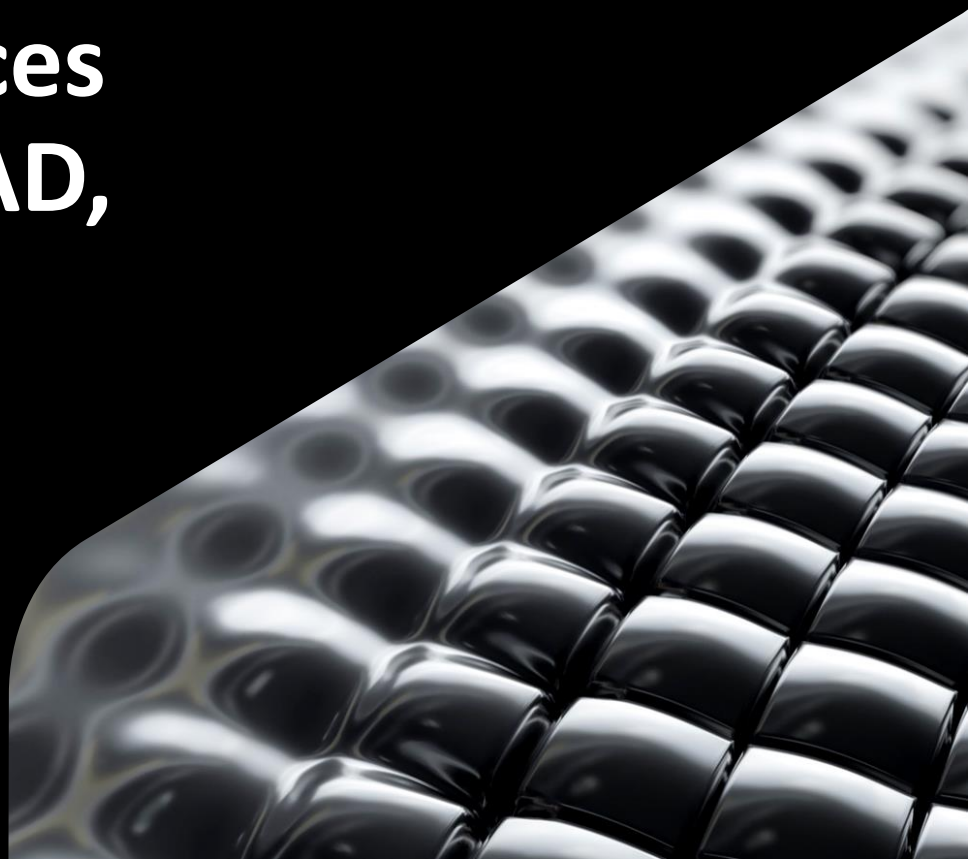
AUTODESK UNIVERSITY

Giant Steps: Advances in Seamless BIM, CAD, and GIS Integration

Session CI502227

Anthony Renteria | Sr. Product Manager, Esri

Ramesh Sridharan| Product Line Manager, Autodesk



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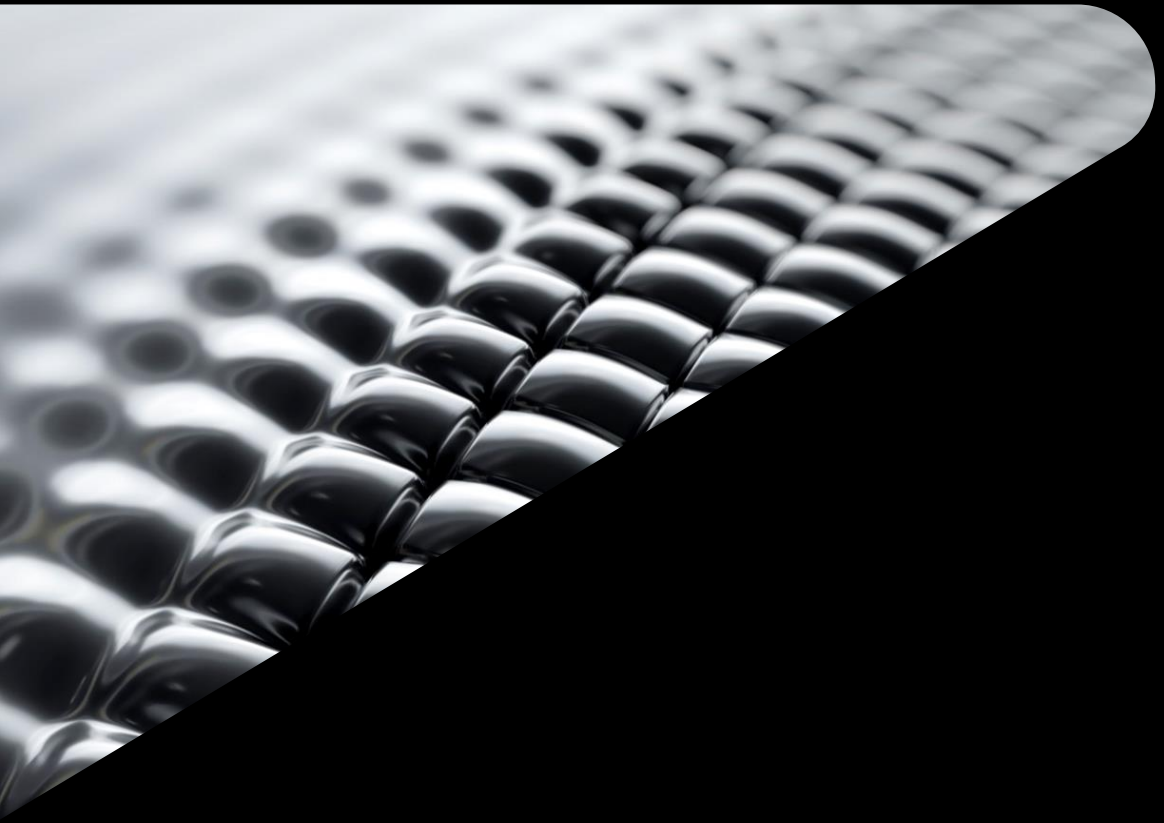
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BIM, CAD, & GIS Integration

For Project Delivery and Operations

- Autodesk-Esri Overview
- Autodesk Integrations
- ArcGIS Integrations
- Vision for the Future
- Q & A





Overview

Autodesk-Esri Collaboration

Back in 2017…

“The benefits of partnering with Autodesk will include securing sustainable resources for the growing population, a responsible human footprint on our natural environment...”

- Jack Dangermond, President, Esri



“…This will allow communities to build more connected, resilient cities, and infrastructure with a focused eye on sustainability.”

- Andrew Anagnost, CEO, Autodesk

A World of Challenges















Our Decisions impact our communities

Breaking Down Data Silos

Through improved GIS & BIM interoperability

- AEC firms and agencies need support
- Data exchange gaps create waste and duplicate efforts
- Focus on professional work instead of data roadblocks

28%
Average Design Time Saved

90 Days
Average Construction Time Saved

13%
Average Cost Savings



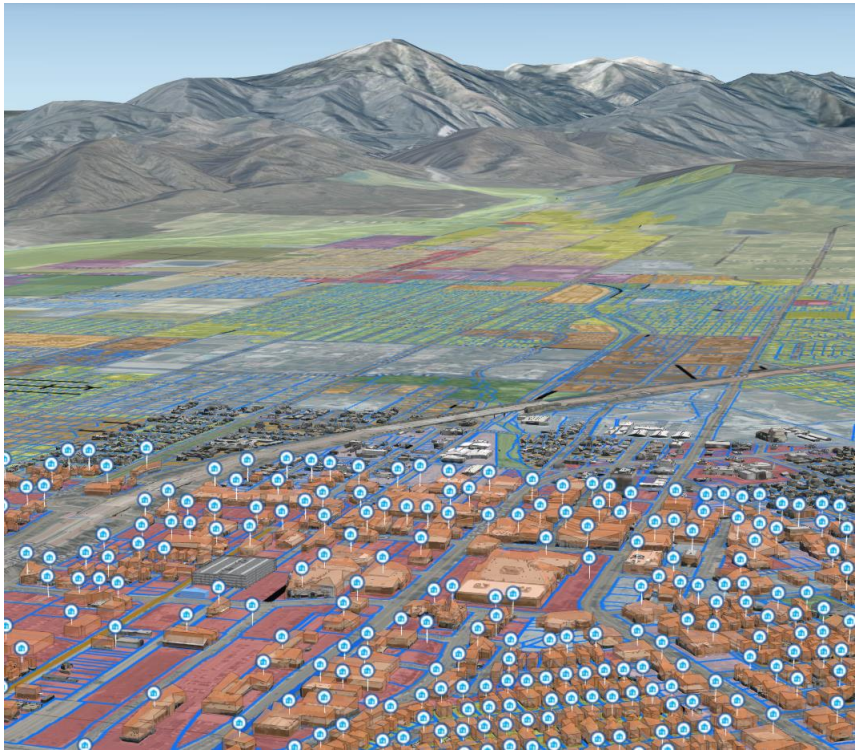
BIM

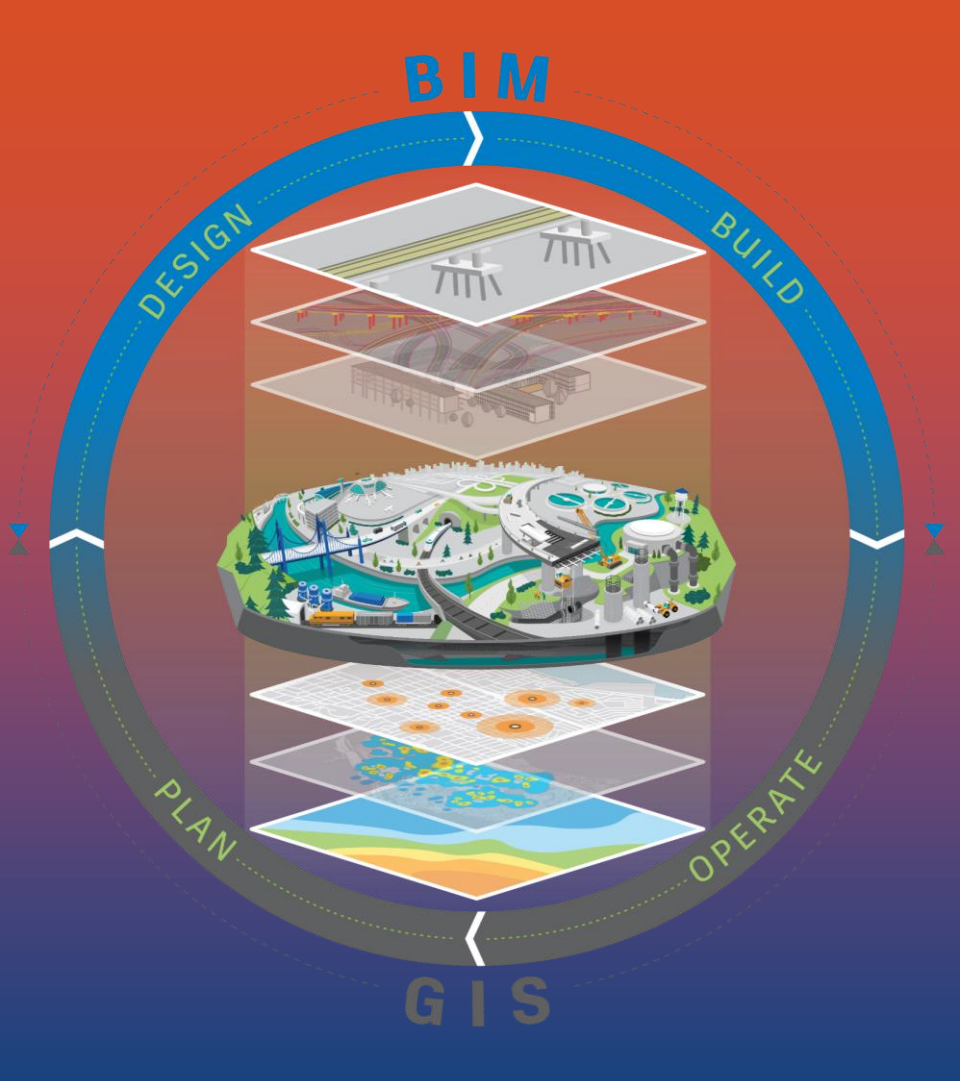
Supplies detailed information about *developed assets*



GIS

Provides information about assets in the context of the *built* and *natural environment*



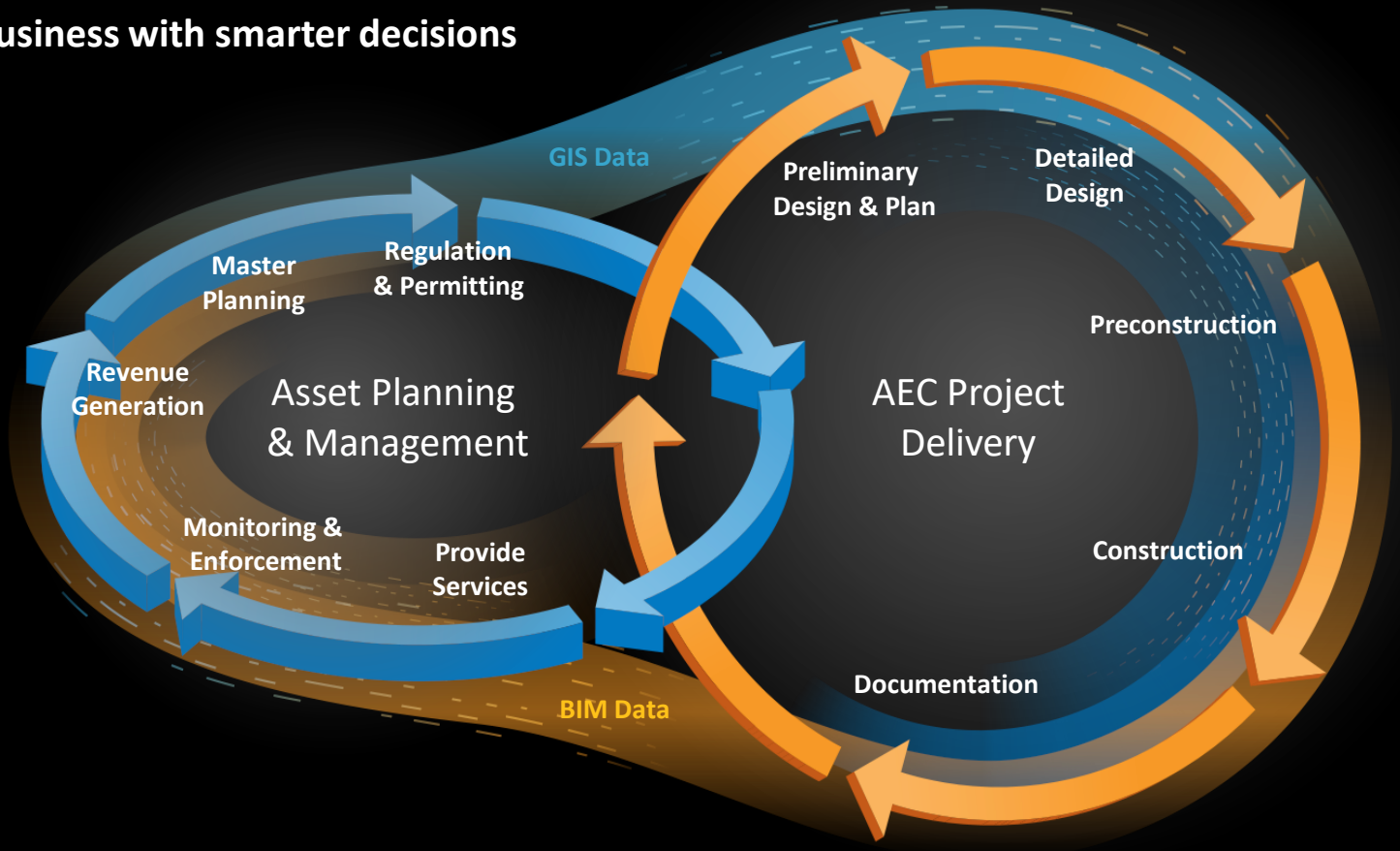


Autodesk – Esri Alliance

Building integrated solutions that remove silos between GIS, Design, and Construction teams, creating more connected workflows, which help to reduce risk, inefficiencies, data loss and cycle times

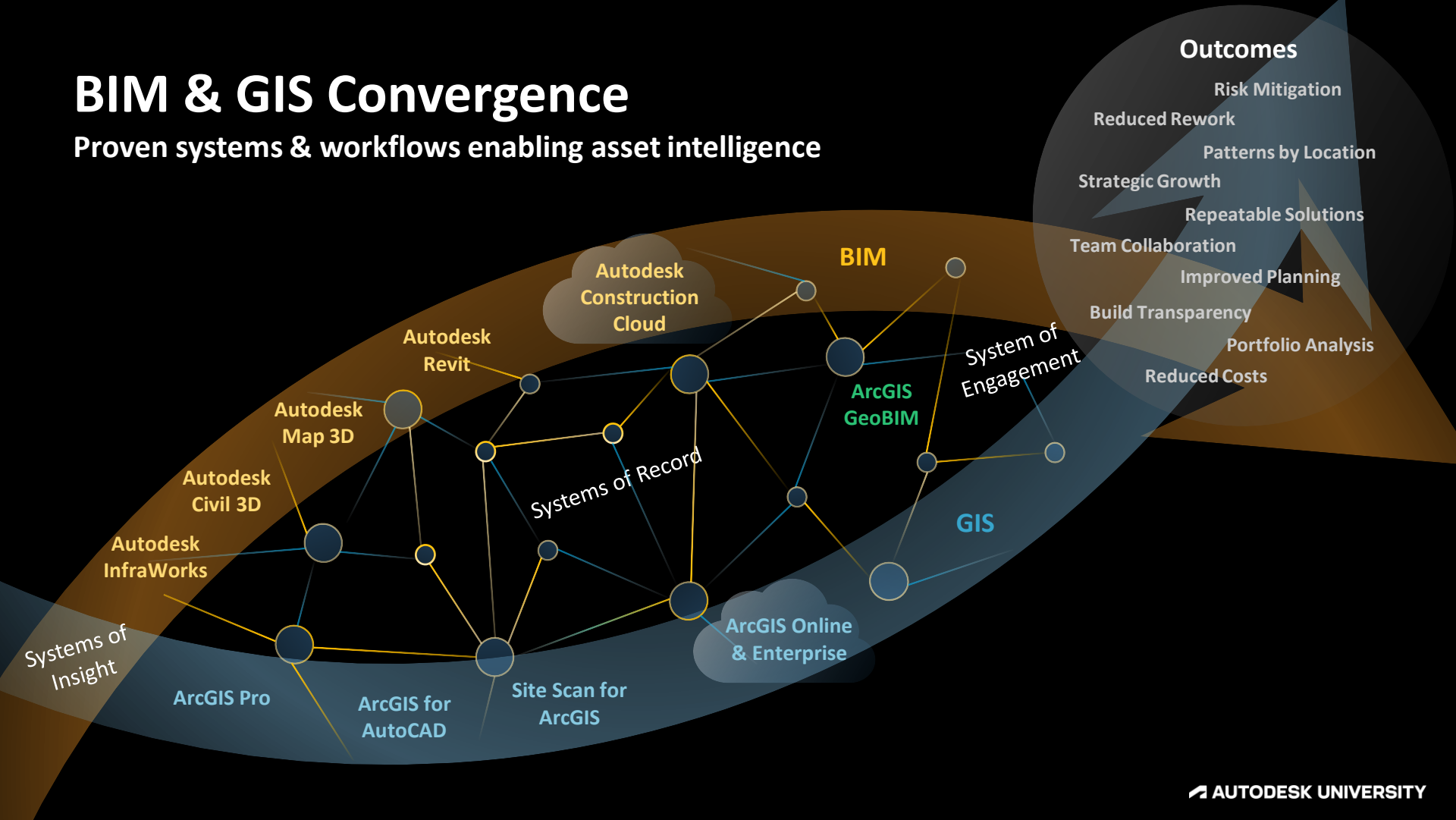
GIS Informs BIM, BIM Fuels GIS

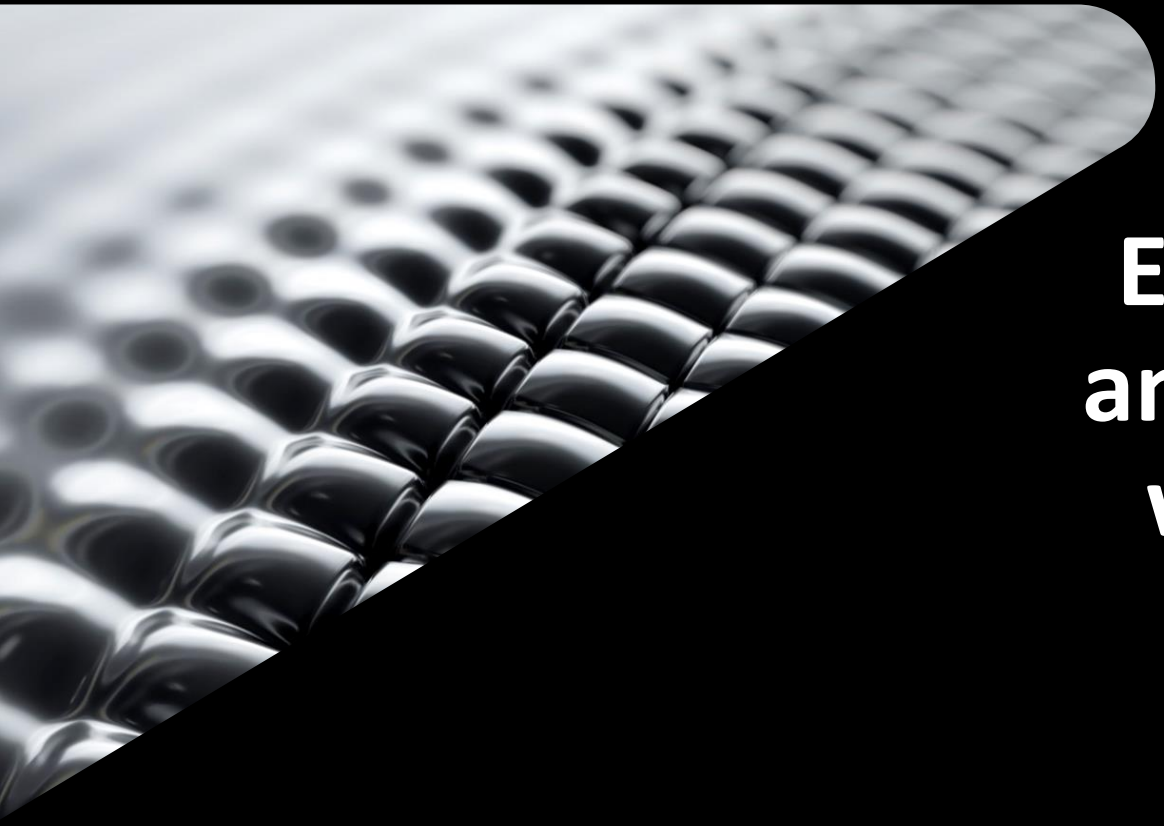
Driving business with smarter decisions



BIM & GIS Convergence

Proven systems & workflows enabling asset intelligence





Elevating Design and Construction with Geospatial

Through Autodesk Integrations

AUTODESK



Connector for ArcGIS

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AUTODESK® INFRAWORKS®

Autodesk Connector for ArcGIS

Connector for ArcGIS

InfraWorks
Civil 3D
Map 3D

2018

- **Connect** to ArcGIS Online
- Browse and select feature layers
- Import **Geometry and Attributes**
- Refresh capability

2019

- **Raster Support** – Terrain and Imagery
- **Portal Manager**
- **Extended Schema** support
- **Save back** changes (both Geometry and Attributes)
- **Export to FGDB**

- Connect to **ArcGIS Portals**
- Browse and select feature and raster layers
- Import **Geometry and Attributes**
- **Data refresh** capability

- **Connect to ArcGIS Portals**
- Fetch GIS layers as **C3D objects**
- Import both **Geometry and Attributes**
- Publish feature layers
- Connector UI enhancements
- **Save back (geometry)**
- **Export to FGDB**

2020

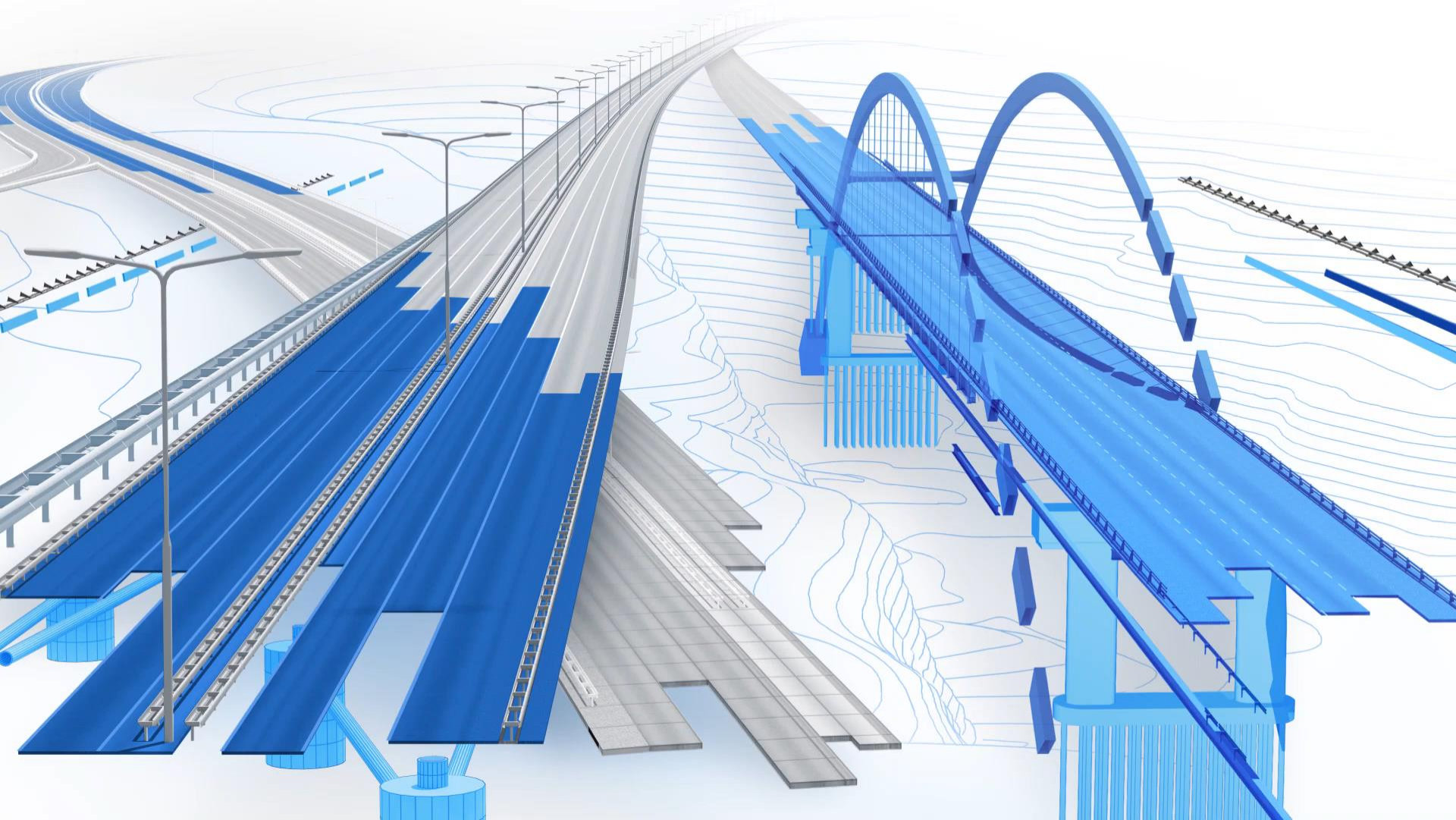
- **Publish** to ArcGIS Portals
- Support **public layers** without authentication
- Attribute selection while Publish or Export to FGDB
- Support Groups visualization
- Authentication enhancements like **SSO**

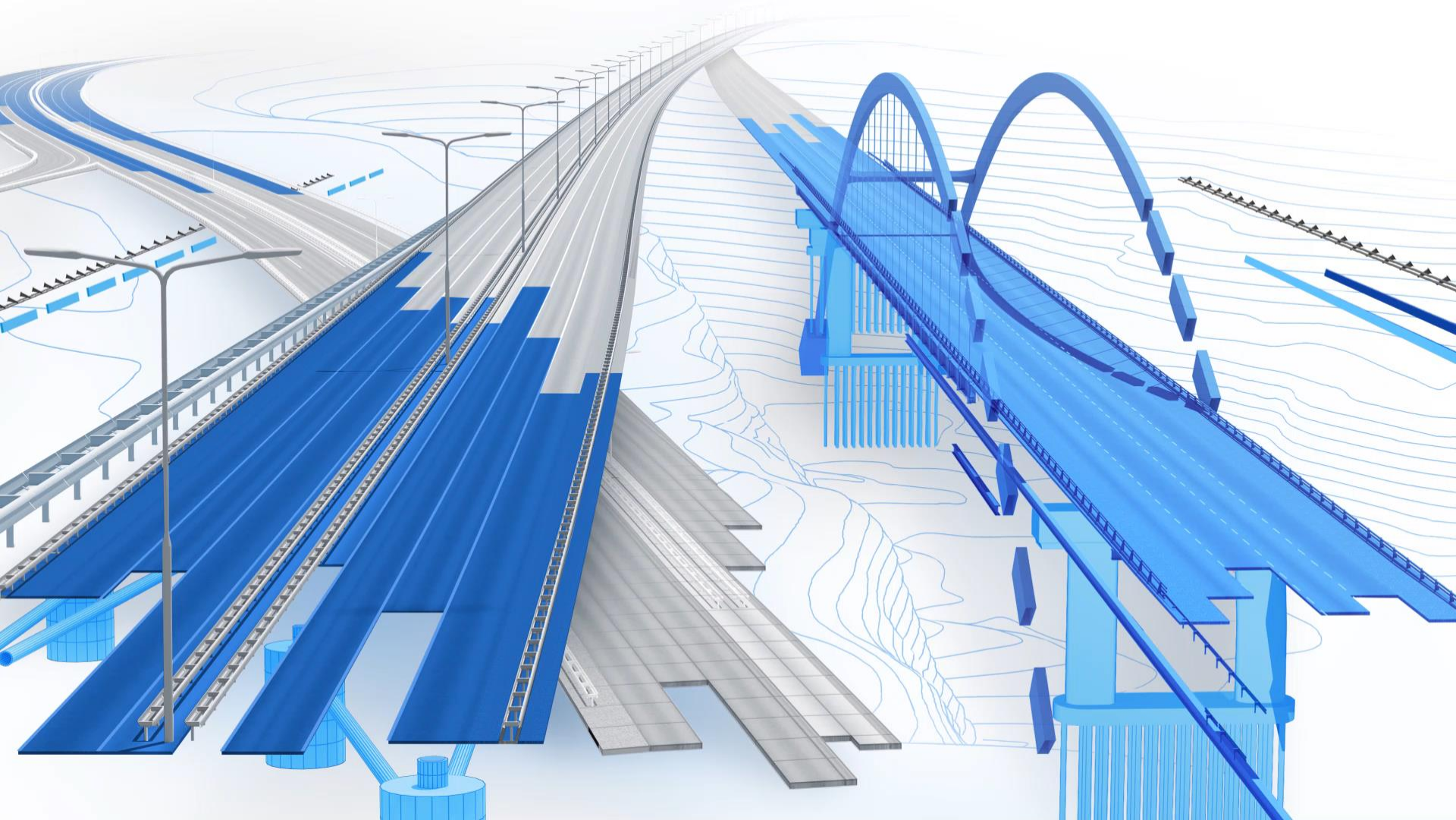
- **Attribute selection while Publish or Export to FGDB**
- Authentication enhancements
- Support **ArcGIS server-based layers** (via ArcGIS Portals)
- Support Groups
- IW Authentication enhancements
- Save back attributes and geometry
- Create new records to ArcGIS Layers
- Support **Raster surfaces and images**

- **Save back feature layers** to ArcGIS Portals

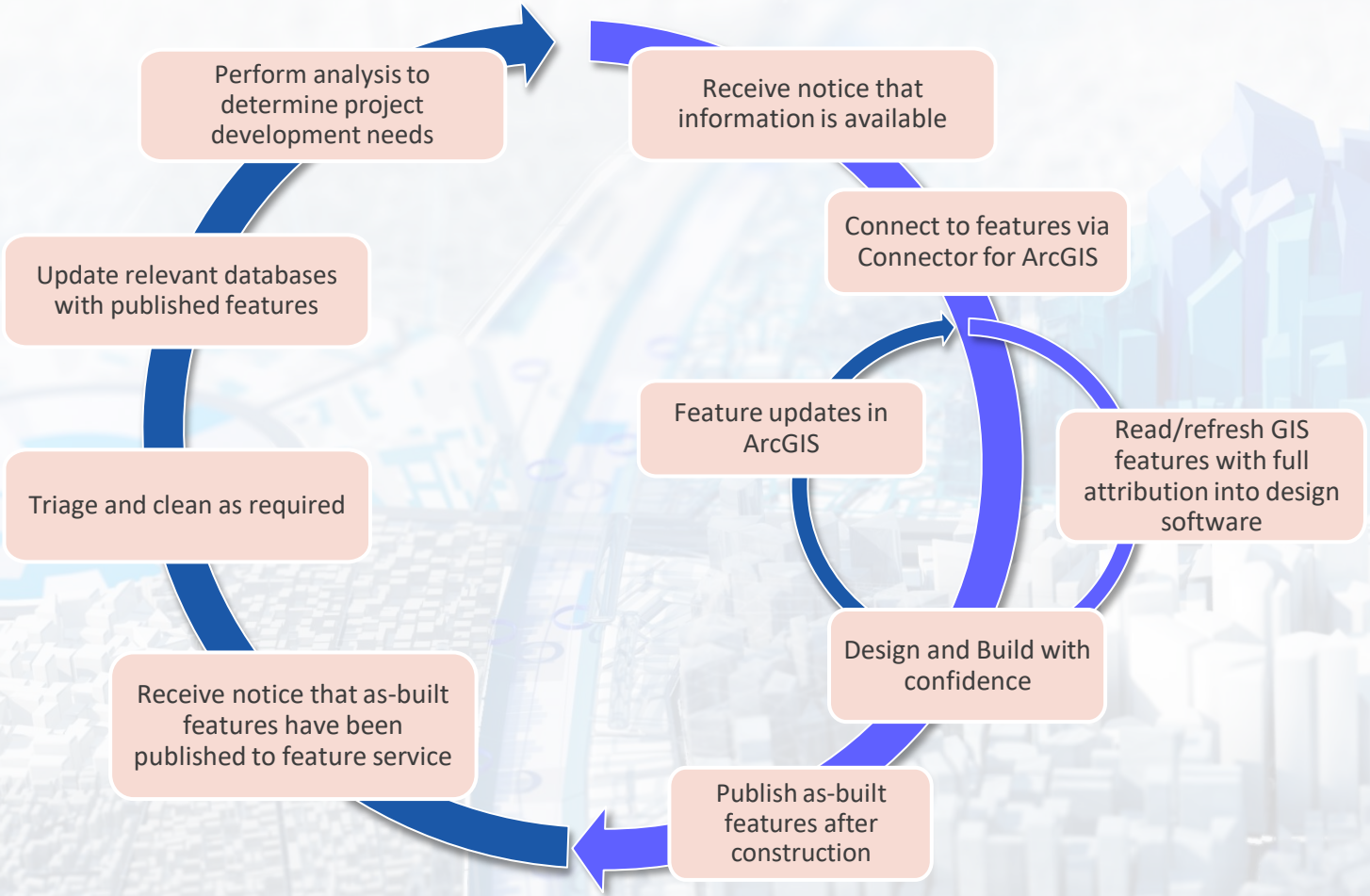
2021

- **Publish data to ArcGIS Online/Portals**





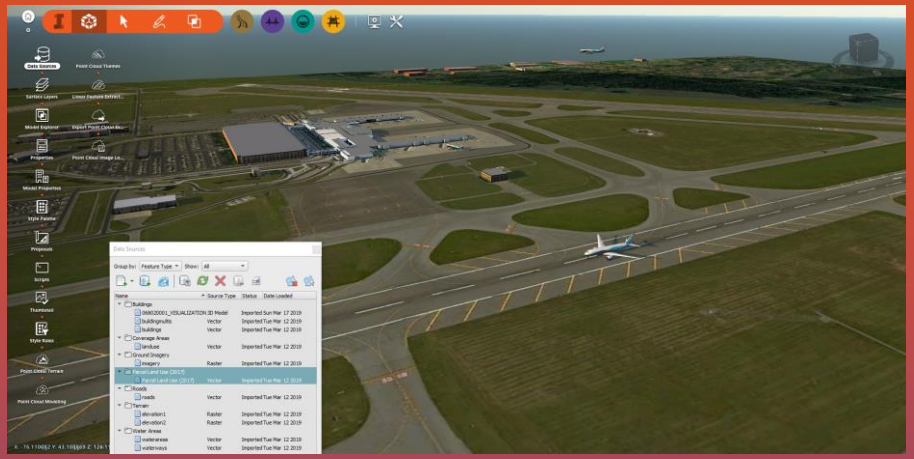
Connected GIS-BIM Workflow in Design



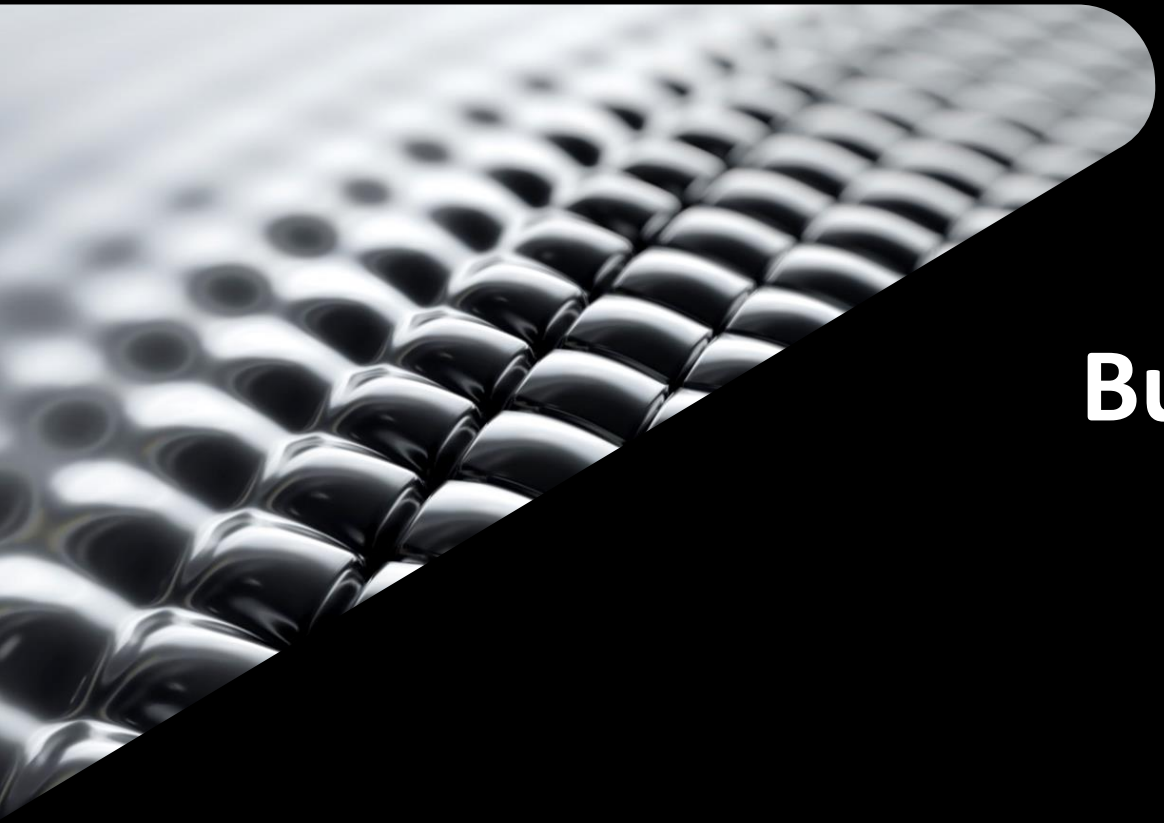
Value to AEC customers

"At C&S Companies we have many projects where legacy data weighs in both on the GIS side or the Design side, leading to a need for more robust exchange of information between design and GIS tools. This gives rise to complicated, redundant, file-based workflows that can be a real mess and impossible to unravel when project data is needed. The Autodesk Connector for ArcGIS is a dream."

Chuck Pietra– C&S Companies







Building Location Intelligence

Through ArcGIS Integrations

ArcGIS Integration Timeline

2018 & Prior

- ✓ArcGIS for AutoCAD (AFA)
- ✓ArcGIS Pro DWG & DGN 2.5D Support
- ✓RVT Direct Support
- ✓Create Building Scene Layer Package

2019

- ✓New BIM to GIS GP Tools
- ✓BIM File to GDB,
- ✓Make Building Layer
- ✓Data Simplification and Enhancements
- ✓Color Support

2020

- ✓AFA – Online and Enterprise, Living Atlas Support
- ✓ArcGIS Pro - BIM Cloud Connection
- ✓Civil 3D support
- ✓Building Layer Management
- ✓RVT Floorplans
- ✓Textures Support

2021

IFC Buildings Schema Support

- ✓Georeferencing Enhancements
- ✓Share Scene Layers for Editing
- ✓ArcGIS GeoBIM Released linking cloud-to-cloud

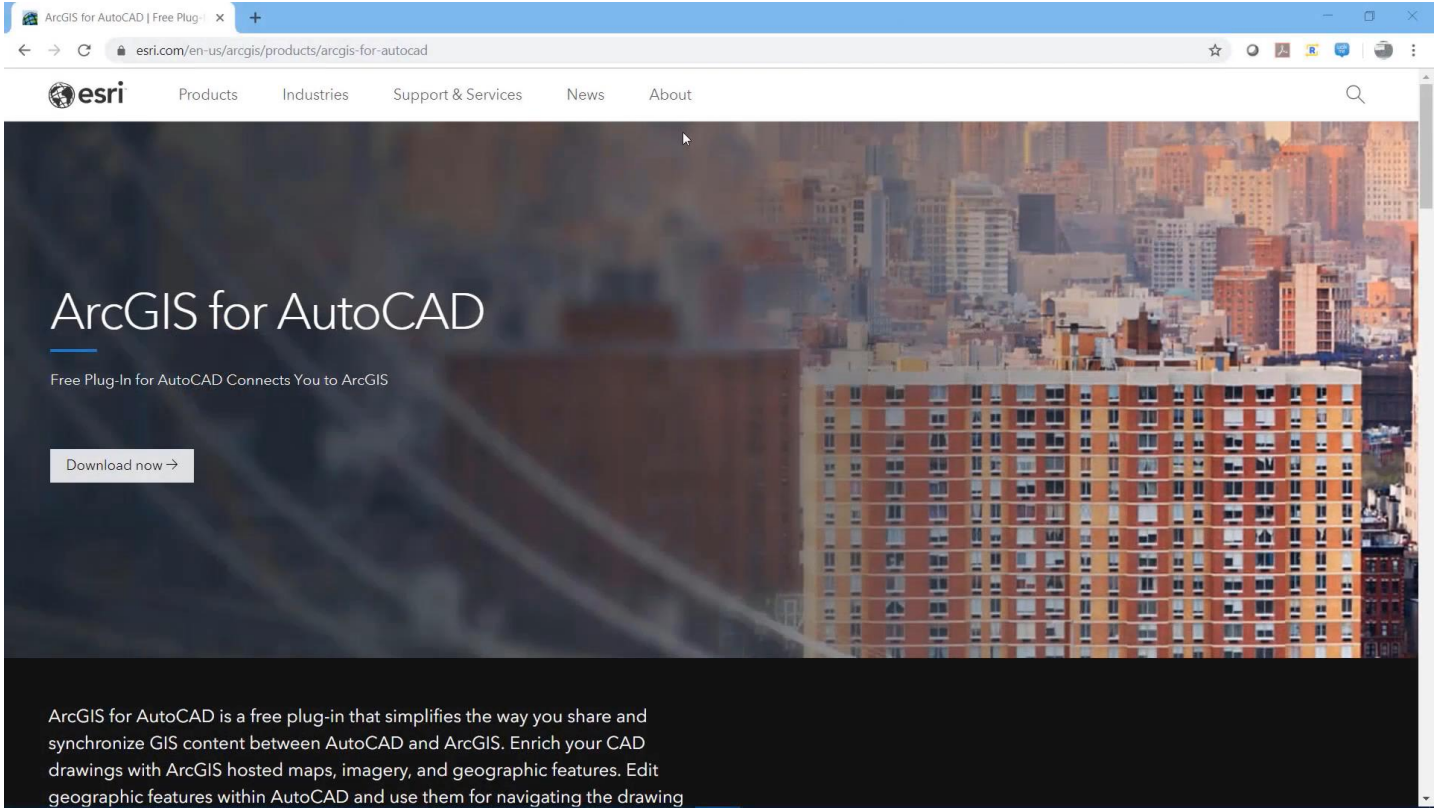
2022

- ✓AFA – Publishing from AutoCAD
- ✓ArcGIS Pro – Infrastructure Discipline, IFC 4x3 support, CS Support
- ✓ArcGIS GeoBIM – IFC Boundaries, Schedule Activity Linking



ArcGIS for AutoCAD

Version 410 - enabling the CAD professional to directly participate in GIS workflows



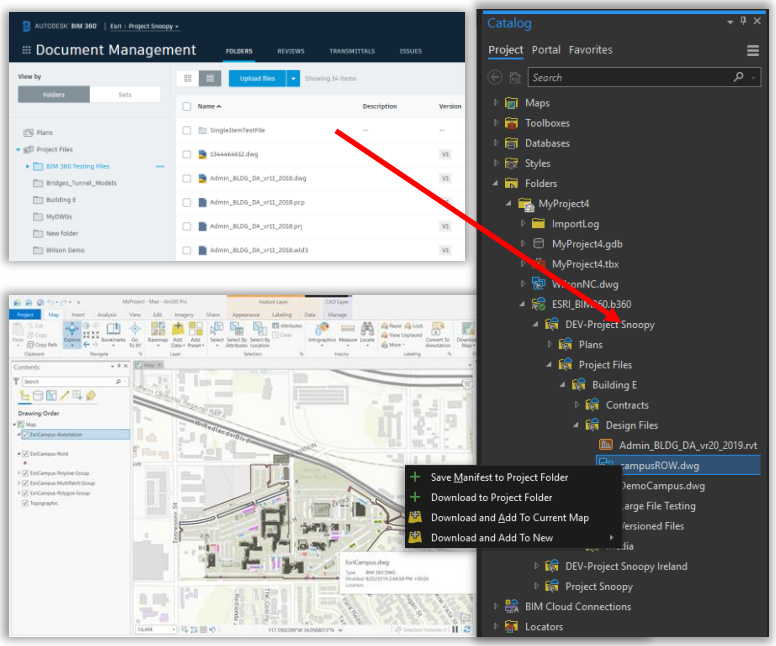
Where to begin in ArcGIS Pro?

Start with where BIM data is collaboratively developed…

- Yes, you can add BIM datasets locally into your ArcGIS Pro project!

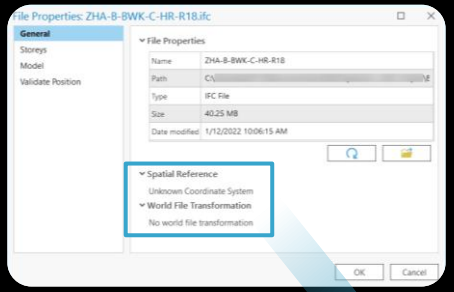
Or…

- Use a BIM Cloud Connection to bring in content directly from an Autodesk Construction Cloud source.
  - RVT, IFC, DWG, DXF, DGN

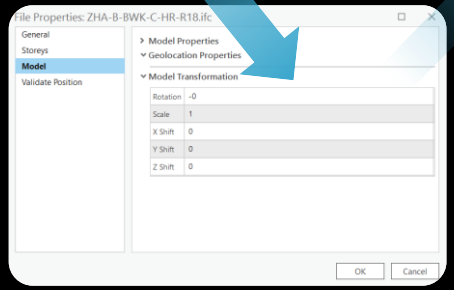


Georeferencing

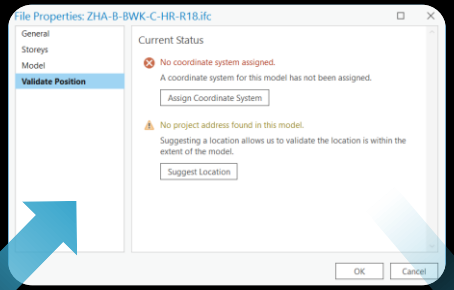
Updated Workflow in ArcGIS Pro



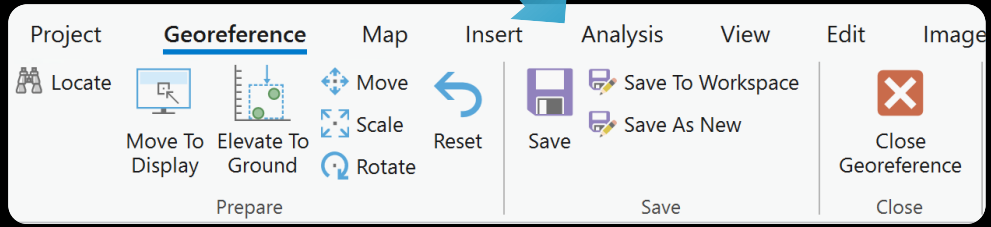
1. Inspect the digital model



2. Check Model Transformation



3. Validate Position to Assign CS and Suggest Address Location

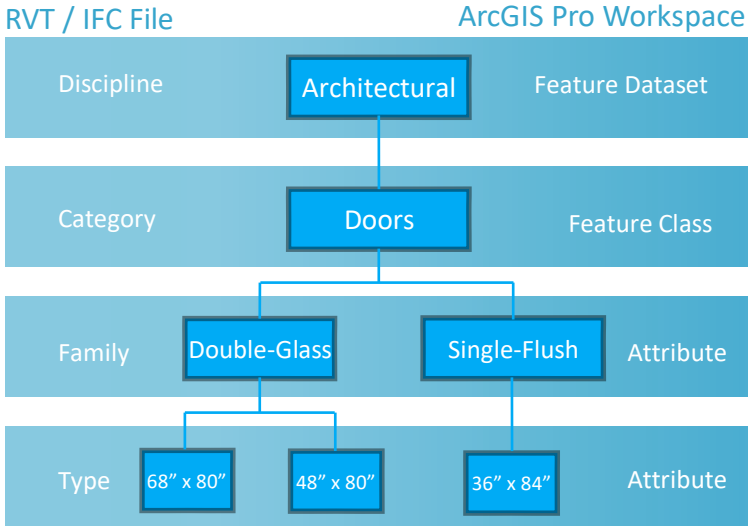


4. Make final positioning adjustments in the digital model

ArcGIS Pro

RVT & IFC Direct Read Support

- Direct read of 3D features from Autodesk's Revit .rvt files in ArcGIS Pro
- Categories as feature class names, by disciplines
- Object family and types as attributes; 2D Floorplan abstractions from RVT models only





ArcGIS Pro

Geoprocessing BIM into GIS

RVT

V2016 to 2022

- Drag & Drop / Add to Scene
or
- BIM File to GDB & Make Building Layer

IFC

2x3 and 4



Building Layer in ArcGIS Pro

Publish web scene as I3S Building Scene layer

- Cache locally (static)
- Cache online (editable/dynamic)

Create Building Scene Layer Package (SLPK)

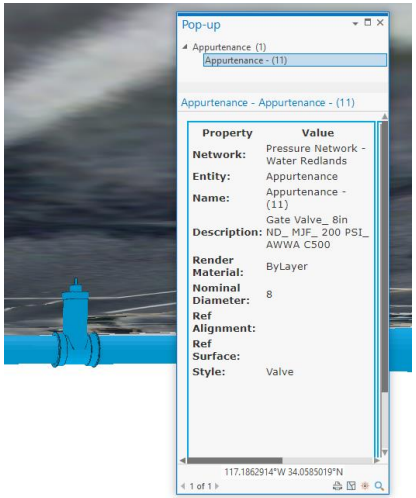
Consume in web, mobile, and desktop

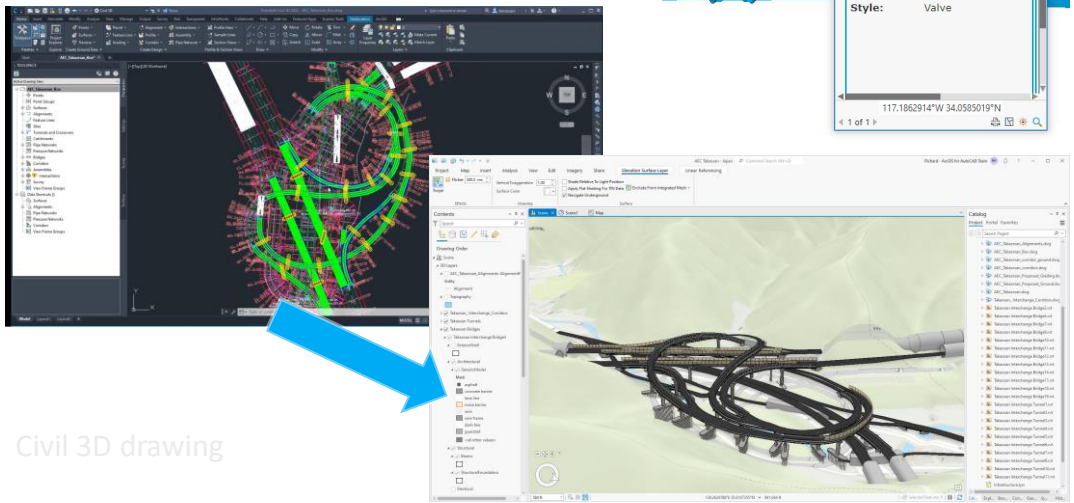
- Visualization
- Analysis
- Exploration
- Collaboration

ArcGIS Pro

Civil 3D DWG Direct Read Support

- Can use 2D & 3D Features
- Object Properties as attributes
- 3D DWG Solids as GIS Multipatch





Civil 3D drawing

Autodesk Civil 3D Object	Esri Geometry Type
Alignment	Polyline M
Appurtenance	Point
Site	Polygon
Catchment	Polygon
Feature Line	Polyline
Fitting	Point
Parcel	Polygon, Polyline
Pressure Pipe	Polyline, Multipatch
Gravity Pipe	Polyline, Multipatch
COGO Point	Point
Structure Point	Point
Surface Point, Break line, Surface	Point, Polyline, Multipatch
Solids	Multipatch

ArcGIS Pro

Geoprocessing CAD, Infrastructure Models into GIS

DWG

- Drag & Drop / Add to Scene
or
- CAD File to GDB



Feature Layer in ArcGIS Pro

Publish web map or scene as I3S Scene layer

- Cache locally (static)
- Cache online (editable/dynamic)

Create Map or Scene Layer Package (SLPK)

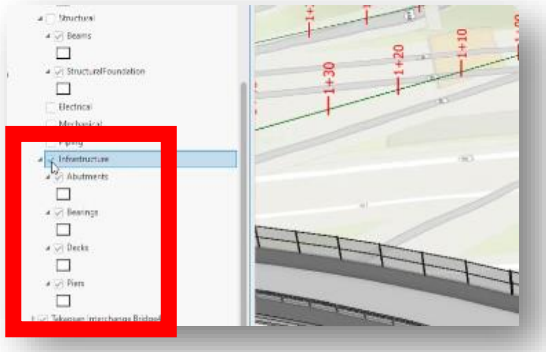
Consume in web, mobile, and desktop

- Visualization
- Analysis
- Exploration
- Collaboration

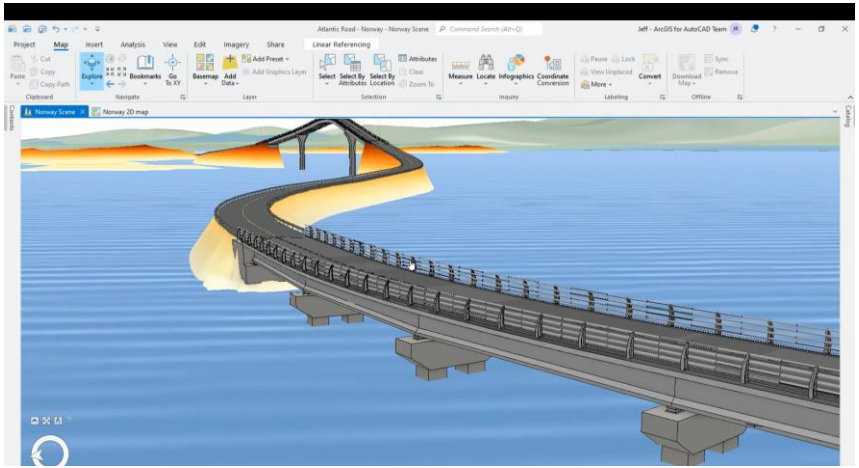
ArcGIS Pro

What's new in Version 3.0?

- ArcGIS Pro 3.0 supports additional infrastructure disciplines and attributes
  - Adds new Infrastructure discipline category
- Improved support for direct read of common BIM formats
  - RVT, DWG, IFC
- Continue expanding infrastructure support for IFC 4.3 standard through ODA Library updates
  - Expanding BIM Infrastructure Support to Rail, Airports, Bridges, Tunnels, Roadways



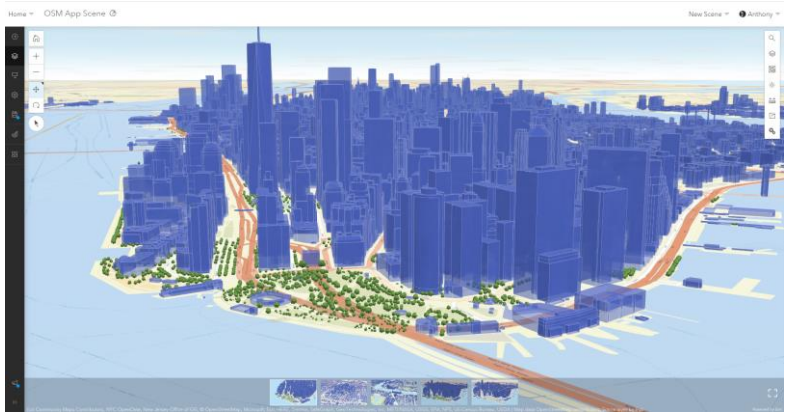
Infrastructure discipline in ArcGIS Pro

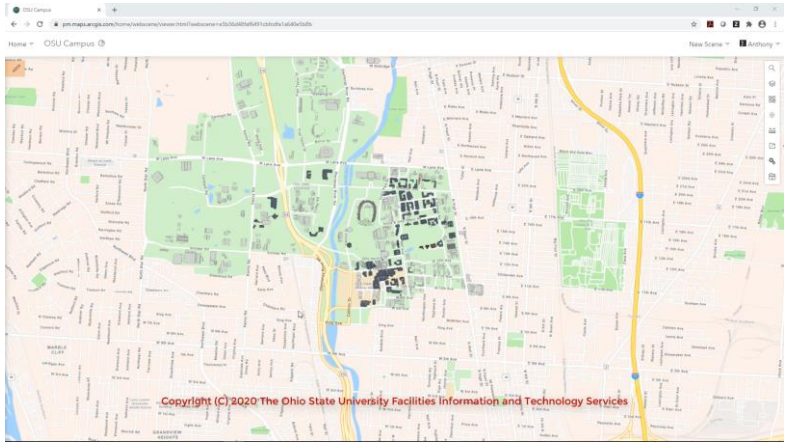


Scene Viewer

Bring together many layers into a web experience

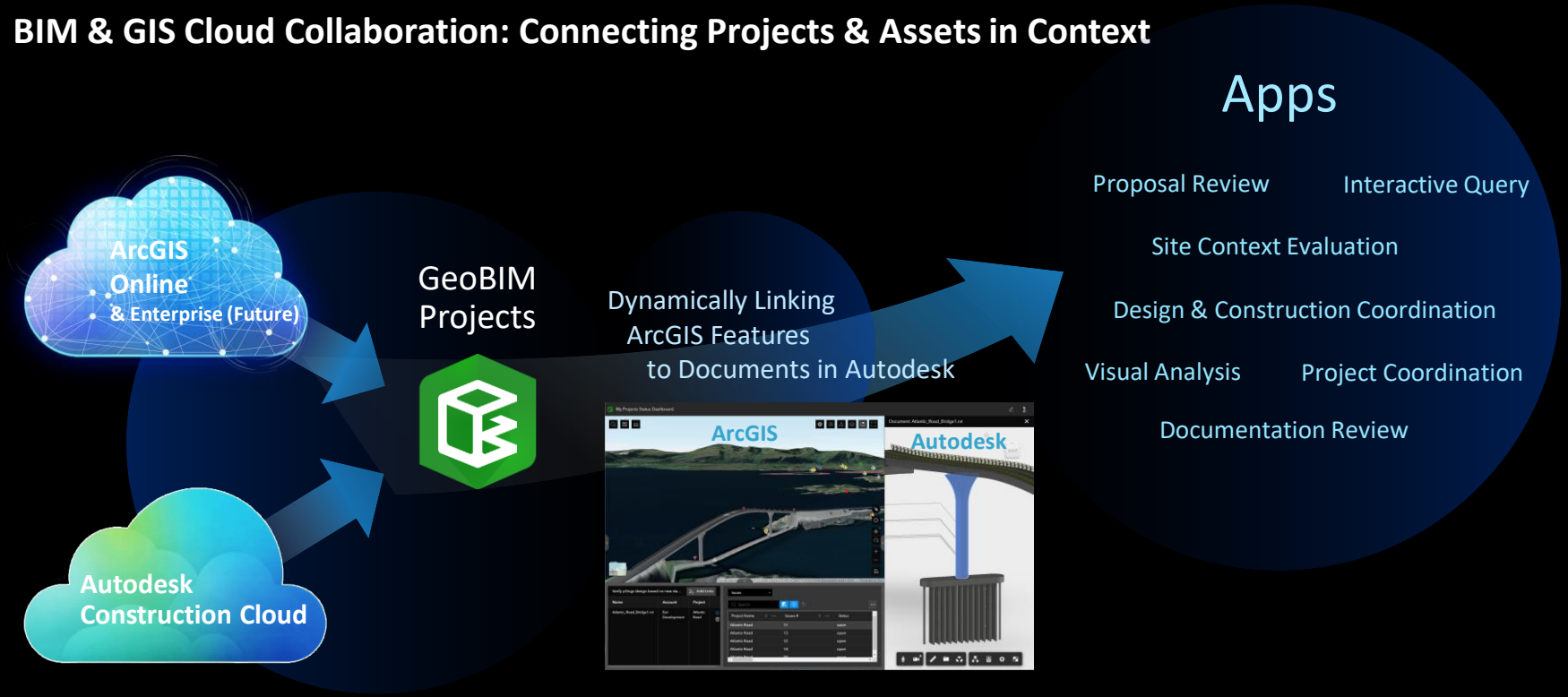
- Imagery
- Feature Layers (as 2D or 3D Symbols)
- NEW! OpenStreetMap 3D Buildings & Trees Layers
- I3S (Indexed 3D Scene) Layers
  - 3D Objects
  - Point Cloud
  - Integrated Mesh
  - Building Scene Layer
    - NEW! Infrastructure discipline to handle infrastructure components for bridges and rail





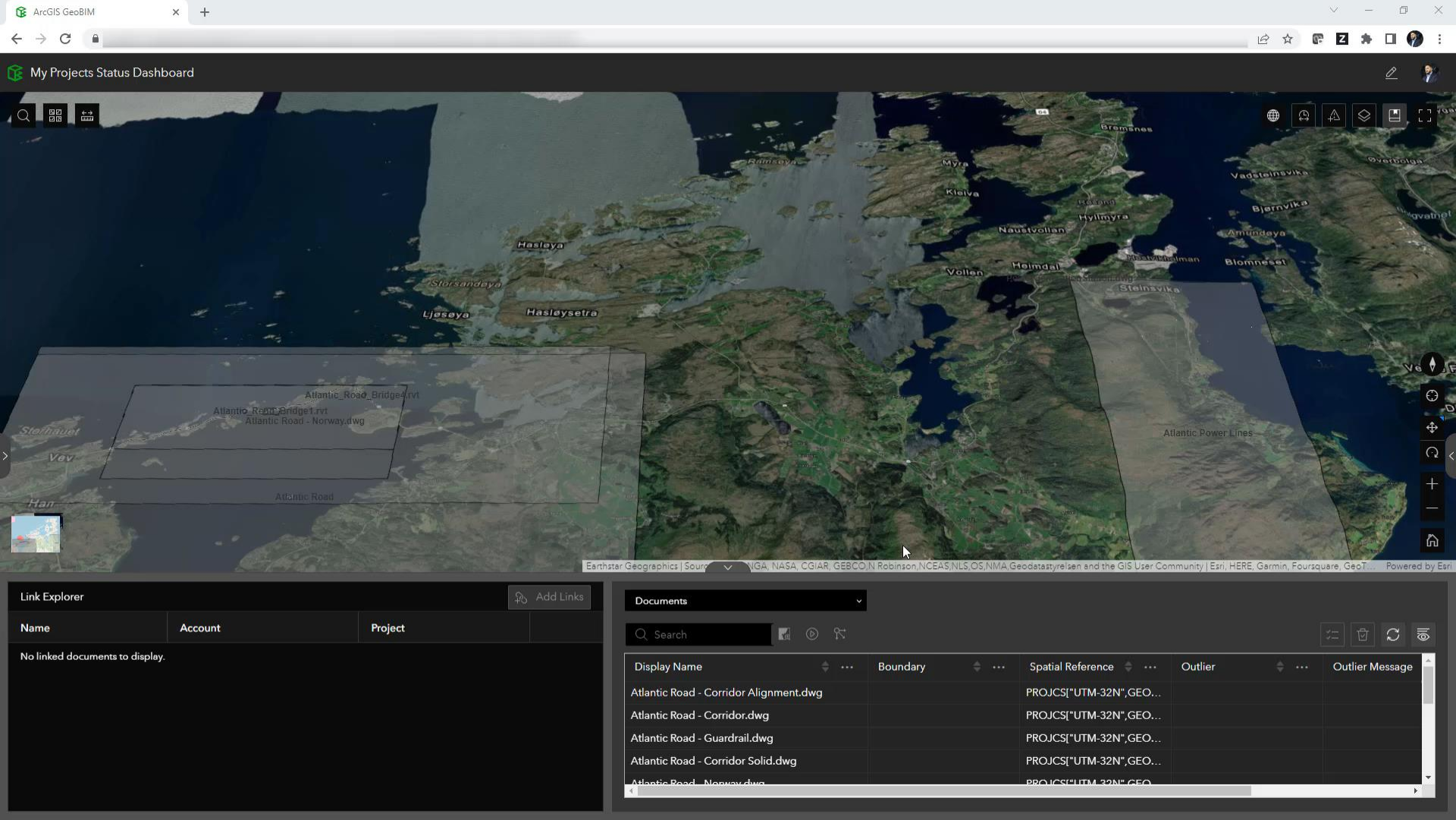
ArcGIS GeoBIM

BIM & GIS Cloud Collaboration: Connecting Projects & Assets in Context



Enabling Collaboration Across Teams . . .

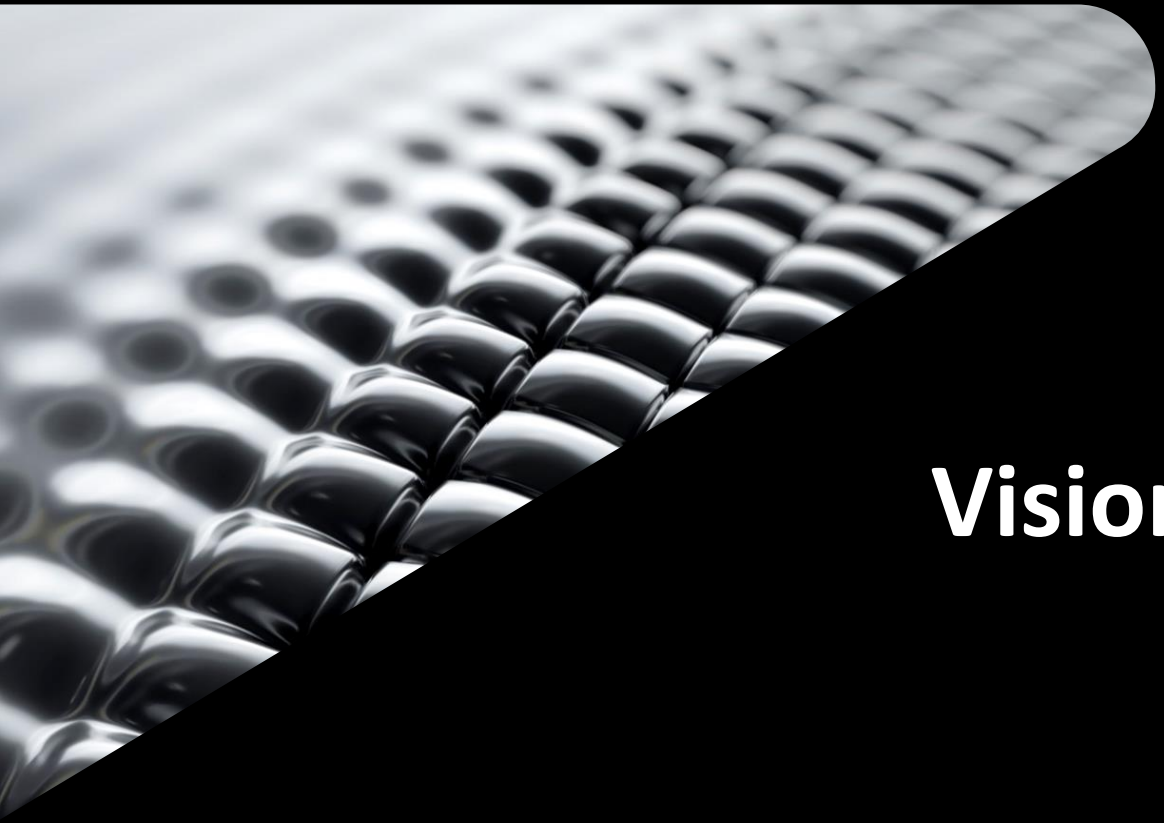
. . . To Design, Build, and Maintain Resilient Infrastructure


ArcGIS GeoBIM
My Projects Status Dashboard
Bremsnes
Myra
Kleiva
Hyllmyra
Naustvollan
Vollen
Heimdal
Steinsvika
Blomnesset
Bjørnvika
Vadsteinsvika
Hasløya
Storsandøya
Ljøsøya
Hasløysetra
Atlantic_Road_Bridge4.rvt
Atlantic_Road_Bridge1.rvt
Atlantic Road - Norway.dwg
Atlantic Road
Atlantic Power Lines
Stofnhauet
Vev
Han
Earthstar Geographics | Sour NGA, NASA, CGIAR, GEBCO,N Robinson,NCEAS,NLS,OS,NMA,Geodatastyrelsen and the GIS User Community | Esri, HERE, Garmin, Foursquare, GeoT... Powered by Esri
Link Explorer
Add Links
Name
Account
Project
No linked documents to display.
Documents
Search
Display Name
Boundary
Spatial Reference
Outlier
Outlier Message
Atlantic Road - Corridor Alignment.dwg
PROJCS["UTM-32N",GEO...
Atlantic Road - Corridor.dwg
PROJCS["UTM-32N",GEO...
Atlantic Road - Guardrail.dwg
PROJCS["UTM-32N",GEO...
Atlantic Road - Corridor Solid.dwg
PROJCS["UTM-32N",GEO...

Benefits of BIM & GIS Cloud Collaboration

- Easy, and immediate access to documentation managed in Autodesk Docs
- Provides business insights on project performance and quality within a holistic view in ArcGIS
- Saves time and labor searching for relevant information and historical context
- Ensures secure collaboration across systems
- Reduces custom development





Vision for the Future

To Promote a Sustainable World

BIM & GIS Integration

Enables Informed Decision Making

Autodesk & Esri continue to expand BIM with geospatial context to enable collaboration, transparency, and sustainability across the project and asset life cycle…

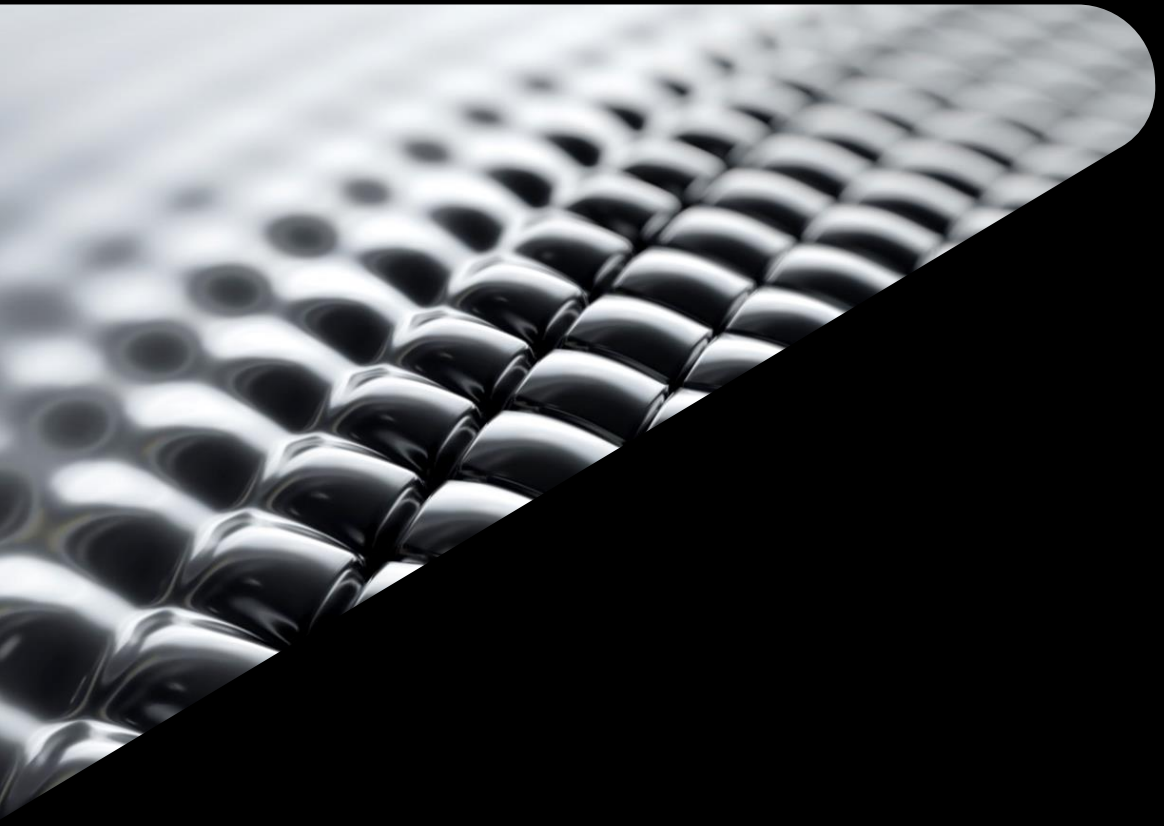


… to help build better, livable communities

Resources

- Contact us:
  - **Share feedback in this Survey to drive future Integrations!**
  - Product Communities:
    - Autodesk Civil 3D, Autodesk InfraWorks, Autodesk Map3D, Autodesk Revit
    - ArcGIS for AutoCAD, ArcGIS Pro, ArcGIS GeoBIM
- Learn more:
  - Autodesk
    - Connector for ArcGIS – Detailed workflow and YouTube Channel
    - BIM & GIS Integration
    - BIM and GIS Cloud Collaboration Joint Offer
  - Esri
    - BIM & GIS Learn Path
    - ArcGIS GeoBIM





Q & A



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