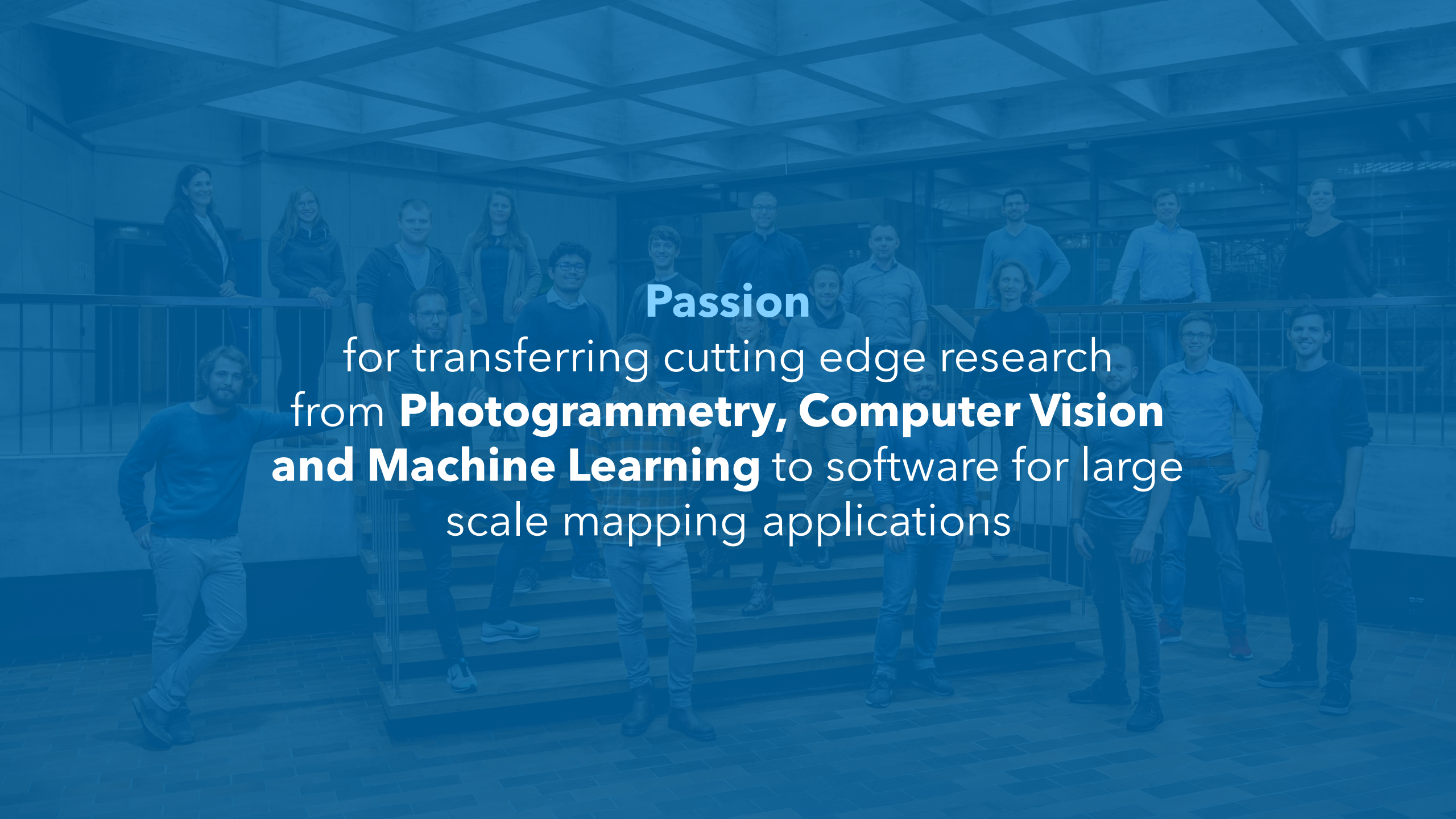
nFrames

esri THE SCIENCE OF WHERE

Photogrammetry meets GIS

nFrames – Esri R&D Center Stuttgart



Passion

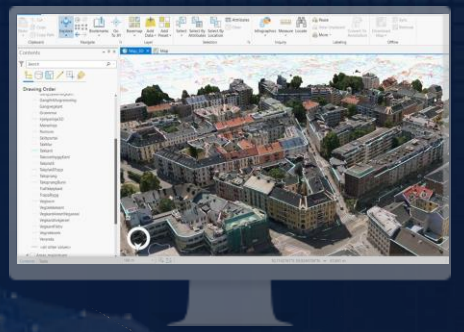
for transferring cutting edge research from **Photogrammetry, Computer Vision and Machine Learning** to software for large scale mapping applications


nFrames
EMPOWERING PHOTOGRAMMETRY
Frankfurt, Germany
Oblique, IGI UrbanMapper / Data courtesy of Aerowest
AEROWEST
Geodata On Demand

Esri Reality Capture – *SURE in the ArcGIS Ecosystem*

esri THE SCIENCE OF WHERE

Reality capture as part of a 3D GIS Experience
map-centric interaction, production, editing and analysis



Seamless end-to-end workflow
from data capture to analytics + web publishing

Multi-Domain
Multi-Sensor, Multi-Platform, Multi-Scale




ArcGIS is 3D

ArcGIS is the 3D System of Record for Digital Twins

Content

IoT

Satellite Imagery

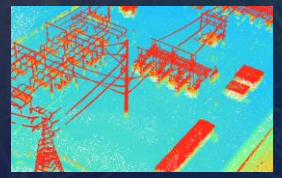
Point Clouds

Oriented Imagery

Scientific Data

2D Features

ArcGIS Online & Enterprise

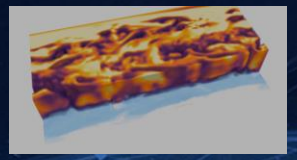


Point Clouds

BIM

Mesh

3D Objects



Voxels

3D Points

I3S Scene Layers

Management

Geo-Enabled Systems

ArcGIS GeoBIM

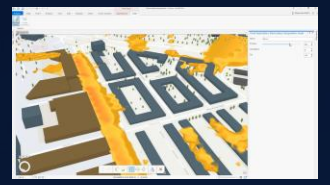
ArcGIS Indoors

ArcGIS Urban

CityEngine

Procedural Modeling

Pro



Apps

Scene Viewer

StoryMaps

Earth

3D Visualization and Analytics

Experience Builder

Mobile

From reality capture to pervasive 3D experiences built on open standards…

Imagery and Remote Sensing

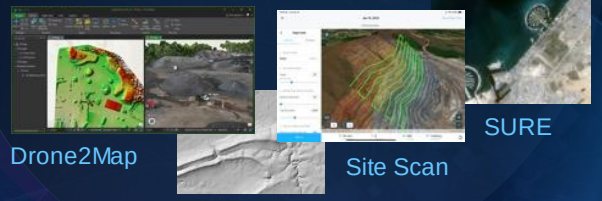
ArcGIS is a Comprehensive Imagery Platform

Map Production

Pixel Editing

Ortho Mapping

Stereo Feature Capture



Drone2Map

Site Scan

SURE

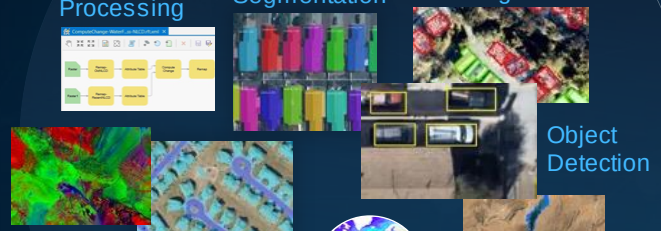
DTM Generation

Analysis & AI

Raster Processing

Segmentation

Deep Learning Tools



Object Detection

Spectral Indices

Classification

Multidimensional

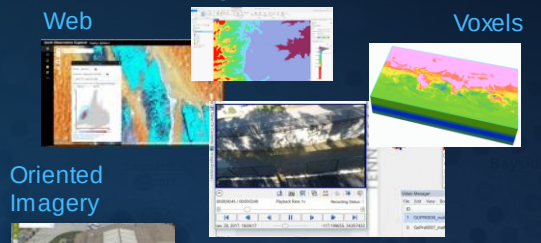
Change Detection

Visualization & Exploitation

Web

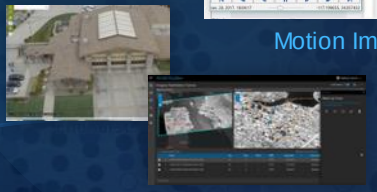
Pro

Voxels



Oriented Imagery

Motion Imagery



Excalibur

Image Management

Streaming Multiband Tiles

Mosaic Datasets

Image Cubes

Dynamic

Pre-Processed

Imagery & Raster Content

All Raster Types:

Formats

Platforms

Modalities

Services

Focused on helping you do your work better

SURE within the ArcGIS Ecosystem

Automated Data Production System for Mapping and 3D

Inputs

Image Files

Lidar

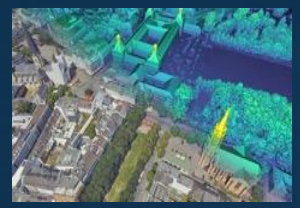
Orientation Data

New

ArcGIS

- Pro
- Enterprise
- Online

True Orthophotos



Textured Meshes

Point Clouds

Digital Surface Model

Data Products

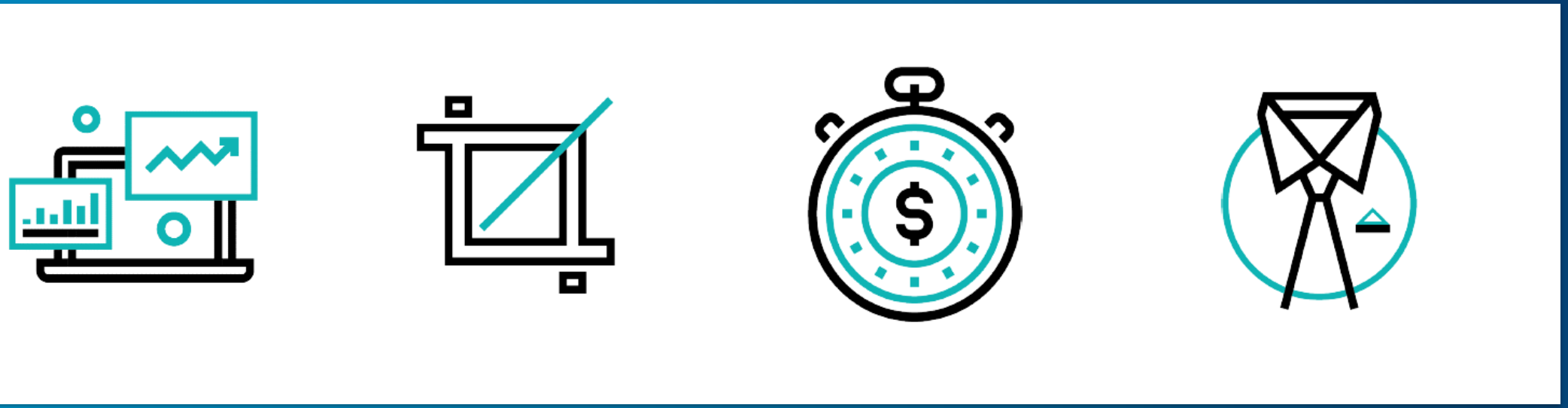
Applications

- Mapping
- 3D Visualization
- Change Detection
- Surface Analytics

Fully Integrated with ArcGIS

Fast, Highly Accurate, Massively Scalable, and Cost Effective

Industry Challenges



Scale
Data volumes
Complexity

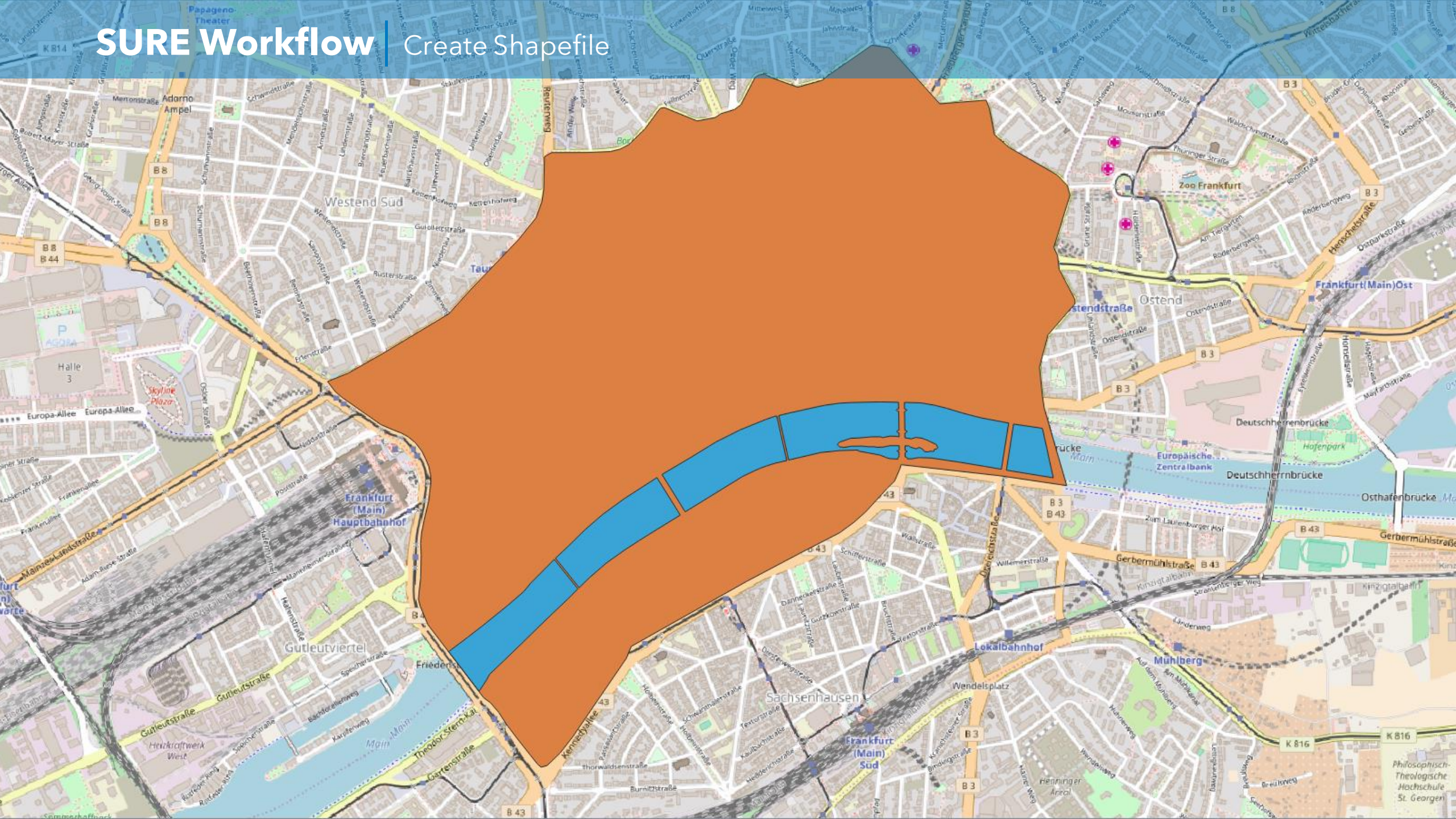
Accuracy
Precision
Sharpness

Cost
Time
Efficiency

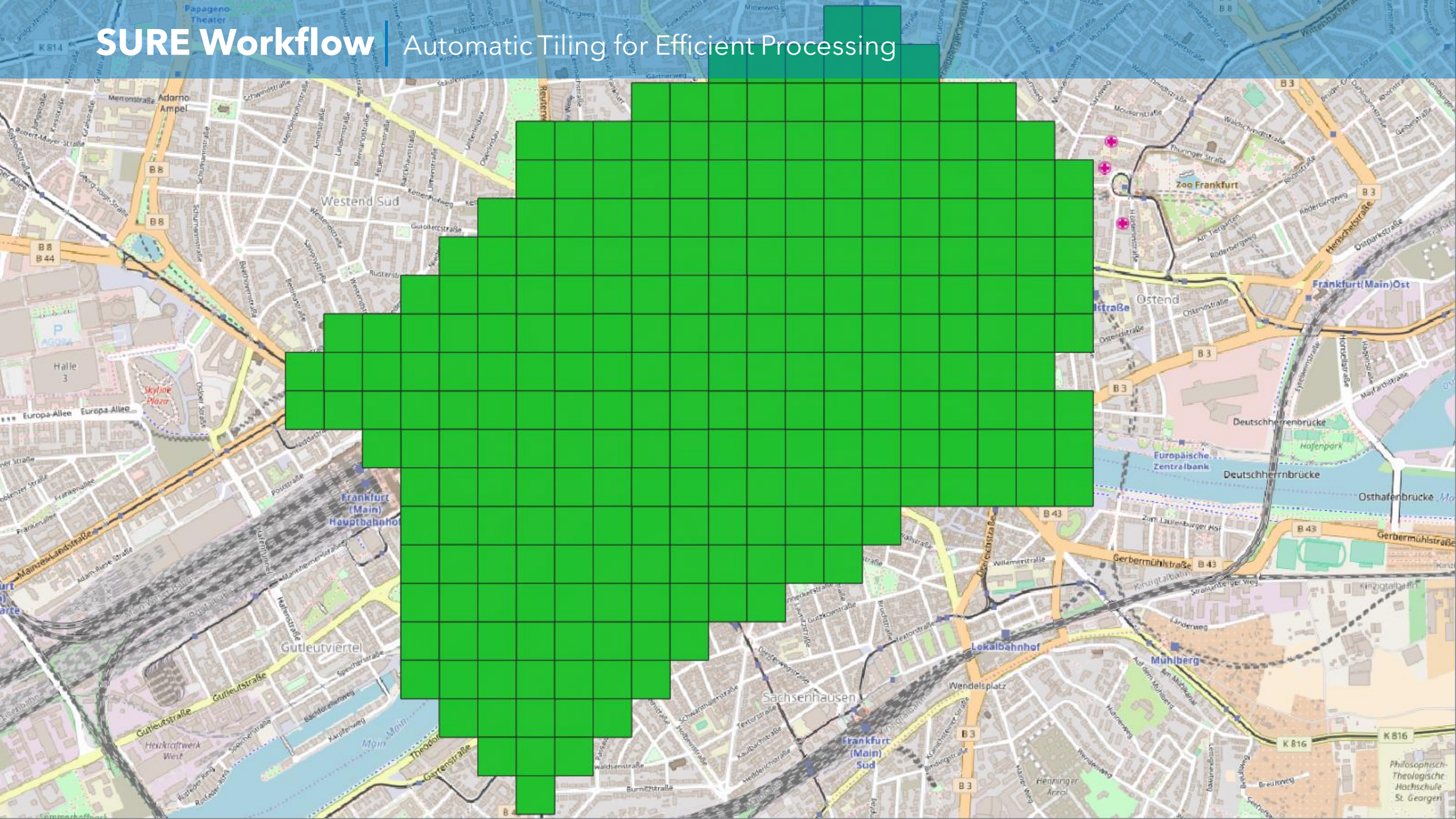
Expertise
Staff
ROI & TCO

SURE Workflow | Define Polygons and Retrieve Area of Interest

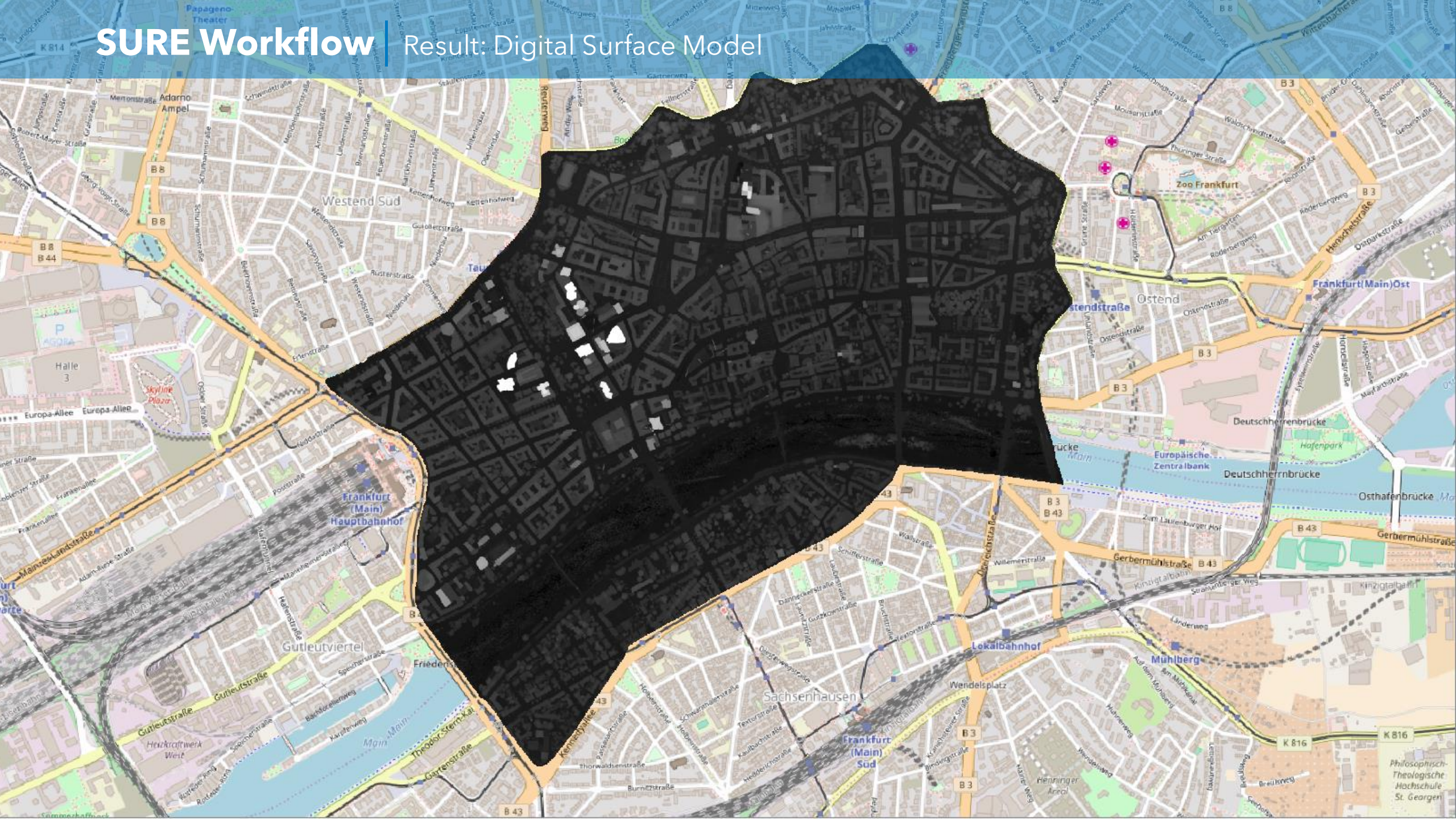
SURE Workflow | Create Shapefile



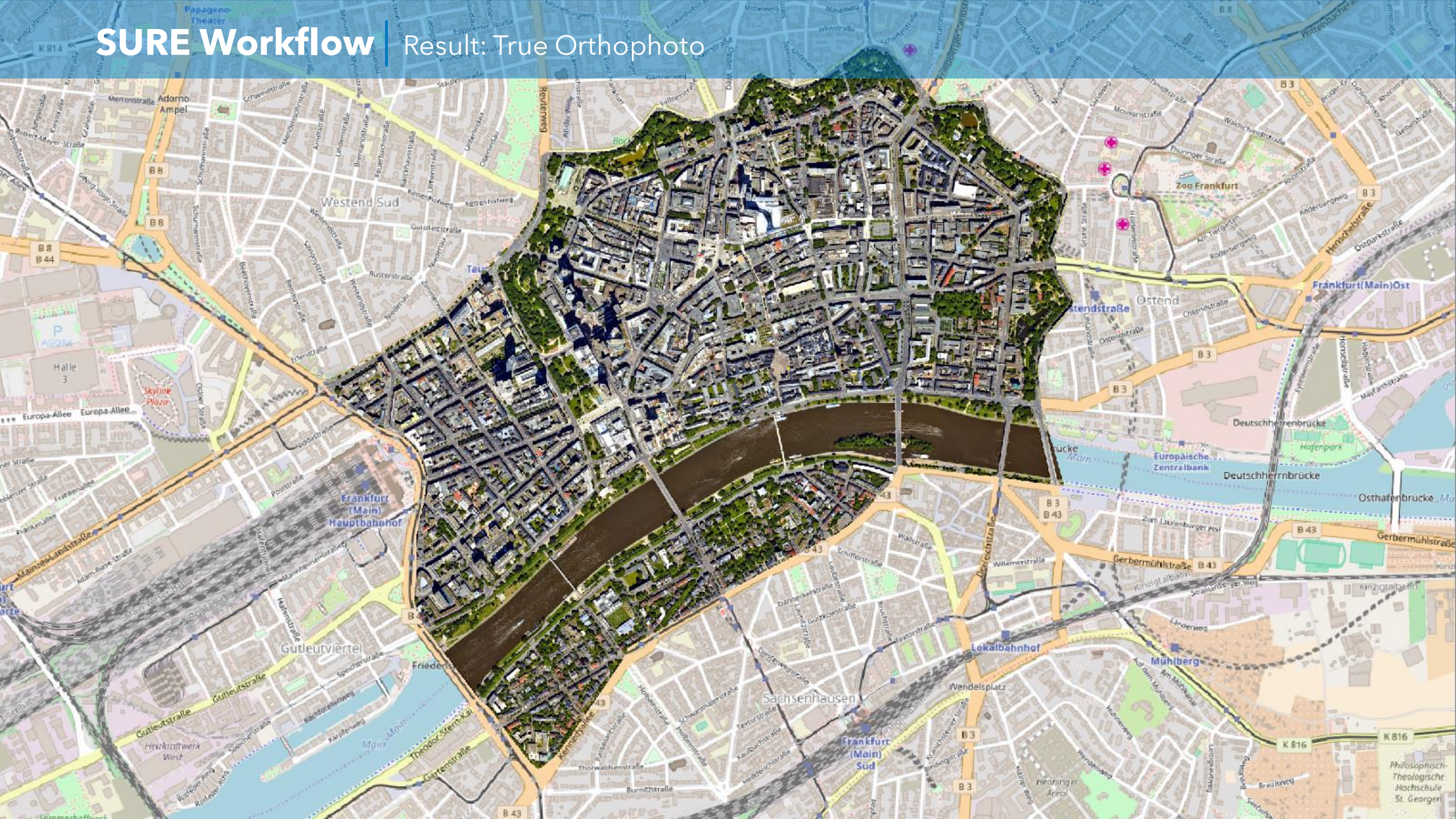
SURE Workflow | Automatic Tiling for Efficient Processing



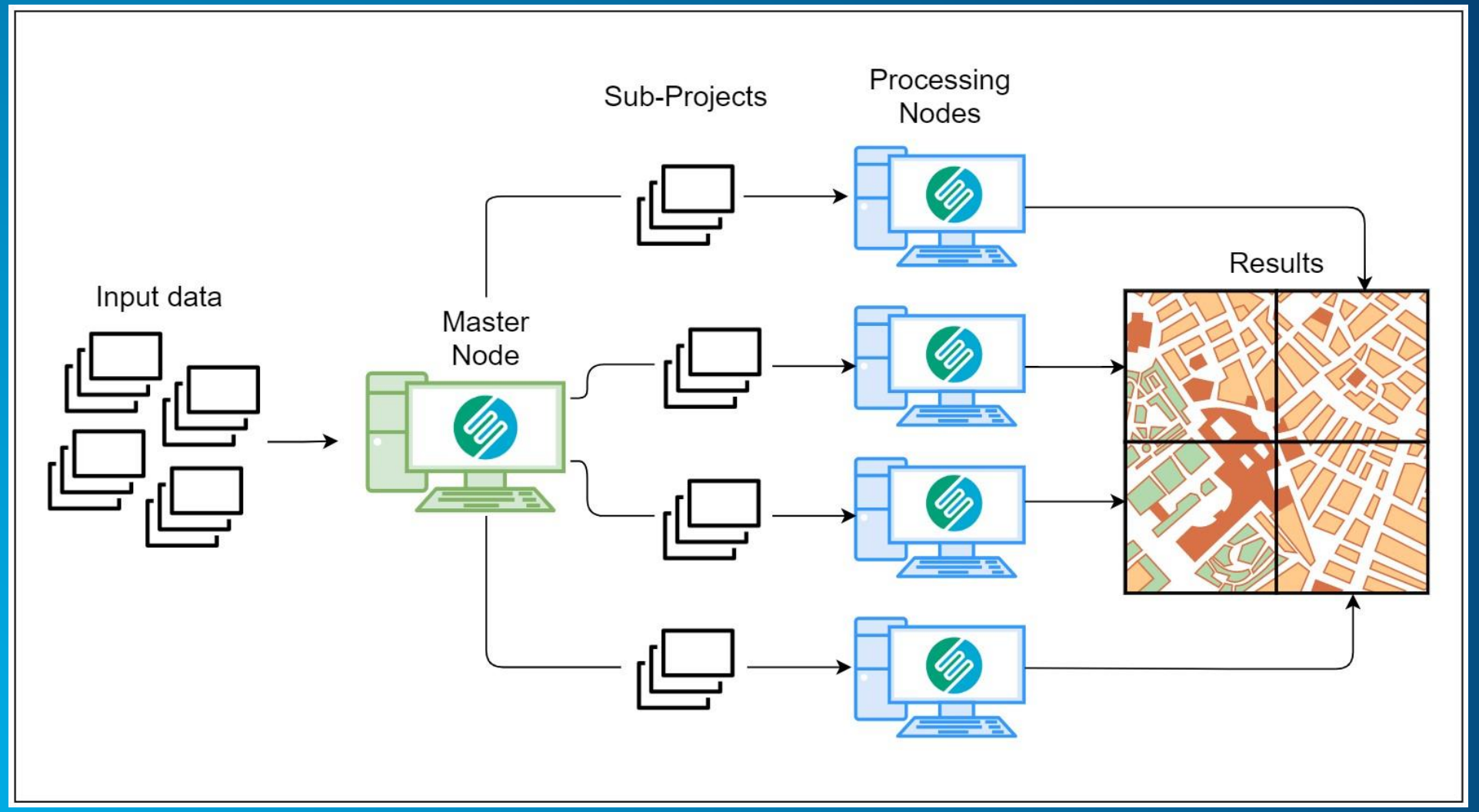
SURE Workflow | Result: Digital Surface Model



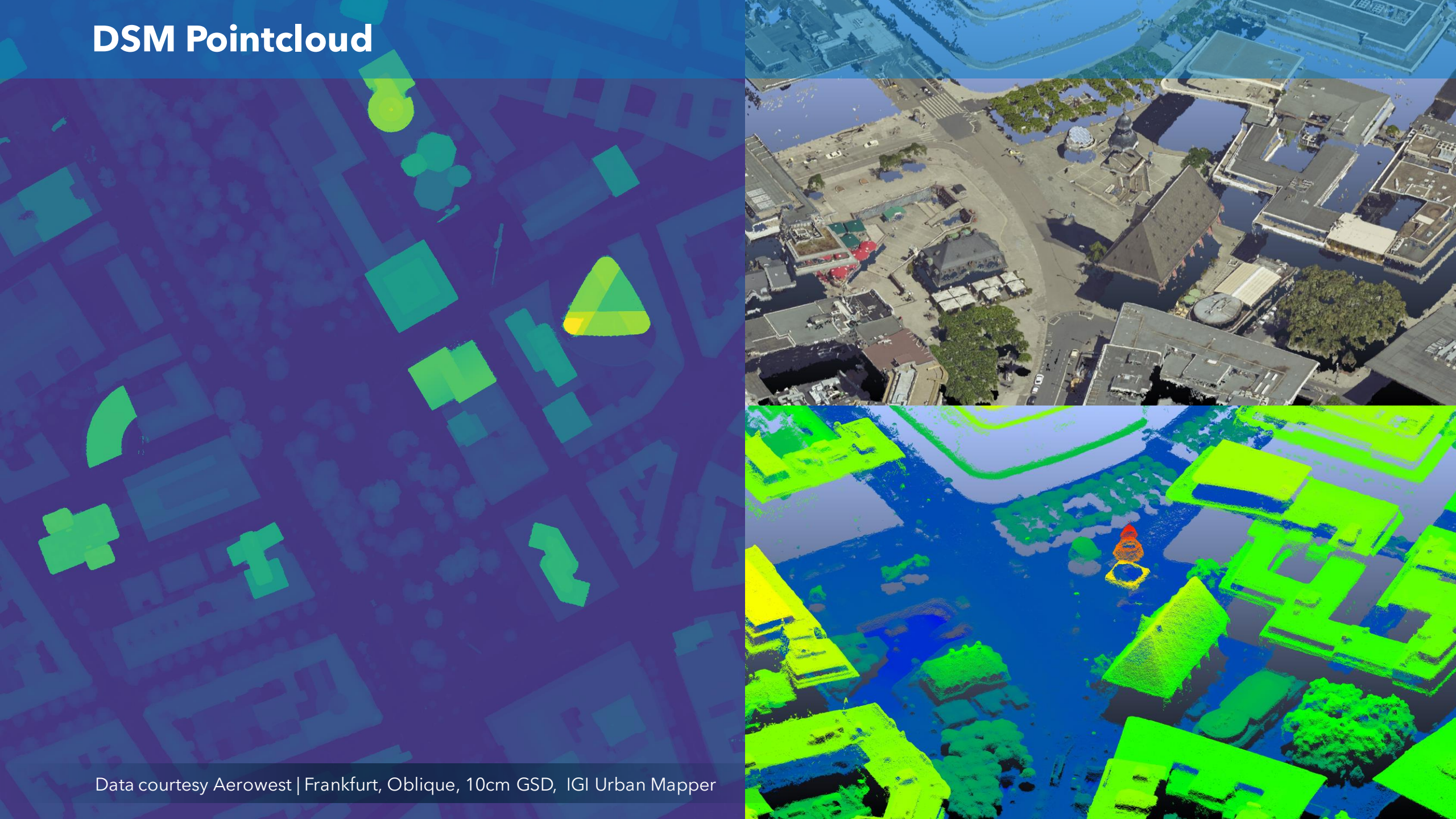
SURE Workflow | Result: True Orthophoto



Distributed Processing



DSM Pointcloud

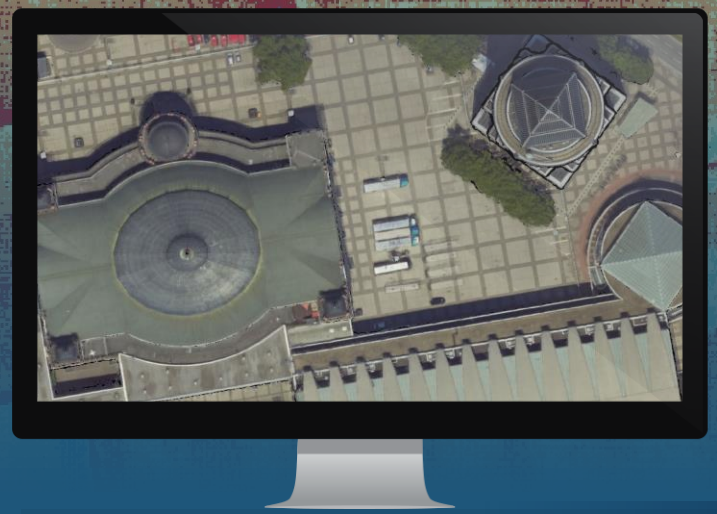


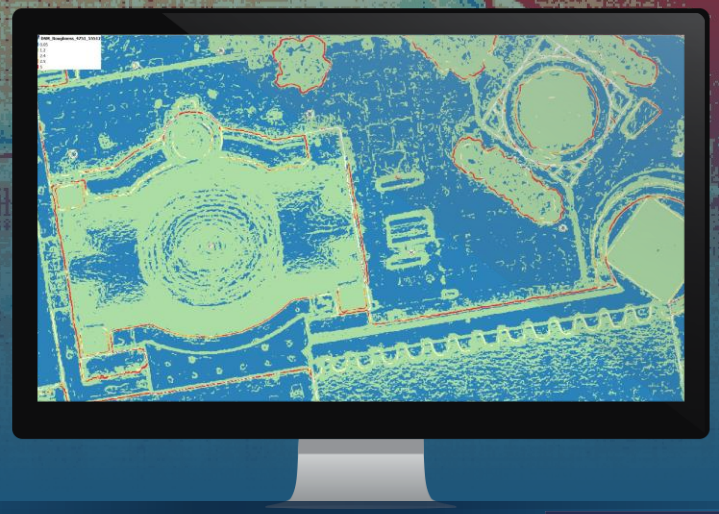
Data courtesy Aerowest | Frankfurt, Oblique, 10cm GSD, IGI Urban Mapper

DSM Metainformation

DSM_CPC_4751_55512
0-15
15-32
32-48
48-64
64-80

- DSM Height Colored
- DSM Point Color
- DSM Point Color Interpolated
- DSM Roughness
- DSM Cell Point Count
- DSM Cell Standard Deviation
- DSM Model Count
- DSM Binary Mask
- DSM Distance Mask





DSM Orthophoto | Projection on the DSM

Data courtesy 3D Reality Maps | Munich, XXX

DSM Orthophotos | Traditional DTM Orthophoto vs. SURE DSM Orthophoto

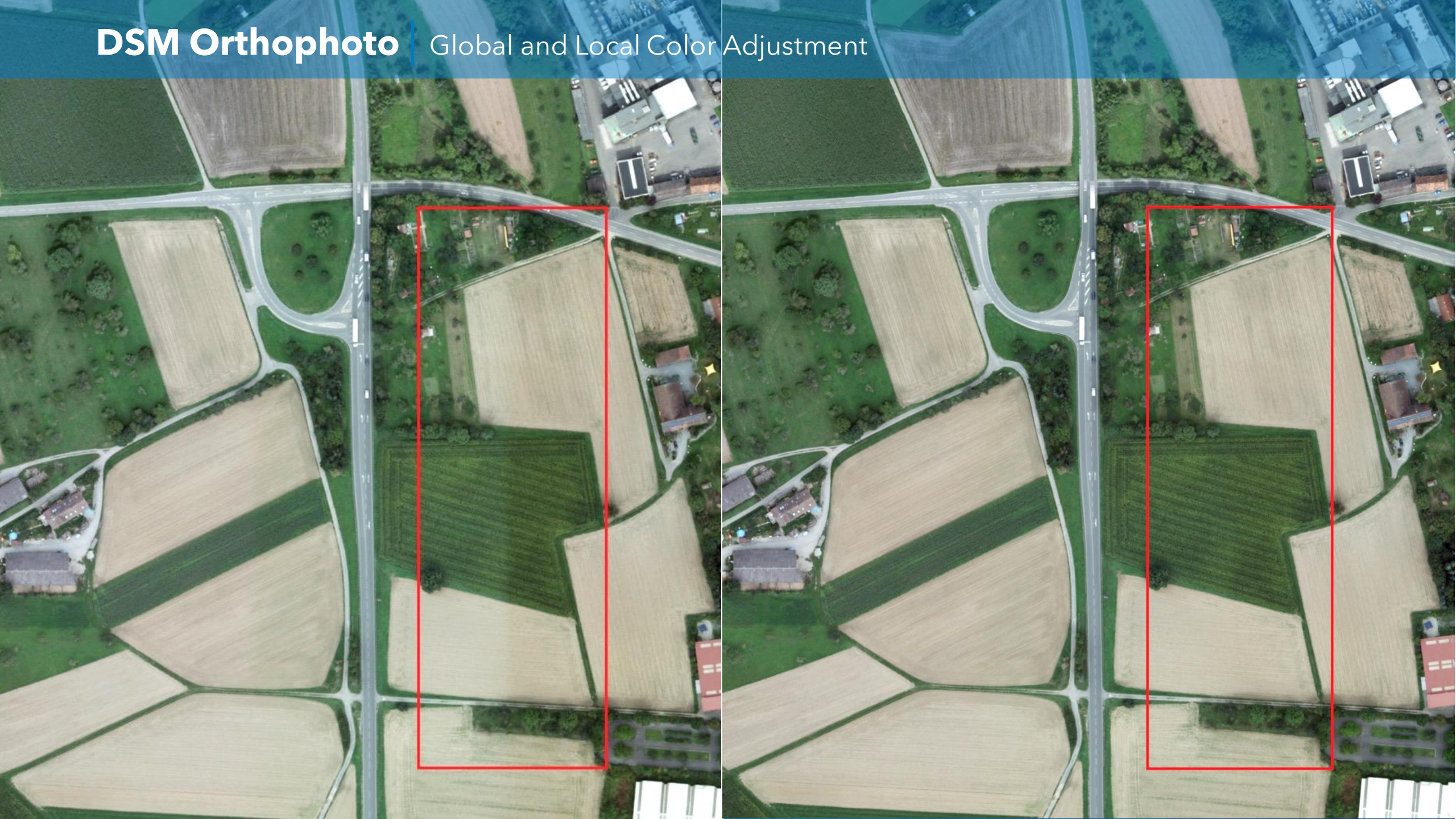
Accuracy & spatial consistency
- Consistent with mapping data + elevation
- Consistent between multiple flights
- Ready for temporal analysis and learning

Automation
- No DTM needed
- No manual seamline & breakline editing
- QA + editing optionally – e.g. based on DSM

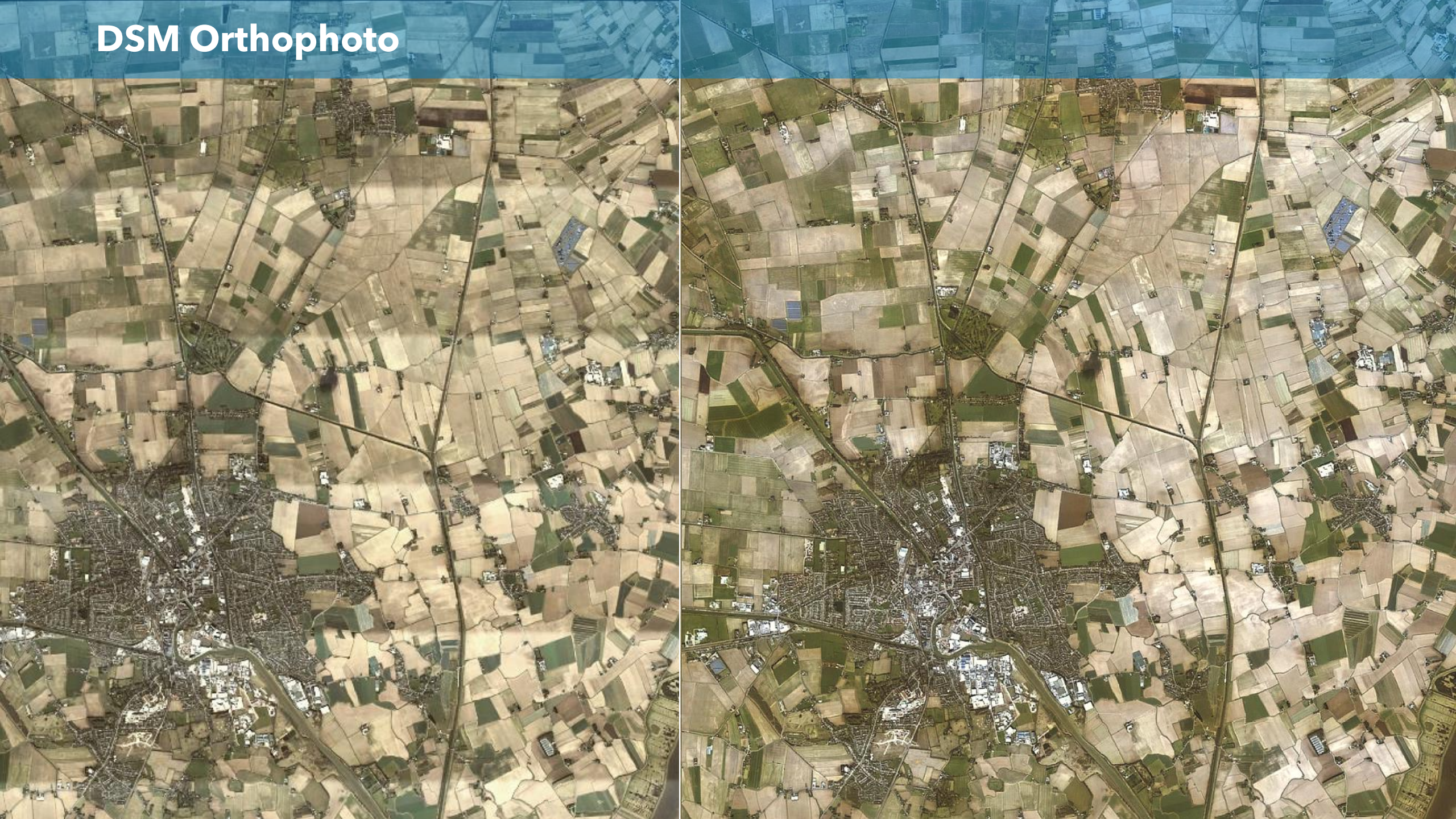
Production speed
- Faster time to delivery
- Elastic scaling with additional computers
- Enables more frequent data update

Data Courtesy of Aerowest AEROWEST

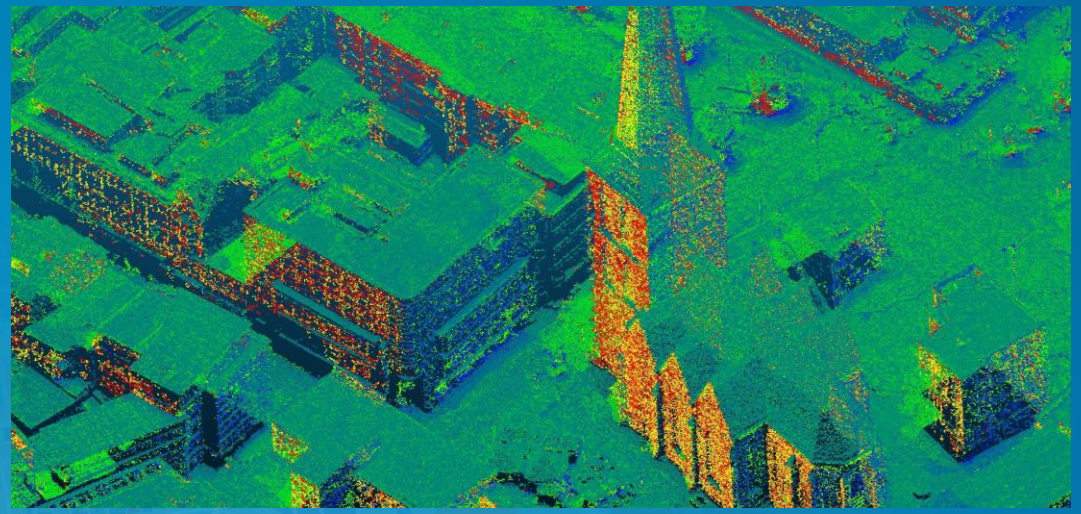
DSM Orthophoto | Global and Local Color Adjustment



DSM Orthophoto



3D Pointcloud



- High precision
- Adaptive sampling
- 16 Bit multispectral color information
- Metainformation
  - Point source ID
  - Precision

Data Courtesy of Aerowest AEROWEST

Mesh

- 3D and DSM Mesh (2.5D)
- High resolution texture
- Streaming ready
- Native export to
  OGC I3S and OGC 3D Tiles

Munich, UltraCam Ospey, 8cm GSD, 80/80 overlap

GeoFly
focus the world

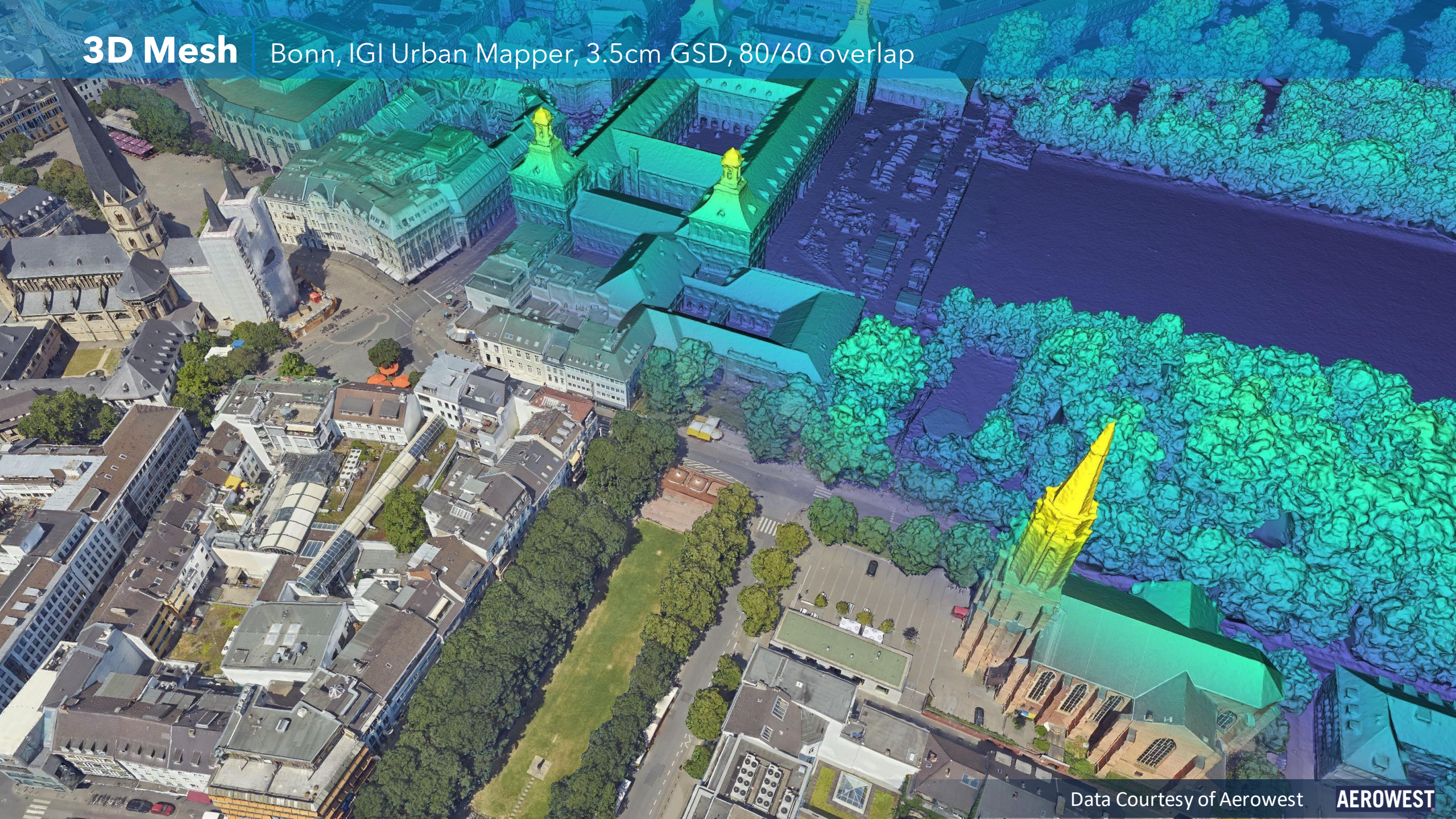
3D Mesh | Frankfurt, IGI Urban Mapper, Oblique, 80/60 overlap

Data Courtesy of Aerowest

AEROWEST

3D Mesh

Bonn, IGI Urban Mapper, 3.5cm GSD, 80/60 overlap



Data Courtesy of Aerowest

AEROWEST

3D Mesh | Erfurt, Vexcel Osprey

Data Courtesy of Geofly

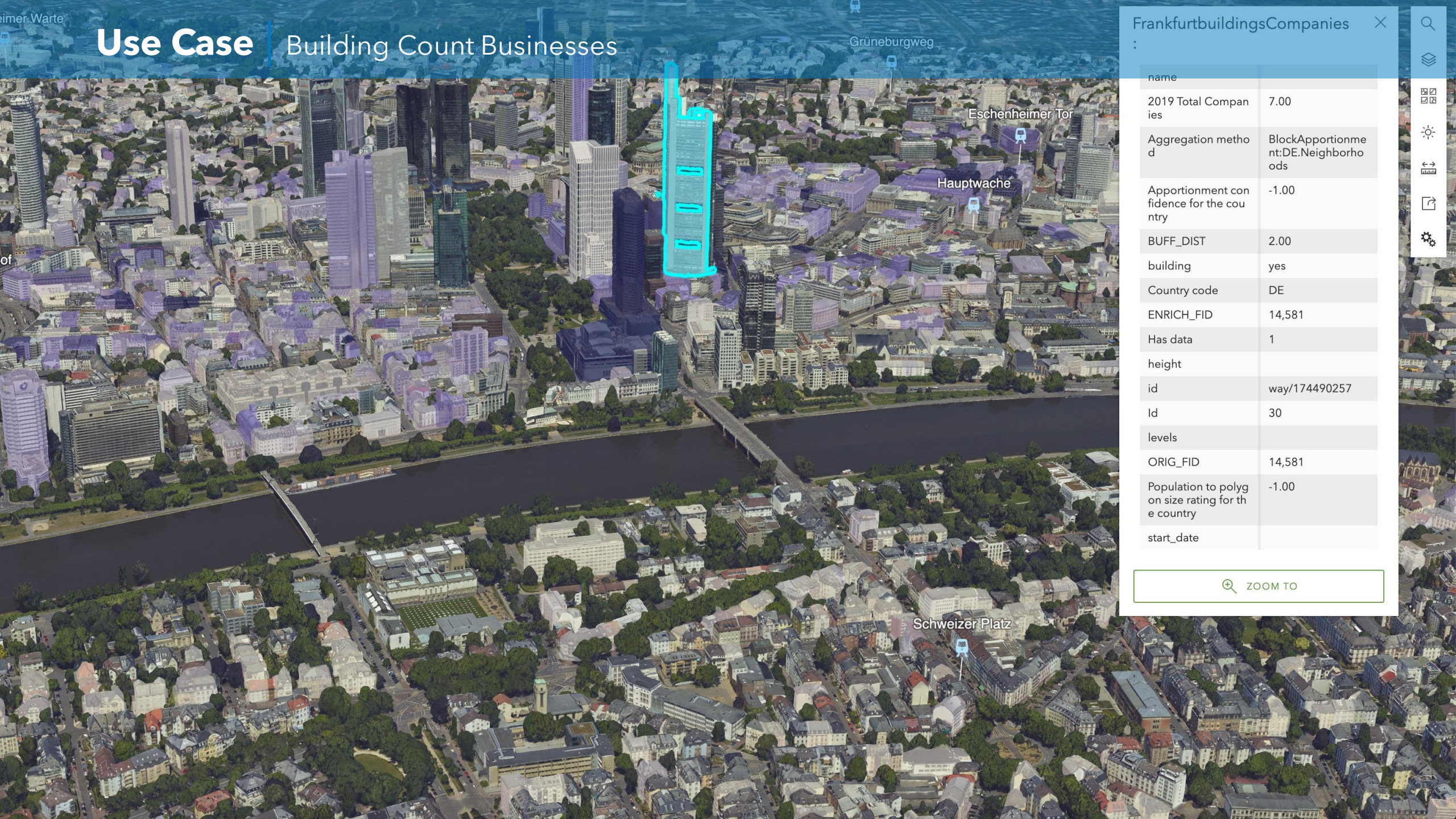
3D Mesh | Munich, Leica CityMapper 2

Data Courtesy of Leica / Hexagon

Use Case | Flooding Demo

Use Case | Mesh Modification

Use Case | Building Count Businesses

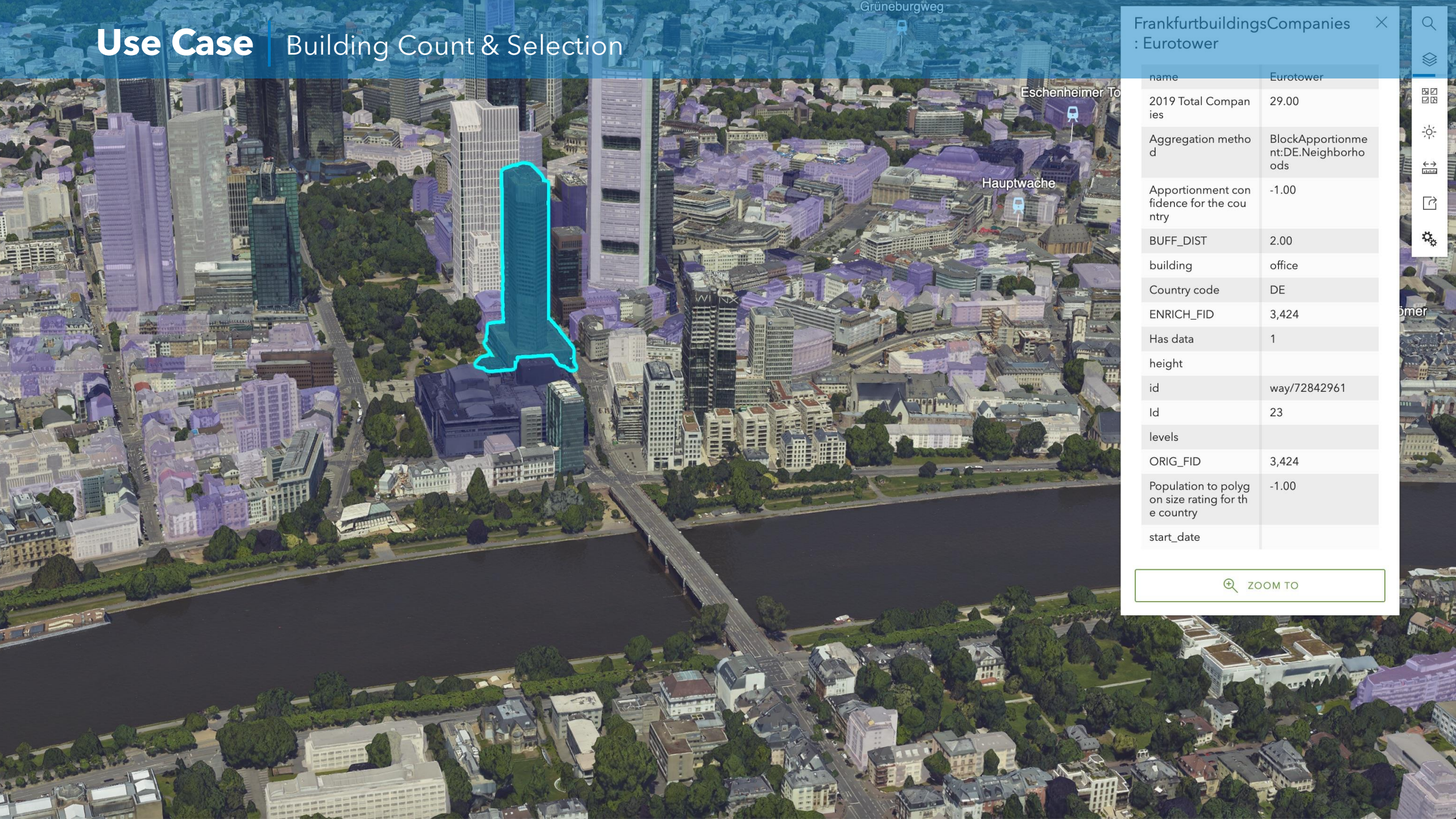


FrankfurtbuildingsCompanies :

name	
2019 Total Companies	7.00
Aggregation method	BlockApportionment:DE.Neighborhoods
Apportionment confidence for the country	-1.00
BUFF_DIST	2.00
building	yes
Country code	DE
ENRICH_FID	14,581
Has data	1
height	
id	way/174490257
Id	30
levels	
ORIG_FID	14,581
Population to polygon size rating for the country	-1.00
start_date	

ZOOM TO

Use Case | Building Count & Selection



FrankfurtbuildingsCompanies : Eurotower

name	Eurotower
2019 Total Companies	29.00
Aggregation method	BlockApportionment:DE.Neighborhoods
Apportionment confidence for the country	-1.00
BUFF_DIST	2.00
building	office
Country code	DE
ENRICH_FID	3,424
Has data	1
height	
id	way/72842961
Id	23
levels	
ORIG_FID	3,424
Population to polygon size rating for the country	-1.00
start_date	

ZOOM TO

IM_Capabilities - Frankfurt_Scenario - ArcGIS Pro

Integrated Mesh Layer

Project | Map | Insert | Analysis | View | Edit | Imagery | Share | Appearance | Data

Scene (Scene Layers on Devex

Add | Disable | Remove | Clip | Mask | Replace

Modification | Operation

Contents

Search

Drawing Order

- Frankfurt_Scenario
  - 3D Layers
    - Icoon_BIM
    - Mesh
      - Mesh_Modifications
        - Modifier
          - Clip
          - Mask
          - Replace
  - 2D Layers
    - Walk_times
      - 2.5
      - 5
      - 10
      - 15
      - 20
    - ConstructionArea
    - World Imagery
  - Elevation Surfaces
    - Ground
      - WorldElevation3D/Terrain3D

Frankfurt_Scenario

849 m | 8,6460749°E 50,1013694°N | 98,309 m | Selected Features: 0

Pop-up

ConstructionArea (1)

Frankfurt Grant Central

ConstructionArea - Frankfurt Grant Centr

Icoon Tower

OBJECTID	1
Shape_Length	0,009053
Shape_Area	0,000004
ProjectName	Frankfurt Grant Central
StartDate	01/01/2023
Architects	Architekturbüro Mecano
ProjectWebSite	https://www.skylineatla central-tower-frankfurt/

8,6551624°E 50,1053701°N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