3D Visualization in ArcGIS Pro

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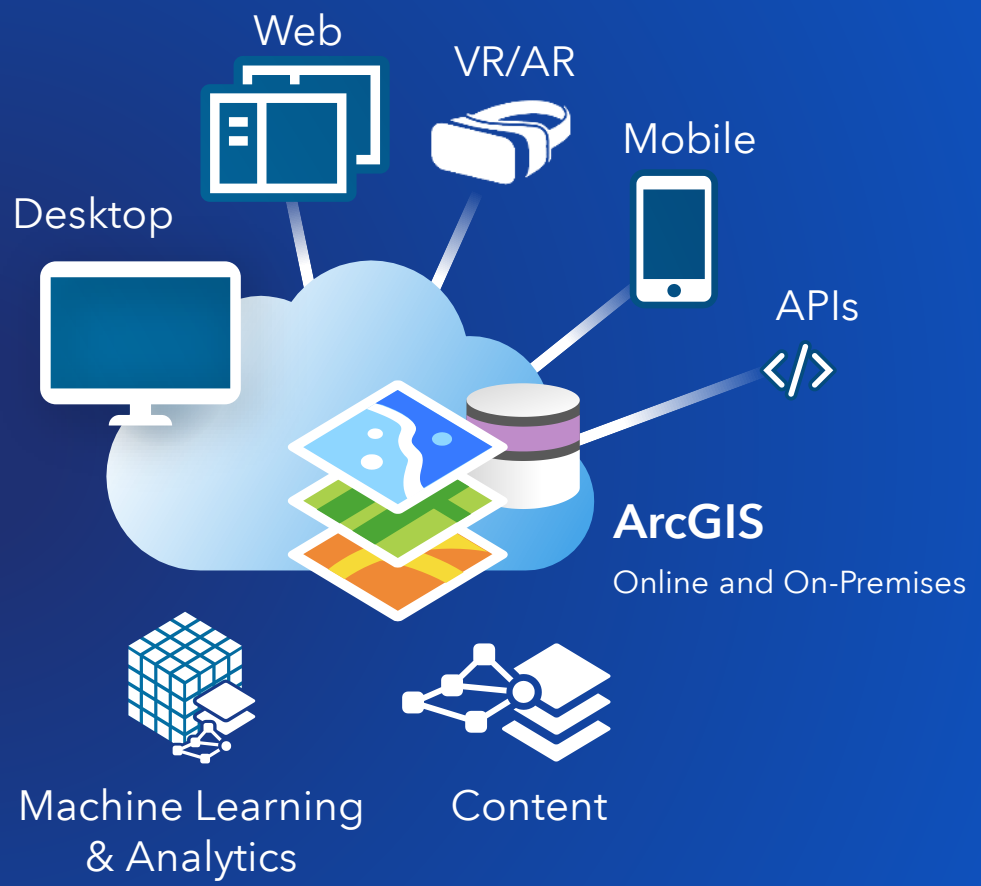
SEE
WHAT
OTHERS
CAN'T

3D Across ArcGIS

- GIS is 3D
- Web GIS services-based architecture
- New clients and experiences
- Workflow modernization
- GeoEnabled Systems



ArcGIS Pro

Enhancements to exploratory analysis and editing

Learn more: youtu.be/rQkKIPFq2tg

Exploratory analysis tools

Line of sight, viewshed, view dome, and slice by plane or volume capability can be applied to visible scene layers.

New: Cut-Fill Tool

3D editing / modeling

Directly edit OBJ, DAE, multipatch features (geodatabase) and scene layers with new precision editing tools.

New: Explode, Merge and Slice Multipatch

Realistic Visualizations

Ambient Occlusion, Eye-dome lighting, Material support in Markers, Water fill symbol

3D object scene layer symbology

Smart mapping functionality to stylize 3D layers (similar to web scene viewer)

Animation for static and dynamic story telling

Create rich animations with 3D content and screen overlays for text and imagery content that can configured with timing settings.

LAS Classification

Classify building rooftops, ground and vegetation Lidar. New Profile viewing helps manually classify lidar.

Enabling customers and partners through Open Standards

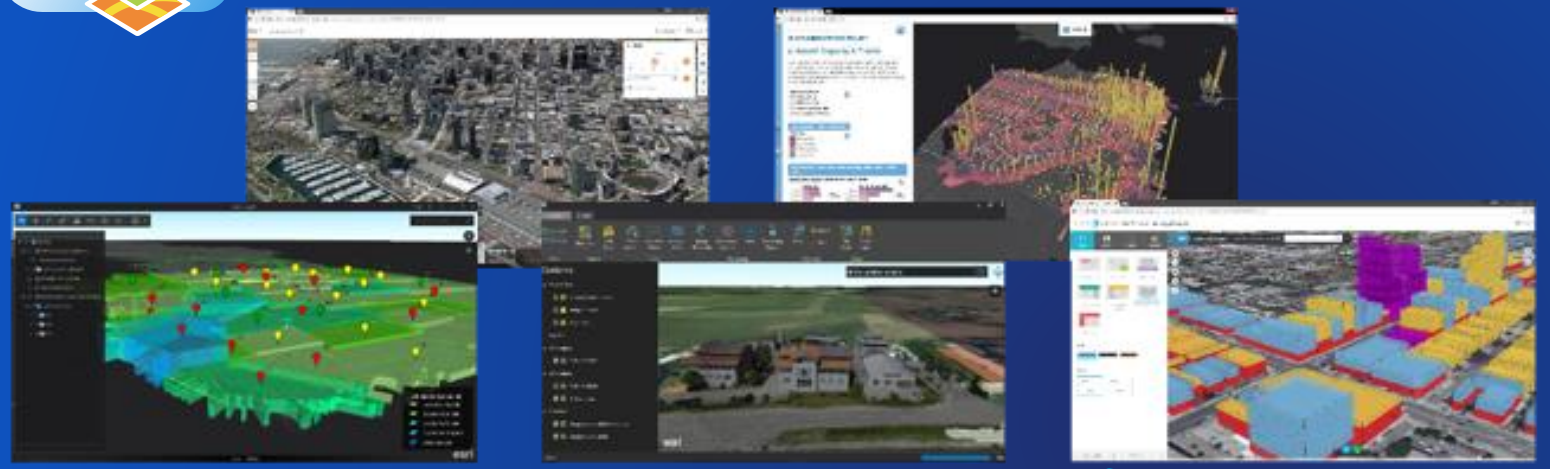
Open Software, Standards and Data enable organizational resiliency

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

I3S	Scalable 3D scene content for visualization and distribution
LERC	Raster (imagery and elevation) compression technology for 2D and 2.5D
LEPCC	3D compression technology used for point clouds and other 3D rasterized data
GeoREST	Esri open REST APIs for access to any kind of GIS content and services

Apps

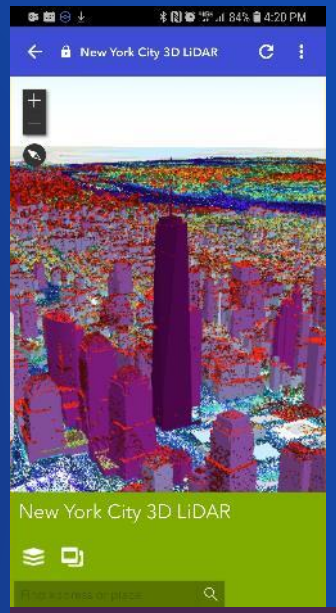
3D Tools For The Field, Office, and Community



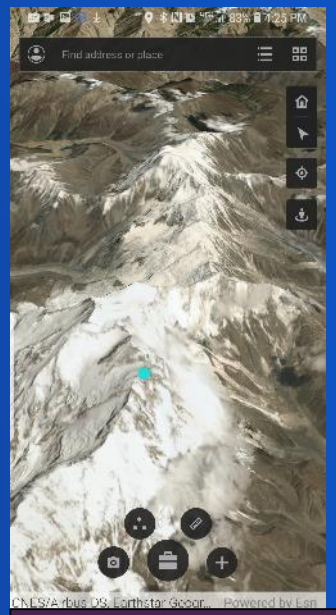
ArcGIS Earth

Drone2Map

Web AppBuilder



ArcGIS Companion App



ArcGIS Earth mobile

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
App Templates	Compare scenes or include an inset web map with a scene
Story Maps	Combine 3D maps with narrative text, images, and multimedia content

Scene Viewer

Enhancements to search, navigation, and rendering

Learn more: bit.ly/WSV2018-3

Try it out: arcg.is/yTSCe

Animated Water Visualizations

Water styles applied to polygon feature layers will add animated waves to your features representing the surface of oceans, lakes, rivers or pools.

Large Feature Datasets

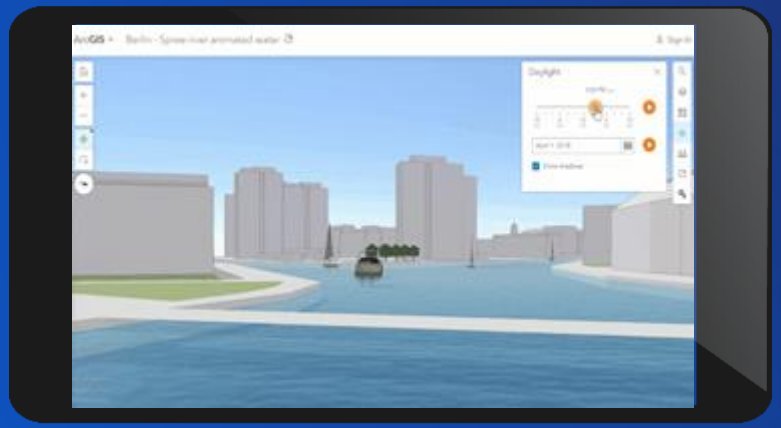
Point, lines and polygon feature layers with thousands or even millions of feature layers can be added to a scene.

Smart mapping line and polygon styles

Lines and Polygons have new smart mapping styles to explore and visualize attribute data. Extrude buildings and make realistic utilities.

Floor Picker in Building Explorer

Isolate building levels to display spaces, structural assets and infrastructure.



Search for features in web scenes

Users can configure feature search in a scene and locate objects by attributed information.

Underground Navigation

Explore subsurface geology and infrastructure with underground navigation.

ArcGIS Earth

Enhancements to analysis and mobile

Learn more: bit.ly/ArcGISEarth18

Download directly from Google Play Store

Browse 2D and 3D content from an Android device

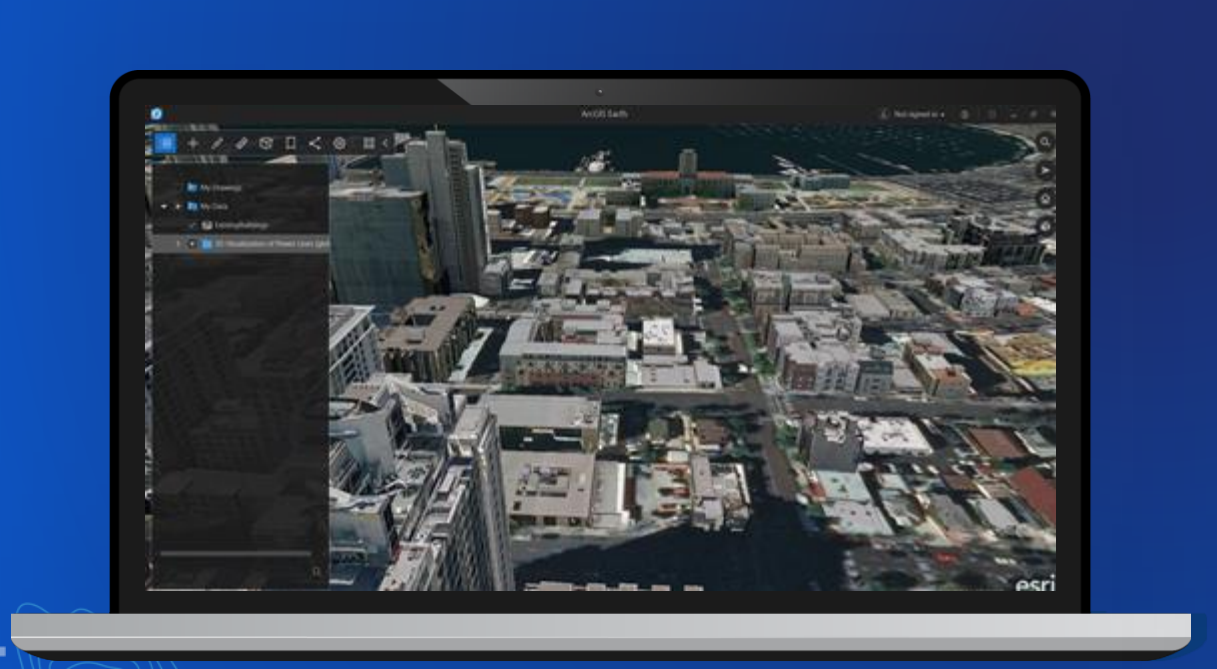
Users can connect to ArcGIS services or add local layer packages saved in local storage.

Perform interactive 3D analysis and create simulations

Run a quick visibility assessment with your fingertips for line of sight and viewshed or simulate along a route.

Collect and share information in the field

The tour feature was introduced to help users collect and share information with photos in album.



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
- Leverage User Roles
- ArcGIS layers
- Data Flows Between Apps

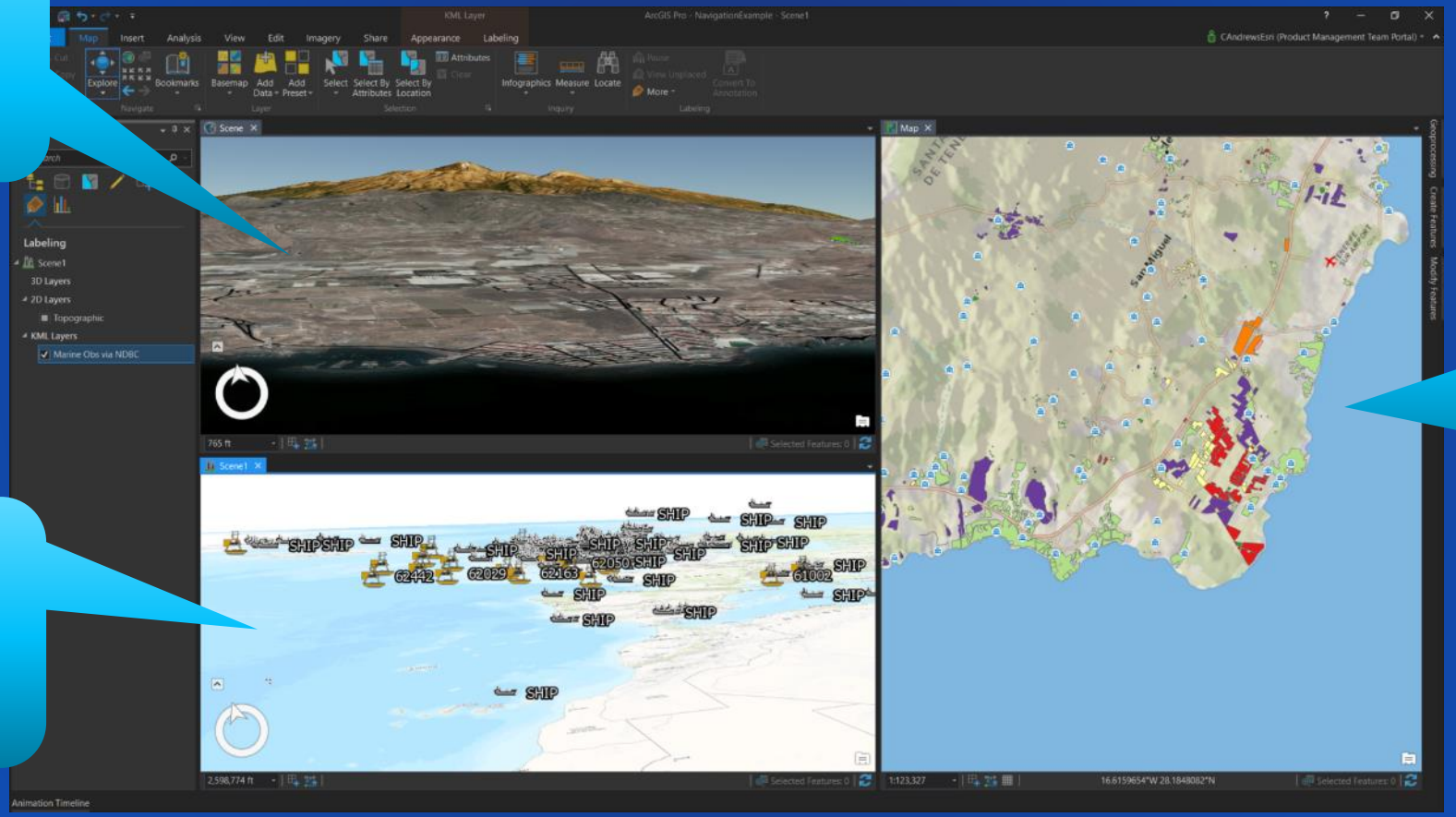
ArcGIS Runtime SDKs	Developer tools for 2D and 3D native iOS, Android, Windows solutions
ArcGIS API for JavaScript	Developer toolkit for building and extending 2D and 3D web apps

3D Visualization in ArcGIS Pro

Introduction of key concepts

Scenes are 3D maps

Global Scene (sphere)



Local Scene (planar)

Map (2D)

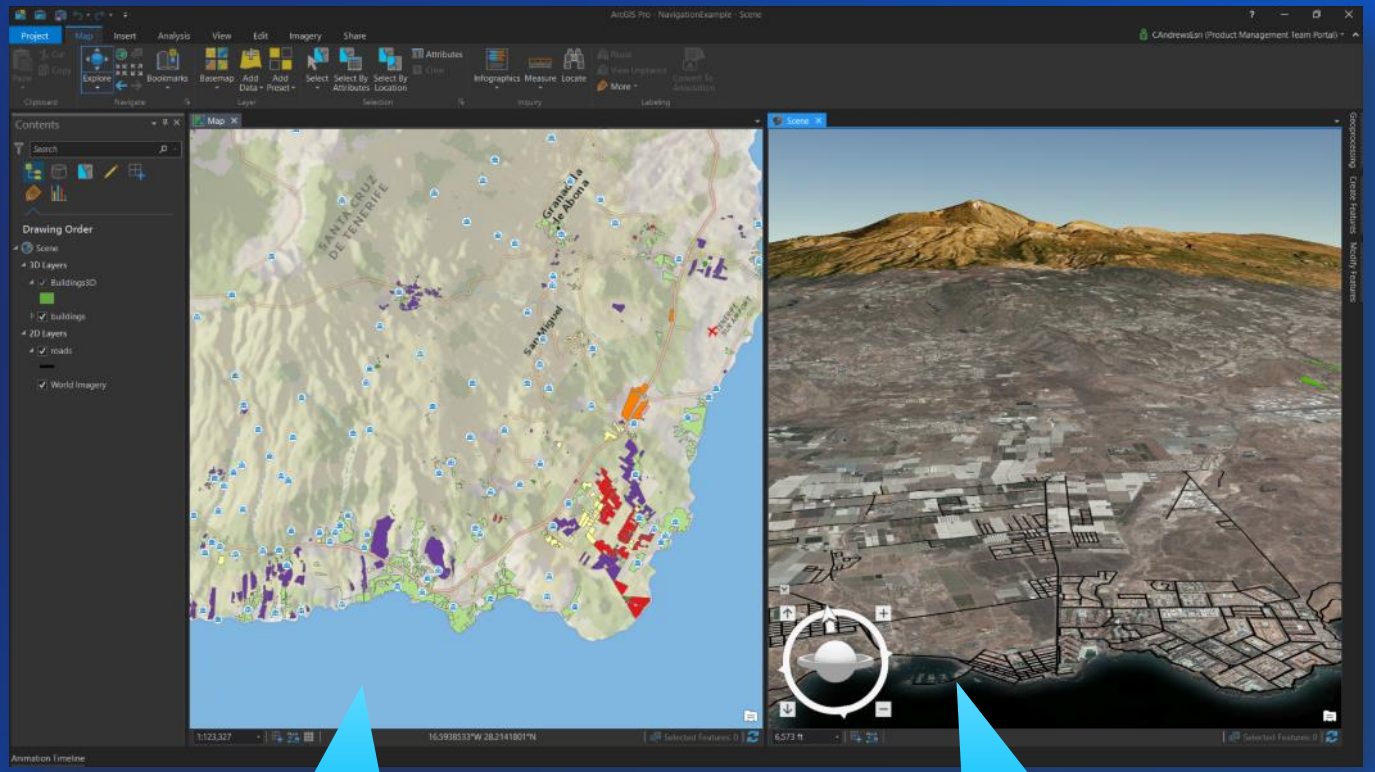
Data from Open Street Map and National Data Buoy Center

Navigating in a scene

- Pan, Zoom, and **Orbit**
  - (Orbit = “Rotate and Tilt the map”)

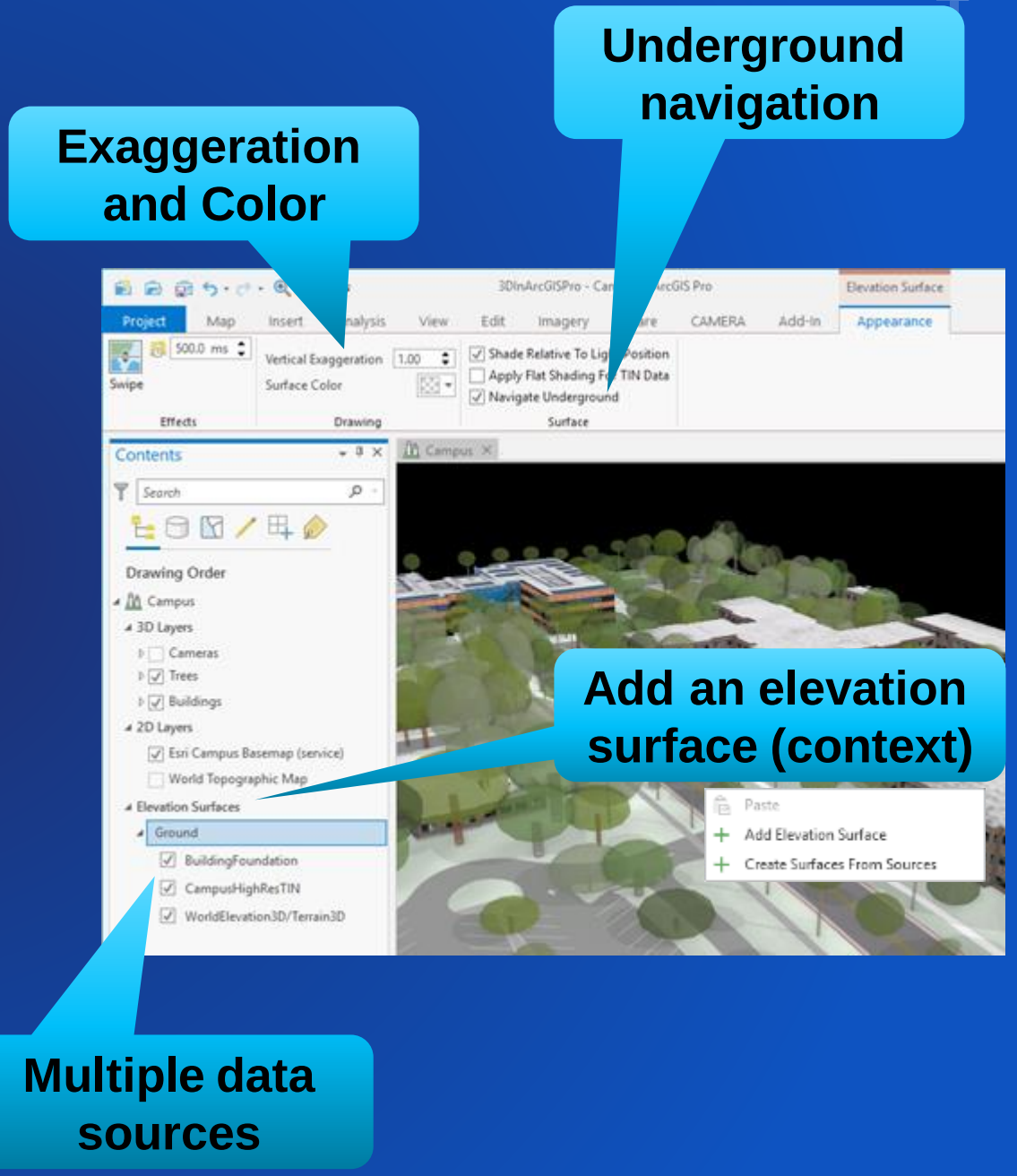
Tips:

- Use bookmarks
- Enable underground navigation
- Use Previous/Next extent
- Learn keyboard shortcuts
- Use the On-screen Navigator control



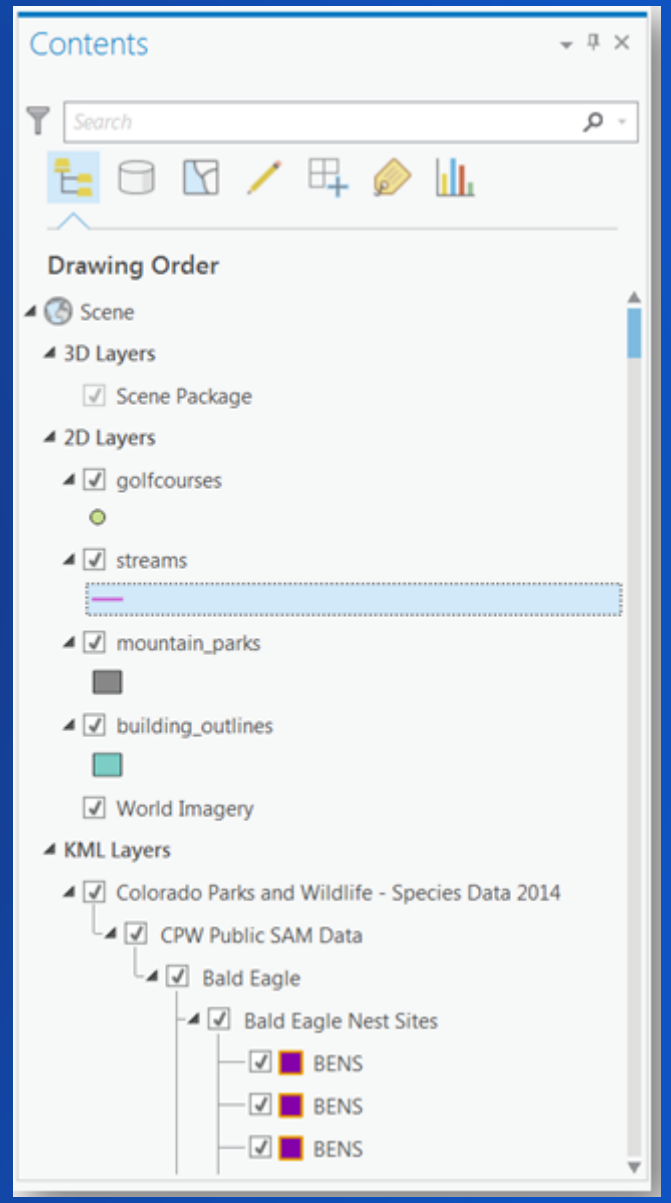
Scenes have elevation surface/s

- Surfaces act as a **height source** / canvas
- A Pro scene always has a **Ground** surface
  - Can act as a boundary for above-ground navigation
- **More surfaces** can be added
  - Non-ground surfaces – geological strata, …
  - Thematic surfaces – temperature, crime, …
  - Before/After surfaces – design, disasters, …
- A surface can have **multiple data sources**
  - Local data – rasters, TINs
  - Services – elevation image services
- You can exaggerate, shade, and color surfaces



Scenes support many types of data

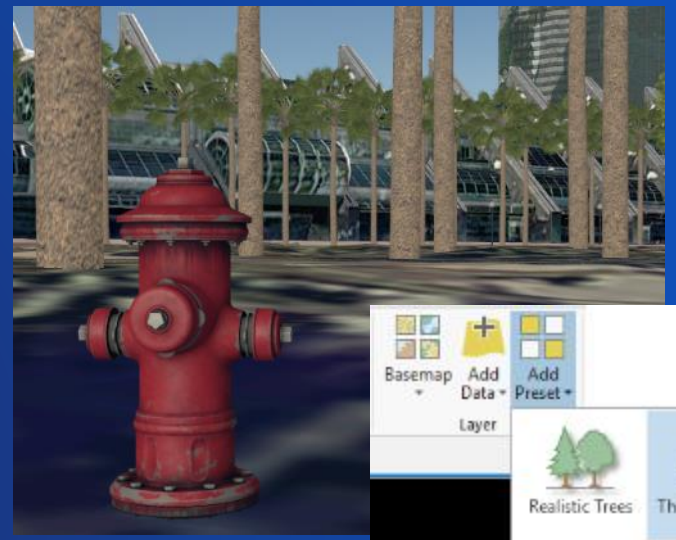
- Vector layers
  - Feature classes: Point, line, polygon, multipatch, annotation, …
  - Scene layers: 3D Point, 3D Object, Integrated Mesh, Point Cloud, …
  - Services: Feature services, Map services, Scene services, …
  - Third party layers: KML, BIM (Revit), CAD, CSV, …
- Raster layers
  - On disk: Image files, Mosaic datasets, NetCDF, …
  - Services: Image services, KML Network Links, WMS, …
- Elevation layers
  - Single-band rasters, TINs, Elevation image services

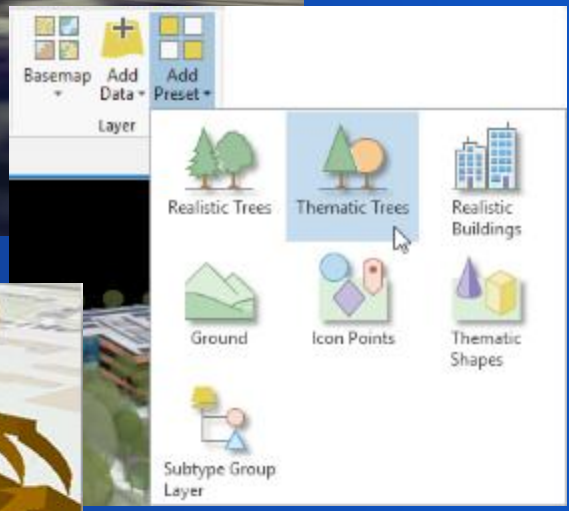


Scenes have extra symbology options

- Use **3D models** for realism and recognizable objects
  - Models may have material properties (eg: shiny)
- **Extrude** polygons to make 3D blocks
- Simple **attribute-driven** shapes (aka “Preset layers”)
- Set vertical positions **realistically** or **thematically**

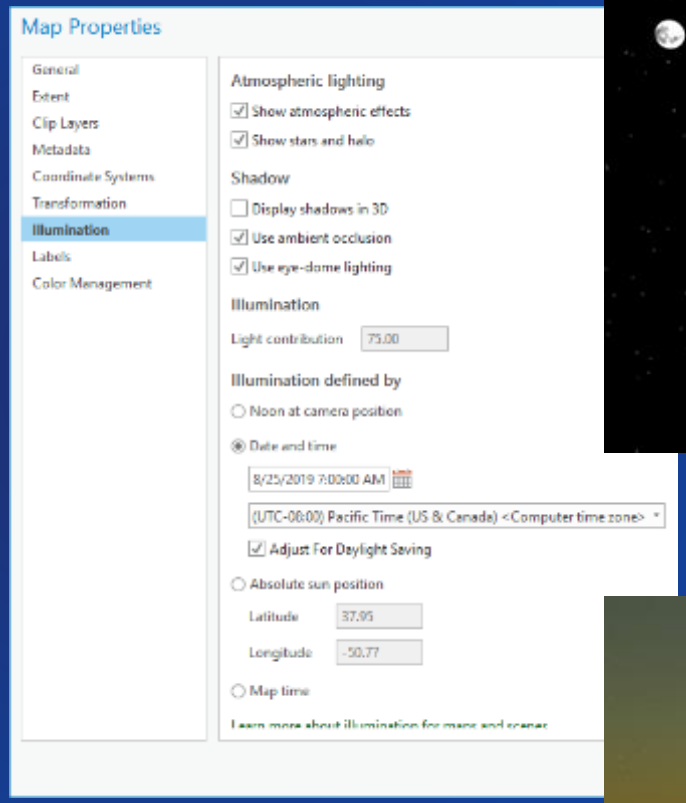
- Plus advanced symbols only available in 3D
  - Procedural rule packages (from CityEngine)
  - 3D-aware geometric effects
  - Animated water fill

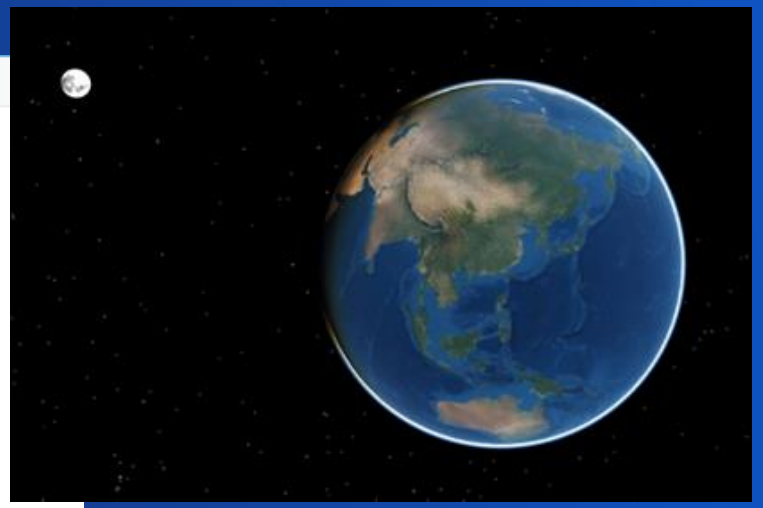


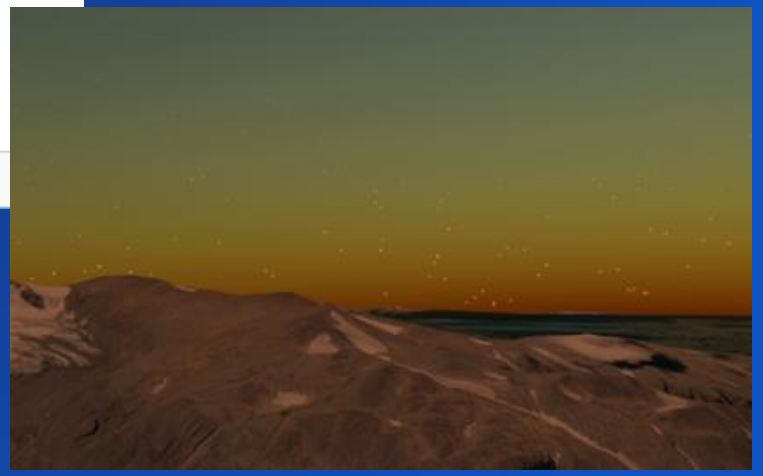


Scenes have lighting, shadows, and environmental effects

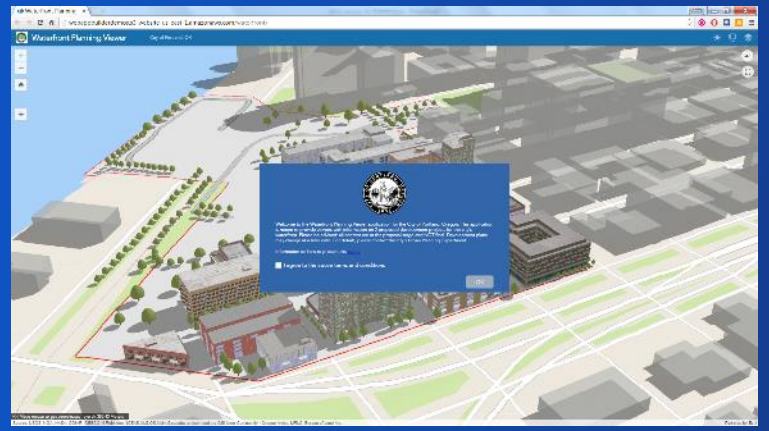
- Atmospheric effects
  - Sunset, sunrise, atmospheric halo
- Sun, moon, and star positioning
- Enable ambient occlusion lighting
- Cast shadows
- Animate lighting through time



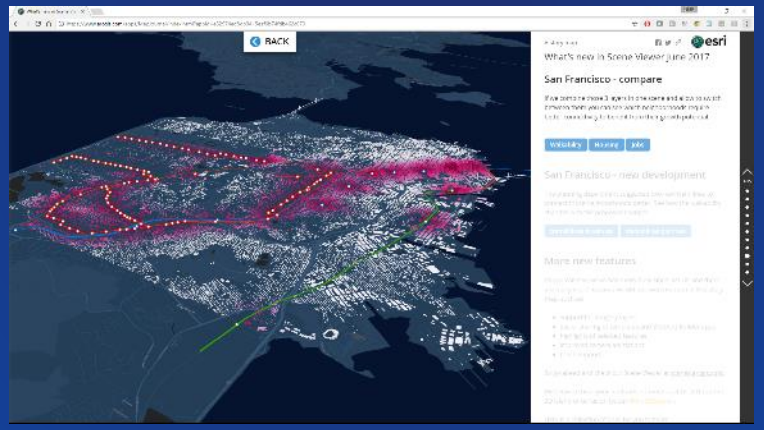




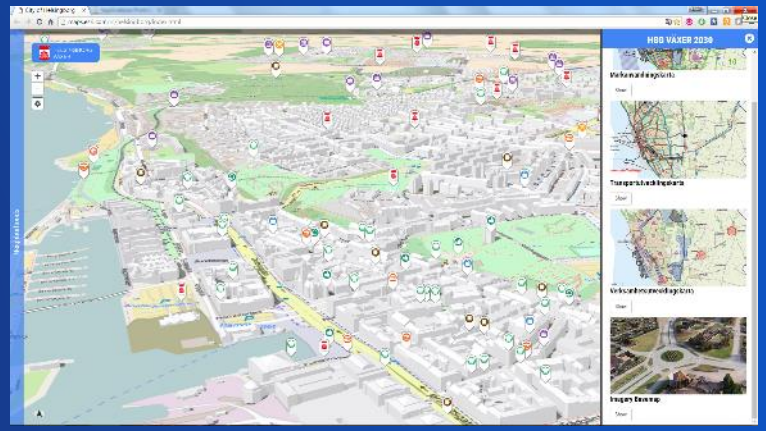
Scenes can be published and re-used (as web scenes)



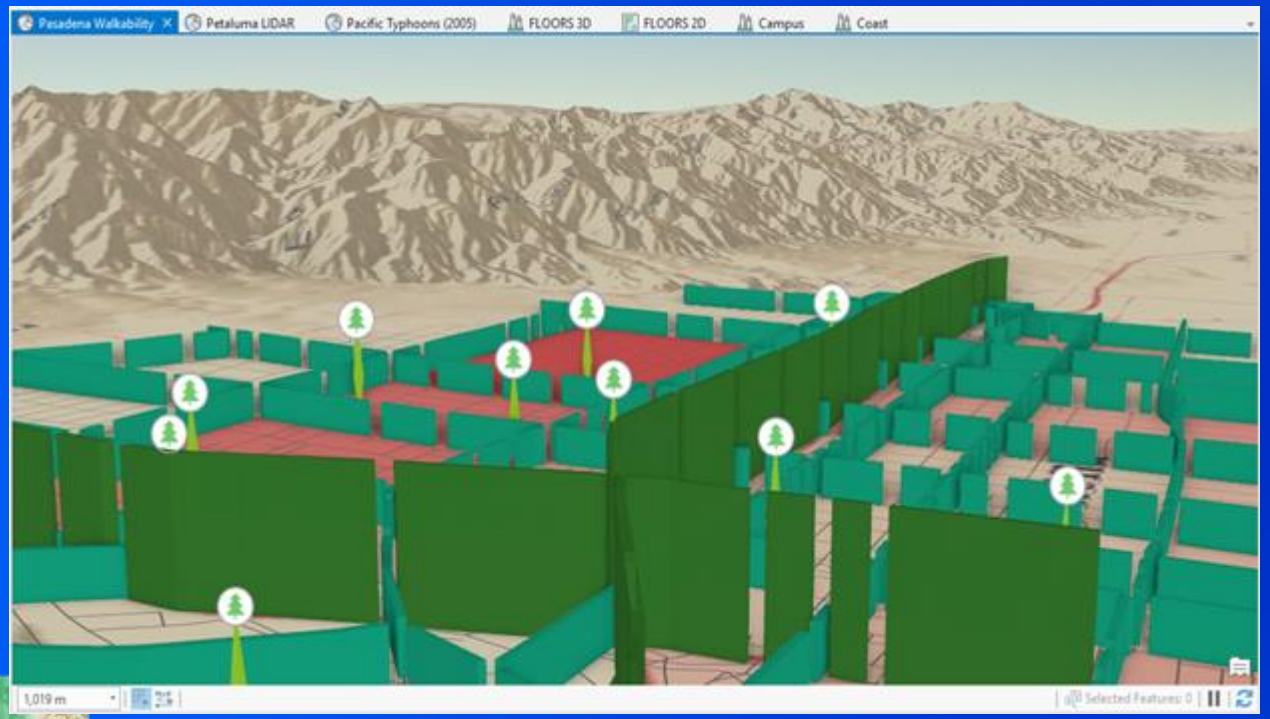
Web AppBuilder



Story Maps



JS API Custom apps

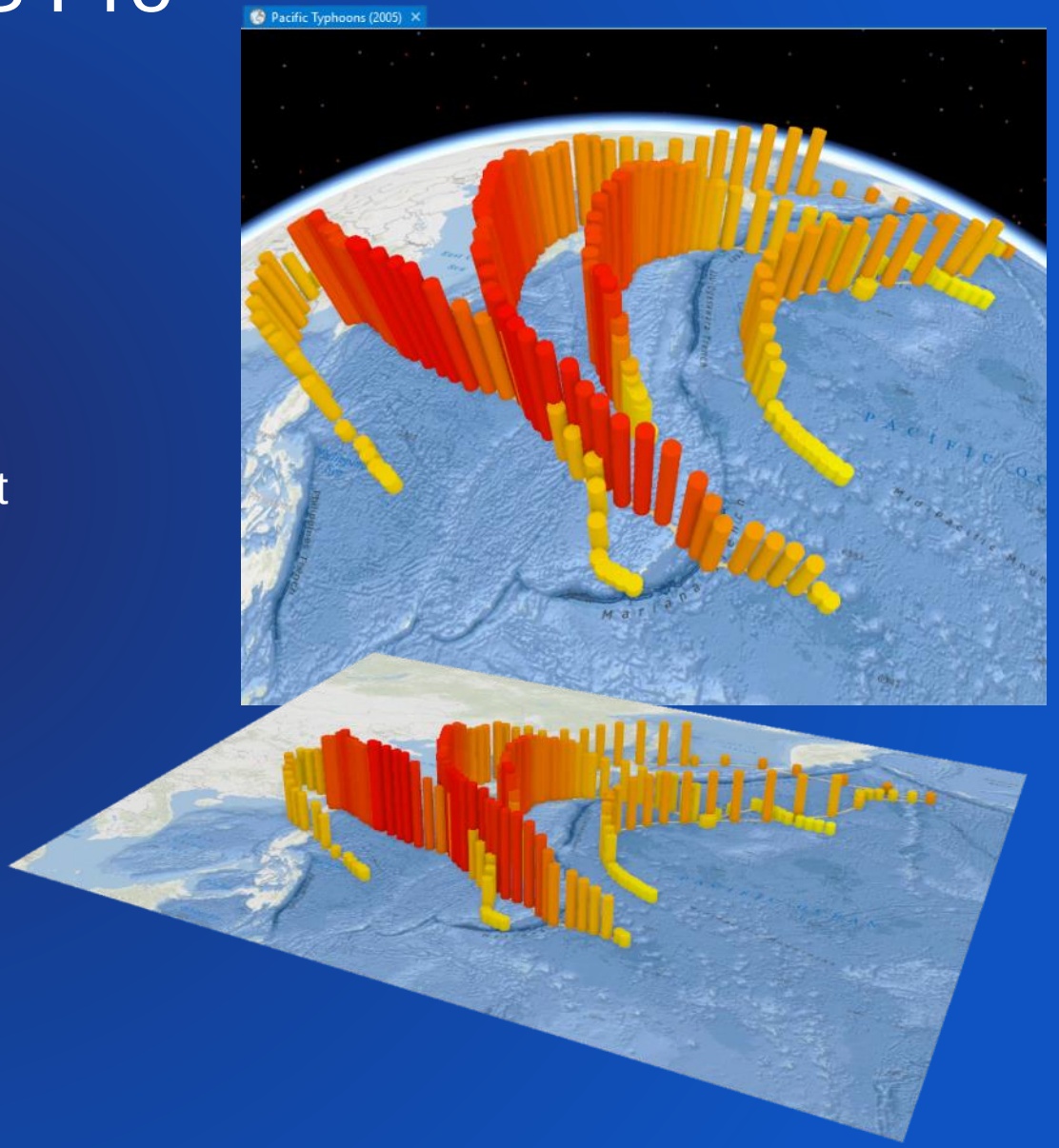


Overview of working with 3D in ArcGIS Pro

Nathan Shephard

Summary: 3D Concepts for ArcGIS Pro

- 3D Viewing modes: Global or Local
- Symbol size: Screen-space or Real-world
- Styling: Realistic or Thematic
- Use attributes to drive symbology
  - Especially geometric properties like size / rotation / offset
- Define the lighting and shadows for the scene
- More advanced options are available, such as:
  - Geometric Effects
  - Procedural Symbology
  - Animated Water Fill (not shown… yet)



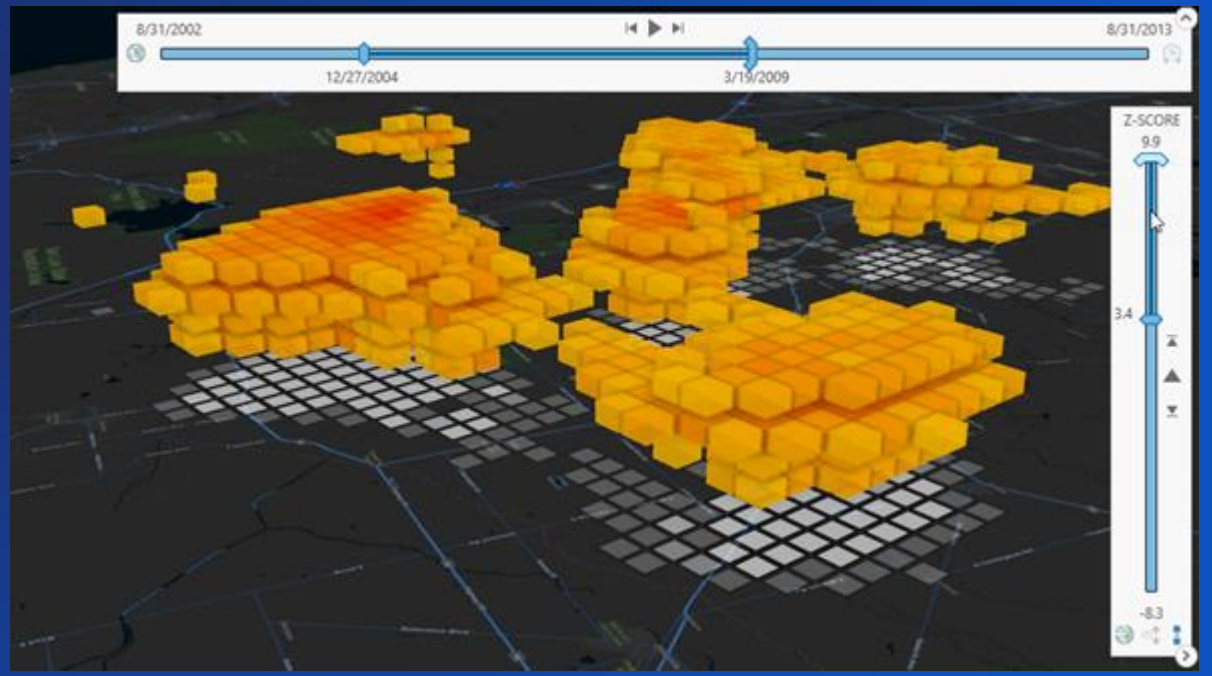
Using Sliders with 3D

Exploring data through time and numeric ranges

Explore content using sliders

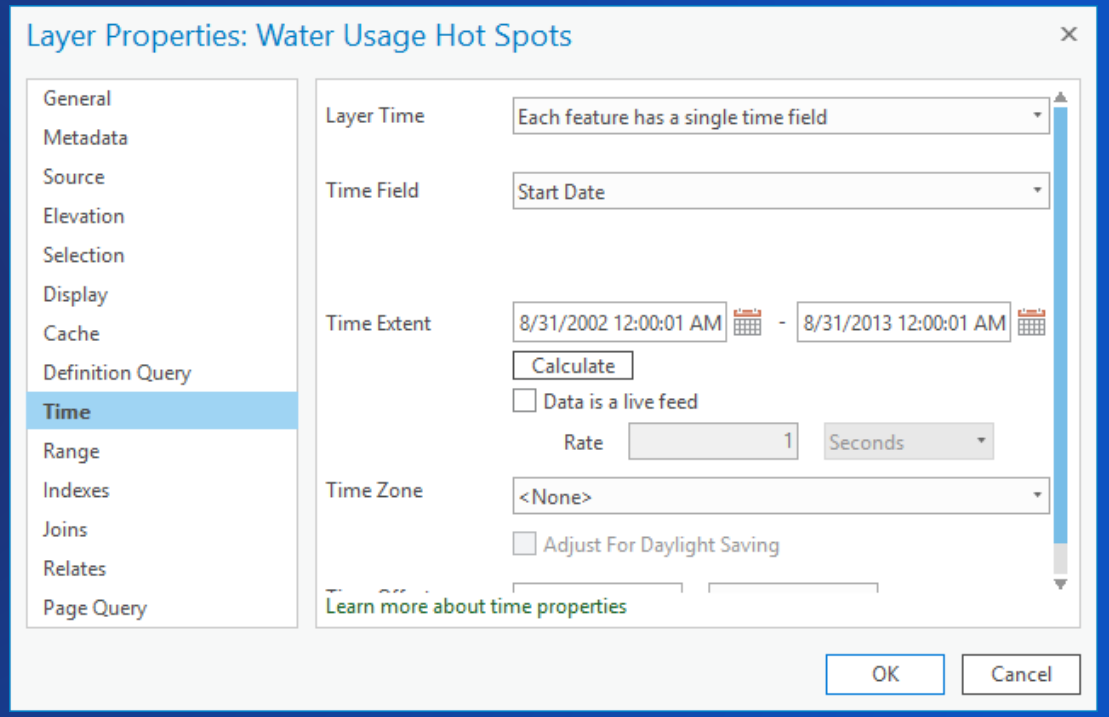
- Visual filtering of content using interactive on-screen controls
  - “A map/scene can have a temporal extent”
  - “A map/scene can have a range extent”
- Sliders can drive many layers in the scene
- Properties are kept when publishing
  - But… web maps only have a time slider (OOB)
  - And… web scenes have neither (so far)

- TIP: Can be used in Animations!



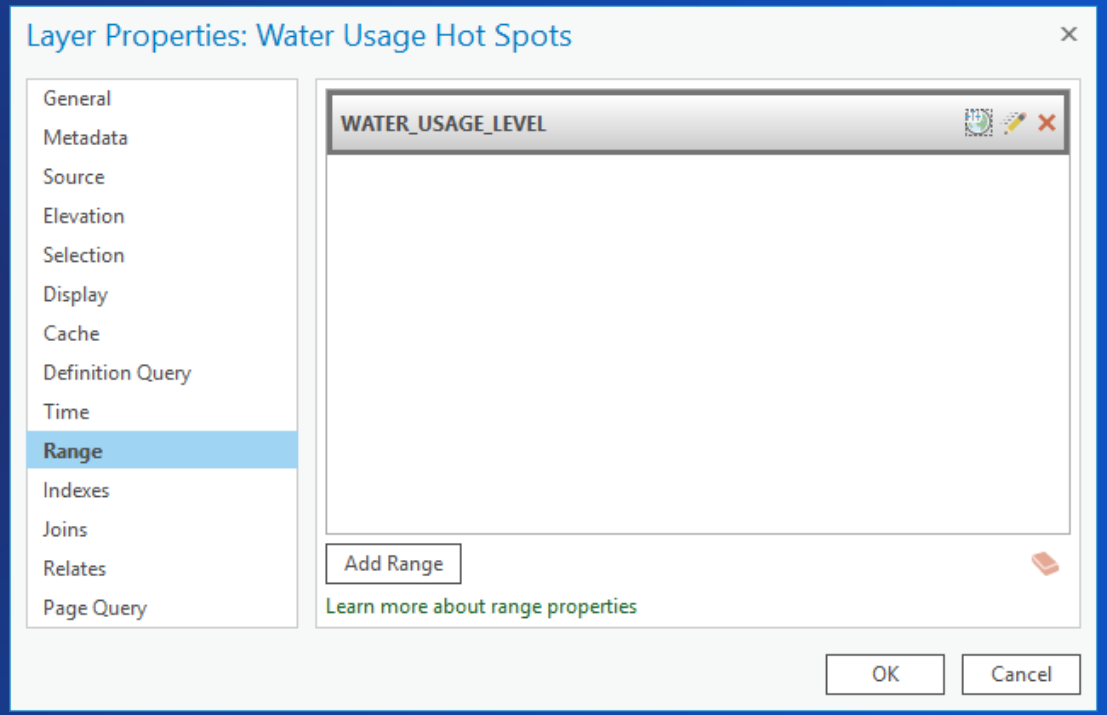
Time-aware layers

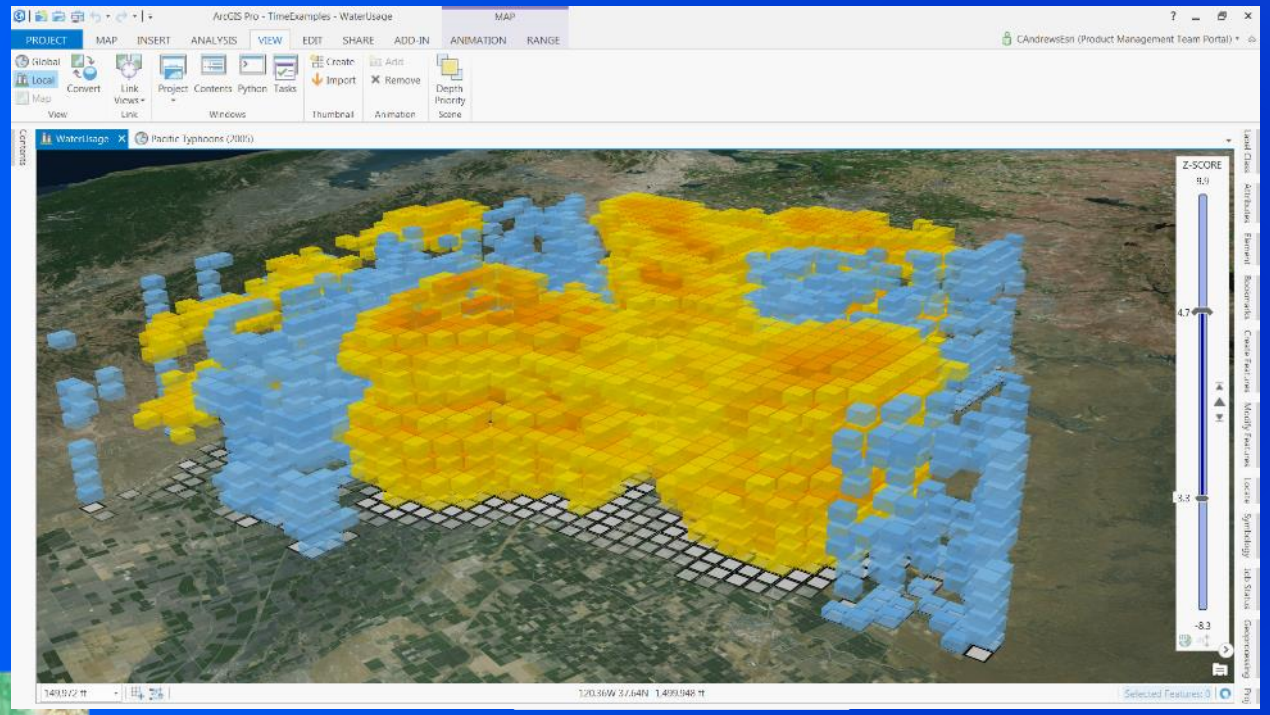
- Temporal information stored as an attribute
  - Single field for the event moment
  - Two fields for the start-end of an event
- Set the time zone (as needed)
- Content will filter **based on the map's time**
  - Feature data (by database row)
  - Mosaic datasets (by image row)
  - NetCDF (by virtual row)
- Play through time
- Store time-aware bookmarks



Range awareness

- Numeric range values, stores as an attributes
  - Can be any numeric field for tabular data
  - EG: temperature, price, days-since-serviced, …
- Can have multiple ranges in one layer
  - Set the alias name
  - Define the same logical range on other layers
- Only one range can be active at a time
  - That is, only one range attached to the slider
- Play through a range
- Store range-aware bookmarks





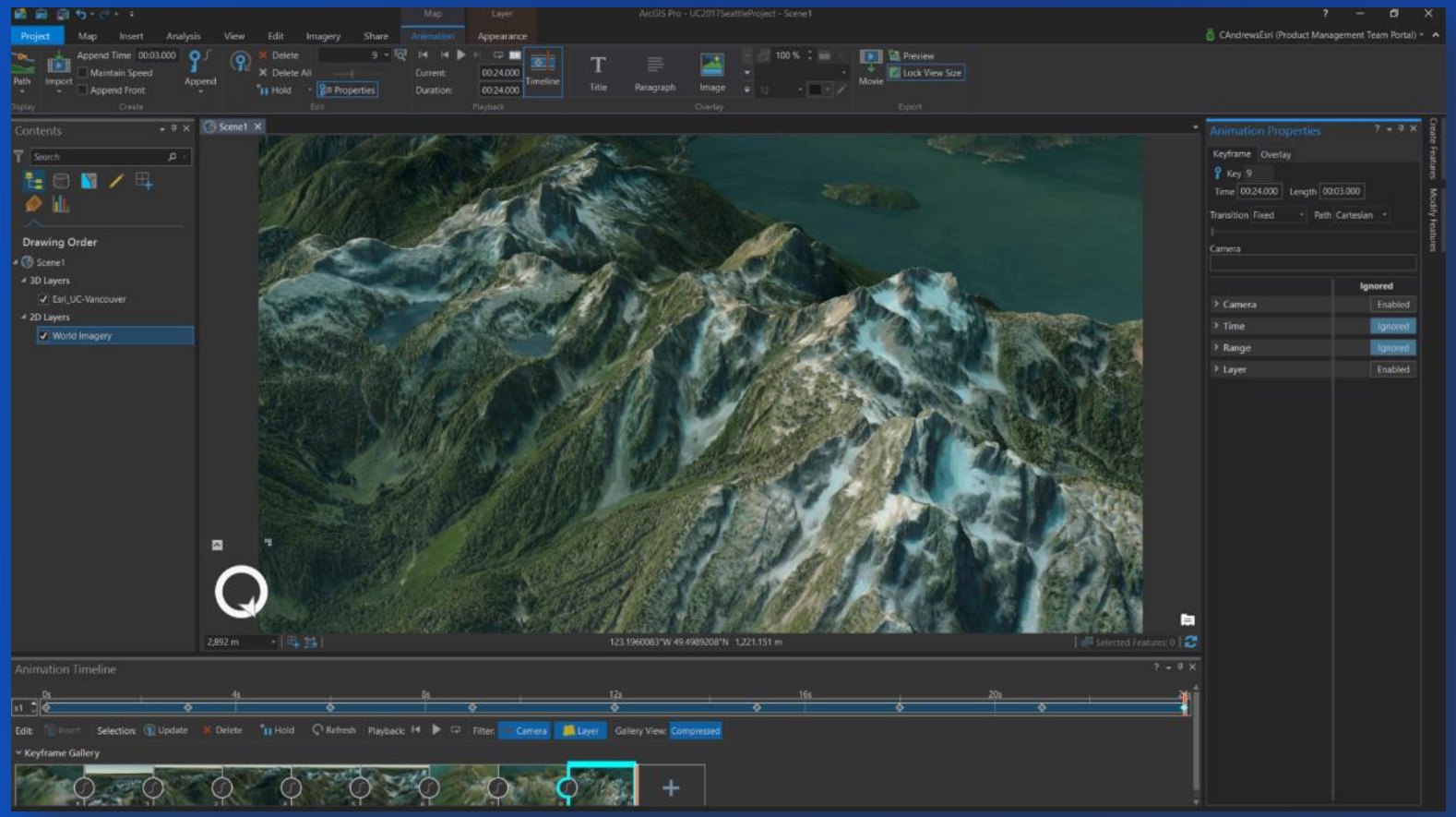
Using the Time and Range Sliders

Nathan Shephard

Introduction to Animation

Author and share geographic stories from Pro as videos

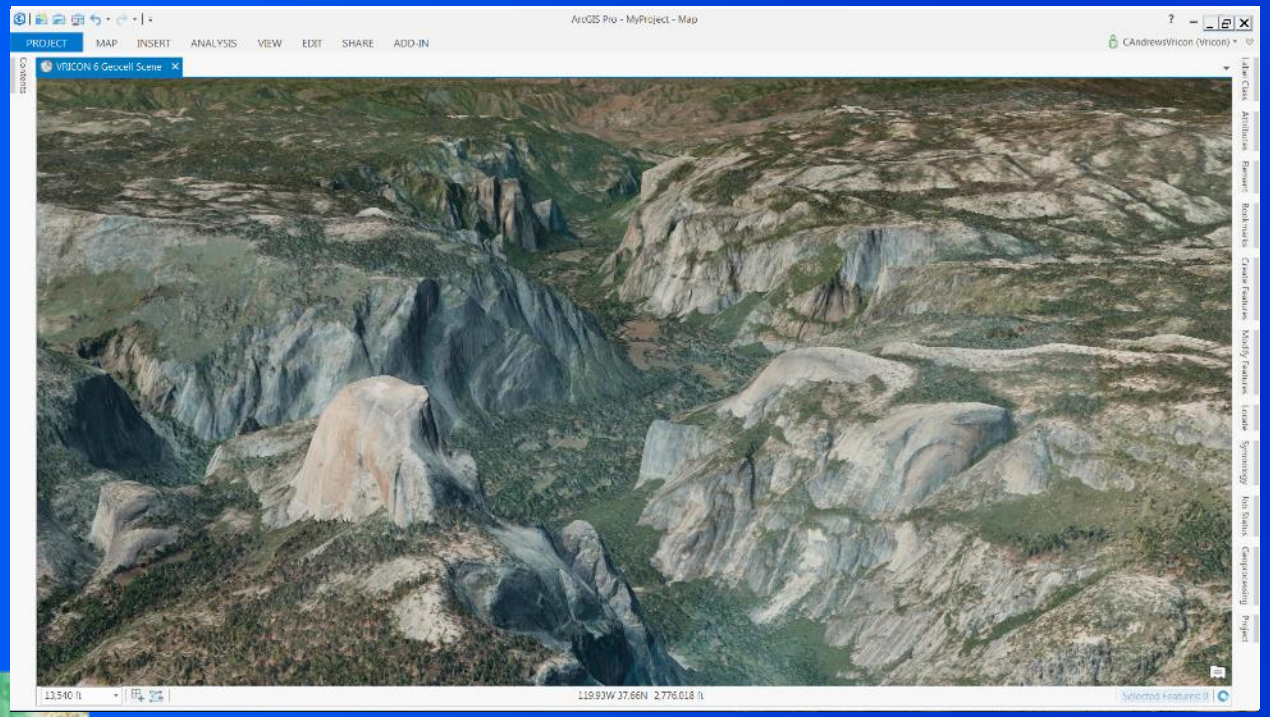
Animation for static and dynamic story telling



Data from Vricon

TIP: How to find the Animation ribbon

- Go to the View Ribbon
- Click on Add on the Animation Tab
- *Don't click Remove unless you want to delete your current animation keyframes*



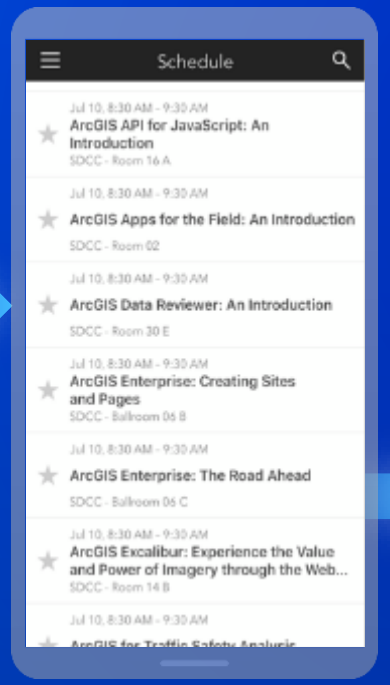
Animation in ArcGIS Pro

Steve Heidelberg

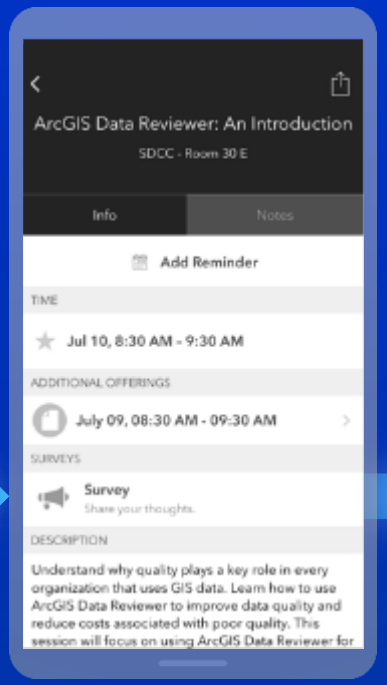
Please Share Your Feedback in the App

Download the Esri Events app and find your event

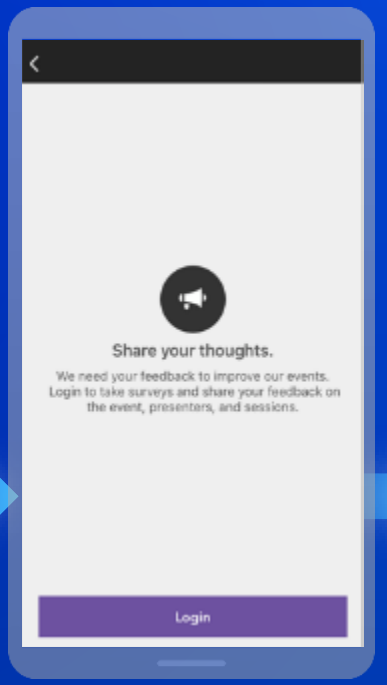
Select the session you attended



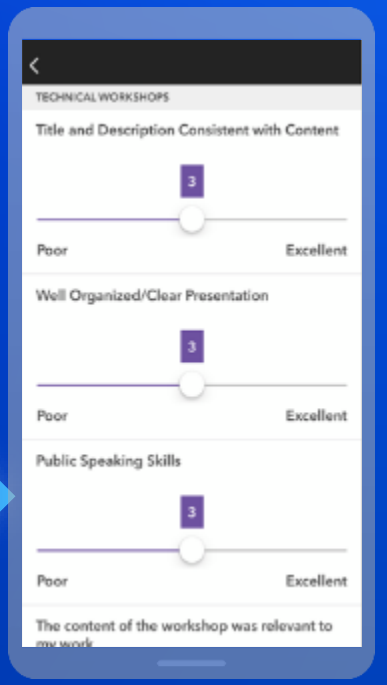
Scroll down to "Survey"



Log in to access the survey



Complete the survey and select "Submit"



Questions?