Feature Extraction from Imagery & Lidar
Kurt Schwoppe, Esri
Mark Romero, Esri
Gregory Bacon, Fairfax County
Today’s Speakers
Image Processing Experts and Good Colleagues

Kurt Schwoppe
Imagery Industry Lead
Esri

Mark Romero
Imagery Specialist
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Gregory Bacon
GIS Analyst III
Fairfax County GISP
The Science of Where
Integrates Dynamic Data About Everything
Think Big - National Imagery Programs
Think Small – Micro Geographies
It Leverages All Types of Remotely Sensed Data

Turning imagery into information
Imagery is Not an Addition to GIS - *It is Part of One*

**Feature Analytics**
GeoAnalytics Server
Large Observation Collections

- Power Outages (50+ Million)
- Density
- Hot Spots
- Space-Time Cube

**Faster (10x+)**
Leveraging Distributed Computing and Parallel Processing

**Raster Analytics**
Image Server
Large Imagery Collection

- Riparian Areas
- Lidar: Bare Earth
- Lidar: First Return
- Imagery

... Accessible from ArcGIS Pro and Python API
Modernizing Imagery

Built Upon an Enterprise Model

See the Earth, Find the Patterns, Share with Others
Modernizing Imagery

In Highly Scalable Configurations

Clients
2D & 3D
- ArcGIS Pro
- Excalibur
- Web Maps
- Scenes

Desktop
Web
Device

Portal

Enterprise Server(s)

Scale Based on User Access

Image Server(s)

Scale Based On Image Processing Load

Data Store Configured for Raster

GeoDataBases (Mosaic Dataset)
The Science of Where is Multidimensional
Delineating both 3D Space and Time

Extending the Language of GIS

Photogrammetry
GIS Data
Oblique Imagery
Lidar
CAD/BIM
Image Server “Hyper Extends” Imagery in Pro

Modernizing Imagery

Infinite Scalability

Raster Analytics
- Deploy to as many Servers as Needed
- Full Distributed Processing
- Elastic Pricing Model

*Elastic Pricing Model
Modernizing Imagery

Imagery Bundles Support Implementation Patterns

Robust Image Processing
OrthoMapping and Stereo

ArcGIS Pro 2.1 & Image Analyst Extension

Image Analytics
Extracting Features & Change Detection

Ortho Mapping
Accurate basemaps and Elevation products

Image Management
Make massive collections of imagery accessible
The Image Analyst Extension extends ArcGIS Pro with advanced tools and user experiences for Image Analysts who perform:

- Image interpretation and exploitation of imagery
- Creation of information products from imagery
- Advanced feature interpretation and measurements from imagery
- Detailed data capture and measurement on stereo imagery
- Advanced raster and image analysis workflows for machine learning and feature extraction
Modernizing Imagery

Image Centric View

Improved UI:
• ELT Like
• Linked Views
• Ribbon(s) for Imagery
• Dedicated Workflows

Image Coordinate Space:
• Up is Up!
• Oblique Viewing
  - Overlay feature layers
  - Create and Edit feature layers
Precise Measurements

Capabilities:

- Measure distance, area, centroid, azimuth – with georeferenced imagery
- Measure height – requires sensor model
- Measure height from shadow – requires sun angle
- Measure 3D objects
- Style and annotate measurements
- Track, store, and manage measurements
- Report generation for decision makers
Modernizing Imagery

Raster Analytics Feature Extraction
Raster Analytics for Land Cover Mapping

CBP Land Cover Classification:
- Barren
- Impervious Roads
- Impervious Surfaces
- Low Vegetation
- Shrubland
- Structures
- Tree Canopy
- Tree Canopy over Impervious Roads
- Tree Canopy over Impervious Surfaces
- Tree Canopy over Structures
- Water
- Wetlands
Modernizing Imagery

Feature Extraction Workflow

Step 1: Call up an Image Service
Step 2: Define your AOI
Step 3: Run Classification Wizard
Step 4: Vectorize the results
Step 5: Publish
Modernizing Imagery

Raster Analytics for Change Detection

Imagery Identifies Changes
It shows where we've been and the direction we are going
Modernizing Imagery

Working with Stereo

Capabilities:
- Works with aerial, satellite, and drone imagery
- Leverages Mosaic Datasets to work with large collections of stereo pairs
- Consistent Pro editing UX – familiar tools, feature template support, etc.
- New cursor modes, and shapes
- Shutter glass, and anaglyph stereo viewing

Application:
- Accurate 3D Mapping
- Improved Image Analysis and Targeting
- 3D Modeling for Mission Rehearsal
Modernizing Imagery | Production Ortho Mapping

- Raw Imagery
- New Web UI
- Block Bundle Adjust
- Source Mosaic Dataset
- ArcGIS Pro
- Image Server
- Ortho
- DSM
- DTM
- Point Cloud
- Derived Mosaic Datasets
- Mobile Apps
- Computer Added Design

ArcGIS
And New Data Models
Extend Imagery Capabilities to the Web

Web App Builder for Imagery Services:
Dissemination & Applications
Gregory Bacon