Pushing 3D GIS Boundaries With WebGL

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GIS & 3D are Advancing

... but what is the underlying technology, what are the use cases, and what are the trends
3D Capabilities Are Integrated Across the ArcGIS System

Enriching All User Experiences

Desktop
- Pro
- CityEngine (Procedural Modeling)
- 3D Visualization and Analytics

Mobile
- Earth
- Runtime
- Web Scenes
- Urban

Web
- 3D Objects
- Experience Builder
- Indoors

Supporting Multiple 3D Workflows
- A Complete 3D System of Record
- A Living Digital Twin
Indexed 3D Scene Layers (I3S)

I3S is an OGC Community Standard
http://www.opengeospatial.org/standards/i3s

The open community GitHub version of this Standard:
https://github.com/Esri/i3s-spec
I3S | Indexed 3D Scene Layer  Supports multiple Profiles and Layer Types

3D Objects
- 3D Shapes
- Trees
- Buildings
- Infrastructure

Point Scene Layer
- Point locations
- Symbolize with 3D Object Styling
- Can visualize attributes by size and color

Integrated Mesh Scene Layer
- Skin of the Earth
- Textured with imagery
- Captured by Drone2Map or other methods

Point Cloud Scene Layer
- LiDAR
- Photogrammetric points
- Style by elevation, color, classification

Building Scene Layer
- Detailed building models
- Read directly from Revit
- Filter categories and floors
3D Web GIS | Full 3D Visual Experience on the Web

3D Features
Database Driven

3D Mesh
Reality Capture
BIM Data in Geo Context

e.g. for visualization or facility management
gltF & 3D GIS | Retain Consistency on the Web all platforms

gltF helps to Address

- Consistency of assets between ArcGIS & 3rd-party applications.
- Materials from 3rd Party tools (i.e. Sketchup, Blender, etc.) import into ArcGIS with inconsistencies (aesthetically look different).

- Consistency of assets between ArcGIS & 3rd-party marketplaces.
- Models from popular 3D marketplaces (i.e. Sketchfab) import into ArcGIS with inconsistencies (aesthetically look different).

- Consistency of AutoCAD 3D models between ArcGIS & 3rd-party applications.
- 3D AutoCAD assets import into ArcGIS with inconsistencies (aesthetically look different).
gITF in ArcGIS | Supported ‘Everywhere’

- **ArcGIS API for JavaScript** can load and place gITF and .glb - Supports Metallic-Roughness
- Scene Viewer supports a configurable authoring experience with hosted gITF webstyles
- **ArcGIS Pro** can use gITF as Marker Symbols
- **ArcGIS Pro Geprocessing** tools can import and manipulate the gITF format
- **ArcGIS CityEngine** can import gITF or export entire procedurally-generated cities as gITF
- Work in progress to support it pervasively in all other ArcGIS suite of 3D Products
3D Web GIS | Summary

• The current trend is pointing for 3D Web GIS to become the primary interface for most geospatial users

• A good out of the box functionality (no code) as well as robust API for JavaScript and a configurable authoring experience is essential

• Geospatial users expect consistency of experience, data and quality between Web, desktop and mobile experiences

• Fragmentation of features between various browsers is still a risk for further wider adoption

• The ArcGIS API for Java Work in progress to support it pervasively in all other ArcGIS suite of 3D Products
• More patterns emerging using WebAssembly as a glue between various platforms and enabling us to bring more features quickly to web platforms

• Switched default to WebGL 2.0 in all our webgl 3d applications taking advantage of features such as:
  - 3d textures
  - glfragdepth
  - Uniform buffer
  - Texture & vertex array objects
  - Various texture formats now supported in 2.0
  - …