Creating and Maintaining Your 3D Basemap

Brian Sims

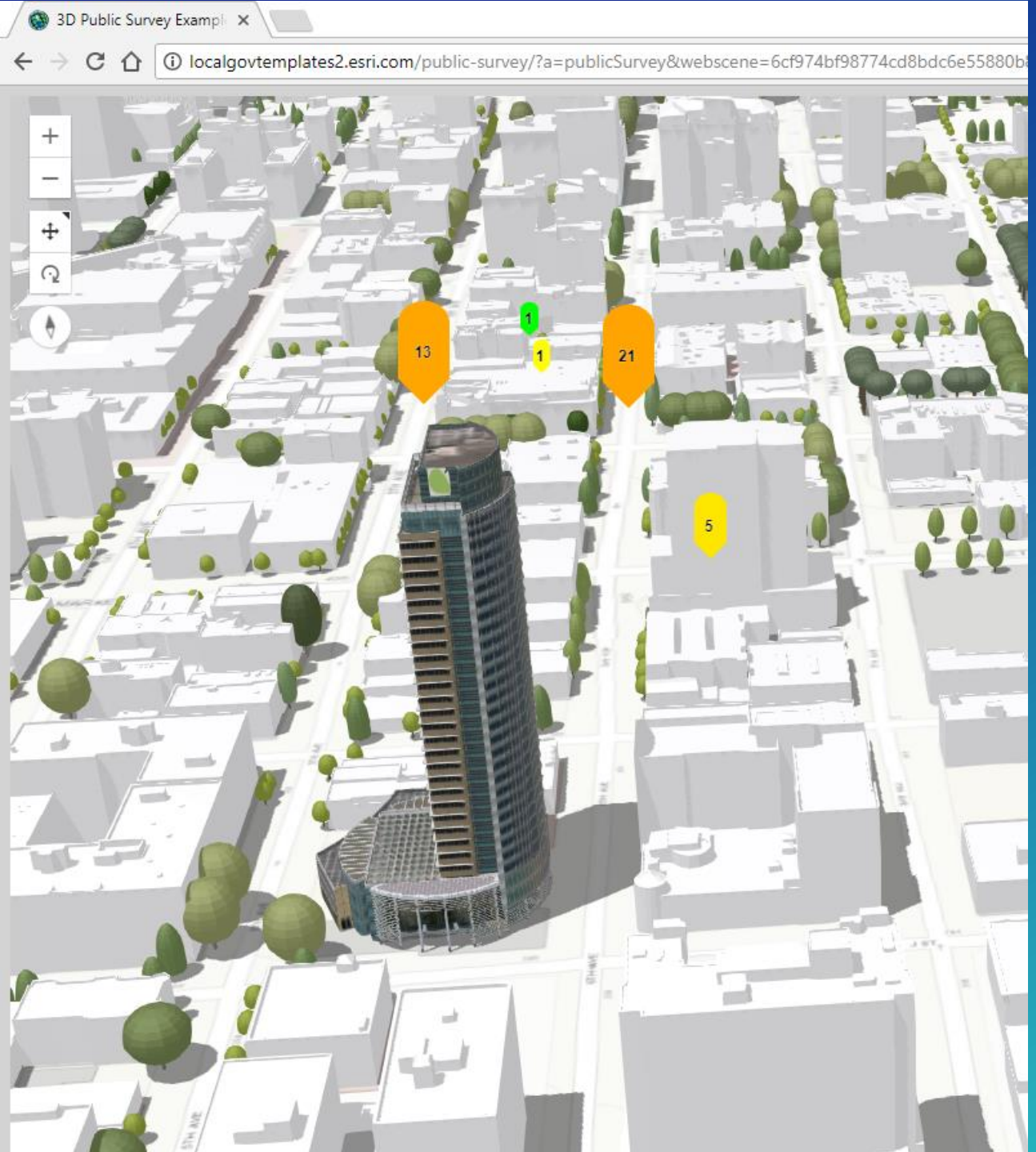
Dan Hedges

Gert van Maren

Complementary Resource Email

(no marketing)

- A copy of the presentation
- Links to today’s web demos
- Links to training materials



Agenda

Why 3D?

What is a 3D Basemap?

Brian Sims | Esri

Creating a 3D Basemap

Dan Hedges | Esri

Maintaining + Sharing Best Practices

Brian Sims | Esri

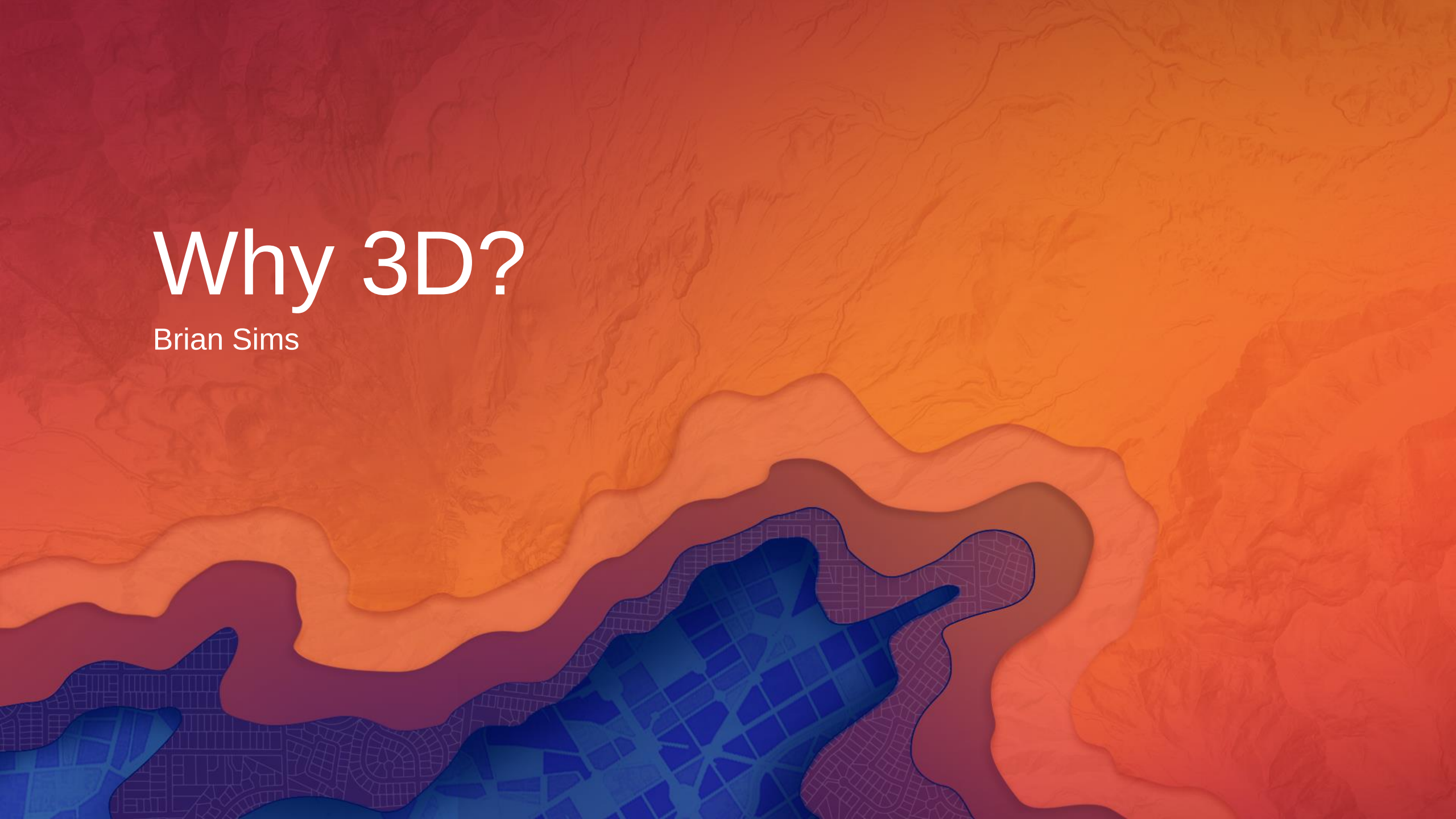
Understanding + Engaging

Gert van Maren | Esri

Q&A

Why 3D?

Brian Sims



Why 3D?

Traditionally we manage our cities like this…

	A	B	C	D	E	F	G	H
1	Region	1990_total	1990_urban	1990_rural	1990_%_urban	1990_%_rural	1980_total	1980_urban
2	UNITED STATES	248,709,873	187,053,487	61,656,386	75.20%	24.80%	226,542,199	167,050,992
3	Northeast Region	50,809,229	40,091,737	10,717,492	78.90%	21.10%	49,136,816	38,905,545
4	New England Division	13,206,943	9,829,175	3,377,768	74.40%	25.60%	12,348,920	9,269,249
5	Maine	1,227,928	547,824	680,104	44.60%	55.40%	1,125,043	534,072
6	New Hampshire	1,109,252	565,670	543,582	51.00%	49.00%	920,610	480,325
7	Vermont	562,758	181,149	381,609	32.20%	67.80%	511,456	172,735
8	Massachusetts	6,016,425	5,069,603	946,822	84.30%	15.70%	5,737,093	4,808,339
9	Rhode Island	1,003,464	863,381	140,083	86.00%	14.00%	947,154	824,004
10	Connecticut	3,287,116	2,601,548	685,568	79.10%	20.90%	3,107,564	2,449,774
11	Middle Atlantic Division	37,602,286	30,262,562	7,339,724	80.50%	19.50%	36,787,896	29,636,296
12	New York	17,990,455	15,164,047	2,826,408	84.30%	15.70%	17,558,165	14,858,068
13	New Jersey	7,730,188	6,910,220	819,968	89.40%	10.60%	7,365,011	6,557,377
14	Pennsylvania	11,881,643	8,188,295	3,693,348	68.90%	31.10%	11,864,720	8,220,851
15	Midwest Region	59,668,632	42,774,196	16,894,436	71.70%	28.30%	58,866,998	41,519,748
16	East North Central Division	42,008,942	31,073,858	10,935,084	74.00%	26.00%	41,682,908	30,533,879
17	Ohio	10,847,115	8,039,409	2,807,706	74.10%	25.90%	10,797,603	7,918,259
18	Indiana	5,544,159	3,598,099	1,946,060	64.90%	35.10%	5,490,210	3,525,298
19	Illinois	11,430,602	9,668,552	1,762,050	84.60%	15.40%	11,427,409	9,518,039
20	Michigan	9,295,297	6,555,842	2,739,455	70.50%	29.50%	9,262,044	6,551,551
21	Wisconsin	4,891,769	3,211,956	1,679,813	65.70%	34.30%	4,705,642	3,020,732
22	West North Central Division	17,659,690	11,700,338	5,959,352	66.30%	33.70%	17,184,090	10,985,867
23	Minnesota	4,375,099	3,056,474	1,318,625	69.90%	30.10%	4,075,970	2,725,202
24	Iowa	2,776,755	1,683,065	1,093,690	60.60%	39.40%	2,913,808	1,708,232

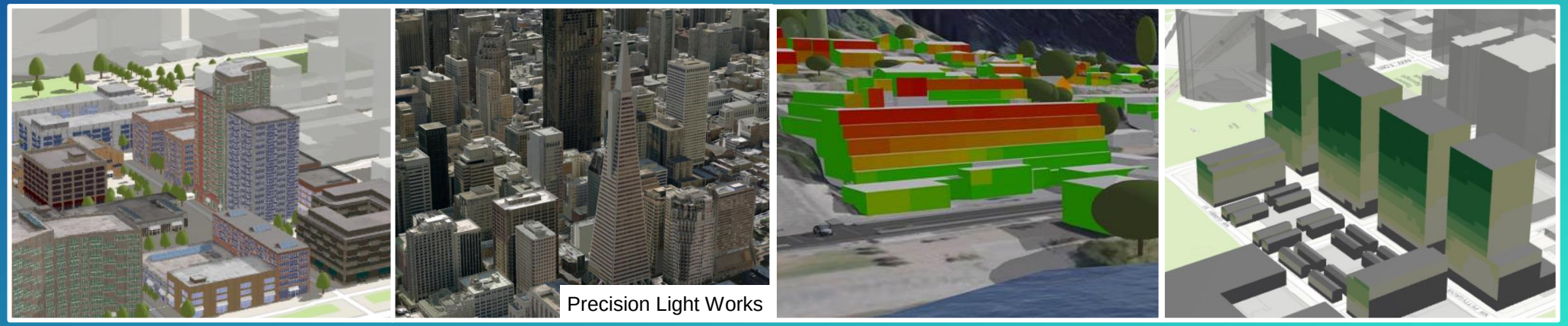
Why 3D?

Yet cities look like this

Why 3D?

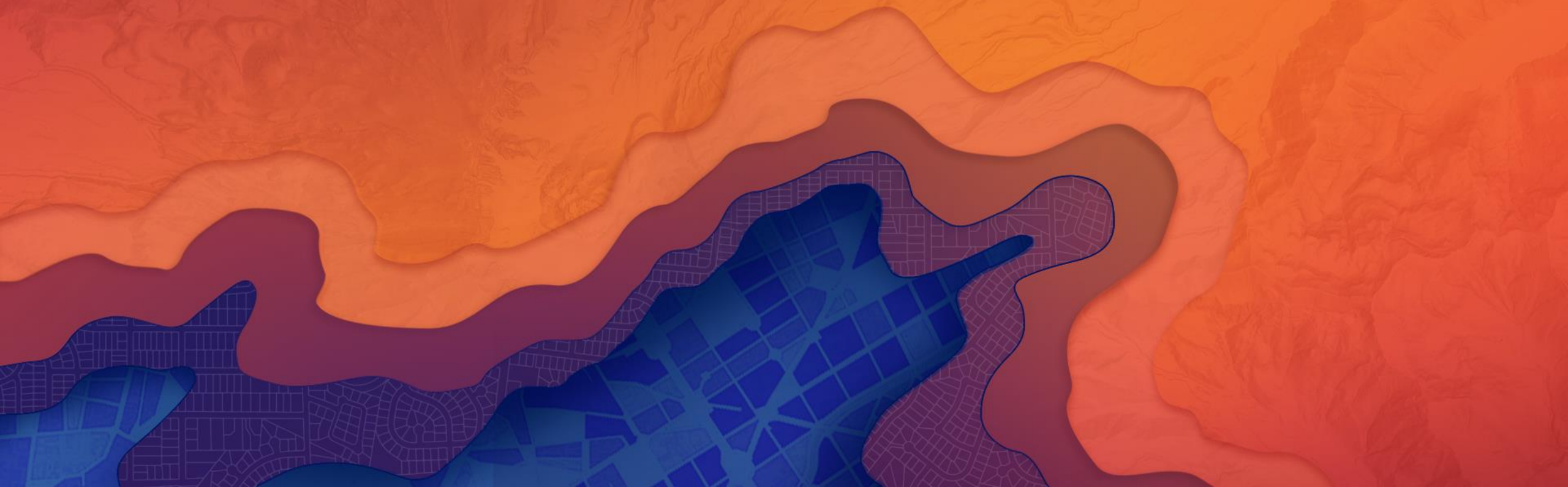
Across all industries ArcGIS users are going 3D to:

- Visualize within the context of the real world
- Present with more realism and remove interpretation
- Communicate with non-technical audiences
- **Drive more informed decisions faster**



What is a 3D Basemap?

Brian Sims

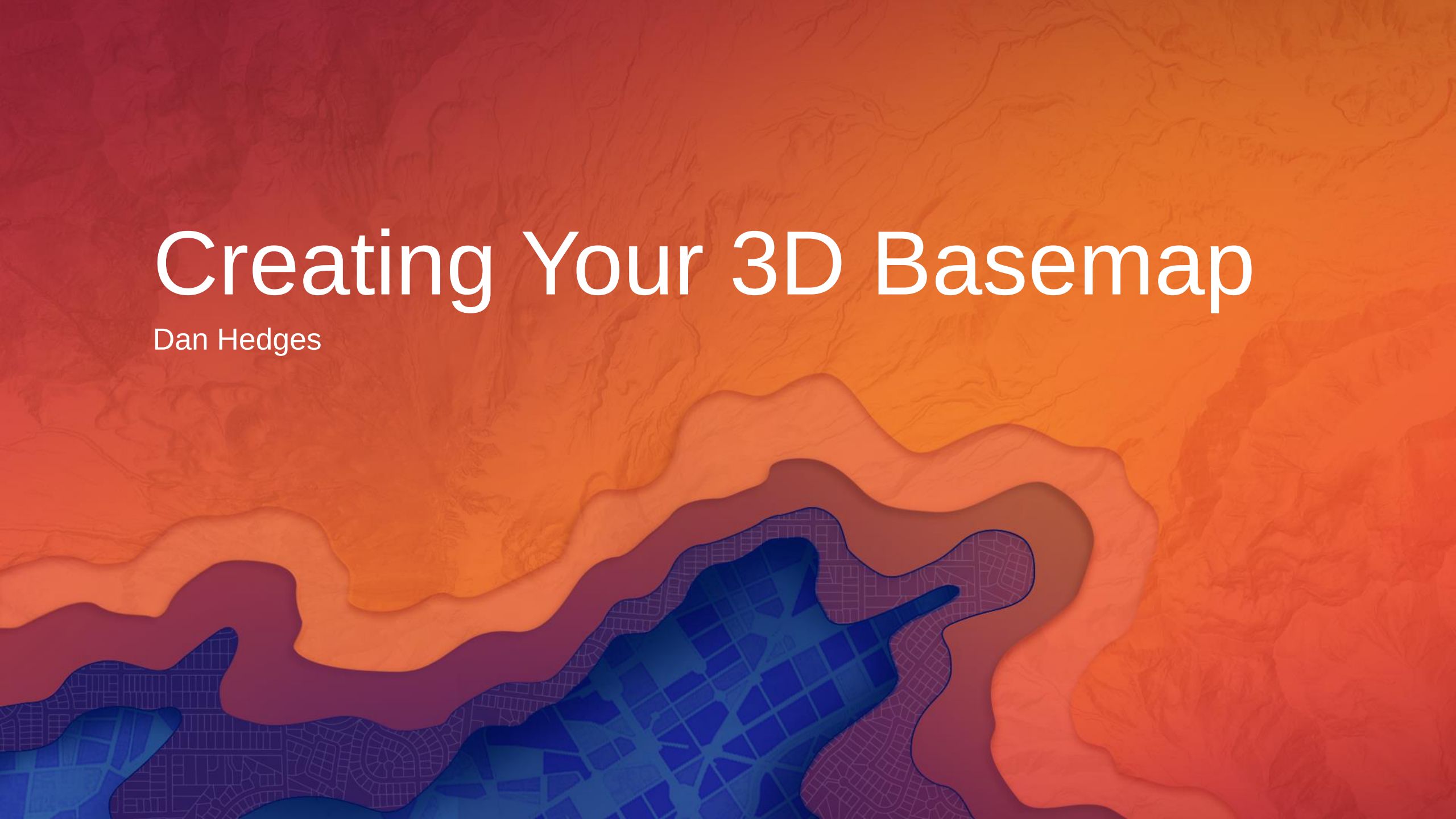


What is a 3D Basemap?

- **3D Buildings**
- **Trees**
- **Water Bodies**
- **Basemap**
- **Terrain**

Creating Your 3D Basemap

Dan Hedges



Local Government 3D Basemap Solution

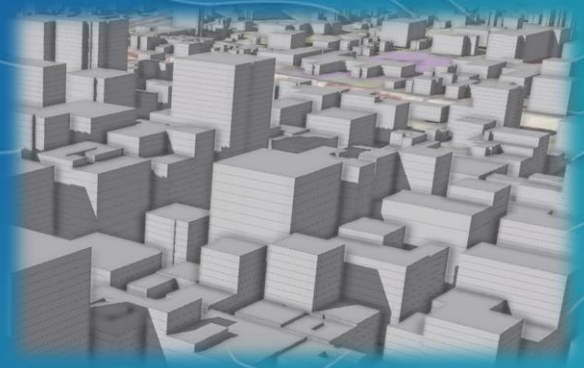
Lidar
(minimum ground classified)

Building Footprints

Elevation, Roof and Tree Parameter Extraction

Local Government Information Model

Procedural Rules



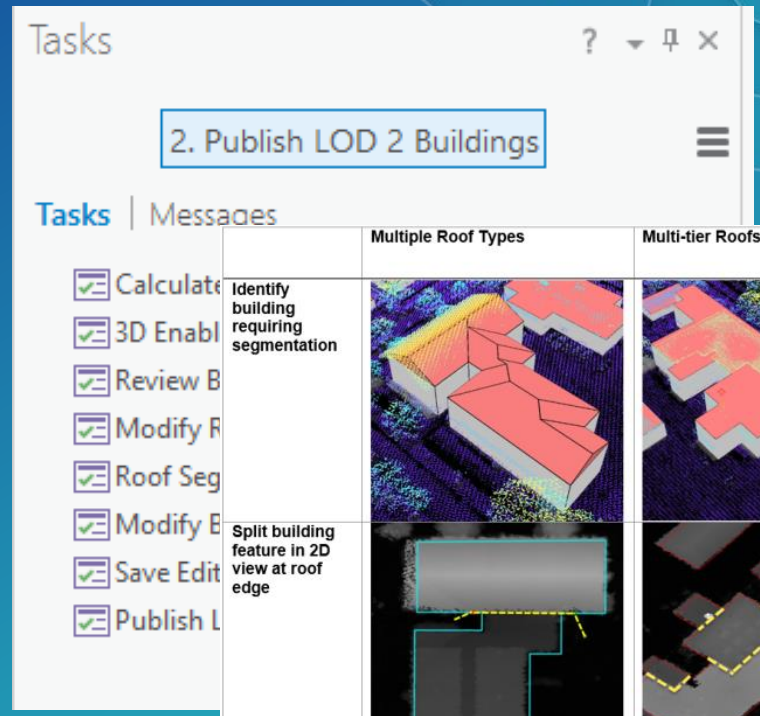
Basic Scene

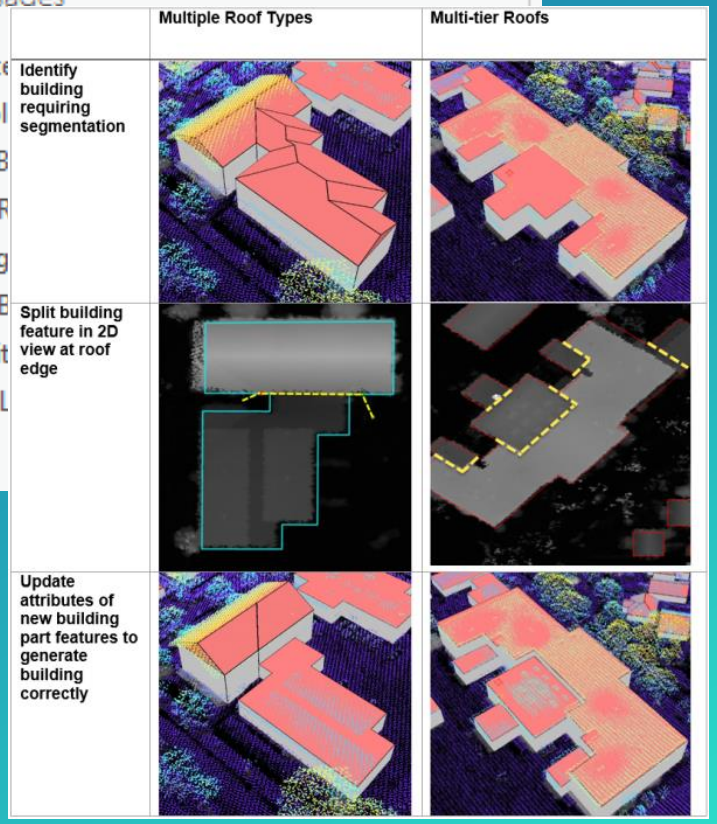
Schematic Scene

Realistic Scene

Local Government 3D Basemap Solution

- Task-based workflows
  - Documentation in tasks and online
- Semi-automatic generation
  - Automatic extraction of main roof form and trees
  - Procedural representation
  - Confidence measurement
  - Manual clean-up for complex roofs
- Quality depends on building footprint accuracy and Lidar point density
  - > 3 feet point spacing → LOD1 buildings
  - < 3 feet point spacing → LOD2 buildings





Roof-Form Extraction for Procedural Building Modeling

- Extract information about roof shape and height from lidar-derived surfaces
- Symbolize buildings in 3D using procedural rules
- Review output against LAS dataset

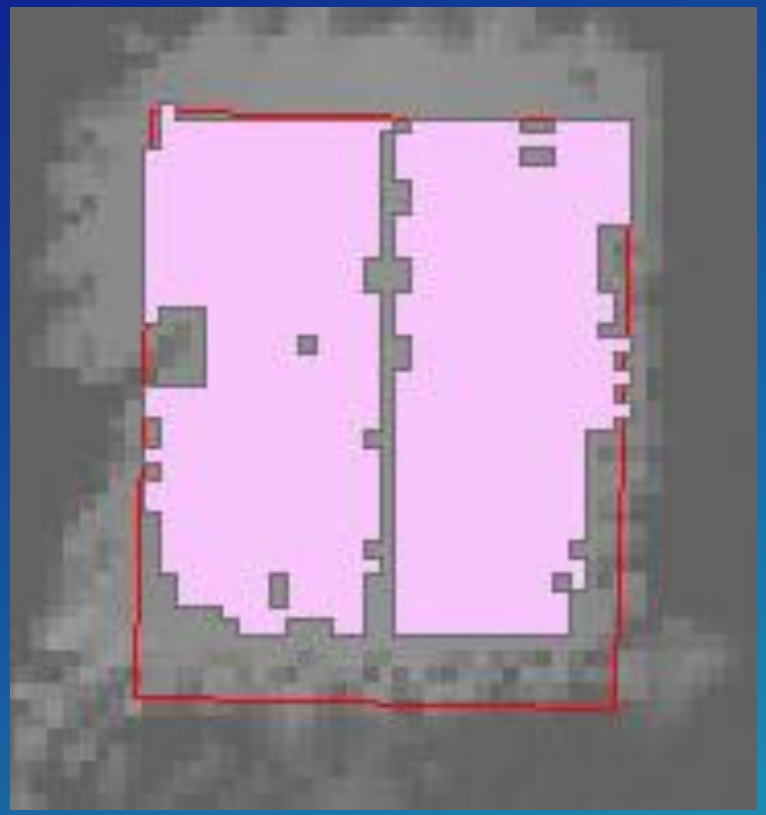
Automated Roof-Form Extraction for Schematic Buildings

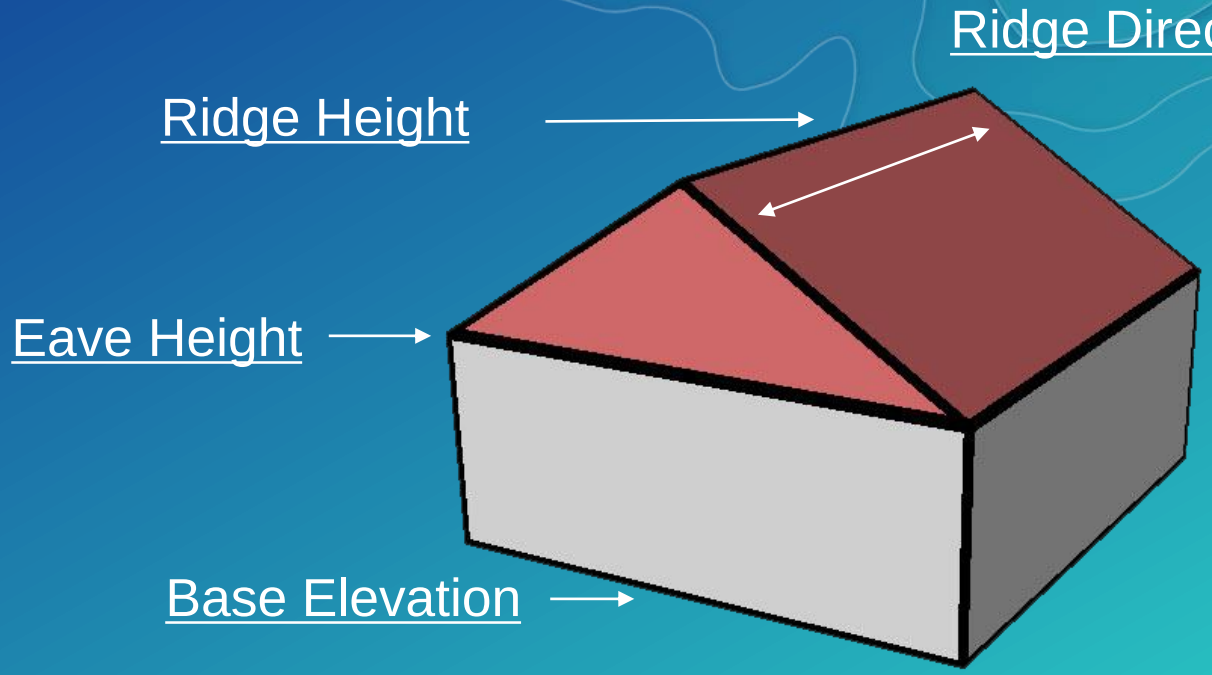
- Classify areas of like slope & aspect in DSM

- Create roof-plane polygons

- Extract attributes

Procedural Modeling

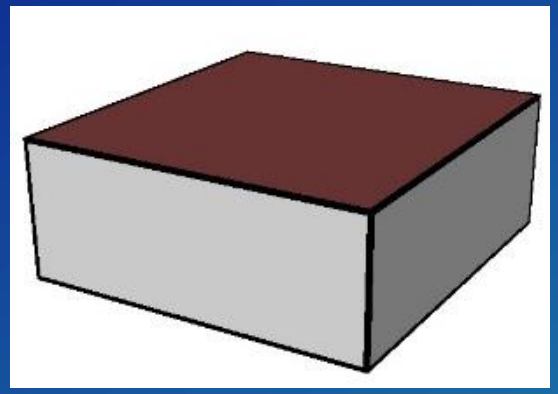




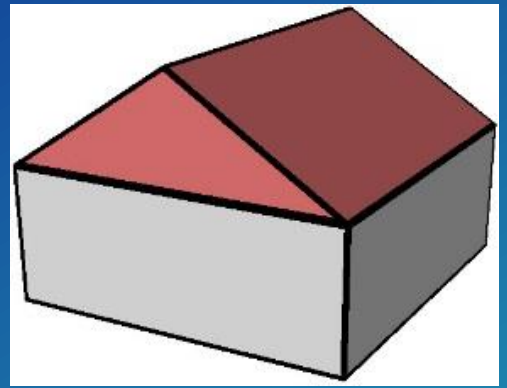
Roof Form: Gable

Procedural Modeling

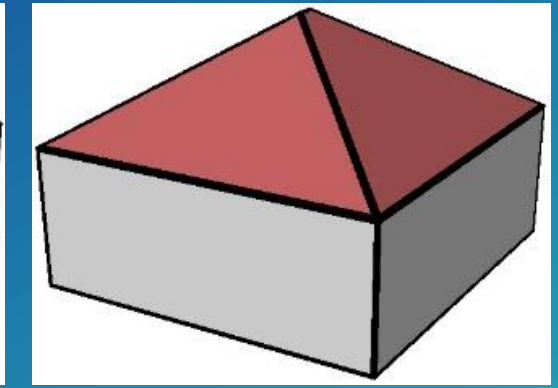
- Roof types automatically classified



Flat



Gable

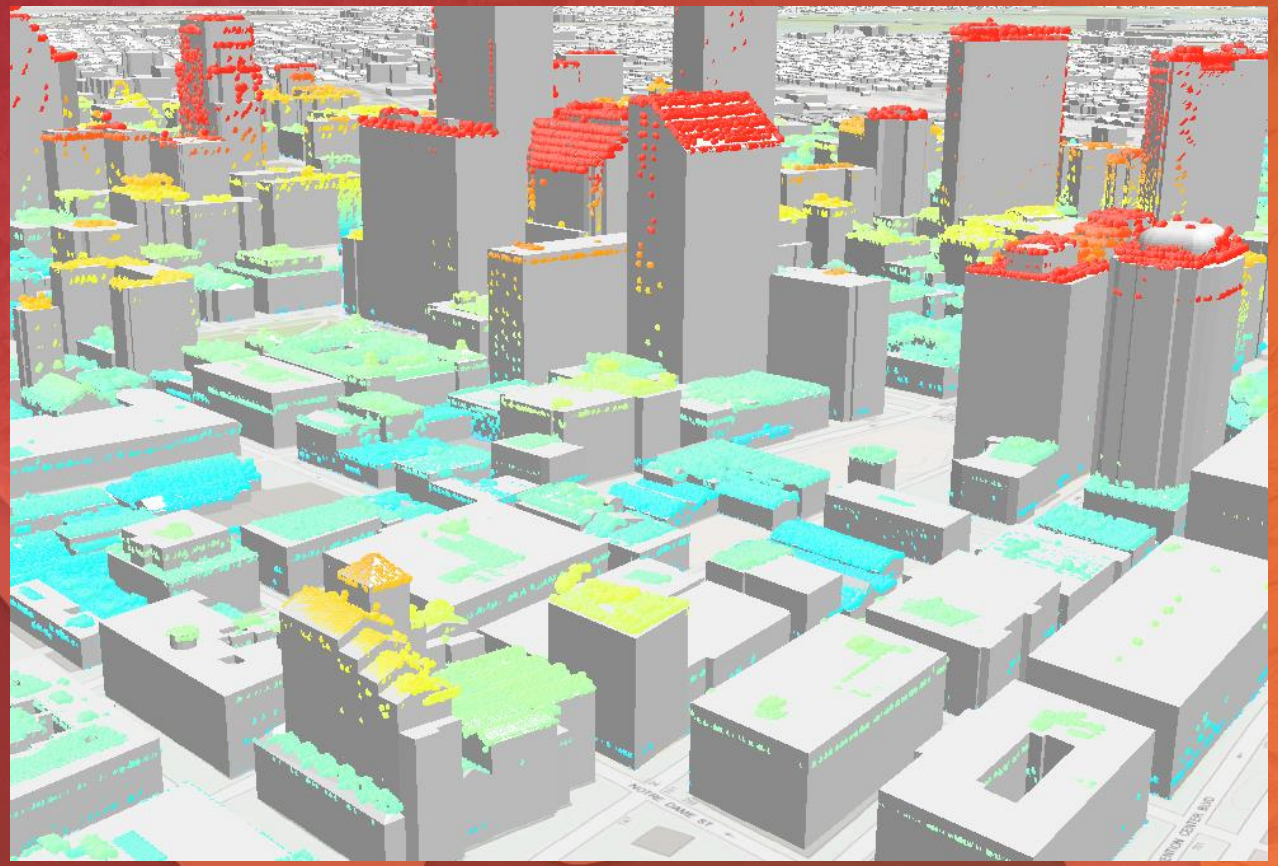


Hip

- Other types supported:
  - Shed
  - Dome
  - Vault
  - Mansard

Reviewing Output

- Prioritize review based on confidence metrics
- Compare procedural symbols directly against lidar
  - Manual changes update on-the-fly

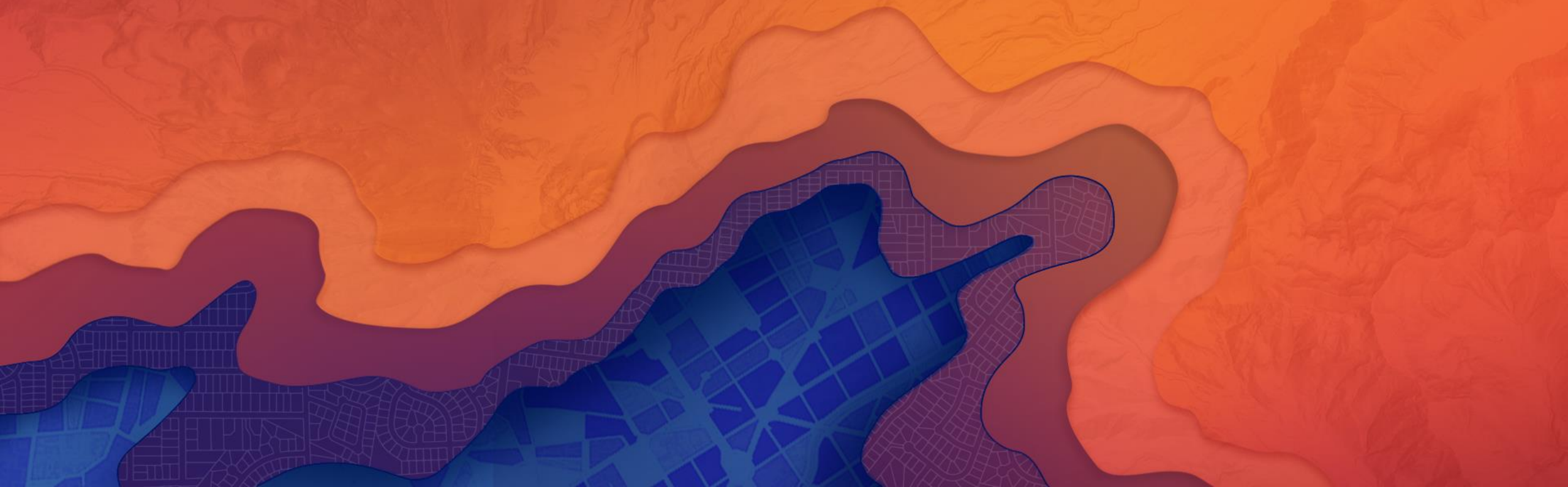


Demo: 3D Basemap Creation

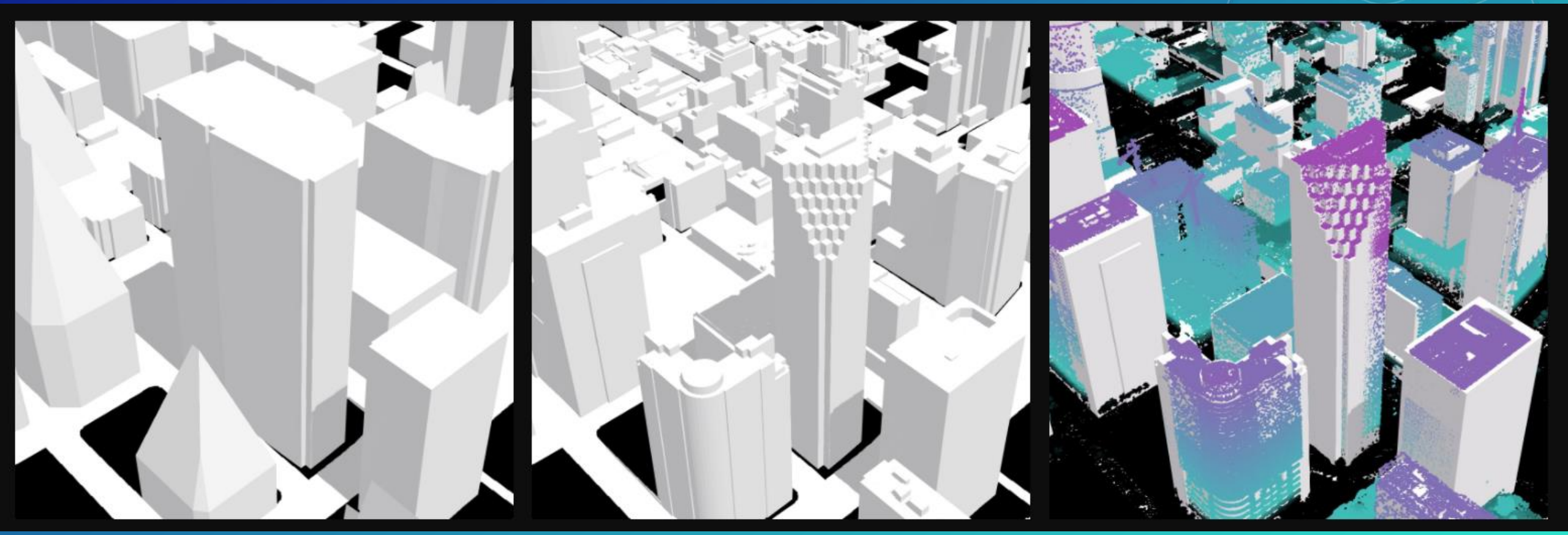
In ArcGIS Pro

Maintaining + Sharing Your 3D Basemap

Brian Sims



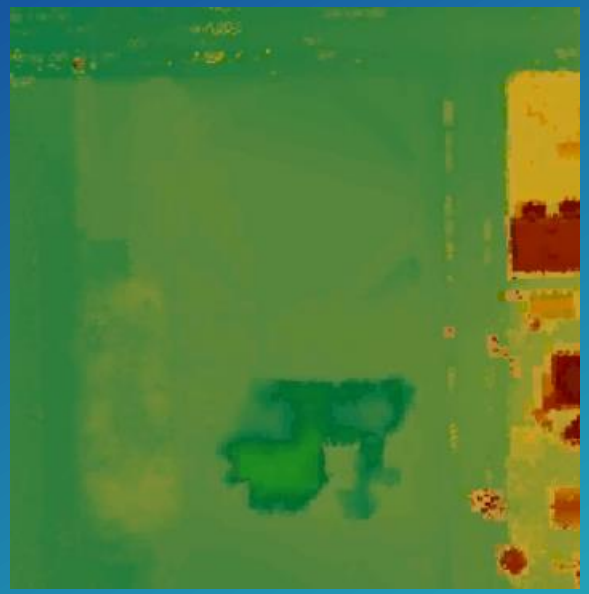
Maintaining + Sharing Your 3D Basemap



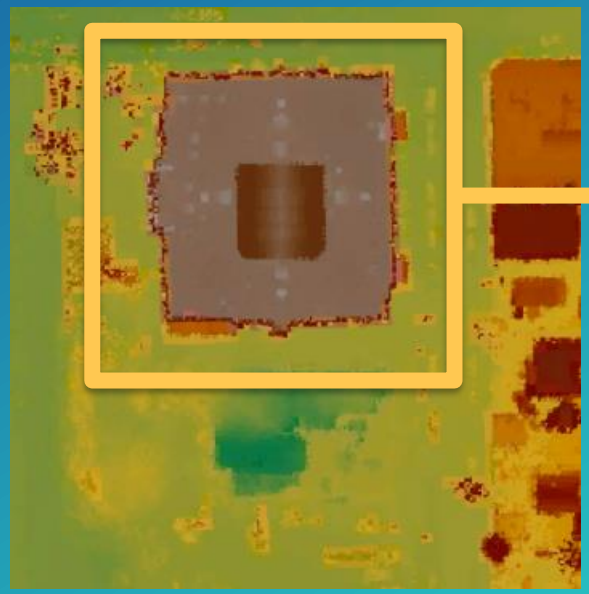
Maintaining + Sharing Your 3D Basemap

Best Practices

First Capture



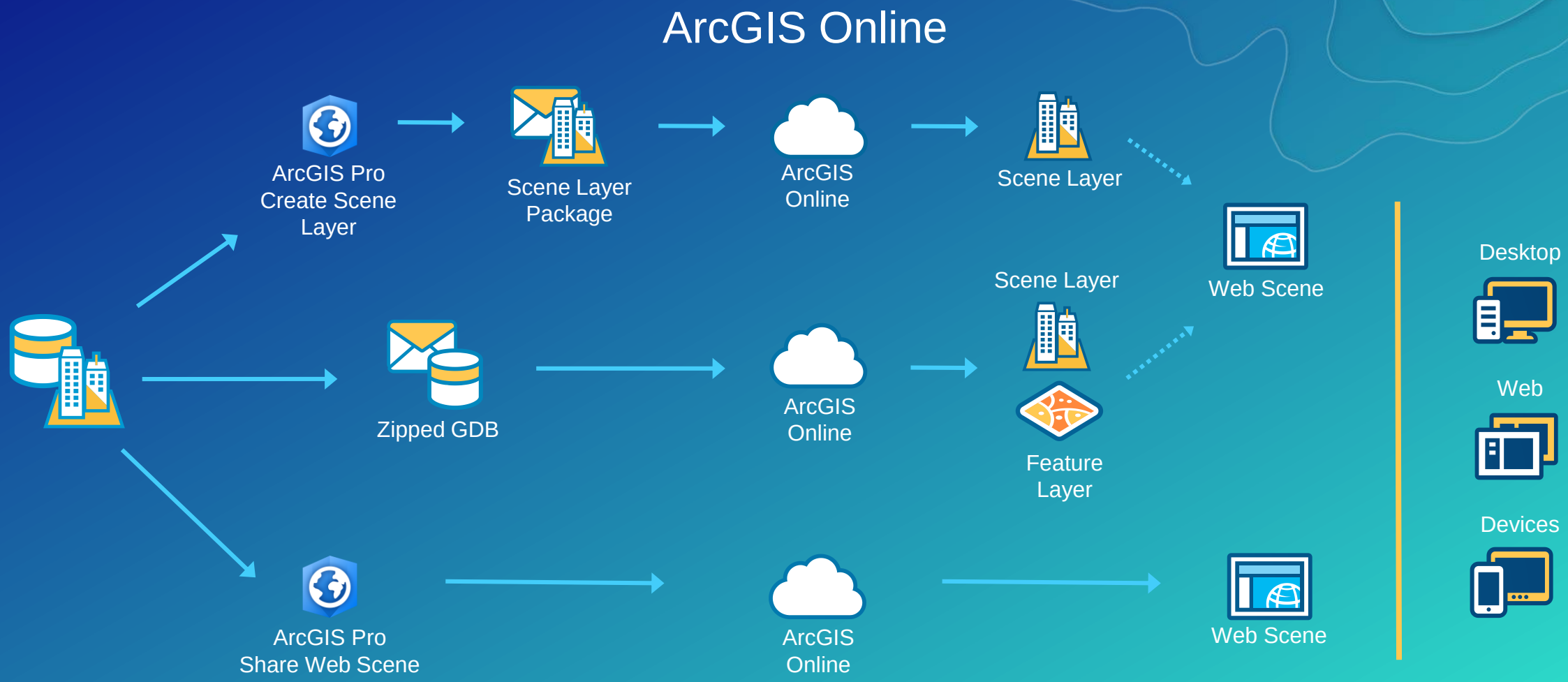
Second Capture



Extract New
Building

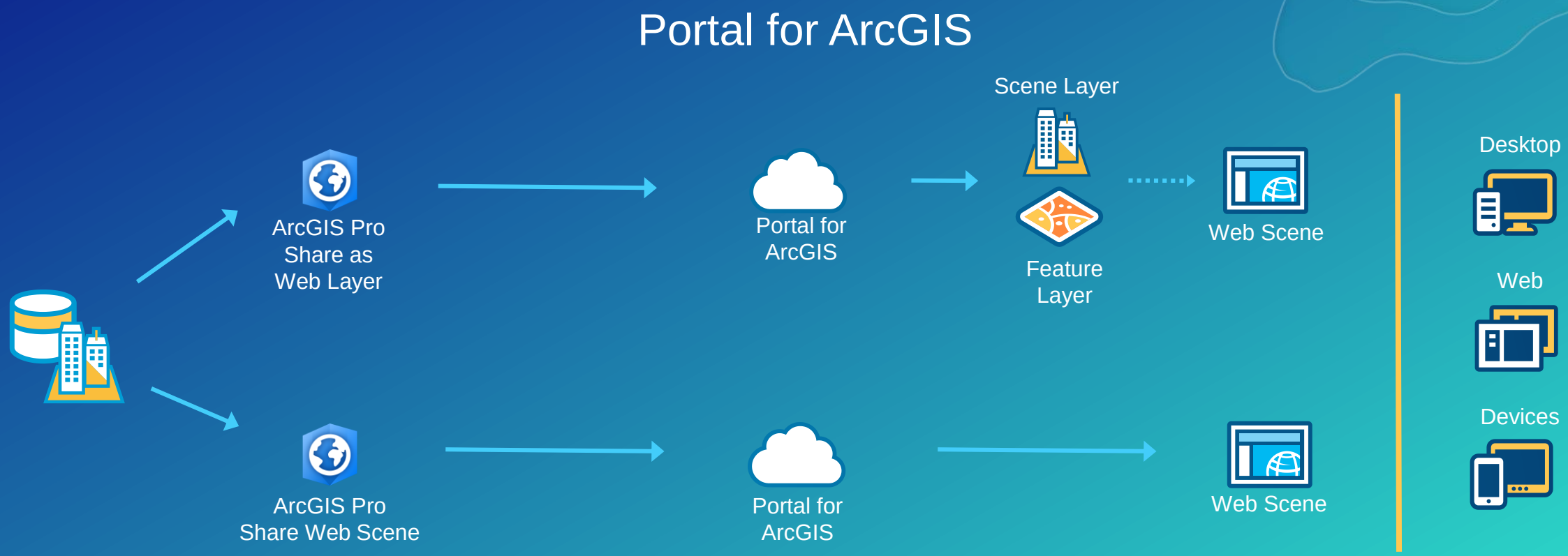
Maintaining + Sharing Your 3D Basemap

Best Practices



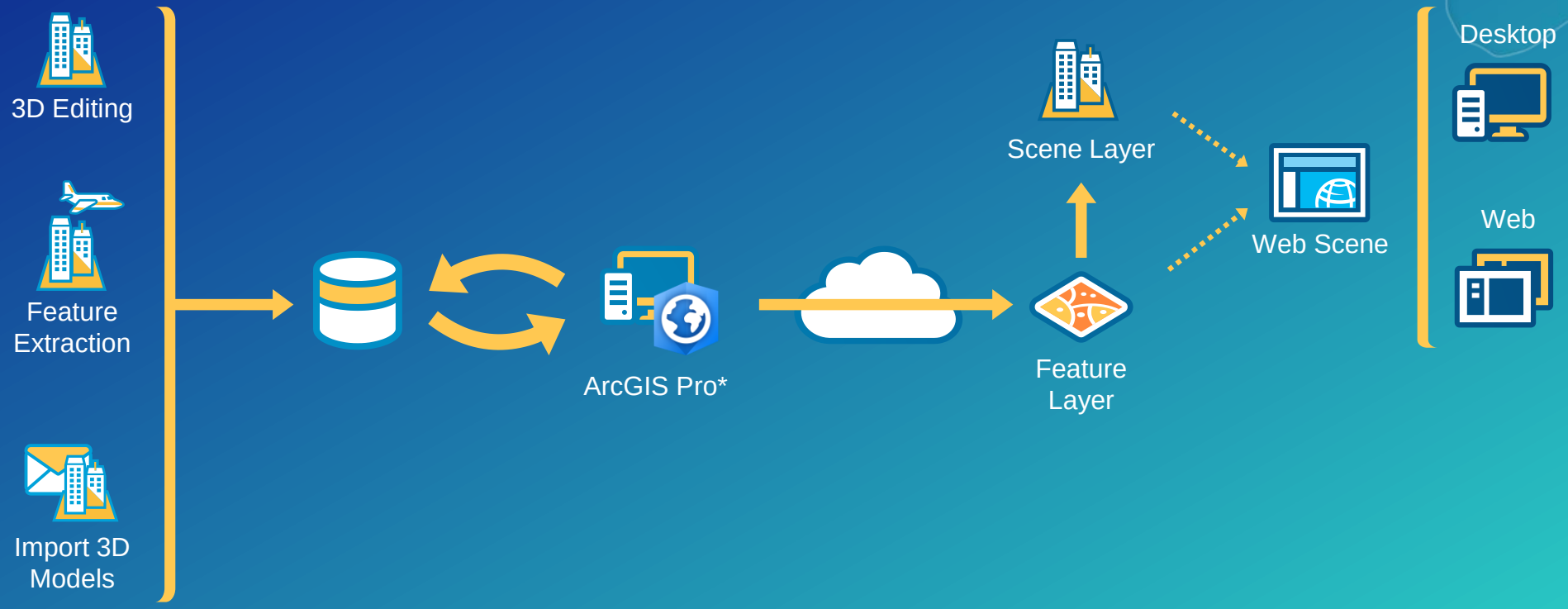
Maintaining + Sharing Your 3D Basemap

Best Practices



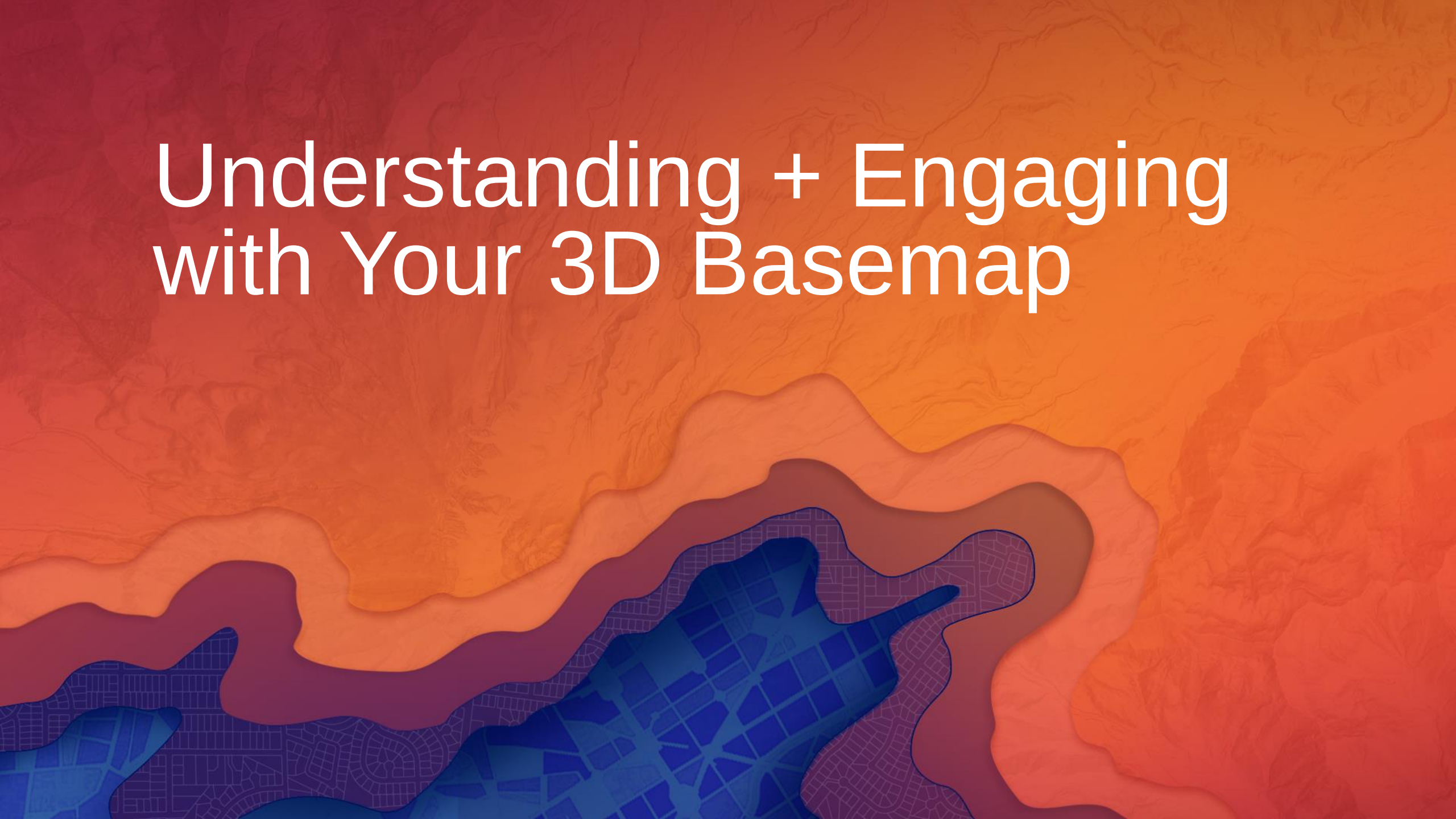
Maintaining + Sharing Your 3D Basemap

Best Practices

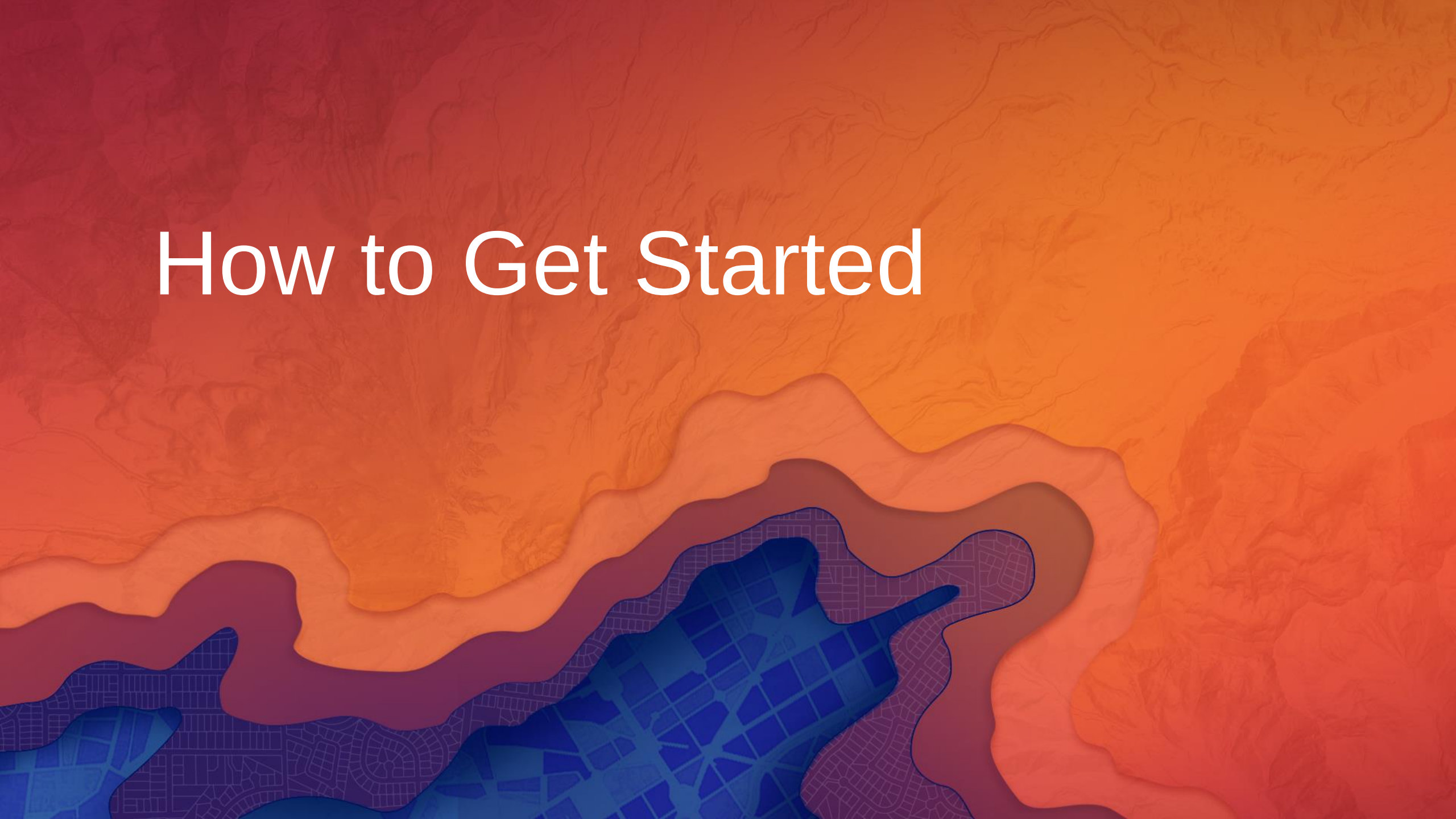


*Share Multipatches in Pro with layer in a Map or in 2D Features section of a Scene

Understanding + Engaging with Your 3D Basemap



How to Get Started



How to Get Started

Local Government Solutions

ArcGIS for Local Government GALLERY COMMUNITY DOCUMENTATION

Your Entire Organization

Local Government 3D Basemaps

Publish a collection of local government 3D basemaps that serve as a foundation for desktop, mobile and web mapping applications.

Basic Scene

Schematic Scene

ArcGIS for Local Government GALLERY COMMUNITY DOCUMENTATION

Planning and Development

Review Proposed Developments

A collection of maps and apps used to visualize proposed developments and assess the impact of each new development on the existing community.

Visualize Proposed Development

Conduct Visibility Assessment

3D Enablement Workshop

Organized as a phased set of workshop activities

Dive deep into working with 3D in ArcGIS

- Learn advanced 3D workflows and techniques
- Hands-on, one-on-one
- Your data in your environment
- Align with a current project for immediate ROI

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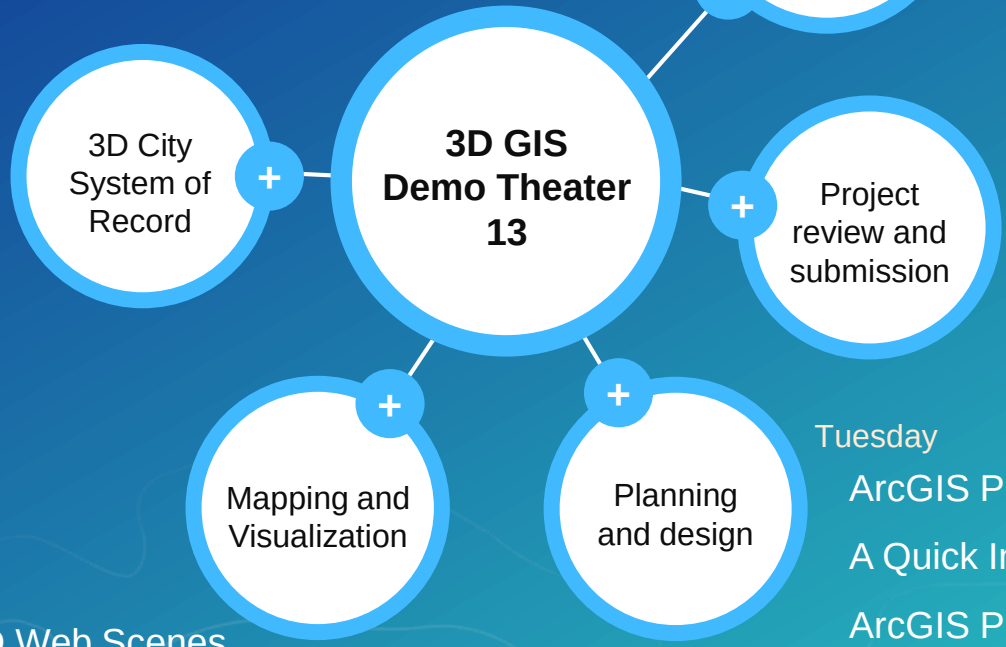
3D GIS Demo Theater 13



Tuesday

Authoring 3D Scenes in ArcGIS Pro | 9:30 am

3D Basemaps: An Introduction | 12:30 pm

Wednesday

Point Clouds and 3D Mesh | 12:30 pm

Thursday

3D Enable Your Campus and Workplace | 9:30 am

Refining 3D Buildings Extracted from LiDAR | 12:30 pm

Tuesday

3D Web Apps for Community Engagement | 4:30 am

Hands on with VR and AR | 5:30 pm

Wednesday

VR with ArcGIS | 5:30 pm

Thursday

VR with ArcGIS | 5:30 pm

Tuesday

Review Proposed Development | 3:30 pm

BIM and GIS: An Introduction | 4:30 pm

Tuesday

ArcGIS Pro and CityEngine: Advanced Topic | 10:30 am

A Quick Introduction to CityEngine | 11:30 am

ArcGIS Pro: 3D Zoning and Development Capacity Analysis | 3:30 pm

Wednesday

A 3D GIS Strategy for Integrated Urban Planning 2:30

Creating and Sharing Awesome 3D Web Scenes

ArcGIS Pro: 3D Tips and Tricks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