

What's New in Imagery Management: *Introducing ArcGIS Online Imagery*

Kurt Schwoppe, David Wright, Jeremy Schuyler

2021 ESRI FEDERAL GIS CONFERENCE

Today's Speakers

Experts from Esri's Remote Sensing & Imagery Team



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David Wright
Senior Solutions
Engineer



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Project Manager

Turning Imagery Into Information

Remote Sensing is Foundational to GIS

Turning Imagery into Actionable Information



Satellite

Aerial
Cameras

Drones

Built Environment

Natural Environment

*Integration of Dynamic Data About
Everything*

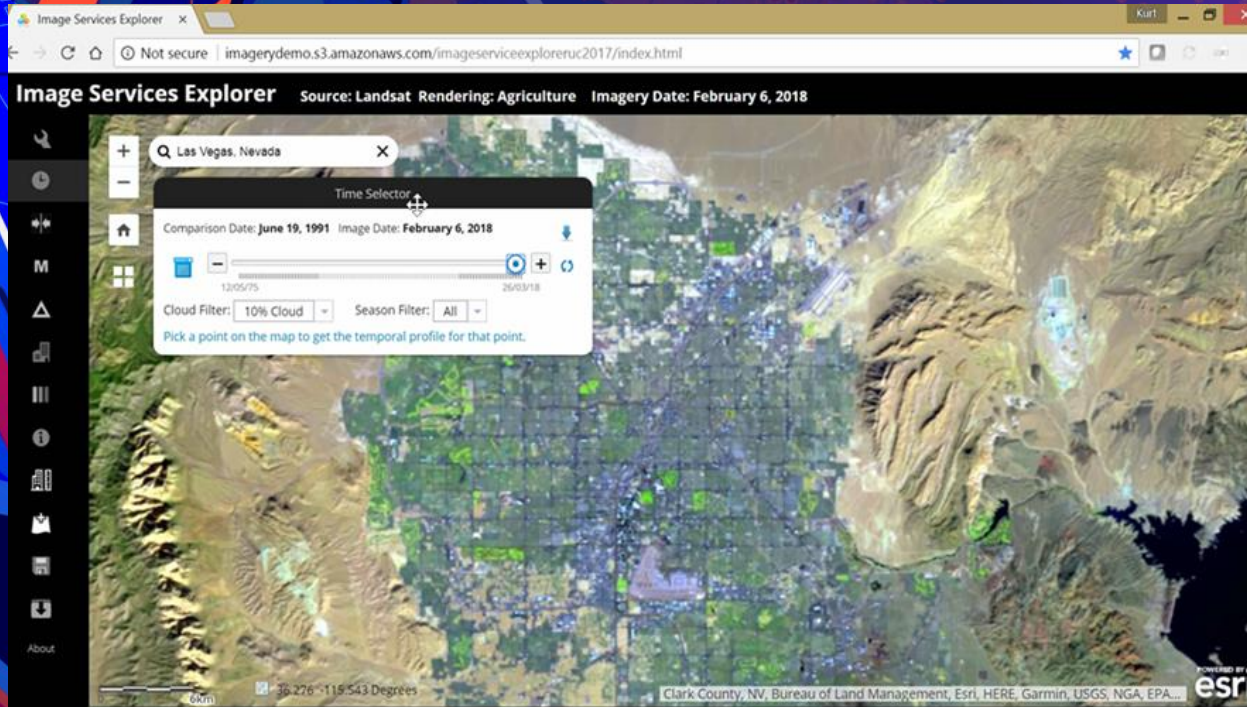
Capabilities vs Complexity

The Challenge of making complex things easy

— Capabilities
— Complexity

Flattening the Imagery
Complexity Curve

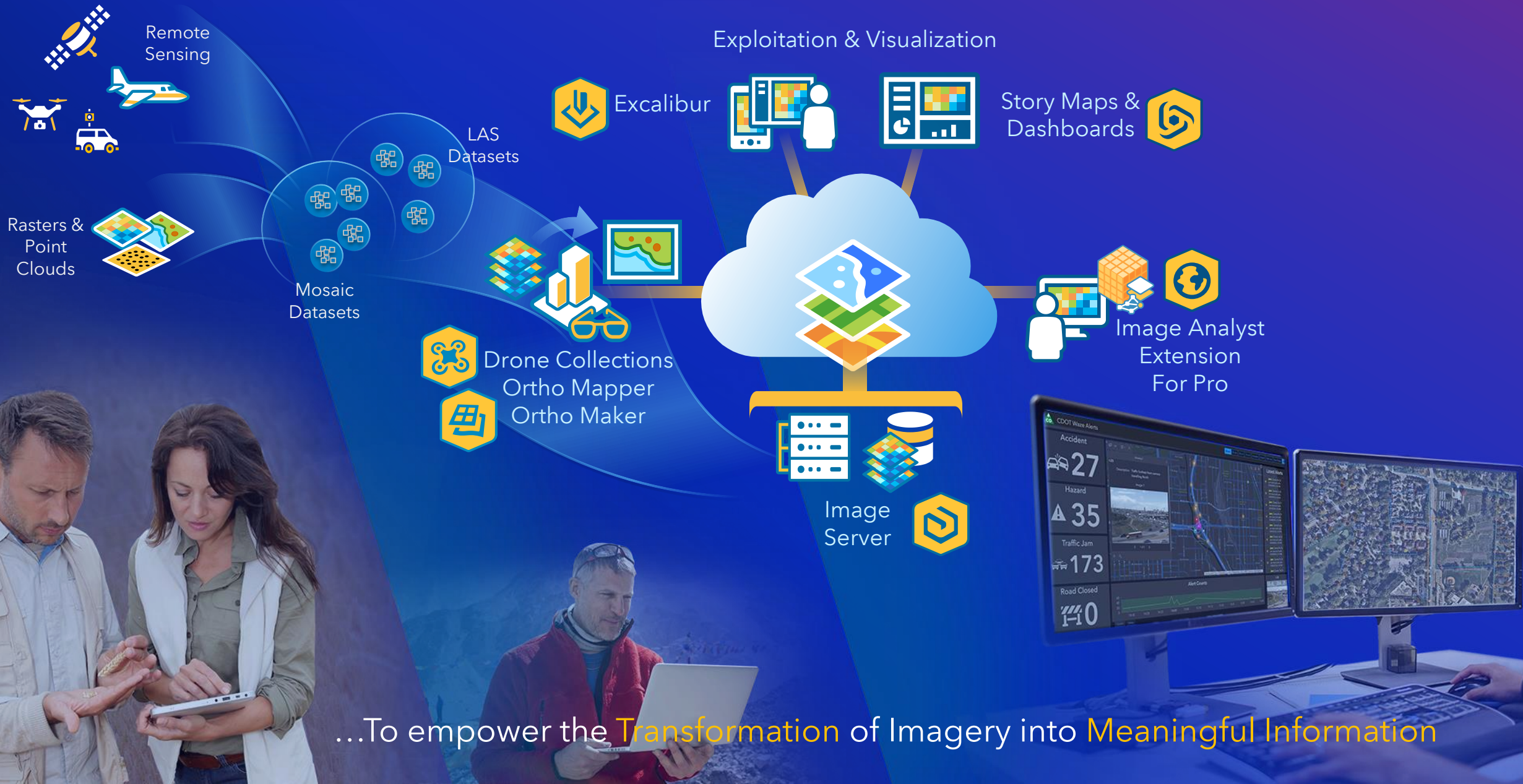




Sample Application

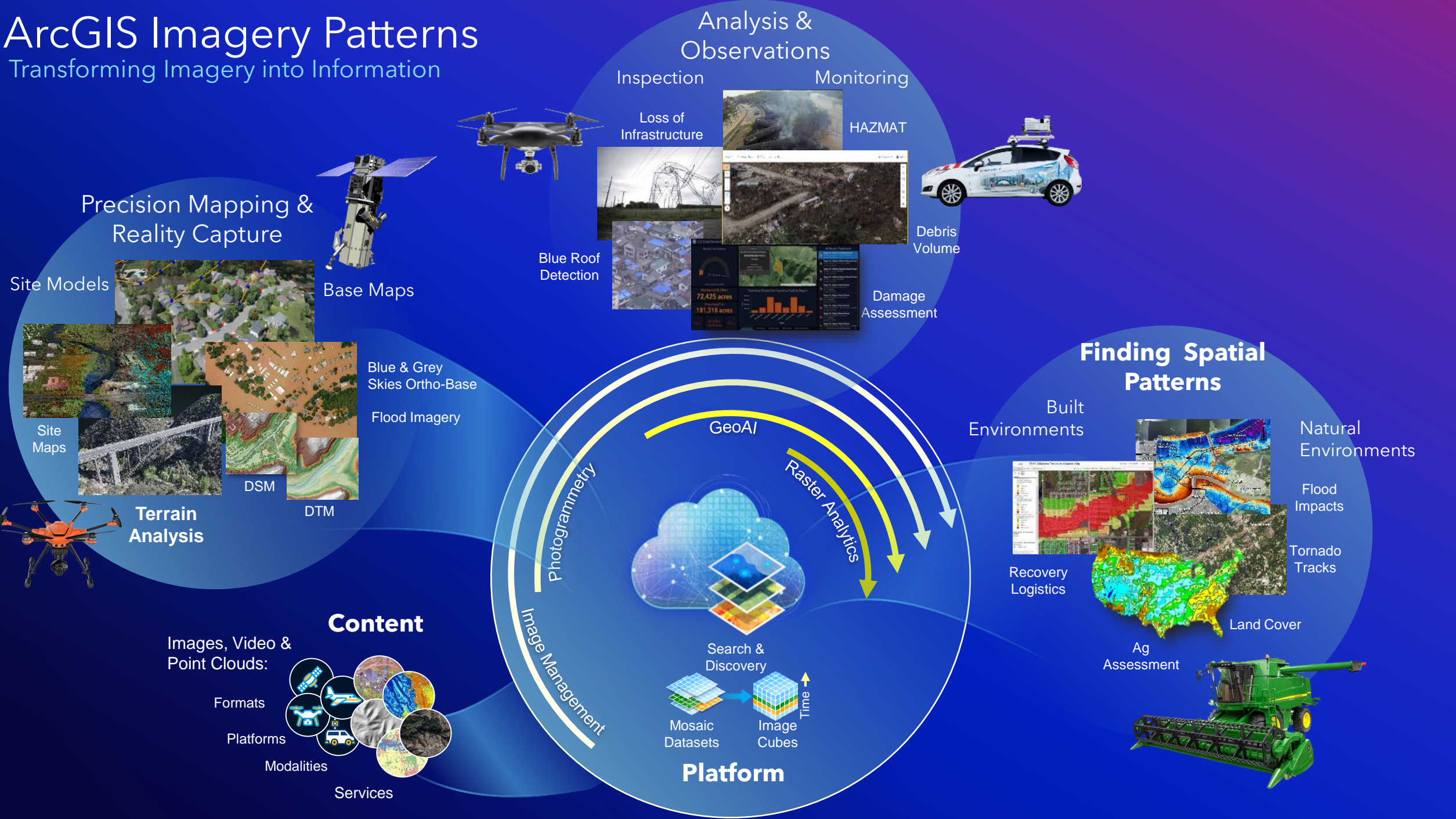
Esri Image Services Explorer

Imagery as Part of ArcGIS



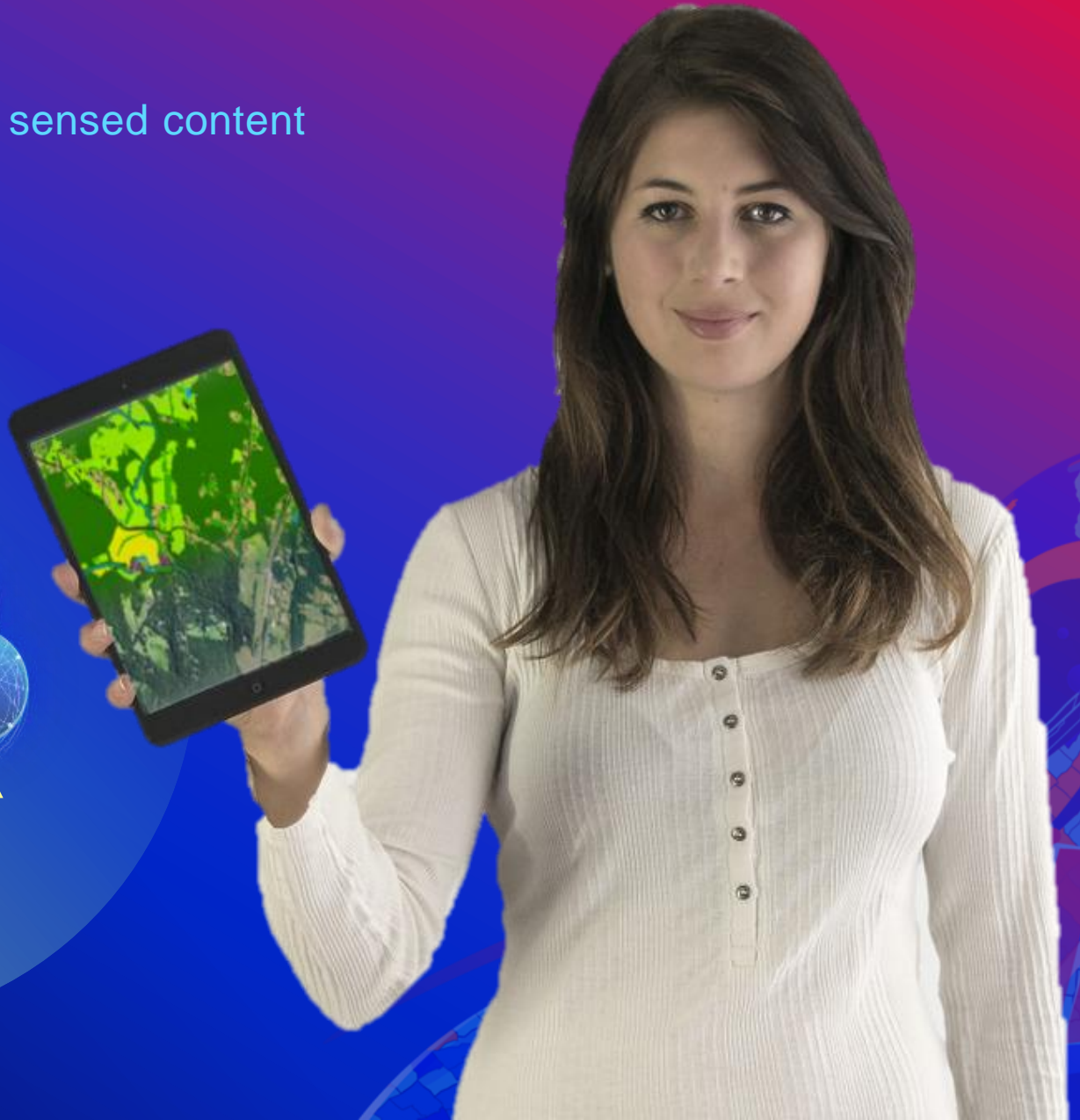
ArcGIS Imagery Patterns

Transforming Imagery into Information

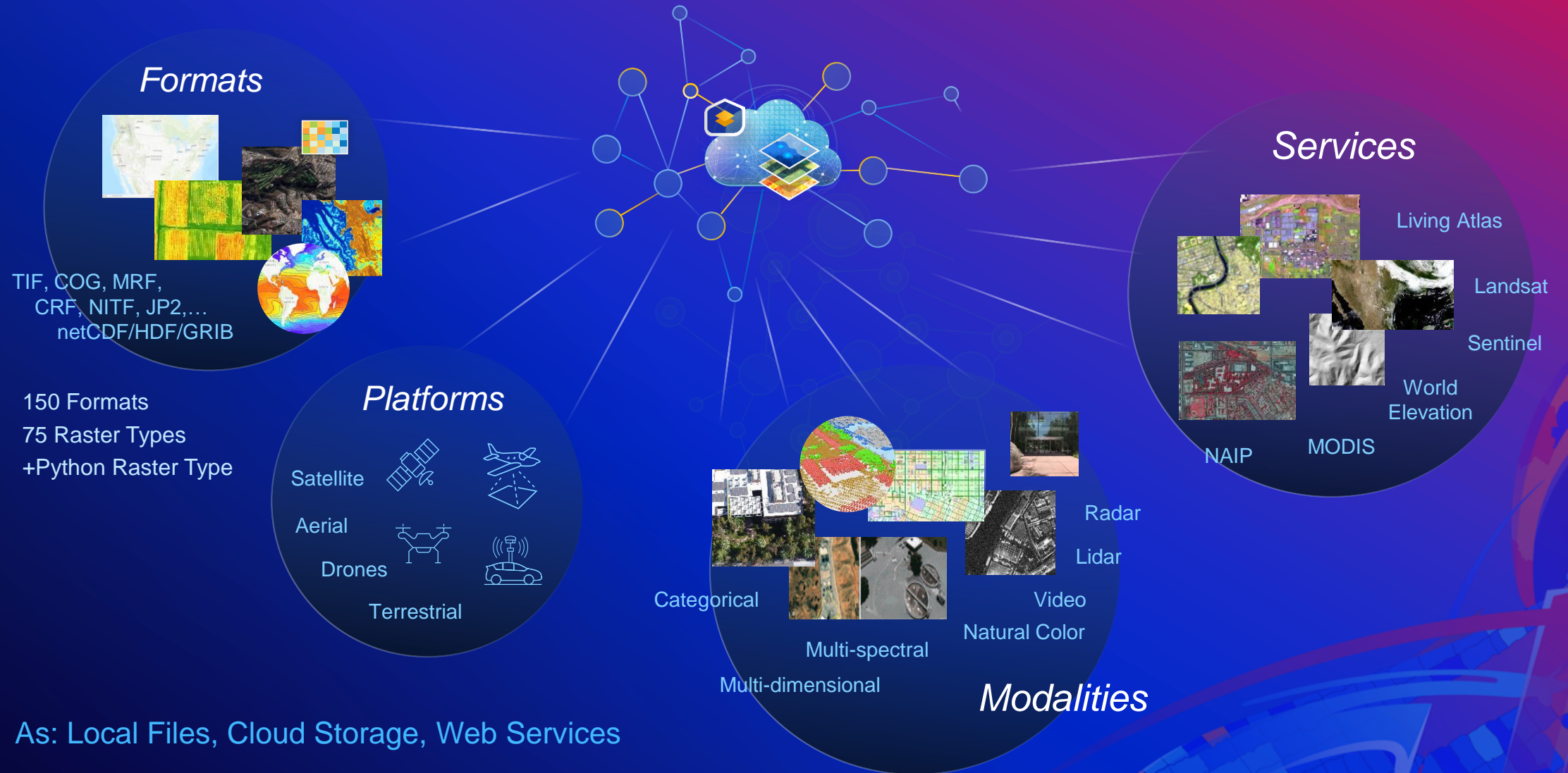


Imagery Management

Rapid access to massive amounts of remotely sensed content



Content – Support for All Imagery and Rasters



Content in the Living Atlas

Basemaps

Demographics
and Lifestyle

Transportation

Urban Systems



GLDAS
Snowpack



Sentinel-2 Views



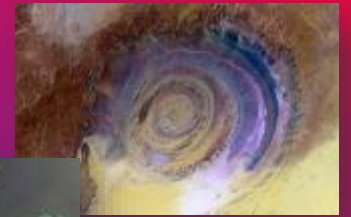
NAIP (NDVI)



MODIS



Landsat 8

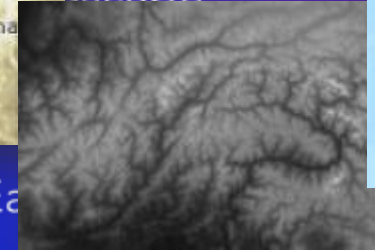


USA Woody Biomass



Imagery

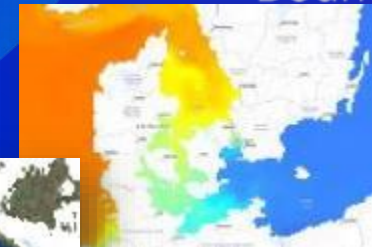
Terrain
Landscape



World Ecophysiographic
Land Units

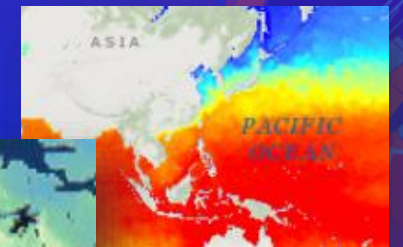


HYCOM Sea Water Salinity

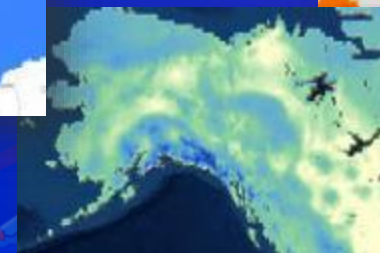


Boundaries
Places

Sea Surface Temperature



GLDAS Soil Moisture



Mapping in Multiple Dimensions

Creating accurate and authoritative data from imagery

Reality Mapping

Site Models

Site Planning

Base Maps

Simulation

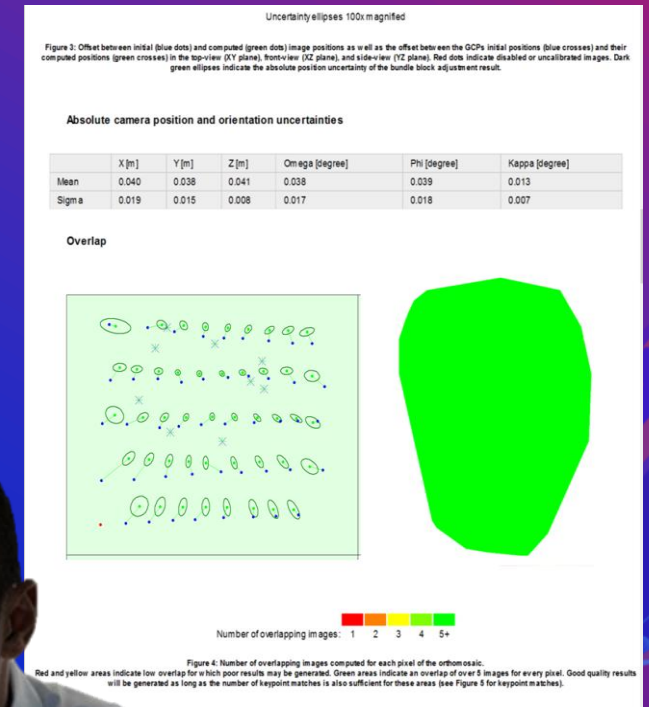
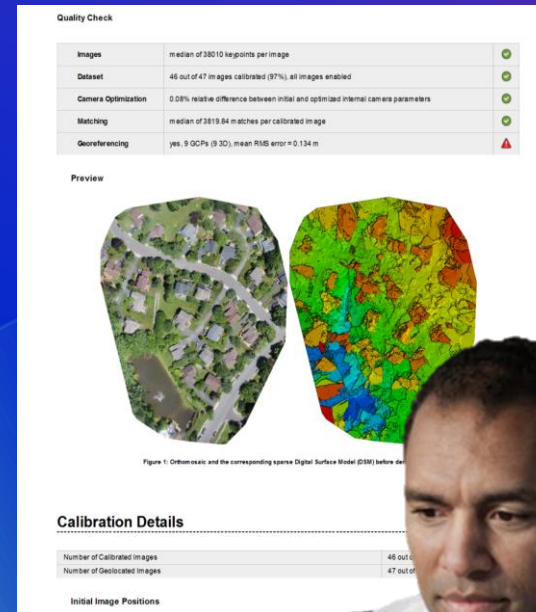
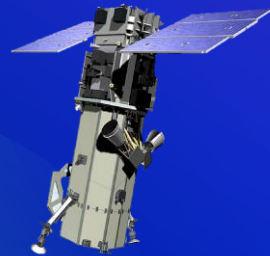
Ortho Photos

3D Mesh

Topo Maps

DSM

DTM



SURE for ArcGIS

Automated Data Production System for Mapping and 3D



Fully Integrated with ArcGIS

Fast, Highly Accurate, Massively Scalable, and Cost Effective

Observations On Demand

Automating targeted feature extraction from Imagery



Information on Demand

Inspection

Monitoring

Surveillance



Change Detection



Damage Assessment



Activity Tracking

Security

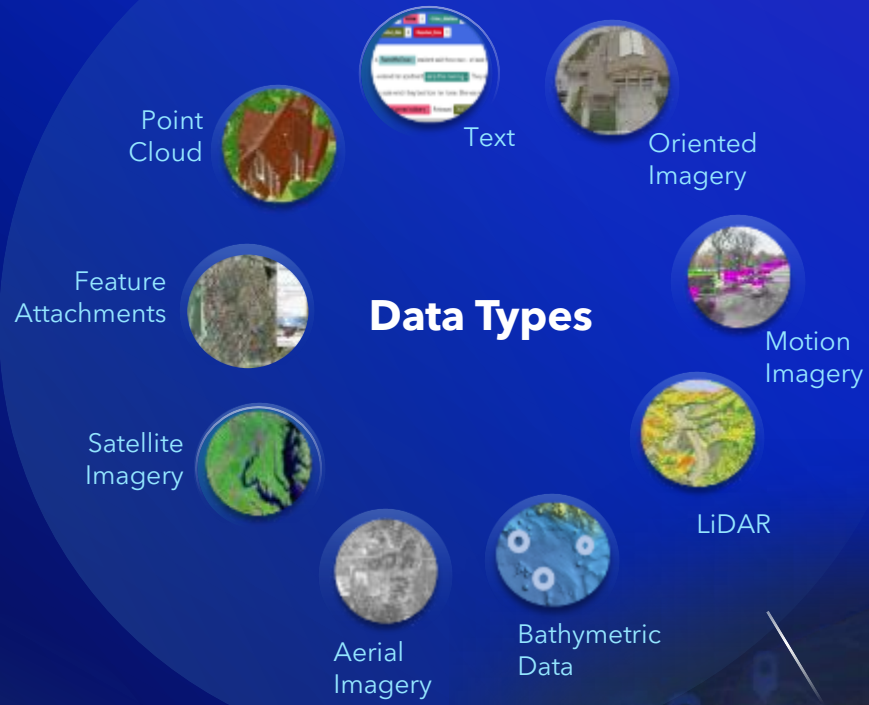


Web Cams



Deep Learning in ArcGIS

Different data types, tasks and integration



Integration

New

Deep Learning models on the living atlas:

- Building footprint extraction
- Tree classification from LiDAR
- Land cover classification

Finding Spatial Patterns

Raster Analytics at Scale

Finding Spatial Patterns

Built Environments



Urbanization



Mobility



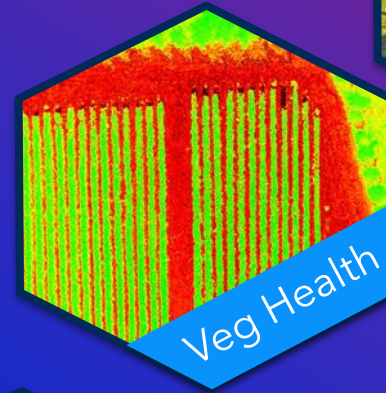
Land Cover



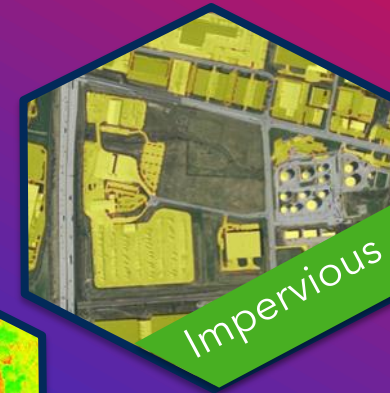
Natural Environments

Humanitarian Operations

Terrain Analysis



Veg Health



Impervious



Land Cover



Change



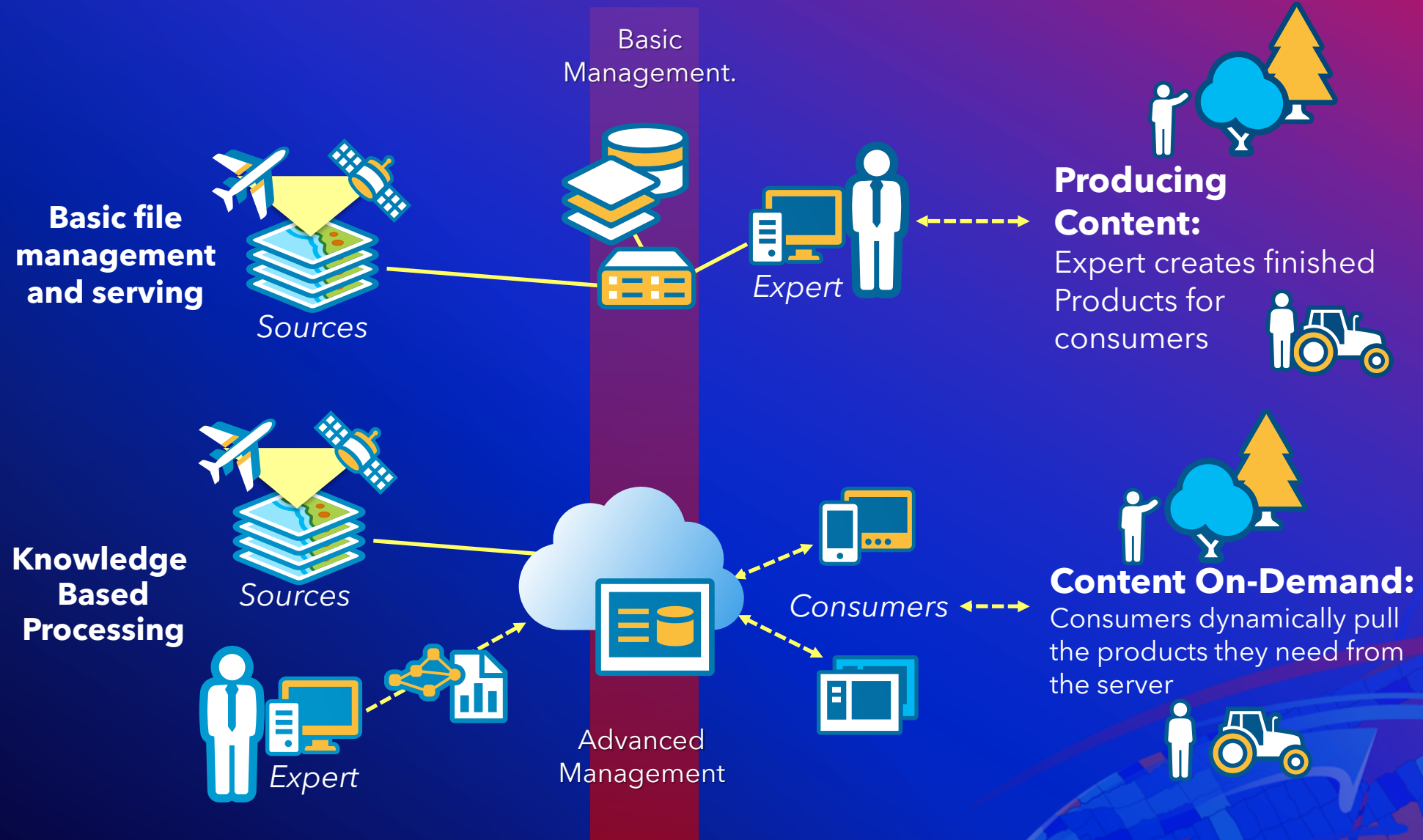
Image Analysis

Extracting Information from Imagery



Analytics as a Component of Imagery Management

Building tradecraft into the data management process



The background is a vibrant, abstract composition. It features a stylized globe in the upper right corner, rendered in shades of blue and red. Below the globe, there are swirling, wavy patterns in blue and red. In the lower left corner, there is a cluster of small, colorful dots (blue, orange, and red) that resemble a data visualization or a starburst. The overall color palette is dominated by deep blue, magenta, and red.

ArcGIS Online Imagery for Hosted Imagery Layers and Analysis

David Wright | Senior Solution Engineer | Imagery & Remote Sensing

Increasing imagery value in the organization

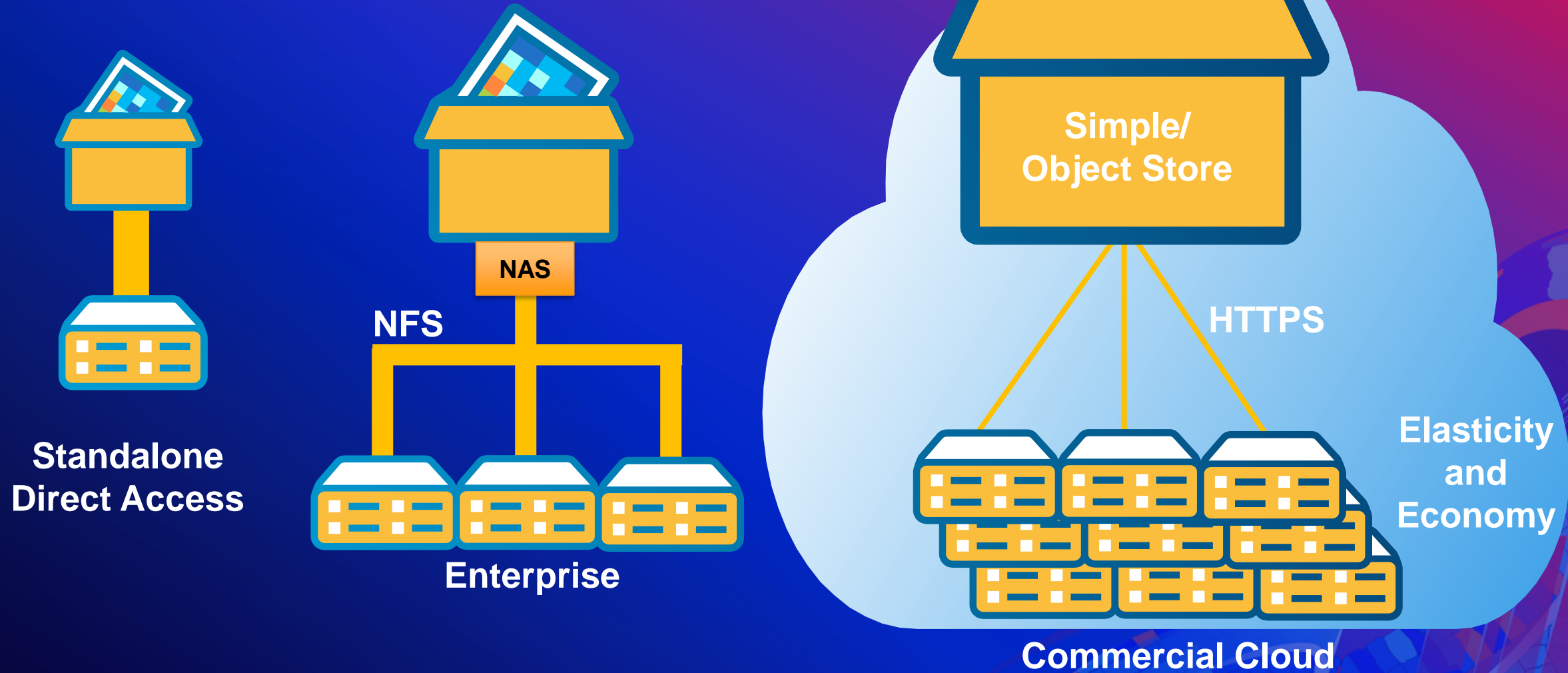
Mosaic Dataset



- References source data
 - Satellite scenes
 - Aerial images
 - Categorical
 - Terrain
- Recognizes provider raster types, formats, bands, pixel sizes, bit depth
- Defined in a geodatabase with metadata
 - Catalog
- Specifies processing to be applied on-the-fly
 - Dynamic mosaicking rules
 - Over 150 Raster Functions
 - Viewed as mosaic or individual images
- One storage footprint – many applications in visualization and analysis

Storage options

Use any or all that enable your workflows



Open datasets from commercial cloud providers

Leverage massive archives without storage cost

- Landsat
- Sentinel-2
- Sentinel-1, Sentinel-5P
- MODIS
- VIIRS
- NAIP
- DEM / DSM
- Daymet
- etc.

Registry of Open Data on AWS

us-west-2

us-east-1

east-us

west-eu



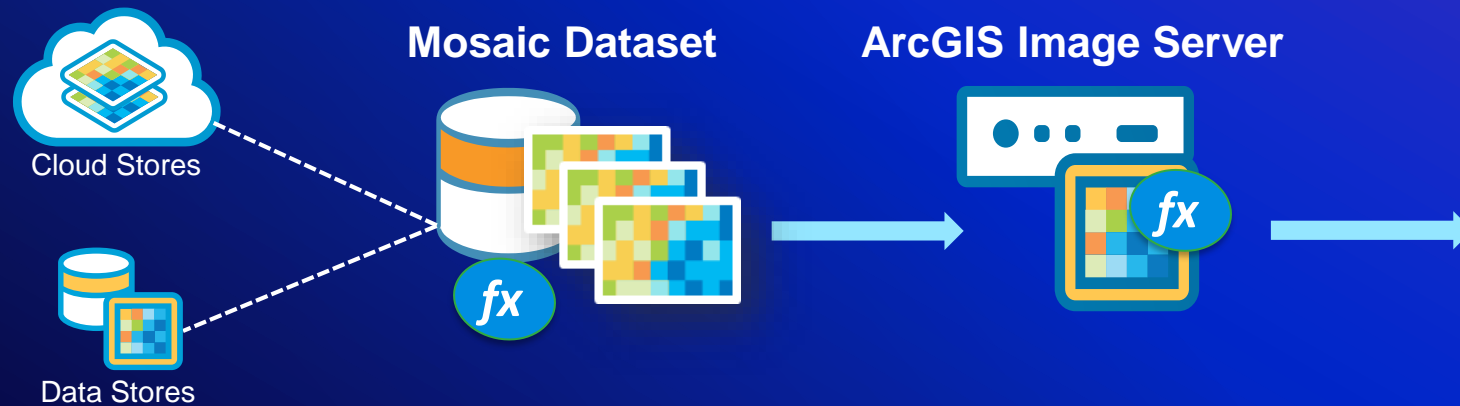
Microsoft Azure

Open Datasets

Service enablement with ArcGIS Image Server

Enterprise solution for sharing imagery and remote sensing data

- Part of ArcGIS Enterprise
- Powerful enabler for sharing large imagery collections
- Extends Mosaic Dataset access beyond user desktop
 - Additional users, applications, and devices
 - Scaled processing with Raster Analytics



Desktop Web Device



Image Service



**Processing
Templates**

True Color



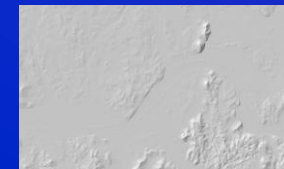
Color IR



MSAVI



Classified



etc...

Raster Analytics

Distributed processing and analysis

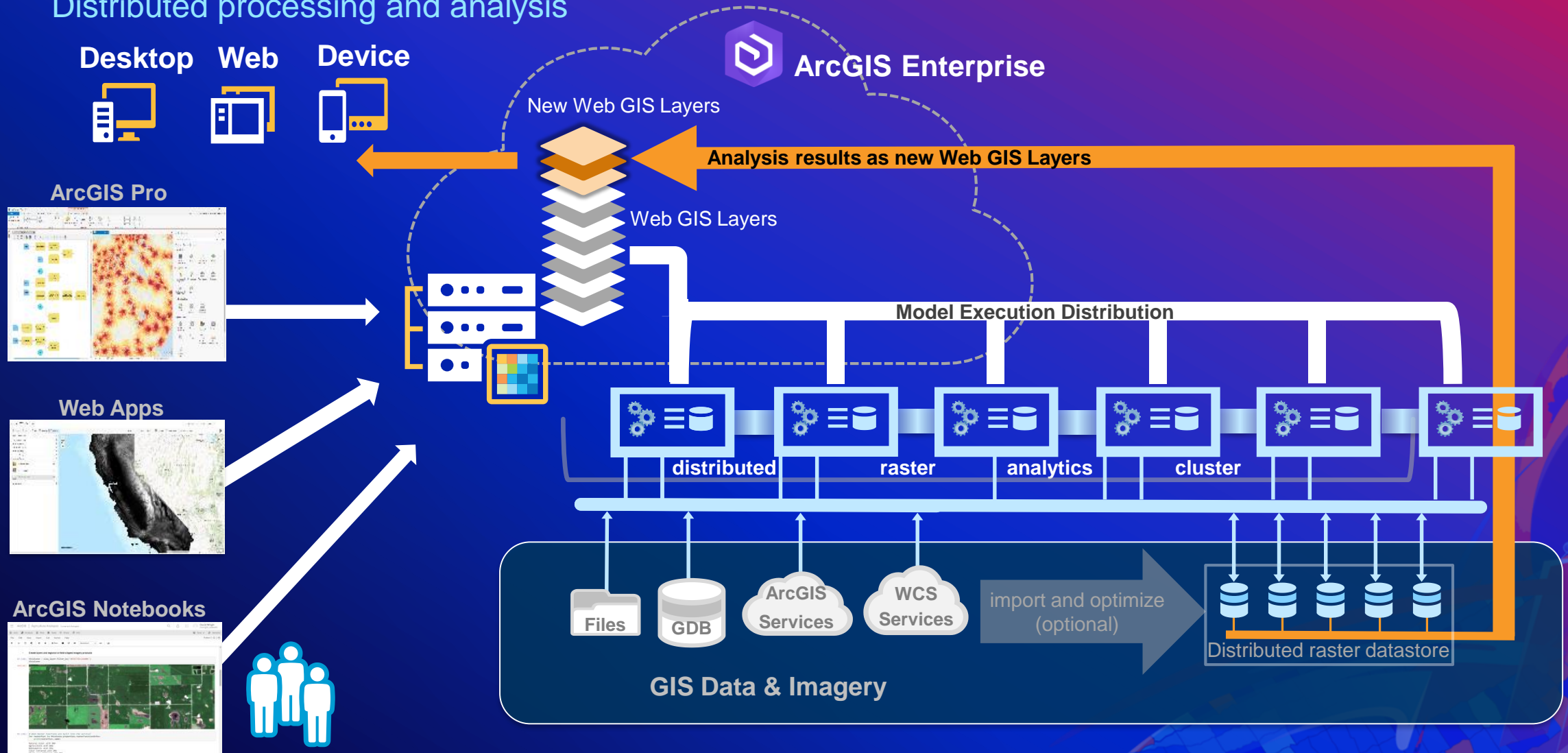


Image Service publishing from cloud storage

Made easy with latest versions of ArcGIS Pro

- With imagery delivered to cloud bucket or container
 - Create Cloud Storage Connection File in ArcGIS Pro

Amazon S3 > esri-imagery-blegeer > PlanetLouisianaPipeline

esri-imagery-blegeer

Overview

Q Type a prefix and press Enter to search. Press ESC to clear.

Upload Create folder Download Actions

US West (N. California)

Viewing 1 to 27

<input type="checkbox"/>	Name	Last modified	Size	Storage class
<input type="checkbox"/>	20200813_143103_104b_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:39:11 AM GMT-0600	157.7 MB	Standard
<input type="checkbox"/>	20200813_143103_1_104b_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:39:11 AM GMT-0600	153.5 MB	Standard
<input type="checkbox"/>	20200813_143433_104a_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:39:11 AM GMT-0600	133.8 MB	Standard
<input type="checkbox"/>	20200813_143433_1_104a_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:39:11 AM GMT-0600	147.1 MB	Standard
<input type="checkbox"/>	20200813_143436_104a_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:39:11 AM GMT-0600	140.4 MB	Standard
<input type="checkbox"/>	20200813_143437_104a_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:57:04 AM GMT-0600	149.6 MB	Standard
<input type="checkbox"/>	20200813_161005_57_2259_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:58:17 AM GMT-0600	660.9 MB	Standard
<input type="checkbox"/>	20200813_161007_78_2259_3B_AnalyticMS_SR.tif	Oct 21, 2020 7:58:56 AM GMT-0600	656.3 MB	Standard



Geoprocessing

Create Cloud Storage Connection File

Parameters Environments

Connection File Location
acsfles

Connection File Name
esri-imagery

Service Provider
Amazon

Access Key ID (Account Name)
THISISMYACCESSKEYID

Secret Access Key (Account Key)

Bucket (Container) Name
esri-imagery

Folder

Region (Environment)
US West (N. California)

Service End Point
s3-us-west-1.amazonaws.com

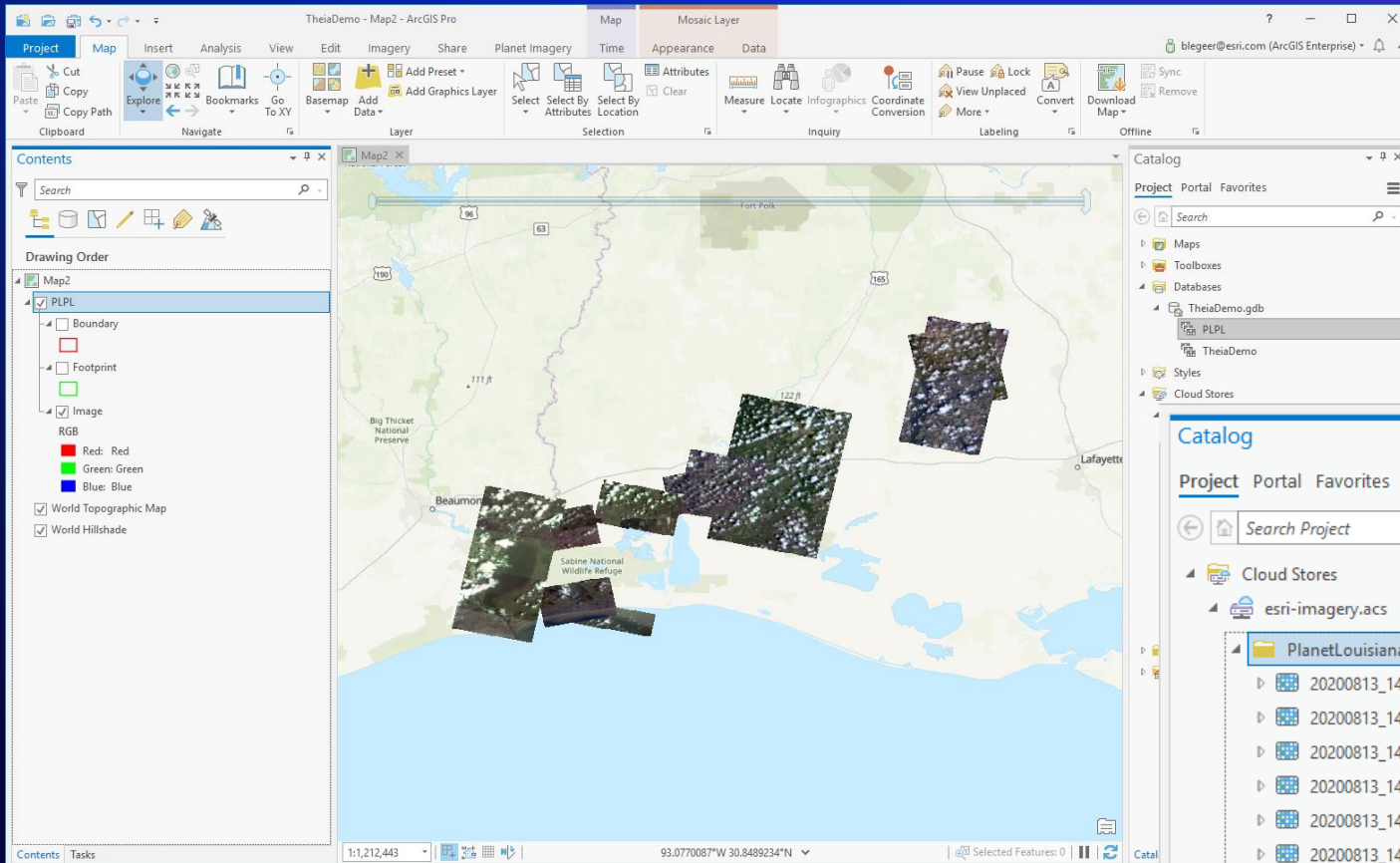
Provider Options

Name	Value
AWS_REQUEST_PAYER	
AWS_NO_SIGN_REQUEST	
AWS_VIRTUAL_HOSTING	
AWS_DEFAULT_PROFILE	
AWS_SESSION_TOKEN	
AWS_HTTPS	
CPL_VSIS3_USE_BASE_RMDIR_RECURSIVE	
ARC_DEEP_CRAWL	

Image Service publishing from cloud storage

Made easy with ArcGIS Pro

- Add Rasters to Mosaic Dataset
- Cloud Store registered in ArcGIS Enterprise



Register Cloud Store

Register a cloud store on your ArcGIS Server [Help](#)

Type:

Cloud Store Name:

Credential Type:

Access Key Id:

Secret Access Key:

Region:

S3 Bucket Name:

Folder:

☐ Register Cache directory

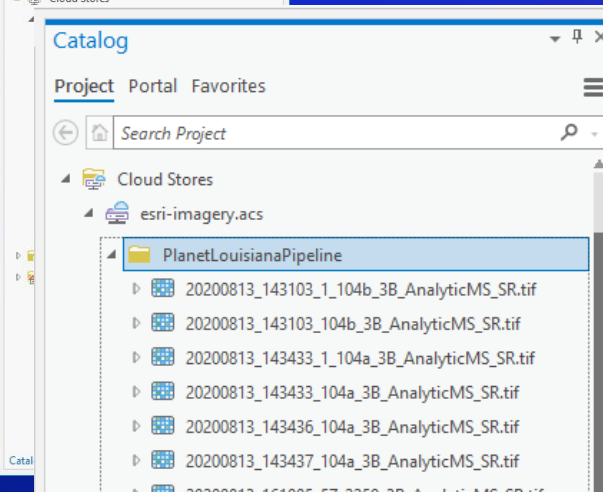
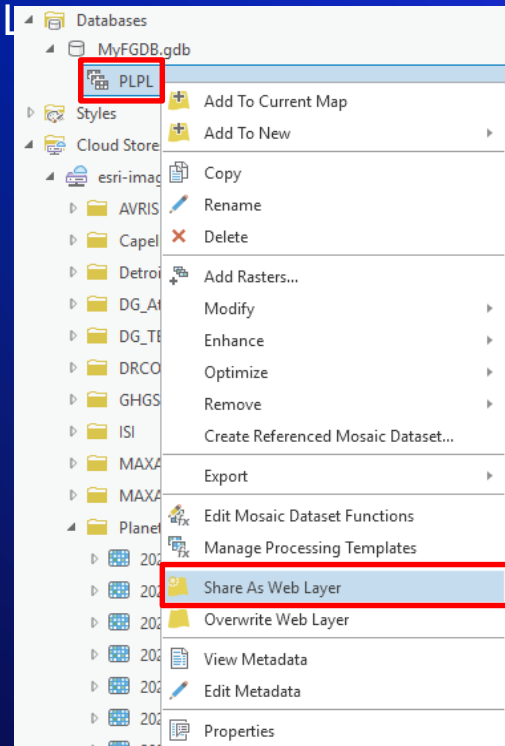


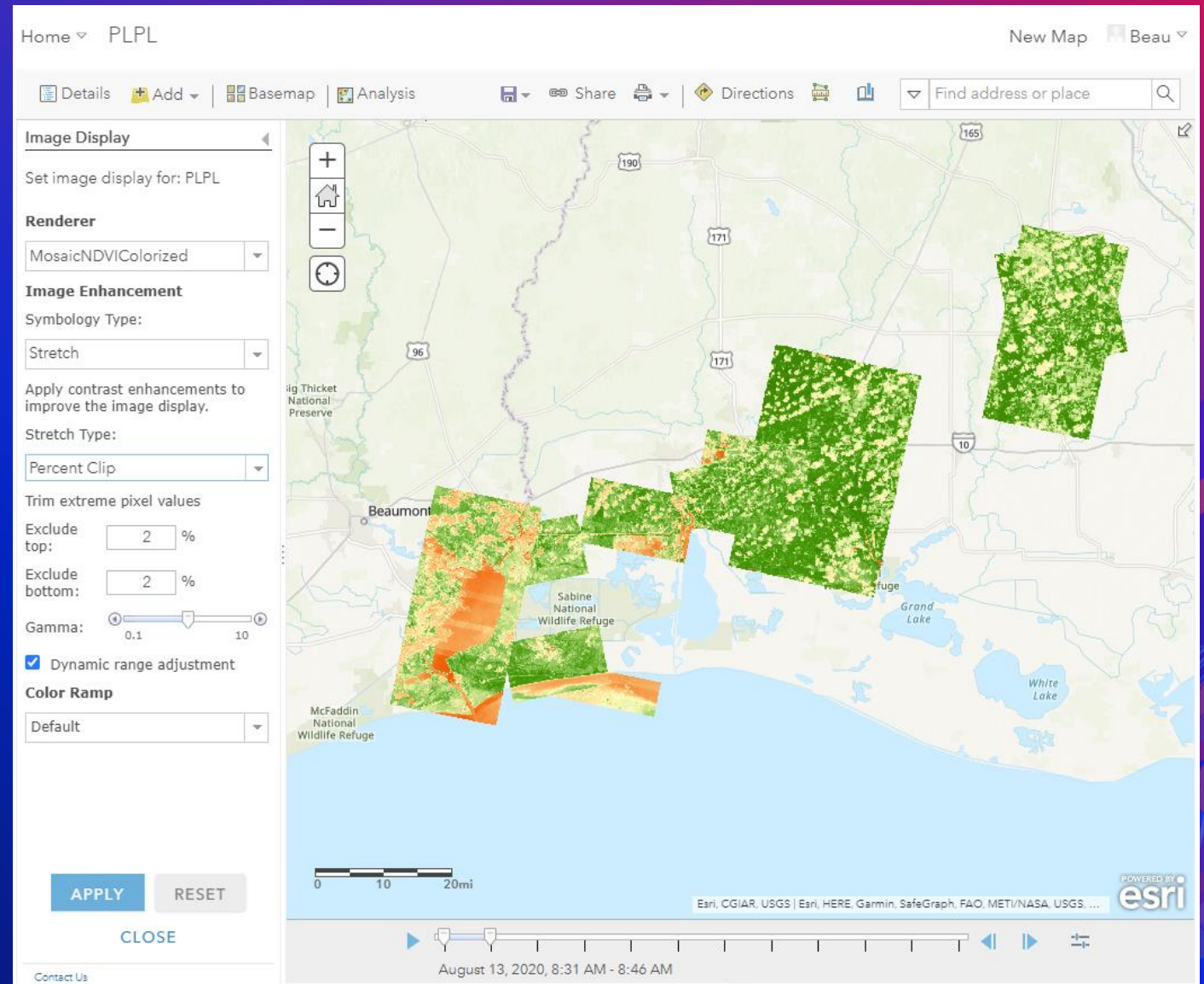
Image Service publishing from cloud storage

Made easy with ArcGIS Pro

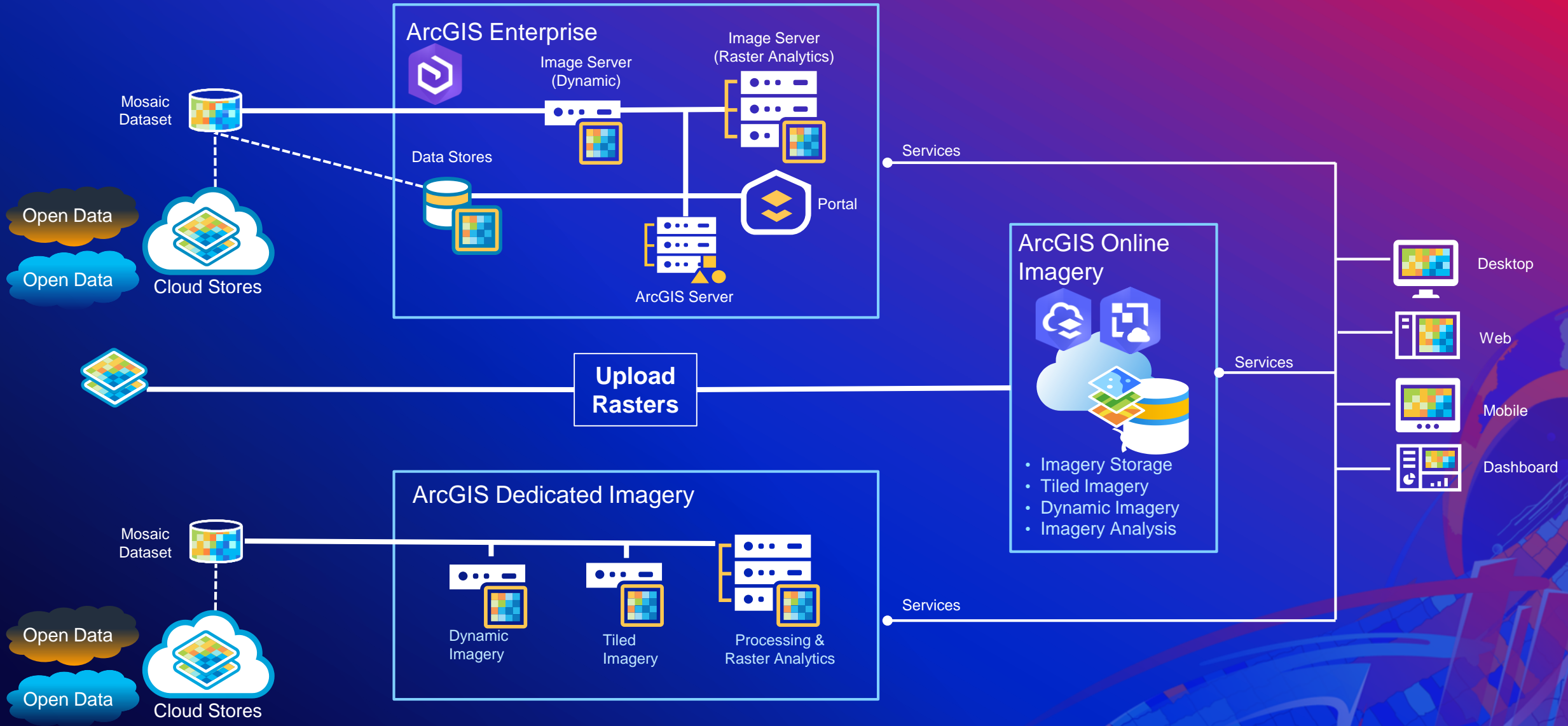
- Share Mosaic Dataset as Web



- Image Service available for all clients
 - Processing templates
 - Time enablement



Making Imagery Accessible



Key Differences in ArcGIS Online Hosted Layers

Tiled Layer	Tiled Imagery Layer (New)	Dynamic Imagery Layer (New)
No server-side processing	No server-side dynamic processing or image access	Server-side dynamic mosaicking, image processing, and access (projections, rendering, band sub-setting, raster functions, and more)
Static tiles	Static tiles	Dynamic mosaicking and image access
Does not support image collections	Does not support image collections	Supports image collections (analogous to mosaic datasets)
1 or 3 band JPG/PNG tiles	Full pixel depth, band count CRF tiles	Full pixel depth, band count CRF tiles
No client-side processing	Supports client-side processing	Supports client-side processing
Visualization	Visualization and analysis	Visualization and analysis

- **Tiled Imagery Layer** can be republished as **Dynamic Imagery Layer** and vice versa

Dynamic Imagery Layer control

Additional operations on Dynamic Imagery Layers

- Editing of service configuration

SPOT7_Sep_07_2020_DynamicMosaic_PS

Settings

General Imagery Layer (hosted)

Overview

Usage

Settings

General

Content Status

☒ Allow downloadable exports

☒ Allow analysis

☒ Allow function

Default template

None

☒ NDVI_Color_Ramp.rft.xml

Choose Raster Function Template

☐ Catalog

☐ Download

☒ Cache

☐ Mensuration

Capabilities

☐ Image

Maximum columns per request

15000

Maximum rows per request

4100

Maximum samples count

1000

Default resampling method

Bilinear Interpolation (for continuous data)

Allowed compressions

☐ None

☐ JPEG

☐ LZ77

☐ LERC

Default LERC compression tolerance

0.01

Default JPEG compression quality

75

- Additional tools for Image Collection layer configuration

HPF NAIP CO Dynamic Image Collection

Overview

Image Management

Usage

Settings

Build Footprints

Computes the extent geometry of every raster in the collection. Use this tool to refine footprints and remove low quality edge pixels.

Build Overviews

When you're satisfied with your processing configuration of all images, you can build overview images to speed up display performance.

Compute Seamlines

Refine mosaic boundaries by building seamlines. Use this tool to smooth the blending of overlapping images.

Compute Color Corrections

Balance and correct color variations among images. Use this tool for an improved visual mosaic. It is not recommended for analytical purposes.

Calculate Statistics

Calculate image statistics and histograms. Statistics are used for rendering and analysis.

Define NoData Pixel Values

If your imagery requires certain values to represent NoData, use this tool to define them.

Enabling Hosted Imagery Capabilities

Access Control

- Organization Administrator grants permission at Role (User level)
- Role privilege requirements
 - Create Hosted Imagery Layers
 - Content
 - Publish Tiled Imagery layers
 - Publish Dynamic Imagery layers
 - Enable Raster Analytics
 - Premium Content
 - Imagery Analysis

Member roles

Manage roles

Create, edit, and manage member roles by enabling or disabling permissions.

Create role

Search roles

Edit role

Content

Enabled: 7/9

Enable all

Publish hosted tiled imagery layers

Allow member to publish hosted tiles imagery layers from a single image or collection of images.

Publish hosted dynamic imagery layers

Allow member to publish hosted dynamic imagery layers from a single image or collection of images.

Premium Content

Enabled: 6/8

Enable all

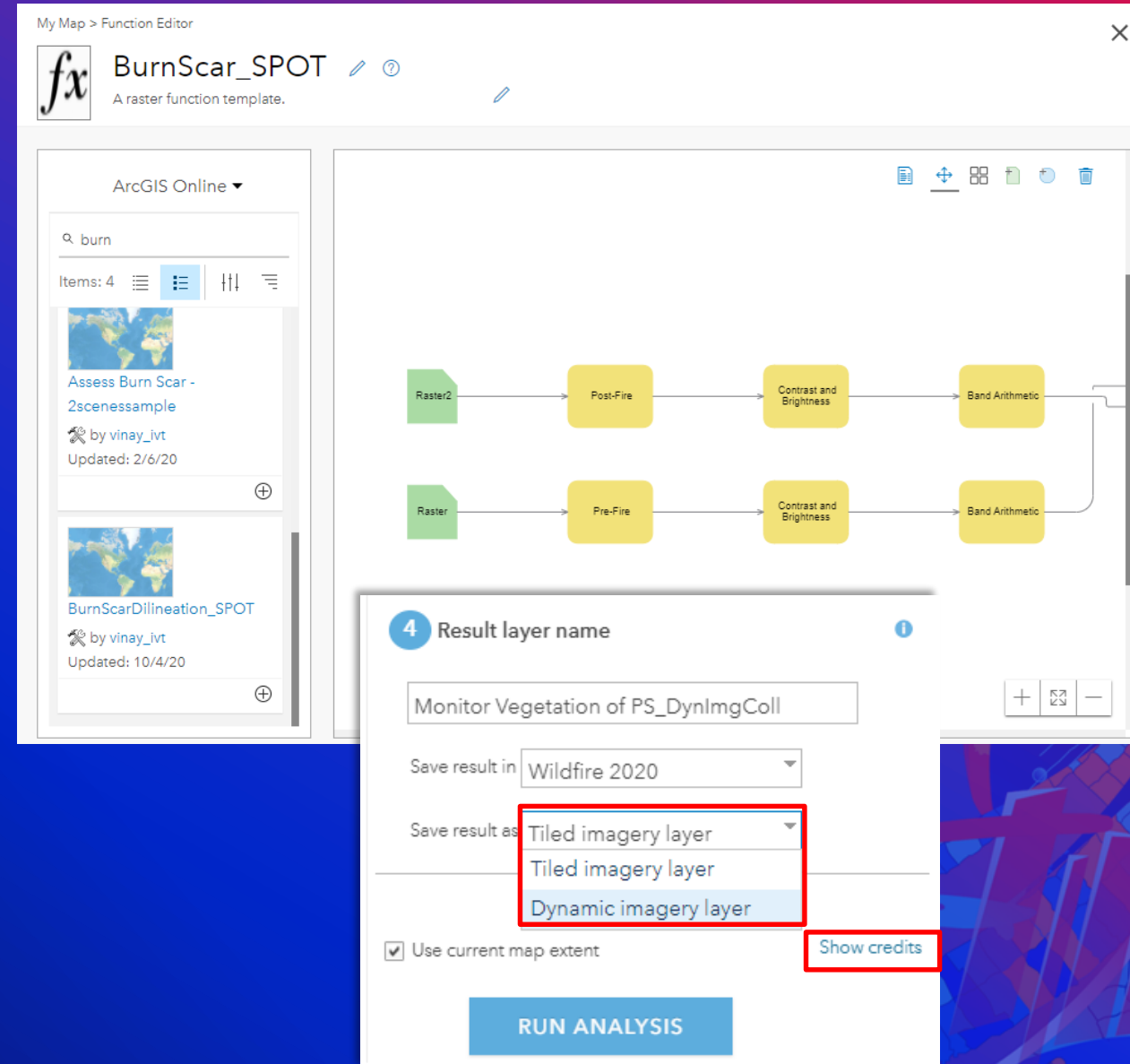
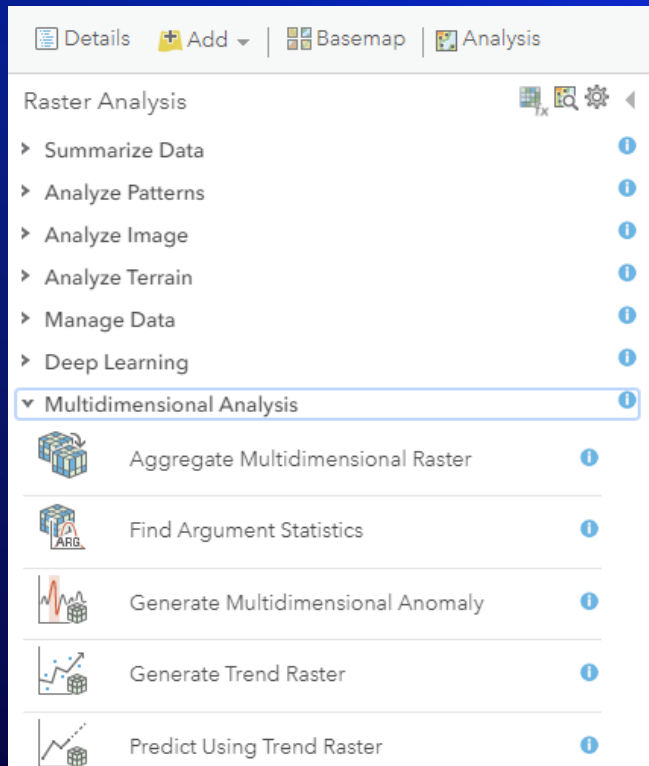
Imagery Analysis

Allow member to perform imagery analysis tasks.

Raster Analysis

Powerful set of Raster Analytics to leverage

- 18 ready to use tools under Perform Analysis pane
- 150+ Raster Functions / Function Editor UI
- Output to new Hosted Imagery Layers
- Credit consumption estimate



Demonstrations

The background features a vertical color gradient from deep purple on the left to bright red on the right. In the top right corner, there is a stylized, abstract face composed of swirling blue and red shapes. In the bottom left corner, there is a cluster of small, glowing blue and orange dots, resembling a starburst or a molecular structure.

The background is a vibrant, abstract composition. It features a stylized globe with swirling blue and red patterns, suggesting data or satellite imagery. In the bottom left corner, there is a cluster of small, colorful dots (blue, orange, and red) that resemble a data visualization or a map of a specific region. The overall color palette is dominated by deep blues, purples, and bright reds, creating a high-tech, digital atmosphere.

Imagery Data Management

A pilot program for FEMA

Jeremy Schuyler

FEMA imagery needs

Sources and formats

- Individual geo-tagged images
- 360° cameras
- Aerial imagery
- Satellite imagery
- 3D meshes
- Point clouds



Demonstrations



Imagery Data Management at FEMA

Steps to success

- Rapid access to wide variety of sources and types
- Centralized storage and dissemination for easy discovery
- Provide analysis ready image services
- Application ready services
- Manage access





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SCIENCE
OF
WHERE®