



Best Practices for Managing Processed Ortho Imagery

Cody A. Benkelman

Characteristics of Processed Ortho Imagery

- Typically 8 bit (sometimes 16)
- Typically 3 spectral bands (sometimes 4)
 - RGB or Color IR
- May/may not have been color corrected
- File layout
 - Typically delivered as regular edge-joined tiles *OR*
 - Multi-image mosaics (e.g. NAIP “compressed county mosaics”, mosaics from UAS flights)
- Sources:
 - USDA NAIP program
 - Custom collections for state/local governments

Typical Uses of Processed Ortho Imagery

- **State/county/city government web sites**
 - Background imagery
 - Change analysis
 - Growth planning
 - Pervious/Impervious surface mapping
 - Public use (Tourism, Real Estate, Hunting, Hiking...)
- **Manual feature extraction**
 - Road/Highway infrastructure
 - Wetlands
 - Forestry
 - Boundary mapping

Usage Modes of Processed Ortho Imagery

- **Visual Interpretation**
 - *(most common)*
 - May desire access to image metadata
 - Manual feature extraction
 - Large numbers of Users
- **Technical image analysis**
 - *(less common)*
 - Users need data values
 - 4 band, 16 bit



Drone Imagery

Prairie dogs & Black footed ferrets...

<http://esriurl.com/WWFBelknap>

Data courtesy of:

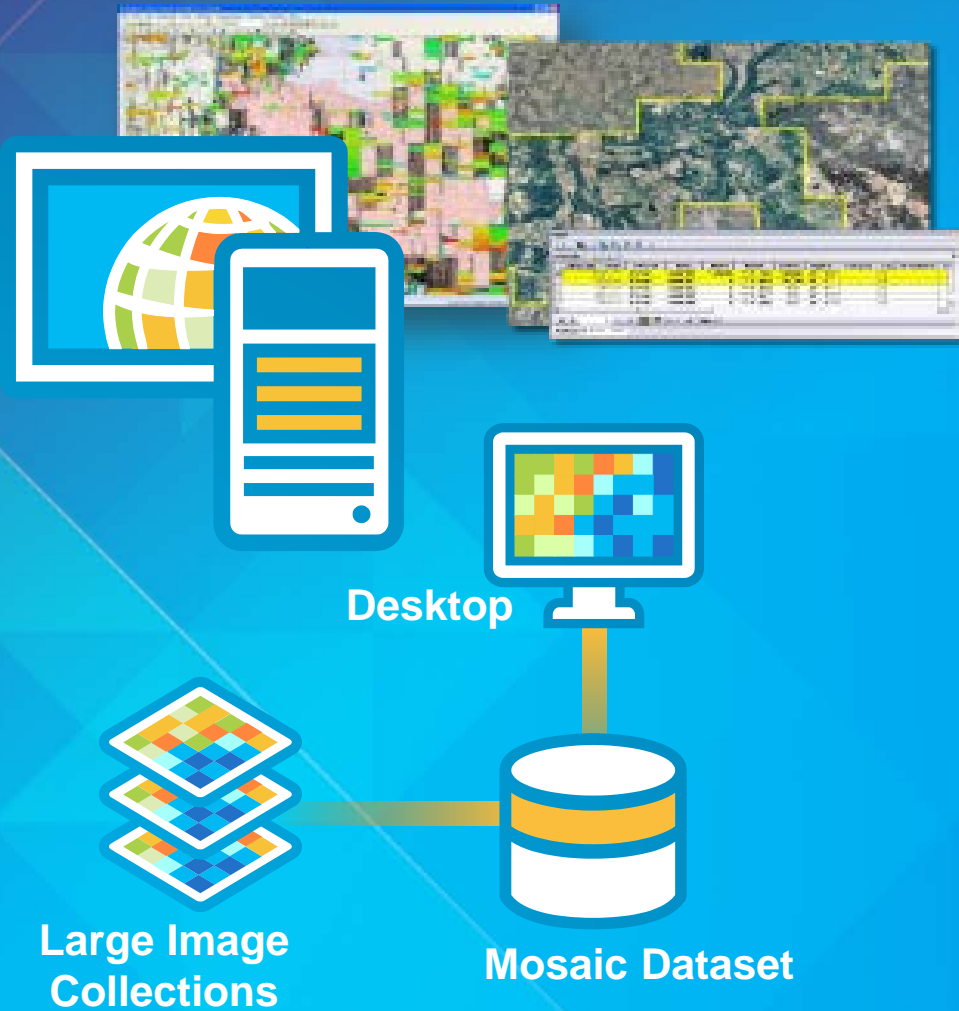
World Wildlife Fund, Topcon, Behron LLC, Idaho State University, Eagle Digital Imaging, Fort Belknap Fish and Wildlife Department

Data Management Objectives

- **Share imagery with users**
- **Manage Cost vs. Performance**
 - Implement In-house, DIY Cloud, AGOL?
- **Ensure scalability & maintainability**
 - Apply automation

Image Management Workflow 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

Mosaic Dataset Design

- **Key metadata → Attribute Table**
 - Dates acquired (start, end)
 - Date published
 - Horizontal Accuracy (CE90)
- **Handling NoData**
- **Source / Derived Model with Raster Functions**
- **Automation!**

File Layout – one of three cases

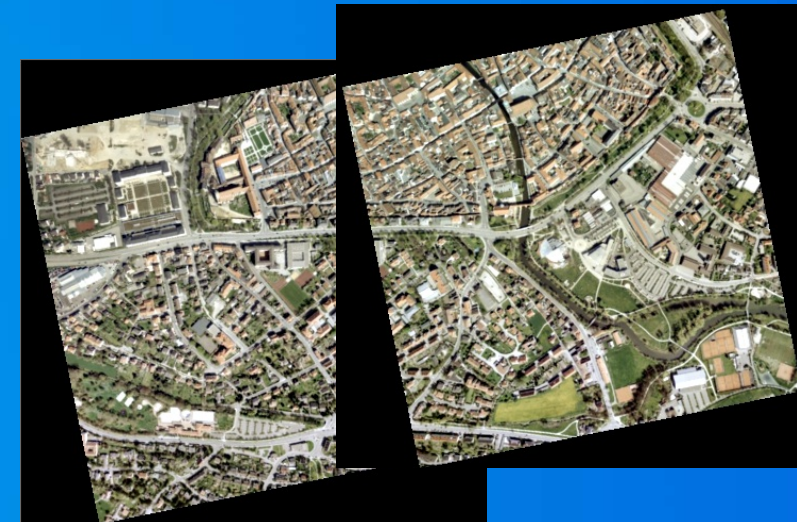
Edge matched or overlapping ortho tiles



Orthorectified mosaic (compressed, *SID or *JP2)



Individual orthophotos

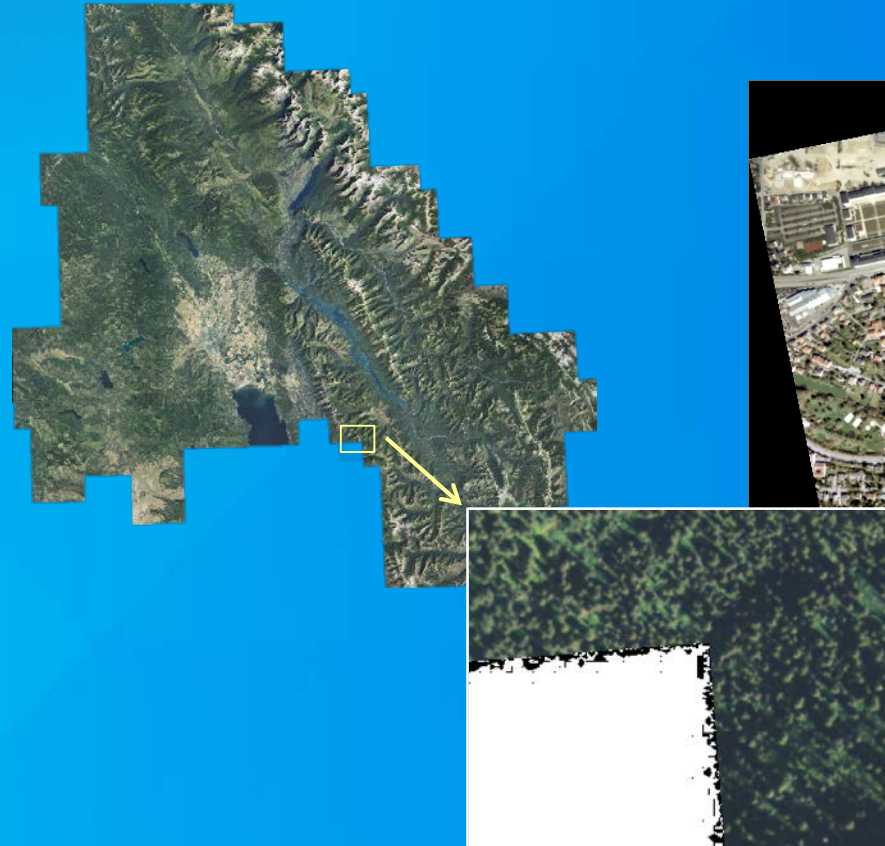


Handling NoData – Set “NoData Value”

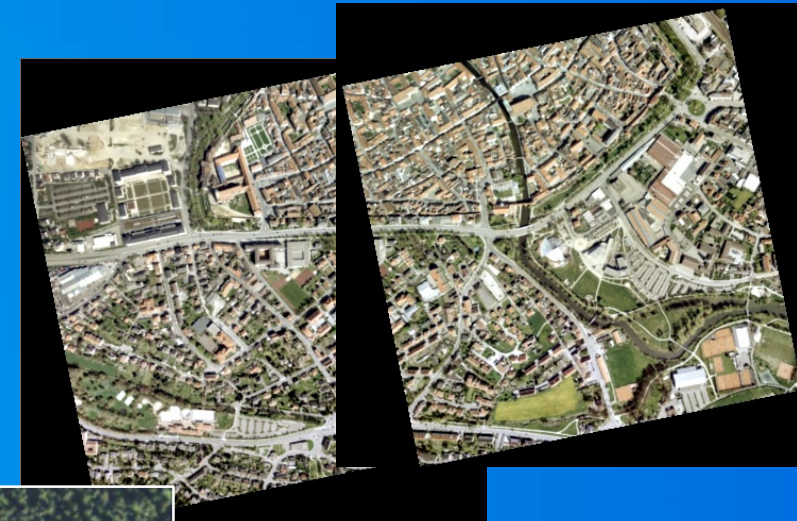
Edge matched or overlapping ortho tiles



Orthorectified mosaic (compressed, *SID or *JP2)



Individual orthophotos



Handling NoData – Build Footprints

Edge matched or overlapping ortho tiles



Orthorectified mosaic (compressed, *SID or *JP2)

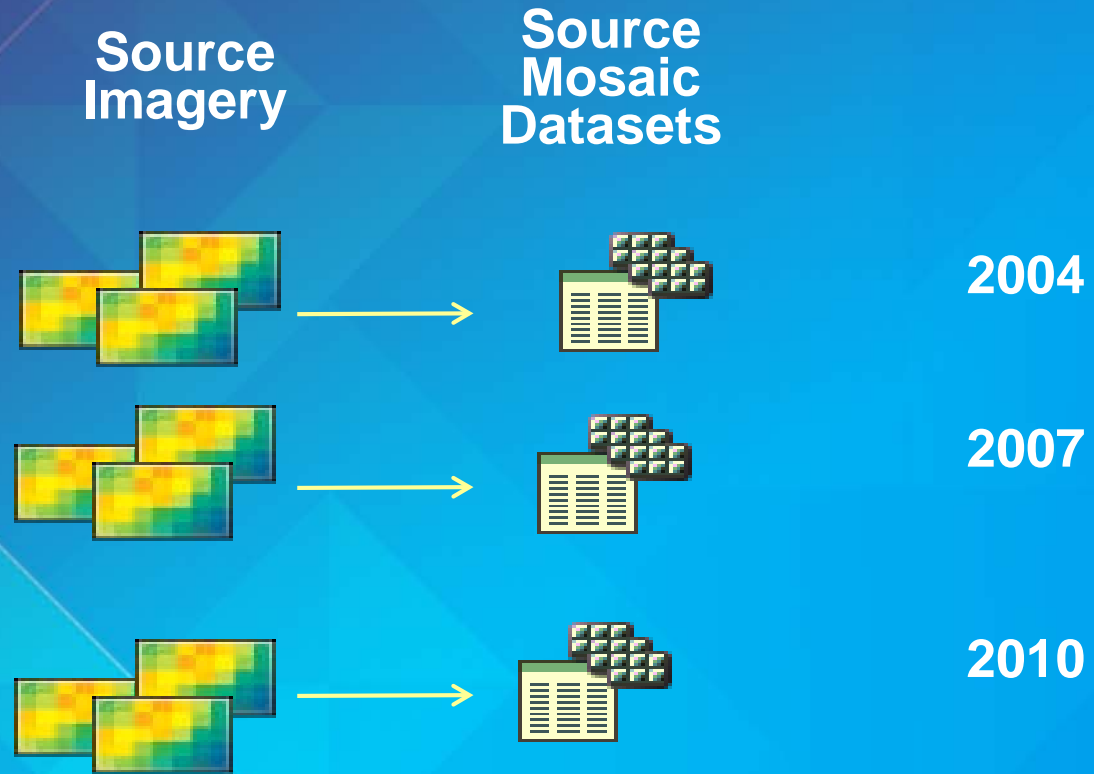


Individual orthophotos

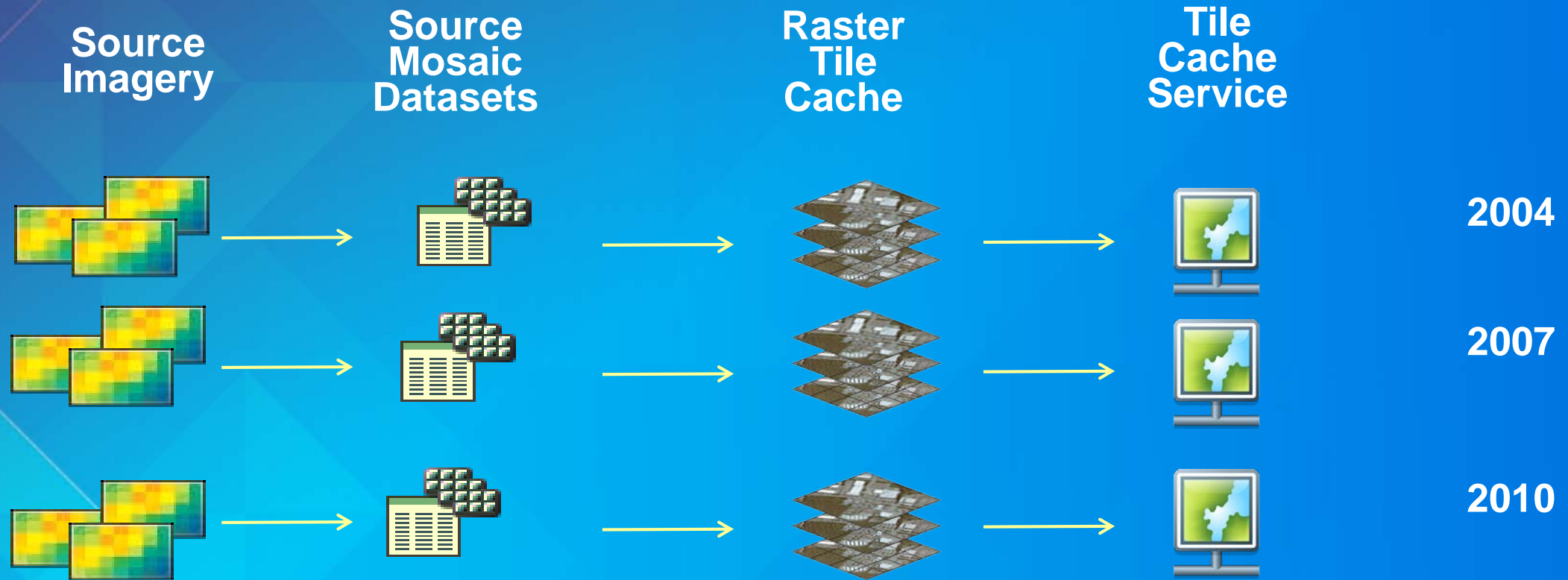


Build footprints → Clip to footprints to remove NoData

Source / Derived Data Model – begin with “Source” Mosaic Datasets

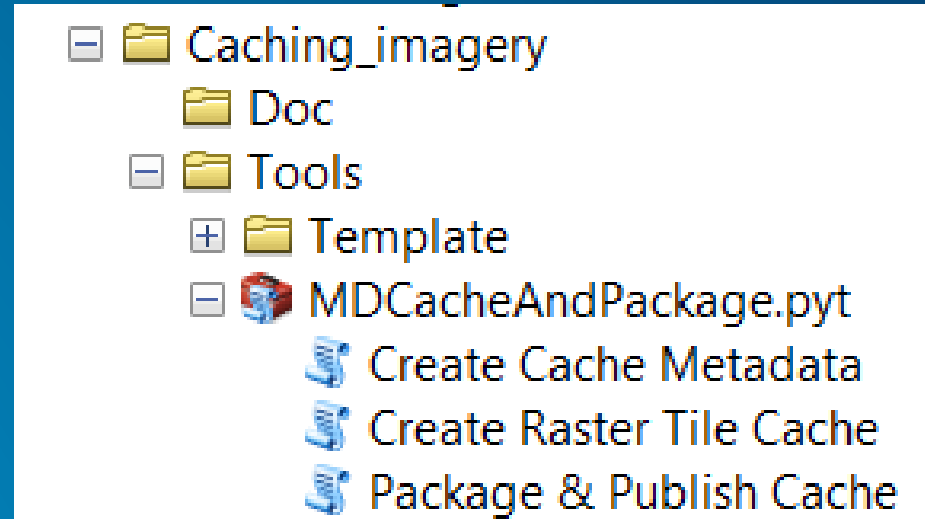


Source Mosaic Datasets – Direct to Raster Tile Cache (optional)

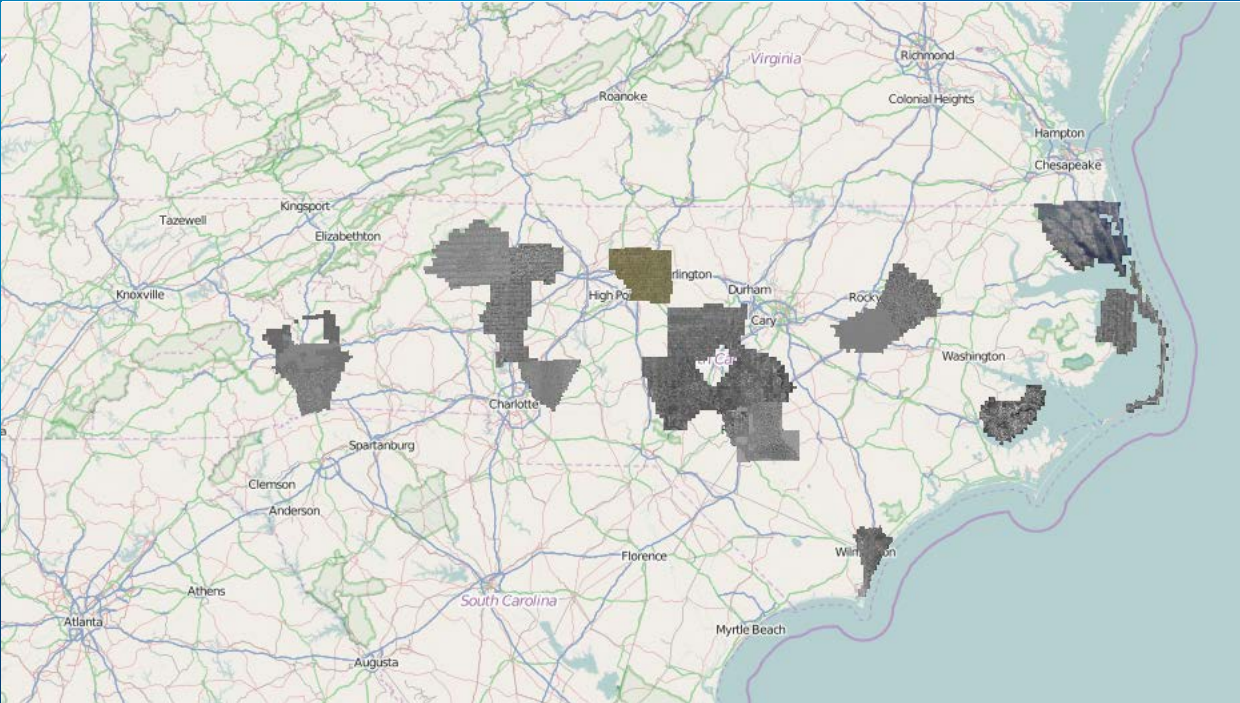


GP Tools for generating, attributing, and publishing cache

- <http://esriurl.com/CacheTools>



- Recorded live training seminar (LTS) for image caching:
<http://esriurl.com/ImageCacheLTS>

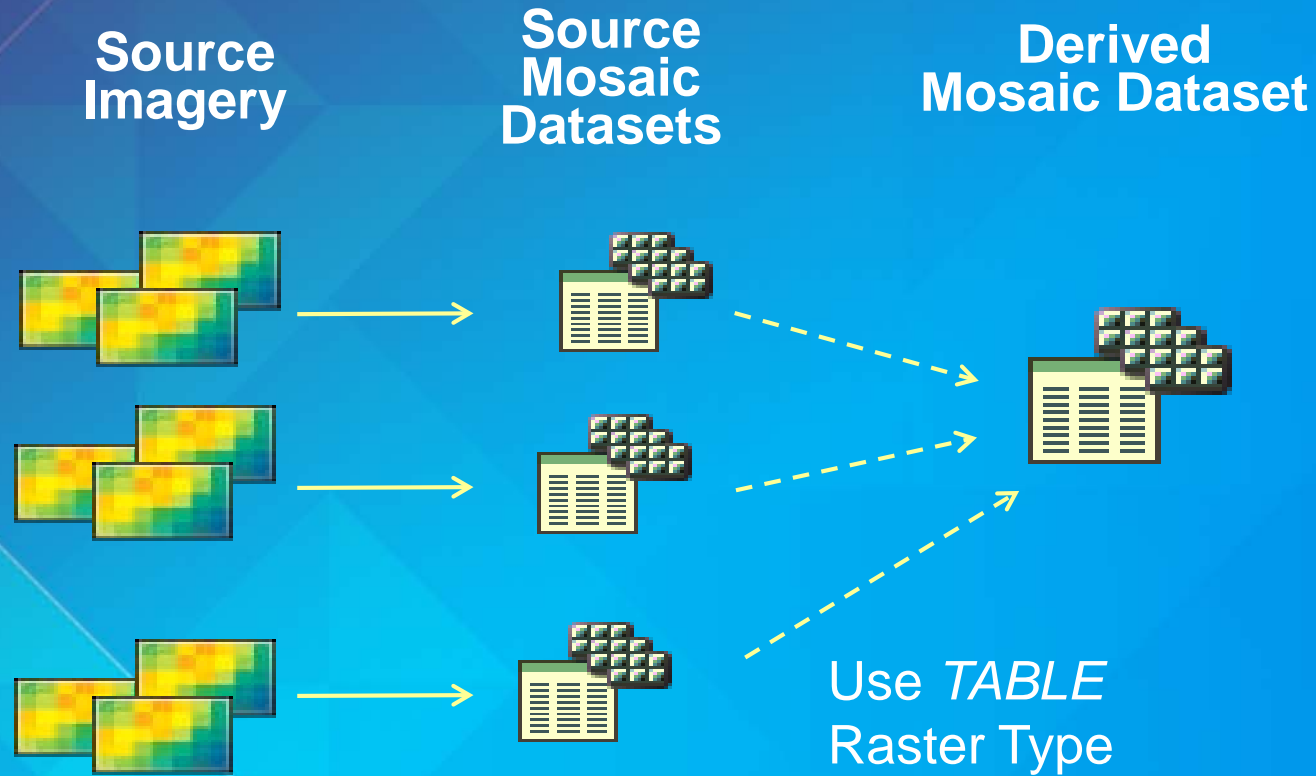


Time Enabled

NC OneMap: <http://arcg.is/1GpdjLP>

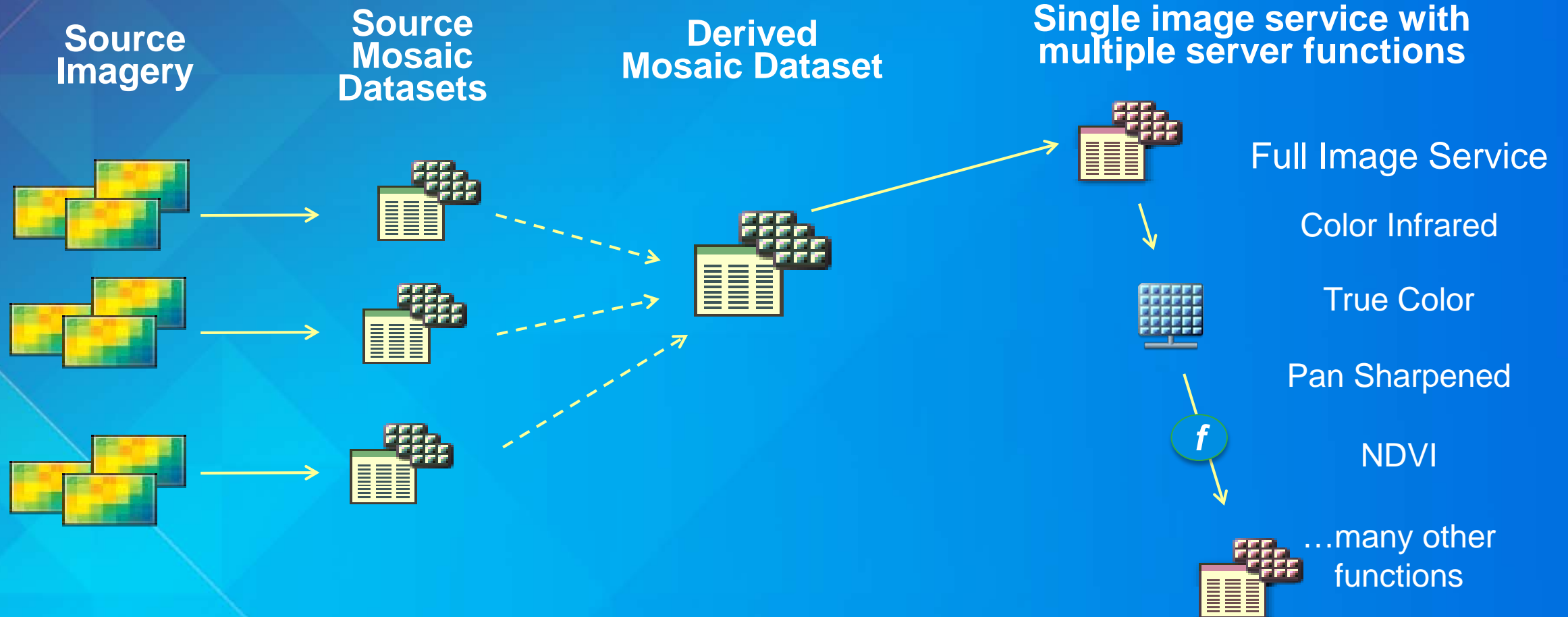
Data courtesy of:
State of North Carolina

Combine into Derived Mosaic Dataset

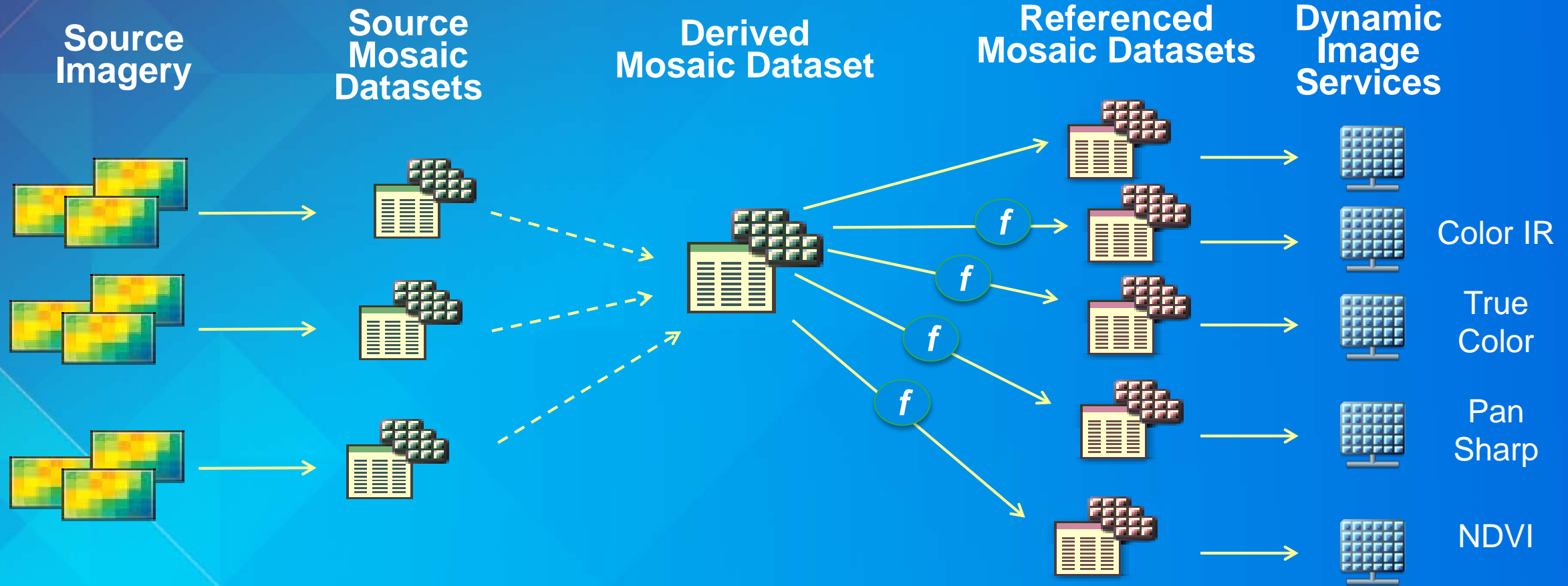


Advantage: All image data available in a single location

On-the-fly Products using Server Raster Functions

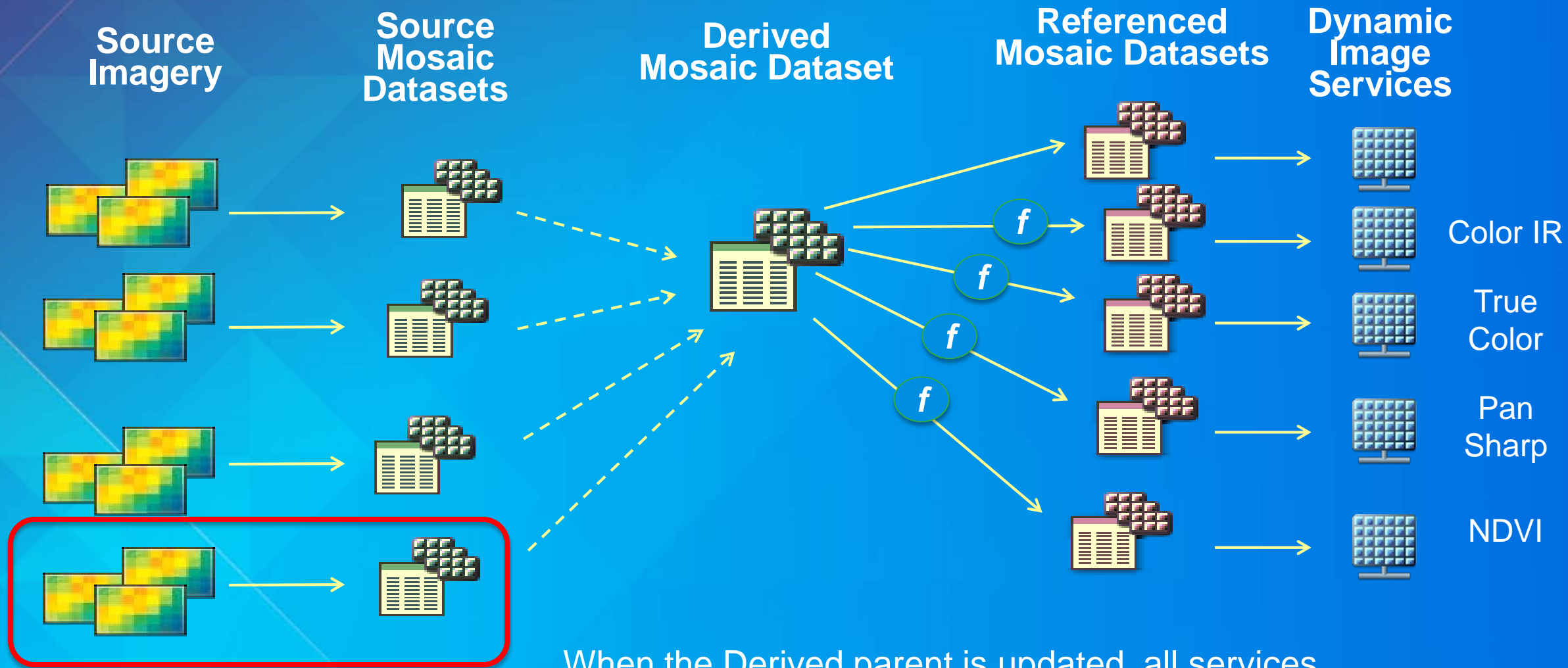


Alternative design using Referenced Mosaic Datasets



Available since ArcGIS 10.0
Appropriate for serving to WMS clients

Update with new data



When the Derived parent is updated, all services synchronize automatically

Image Management Workflows

Best Practice Workflows for Image Management

- **Resource Center landing page** <http://esriurl.com/6005>
- **Guidebook in Help System** <http://esriurl.com/6007>
- **ArcGIS Online Group** <http://esriurl.com/6539>
 - Downloadable scripts & sample data
- **Recorded webinars**
 - Image management <http://esriurl.com/LTSImgMgmt>
 - Image caching <http://esriurl.com/ImageCacheLTS>
- **Source code on GitHub** <http://esriurl.com/MDCS>

ArcGIS Resources

Home Communities Help Blog Forums Videos Search Imagery

Image Management Workflows

Communities / Imagery

Manage collections of imagery in ArcGIS using a mosaic dataset.

Share your collections online as image services.

ArcGIS enables you to work with a wide variety of imagery acquired from different sources. These image management workflows provide best practices for managing large collections of imagery to make the imagery quickly and efficiently accessible. The image management workflows are described in the Image Management Guidebook which begins with a general overview of all aspects related to image management, followed by workflow-specific sections regarding best practices for all workflows listed below.

The following additional components unique to each workflow are referenced below:

- Scripts and associated documentation for the automation of workflows.
- Sample data to be used with the scripts to create sample mosaic datasets and image services.

ArcGIS Resources

Home Communities Help Blog Forums Videos

Image Management

Help

Image Management

- Standard Workflow
 - Overview
 - Data sources and formats
 - Data structure
 - Metadata
 - Preprocessing
 - Mosaic dataset design
 - Source mosaic datasets
 - Derived mosaic datasets
 - Referenced mosaic datasets
 - Publishing
 - Caching
 - Optimization
 - Maintenance
- Elevation data
 - Overview
 - Data sources and formats
 - Data structure
 - Metadata
 - Preprocessing

datasets, and maintain the services. This guidebook further expands on these concepts and workflows for different types of imagery. The following

Optional Preprocessing

Source Data Collections Source Mosaic Datasets Derived Mosaic Datasets

Each contains similar imagery Manages all properties Combined multiple

ArcGIS FEATURES PLANS GALLERY MAP HELP Sign In

ArcGIS Image Management Workflows

SHARE

This group includes resources associated with Esri's "best practices" for managing & serving large collections of imagery. Resources include sample data and Python scripts, links to documentation, and example image services and web applications.

Group Content

All Results

Title	Owner	Rating	Views	Date
Landsat 8 Script	ImageryWorkflowsTeam	★★★★★ (1 rating, 1 comment, 278 downloads)		Last Modified: May 2, 2014
Elevation Reviewer	ImageryWorkflowsTeam			Last Modified: November 13, 2013

Group Details

Status: public
Contributors: All members
Tags: image services; image management; best practices; python; mosaic dataset; workflows


2 Members
esri
ImageryWorkflowsTeam



[Open](#) ▾ [Details](#)

Preprocessed Orthos Sample Data

A ZIP archive containing multiple preprocessed orthorectified images for use with example scripts to demonstrate best practices in image management.

 Geoprocessing Sample by ImageryWorkflowsTeam

Last Modified: February 7, 2015

Preprocessed Orthos Sample Python Scripts

A ZIP archive containing Python scripts for building mosaic datasets to manage multiple years of preprocessed orthophotos

 Code Sample by ImageryWorkflowsTeam

Last Modified: February 7, 2015

Automation Demo

Image Management Workflows

Summary – Key considerations

- **Raster Tile Cache vs. Dynamic Image Services**
 - Cache: fastest performance for large # of users
 - Dynamic: if > 8 bit, or > 3 bands, or need imagery in overlap
- **If cache, is original metadata important?**
- **Time enabled?**
- **Data format: Tiles, Ortho Files, or Orthomosaic**
- **Apply automation!**



Understanding our world.