s**
- Open Infrastructure
- Transmission Format
- Cloud, Web and Mobile friendly

**CityGML**
- Open Infrastructure
- Exchange Format
- Common Semantics
How to convert between?

CityGML → ETL → Indexed 3D Scene Layers (I3S)
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

- 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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