Drones and Imagery in the ArcGIS Platform

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ArcGIS is a Comprehensive Imagery Platform, *including Drones*

Drones Integrate into the Complete ArcGIS Platform

- **System of Engagement**
  - To share imagery products and information to those that need it

- **System of Record**
  - To manage and process all your imagery

- **System of Insight**
  - To extract Information from Imagery

- **Professional Imagery & Geospatial Analysts**

- **Server**

Analyse

Share
Drones Integrate into the Complete ArcGIS Platform

ArcGIS is a Comprehensive Imagery Platform, including Drones

Drones are inherently geospatially enabled computers in motion, and as such, they depend on and continuously generate geospatial data.

**Analyze**
- Visualization
- Spatial Analysis
- Scalable Analytics

**Drone Operations**

**Share**
- Dynamic image services
- Geoprocessing services
- APIs for custom applications
- Secure access control

**Manage**
- Extensive content to support project planning
- Processing to create imagery products
- Authoritative metadata
Project planning in GIS
Project planning

*Extensive content and tools to support your drone project planning*

- The Living Atlas and ArcGIS Online
  - Elevation
Project planning

*Extensive content and tools to support your drone project planning*

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Graphic courtesy of TopCon/MaVinci Flight Mission Control Software
Project planning

*Extensive content and tools to support your drone project planning*

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  - Elevation

Viewshed calculation to maintain line of sight
Project planning

*Extensive content and tools to support your drone project planning*

- The Living Atlas and ArcGIS Online
  - Elevation
  - Weather, Wind
  - Political Boundaries
  - FAA maps

...more...

- Client GIS data content
Drone data ingestion & processing

Drone2Map, FMV
Workflow for drone imagery based on camera & operational mode

Close range imagery (inspection)

Nadir imagery

Oblique imagery

Full Motion Video

Frame Imagery

Video
Workflow for drone imagery based on camera & operational mode

- Close range imagery (inspection)
- Orthorectified Mosaics
- 3D Point Clouds & Meshes
- Smart Inspection Photos

FRAME IMAGERY

- Nadir imagery
- Oblique imagery
- Full Motion Video

Drone2Map
Workflow for drone imagery based on camera & operational mode

- Close range imagery (inspection)
- Nadir imagery
- Oblique imagery
- Full Motion Video

Other software

- Orthorectified Mosaics
- 3D Point Clouds & Meshes
- Smart Inspection Photos
Workflow for drone imagery based on camera & operational mode

- Close range imagery (inspection)
- Oblique imagery
- Nadir imagery
- Full Motion Video

ArcMap (Pro in early 2017)
Workflow for drone imagery based on camera & operational mode

- Close range imagery (inspection)
- Nadir imagery
- Oblique imagery
- Full Motion Video

Georeferenced video, on map
Map feature data, projected into video
Rapid video search by geography or metadata
Georeferenced features extracted from video

ArcMap (Pro in late 2016)
Drone data management
Mosaic Dataset & Automation
Image Management Using Mosaic Datasets
Highly Scalable, From Small to Massive Volumes of Imagery

Create Catalog of Imagery
- Reference Sources
- Ingest & Define Metadata
- Define Processing to be Applied

Apply:
- On-the-fly Processing
- Dynamic Mosaicking

Access as Image or Catalog
Source / Derived Data Model – begin with “Source” Mosaic Datasets

Ingest outputs from each individual project into a mosaic dataset, then complete QC to ensure proper configuration & metadata.

- May 15
- June 1
- June 15
Combine into Derived Mosaic Dataset

Source Imagery → Source Mosaic Datasets → Derived Mosaic Dataset

Advantage: All image data* available in a single location

Use TABLE Raster Type

* “All data” refers to data with common content; should not mix elevation data with imagery
On-the-fly Products using Server Raster Functions

Source Imagery → Source Mosaic Datasets → Derived Mosaic Dataset → Single image service with multiple server functions

- Full Image Service
- Color Infrared
- True Color
- NDVI
- Hillshade
- …other functions as appropriate
Shared from a single repository, client can select data by attribute.
Resources: Image Management Workflows

- Image Management Workflows & FAQ
- Image Management Guidebook (ArcGIS Help)
  - http://esriurl.com/6007
- ArcGIS Online Group
  - http://esriurl.com/6539
- Enterprise Image Management White Paper
  - http://esriurl.com/EIMWP
- Optimize Rasters (MRF for cloud storage)
  - http://esriurl.com/OptimizeRasters
  - http://esriurl.com/MRF
# Analysis

<table>
<thead>
<tr>
<th>Terrain</th>
<th>Hydrology</th>
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<tbody>
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<td>Forestry</td>
<td>Agriculture</td>
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<td>Utilities</td>
<td>…many more</td>
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Sharing/Dissemination
ArcGIS Online, ArcGIS Server
Sharing imagery – a range of options

• **ArcGIS Online**
  - Raster tile cache (base map format) for RGB orthos
  - Feature services with FMV flight tracks & footprints
  - Scene services for 3D models
  - Web access to oriented (inspection) imagery stored in the cloud

• **ArcGIS Server**
  - Dynamic image services for multispectral imagery
  - Raster functions for on-the-fly products (NDVI, Hillshade, Slope…)
  - Geoprocessing services (Viewshed, Downstream Trace, Stockpile volume calculations…)

• **ArcGIS Portal**
Stockpile volume calculations

*Volume calculation on sloping ground*

*Geoprocessing services for server-side processing*