

A 3D rendering of a globe with a blue Ethernet cable plugged into it, set against a white background with a large blue curved line.

Oriented Image Catalog and Full Motion Video

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Great River Energy

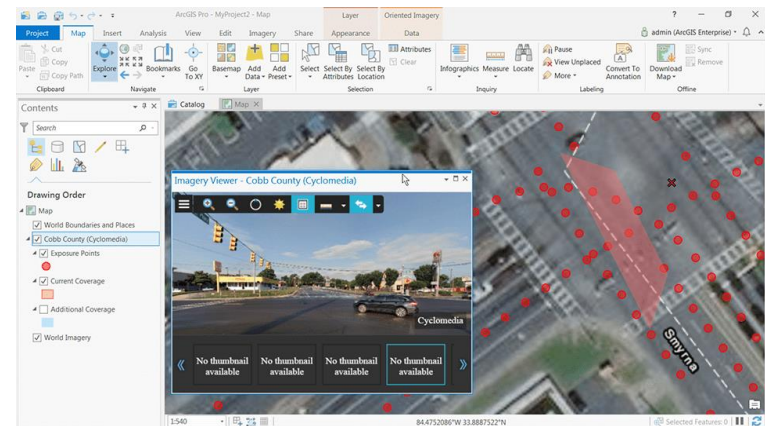
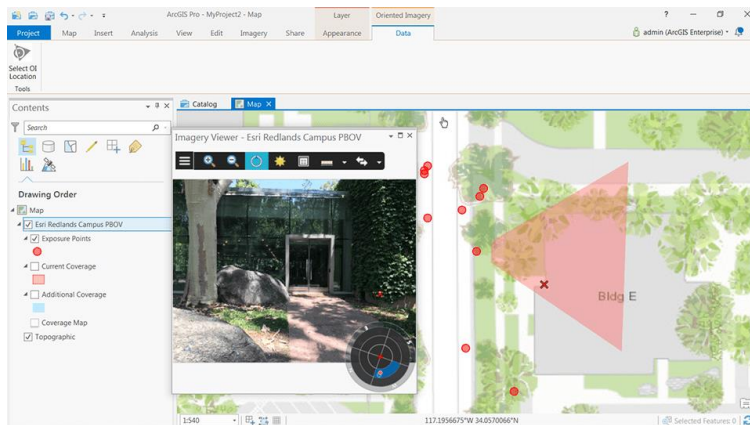
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 - Benefits
 - Imagery supported
- Getting Started with OIC in Pro
- Creating an Oriented Image Catalog
 - Elk River power plant decommissioning example
- Oriented Imagery GitHub
- What is Full Motion Video
- Possible use of OIC and FMV at GRE



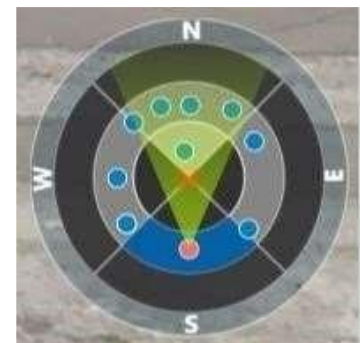
What is Oriented Image Catalog (OIC)

- The word 'oriented' is used to refer to non-traditional mapping imagery (i.e. imagery that isn't pointed straight down at the ground).
- OIC is a means for managing and viewing oriented imagery.
 - A data structure that references a point-based feature service that defines the camera location, orientation, and image metadata.



What is Oriented Image Catalog (OIC)

- OIC supports images collected from aerial, drone, or terrestrial sensors, including oblique, bubble, 360-degree, street-side, and inspection imagery, among others.
- Oriented imagery collections can be viewed two ways: using the add-in for ArcGIS Pro or using an app built with the Oriented Imagery widget for Web AppBuilder.



Benefits of OIC

- Provides the user the ability to store and sort imagery that is not suitable for orthorectification
 - The process of removing the effects of image perspective (tilt) and relief (terrain) effects for the purpose of creating a planimetrically correct image.
- Provides imagery location and indicates the image coverage
 - Provides the accuracy of the orientation of the image
 - Provides a mapping between ground features and image feature as well as the ability to take measurements
 - Superimpose the display of features into the images, or annotation and record features in the image with the location in map space also being recorded.



Imagery supported

- The following types of cameras are supported
 - Framed
 - Wide-angle
 - Omnidirectional
 - Synthetic omnidirectional
- Image structure
 - Single or multiple images stitched together are supported
- Image format
 - A variety of formats are supported (.jpeg, .pnc, etc.)



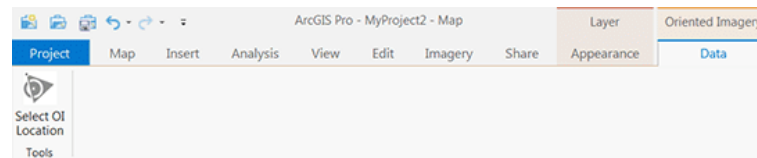
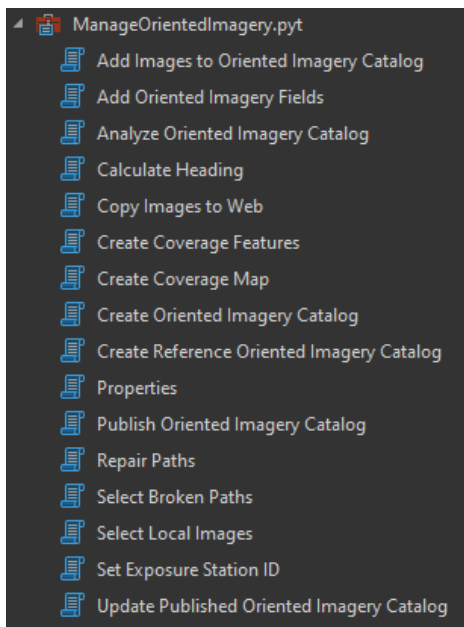
Getting Started

- [OIC Management tools](#) (to create and publish an OIC)
- [ArcGIS Pro Add in](#) (to access OIC in ArcGIS Pro)
- [Tutorial to create an OIC](#) (very helpful tutorial that walks you through the steps to create an OIC with example Esri data)
- Next, we will go through creating an oriented image catalog by walking through the tutorial, only with some imagery that was captured by a drone during a decommissioning of a power plant by GRE in Elk River, MN.



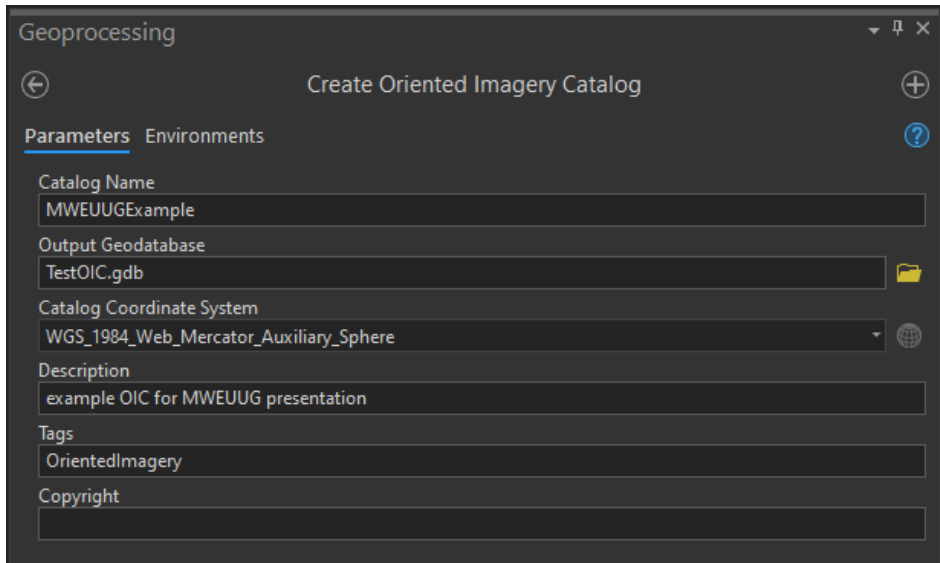
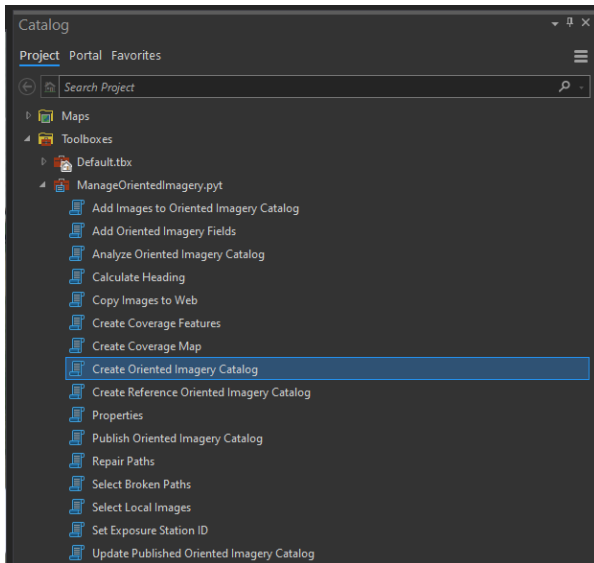
Creating an Oriented Image Catalog

- Before you get started creating an OIC, do the following:
 - [Download](#) and install the Oriented Imagery add-in for ArcGIS Pro.
 - [Download](#) and install the Oriented Imagery Management Tools.
 - Click **Toolbox > Add Toolbox** and navigate to the location where you installed the Oriented Imagery GP tools (C:\Image_Mgmt_Workflows\OrientedImagery\GPTool). Select **ManageOrientedImagery.pyt** and click OK.

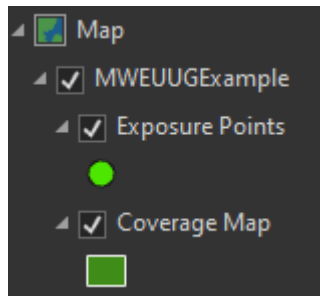


Creating an Oriented Image Catalog

- Create an empty oriented imagery catalog (OIC) in your project

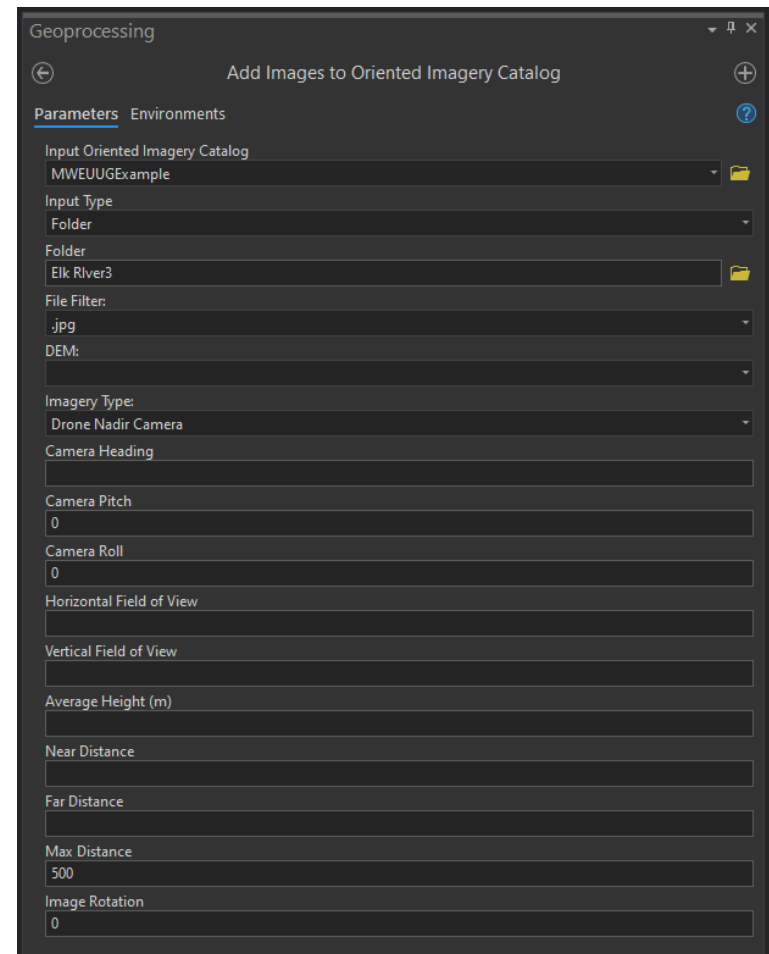


- A new (empty) exposure points and coverage map features get created in your project



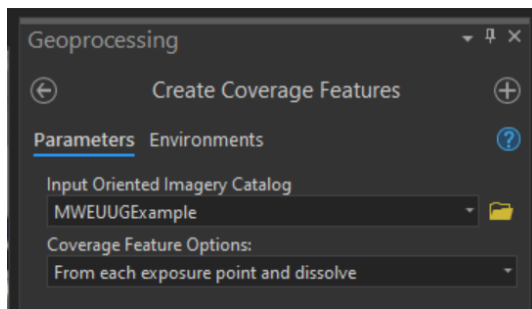
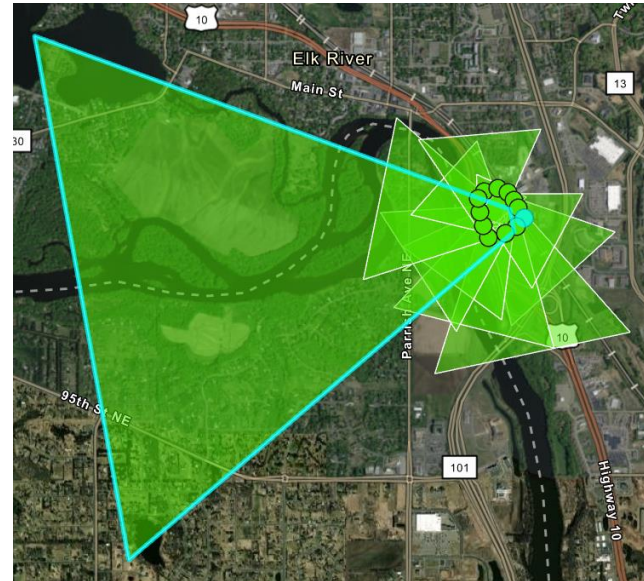
Creating an Oriented Image Catalog

- Add images to Oriented Imagery Catalog
- Input Types:
 - Feature service with attachments
 - Folder
 - Frame table
 - Geospatial video
 - Image list
 - Images
 - Image Service
- After successfully adding images to OIC, the Exposure Points feature class is populated and draws on the map the locations of where the picture was taken depending on the metadata from the image.



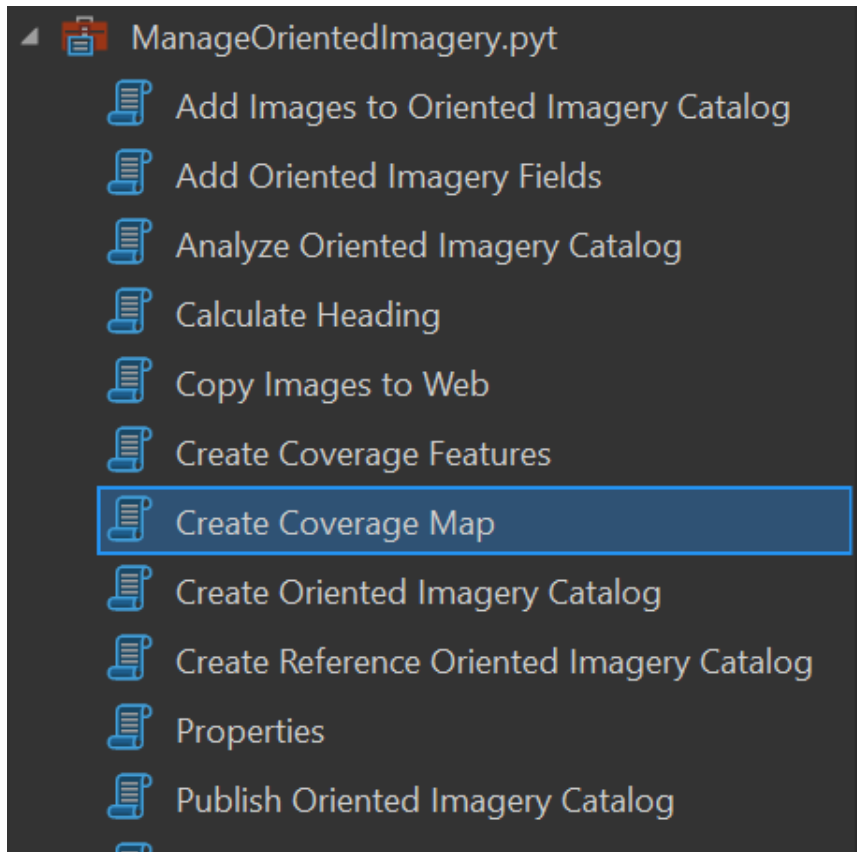
Coverage features

- Created coverage features that represent the coverage of each photo loaded into the Exposure Point feature class.
 - Coverage feature options include:
 - From exposure point
 - From exposure point and dissolve
 - Buffer each exposure point
 - From extent of all exposures
 - If the polygon(s) look incorrect at this point, you can use the **Properties** tool to change the property values before re-running the **Create Coverage Features** tool.

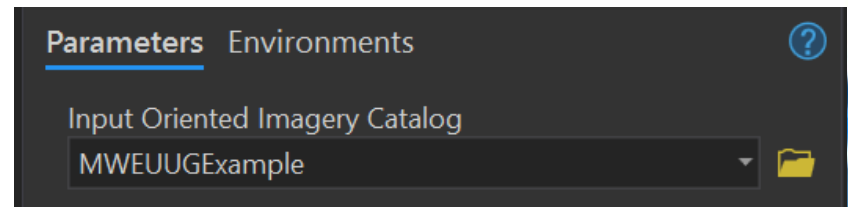


Create coverage map

- Create coverage map tool



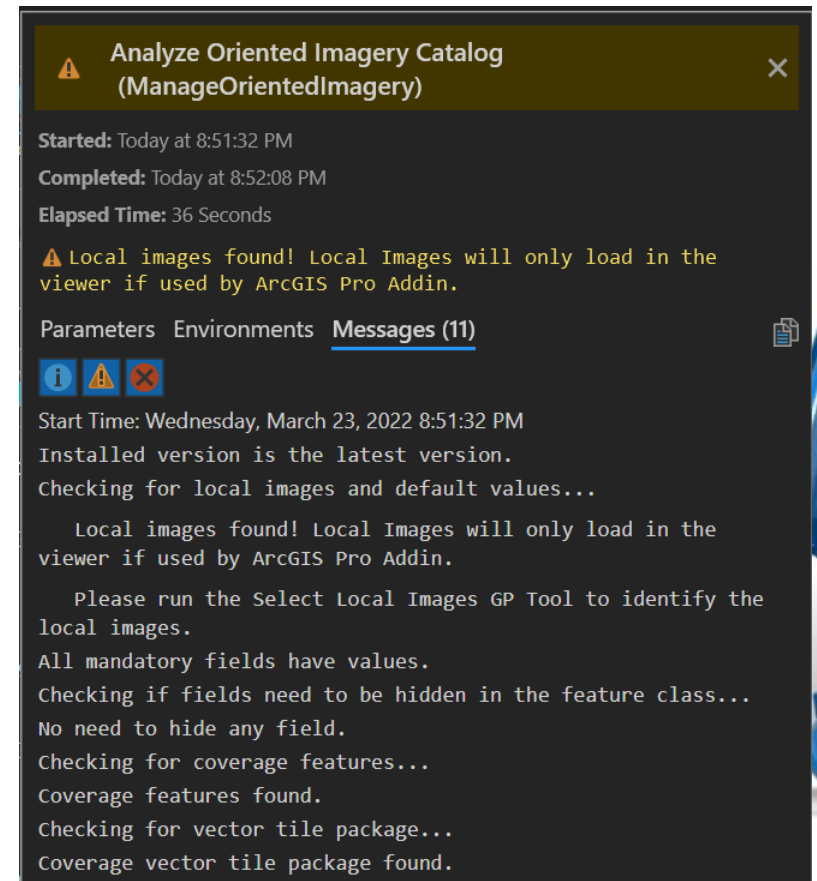
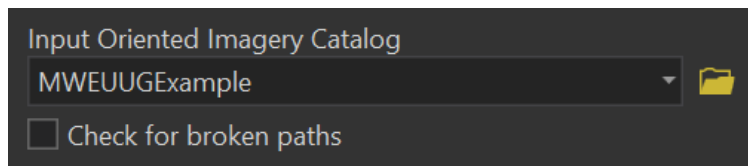
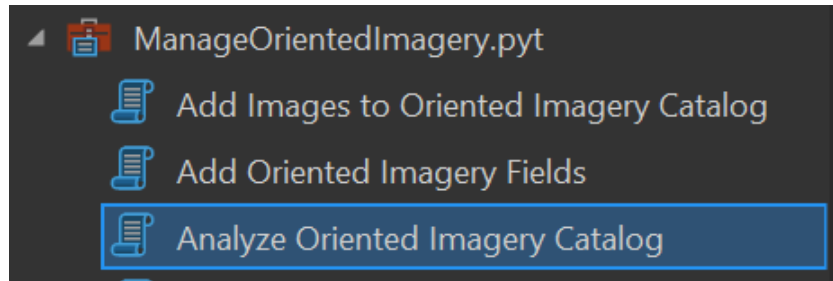
- Create a coverage map, which is a vector tile package file of the coverage features created in the last step. (A vector tile is a more efficient way to show the coverage area.).



- This coverage map will be later used after we publish the OIC to be viewed in ArcGIS Enterprise or ArcGIS Online.

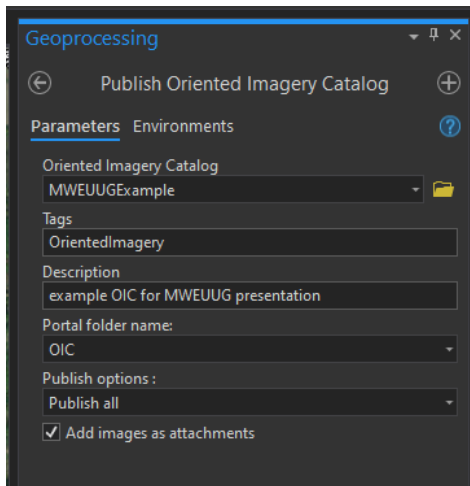
Analyze OIC prior to publishing






- The final step when creating an OIC is to analyze the catalog to see if there are any optimizations or fixes needed



Publishing OIC to ArcGIS Online or ArcGIS Enterprise portal

- Now that we have an OIC created in Pro, you may want to publish to your enterprise portal or ArcGIS Online
- Allows for the viewing of OIC in web maps/apps



<input type="checkbox"/>	Title	
<input type="checkbox"/>	 MWEUUGExample	Oriented Imagery Catalog
<input type="checkbox"/>	 MWEUUGExample_CoverageMap	Tile Layer (hosted)
<input type="checkbox"/>	 MWEUUGExample_CoverageMap	Vector Tile Package
<input type="checkbox"/>	 MWEUUGExample_ExposurePoints	Feature Layer (hosted)
<input type="checkbox"/>	 MWEUUGExample_ExposurePoints	Service Definition







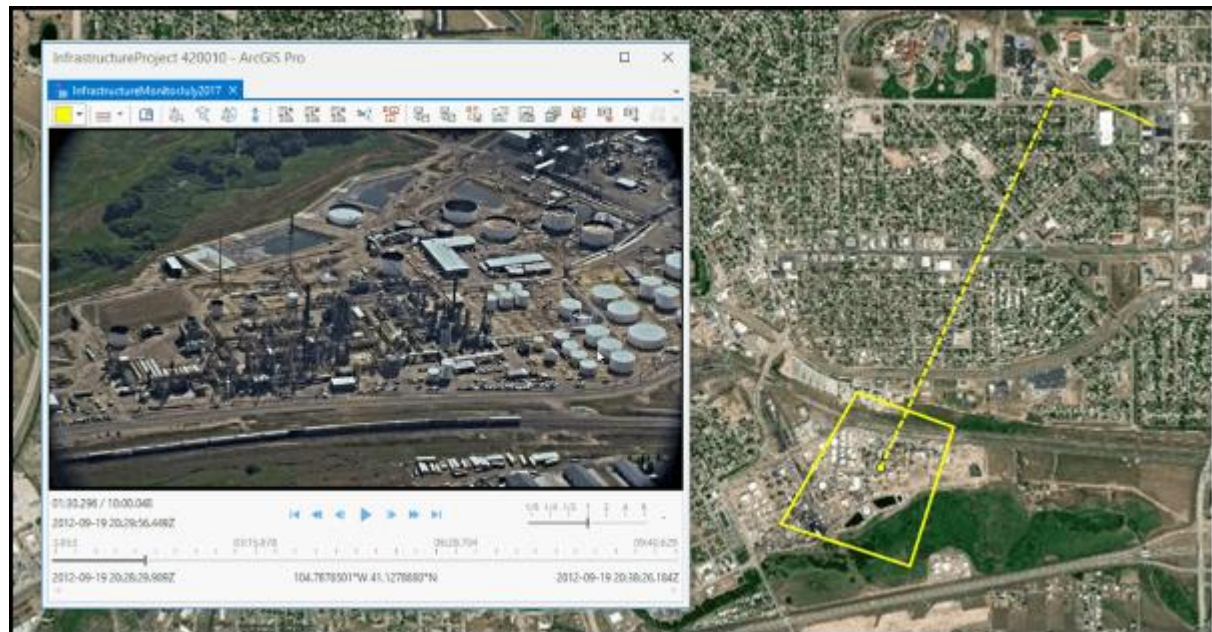
Oriented Imagery GitHub

- <https://github.com/Esri/oriented-imagery>
- This site contains developer resources for Oriented Imagery, including 2D and 3D Web AppBuilder widgets, the Experience Builder widget, a description of the Oriented Imagery API, and a schema for oriented imagery catalogs.
- Users can use the OI widgets for Web App Builder and Experience Builder to build web apps to explore oriented imagery.
 - Examples:
 - [2D](#)
 - [3D](#)



What is Full Motion Video (FMV)

- Full Motion Video (FMV) in the ArcGIS Image Analyst extension provides capabilities for playing and geospatial analysis of video that is FMV-compliant.
 - FMV-compliant refers to the combination of a video stream and associated metadata into one video file, which makes the video geospatially aware
- The sensor systems collect camera pointing information, platform position and attitude, and other data and encode it into the video stream so that each video frame is associated with geospatial information.



Full Motion Video – features and benefits

- FMV takes advantage of crucial metadata, provides visual and analytical processing tools, and provides ArcGIS Pro platform capabilities to support project and mission-critical workflows.
 - FMV is fully integrated into ArcGIS Pro, which takes advantage of system architecture, data models, tools and capabilities, and sharing across the ArcGIS platform.
 - View and analyze live-stream videos and archived videos.
 - The video player is linked to the map display, enabling the following:
 - Display of the video footprint, sensor location, and field of view on the map.
 - Any information collected in the video player is projected and displayed on the map together with your existing GIS data.
 - Update the map to zoom to the video frame and follow videos across the map.
 - Use intuitive digital video recorder (DVR) controls, image and video clip capture, and analysis tools
 - Create and manage bookmarks.
 - Mark locations and phenomena of interest.



Full Motion Video - example

- <https://youtu.be/rGFZT9yWzRM>



GRE's future use of OIC and Full Motion video

- Substation walk throughs
 - 360 pictures of entire substation footprint
 - Possible creation of augmented or virtual reality training of substation activity based off photos taken
- Corridor management
 - Both oriented image catalog and full motion video of transmission line corridors
 - Vegetation management
 - Encroachments
 - Structure maintenance and survey



Resources

- <https://github.com/Esri/oriented-imagery>
- https://github.com/Esri/oriented-imagery/blob/master/OrientedImageryCatalog_Schema.pdf
- <https://www.esri.com/arcgis-blog/products/arcgis/imagery/whats-new-in-oriented-imagery-2-6/>
- <https://pro.arcgis.com/en/pro-app/latest/help/analysis/image-analyst/introduction-to-full-motion-video-in-arcgis-pro.htm>

