



ESRI International User Conference

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Technical Workshops

What's New in Imagery and Raster at ArcGIS 10

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What's new in Imagery and Raster at ArcGIS 10?

What's new in Imagery and Raster at ArcGIS 10?

A Lot!

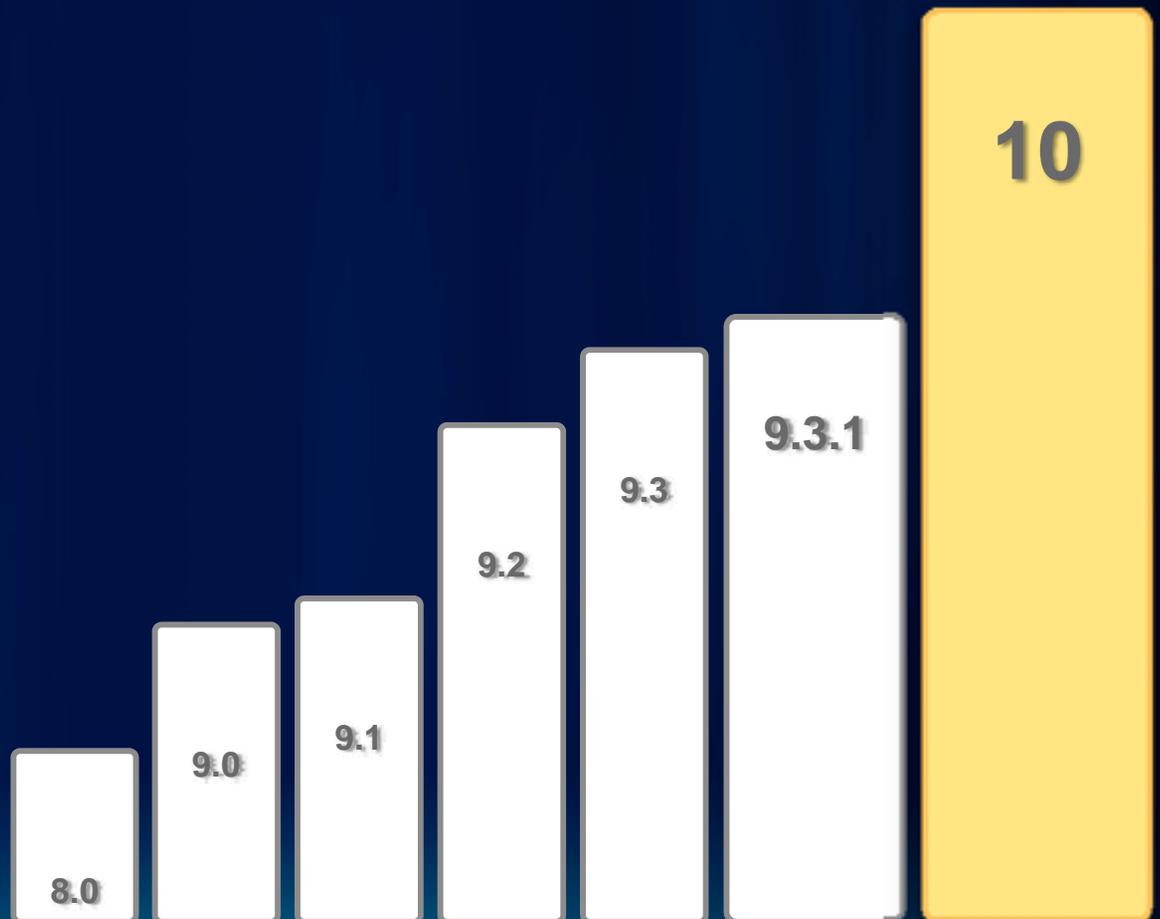
What's new in Imagery and Raster at ArcGIS 10?

A Lot!

Agenda

- Overview
- Content
- Management
- Dissemination
- Visualization
- Analysis
- Q&A

Slides will use orange color to emphasize features that are **New or Substantially Improved**



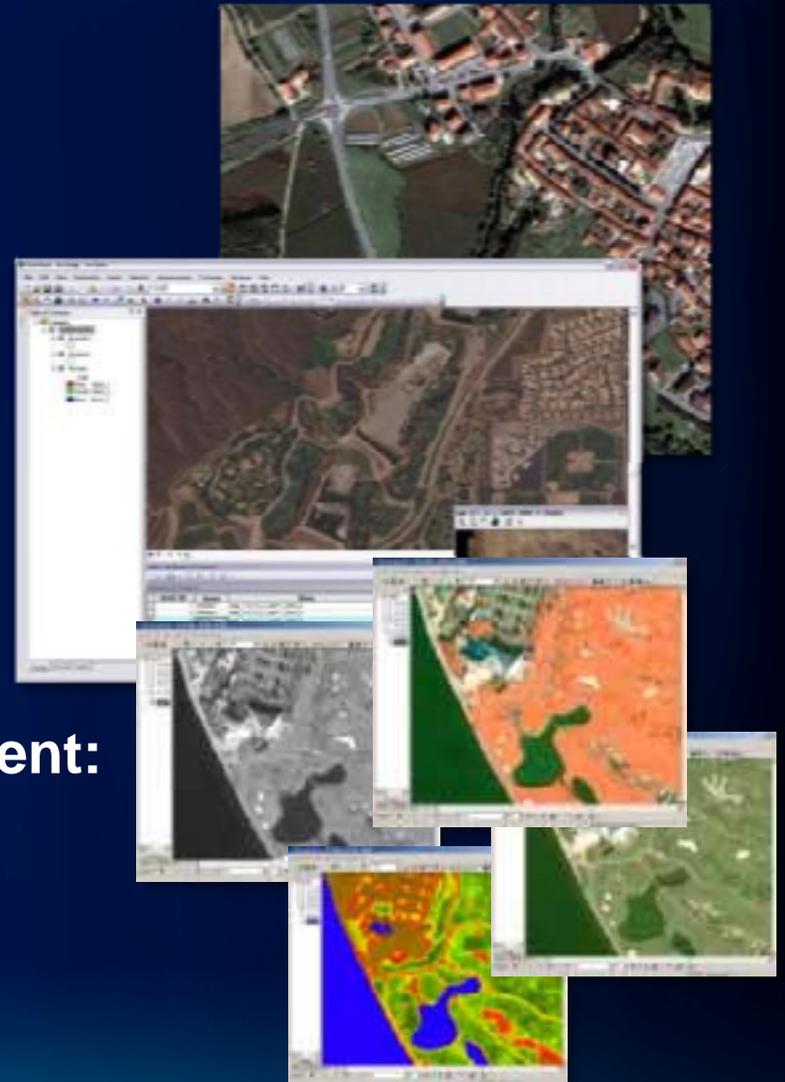
Geospatial Information, Integrated & Accessible



Imagery is Core to GIS

ArcGIS – Maximizing the Value of Imagery

- **Providing Image Accessibility:**
 - Timely
 - Quickly
 - Accurately
 - Collectively
 - Simply
- **Exploiting Rich Information Content:**
 - Resolution
 - Temporal change
 - Spectral range
 - Dynamic range



Elements of a Complete GIS

- Content
 - Base data provided by ESRI
- Management
 - Storing, Organizing and Structuring
- Dissemination
 - Accessibility to data, information and knowledge
- Visualization
 - Interpretability and human understanding
- Analysis
 - Gain knowledge to make informed decisions



Imagery Content

*Base Data Provided by **Esri***



World Imagery Updates at 10

- Worldwide Imagery at 15m Resolution
- United States Imagery 1m or better
 - Updates to over 50% of United States
 - New Sub-meter Imagery in Metro Areas
 - Formerly available by subscription only
- International
 - GeoEye IKONOS Imagery for Major Metro Areas
 - Expanded Imagery for other Countries
 - GreatBritain, Belgium, France, Germany, Czech Republic, Luxembourg, Netherlands, Portugal
- Community Map Program



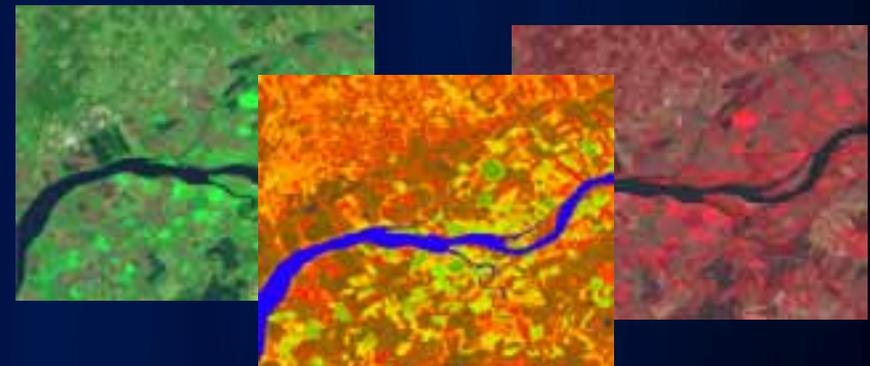
World Landsat Imagery

To be added to ArcGIS.com

- **NaturalVue (from *MDA*)**
 - Color Balanced, Orthorectified mosaic



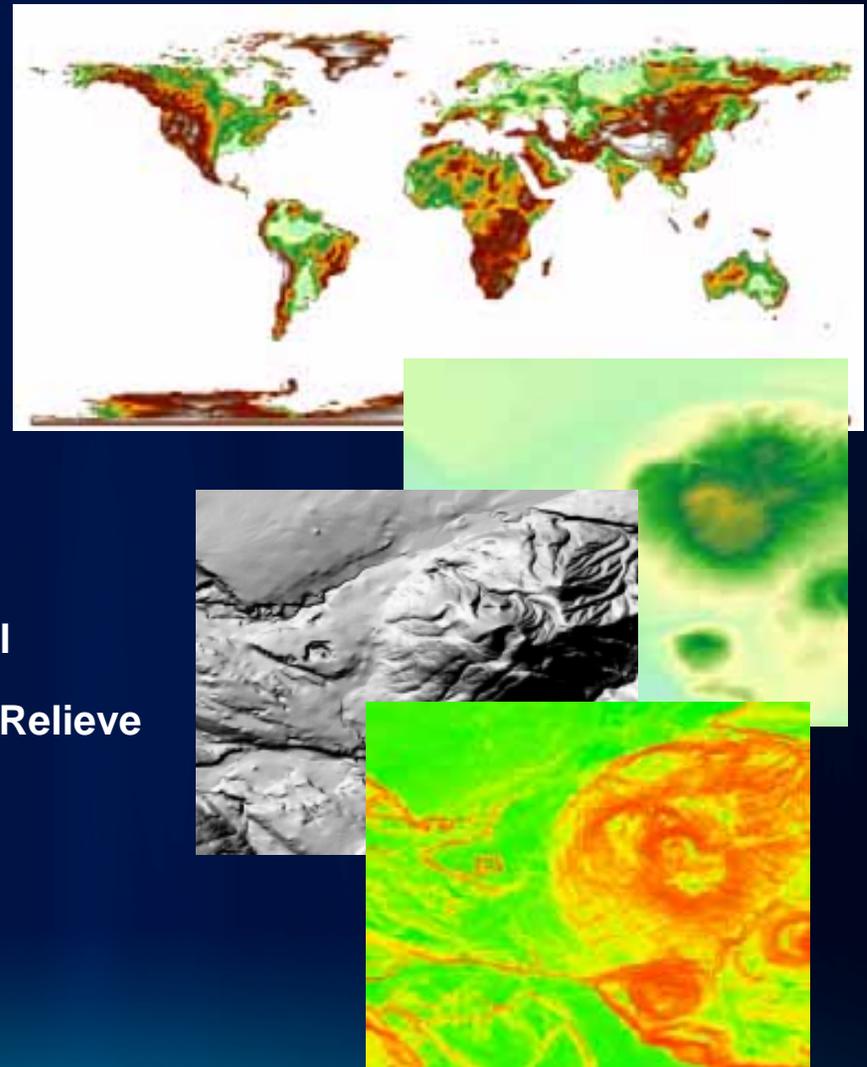
- **Global Landsat GLS**
 - 1980, 1990, 2000, 2005
 - Image Services
 - L1T, Radiance, TOA-Reflectance, Surface Reflectance
 - 8band, Color 321, False Color 432, PseudoColor 742, NDVI



World Elevation

To be added to ArcGIS.com

- **Multi Source**
 - GTOPO, SRTM,
 - USGS NED (1 and 1/3 arcsecond)
 - Lidar for sample areas
 - EGM2008 Geoid model
- **Services**
 - Elevation Orthometric & Ellipsoidal
 - Hill Shade, Slope, Aspect, Shaded Relieve
- **Tasks**
 - Profile, Viewshed, Contour



Content Demo

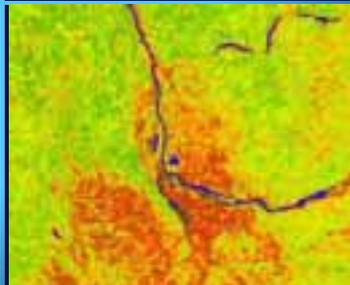
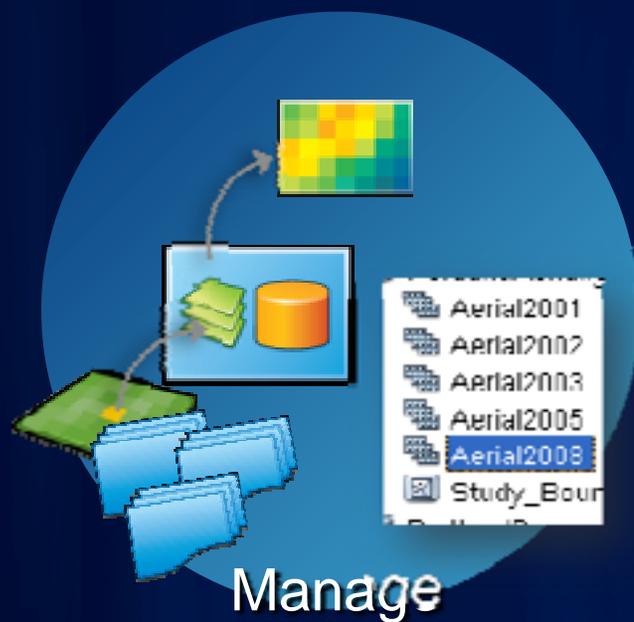


Image Management



ArcGIS – For Image Data Management

Storage, Catalog, Metadata & Process

- Workstation User

“What do I have? How can I easily work with it?”

- Organizations with collections of processed imagery

“How do I serve all our ortho images?”

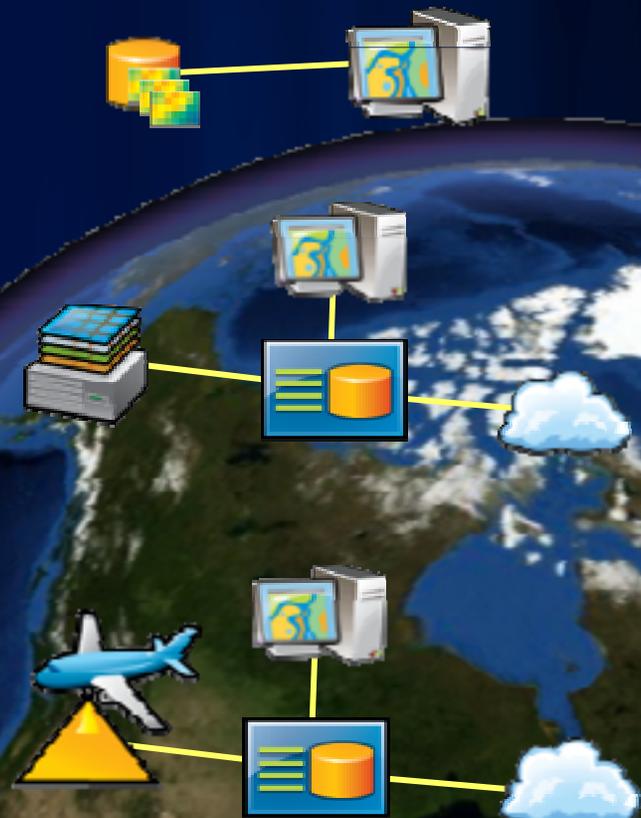
“How can I server my elevation data to multiple users?”

- Enterprises collecting new imagery

“How do I process and serve imagery that we acquire?”

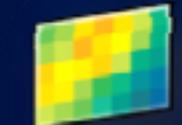
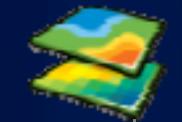
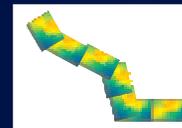
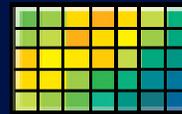
Catalog all available imagery

Make it quickly accessible in the required form



Wide Variety of Imagery

- Multiple Sources
 - Satellites, Aerial, Terrestrial, Scanning
- Multiple Forms
 - Ortho Images Tiles
 - Image Strips
 - Processed Rasters
 - Elevation models / Lidar
 - Analysis results
 - Thematic maps
 - Scenes
 - Sensor Images
- Multiple Formats
 - TIF, NITF, JP2,...



Procured as Background

Acquired for Analysis

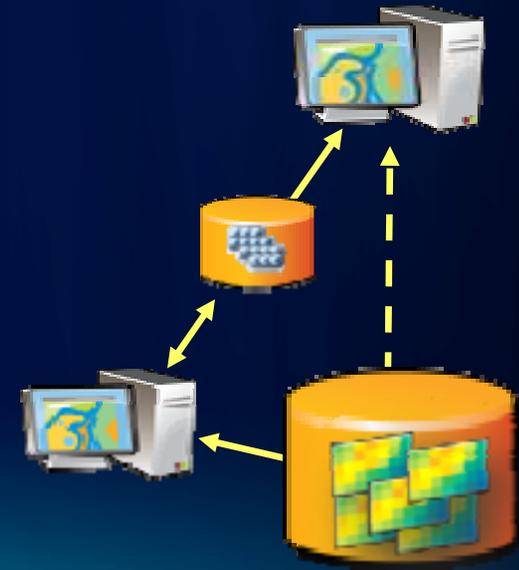
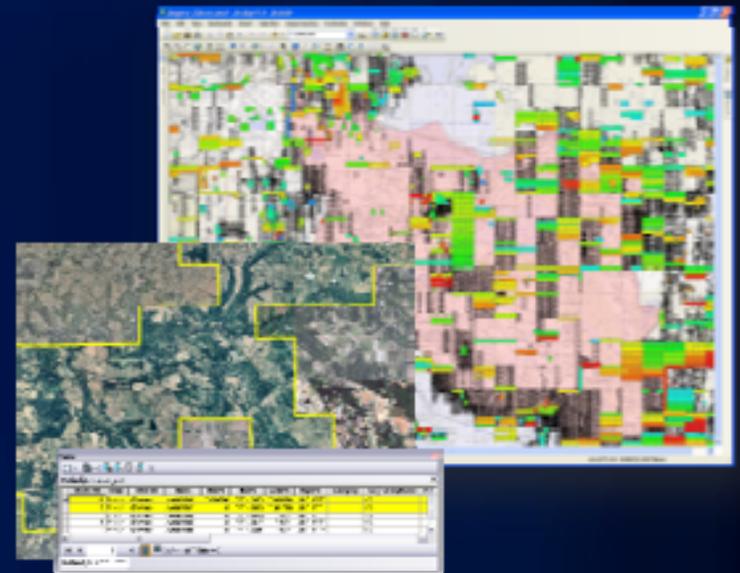
Improved Read / Write of Formats

- More Formats
 - BigTIF, MapCache, ..
 - NITF Improvements
 - TIF with CCITT4/CCITT3
- Compressed Pyramids
- Faster Read
- Use GDAL Drivers
 - Extensible
- Improved Projection Support
- Improved Color Maps

Mosaic Dataset

Optimum Model for Image Data Management

- Within ArcGIS Desktop (Editor/Info)
- Quickly Catalog
 - All raster datasets
 - Imagery from different sensors
- Define – In Geodatabase
 - Metadata
 - Processing to be applied
 - Default viewing rules
- Access – In all ArcGIS applications
 - As Image
 - Dynamic Mosaic , Processed on the fly
 - As Catalog
 - Footprints, Detailed metadata



Mosaic Datasets

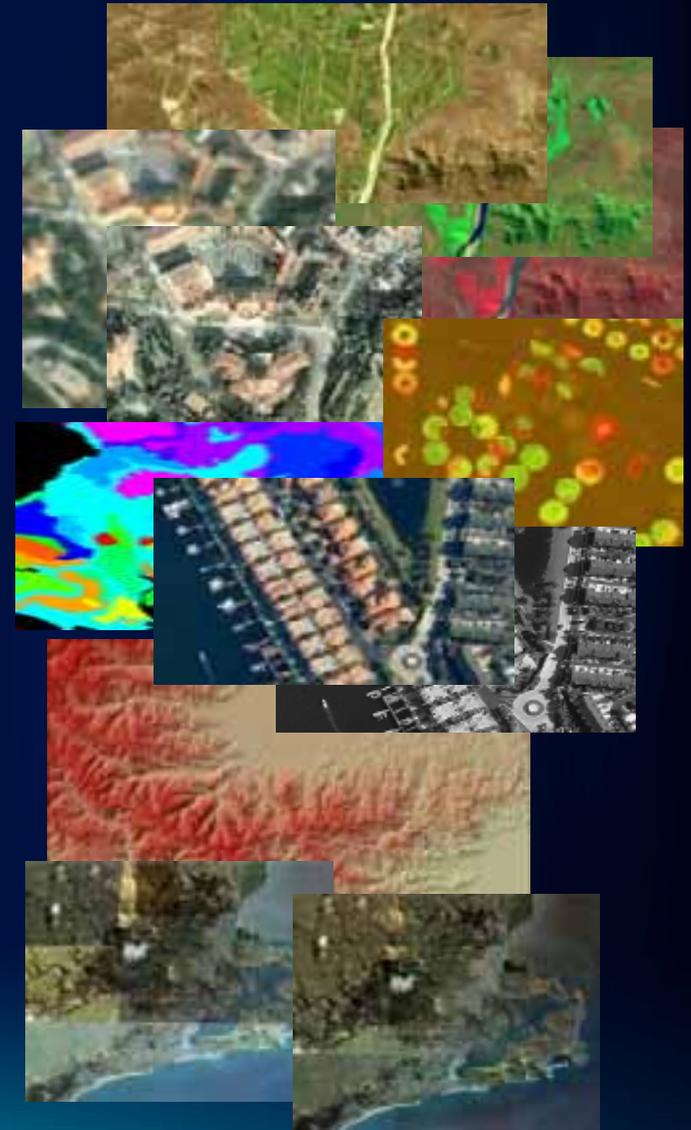
As replacement for ISDef, Raster Catalog

- Improvement over Image Service Definition (ISDef)
 - Massive scalability
 - No compile
 - NoData support
 - No extension required
 - Geoprocessing tools for authoring
- Improvement over Raster Catalogs
 - Raster Types
 - Define functions for On-the-fly processing
 - Dynamic Mosaicking
 - Overviews

On-The-Fly Processing

Create Multiple Products from a Single Source

- Imagery processed as accessed
- Processes
 - Stretch, Extract Bands
 - Clip, Mask
 - Reproject, Orthorectify, Pan Sharpen
 - Vegetation Index, Classify
 - Shaded Relief, Slope, Aspect
 - **Color Correction**
 - ...
- Applied to
 - Individual rasters in mosaic
 - Complete Mosaic Dataset

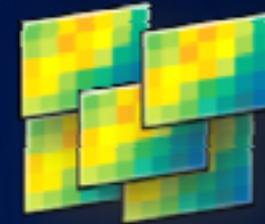


Utilizing the full image information content

Dynamic Mosaicking

Mosaicking Multiple Images On Demand

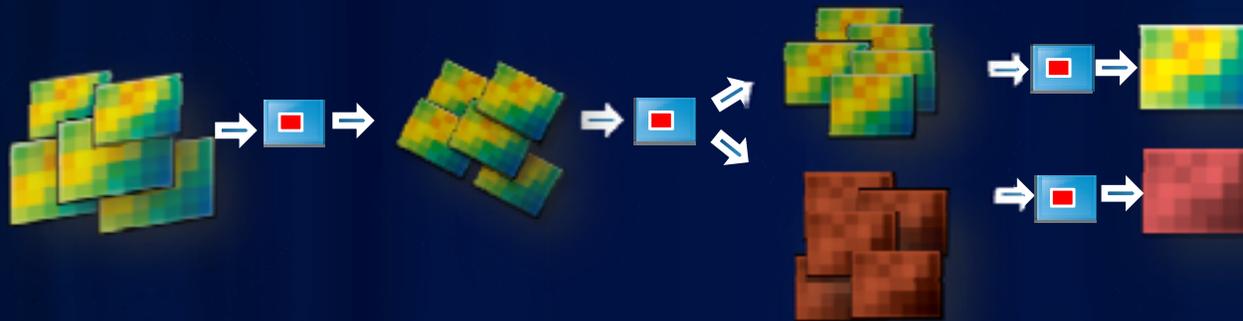
- Fuse imagery from multiple sources
- User control of Mosaic Method
 - By Date – 'Latest', 'Closest to May 2001'
 - By Attribute – 'Highest Sun Angle'
 - By Viewpoint – North, South, East, West
 - Seamline – Feathered blend
- **User Query** – 'Landsat imagery, with no cloud, later than June 2001'
- **NoData Support**
- Set default - Users sees best available imagery



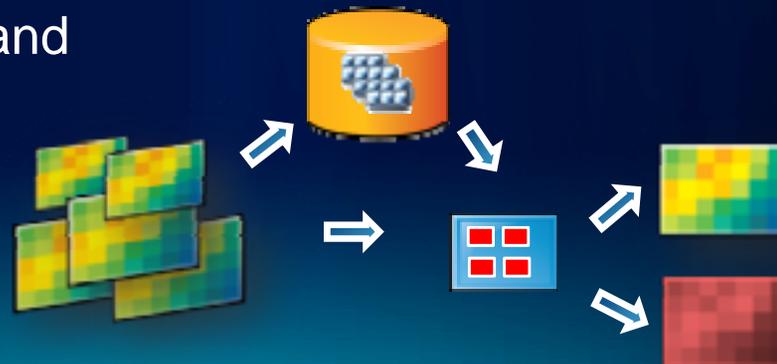
Utilizing information from overlapping images

Enhancing Processing Methodologies

- Conventional Image Processing Workflows are Linear
 - Multiple processes create intermediate results
 - Products created as static mosaic



- Mosaic Datasets Enable Transactional Workflows
 - Processes applied on demand
 - Products created on demand



On-the-fly Processing & Dynamic Mosaicking

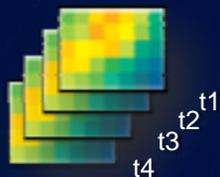
Resolves Traditional Image Management and Processing Issues

Processing Time

Reduces processing

Overlapping Imagery

Maintain information



Disparate Datasets

Large NoData areas

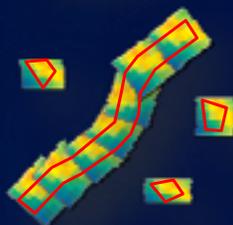


Image Quality

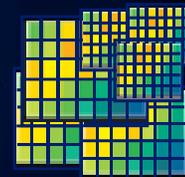
Reduces resampling

Storage

Reduces storage by removing redundancy

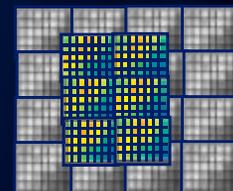
Multi-resolution Data

No need to sample up or down



Maintenance

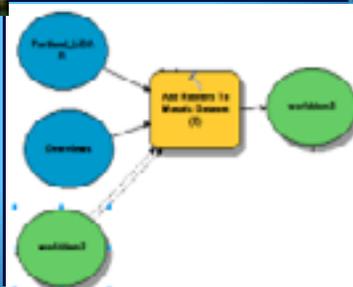
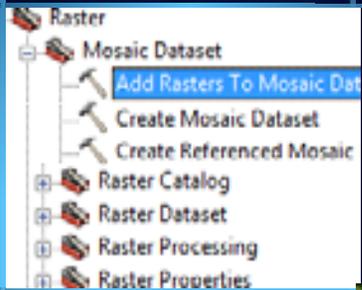
Add imagery as required



Maintain Metadata

Retain valuable information

Management Demo



Dissemination

Providing Image Accessibility



*Sharing: Direct, Static & Dynamic
Access: Multiple Clients*



Image Accessibility

To Multiple Applications

- Direct Access

- Raster
- Mosaic Dataset

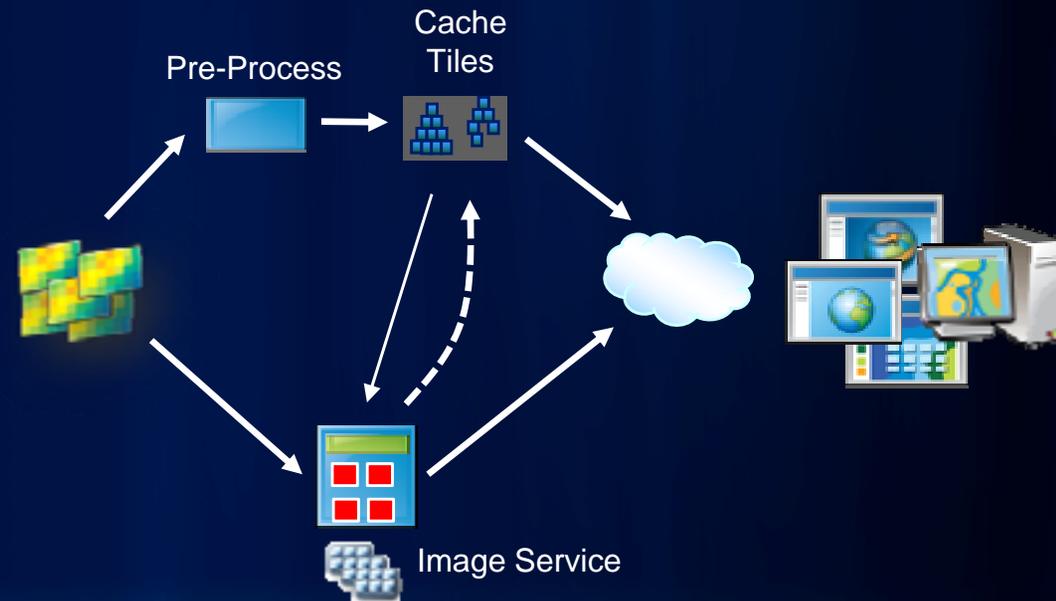


- Static Web Services

- Map Cache
- Compact Cache
- JPGPNG

- Dynamic Image Services

- Server based processing
- Image Services, WMS, WCS, KML
- SOAP, REST interfaces



ArcGIS provides image accessibility

ArcGIS Server - Image Services

Optimized Serving of Imagery and Rasters

- Core capability of ArcGIS Server
- Serve:
 - Raster Datasets
 - **Raster Layer – Can include functions**
- As Image Service, WMS, WCS, KML
- **1:M – One raster in many forms**
- Client defined properties
 - Spatial Reference System
 - Compression for Transmission – For Low Bandwidth Networks
 - **Functions – Client defined enhancements**
- Export – User defined projection and extents

ArcGIS Server - Image Extension

Serving large collections of Imagery and Rasters

- Extends Image Services to **serve Mosaic Datasets**
- Accessible as:
 - Image – Dynamic Mosaicking and On-the-fly processing
 - **Catalog – Table, Metadata, Queries**
- M:M – Many rasters as one or many images
- **Download – Original Imagery with optional clipping**

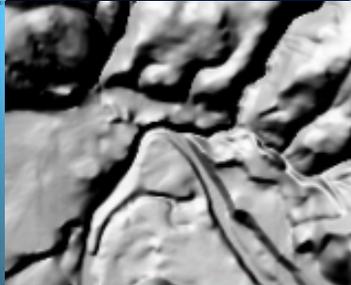
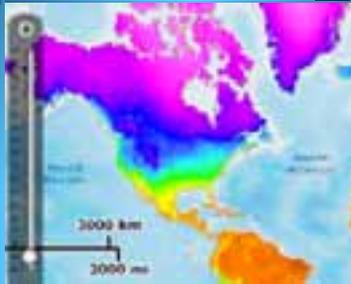
- **No Separate Install**
- **Windows/Linux/Solaris**

Image Service Client Applications

- ArcGIS Desktop
- ArcGIS Explorer
- 3rd Party Apps – Microstation, AutoCAD
- OGC Standards – WMS, WCS, KML
- **Enhanced Web APIs**
 - SOAP, REST
 - Service Description
 - Export Image – Extent, Resolution, **Function**
 - **Query – Where ..**
 - **Identify – Feature, Pixel Size,...**
 - **DownLoad - RasterID, Envelope/Geometry, Format,...**



Dissemination Demo



ArcGIS Desktop – Accelerated Display

Seamless Pan and Zoom

- Electronic Light Table like display performance
- Integrated geospatial imagery and vectors
- Utilizes Hardware Acceleration
- Dynamic
 - Change: Contrast, Brightness, Gamma, DRA

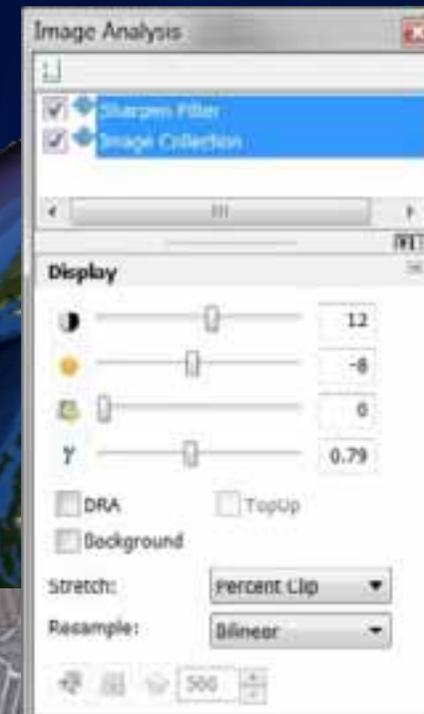


ArcGIS Desktop - Image Analysis Window

Better Interpretation & Understanding of Imagery



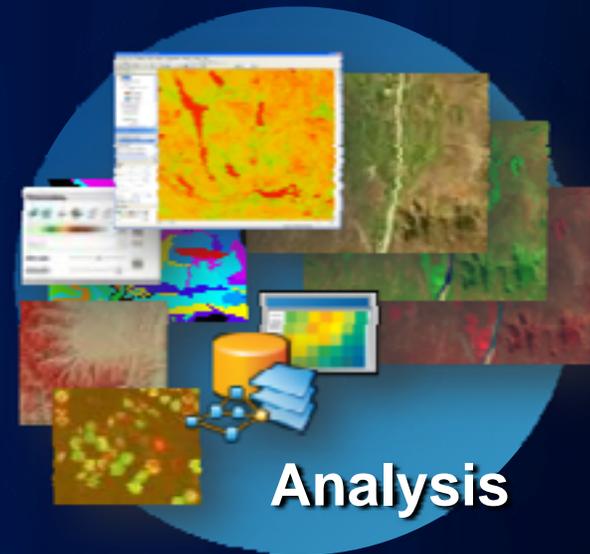
- Single Button Access to
 - Image Enhancements
 - Image Interpretation
 - Image Processing
- Save functions in Layers



Visualization Demo

Analysis

Exploiting the full value of imagery



Search & Discovery

Finding the Required Imagery

- Simplified through Image Services
 - Best by default
 - User Query
 - User defined mosaic method
- **Catalog Access**
 - **Footprints**
 - **Metadata**
- **Selections**
- **WebBased Query tools**

Image Processing

Exploiting the Full Value of Imagery

- Through **Image Analysis Windows**
 - Ortho
 - PanSharp
 - Composite
 - Mosaic
 - ...
- Applied On-The-Fly
- Stored in Layer

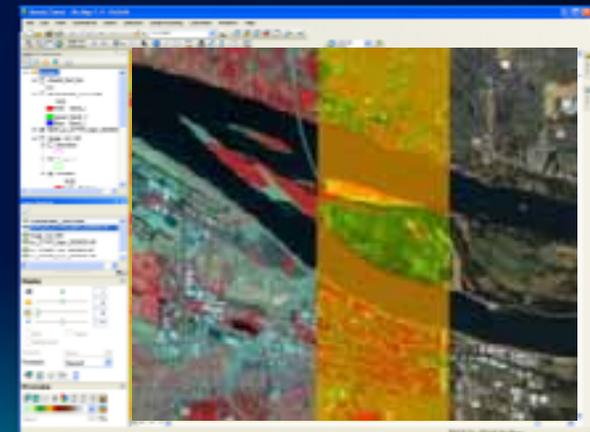
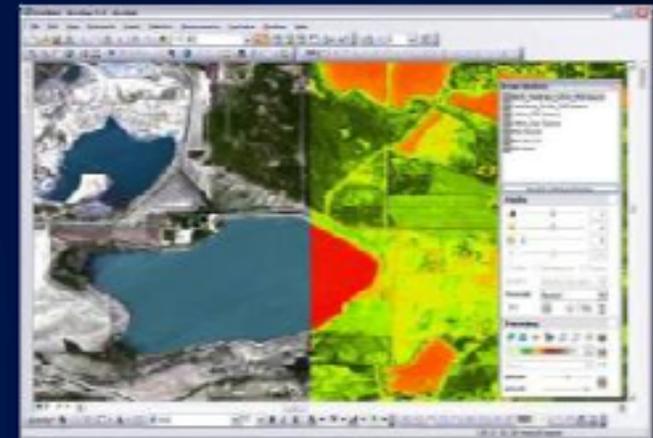
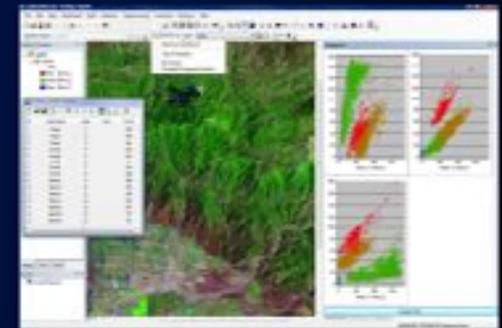
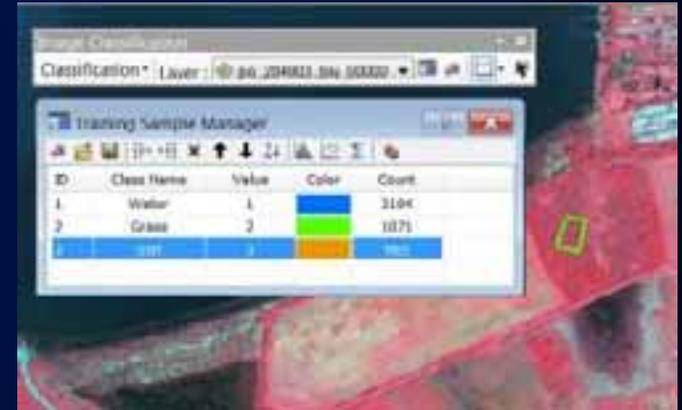


Image Classification Toolbar

Added to Spatial Analyst

- Training Sample Manager
 - Supervise & Unsupervised
 - Class Probability
 - Principle Component Analysis
- Define training areas graphically
- Generate Signature
- Uses functions
- Requires Spatial Analysis Extension
- Not to be confused with Feature Extraction



Analysis Demo

ArcGIS – A Platform for Complete Imagery Solutions

Information Centric Workflows Enable Efficiency & Interoperability

- **ESRI works closely with its partners**
- **ArcGIS provides THE platform**
- **Partners provide domain expertise**

- Automated Feature Extraction
- Multispectral Analysis
- Hyperspectral Analysis
- Radar
- Specialized Sensor Support
- Stereo Display
- ...

Trimble (Applanix)
 Microsoft (Vexcel)
 DigitalGlobe
 Pictometry
 RapidEye
 GeoEye
 SPOT

ITT VIS
 Definiens
 Clark Labs
 Overwatch
 BAE Systems



Service partners not listed

PCI Geomatics
 Trimble (Inpho)
 LizardTech
 i-cubed
 MDA

DAT/EM
 PurVIEW
 TerraGo
 Qcoherent

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QUESTIONS?