

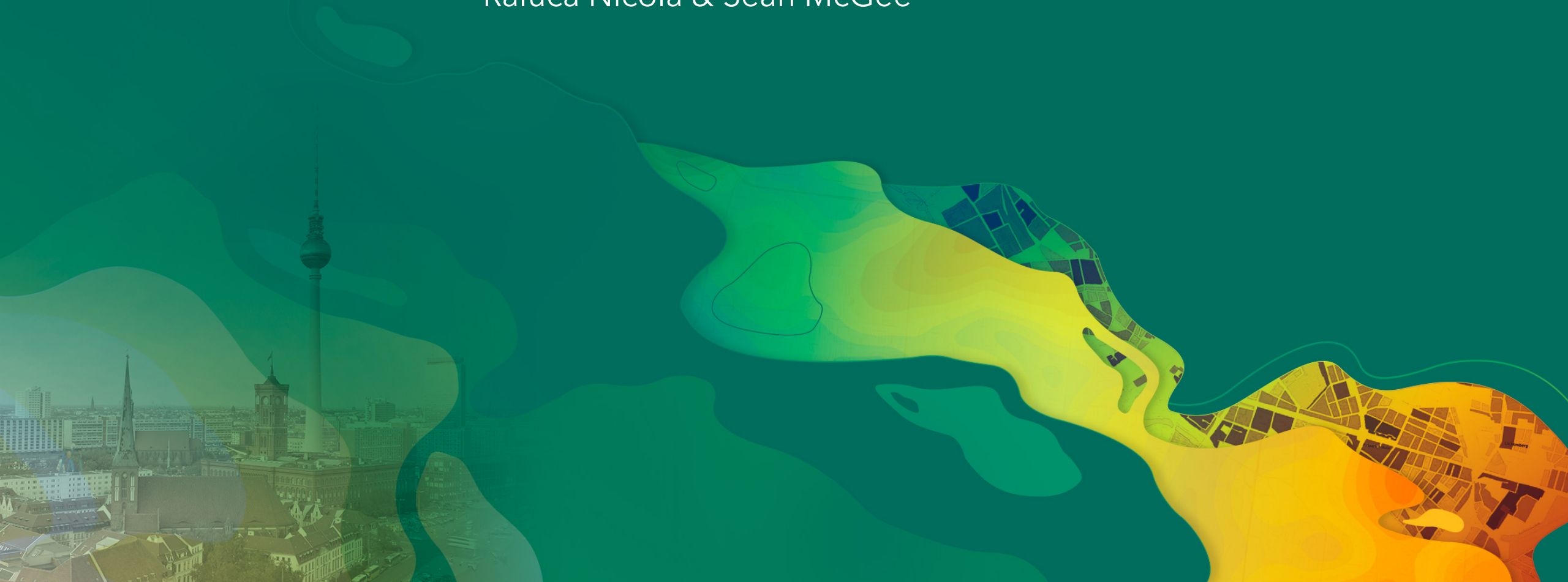


DEVELOPER  
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# Getting Started with 3D in the ArcGIS API for JavaScript

Raluca Nicola & Sean McGee





## Sean McGee

 Developer Evangelist, Esri UK

 JavaScript, Animations, 3D

 Aylesbury, UK



## Raluca Nicola

 Product Engineer JS API, Esri R&D Center

 Data visualization, 3D

 Zurich, Switzerland

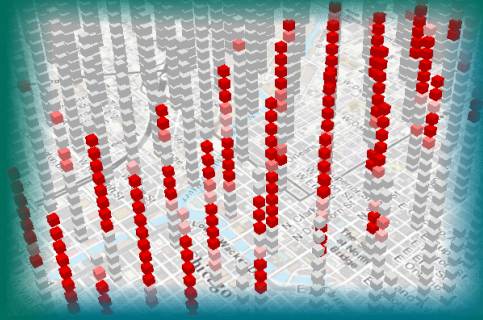
# Presentation overview

- Introduction to 3D
- 3D API Concepts
- 3D Layers
- Demo
- What's coming
- Resources

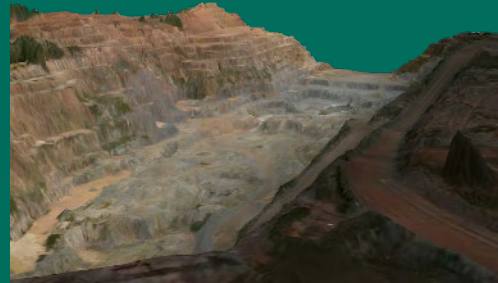


# Introduction to 3D

# 3D GIS across industries



Scientific Visualization



Mining

Developing Energy resources



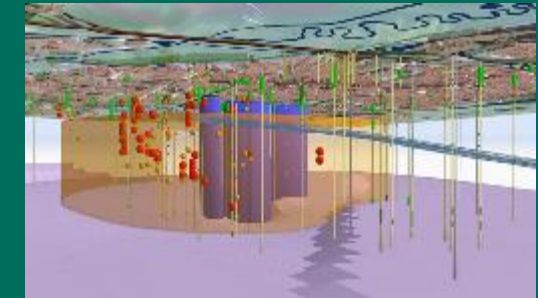
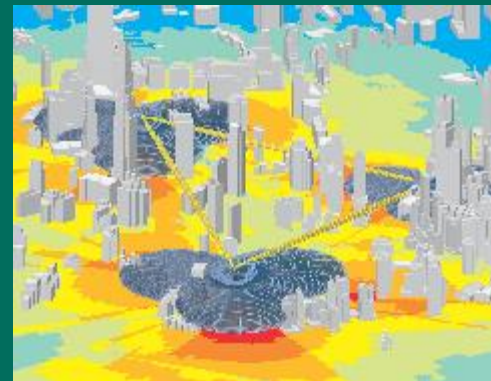
Transportation



City monitoring and planning



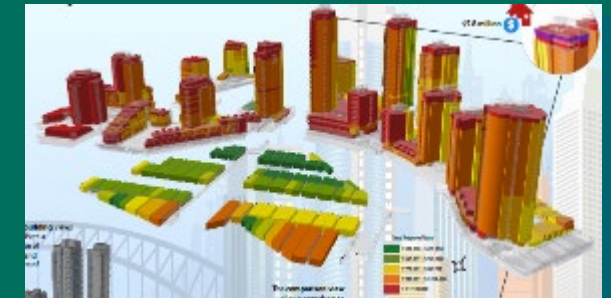
Utilities and Telecommunications



Environmental assessment



Facilities Management



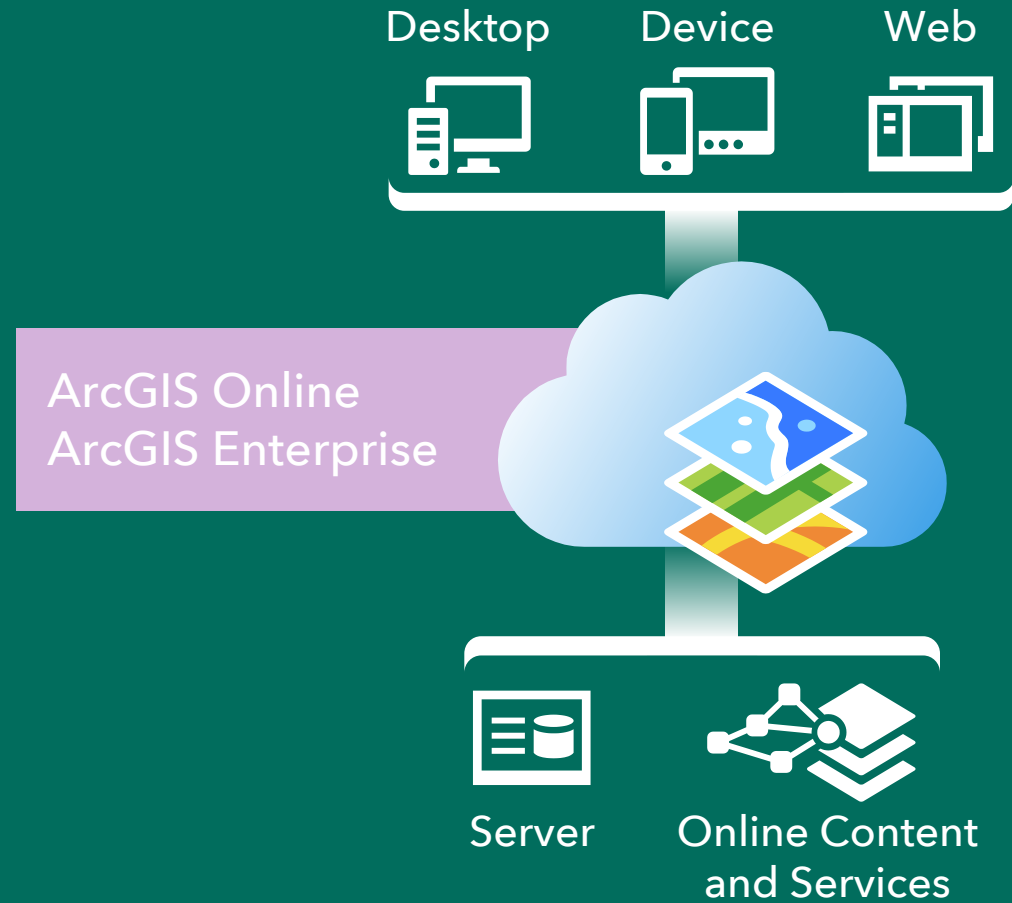
Land Management

# Engaging, immersive 3D experiences

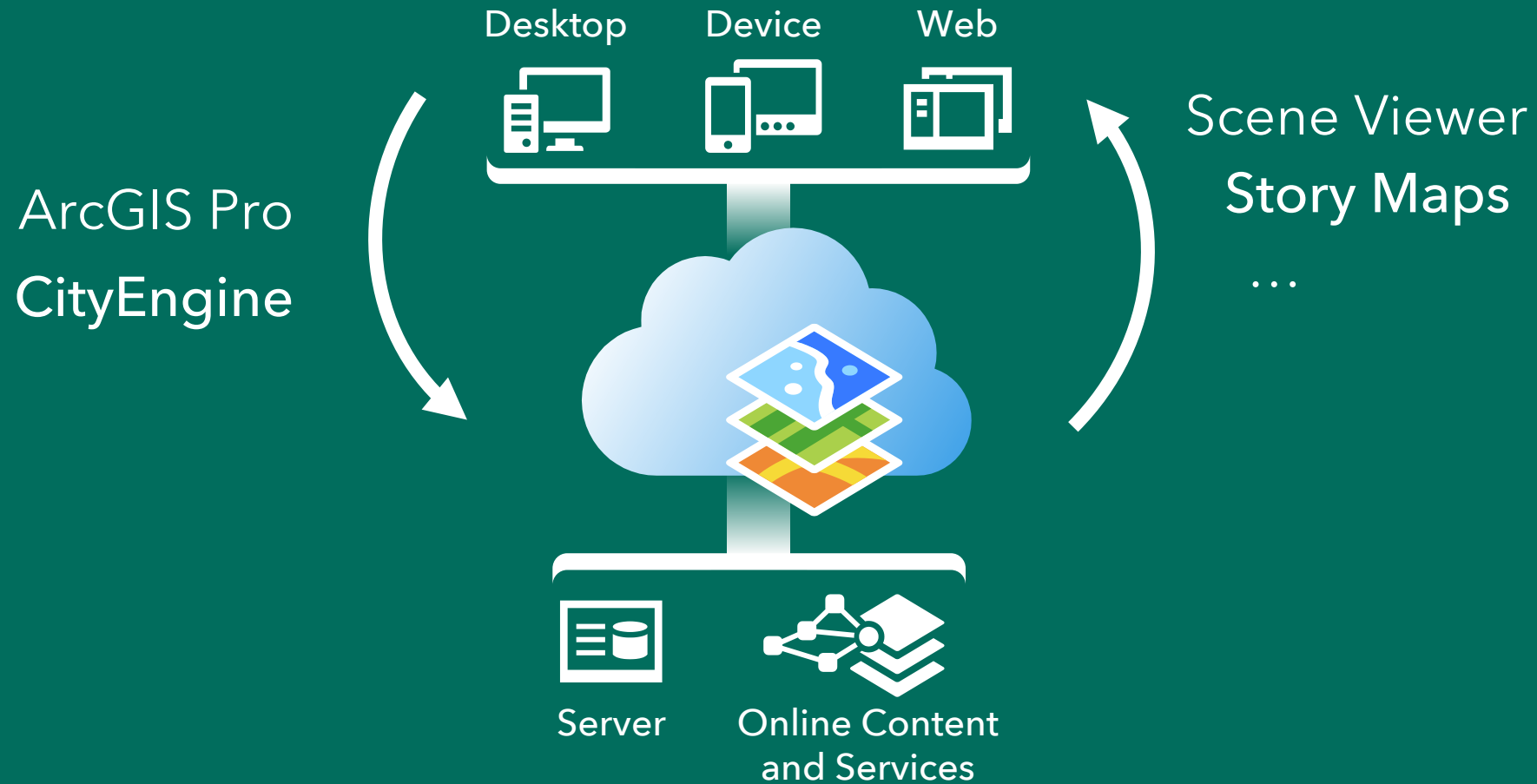


# The ArcGIS Platform

A System for Managing and Applying Geographic Information

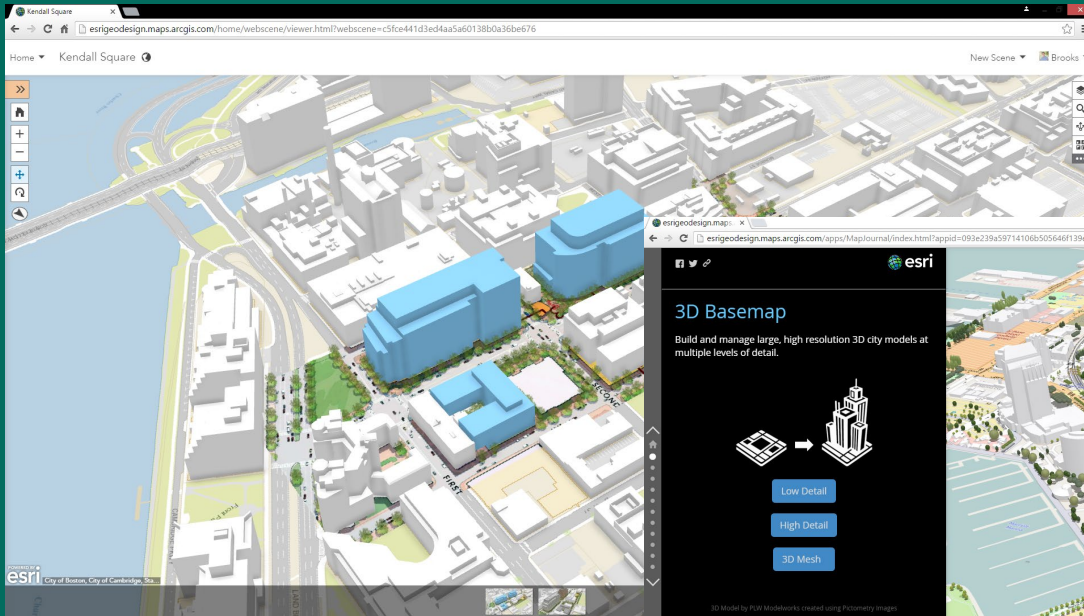


# The ArcGIS Platform - 3D Web Layers

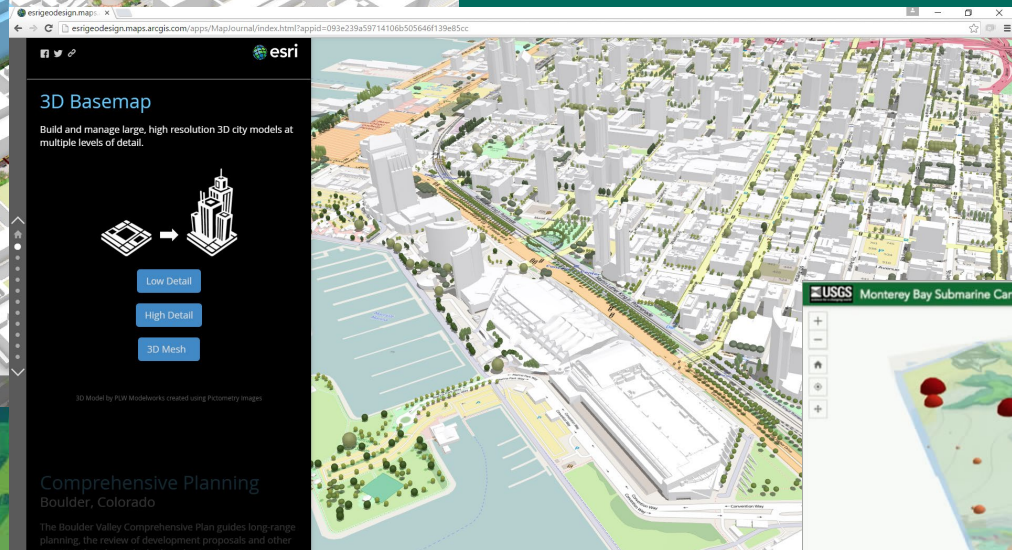




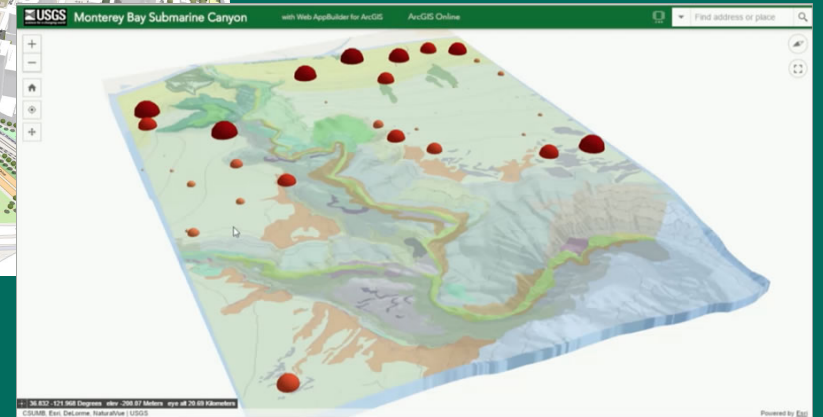
# Esri Provides General-Purpose 3D Web Apps



Scene Viewer

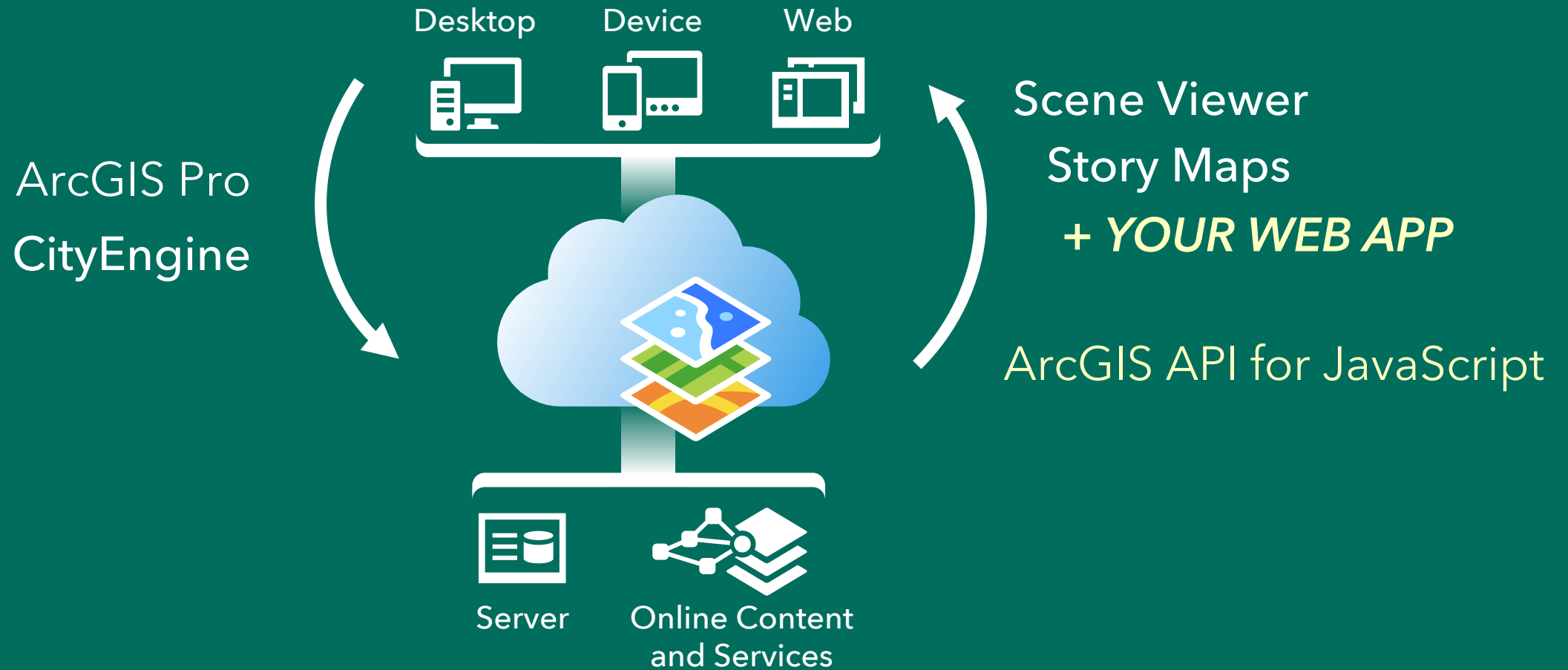


Story Maps

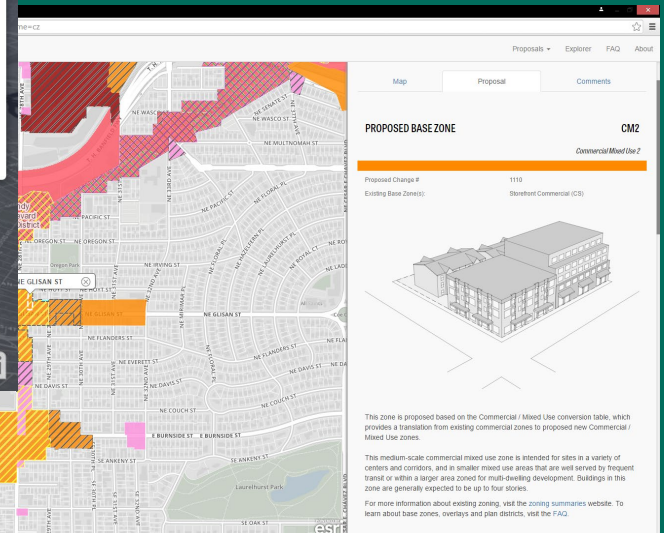
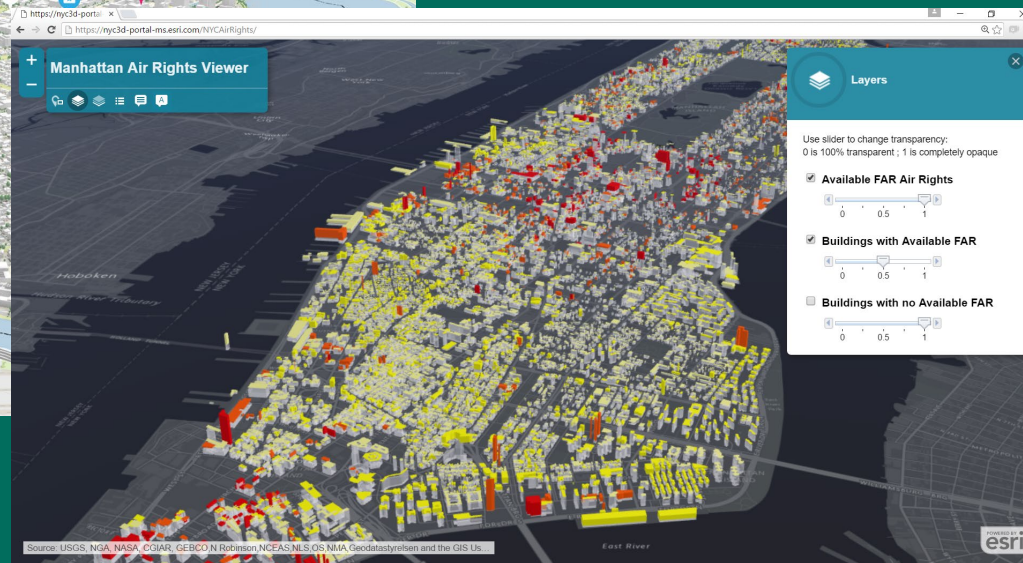
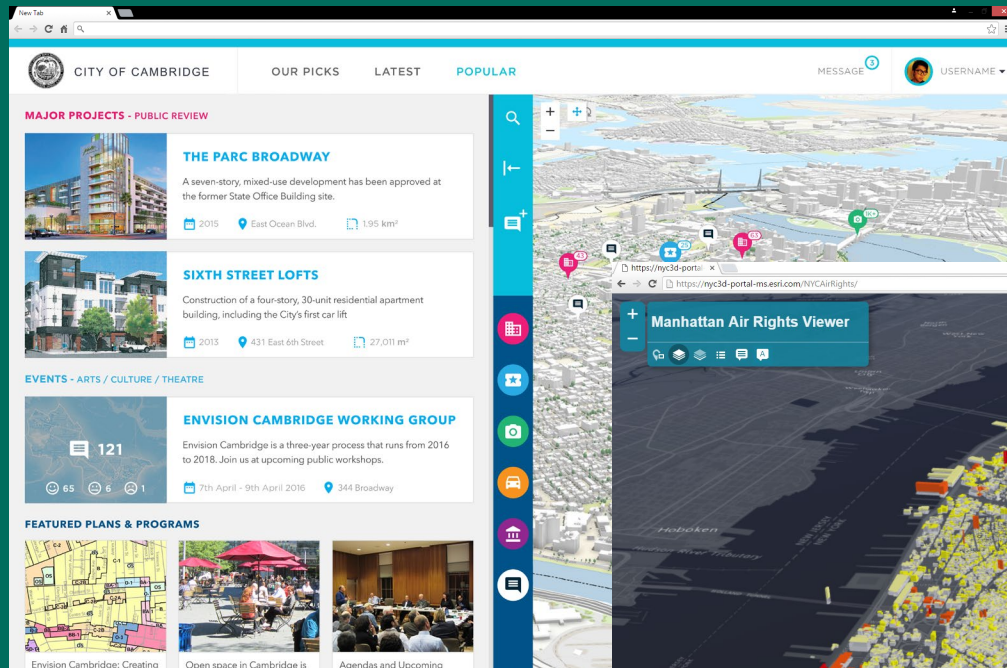


Web AppBuilder ...

# The ArcGIS Platform - 3D Web App Development



# Build Your Own Special-Purpose 3D Web Apps



Add news/social feeds,

filter/reporting functionality,

custom UI elements, etc ...

# 3D API Concepts

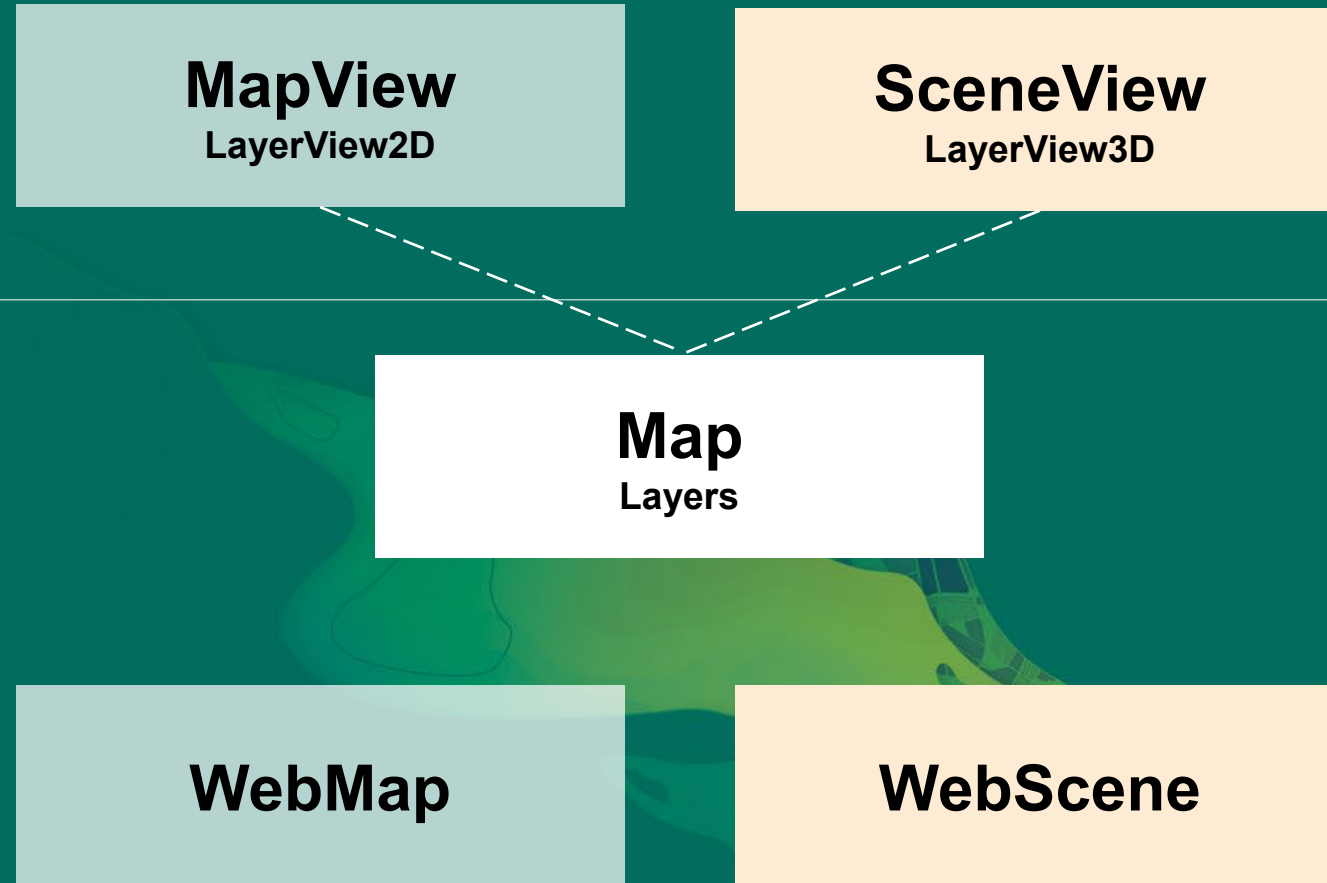
# It all starts with a **Map...** and a **SceneView**

Renders and interacts with the model

## View

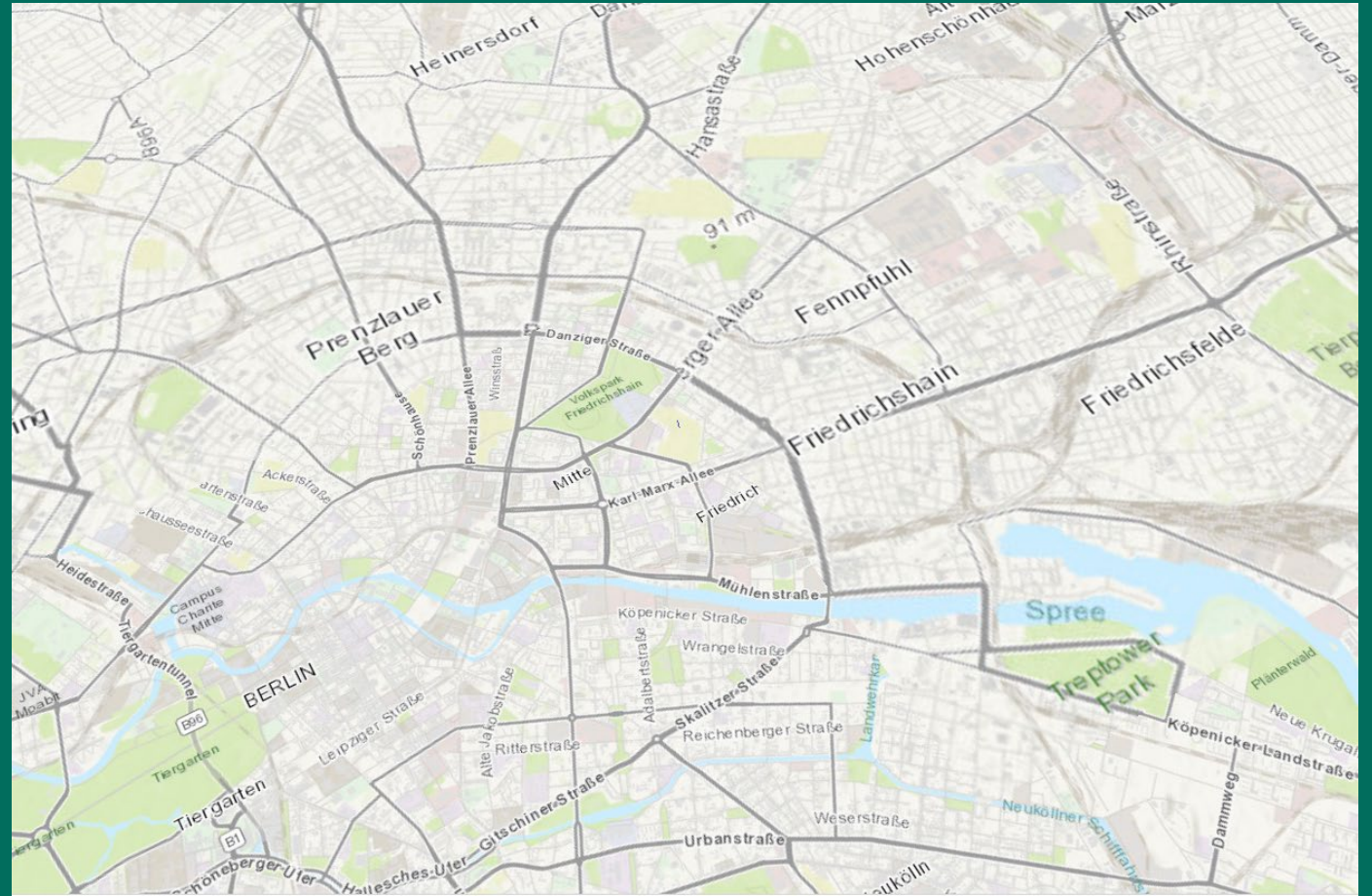
## Model

Describes the content of the map/scene



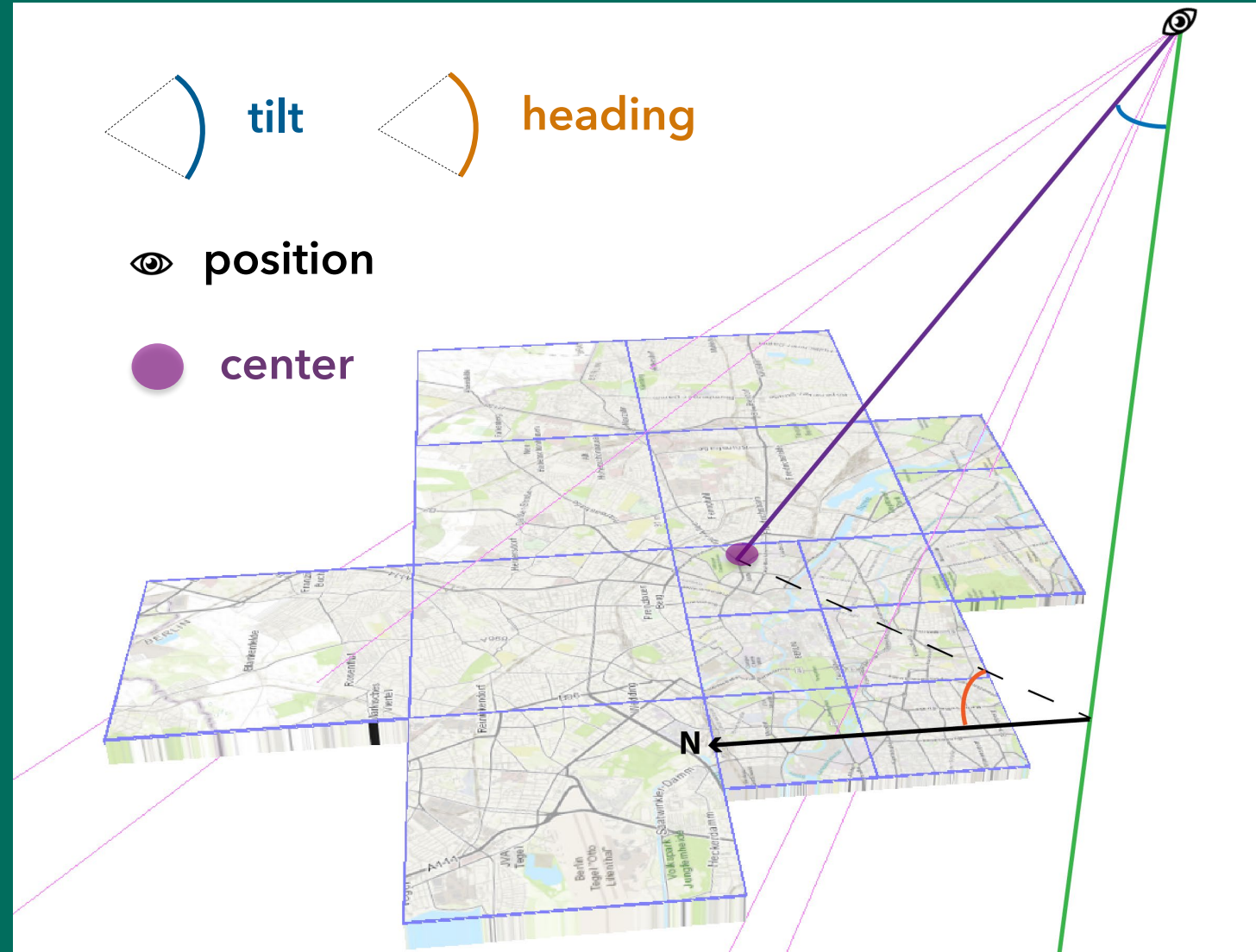
# A SceneView needs a camera

```
const camera = {  
  position: [  
    13.38142953,  
    52.45685745,  
    13104.64594  
  ],  
  heading: 30,  
  tilt: 32.52  
}
```



# A SceneView needs a camera

```
const camera = {  
  position: [  
    13.38142953,  
    52.45685745,  
    13104.64594  
  ],  
  heading: 30,  
  tilt: 32.52  
}
```



# A SceneView can be in global or local **viewingMode**

## Global

- geographic, global extent, spherical



## Local

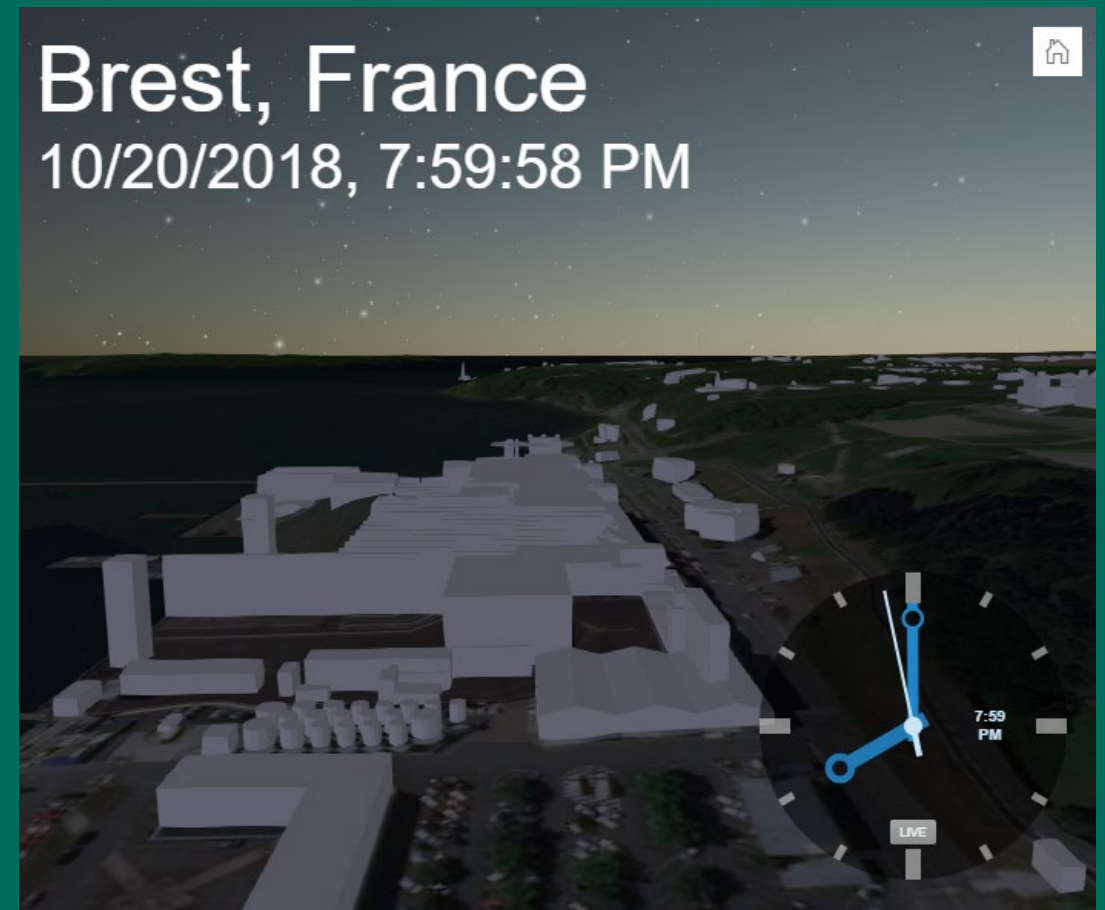
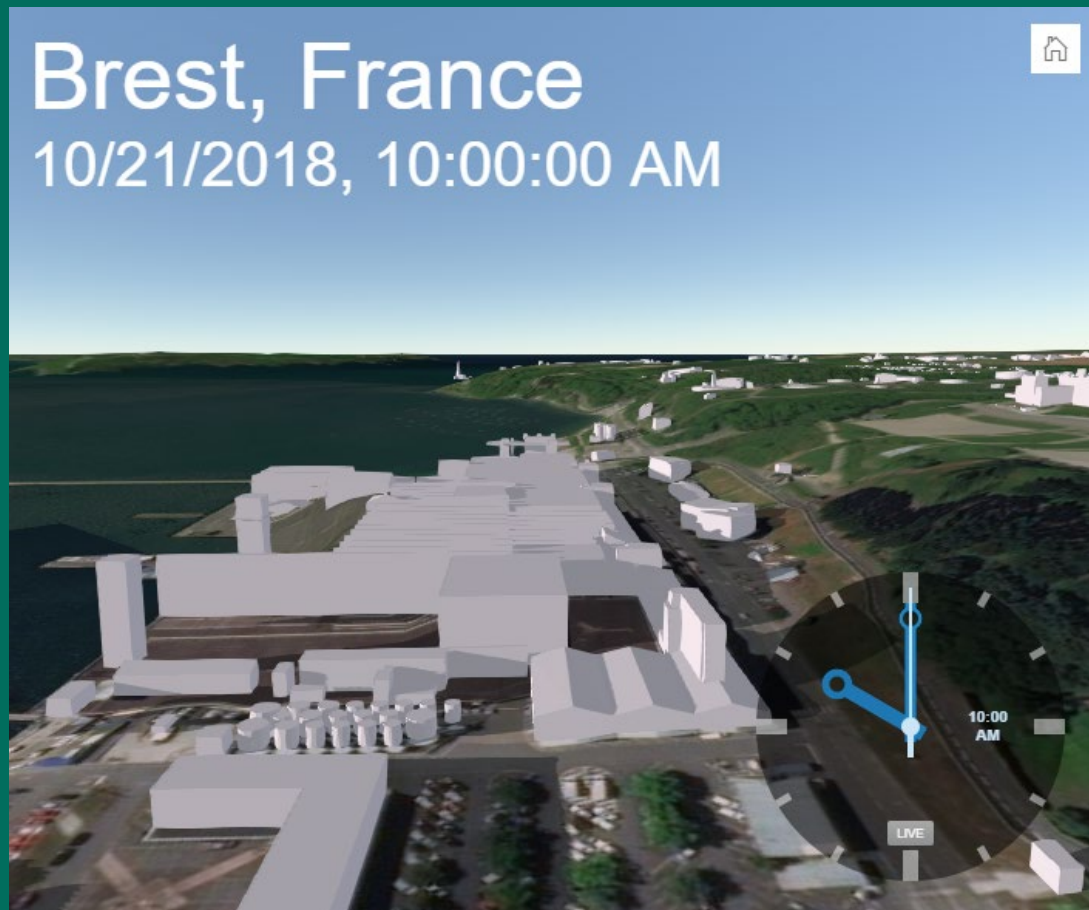
- projected, local extent, planar, clipping



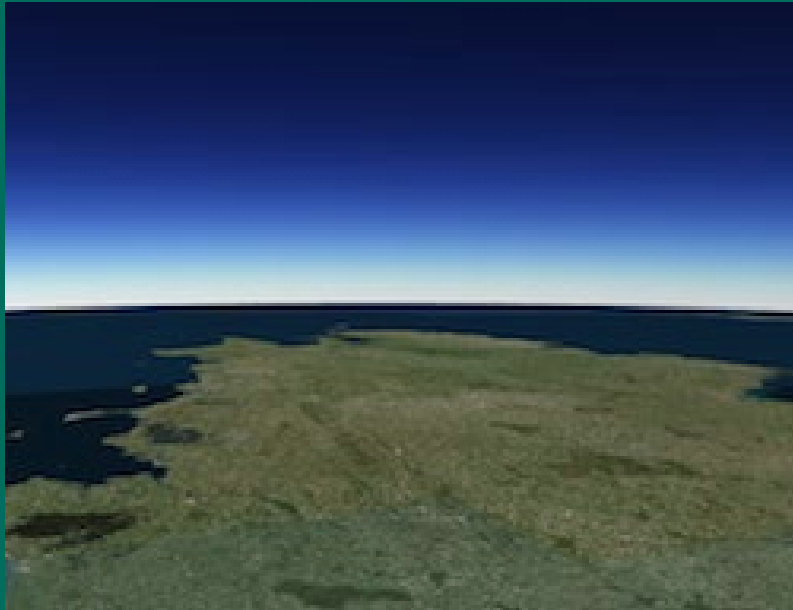


# SceneView has an environment with **lighting** conditions

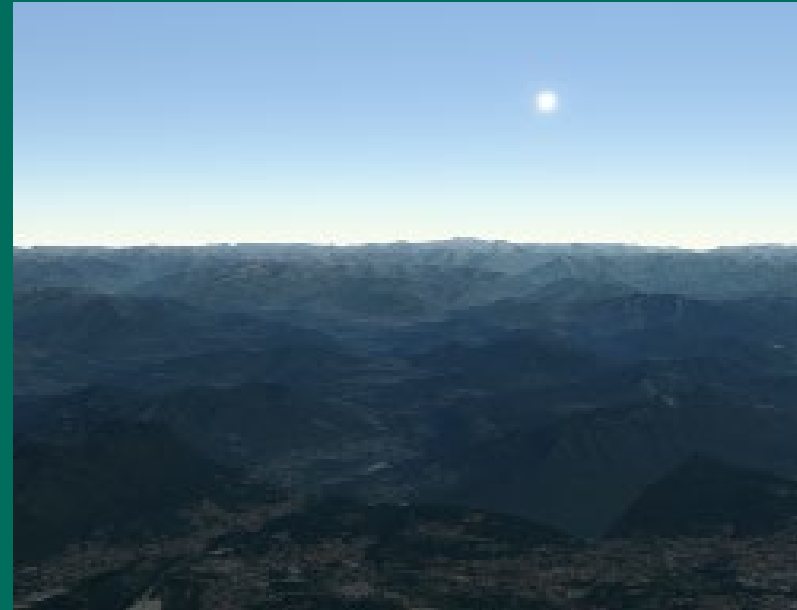
**Lighting** - shadows, date, ambient occlusion



# The **atmosphere** is also part of the environment



Low quality



High quality

# The SceneView environment can have a **background** color

## World's biggest cities

Shanghai seems to be the most populated city in the world with 24 million inhabitants, followed by Beijing with 21 million. On the third place is the city of Delhi with 16 million people.



Powered by Esri

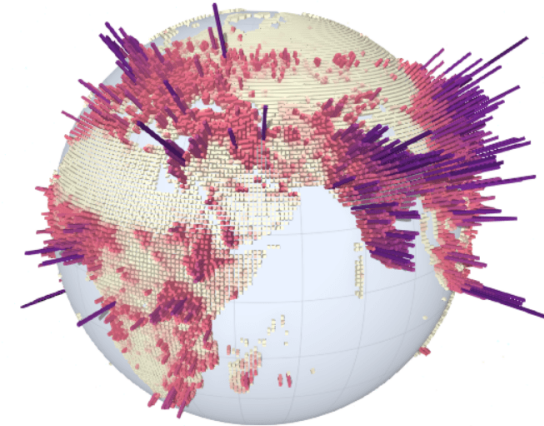
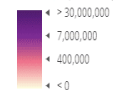
## World population count

2000 | 2005 | 2010 | 2015 | 2020

World population count visualization based on the grid world population dataset by SEDAC. The grid has a resolution of approximately 110km. The height and the color of the bars represent the number of persons per grid unit.



Number of persons/grid unit



Powered by Esri

## World population in 2020

World population count estimate for 2020 as a grid. The grid has a resolution of approximately 110km. Use the slider to filter cells based on the number of persons per grid unit.



Original population raster data from SEDAC. This prototype was built with ArcGIS API for JavaScript. The code for this app is on GitHub.

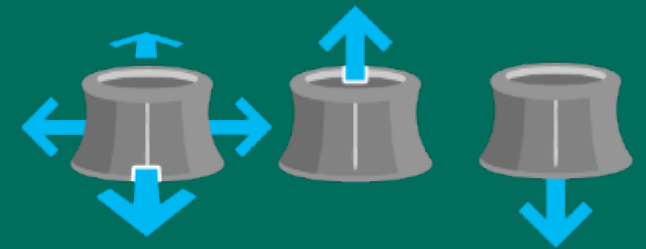
# Navigation in a SceneView

Mouse, keyboard & touch input

New!  GamePad



& 3D mouse



# Layers

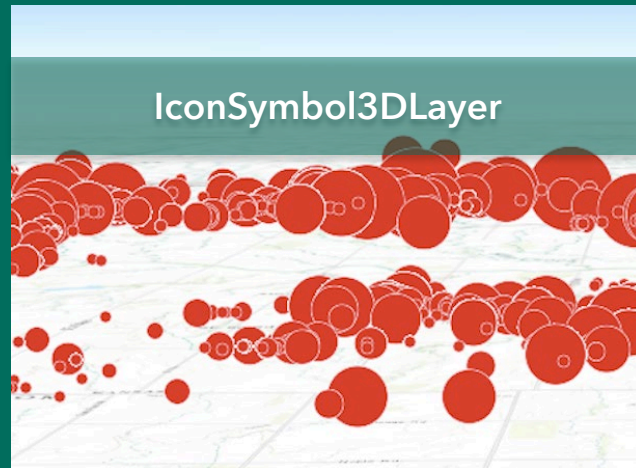
# A SceneView can display vector or raster layers

FeatureLayer	vector
CSVLayer	vector
StreamLayer	vector
MapImageLayer	dynamic
ImageryLayer	dynamic
WMSLayer	dynamic
OpenStreetMapLayer	raster, cached
TileLayer	raster, cached
WebTileLayer	raster, cached
WMTSLayer	raster, cached
VectorTileLayer	vector, cached

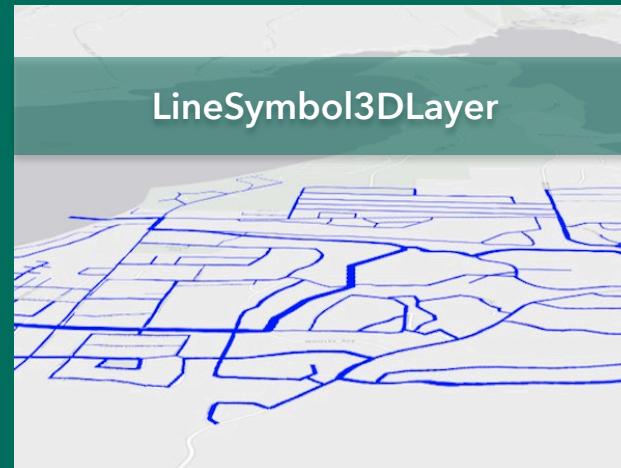


# Symbology

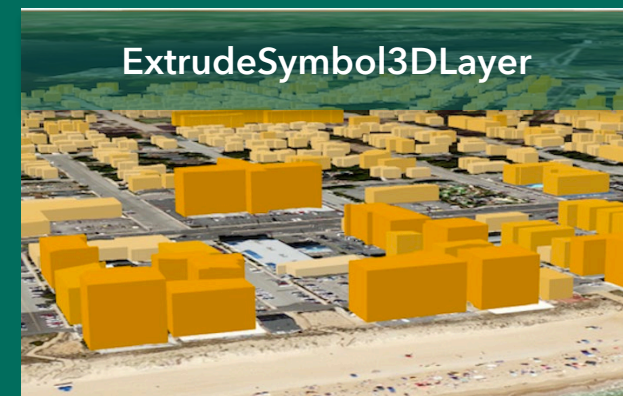
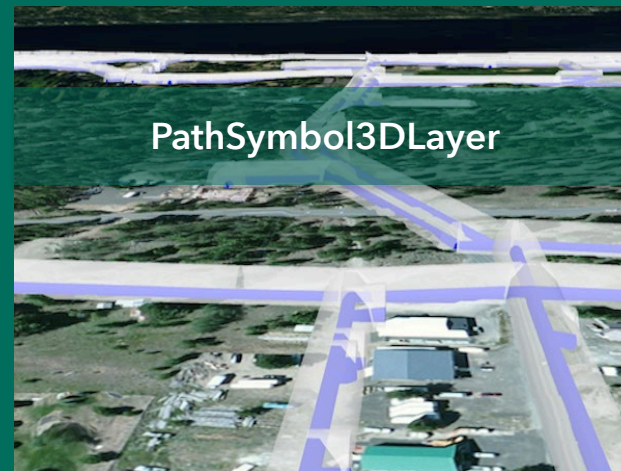
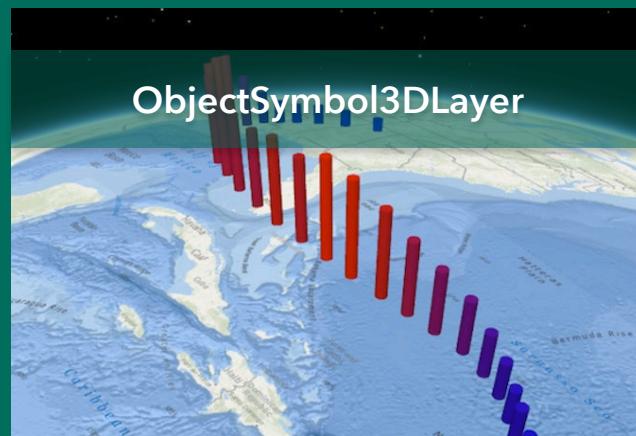
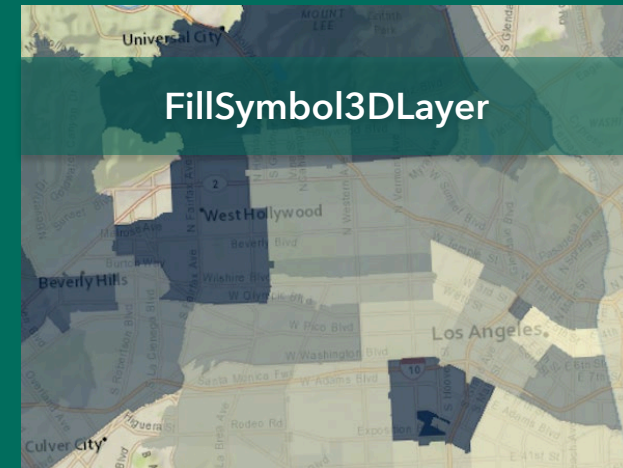
## Point



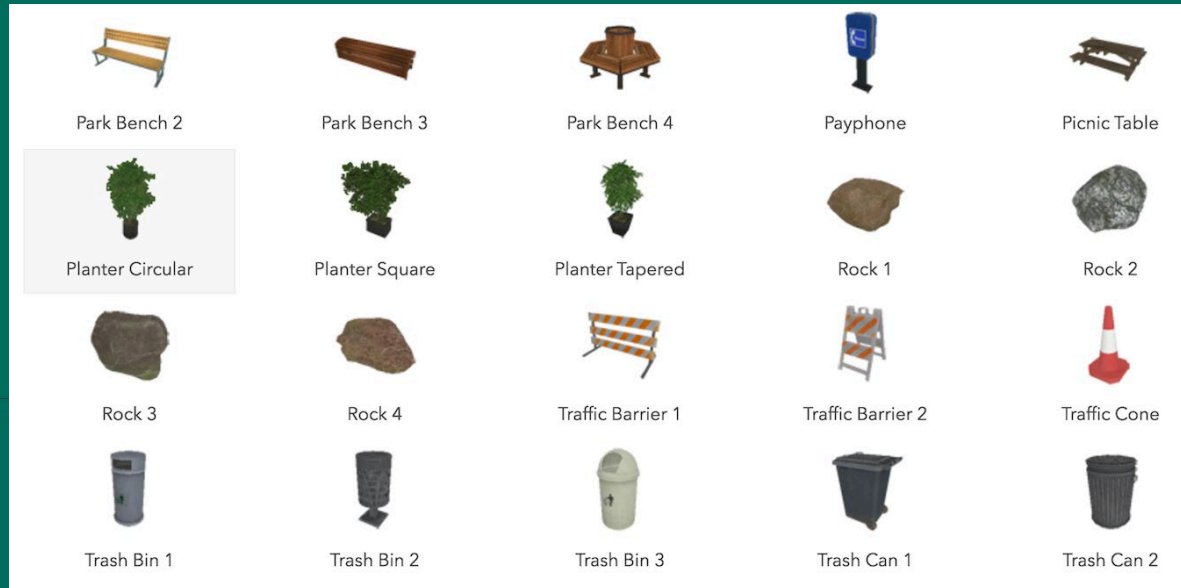
## Line



## Polygon



# Symbology - WebStyleSymbol



```
const webStyleSymbol = new WebStyleSymbol({  
  name: "Traffic_Barrier_1",  
  styleName: "EsriRealisticStreetSceneStyle"  
});
```



# Symbology

layer



renderer



symbol



symbolLayers

```
var layer = new FeatureLayer({
  renderer: new SimpleRenderer({
    symbol: new PointSymbol3D({
      symbolLayers: [new IconSymbol3DLayer({...})]
    })
  }),
  elevationInfo: {
    mode: "relative-to-scene"
  },
  labelingInfo: [{
    symbol: new LabelSymbol3D({
      symbolLayers: [new TextSymbol3DLayer({...})]
    })
  }]
});
```

# Symbology

renderer



symbol

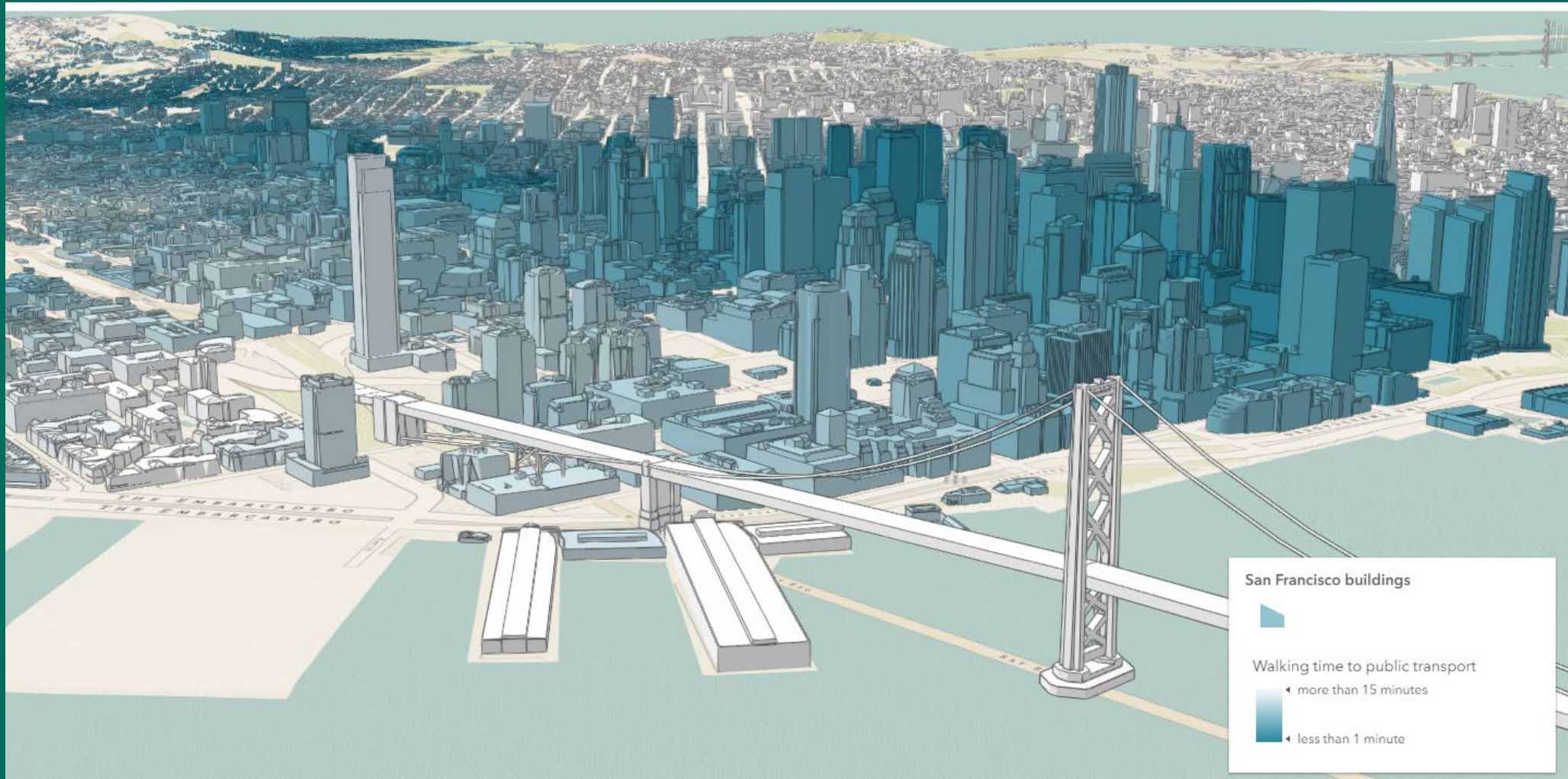
symbolLayers

visualVariables

for numeric continuous visualizations

```
var layer = new FeatureLayer({
  renderer: new SimpleRenderer({
    symbol: new PointSymbol3D({
      symbolLayers: [new IconSymbol3DLayer({...})]
    }),
    visualVariables: [{
      type: "size",
      field: "TOTPOP_CY",
      normalizationField: "SQMI",
      stops: [{
        value: 4000,
        size: 6
      },
      {
        value: 23000,
        size: 40
      }
    ]
  }]
});
```

# A SceneView displays **3D Object SceneLayer**



[See 3DObject SceneLayer sample](#)

## A SceneView displays **Point SceneLayer**



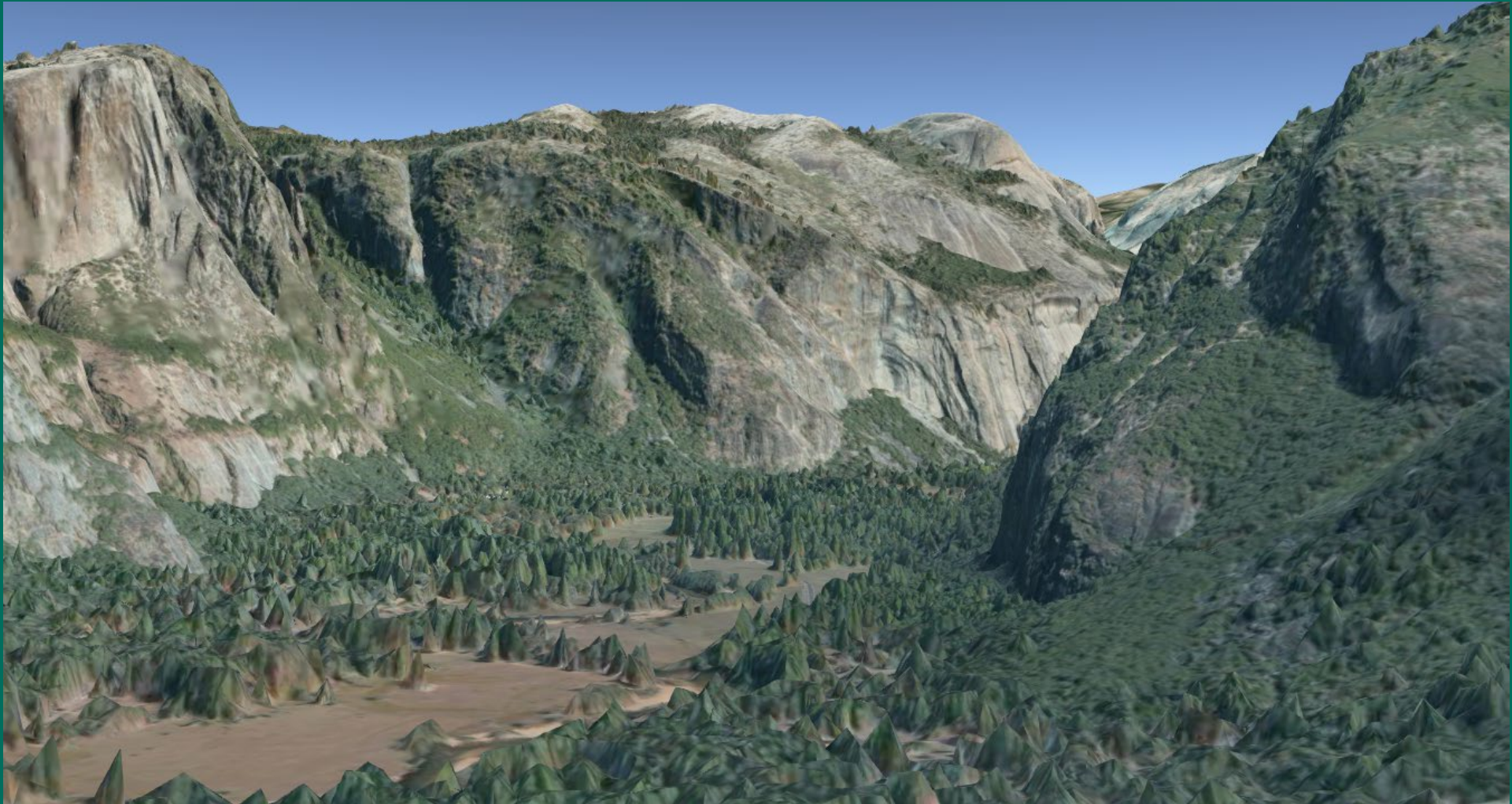
[See Point SceneLayer sample](#)

# A SceneView displays **PointCloudLayer**



[See PointCloudLayer sample](#)

A SceneView displays **IntegratedMeshLayer**



[See IntegratedMeshLayer sample](#)

# A SceneView displays **ElevationLayers**

Elevation difference: 67.36 m

Legend:

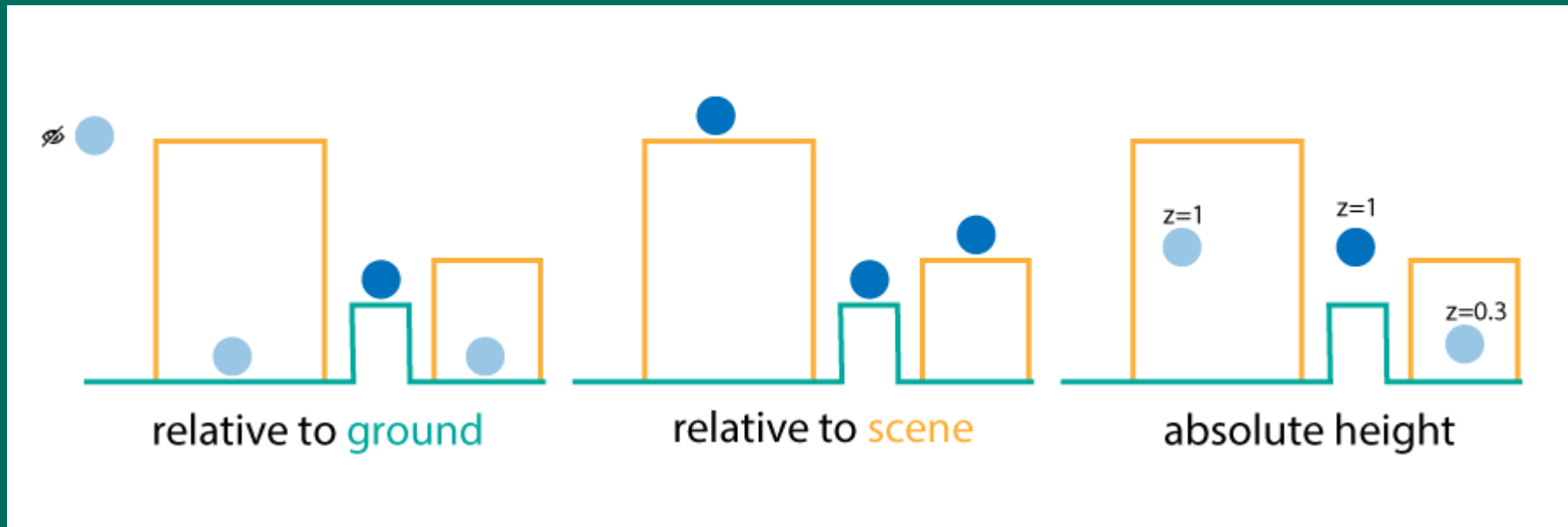
- Surface point before landslide
- Surface point after landslide

Show surface after landslide



[See Elevation query sample](#)

# Elevation modes in 3D



[See Elevation sample](#)





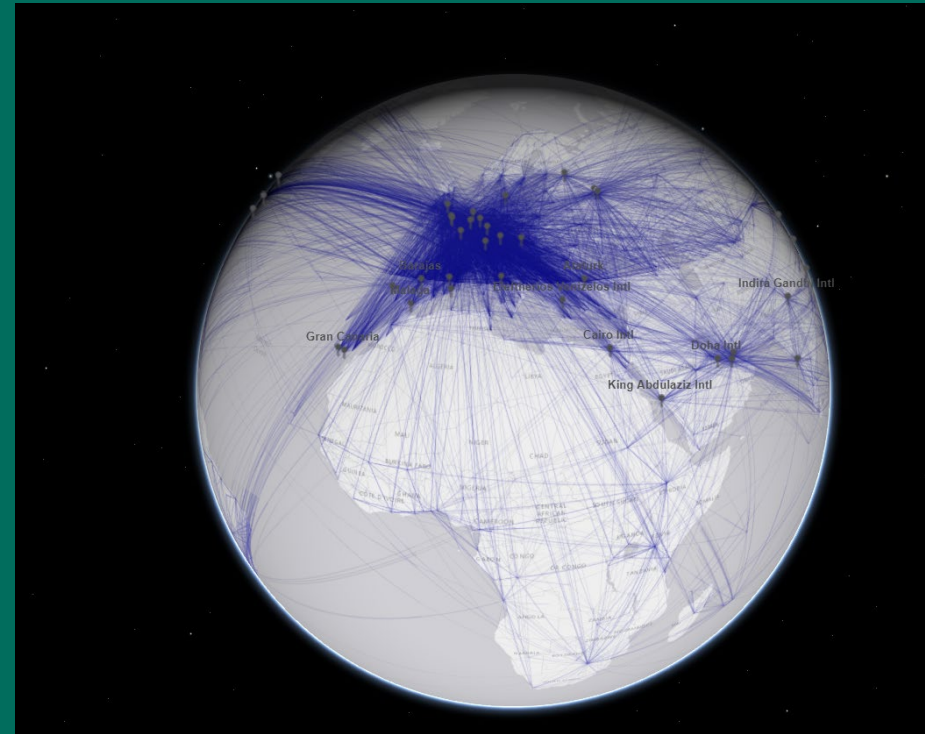
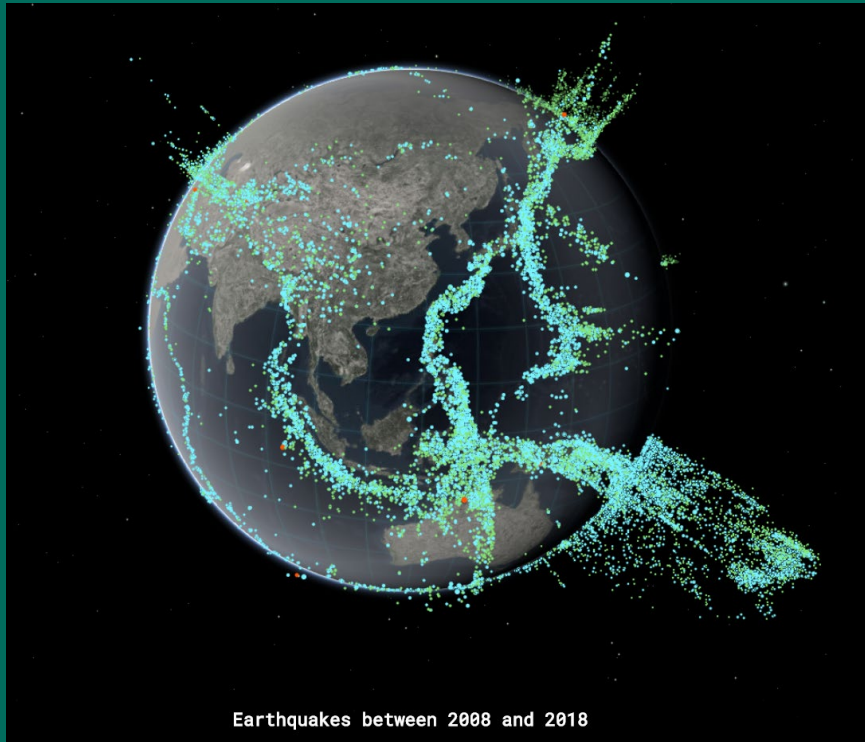
Demo

**What's coming soon**

# Slice widget



# Very large datasets



# Resources

## Useful links and resources

- Link to our presentation
- Developer site - <https://developers.arcgis.com/javascript>
- Building 3D apps with data - [github.com/..](https://github.com/)
- Building a 3D web app - [youtube.com/..](https://youtube.com/)

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