A Holistic Approach to Building 3D Web Apps

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Session Overview

- Introduction to 3D
- Web scenes
- Building custom web apps with web scenes

Introduction to 3D

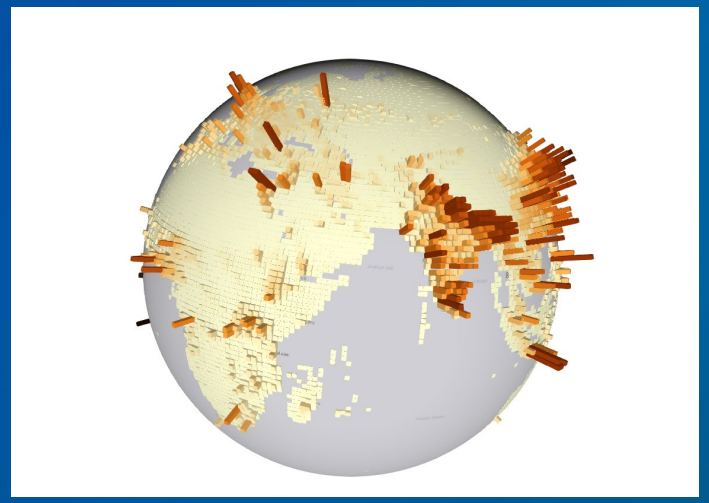
What is 3D in the platform?

- Scene layers, feature layers and more!
- Powered by services; accessible across clients
- Combine 2D and 3D in Esri WebGIS architecture
- Create higher value visualizations, analyses, and information products using data and geoprocessing with 2D and 3D
- Web scenes as building blocks for 3D apps

Global vs. Local Scenes

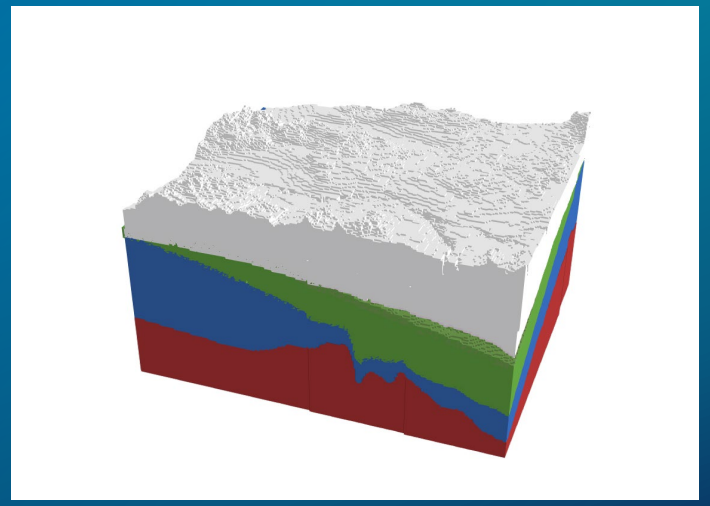
Global

- Web Mercator or WGS84
- Sphere/curved surface
- Underground navigation



Local

- Any PCS (including Web Mercator)
- Flat surface/no curvature
- ClippingExtent
- Underground navigation



Global Scenes

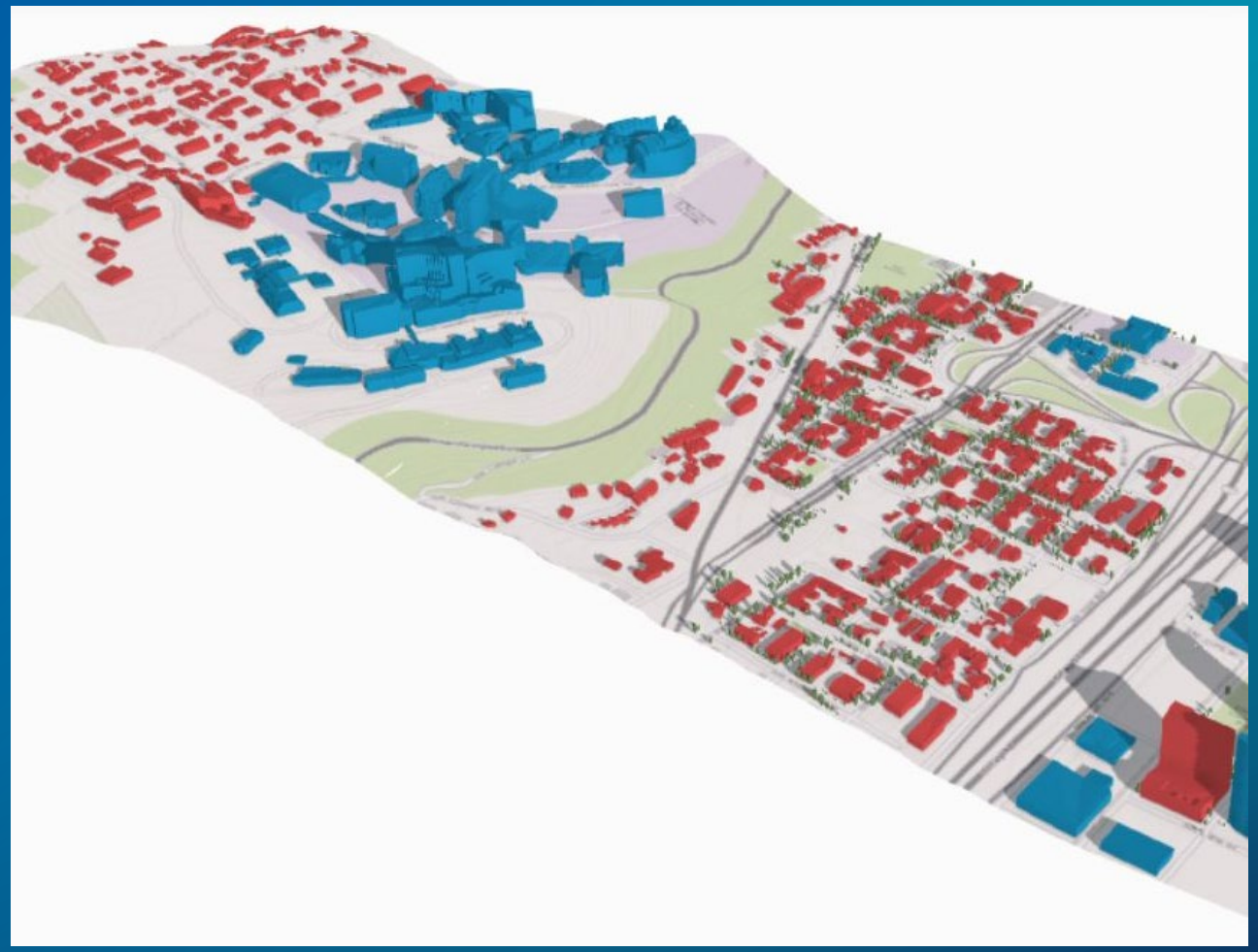
```
var map = new Map({
  basemap: "topo",
  layers: []
});

var view = new SceneView({
  container: "viewDiv",
  map: map,
  // this is the default
  viewingMode: "global"
});
```

Local Scenes

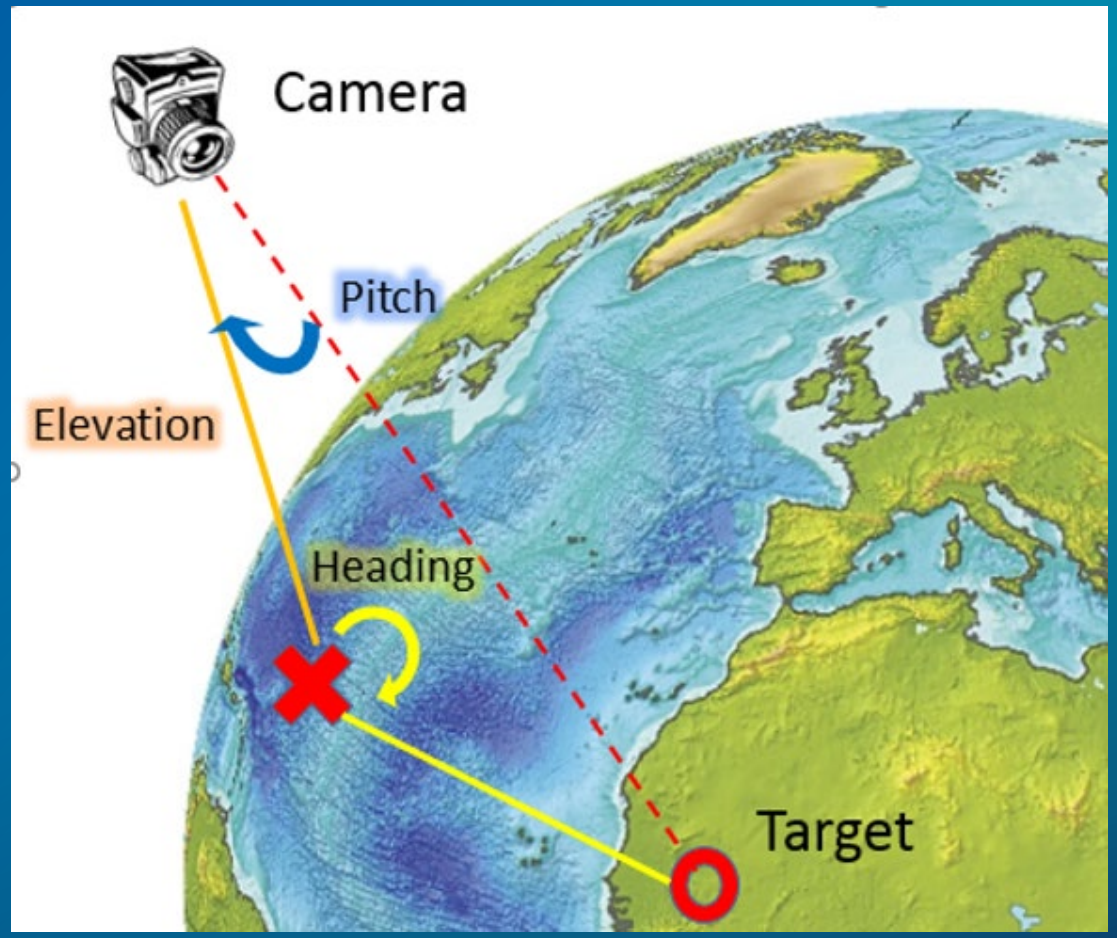
```
var map = new Map({
  basemap: "topo"
});

var view = new SceneView({
  container: "viewDiv",
  map: map,
  viewingMode: "local",
  clippingArea: {
    // set extent properties here
  }
});
```



Camera

```
var view = new SceneView({
  container: "viewDiv",
  map: map,
  camera: {
    position: {
      x: -111.526,
      y: 38.984,
      // elevation in meters
      z: 2500000,
      // WGS84
      spatialReference: { wkid: 4326 }
    },
    // aka "pitch"
    tilt: 45,
    heading: 330.023
  }
});
```



Navigation

- Manual with mouse and keyboard gestures
- Programmatic navigation with goTo()

```
view.goTo({
  center: [-126, 49],
  zoom: 13,
  tilt: 75,
  heading: 105
});
```

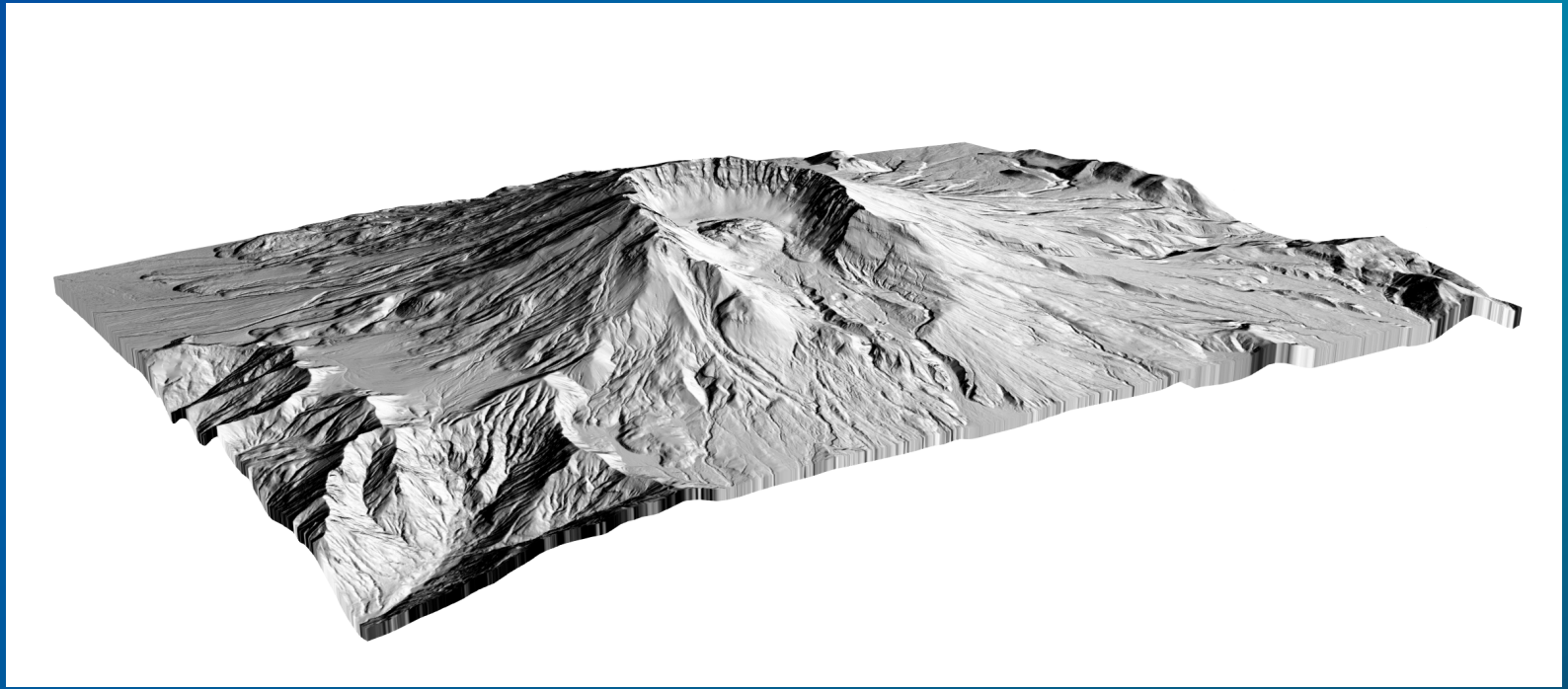

```
view.goTo(myCamera);
```

```
view.goTo(geometry);
```

```
view.goTo([ graphic1, graphic2, ... ]);
```

Elevation layers

- Provide vertical geographic context to your map
- Can be published to Portal for ArcGIS or ArcGIS Online using ArcGIS pro



Elevation layers

Esri world elevation service

```
var map = new Map({
  basemap: "satellite",
  // Esri world elevation service
  ground: "world-elevation",
  // operational layers
  layers: [ ... ]
});
```

Hosted elevation layer

```
var map = new Map({
  basemap: "topo",
  ground: {
    // Collection of elevation layers
    layers: [
      new ElevationLayer({
        url: "../OsoLandslide_After_3DTerrain/ImageServer"
      })
    ]
  },
  // operational layers
  layers: [ ... ]
});
```

Visualization

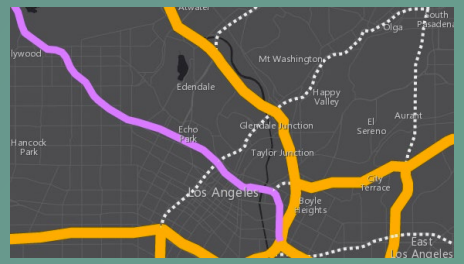
PointSymbol3D

LineSymbol3D

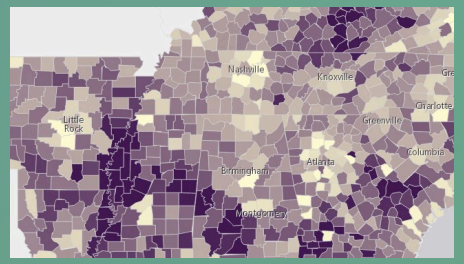
PolygonSymbol3D

IconSymbol3DLayer

LineSymbol3DLayer



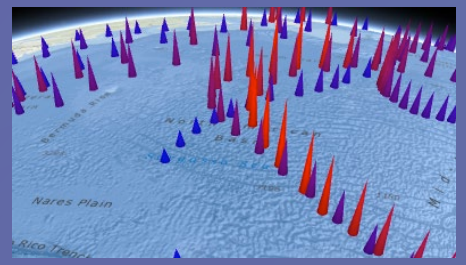
FillSymbol3DLayer



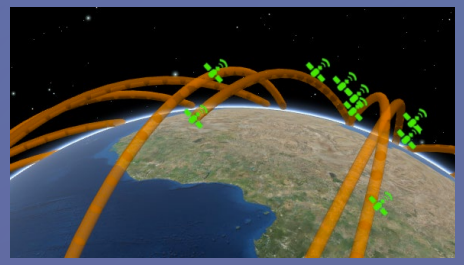
Flat

- Screen size units (pt, px)
- Graphics are in screen space

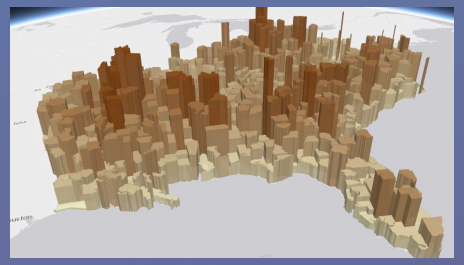
ObjectSymbol3DLayer



PathSymbol3DLayer



ExtrudeSymbol3DLayer



Volumetric

- Real world units (feet, meter)
- Graphics are in real world space

Visualization

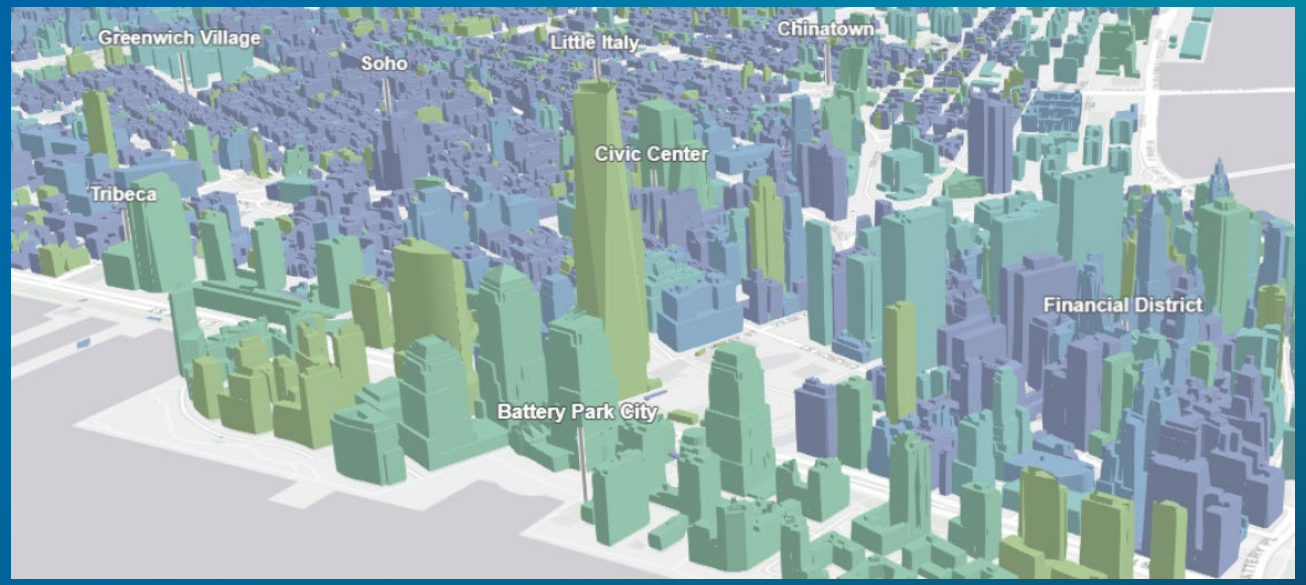
Symbol layers within 3D symbols drive the visualization

MeshSymbol3D

↓

FillSymbol3DLayer

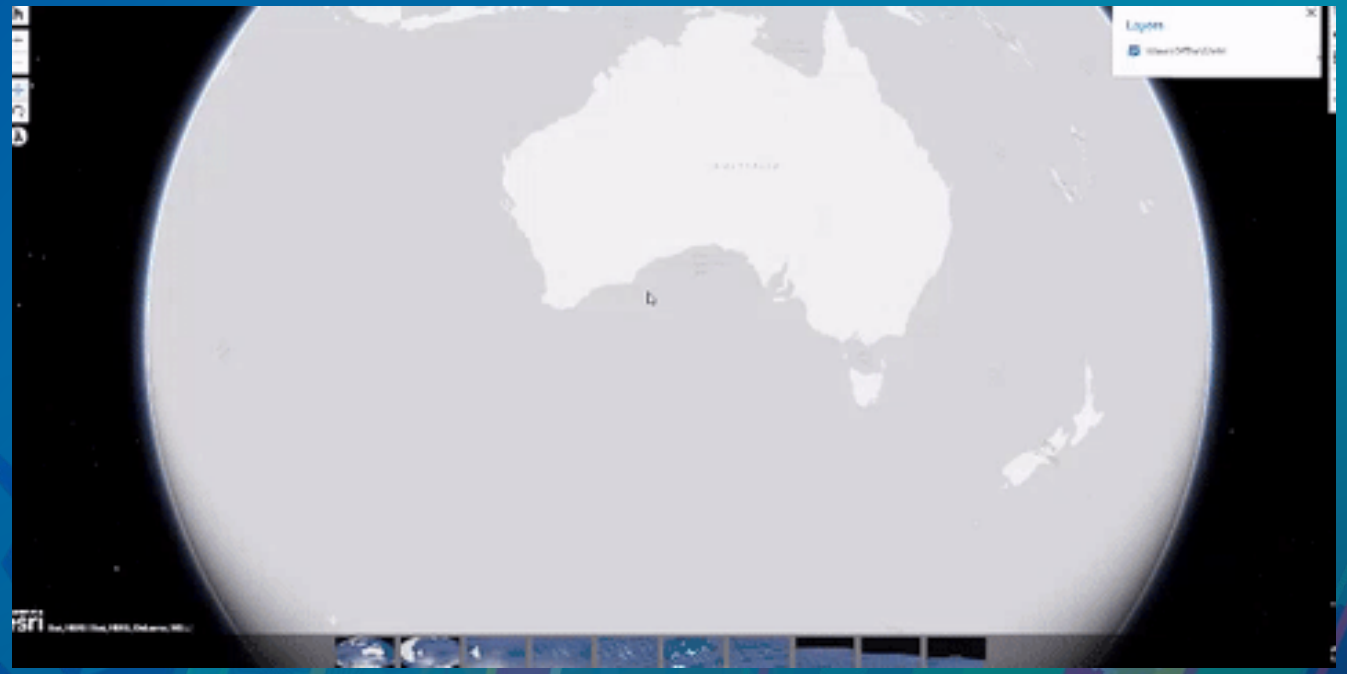
```
function createSymbol(color){
  return new MeshSymbol3D({
    symbolLayers: [
      new FillSymbol3DLayer({
        material: { color: color }
      })
    ]
  });
}
```



Web Scenes

Web Scenes

- Author in ArcGIS Online (can also be done in ArcGIS Pro)
- Publish layers in ArcGIS Online
- Author the scene with slides
- Save – get item ID

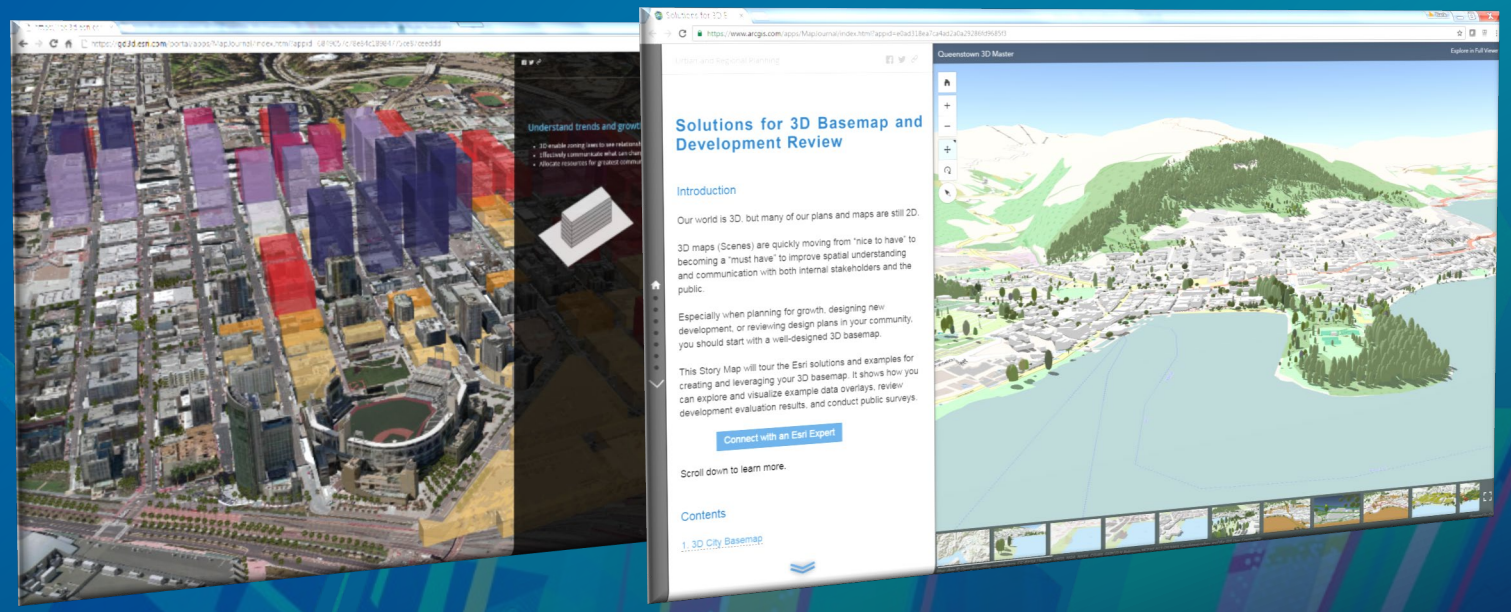


Intro to Web Scenes

- Allow you to visualize and analyze geographic information in an intuitive and interactive 3D environment
- Can add and customize 2D and 3D layers
  - Feature layer, map image layer, scene layer
- Control environment settings
  - Shadows
  - Time of day
- Can be global or local

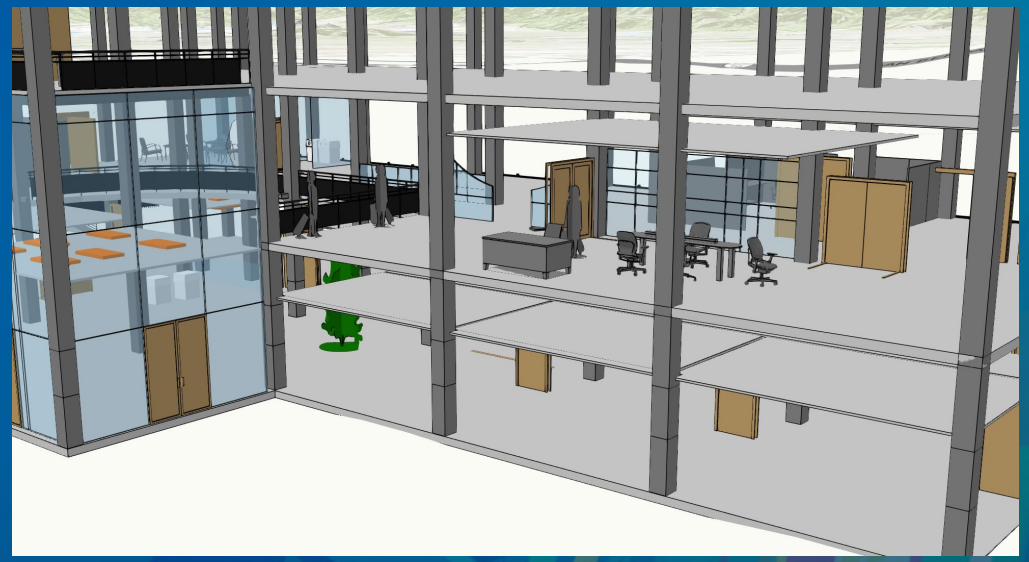
Scene Layers

- Cached web layers that are optimized for displaying a large amount of 2D and 3D features and can be viewed in the scene viewer
- Three different types of scene layers:
  - Point
  - 3DObject
  - IntegratedMesh
  - PointCloud
  - BuildingSceneLayer



Building scene layers

- Visualize BIM models in your scenes with the building scene layer
- New scene layer type released December in ArcGIS Online, coming in 10.7 release of Portal
- Create building scene layer using Revitt data + Create Building Scene Layer GP tool in ArcGIS Pro 2.3



How to Create a Scene Layer in ArcGIS Online & Enterprise

- Create a scene package in ArcGIS Pro
- Upload the scene package to ArcGIS Online or Portal
- Publish a scene layer from the scene layer package
  - Use this to publish Point, 3D Object, Integrated Mesh, Point Cloud scene layers

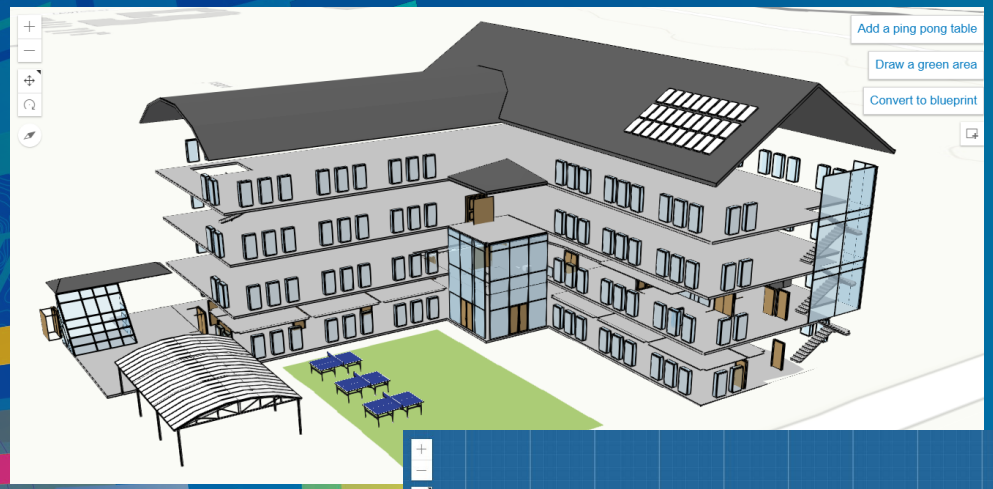
- Share data directly from ArcGIS Pro to ArcGIS Online(Pro 2.1) or Portal
  - Creates a scene layer with associated feature layer
    - Use this to publish Point and 3D Object scene layers

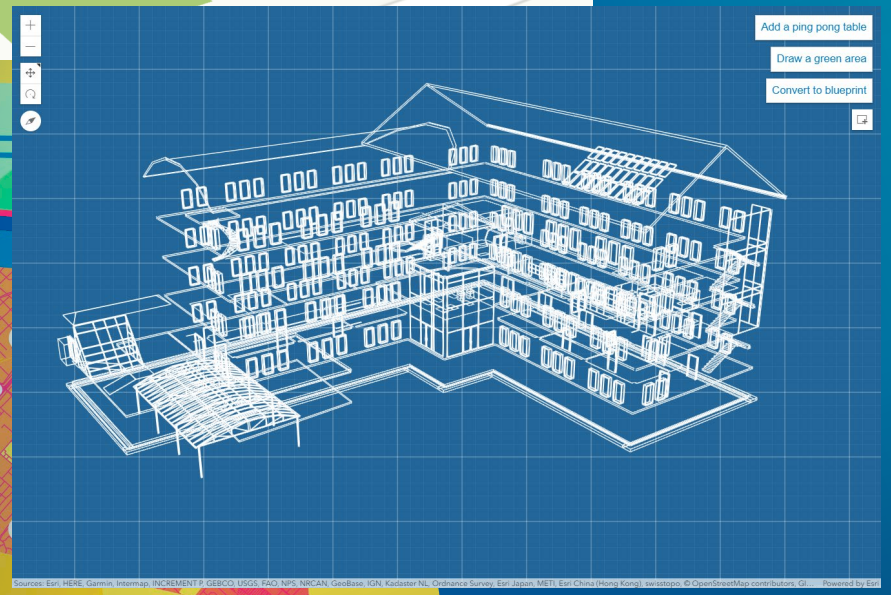
- Publish scene layers from hosted feature layers in ArcGIS Online
    - Use this to publish Point and 3D Object scene layers

How to Create a Web Scene in ArcGIS Online & Enterprise

- Click the Scene text inside your Organization to launch the Scene Viewer
- Add 2D and 3D layers to your web scene
- Configure your web scene

- In ArcGIS Pro add 2D and 3D layers
- Configure your layers (popups, style etc)
- Share web scene from ArcGIS Pro to ArcGIS Online or Portal
  - This can also be used to publish hosted layers as well directly to ArcGIS Online or Portal





Creating a building visualization

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