ArcGIS GeoEvent Server:
Making 3D Scenes Come Alive with Real-Time Data

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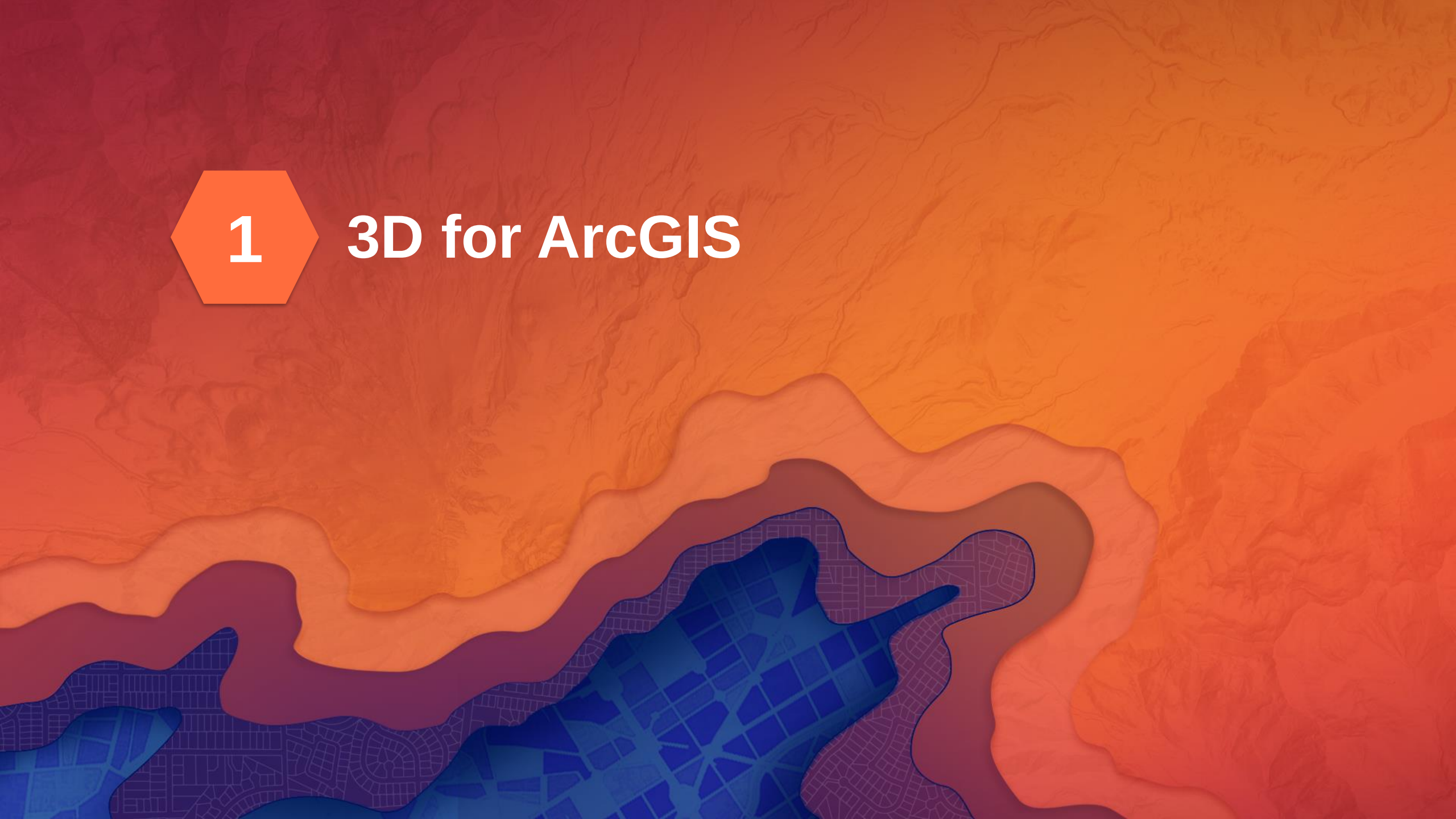
Agenda

1. 3D for ArcGIS
2. Real-Time GIS
3. Static 3D Scene
4. Making 3D Scenes Come Alive
5. Real-Time 3D Visualization
6. Conclusions

1 3D for ArcGIS



Core 3D Capability

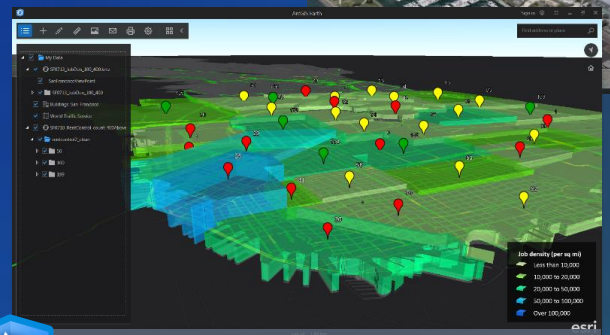
Anywhere In Any Environment

- Combine 2D and 3D in the same web GIS architecture
- Reuse dynamic services across clients
- Securely collect, manage, curate 3D data
- Conduct analysis across real-time and historical data
- Create tailored experiences for different types of users

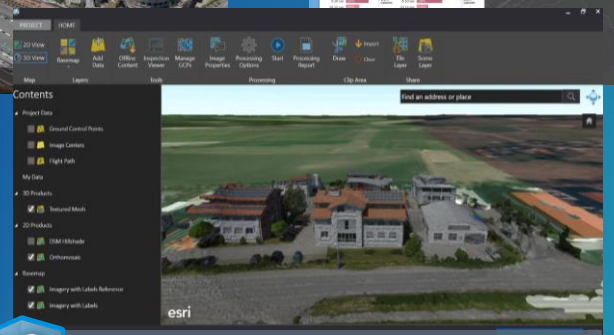
Cross-platform | Open | Accessible

Apps

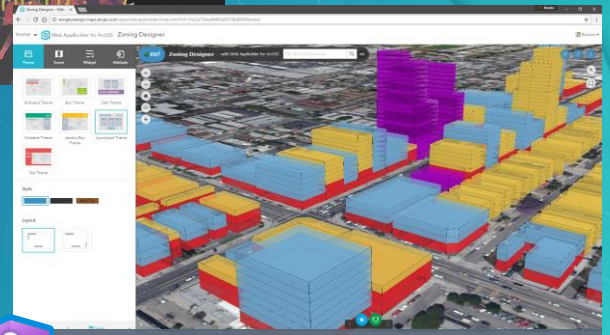
Focused 3D Tools For The Field, Office, and Community



ArcGIS Earth



Drone2Map

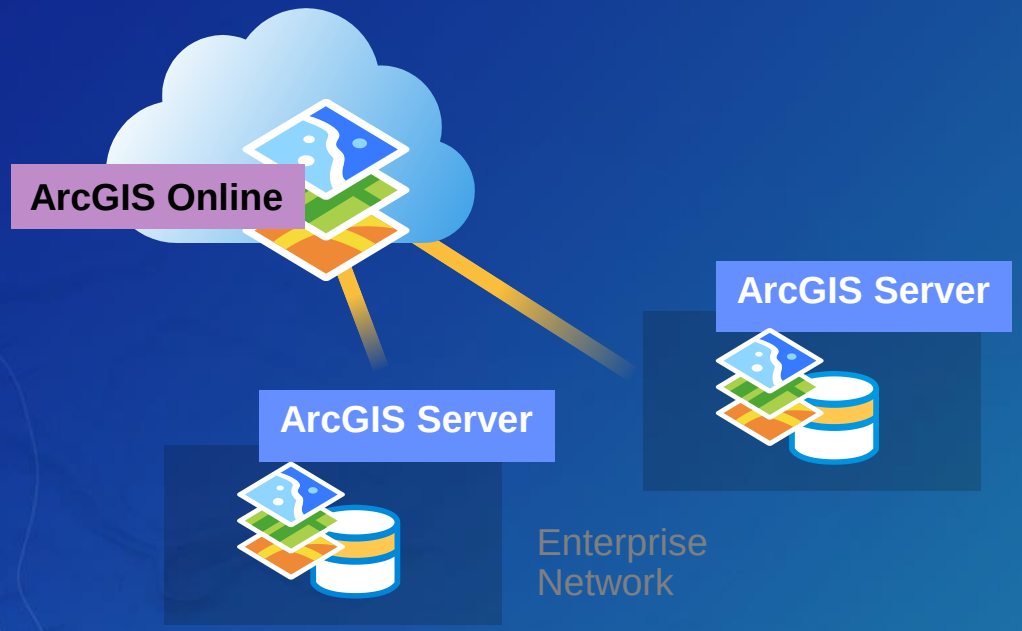


Web AppBuilder

ArcGIS Earth	Easy-to-use 3D data exploration for Enterprise users
Drone2Map	Streamline the creation of professional imagery products from drones
Web Scene Viewer	View 3D maps in any standard web browser
Web AppBuilder	Build powerful 3D GIS apps without writing a single line of code
Story Maps	Combine 3D maps with narrative text, images, and multimedia content

Enterprise

Hosted 3D In The Cloud and/or On-Premise



Enterprise data and services

- Web Scene
  - Vehicle for cross-platform 3D capability
  - Collection of layers, environment settings, slides, animation
  - Essential for 3D apps on any platform or experience
- Scene Layer
  - Scalable cache of graphics, styles, and attributes
  - 3D Objects, 3D Points, Integrated Meshes, Point clouds

ArcGIS Online	Content and services for sharing ideas in 2D and 3D
ArcGIS Server	Scalable 2D/3D enterprise content distribution and geoprocessing
GeoEvent Server	Connect and manage real-time information (IoT)

Developer Tools

Development and Scripting Tools For Extending/Customizing

Android
HTML5
Java
C#
REST
JavaScript
Web
QML
.NET
C++
Python
Qt
Swift
Windows
Xamarin
Apple
Objective-C

Reduce Development Costs

- 3D Everywhere
- Vector Tiles
- Smart Mapping
- Leverage User Roles
- Data Flows Between Apps

ArcGIS Runtime SDKs	Developer tools for 2D and 3D native iOS, Android, Windows solutions
ArcGIS JavaScript API	Developer toolkit for building and extending 2D and 3D web apps

Supported Real-Time Data

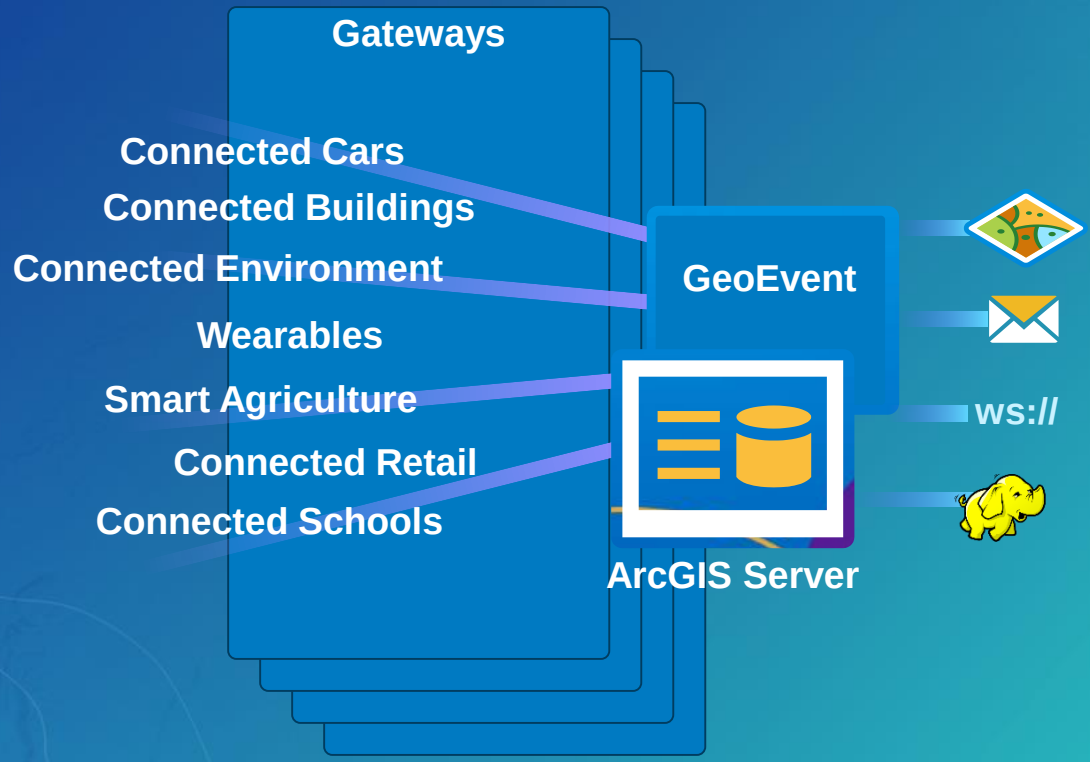
- StreamLayer (from GeoEvent Stream Service) – JavaScript API 4.x
- KML
- Feature Services from Spatiotemporal Big Data Store
  - Very fast writing rate on add, update, delete
  - Rapid retrieval of Features

2 Real-Time GIS

Real-Time GIS and The Internet of Things

Enable real-time spatial reasoning

- Spatial reasoning is needed amongst the Internet of Things
- Performing continuous analytics closer to the things can improve their ability to sense
- When meaningful patterns are found things can send updates to those who need it

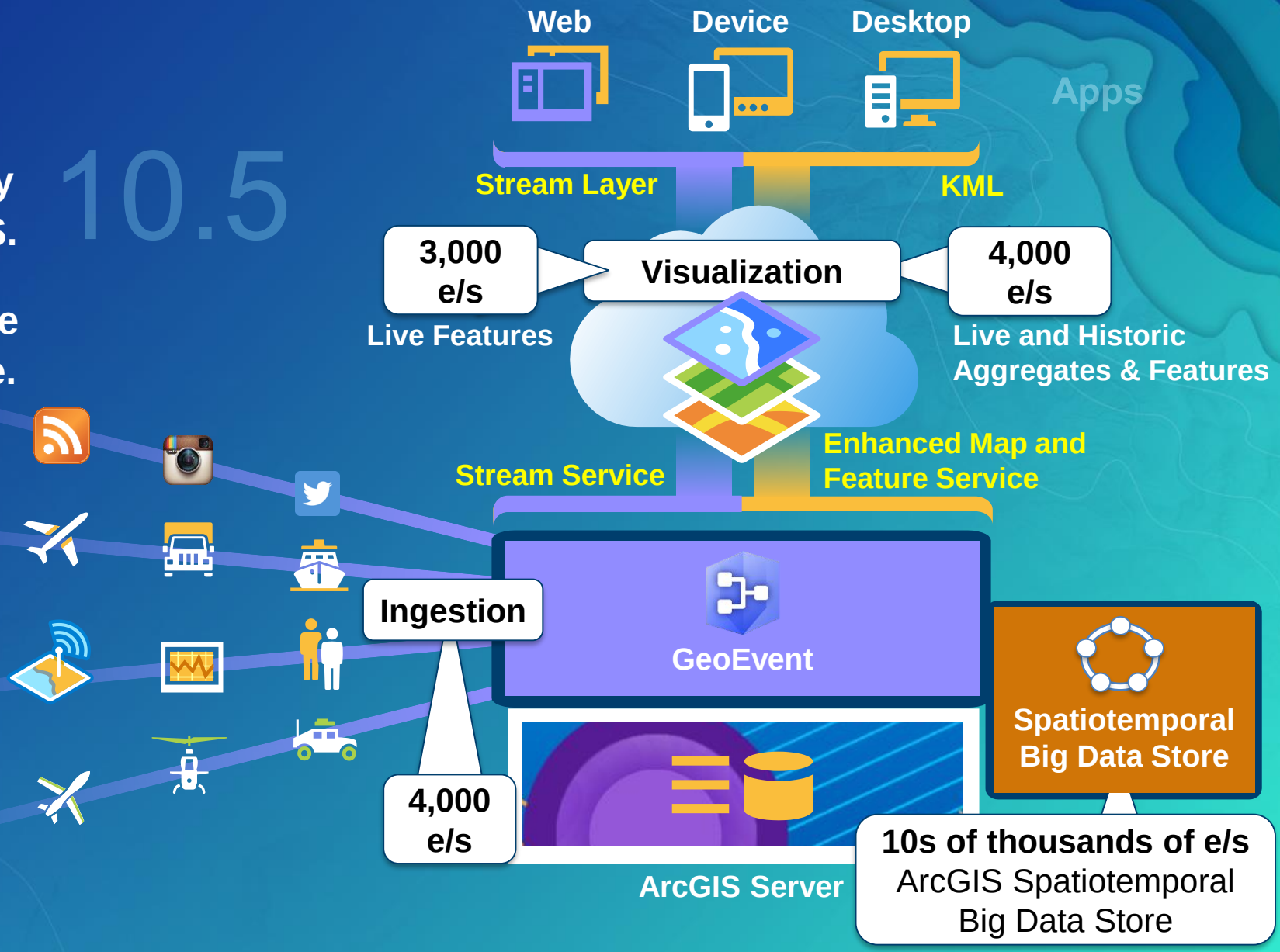


Real-Time GIS

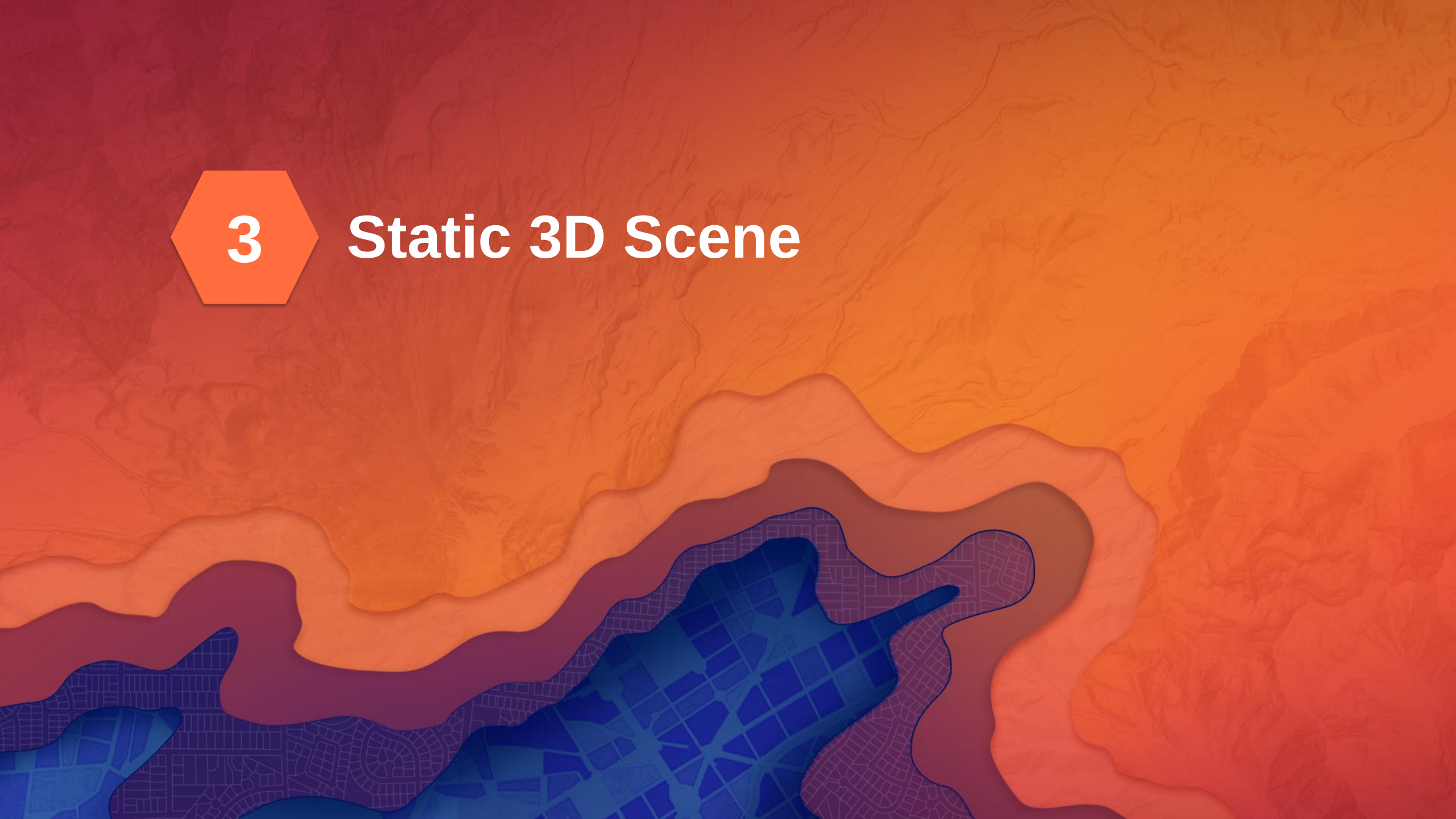
ArcGIS 10.5

10.5

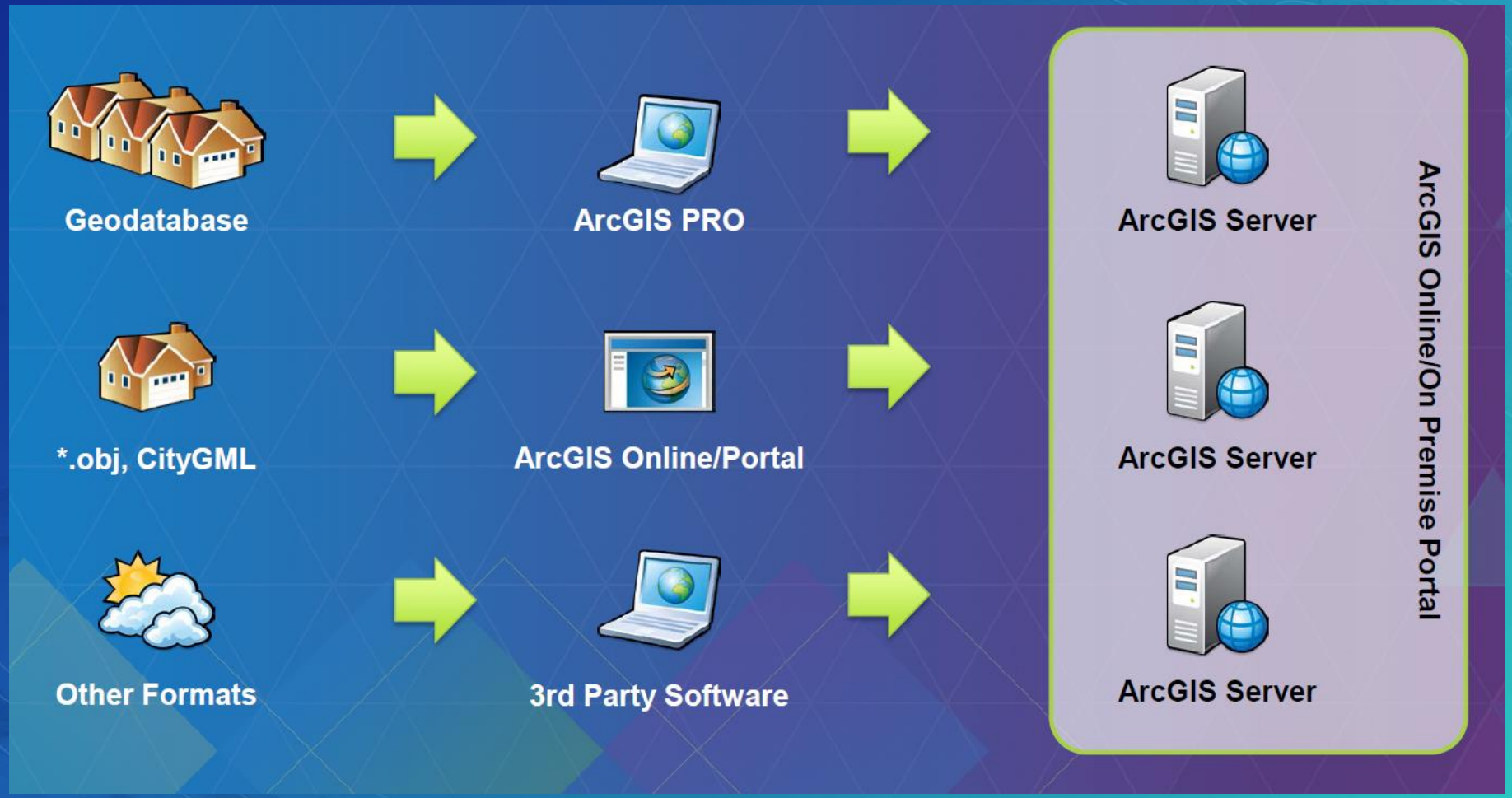
- Can ingest higher velocity real-time data into ArcGIS.
- Observations CAN now be stored in a Big Data Store.
- Can visualize high velocity and volume data
  - as an AGGREGATION,
  - as discrete FEATURES,
  - live & HISTORICALLY.
- Visualization CAN scale.



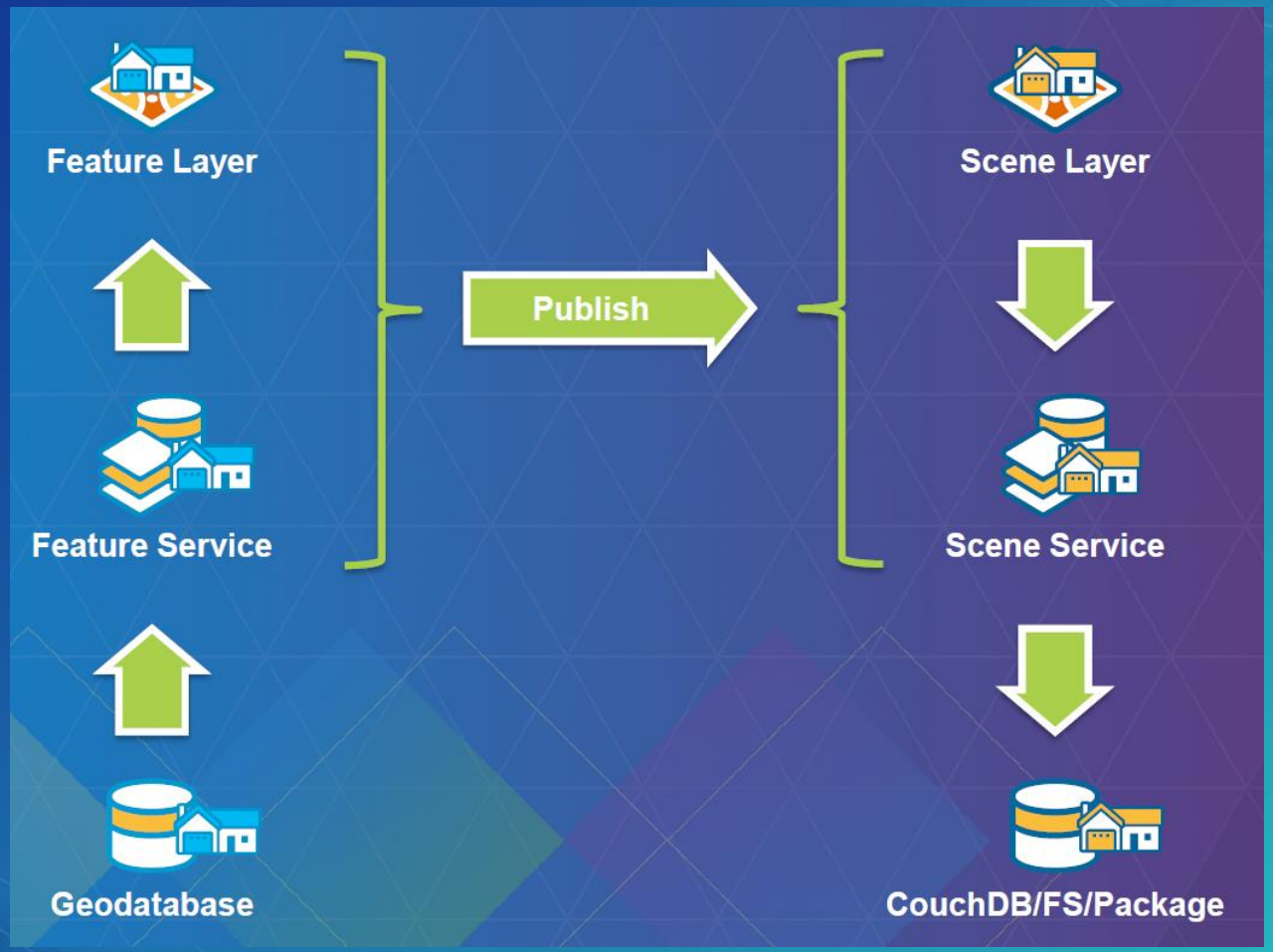
3 Static 3D Scene



Creating Scene Services



Scene Service

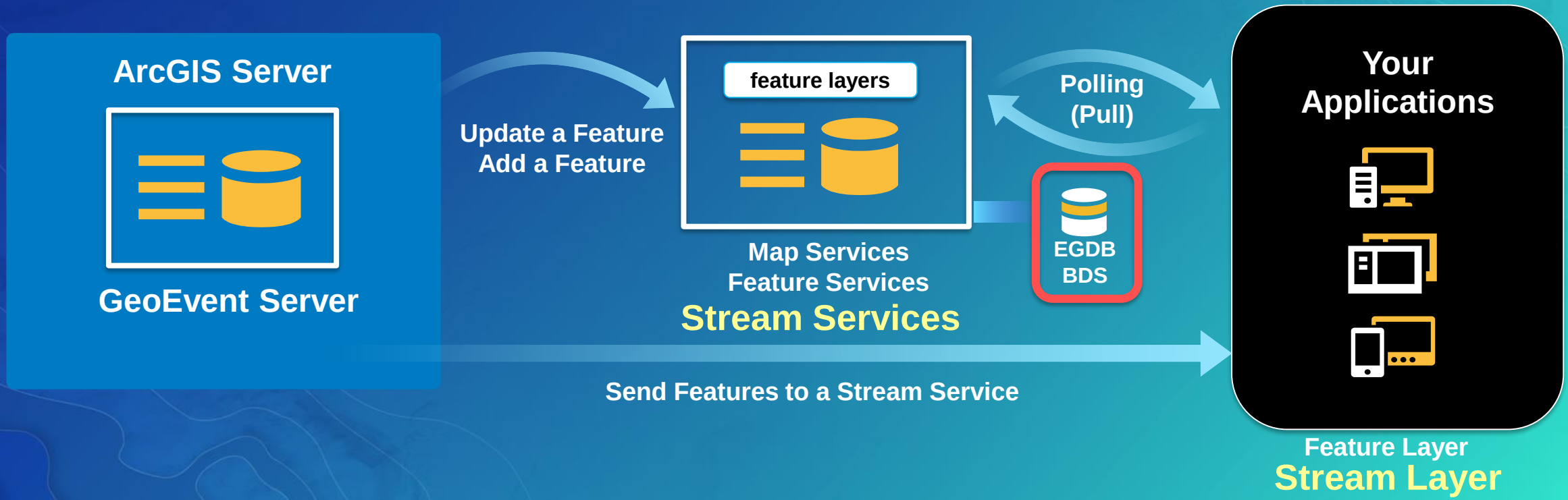


4 Making 3D Scene Comes Alive

Stream services vs. traditional feature services

Two patterns, two important differences

- Feature services **persist** their data in a Geodatabase
- Stream services **broadcast** their data without first persisting the data



Support for stream services in the 10.3 and 10.3.1 product releases

What can I use to consume stream services?

- ArcGIS Online and Portal for ArcGIS Web Maps
- ArcGIS Online and Portal for ArcGIS web application templates
- Web applications built using Web AppBuilder
- Your own web apps that use the ArcGIS API for JavaScript

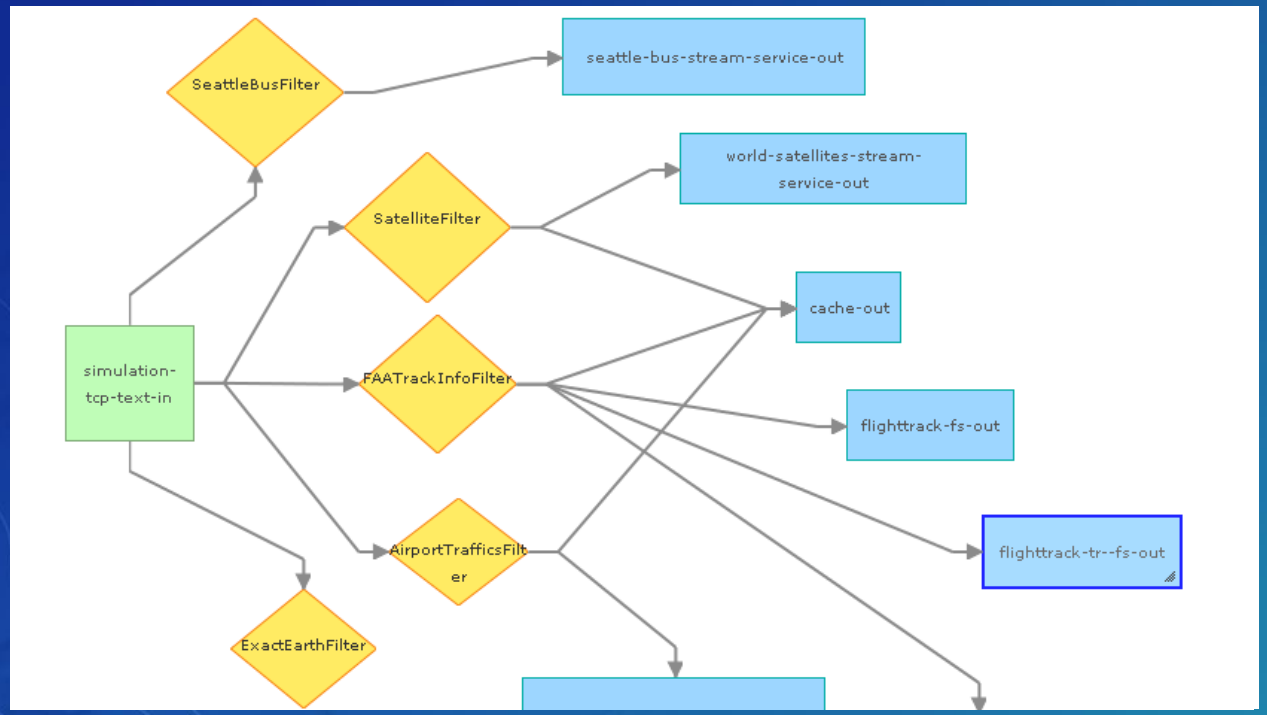
KML Service

How to enable KML service

- Not available out-of-box!
- Obtain the KML Connector for GeoEvent on GeoEvent Gallery (10.2.x)

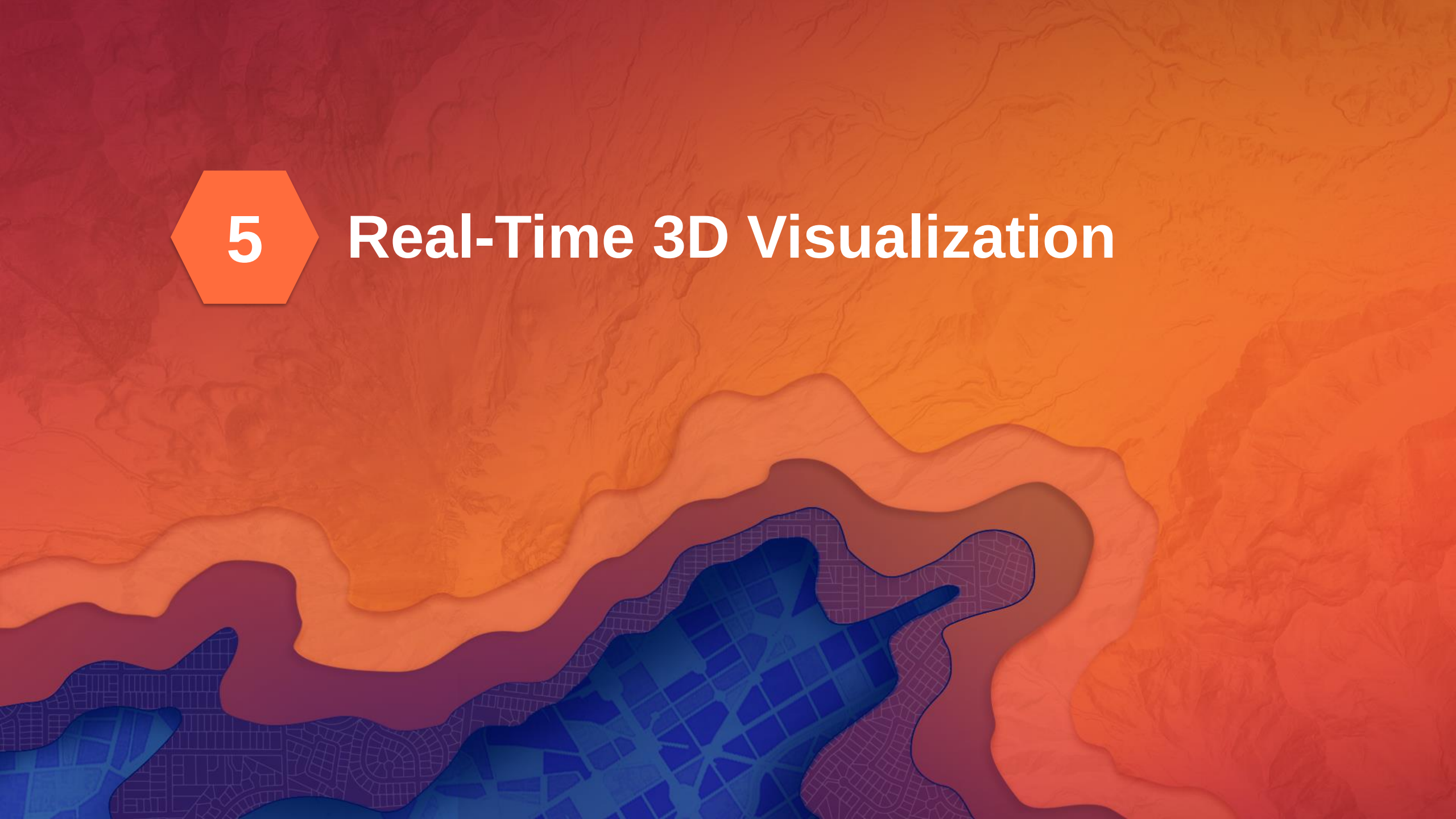
  http://www.arcgis.com/home/item.html?id=8ddf65e2d9894d37ae19856671392c45
- Obtain source code from GitHub (updated to 10.4) and build it

  https://github.com/Esri/kml-for-geoevent
- Deploy the jar to GeoEvent\deploy folder
- Create Output



Demo Publishing Real-Time Services

5 Real-Time 3D Visualization



3D Visualization Techniques

Keeping up the 3D display performance

- 3D scene contains continuous scale
  - depending on the positions of viewer and target
- Use high LOD 3D symbol to represent objects close to the viewer
- Use low LOD symbol for objects that are further away from the viewer
  - Billboard 2D graphics
  - Simple geometric shape (e.g. spheres)
- Remove objects that are too close or too far from the scene
  - Use view volume culling
  - Use fog (particle system)

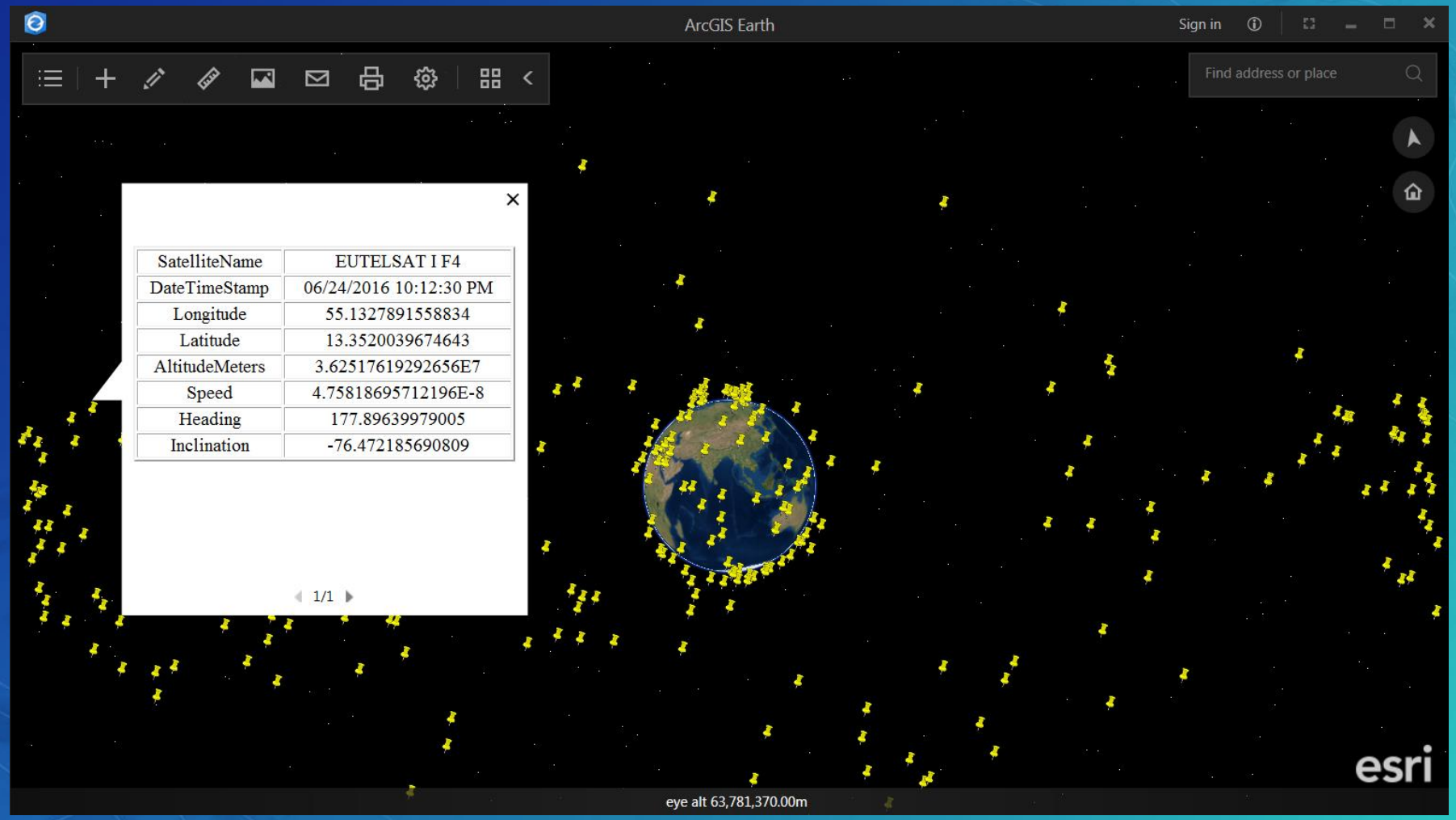
3D Visualization Techniques

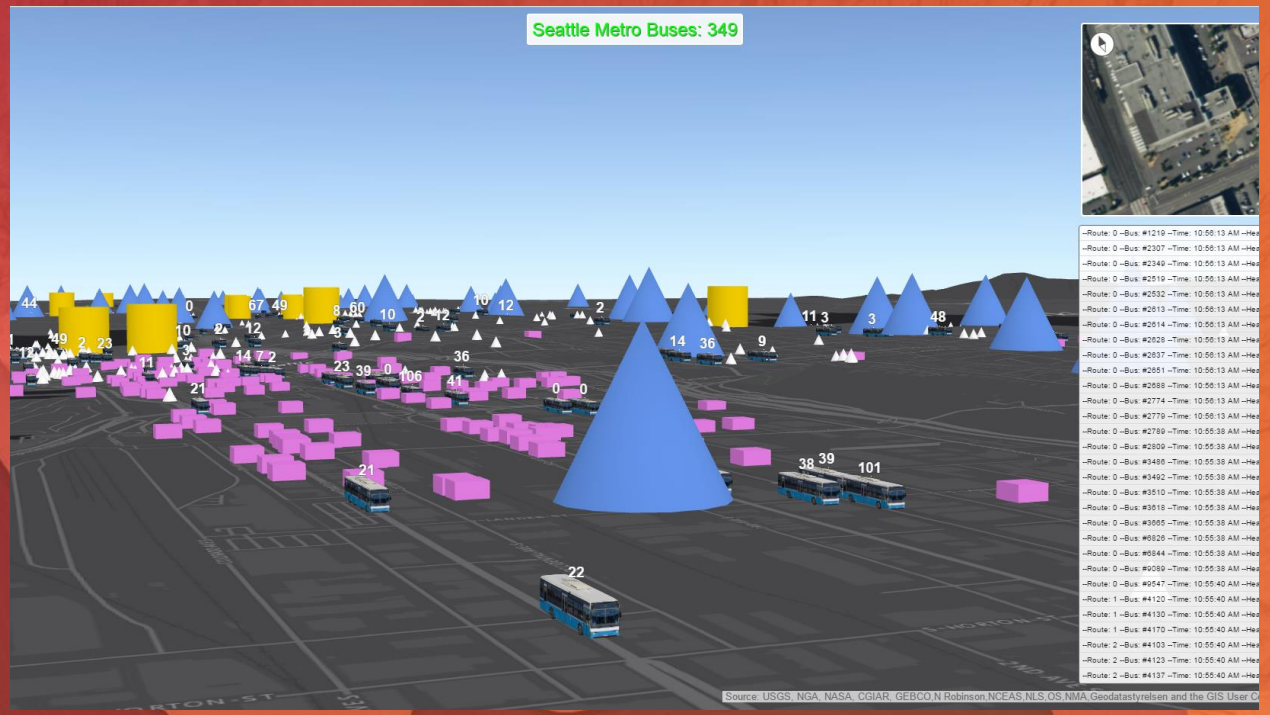
Make it interesting

- **Animated symbol**
  - Contains animation sequence
  - 2D or 3D
  - GIF animation
  - Particle System
- **Multi-representation**
  - Adapting to object status or condition
  - Adapting to distance to the viewer - LODs

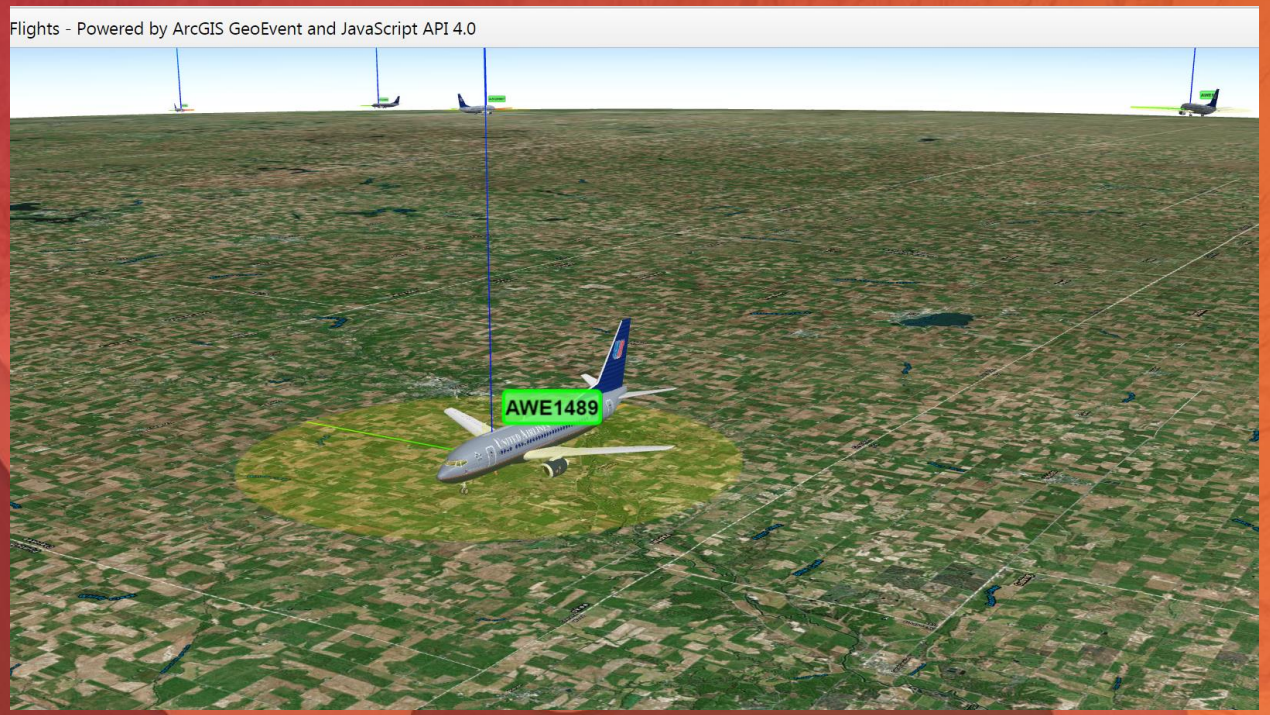
Demo Visualization Techniques

KML on ArcGIS Earth (1.2)

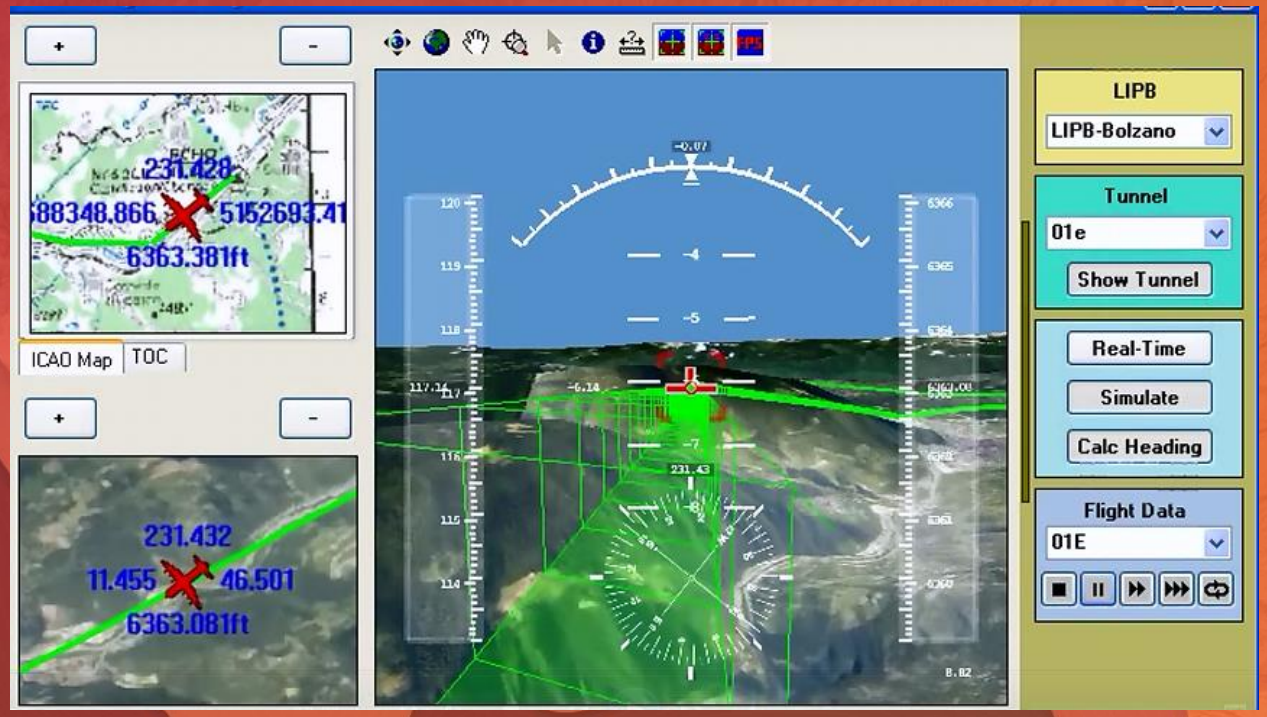




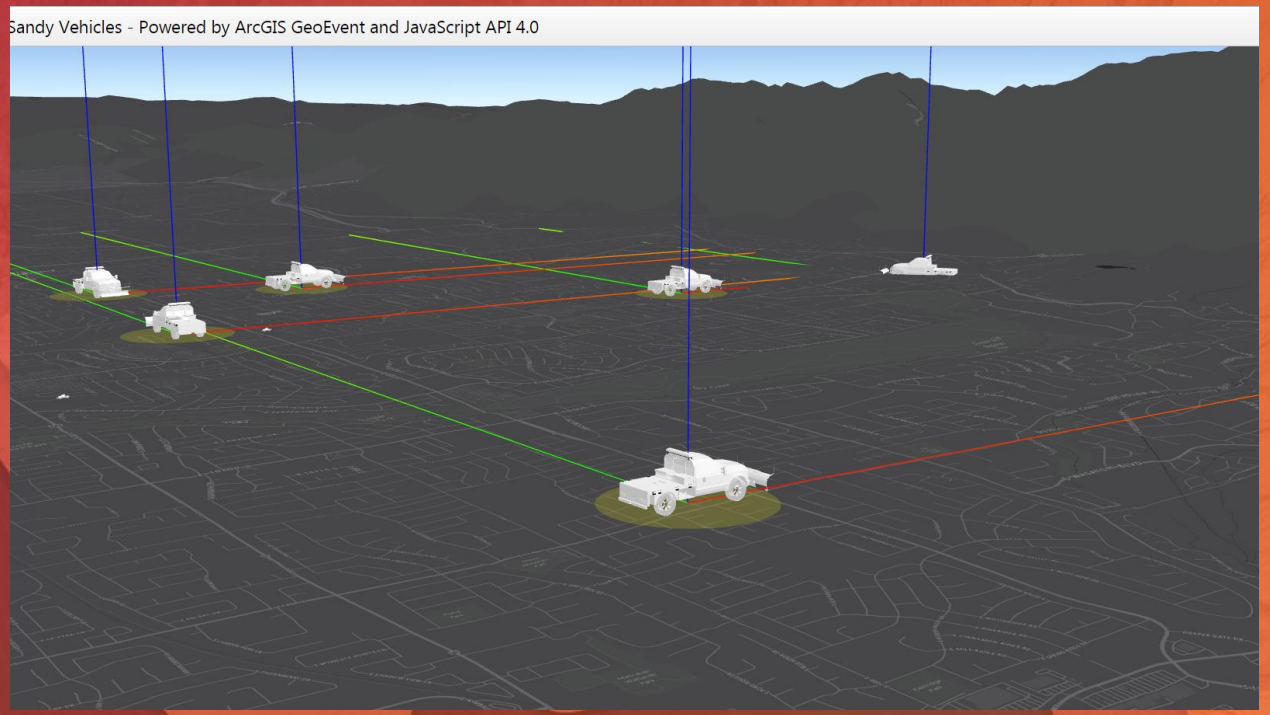
Demo 3D Seattle Buses



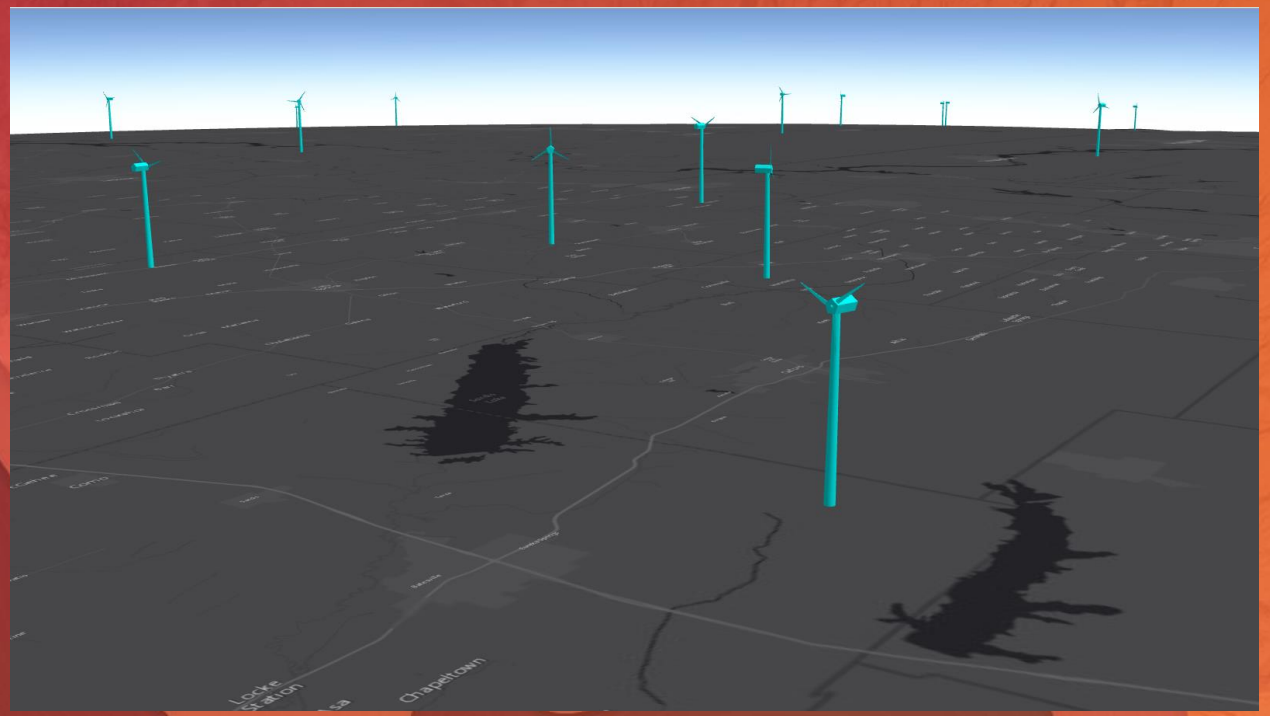
Demo 3D Flights



Demo Esri Real-Time 3D Apps

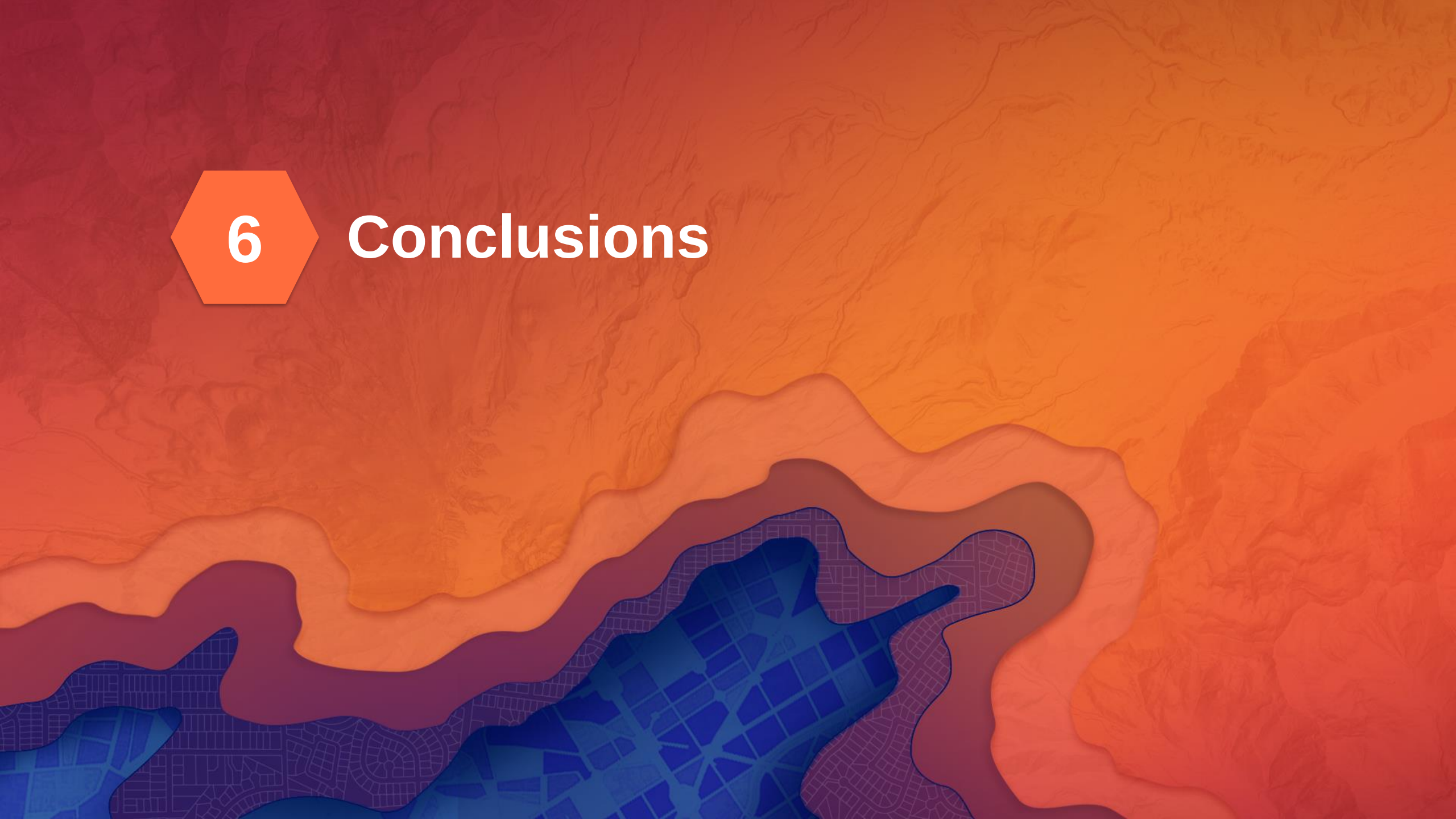


Demo 3D Vehicles



Demo 3D Windmills in motion

6 Conclusions



Conclusions

- Time enabled 3D applications for mobile and web can be developed using ArcGIS components
  - 3D Web Scene, ArcGIS Explorer, ArcGIS Earth
  - GeoEvent to handle real-time data
  - JavaScript API for ArcGIS version 4
- Visualization of large volume of data in 3D needs certain techniques for good performance
- JavaScript API version 4 allows external renderer using 3rd party libraries (e.g. Three.js)

Who do you want to be?

Real-Time & Big Data GIS

other sessions

• **GeoEvent Server: An Introduction**	Tue, 10:15-11:30am, Room 10 Thu, 1:30-2:45pm, Hilton – Sapphire Ballroom I
• **Real-Time & Big Data: Leveraging the Spatiotemporal Store**	Tue, 10:15-11:30am, Room 15 A Thu, 1:30-2:45pm, Room 15 A
• **GeoEvent Server: Applying Real-Time Analytics**	Tue, 1:30-2:45pm, Room 17 B Thu, 3:15-4:30pm, Room 14 A
• **Real-Time & Big Data GIS at a Massive Scale**	Wed, 3:15-4:30pm, Room 3 Fri, 9:00-10:15am, Room 8
• **GeoEvent Server: Leveraging Stream Services**	Wed, 3:15-4:30pm, Room 14 B
• **GeoEvent Server: Best Practices**	Thu, 10:15-11:30am, Room 9
• **GeoEvent Server: Internet of Things (IoT)**	Thu, 10:15-11:30am, Room 14 B
• **GeoEvent Server: Making 3D Scenes Come Alive**	Wed, 1:30-2:15pm, Demo Theater 05 - Real-Time
• **GeoAnalytics Server: An Introduction**	Wed, 10:15-11:30am, Room 4 Thu, 10:15-11:30am, Hilton – Sapphire Ballroom E

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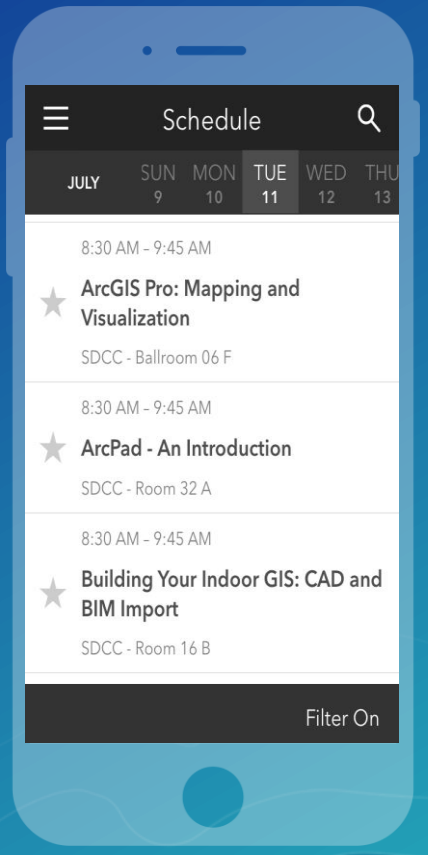
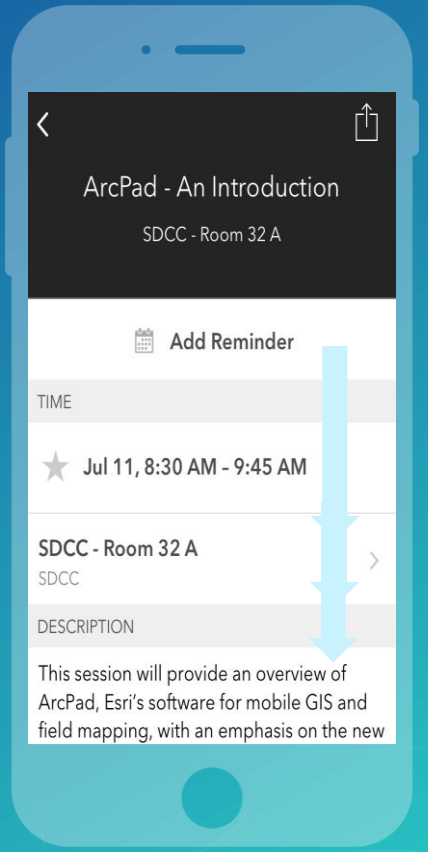
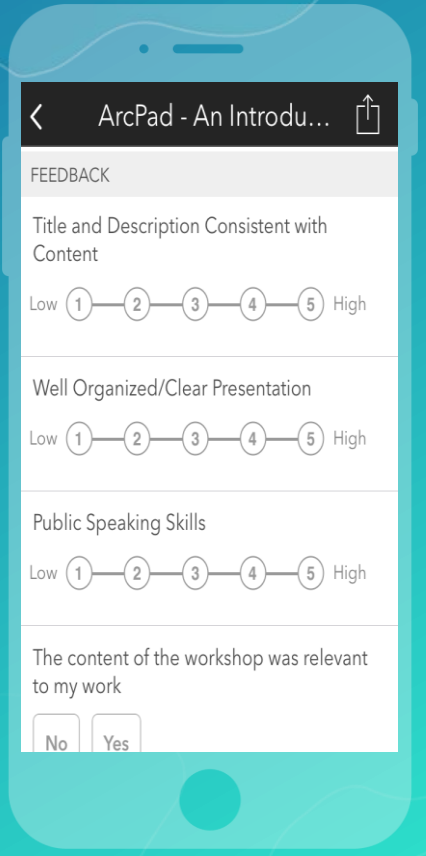
Select the session you attended



Scroll down to find the survey



Complete Answers and Select "Submit"



Questions / Feedback?

To learn more:
http://links.esri.com/geoevent
https://links.esri.com/geoevent-forum

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