GIS + BIM
For AEC Project Delivery & Operations

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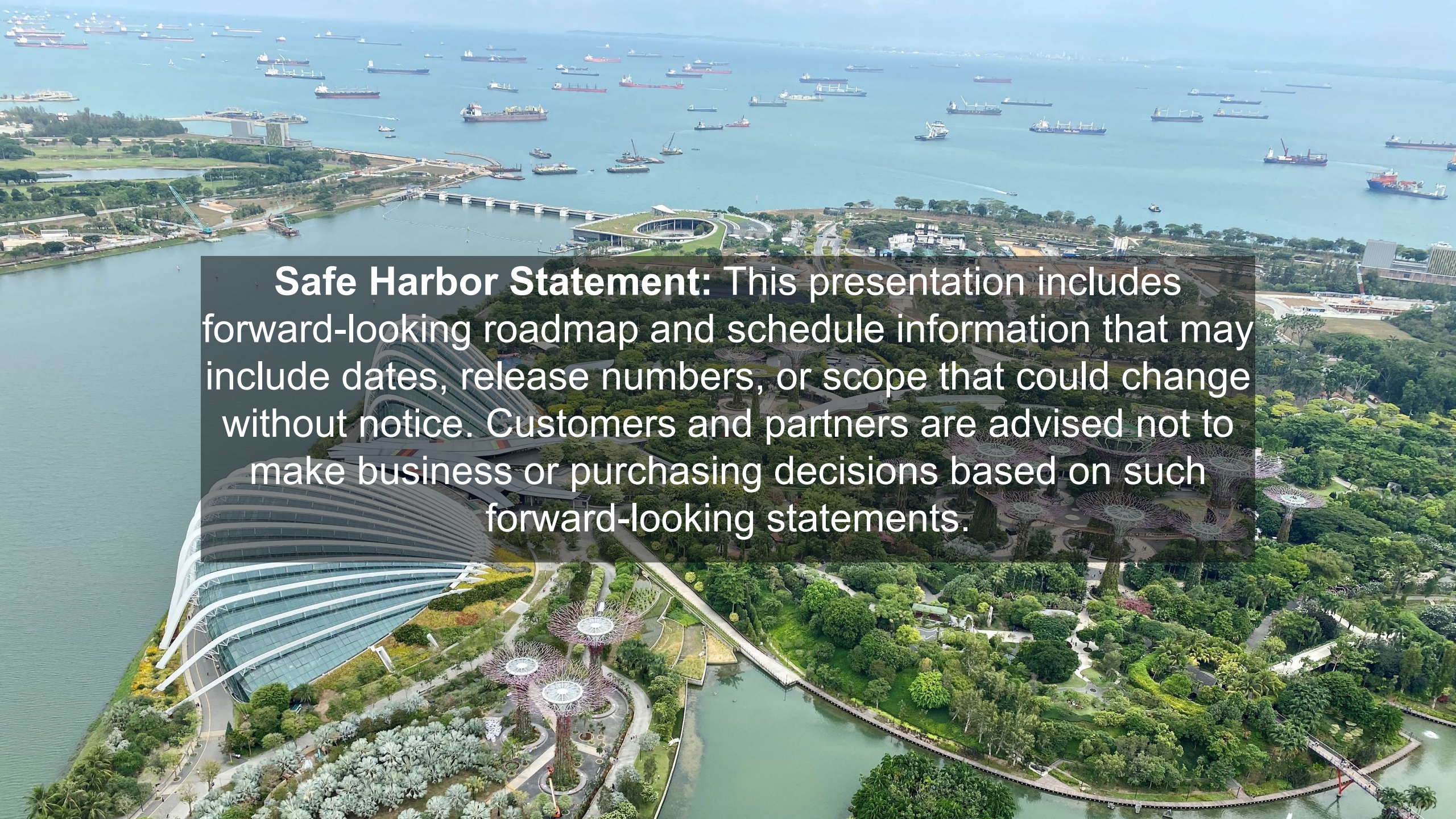


Safe Harbor Statement: This presentation includes forward-looking roadmap and schedule information that may include dates, release numbers, or scope that could change without notice. Customers and partners are advised not to make business or purchasing decisions based on such forward-looking statements.

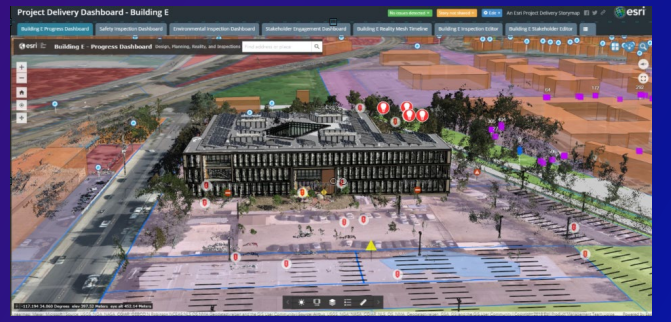
GIS + BIM for AEC Project Delivery & Operations

- A look at the value of BIM and GIS for Project Delivery
  - Starting from the end
  - How does BIM and GIS fit in with Project Delivery
  - Who benefits from Project Delivery
- Overview of Revit / Civil 3D
  - Direct read of Revit Data
  - Slice and Dice
- IFC opening the door to BIM data exchange
  - What is supported
  - How does it compare to the Revit support
- Expanding the value of BIM and GIS with Schedule Data
  - Moving from 3D to 4D (5d?)
- ArcGIS GeoBIM –
  - The next generation of BIM and GIS Integration
- Q+A Discussion

A Look at BIM and GIS in Project Delivery

Lets start from the end

BIM and AEC in ArcGIS

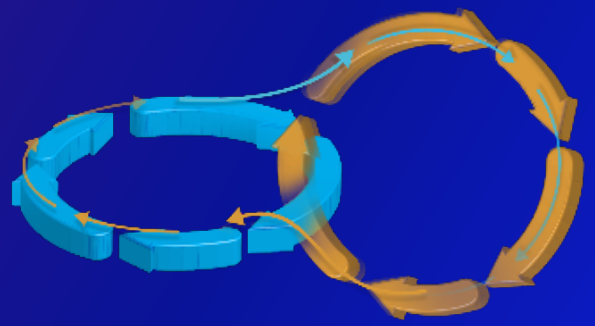


- Integrating design and geospatial data is becoming the standard throughout the AEC industry. The perception that BIM and CAD data are separate silos from GIS is diminishing.
- It is becoming increasingly easier to integrate BIM models into ArcGIS Pro and share the design across project teams.
- The evolution of integrating design and operation workflows into spatial context and the advancing capabilities for ArcGIS help make ArcGIS the prime solution for AEC firms and Owner/Operators to better manage projects and infrastructure.
- The ease of sharing content, connecting field and sensor data, analyzing and predicting operational trends is solidifying ArcGIS as the future of AEC Project Delivery and Operations Management.

Transforming Asset Lifecycle Management with ArcGIS through BIM and GIS Integration

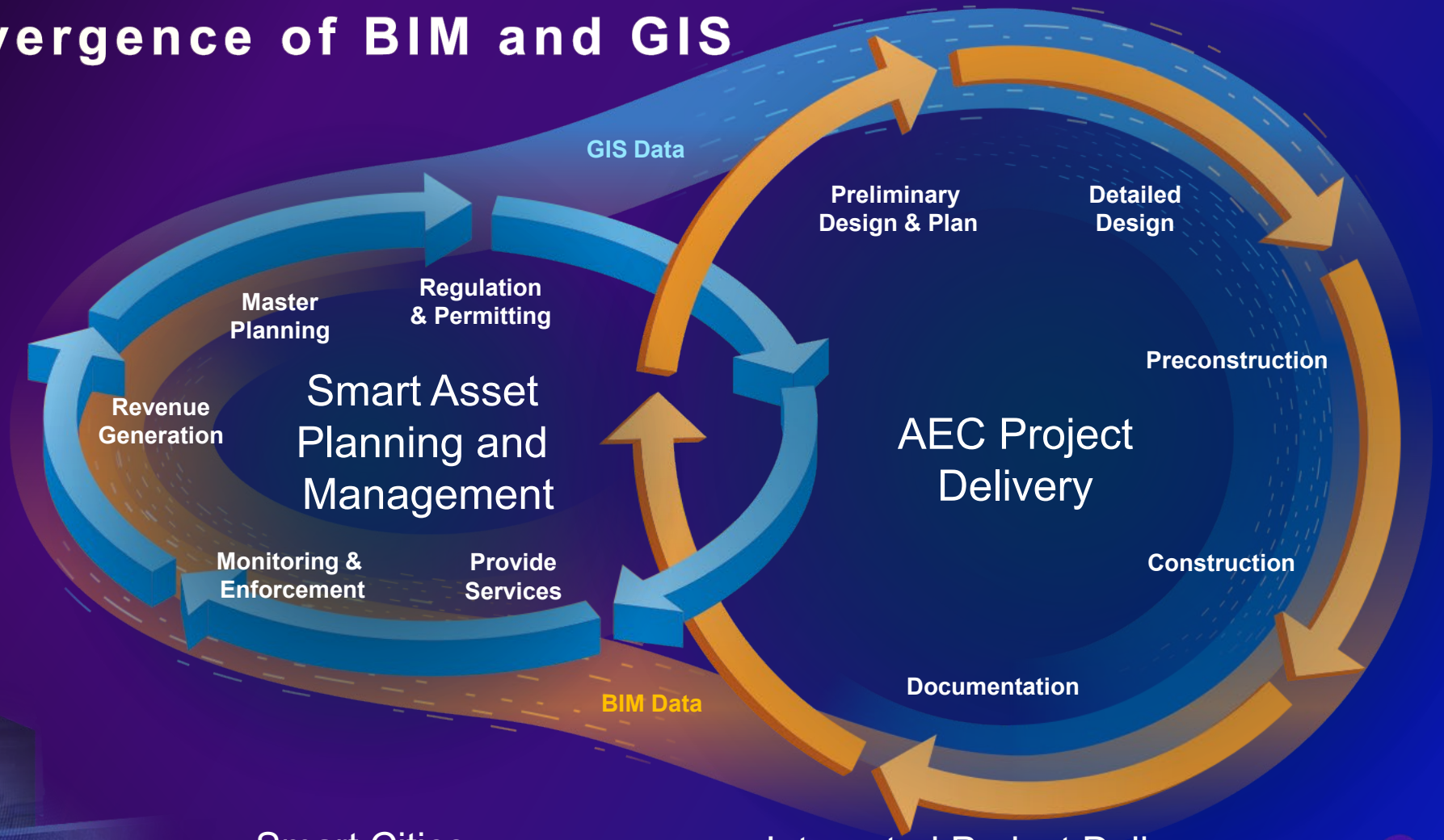
- AEC professionals leverage GIS information to provide the context and constraints for planning, permitting, design and construction.

- Owner/operators use GIS information to plan and manage asset portfolios and use information from BIM represent the built environment



- BIM and GIS together offer the opportunity to transform project delivery and the operation of infrastructure, systems, and cities leading to better outcomes and more efficient operation

The Convergence of BIM and GIS



Smart Cities
Capital Portfolios
Smart Infrastructure
…

Integrated Project Delivery
Digital Engineering
Building Information Modeling
…

ArcGIS Is Being Leveraged By Multiple AEC Project Teams

Plan

Environmental Inspectors
Planners
Public Outreach
Wetlands Agents
Land Surveyors
Data Engineer
BIM Technicians
Drone Technicians
Engineers
Owner Operators

Design

Cartographers
CAD Drafters
Project Controls Specialists
Asset Managers
Scheduler
Site Superintendent
BIM Technicians
Real Estate Team
Land Use Agents

Build

Construction Inspectors
Public Officials
Architects
Archaeologists
Maintenance Technicians
Building Inspectors
Executives
GPU
Program Managers
GIS Professionals

Operate

Safety Managers
Computer Technicians
General Public
Stakeholders
AI&ML Developers
Regulatory Compliance Officers
Project Managers

Alignment of Project Teams helps to successfully plan, design, construct and operate assets throughout their lifecycle

ArcGIS - Managing AEC Project Delivery and Smart Assets

Complex Interactions between many Disciplines and Technologies Provide Workflows for Critical Tasks

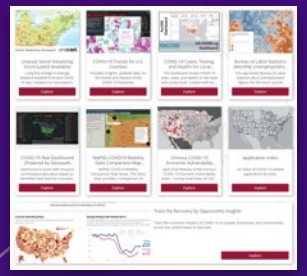
GIS Maps and Dashboards

Giving Project Teams the Power of Real-Time and Data-Driven Visualization

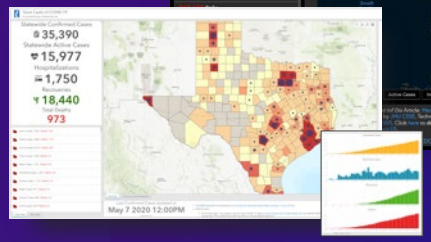
Dynamic &
Interactive

Analytic

Geospatial
Infrastructure



Maps



Dashboards

StoryMaps

Public

Decision Makers

Policy Makers

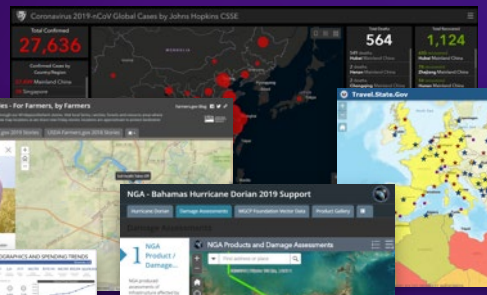
Telling the Stories That Help People Understand

ArcGIS Apps Give the Power to Everyone

Providing Easy Access

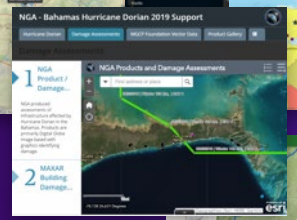
Interactive Web Apps

Dashboards

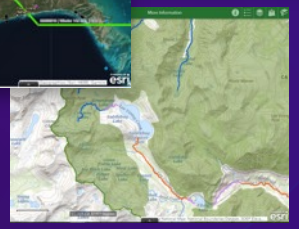


Mapping

Infographics



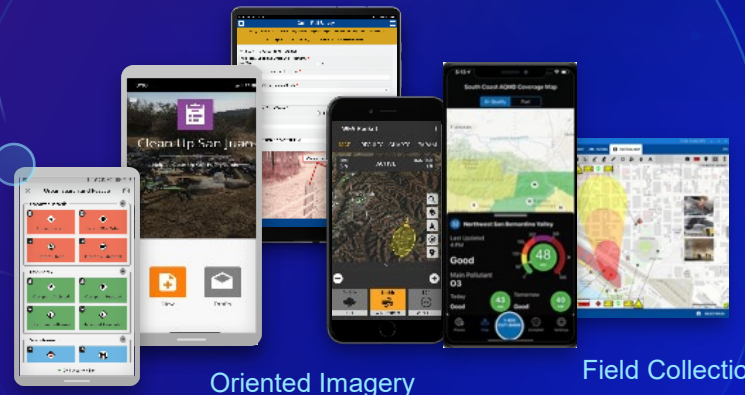
StoryMaps



Web Maps

Layers & 3D Scenes

Mobile Deployments



Oriented Imagery

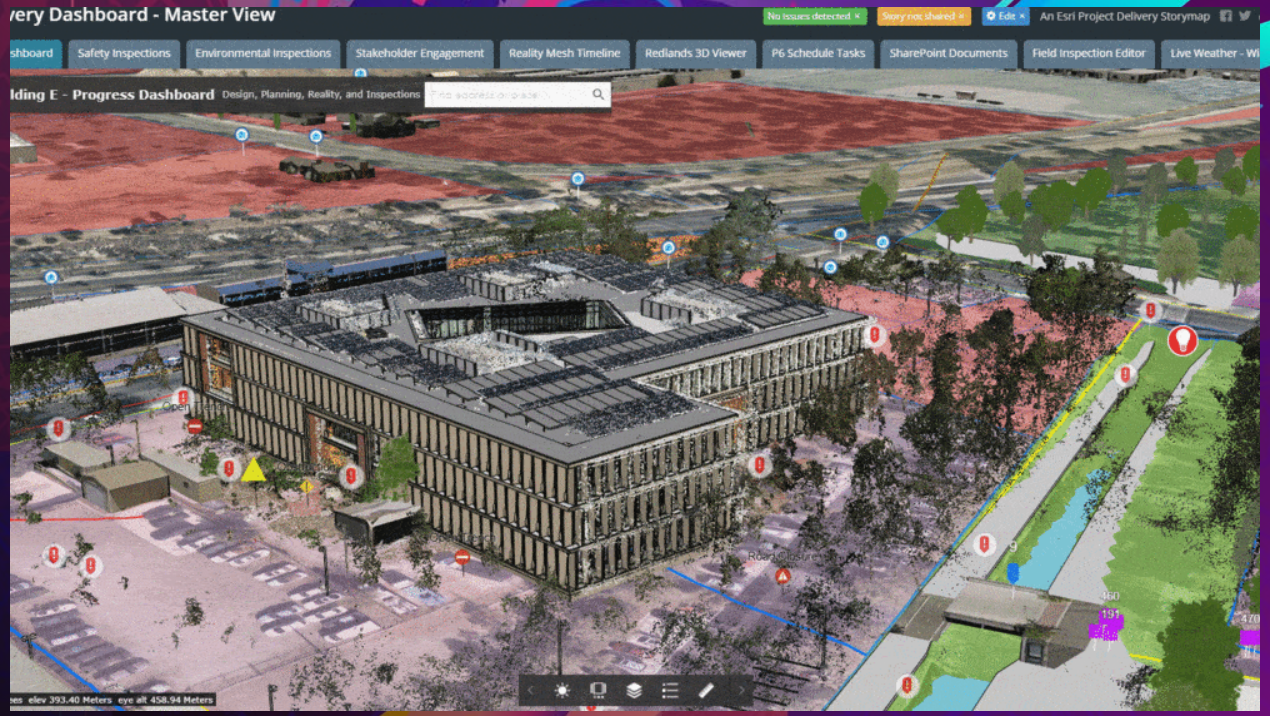
Field Collection

Field Surveys

Mobile 3D

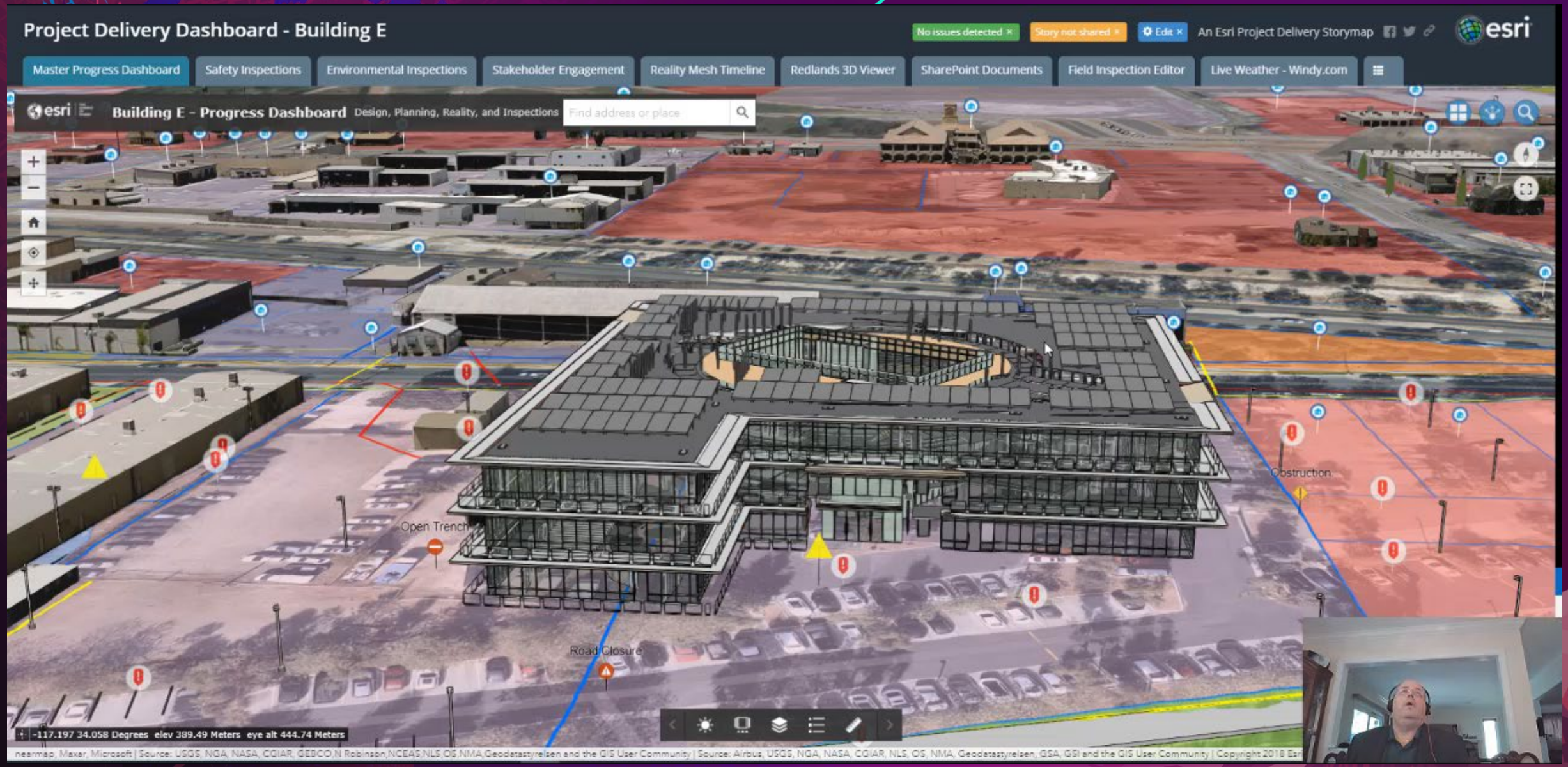
Geospatial Infrastructure

Opening Access to Everyone



Project Delivery Demo

Steven Santovasi


Project Delivery Dashboard - Building E
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Story not shared
Edit
An Esri Project Delivery Storymap
esri
Master Progress Dashboard
Safety Inspections
Environmental Inspections
Stakeholder Engagement
Reality Mesh Timeline
Redlands 3D Viewer
SharePoint Documents
Field Inspection Editor
Live Weather - Windy.com
Building E - Progress Dashboard
Design, Planning, Reality, and Inspections
Find address or place
Open Trench
Road Closure
Obstruction
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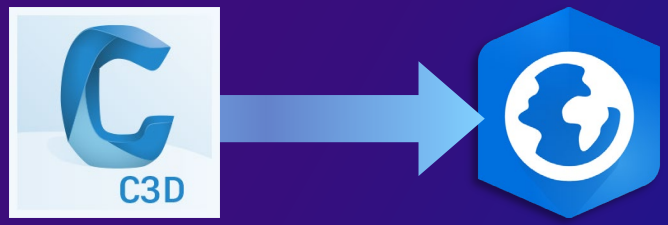
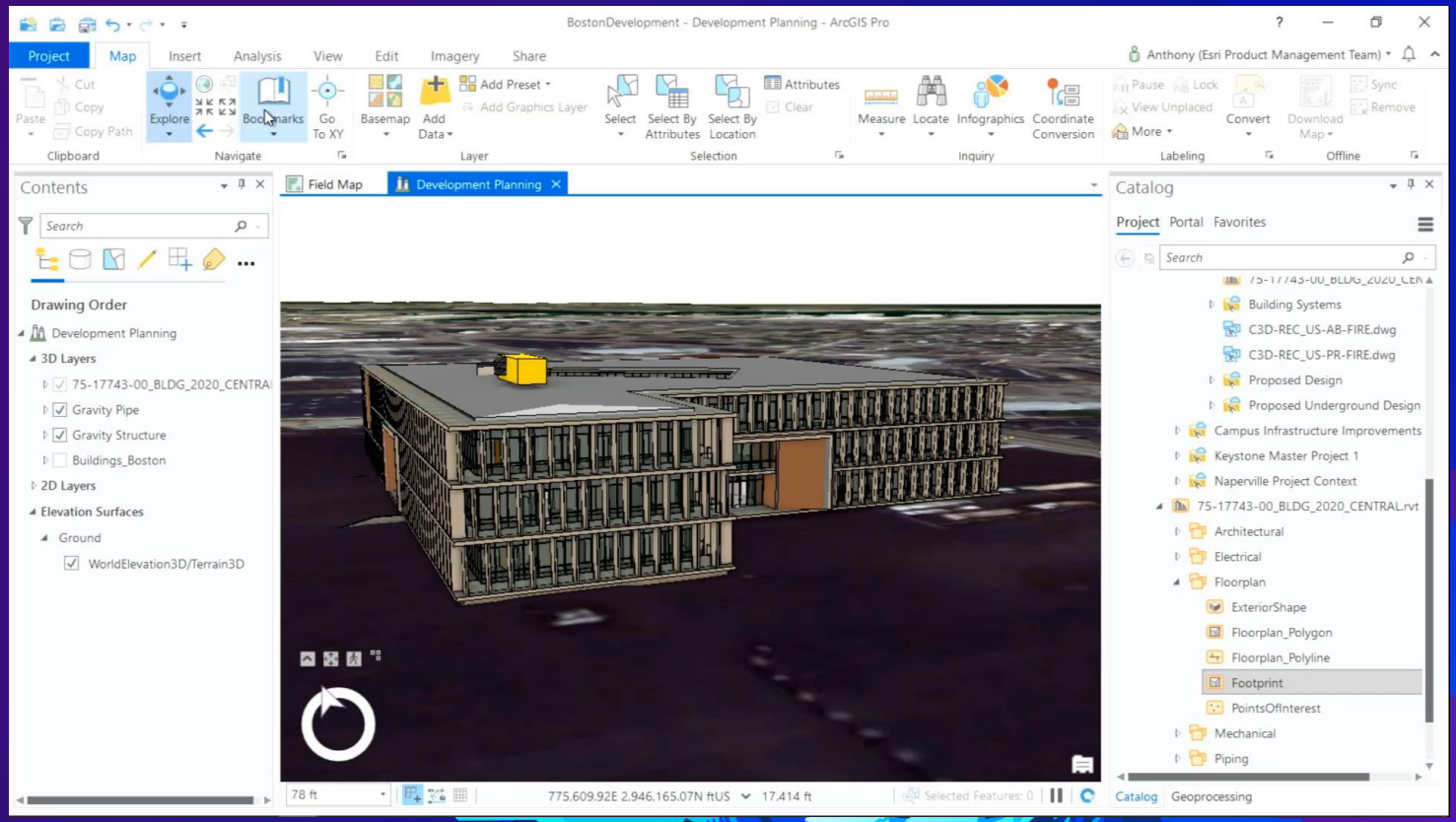
Overview of Civil 3D & Revit in ArcGIS Pro

Enhanced Support of AEC Workflows in ArcGIS Pro

ArcGIS Pro Integration – Civil 3D



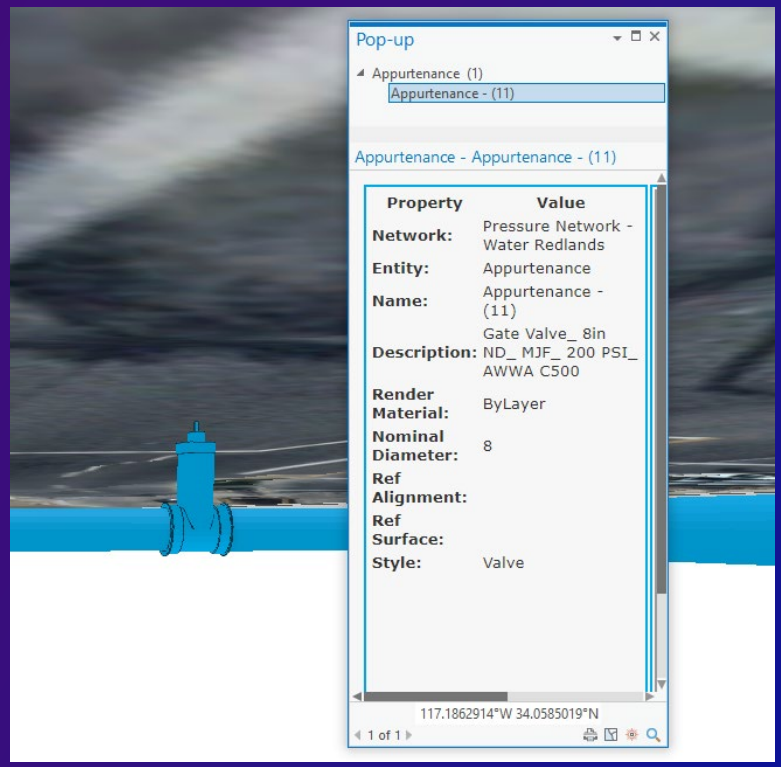
- Direct read of Autodesk Civil 3D .dwg files in ArcGIS Pro
- 2D and 3D
- Object Properties as attributes



ArcGIS Pro Integration – Civil 3D

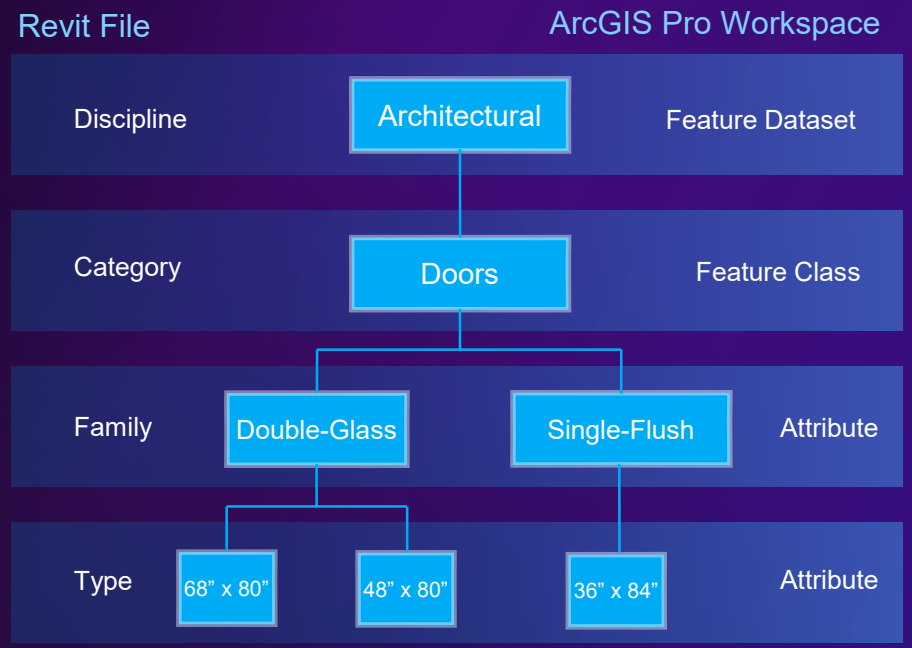
Autodesk Civil 3D Object	Esri Geometry Type
Alignment	Polyline
Alignment Profile	Polyline
Appurtenance	Point
Site	Polygon
Catchment	Polygon
Feature Line	Polyline
Fitting	Point
Parcel	Polygon, Polyline
Pressure Pipe	Polyline
Pipe	Polyline
COGO Point	Point
Structure Point	Point
Surface Point	Point

Supported Autodesk Civil 3D entities and their ArcGIS Pro Geometric type



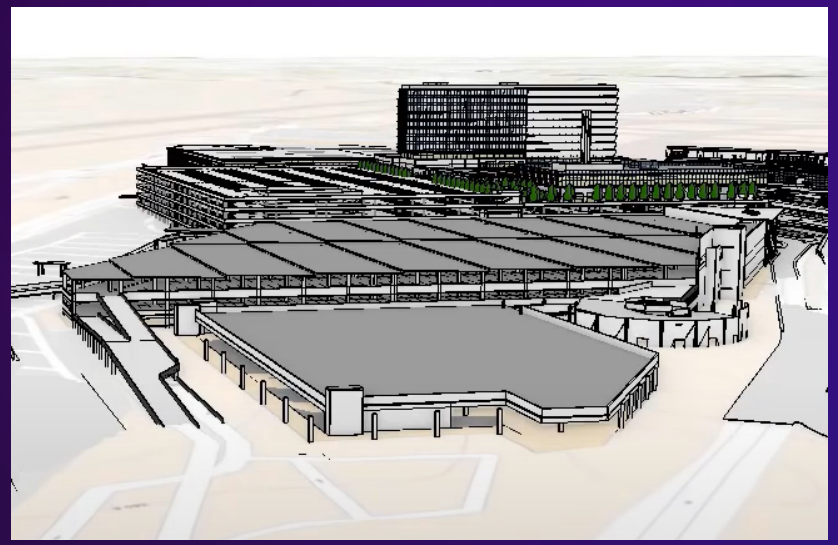
ArcGIS Pro Integration – Revit

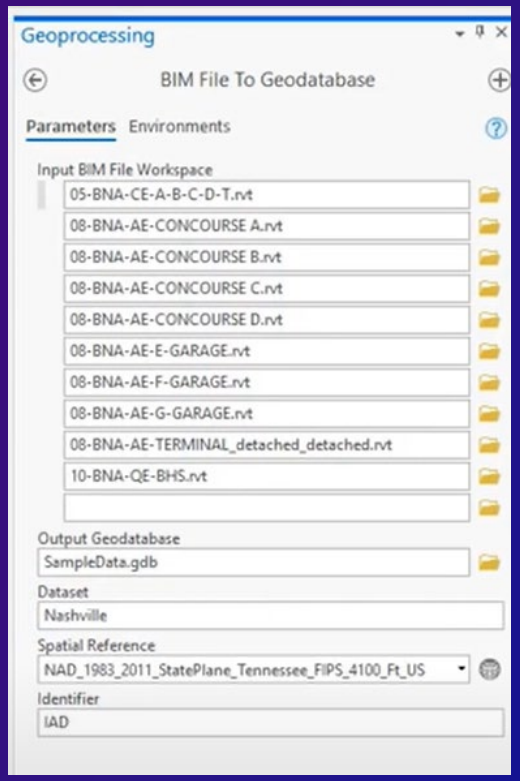
- Direct read of 3D features in Autodesk's Revit .rvt files in ArcGIS Pro
- Revit categories as feature class names, by construction disciplines
- Object family and types as attributes

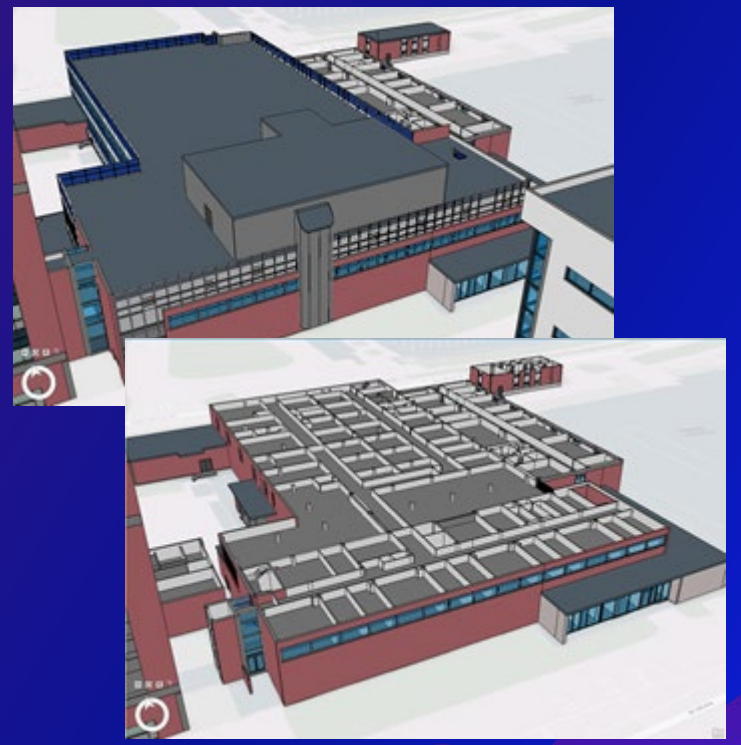


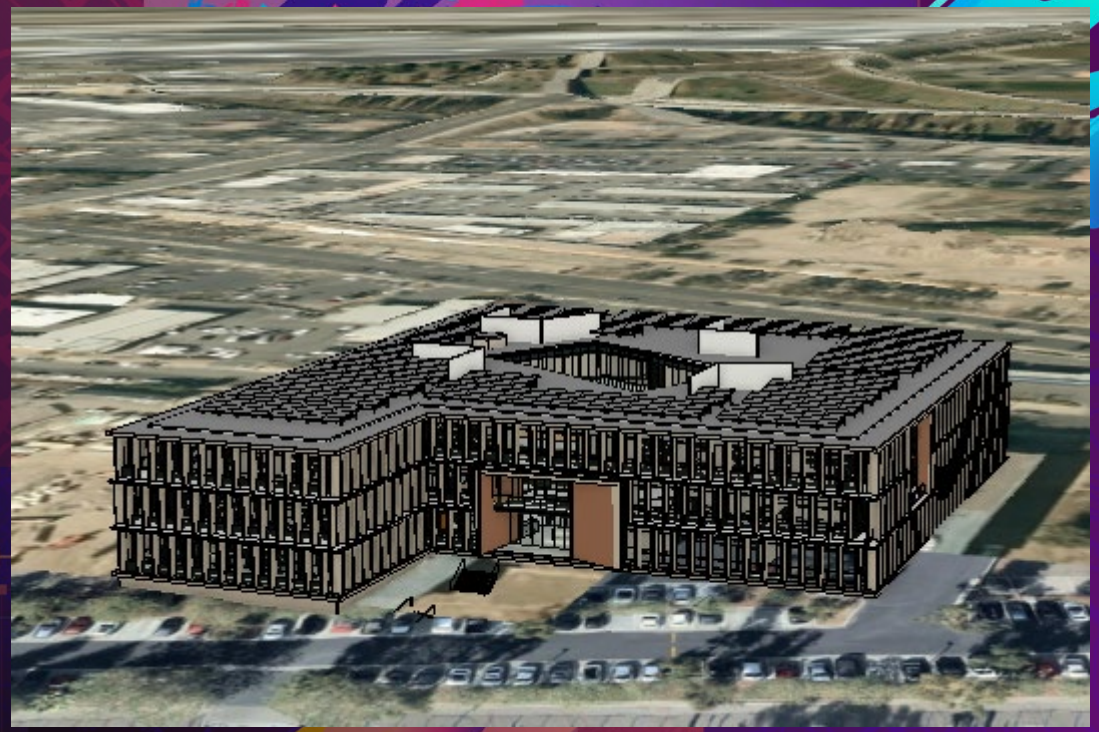
Tools and Workflows for Revit

- Georeferencing Support for Revit
- BIM to file Geodatabase
- Building Filter
- Create Building Scene Layer



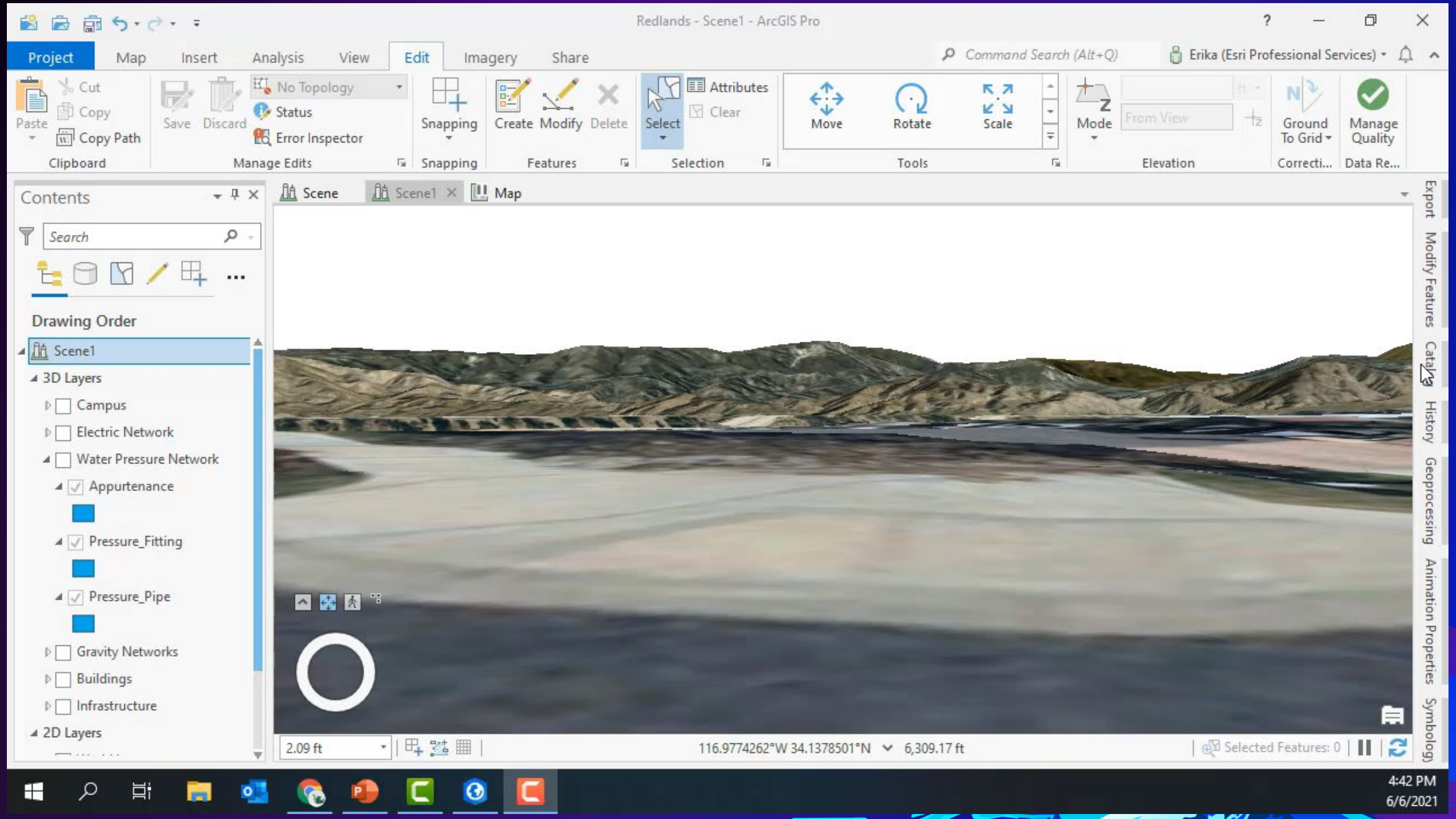






Civil 3D and Revit in ArcGIS Pro

Demonstration video


Redlands - Scene1 - ArcGIS Pro
Project
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Command Search (Alt+Q)
Erika (Esri Professional Services)
Cut
Copy
Copy Path
Paste
Clipboard
Save
Discard
No Topology
Status
Error Inspector
Manage Edits
Snapping
Snapping
Create
Modify
Delete
Features
Attributes
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Rotate
Scale
Tools
Mode
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Data Re...
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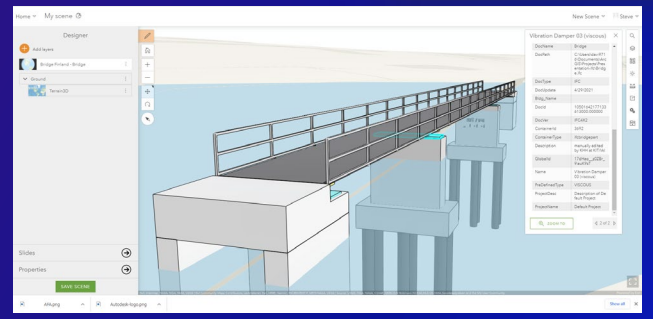
3D Layers
Campus
Electric Network
Water Pressure Network
Appurtenance
Pressure_Fitting
Pressure_Pipe
Gravity Networks
Buildings
Infrastructure
2D Layers
Scene
Scene1
Map
Export
Modify Features
Catalog
History
Geoprocessing
Animation Properties
Symbology
2.09 ft
116.9774262°W 34.1378501°N
6,309.17 ft
Selected Features: 0
4:42 PM
6/6/2021

Whats new in ArcGIS with IFC Integration

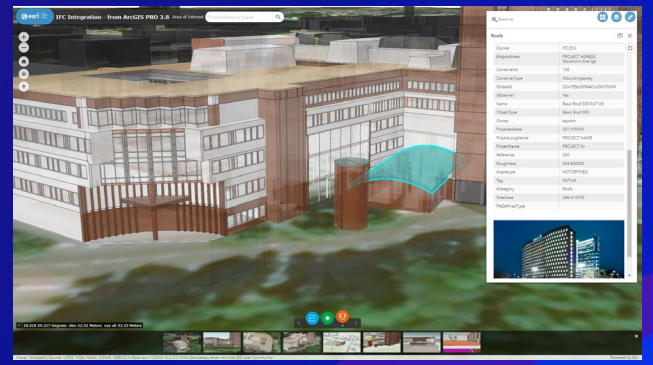
Direct Integration of IFC BIM format in ArcGIS Pro 2.8

IFC Integration - Overview

- **buildingSmart International - Industry Foundation Classes (IFC) is an open international standard that is used to create an *exchange* version of a BIM model for sharing and is not typically used for editing. It is often compared to a PDF of a Word document.**
- **This gives the opportunity for end users to contextually review IFC file content from different disciplines and different source applications.**
- **Can be viewed in context with GIS and other spatial and design data for location, compliance, clashes and other issues.**
- **IFC is heavily adopted internationally and in some areas is more common than Revit**
- **There is support for import and export of IFC within Autodesk Revit and most BIM software applications**
- **Beginning in ArcGIS Pro release 2.8 Esri will support IFC 2x3 and 4x for Buildings**



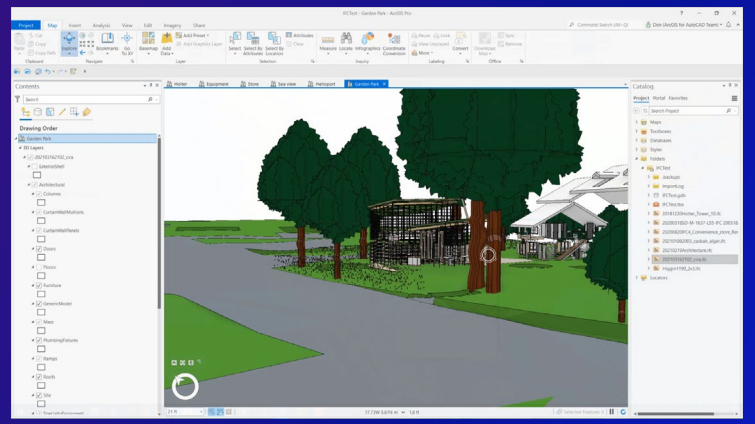
IFC Model integrated in ArcGIS Pro 2.8



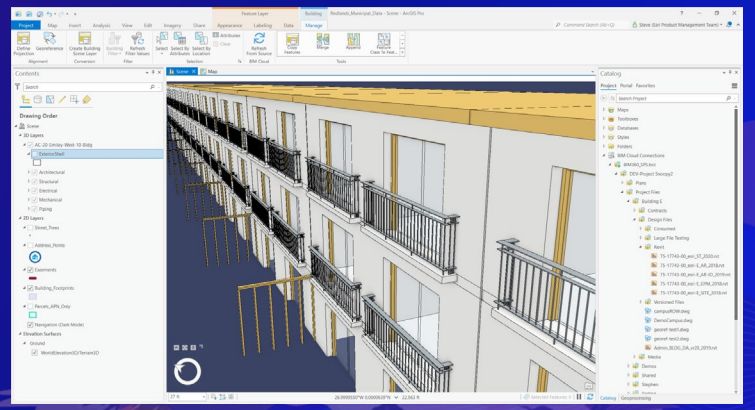
IFC Model integrated and shared through ArcGIS Online Web App Builder

IFC Integration

- IFC fits seamlessly into the same ArcGIS Pro workflows as Revit
  - Directly read of IFC in ArcGIS Pro
  - Same ArcGIS Pro workflows to convert IFC to BSL and GDB
  - IFC files can also be accessed through ArcGIS Pro's BIM Cloud Connection to BIM360 or the Autodesk Construction Cloud (ACC)
- IFC Beta Program has been very successful and has provided valuable feedback from participants.
  - Localized characters were tested internationally
  - Issues were identified and ultimately fixed prior to release.
- The ArcGIS Pro IFC roadmap will embrace the inclusion of additional emerging standards for infrastructure types as they become adopted.



Misc IFC Models in ArcGIS

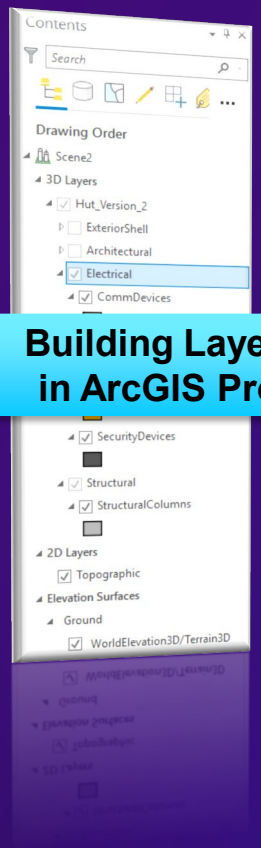


IFC Model from BIM360 in ArcGIS Pro 2.8

Using IFC and Revit files in GIS workflows with OGC I3S

IFC
New at Pro 2.8

Autodesk Revit



Building Layer in ArcGIS Pro

Publish web scene with I3S Building Scene layer

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

Create Building Scene Layer Package (SLPK)

Consume in web, mobile, and desktop

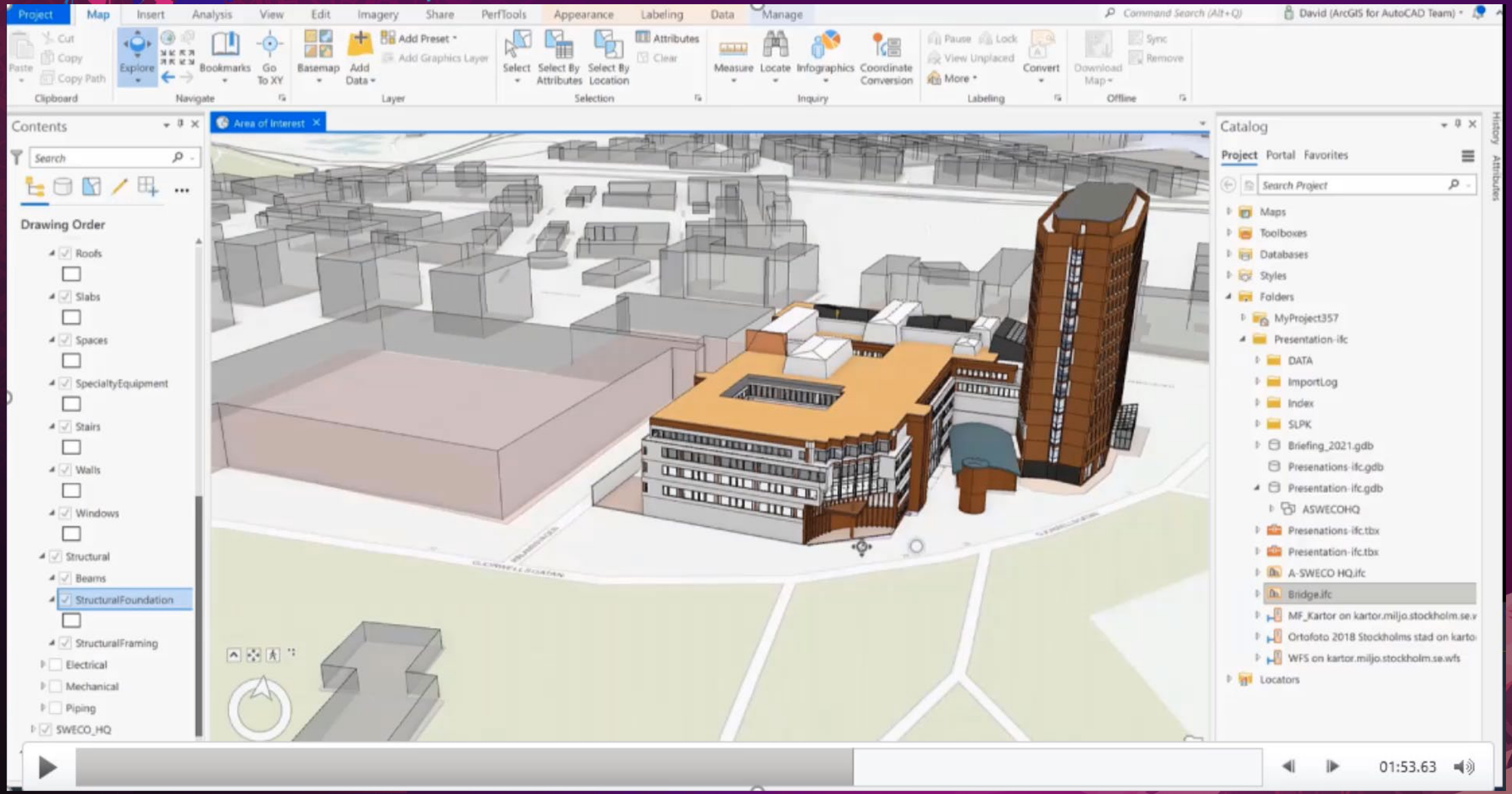
- Visualization
- Analysis
- Exploration

IFC in GDB

IFC in BSL

IFC in ArcGIS Pro 2.8

Demonstration Video


Project
Map
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Analysis
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Labeling
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Command Search (Alt+Q)
David (ArcGIS for AutoCAD Team)
Cut
Copy
Copy Path
Paste
Clipboard
Explore
Bookmarks
Go To XY
Navigate
Basemap
Add Data
Add Preset
Add Graphics Layer
Layer
Select
Select By Attributes
Select By Location
Attributes
Clear
Selection
Measure
Locate
Infographics
Coordinate Conversion
Inquiry
Pause
Lock
View Unplaced
More
Convert
Labeling
Download Map
Sync
Remove
Offline
Contents
Search
Drawing Order
Roofs
Slabs
Spaces
SpecialtyEquipment
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Maps
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Folders
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Presenations-ifc.tbx
Presentation-ifc.tbx
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History
Attributes
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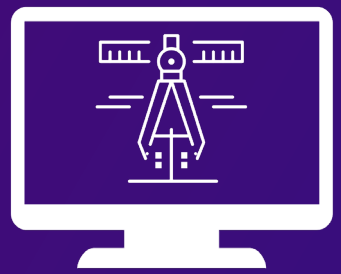
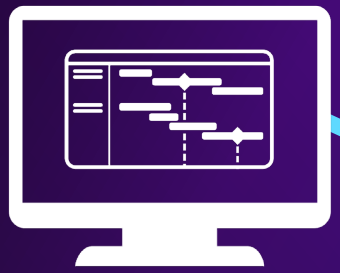
Expanding BIM and GIS with Project Schedule Data

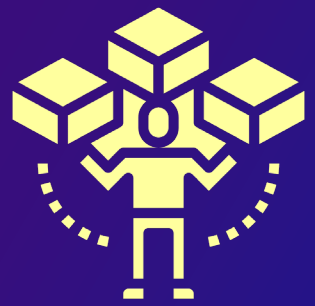


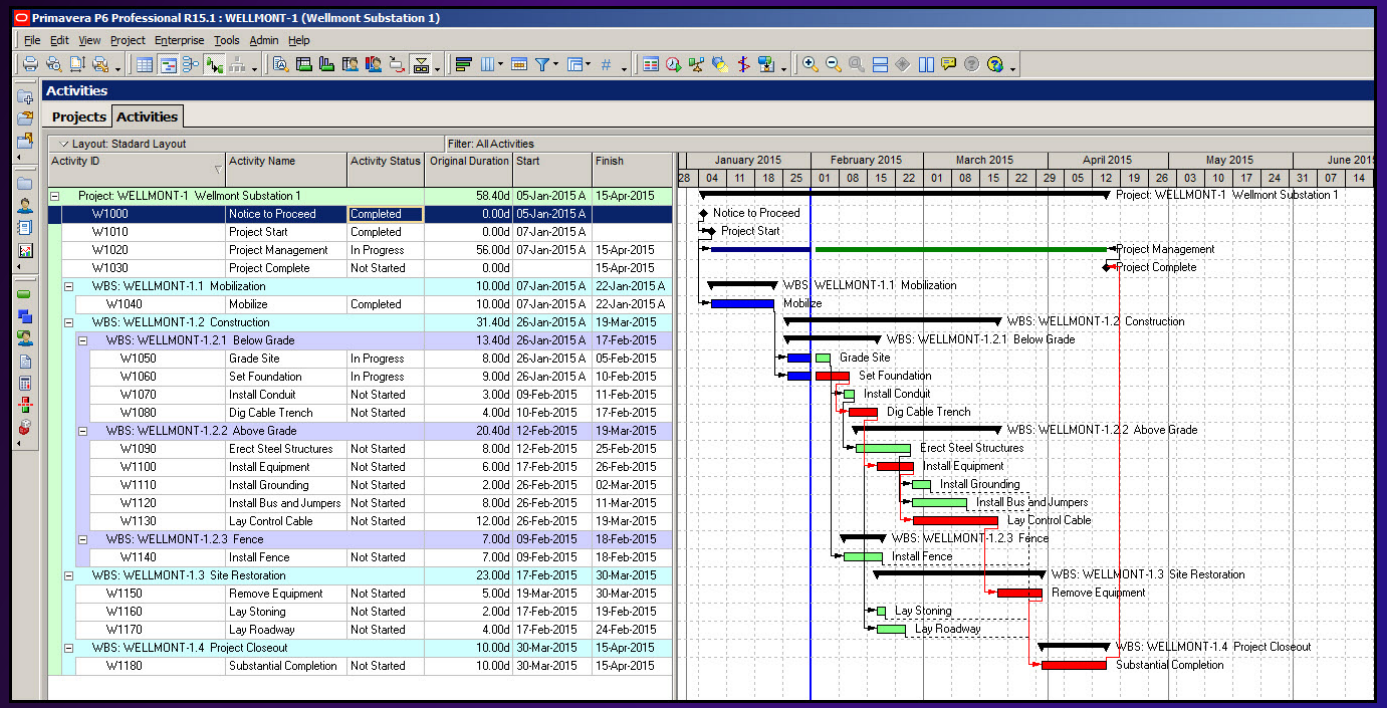
Design & Engineering Software

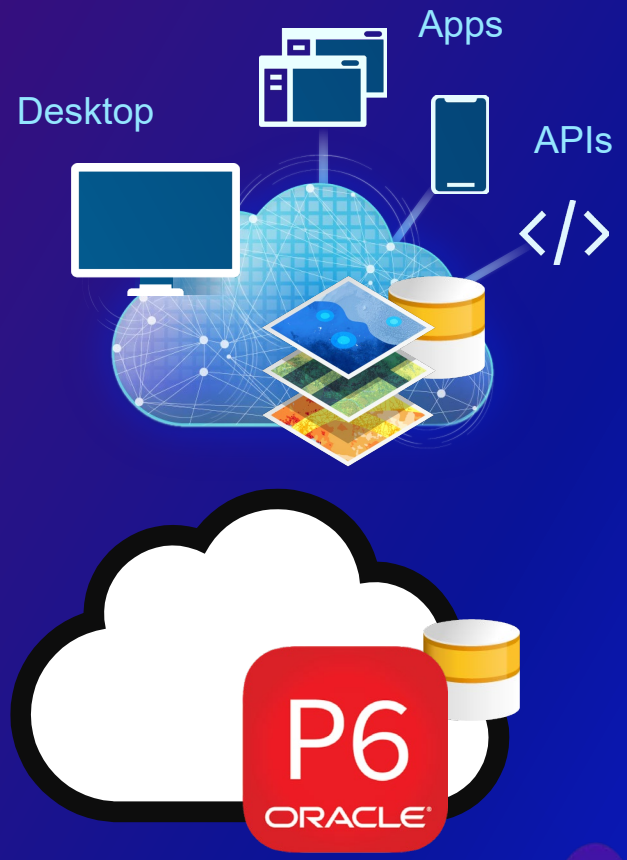


Project Management Software

Geospatial Software



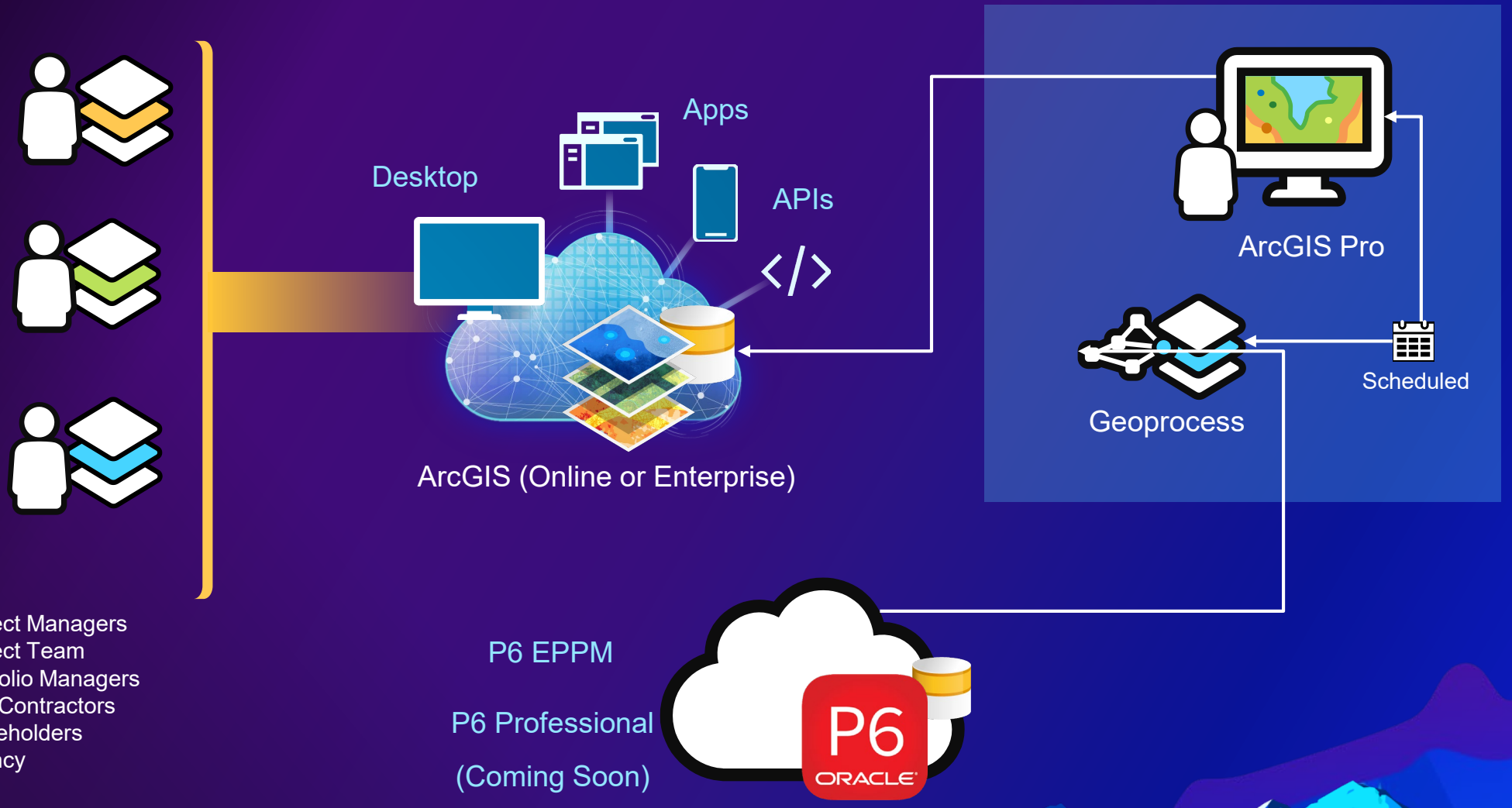

Primavera P6 Professional R15.1 : WELLMONT-1 (Wellmont Substation 1)
File Edit View Project Enterprise Tools Admin Help
Activities
Projects Activities
Layout: Stadard Layout
Filter: All Activities
Activity ID | Activity Name | Activity Status | Original Duration | Start | Finish
Project: WELLMONT-1 Wellmont Substation 1 | 58.40d | 05-Jan-2015 A | 15-Apr-2015
W1000 | Notice to Proceed | Completed | 0.00d | 05-Jan-2015 A
W1010 | Project Start | Completed | 0.00d | 07-Jan-2015 A
W1020 | Project Management | In Progress | 56.00d | 07-Jan-2015 A | 15-Apr-2015
W1030 | Project Complete | Not Started | 0.00d | | 15-Apr-2015
WBS: WELLMONT-1.1 Mobilization | 10.00d | 07-Jan-2015 A | 22-Jan-2015 A
W1040 | Mobilize | Completed | 10.00d | 07-Jan-2015 A | 22-Jan-2015 A
WBS: WELLMONT-1.2 Construction | 31.40d | 26-Jan-2015 A | 19-Mar-2015
WBS: WELLMONT-1.2.1 Below Grade | 13.40d | 26-Jan-2015 A | 17-Feb-2015
W1050 | Grade Site | In Progress | 8.00d | 26-Jan-2015 A | 05-Feb-2015
W1060 | Set Foundation | In Progress | 9.00d | 26-Jan-2015 A | 10-Feb-2015
W1070 | Install Conduit | Not Started | 3.00d | 09-Feb-2015 | 11-Feb-2015
W1080 | Dig Cable Trench | Not Started | 4.00d | 10-Feb-2015 | 17-Feb-2015
WBS: WELLMONT-1.2.2 Above Grade | 20.40d | 12-Feb-2015 | 19-Mar-2015
W1090 | Erect Steel Structures | Not Started | 8.00d | 12-Feb-2015 | 25-Feb-2015
W1100 | Install Equipment | Not Started | 6.00d | 17-Feb-2015 | 26-Feb-2015
W1110 | Install Grounding | Not Started | 2.00d | 26-Feb-2015 | 02-Mar-2015
W1120 | Install Bus and Jumpers | Not Started | 8.00d | 26-Feb-2015 | 11-Mar-2015
W1130 | Lay Control Cable | Not Started | 12.00d | 26-Feb-2015 | 19-Mar-2015
WBS: WELLMONT-1.2.3 Fence | 7.00d | 09-Feb-2015 | 18-Feb-2015
W1140 | Install Fence | Not Started | 7.00d | 09-Feb-2015 | 18-Feb-2015
WBS: WELLMONT-1.3 Site Restoration | 23.00d | 17-Feb-2015 | 30-Mar-2015
W1150 | Remove Equipment | Not Started | 5.00d | 19-Mar-2015 | 30-Mar-2015
W1160 | Lay Stoning | Not Started | 2.00d | 17-Feb-2015 | 19-Feb-2015
W1170 | Lay Roadway | Not Started | 4.00d | 17-Feb-2015 | 24-Feb-2015
WBS: WELLMONT-1.4 Project Closeout | 10.00d | 30-Mar-2015 | 15-Apr-2015
W1180 | Substantial Completion | Not Started | 10.00d | 30-Mar-2015 | 15-Apr-2015
January 2015
February 2015
March 2015
April 2015
May 2015
June 2015
Project: WELLMONT-1 Wellmont Substation 1
Notice to Proceed
Project Start
Project Management
Project Complete
WBS: WELLMONT-1.1 Mobilization
Mobilize
WBS: WELLMONT-1.2 Construction
WBS: WELLMONT-1.2.1 Below Grade
Grade Site
Set Foundation
Install Conduit
Dig Cable Trench
WBS: WELLMONT-1.2.2 Above Grade
Erect Steel Structures
Install Equipment
Install Grounding
Install Bus and Jumpers
Lay Control Cable
WBS: WELLMONT-1.2.3 Fence
Install Fence
WBS: WELLMONT-1.3 Site Restoration
Remove Equipment
Lay Stoning
Lay Roadway
WBS: WELLMONT-1.4 Project Closeout
Substantial Completion


Apps
Desktop
APIs
P6
ORACLE

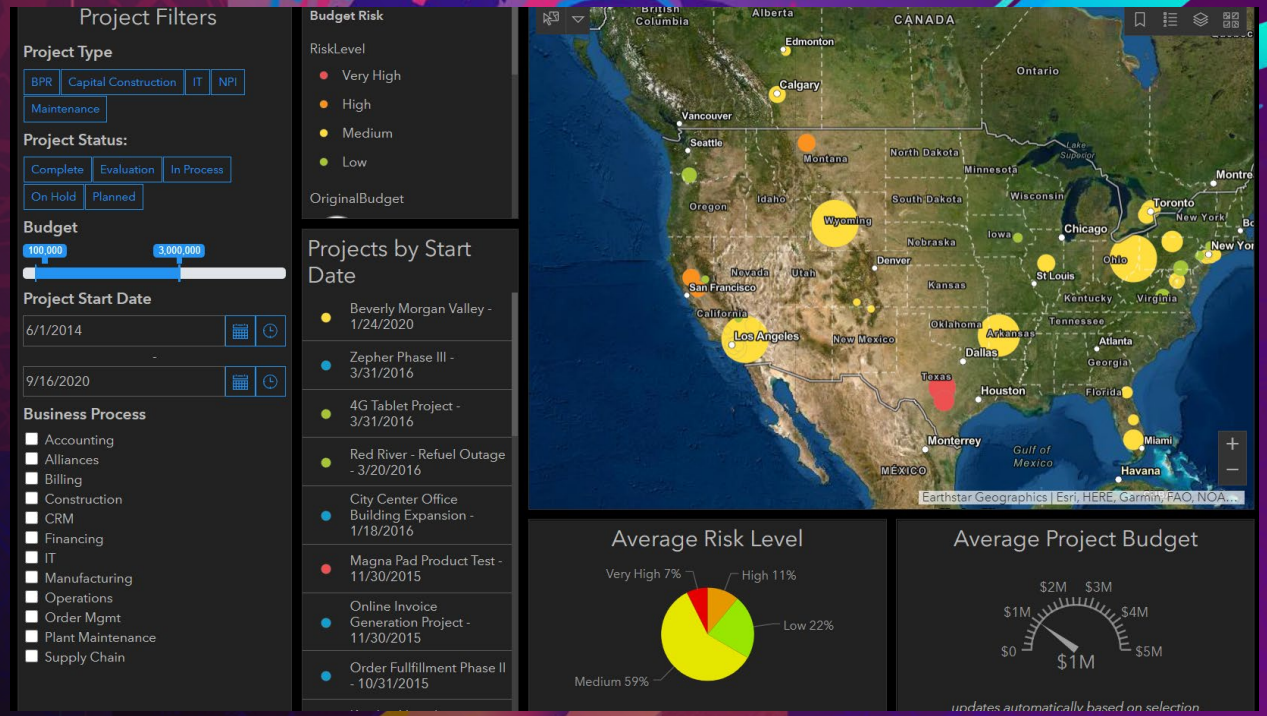
Integration Benefits

- Visualizing scheduling data in a geospatial context allows stakeholders to more clearly understand project progress
- Project schedules are often very detailed and complex, and stakeholders are often only interested in high level information
  - Which projects/activities are on/behind schedule
  - Over under budget
  - Highest risk
- Automated integration of GIS and scheduling data will open new doors to project and workforce management

Solution Conceptual Architecture



- Project Managers
- Project Team
- Portfolio Managers
- Sub-Contractors
- Stakeholders
- Agency



P6 Integration Demo

Visualizing Complex Project Scheduling Data Geospatially

Project Filters

Project Type

BPR | Capital Construction | IT | NPI | Maintenance

Project Status:

Complete | Evaluation | In Process | On Hold | Planned

Budget

100,000 — 3,000,000

Project Start Date

6/1/2014

9/24/2020

Business Process

- [ ] Accounting
- [ ] Alliances
- [ ] Billing
- [ ] Construction
- [ ] CRM
- [ ] Financing
- [ ] IT
- [ ] Manufacturing
- [ ] Operations
- [ ] Order Mgmt
- [ ] Plant Maintenance
- [ ] Supply Chain

Risk & Budget Analysis

Risk Level

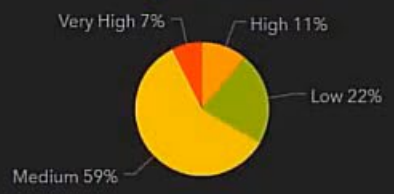
- Very High
- High
- Medium
- Low

Original Budget

Projects by Start Date

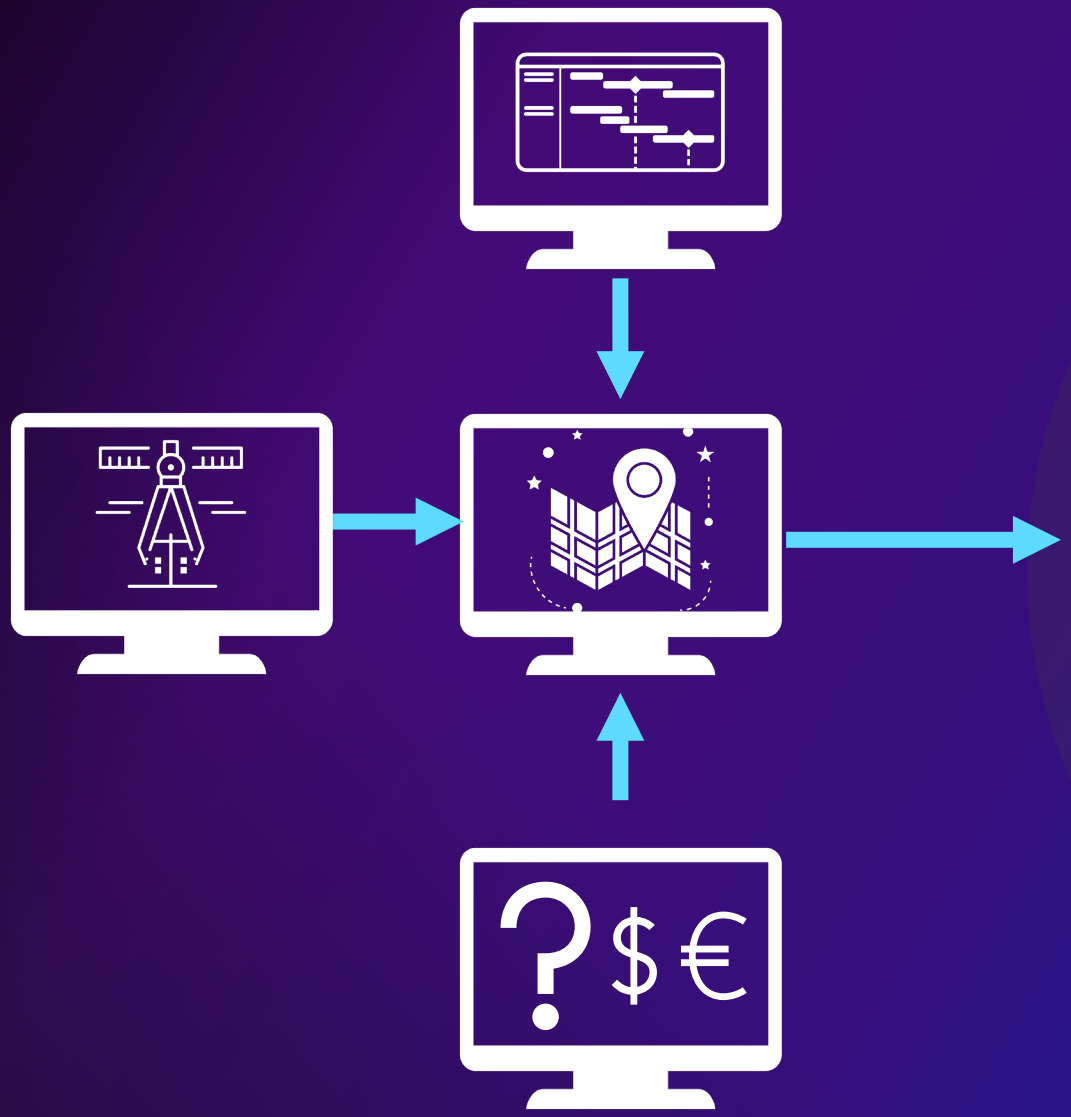
- Lancaster Substation - 1/24/2020
- Zepher Phase III - 3/31/2016
- 4G Tablet Project - 3/31/2016
- Red River - Refuel Outage - 3/20/2016
- City Center Office Building Expansion - 1/18/2016
- Magna Pad Product Test - 11/30/2015
- Online Invoice Generation Project - 11/30/2015
- Order Fullfillment Phase II - 10/31/2015
- Katalyst Virtualization - 10/31/2015
- Nesbid Building Expansion -

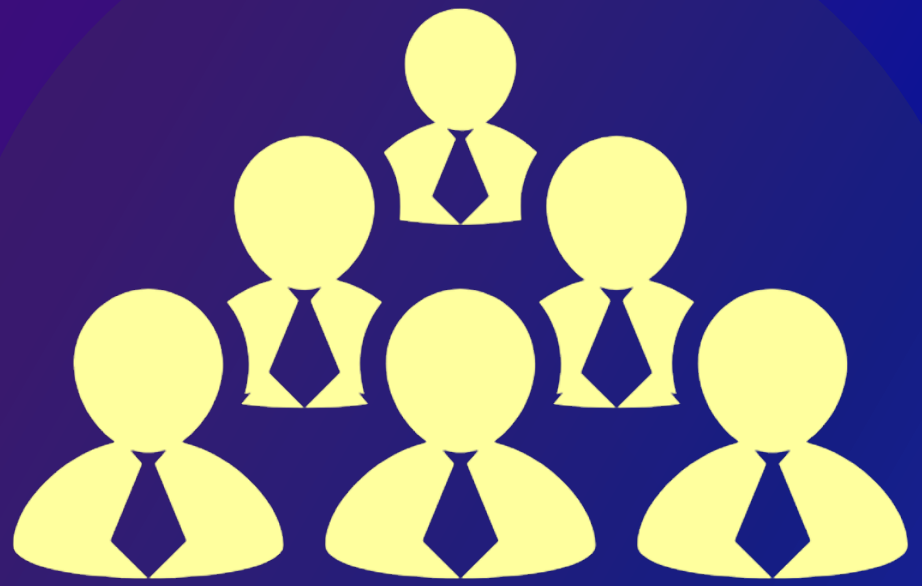
Average Risk Level



Average Project Budget

updates automatically based on selection

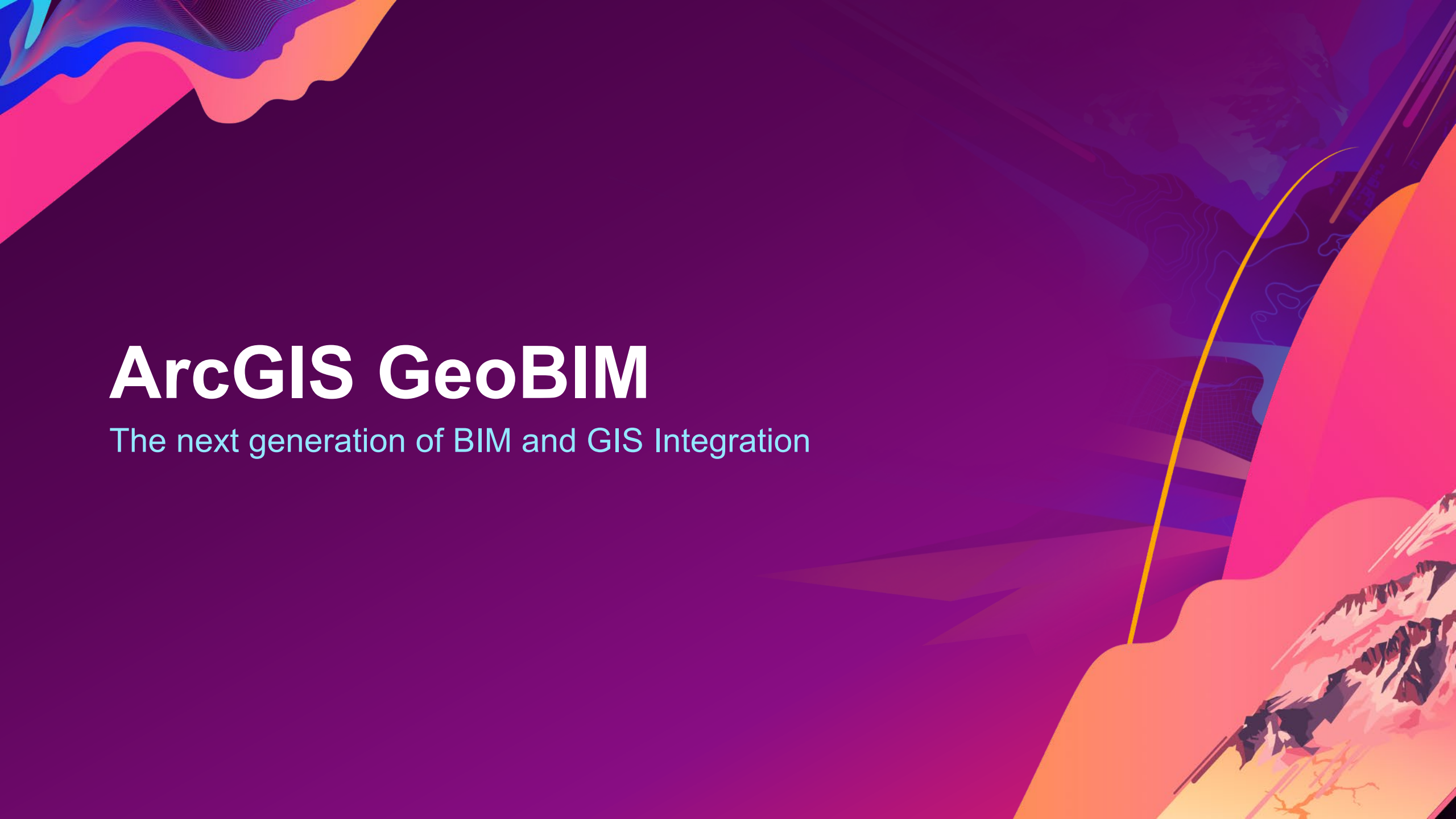




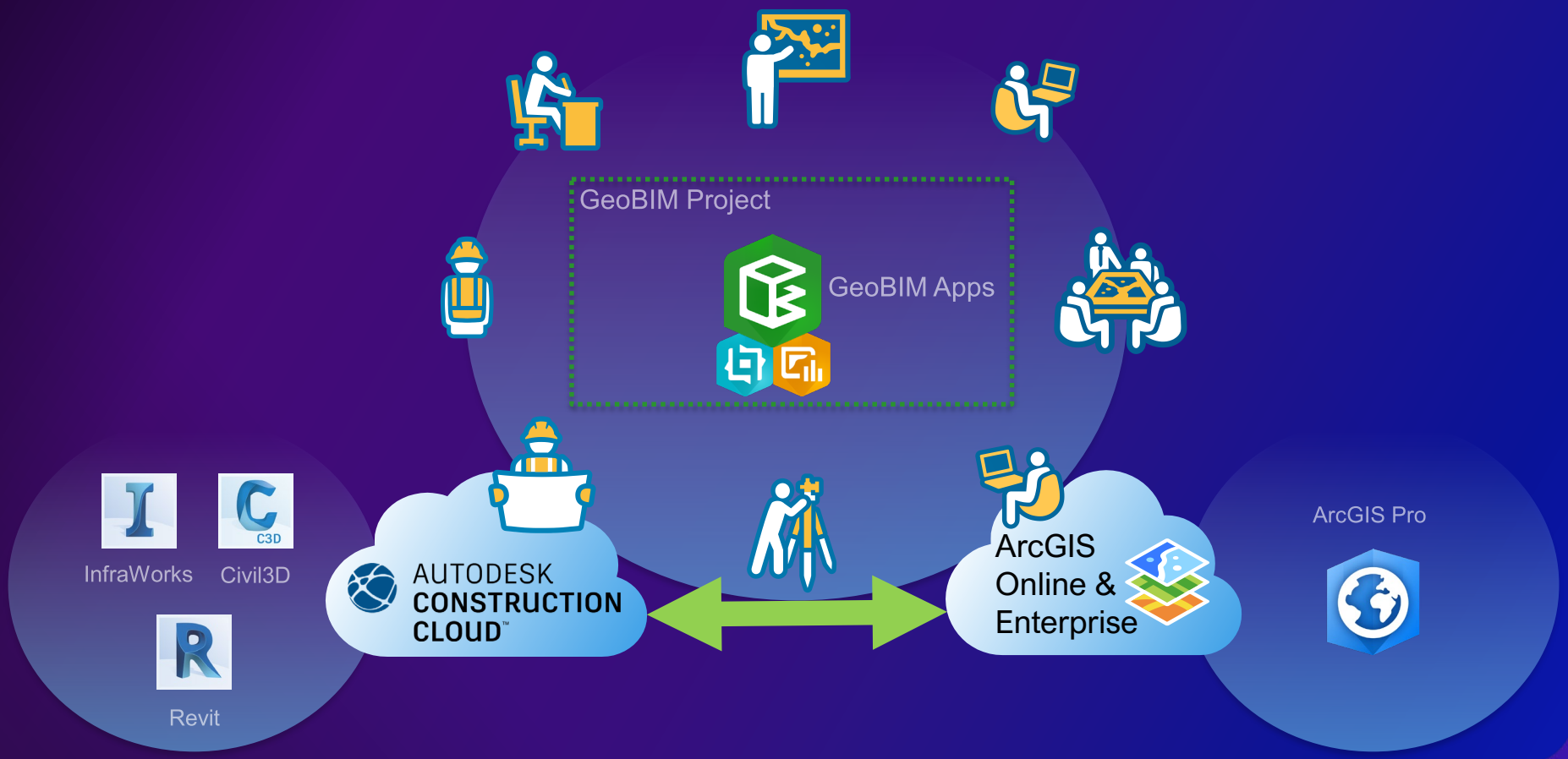
Connect to a Broader Audience
Connect at the Right time
Connect at the Right Level

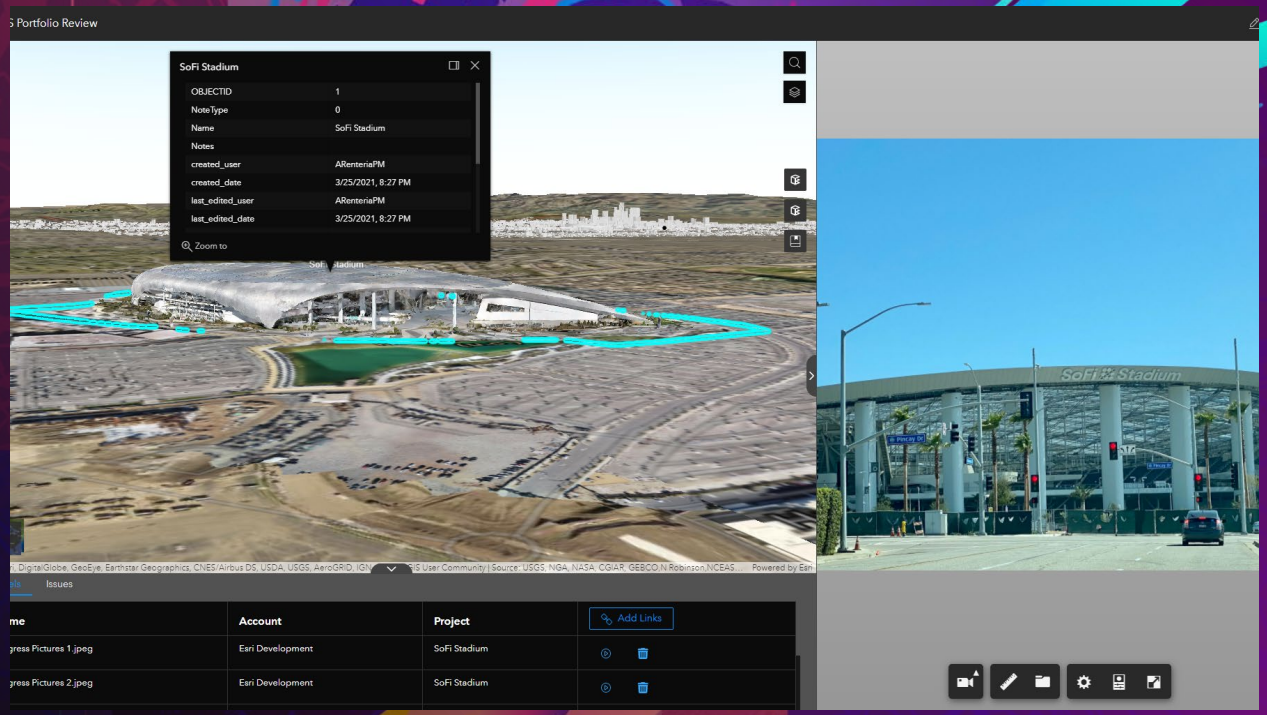
ArcGIS GeoBIM

The next generation of BIM and GIS Integration



ArcGIS GeoBIM *Initial Release*

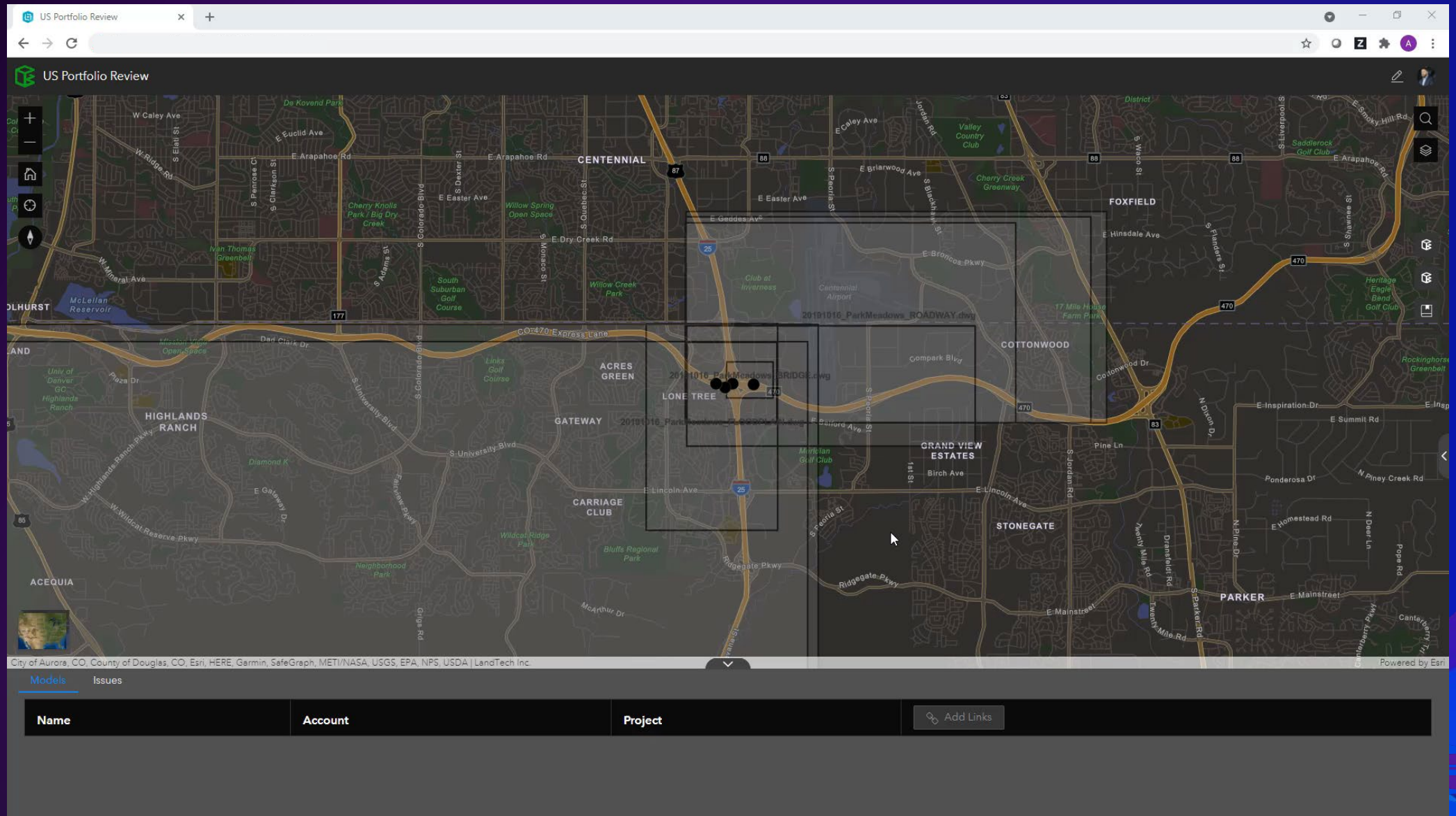




ArcGIS GeoBIM Demo

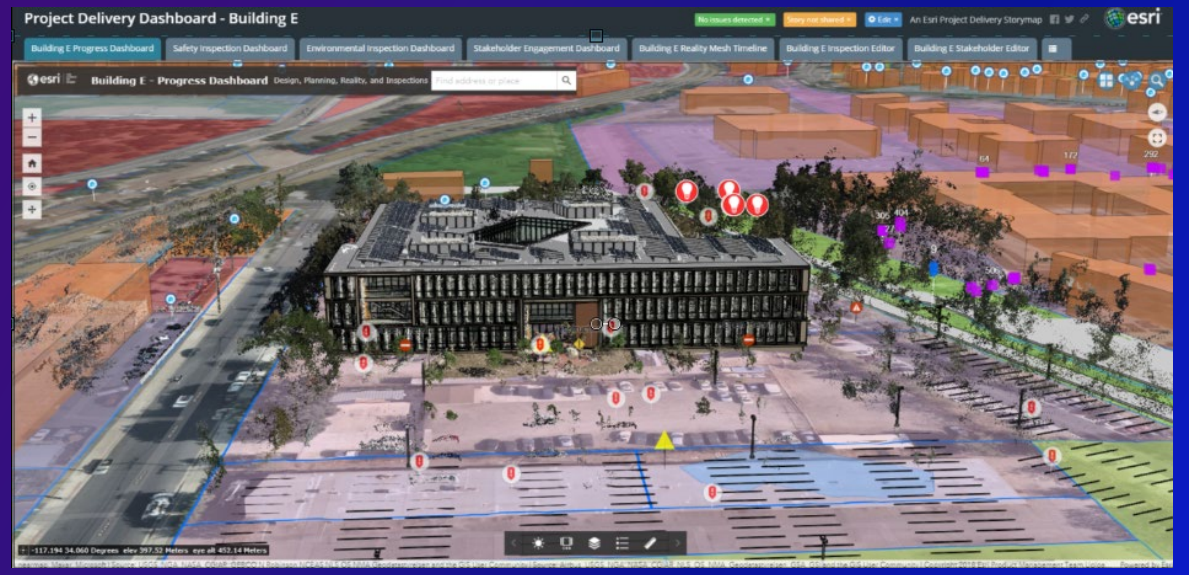
Connecting Levels of Information Across a Portfolio of Projects

ArcGIS GeoBIM App Exploring Multiple Projects



BIM in ArcGIS for AEC & Operations

- Integrating BIM and geospatial data is becoming the rule, not the exception
- BIM in ArcGIS Pro is increasingly easier
  - direct read capabilities, analysis, sharing across projects & assets teams
- Evolution of integrations make ArcGIS a giant ‘toolbox’ to better manage projects and infrastructure.
- Extending content through web services provides simplified stakeholder access



We want your feedback

Click on the Session Survey link
below this video window