

ArcGIS

Imagery and Remote
Sensing

Marathon Data Systems

Marathon Data Systems

- 36 χρόνια παρουσία στον χώρο των Γεωγραφικών Συστημάτων Πληροφοριών (GIS).
- Επίσημος Αποκλειστικός αντιπρόσωπος της εταιρείας Esri (ArcGIS) σε Ελλάδα και Κύπρο.
- Κεντρικά γραφεία Αθήνας: Αιγιαλείας 48, Παράδεισος Αμαρουσίου
- Υποκατάστημα Θεσσαλονίκης: Πλατεία Ιπποδρομίου 12
- Παρουσία στελέχους στην Κύπρο



Strong and Growing

Making a Difference

Contributing to Society

Esri

Serving Our Users

Advancing GIS and Spatial Literacy

Products

Support

Education

Esri Press

Services

Vision

Applying GIS Everywhere









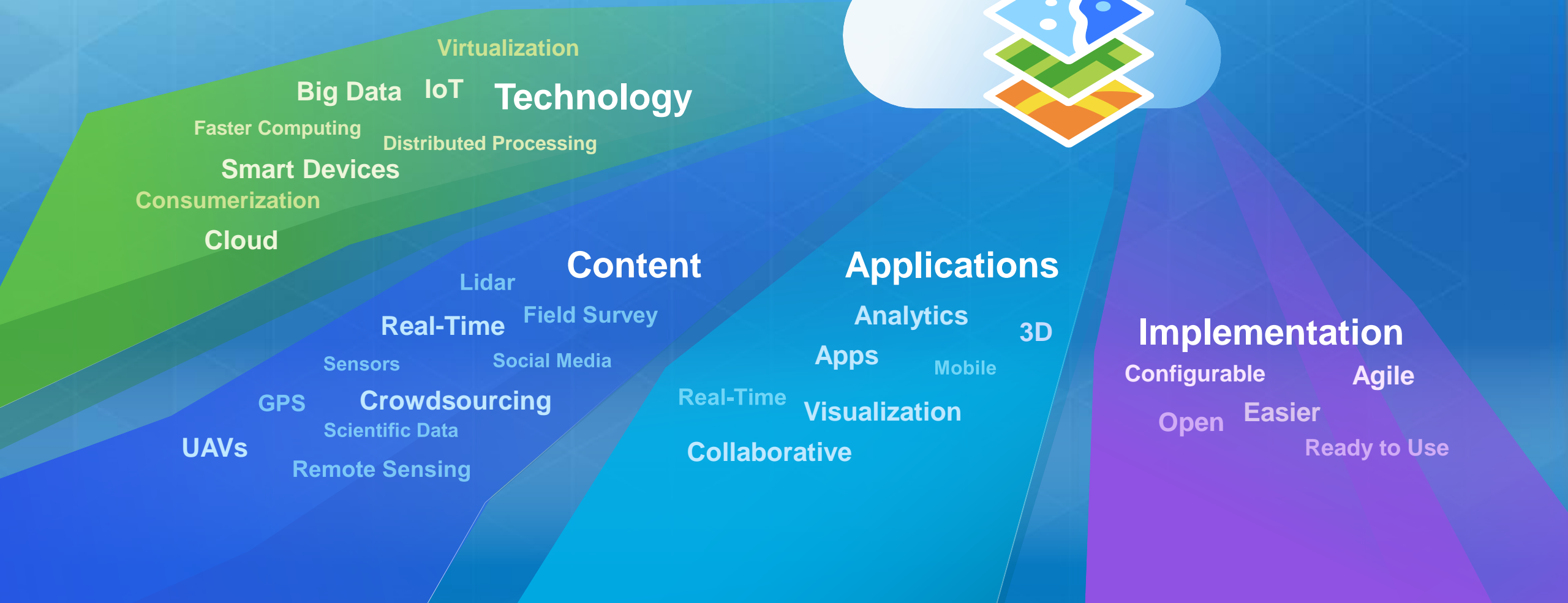
Η πλατφόρμα ArcGIS

GIS: Διαρκής εξέλιξη

Επιδράσεις από νέα τεχνολογικά δεδομένα



Web GIS



Web GIS: Μια νέα προσέγγιση

Μια σύγχρονη αρχιτεκτονική



Client / Server	→	Web Services & App
Stand Alone Desktop	→	Connected Desktop
Data Models	→	Web Maps
Static Data	→	Real-Time
Custom Applications	→	Configurable Templates and Apps
All Purpose Applications	→	Focused Apps
Proprietary Data	→	Open Data & Shared Services

Πλατφόρμα ArcGIS

► Μια ολοκληρωμένη πλατφόρμα Web GIS

ArcGIS



Apps

Access and
Management

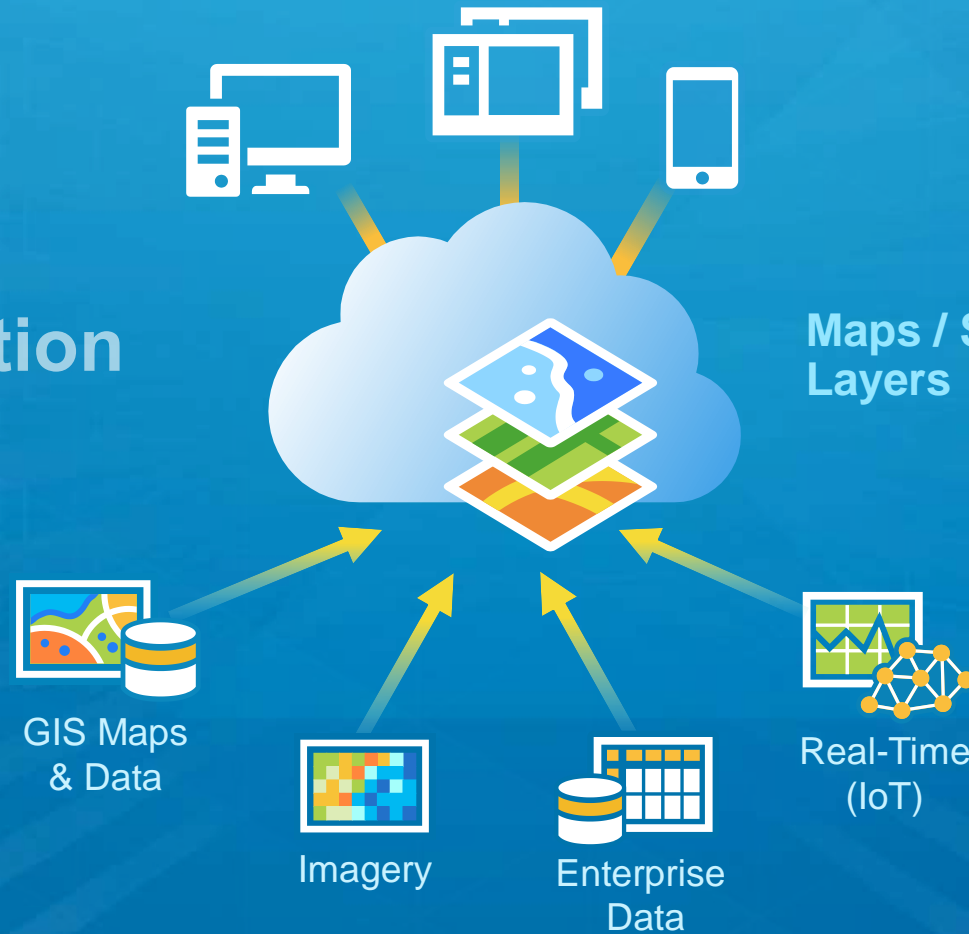
Services and
Systems

Διανομή On-Premises και Online

Πλατφόρμα ArcGIS

► Οργάνωση όλων των τύπων χωρικών δεδομένων

GeoInformation
Model



Maps / Scenes
Layers

Ανοιχτή Πλατφόρμα ▶ Εξασφαλίζοντας την διαλειτουργικότητα

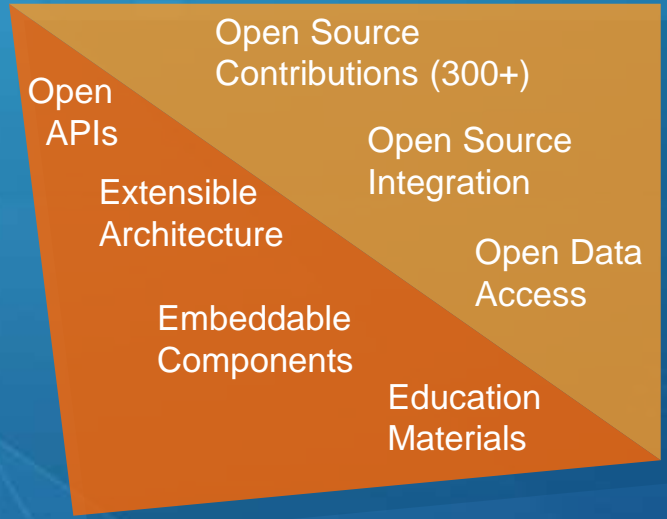
Open Standards



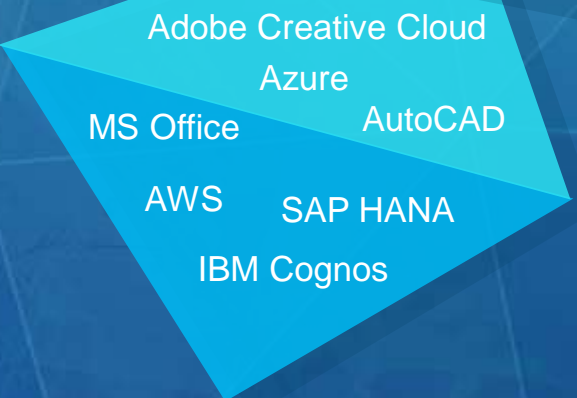
Industry Formats



Open Software



Product Integration



Open

... Ενοποίηση με εκατοντάδες άλλα συστήματα



Big Data

Open

Spatial Analysis

Real-Time

Visualization

Mapping

Data Management

Content

Imagery

Mobile

Πλατφόρμα ArcGIS

Οι δυνατότητες

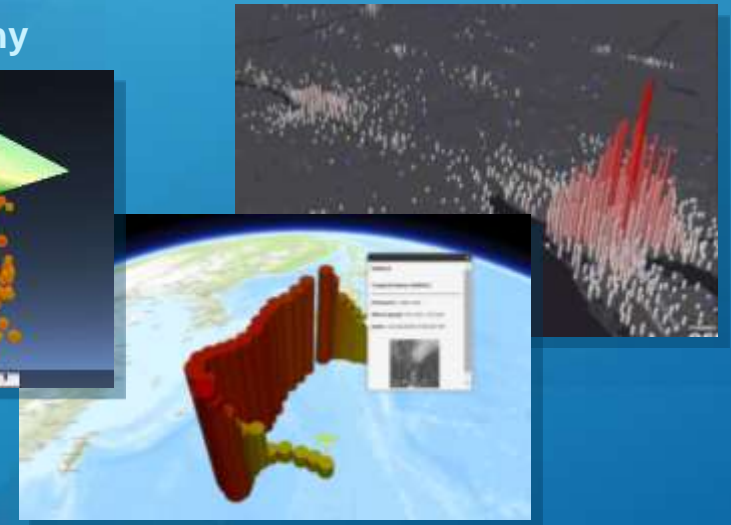
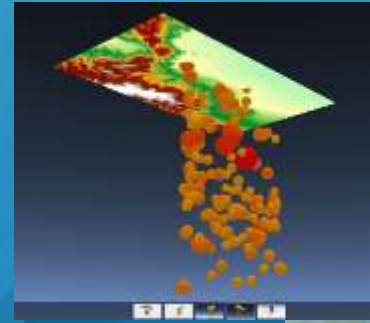
GIS Innovation

Χαρτογραφία & Απεικόνιση ▶ Νέες δυνατότητες για 2D & 3D

Smart Mapping



3D Cartography



Data Visualization



Data Exploration



Vector Tiles



3D ▶ Οπτικοποίηση και Ανάλυση

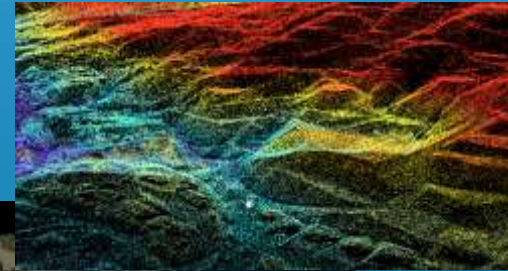
- Ταχύτητα και ευκολία
- Σε οποιοδήποτε περιβάλλον
- Web Scenes σε Online & Server
- Πλήρης υποστήριξη KML



Virtual Cities



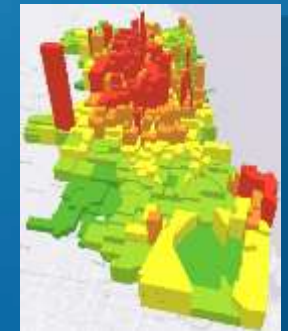
Building Models



Lidar Analysis



Integrated 2D/3D – Pro



Thematic Visualization



Rule-Based Models



Analytics

Global Visualization



ArcGIS Earth

Online Περιεχόμενο ▶ Ένας ζωντανός γεωγραφικός άτλαντας

Υπόβαθρα | Εικόνες | Δημογραφικά | Ανάγλυφο

Ελεύθερη διάθεση δεκάδων χιλιάδων σετ δεδομένων

Χιλιάδες χάρτες και επίπεδα

Έτοιμα προς χρήση

Αξιόπιστα δεδομένα

Συνεισφορά από εκατομμύρια χρήστες...

Χωρική Ανάλυση

► Καλύτερη αντίληψη δεδομένων, λήψη αποφάσεων

Desktop

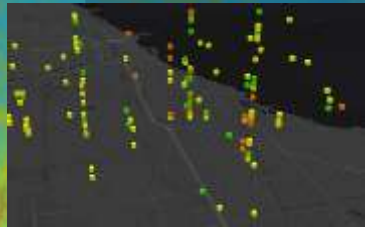
Statistical Clustering



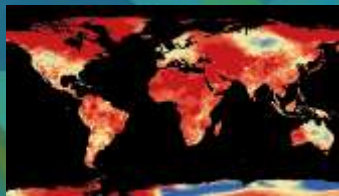
New Raster Functions



Anomaly Detection



Scientific Data Support



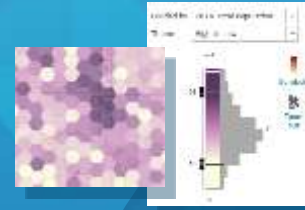
Bayesian Regression (EBK)



Integrating Analysis Tools



Data Exploration



Aggregation



Mode-Specific Routing



Web Browser

Location Allocation



Charting



Hot Spots



Faster Geocoding (230+%)



Buffer



Living Atlas Integration



Interpolation



Δεδομένα Εικόνας ▶ Διαχείριση, Ανάλυση, Δημοσίευση

- Νέα εργαλεία ανάλυσης (100+)
- Πρότυπα ροών εργασίας
- Υποστήριξη δεδομένων από Drones

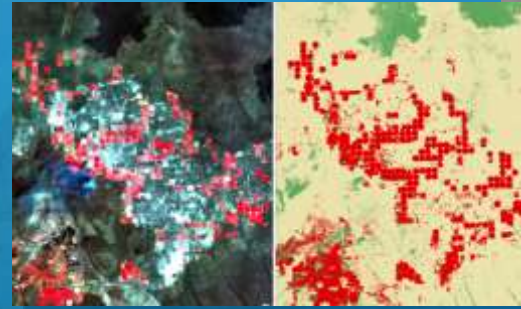
Scientific Data



Object-Based Image Analysis



Image Classification Accuracy Assessment



Full-Motion Video



Dynamic Processing Chains



Oblique Imagery and Measurements



UAV/Drone Support
Drone2Map (NEW)



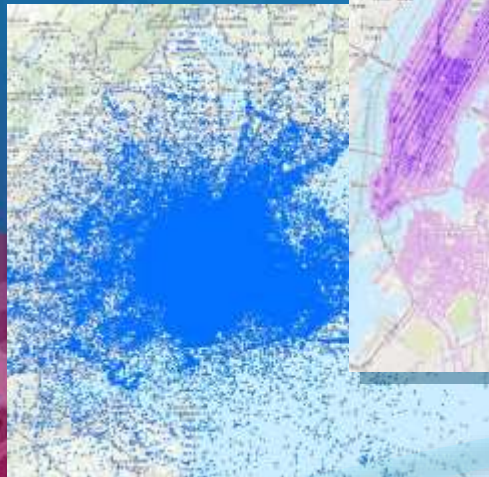
Big Data

► GeoAnalytics & Οπτικοποίηση δεδομένων μεγάλου όγκου

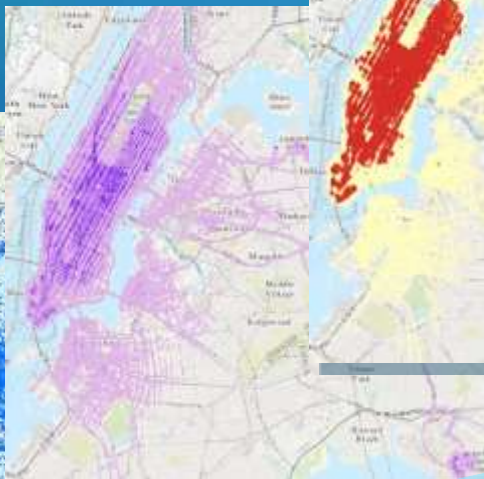
Παράλληλη επεξεργασία για
ανάλυση σε δεδομένα Vector
και Raster

NYC Taxi Data

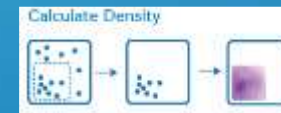
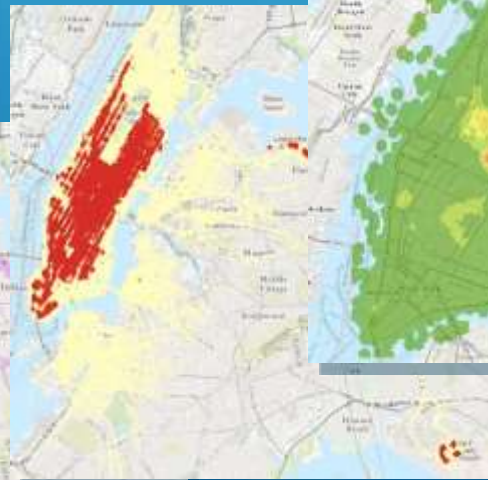
Raw Data



Aggregated Data



Hot Spots



Μέσα στο 2016

... Μια νέα οπτική στα δεδομένα

Real-Time

► Ενσωμάτωση και διάθεση δυναμικών δεδομένων

Ενοποίηση Δικτύων Αισθητήρων και IoT

- Παρακολούθηση, Ανάλυση και Προειδοποιήσεις
- Στατικά και δυναμικά συμβάντα
- Μεγάλου μεγέθους, υψηλής ταχύτητας ροές δεδομένων



*Δημιουργία εφαρμογών GIS πραγματικού χρόνου...
...Απόκριση συστήματος σε συμβάντα*

10.4

Just Released

Desktop

Online

Apps

Server



Πλατφόρμα ArcGIS

Τα συστατικά

Ένα ολοκληρωμένο σύστημα



ArcGIS Desktop

► Το περιβάλλον εργασίας των ειδικών



Νέα και βελτιώσεις

- Analytics & 3D
- Space-Time Modeling
- Vector Tiles
- Image Processing
- LAS Tools
- Concurrent Pro Licensing
- Metadata

Τι αναμένεται ;

- Advanced Mapping
- More 3D & Analytics
- WFS / KML

Προσφέρει τεχνικές προχωρημένης χαρτογραφικής απεικόνισης, εργαλεία επεξεργασίας και ανάλυσης

ArcGIS Platform overview

ArcMap



ArcGIS Pro



Desktop



Web



Device



Apps

Portal



Access



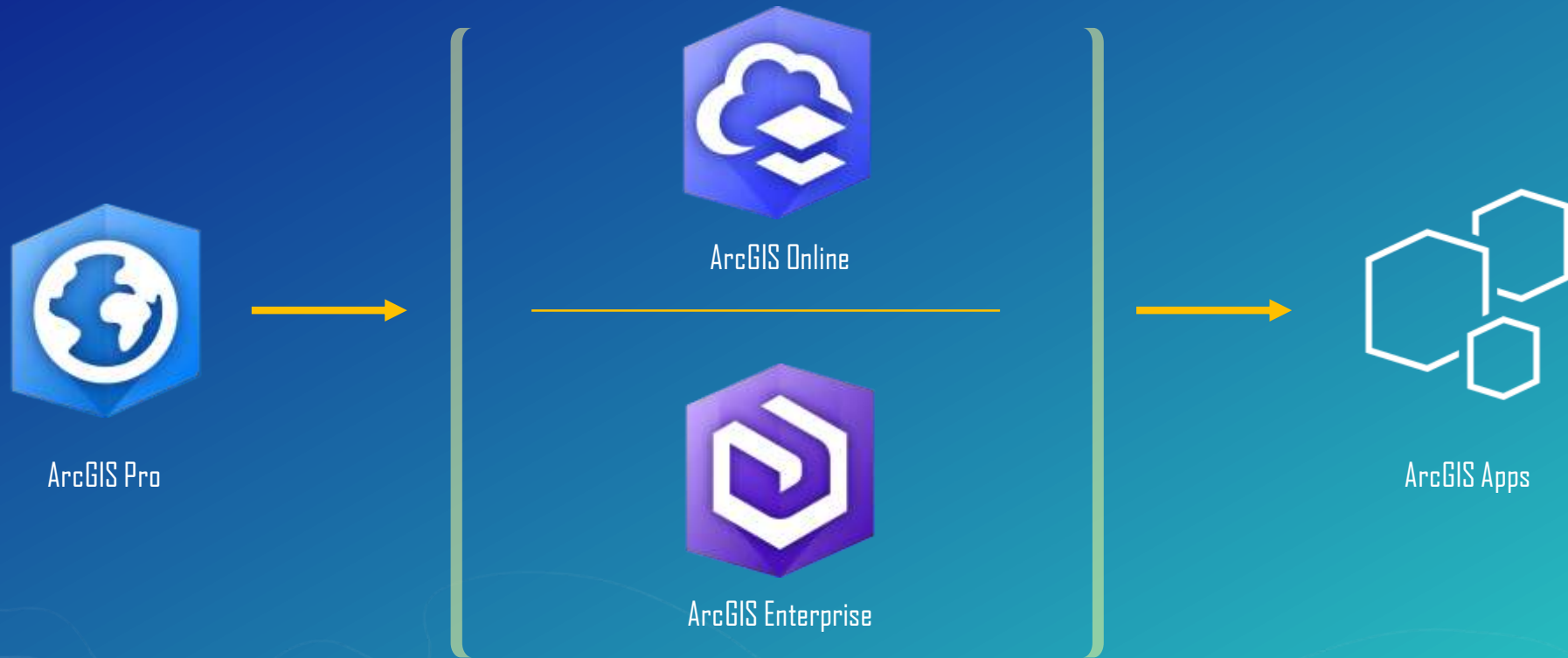
Server



Online Content
and Services

Services

ArcGIS platform products



ArcGIS for Developers

ArcGIS Online ▶ Ένα Cloud Based GIS



SaaS

Νέες δυνατότητες, βελτιώσεις

- Smart Mapping
- Formal Metadata
- Administration

Τι αναμένεται...

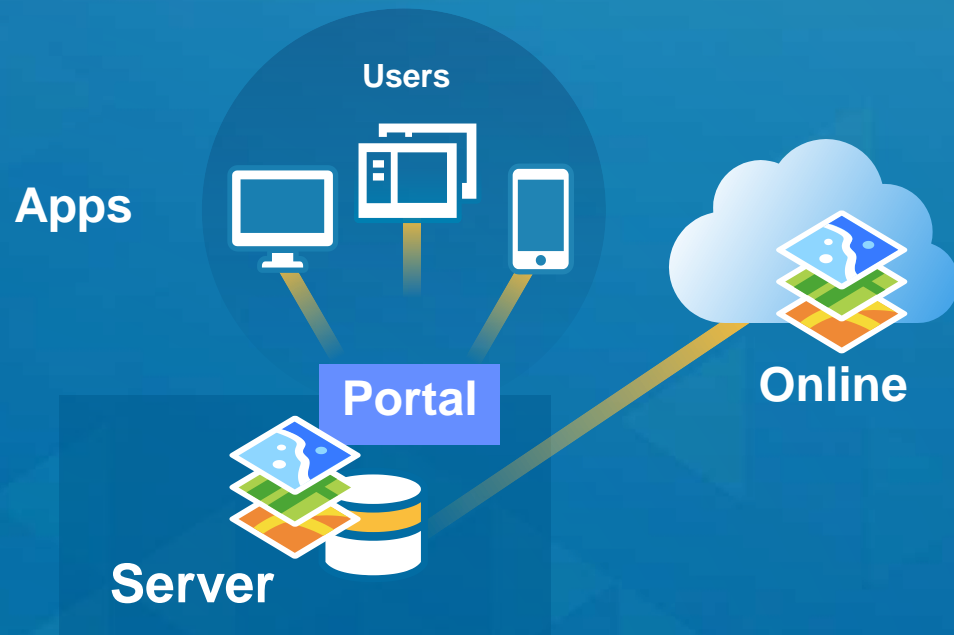
- Καλύτερη αναζήτηση
- Προχωρημένη ανάλυση
- Υποστήριξη WFS / WMTS



Χάρτες στο Cloud, Ανάλυση, Εφαρμογές και Περιεχόμενο

Ενοποιημένο με υπηρεσίες και συστήματα On-Premise

ArcGIS Enterprise ▶ Web GIS για την υποστήριξη της υποδομής ενός οργανισμού



Νέες δυνατότητες, βελτιώσεις

- Portal Integration
- Administration Tools
- Vector Tiles
- Smart Mapping
- Spatial Analysis
- Azure Support
- More OGC Support (KML 2.2, WCS 2.0.1, CSW-3.0)

Τι αναμένεται...

- Distributed Portals
- Big Data Extensions
 - Vector
 - Raster
 - Real-Time



... Καλύτερη διαχείριση, Βελτίωση Ποιότητας και Απόδοσης

Apps

► Αύξηση επωφελούμενων από την χρήση της πλατφόρμας



ΣΤΟ ΠΕΔΙΟ

Navigator

Workforce



Survey123

Collector

Στο γραφείο

Maps for Office

Dashboard

ArcGIS Earth



Drone2Map

Explorer

Insights



Adobe Creative Cloud

GeoPlanner



Μέσω Web

Open Data

Story Maps



Crowdsourcing



Εύκολες, Έτοιμες προς χρήση, Πλούσιες δυνατότητες

App Builders

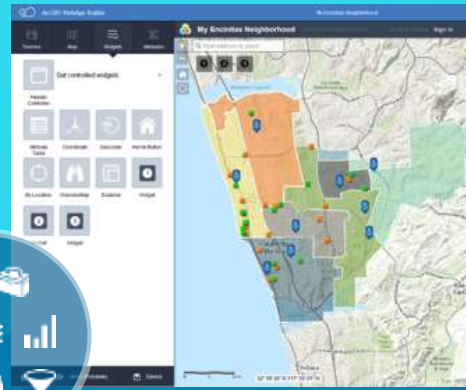
► Δυνατότητα δημιουργίας εφαρμογών

Configurable Templates



20+

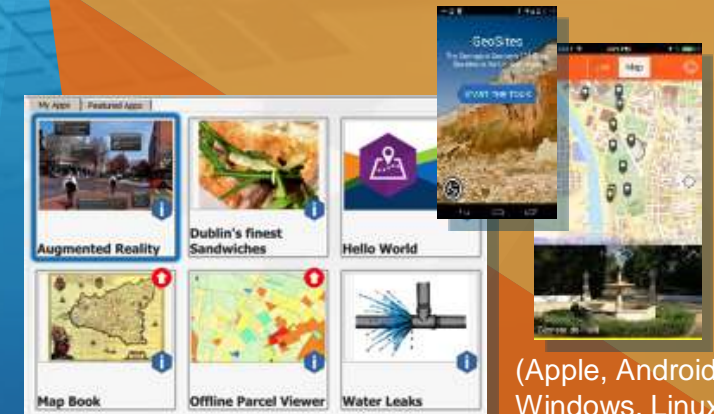
Web AppBuilder



Widgets

HTML5/JavaScript

AppStudio



(Apple, Android, Windows, Linux)

(Developer and End User Licensing)

Native Apps

Παρέχοντας εργαλεία εύκολα στη χρήση, διαμορφώσιμα και επεκτάσιμα

Σχεδιάζονται μια φορά, Εγκαθίστανται παντού...

Λύσεις Ανοιχτού Κώδικα

► Εκατοντάδες έτοιμες προς χρήση εφαρμογές και χάρτες

Local and State Government



Utilities & Telco



Public Safety & Emergency Management



Military and Security



- Κανένα κόστος
- Εύκολη διαμόρφωση
- Πλήρης υποστήριξη

Open Source Solutions

500,000+ Downloads



Έτοιμες λύσεις βάσει βέλτιστων πρακτικών

Precision Agriculture

In precision agriculture, the grower needs detailed information about the field. Key information is gathered from soil testing and yield data to determine the precise amounts of nutrients or seeds to apply. Using precise amounts increases yield and reduces waste, thereby increasing return on investment. Using spatial information and tracking results year-to-year, the grower is able to continuously refine and improve his or her results.

Soil Testing



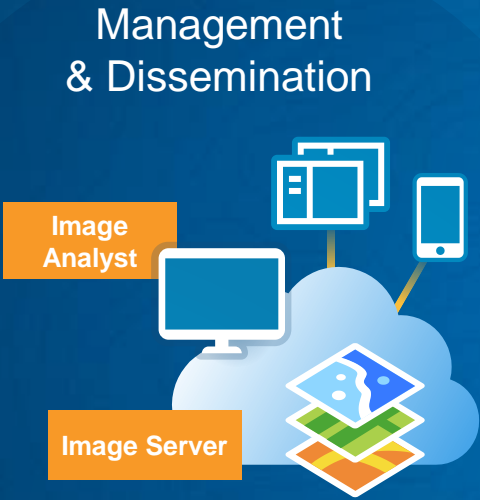
IMAGERY MANAGEMENT & ANALYTICS SYSTEM

ArcGIS IS A Comprehensive Imagery and Remote Sensing System powered by the Esri Geospatial Cloud.



Providing the Foundation for Geospatial Infrastructure

ArcGIS Has Five Core Capabilities for Imagery and Remote Sensing



Visualization & Exploration

Image Space and Mensuration

Oriented Imagery

Full-Motion Video

Street Views

Analysis

Indexes

Classification

Change Analysis

AI / Deep Learning

Raster Processing Functions

Charting

Spectral Profile

Temporal Profile

Map Production

Drone Mapping

Ortho Mapping

Seamless Orthophotos

Ortho Maker

DTM Generation

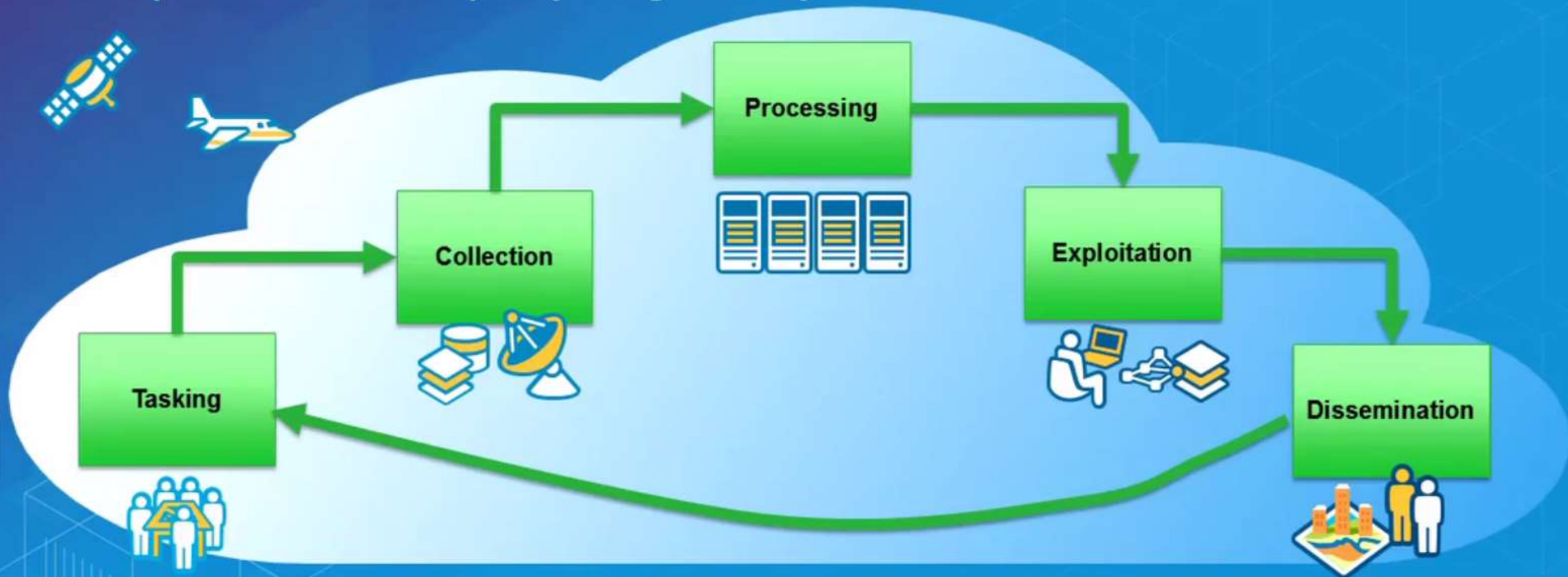
Drone2Map

- ### Content
- Landsat
 - Weather
 - Small Sats
 - High-Resolution Satellites
 - Community Imagery
 - Radar
 - Video
 - Aerial Photos
 - Sentinel
 - Drones
 - All Major Sensors

Integrated and Massively Scalable

Moving from capture to use

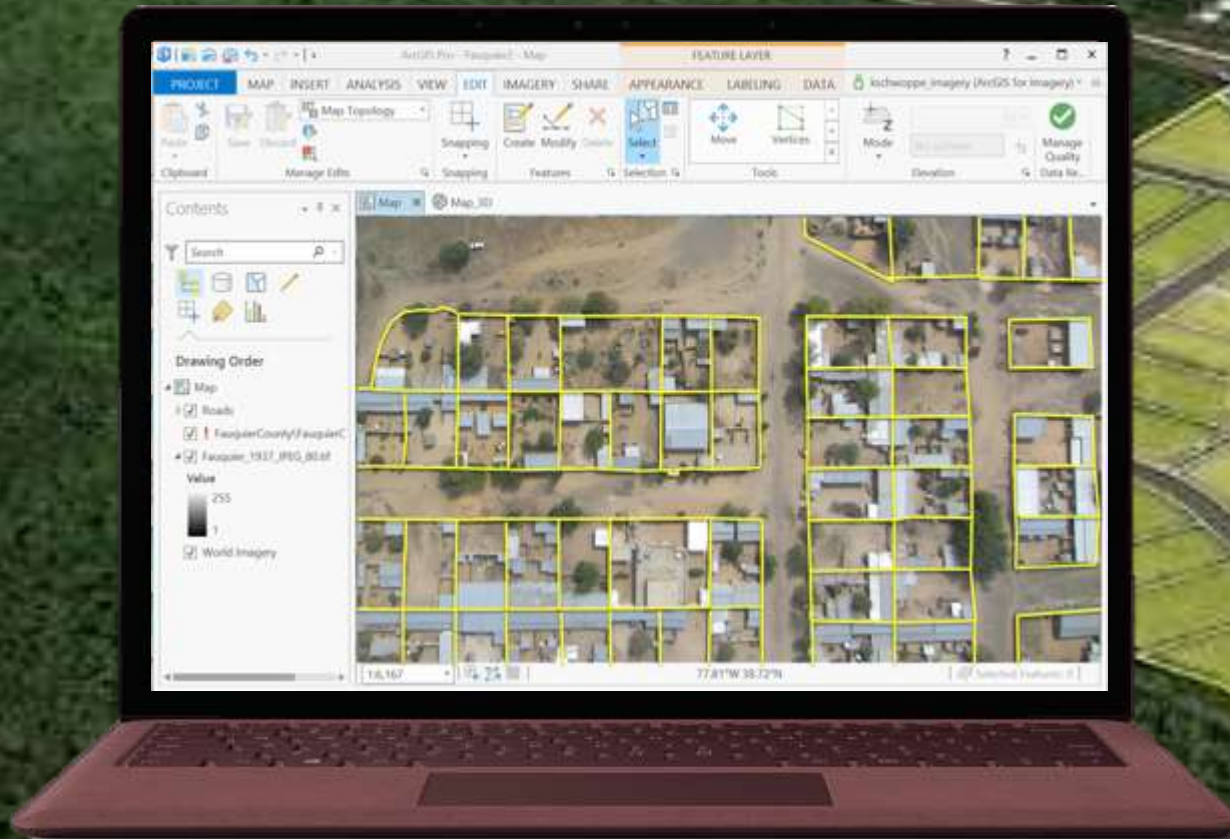
ArcGIS provides access and capability throughout the cycle



Imaging is a continuous process...

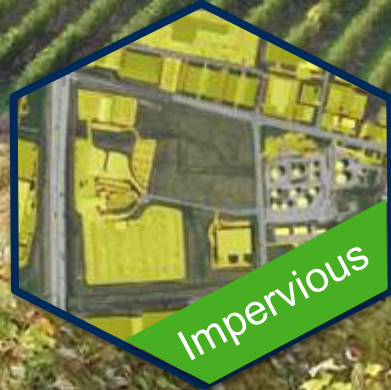
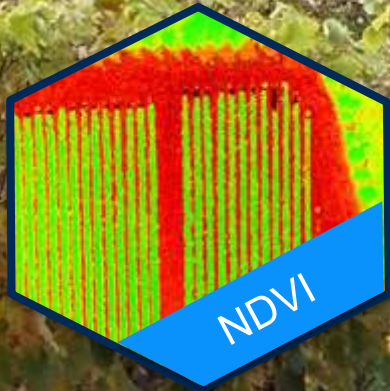
Imagery is Used to Update GIS

Using both manual and automated means



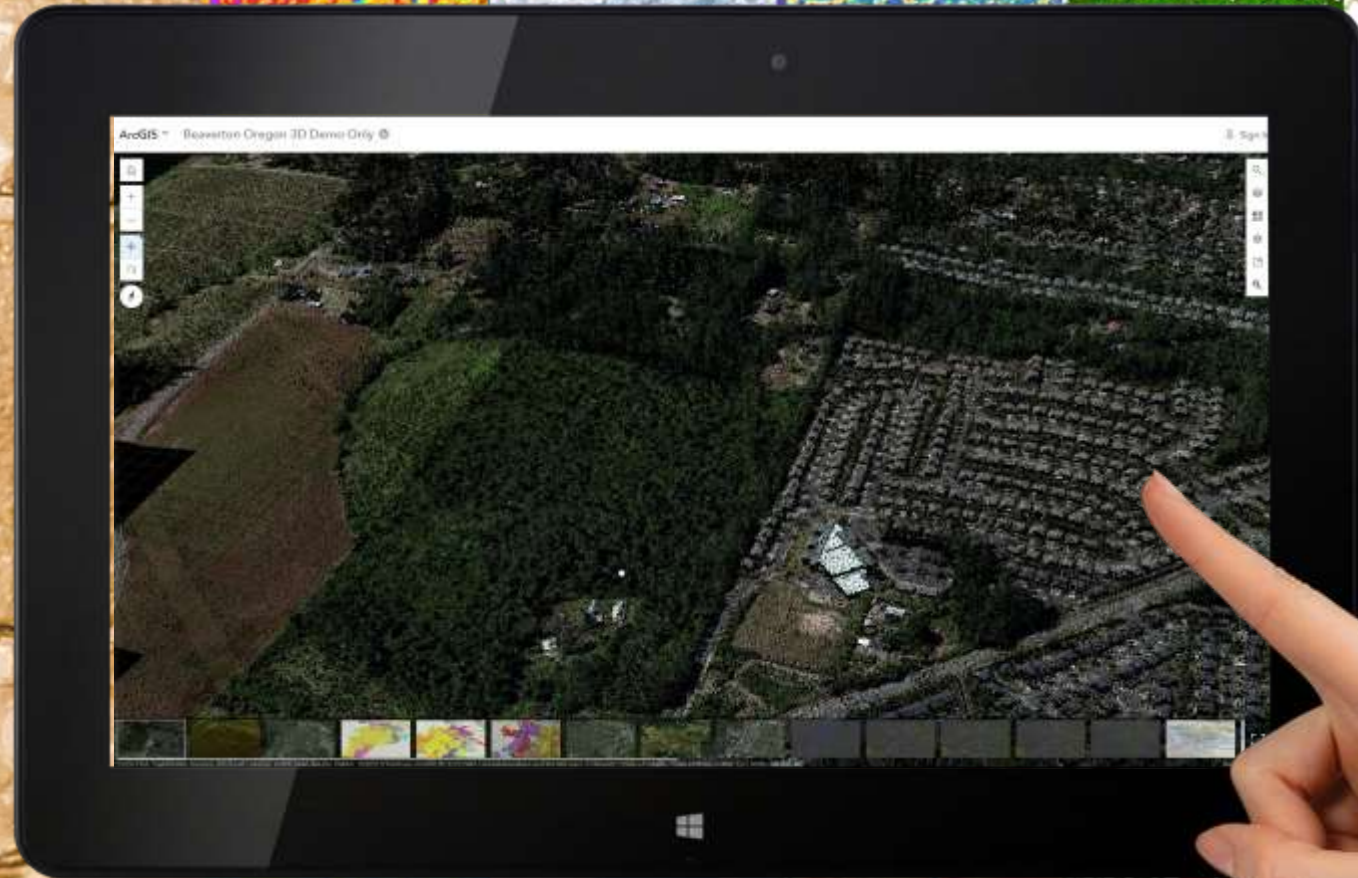
Imagery is Ideal for Mapping the Environment

Agriculture, Forestry, Green Spaces, and Water Resources



Imagery is 3D

Elevation derived from both stereo and lidar



DEM

DSM

Hillshade

Slope

Aspect

Hydro

Solar

Features

Contours

ArcGIS is a complete Imagery Management and Analytics System

*Powered by the Esri Geospatial Cloud to help deliver
deeper insights to your decision-making processes.*



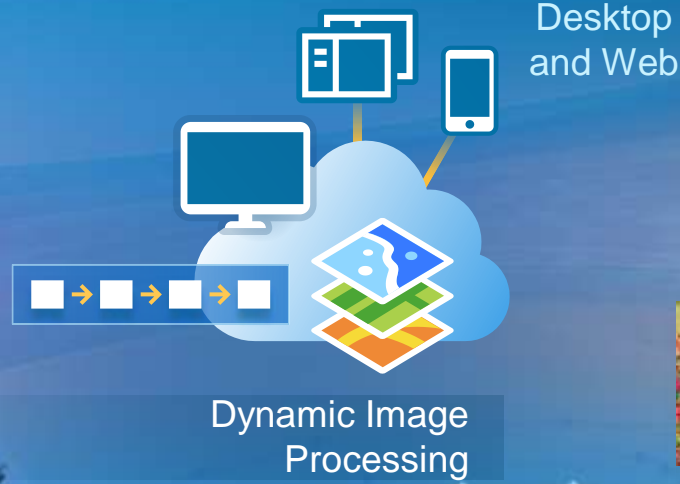
It Integrates All Types of Remotely Sensed Content

Providing Advanced Processing, Analysis, and Management

Landsat
High-Resolution Satellites
Drones
Small Sats
Aerial Photos
Sentinel 2

MODIS

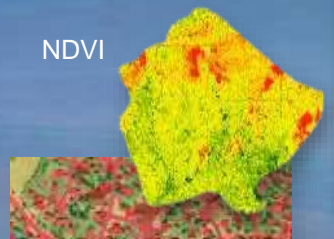
All Major Sensors



Full-Motion Video



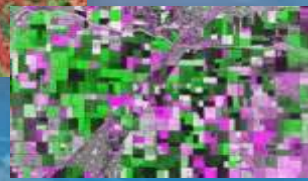
Mensuration



NDVI



Classification



Change Analysis

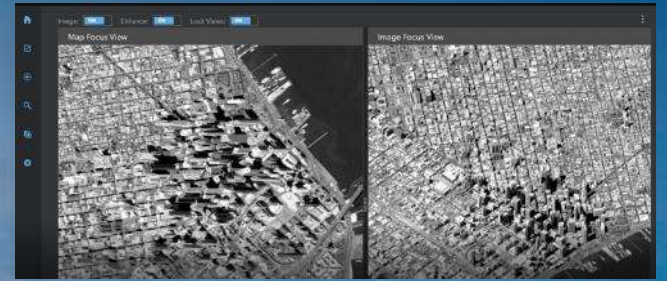
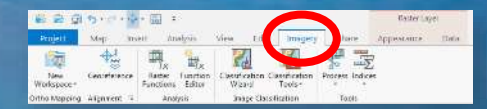


Image Space



Pro Imagery Tab



Powerful Analytics

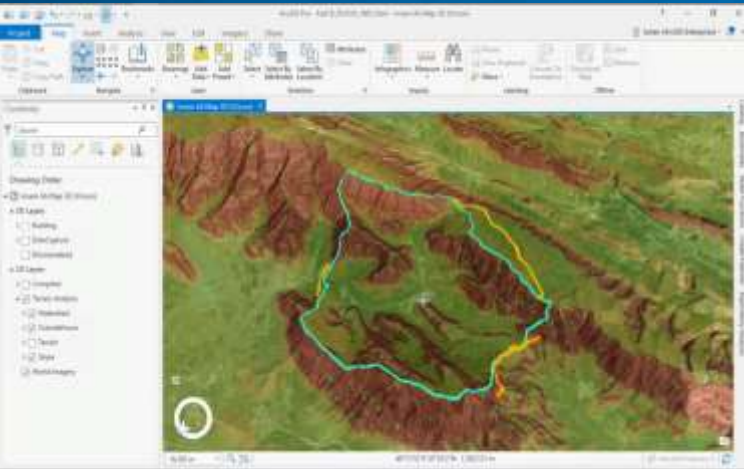


Drone2Map

Imagery Services

Store the data once, use in many applications

Imagery on the Desktop

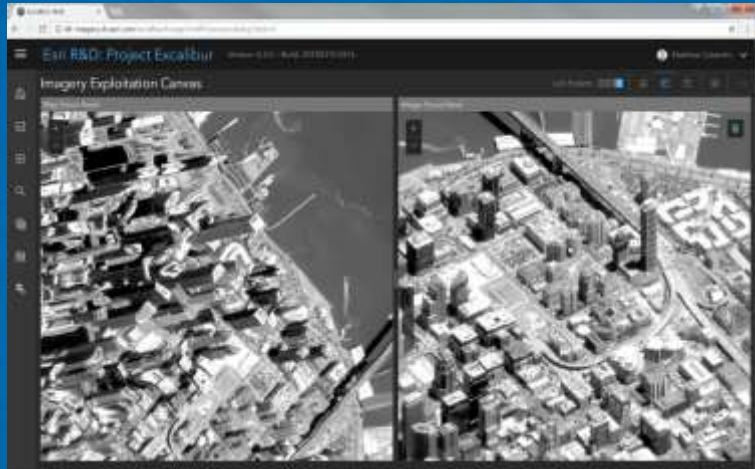


Understand

- Visualization
- Analytics

Full Geographic Context

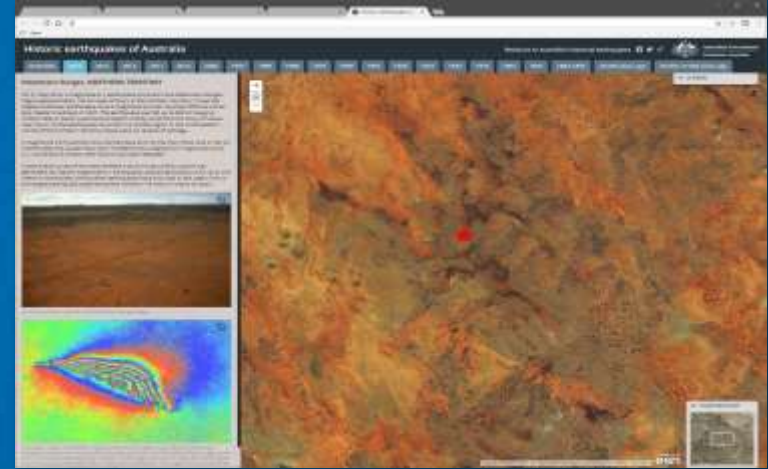
Imagery in Apps



Collaborate

- Distributed Access
- Reduce Cost
- Optimize Workflows

Imagery in Story Maps

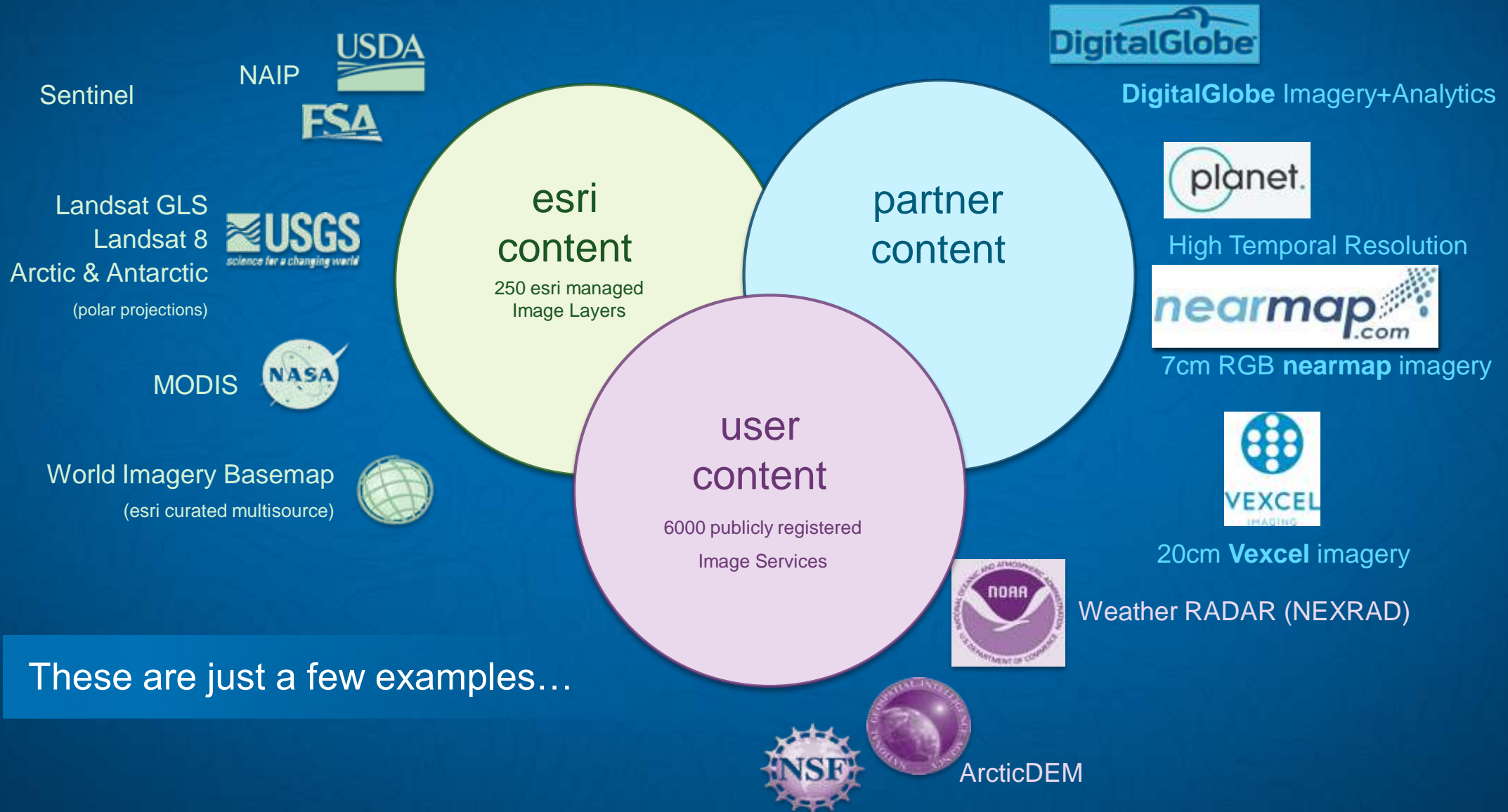


Communicate

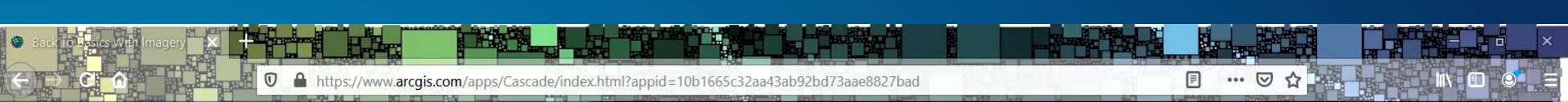
- Share Your Work
- Integrate Media
- Easy Access to All Audiences

Maximizing value through ease of accessibility

Examples of Content Under Image Management



These are just a few examples...



Imagery Services

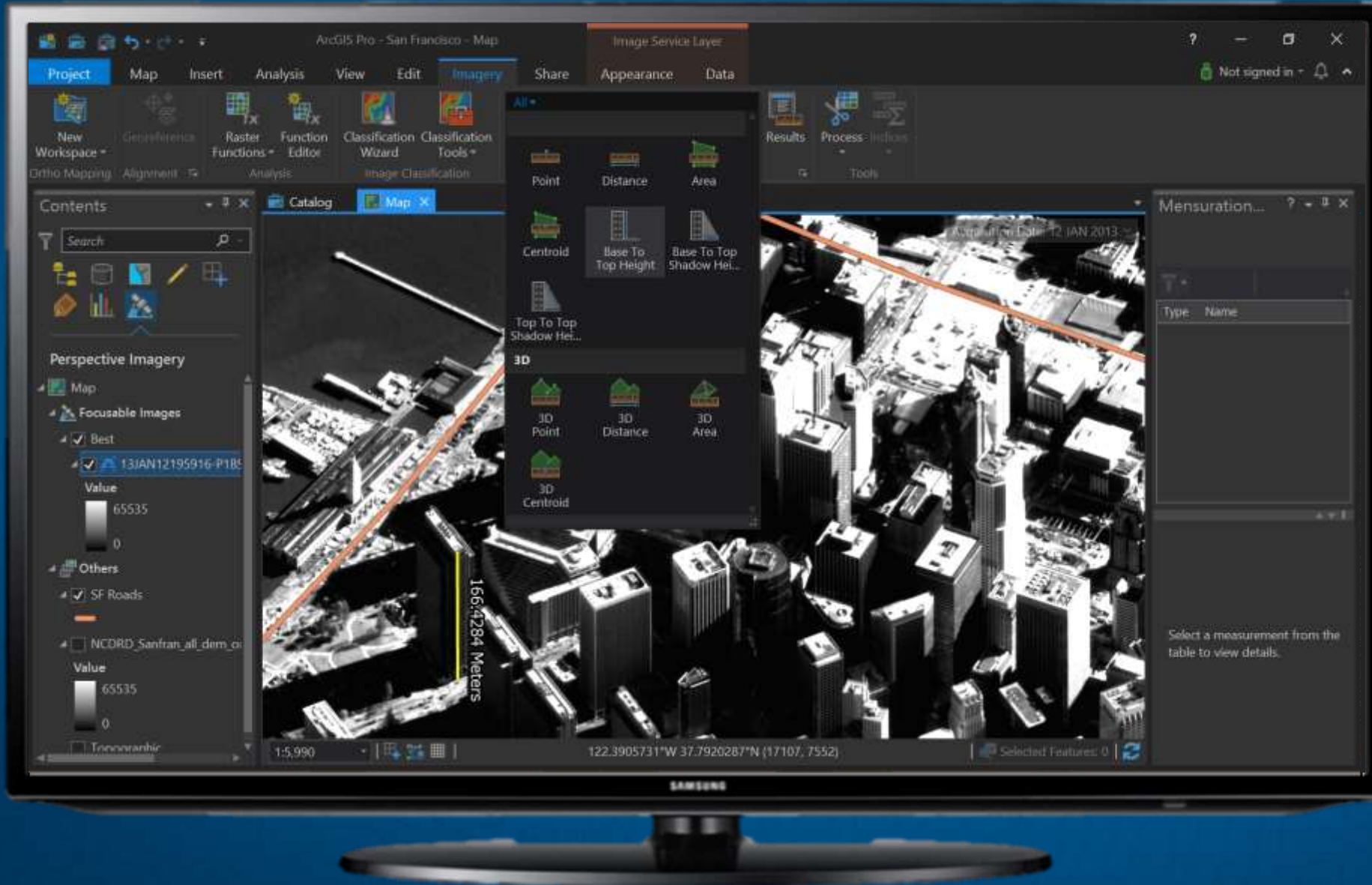
Esri produce, collate and curate geographic content. In fact, the [Living Atlas of the World](#) (Esri's prime application for finding content) is the largest repository of geospatial information in history. This content is made available to you, the user, for use in ArcGIS Online, ArcGIS Pro, ArcMap, Portal for ArcGIS and many of the Esri web applications.

This section will discuss the types of imagery available for use throughout the ArcGIS platform.



ArcGIS Pro

The foundational Application for working with Imagery



Capabilities:

- Simple Imagery User Interface
- Support for Oblique Imagery – Image Coordinate Space
- GIS Connectivity
- Advanced measurement tools
- Linked 2D & 3D Viewers
- Dedicated Imagery Workflows

What is Pro?

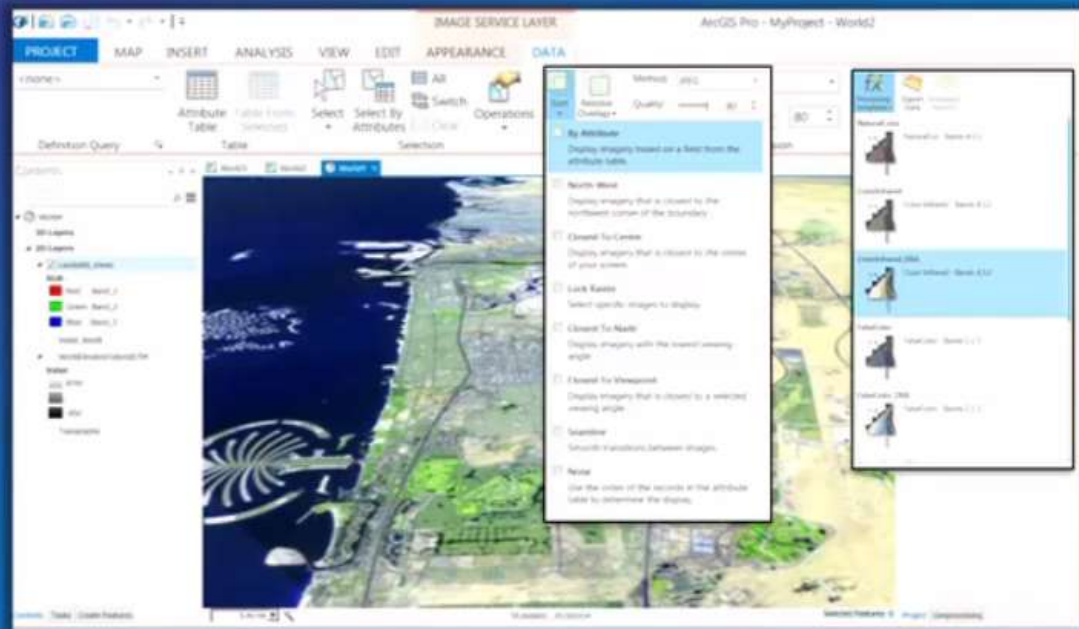
It is part of the platform

- **First rate client**
 - Designed around service enablement
 - Fully aware of AGOL and/or Portal
 - Built to share your work
- **Designed to optimize workflows**
- **Enables comparative experiences**
- **3D**
- **Evolving**
- **Complements the platform**



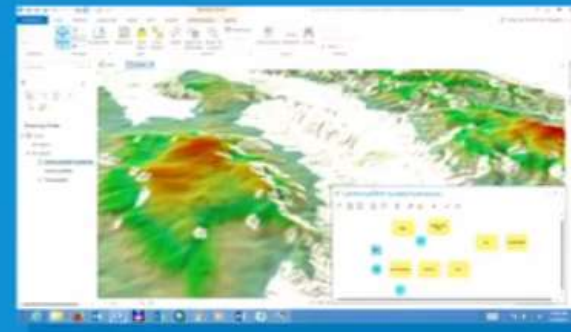
The Imagery User Experience

Enhanced Contextual tabs for imagery



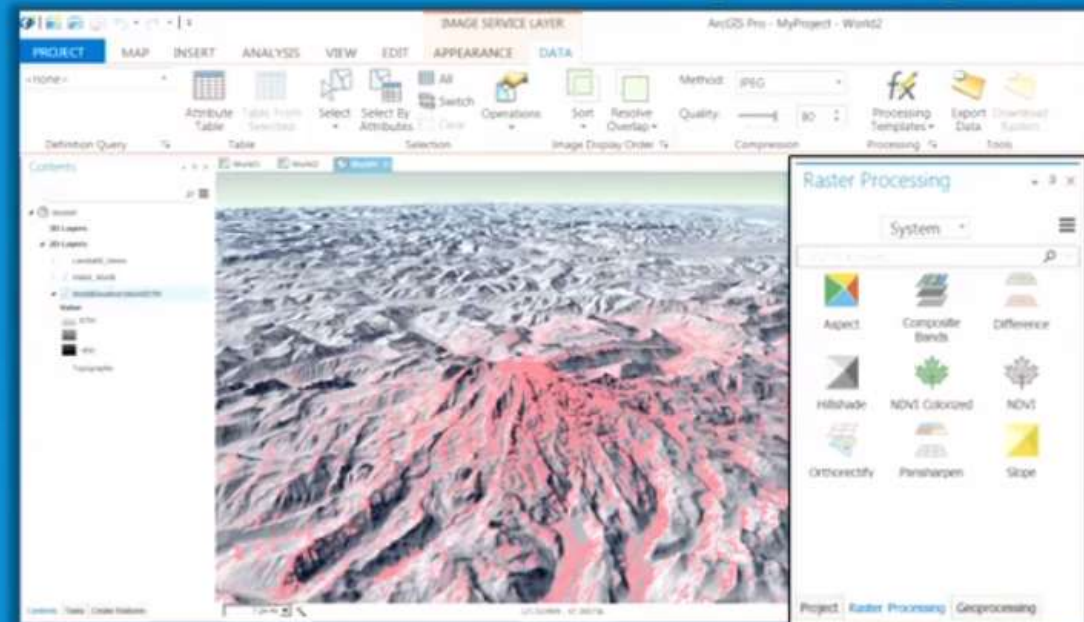
Data Tab

Contextual tabs



Raster Functions Pane

Image Processing Pane



Intuitive Visualization controls

Where do I find the tools? (Before)

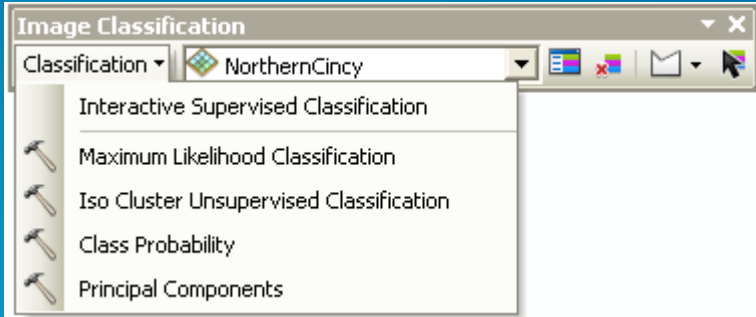
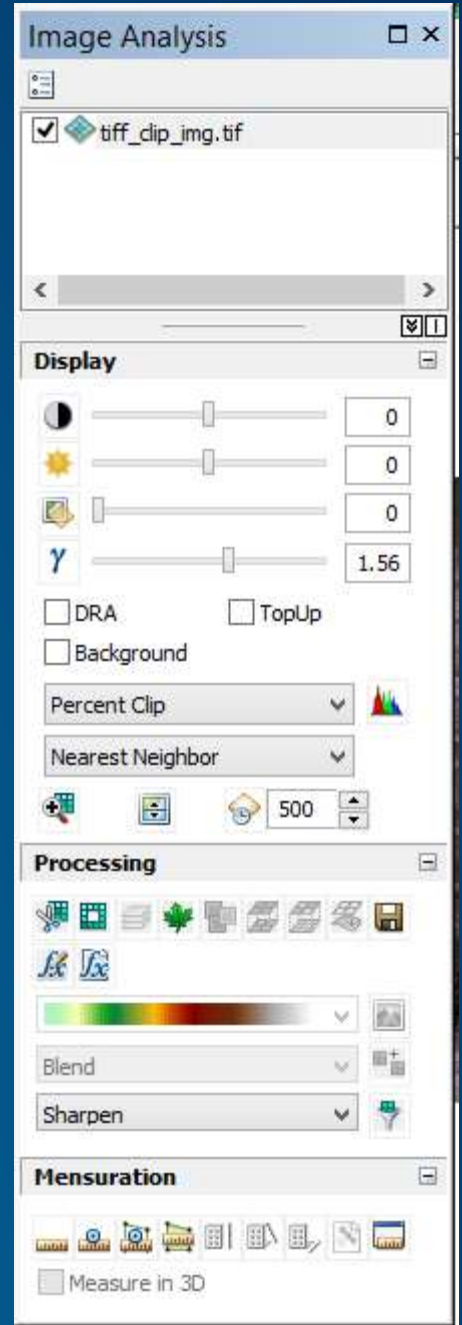
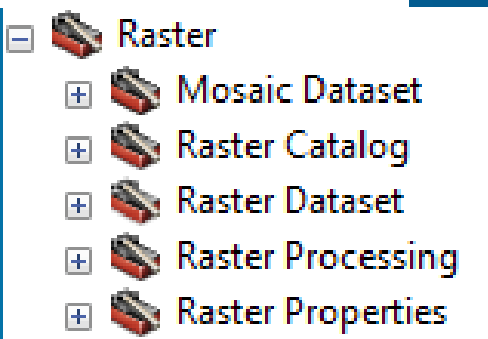
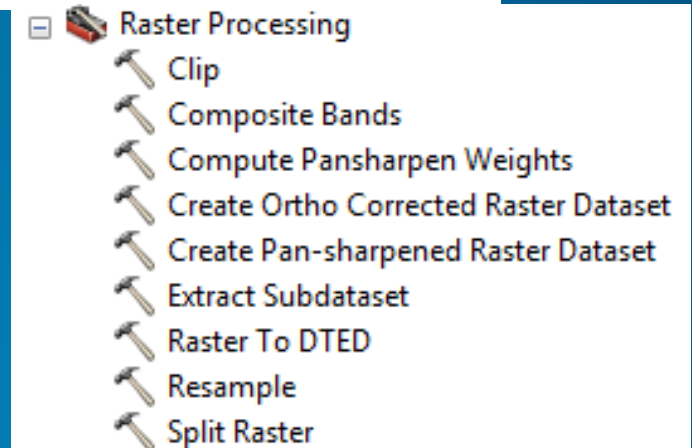
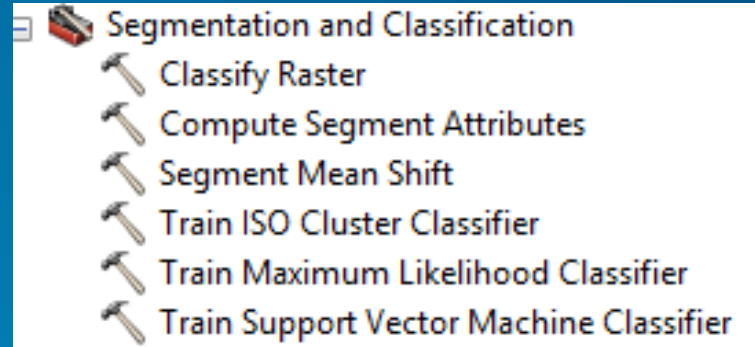


Image Classification Toolbar... Διαθέσιμη μόνο με το Spatial Analyst

	Training Sample Manager	Opens Training Sample Manager.
	Clear Training Samples	Removes all training samples and begins a new supervised classification session.
	Training Sample Drawing Tools	Draws new training samples in the display. There are three ways to create training samples: as polygons, as rectangles, and as circles.
	Select Training Sample	Selects training samples in the display.



Where do I find the tools ? (Now)

Geoprocessing

Find Tools

Favorites | **Toolboxes** | Portal

- Image Analyst Tools
 - Map Algebra
 - Raster Calculator
 - Math
 - Overlay
 - Weighted Sum
 - Segmentation and Classification
 - Classify Raster
 - Compute Confusion Matrix
 - Compute Segment Attributes
 - Create Accuracy Assessment Points
 - Deep Learning Model To Ecd
 - Export Training Data For Deep Learning
 - Generate Training Samples From Seed Points
 - Inspect Training Samples
 - Remove Raster Segment Tiling Artifacts
 - Segment Mean Shift
 - Train ISO Cluster Classifier
 - Train Maximum Likelihood Classifier
 - Train Random Trees Classifier
 - Train Support Vector Machine Classifier
 - Update Accuracy Assessment Points

Raster Functions

Find Raster Functions

Project | **System** | Custom

- Analysis
 - Binary Thresholding
 - Heat Index
 - Kernel Density
 - NDVI
 - NDVI Colorized
 - Tasseled Cap (Kauth-Tho...)
 - Weighted Overlay
 - Weighted Sum
 - Wind Chill
- Appearance
 - Contrast and Brightness
 - Convolution
 - Pansharpen
 - Statistics and Histogram
 - Stretch
- Classification
- Conversion

Project | Map | Insert | Analysis | View | Edit | **Imagery** | Share | Appearance | Data

New Workspace | Georeference | Raster Functions | Function Editor | Classification Wizard | Classification Tools | Point | Distance | Area | Results | Process | Indices

Ortho Mapping | Alignment | Analysis | Image Classification | Mensuration | Tools

Definition Query: <None>

Table: Attribute Table, Table From Selection

Select: All, Visible, Clear

Selection: Operations, Explore Raster Items

Image Display Order: Sort, Resolve Overlap

Method: JPEG

Quality: 75

Compression

Processing: Processing Templates

Multidimensional Filter: Variables

Tools: Download Rasters, Export Raster

Visualize: Create Chart

Contents

Search

Map1

- Clip_Sentinel-2 Views
- Corine Land Cover 2018
- Sentinel-2 Views
 - RGB
 - Red: B4_Red
 - Green: B3_Green
 - Blue: B2_Blue
 - Cyprus Topographic Map
 - World Topographic Map

NBR_Sentinel Scene Imagery_Services Map1



Catalog

Project Portal Favorites History

Living Atlas Categories

landsat8

Search Results

- Landsat Imagery (Antarctic)
- Landsat Arctic Views
- Landsat Imagery (Arctic)
- Landsat Arctic Pansharpened
- Landsat Arctic Imagery: Agriculture with DRA
- Landsat Arctic Imagery: NDSI Colorized
- Landsat Arctic Imagery: Natural Color with DR
- Landsat Antarctic Views
- Landsat Antarctic Panchromatic
- Landsat Arctic Imagery: NDVI Raw
- Landsat Arctic Panchromatic
- Landsat Arctic Imagery: Geology with DRA
- Landsat Antarctic Pansharpened
- Landsat Arctic Imagery: Short-wave Infrared wi
- Landsat Arctic Imagery: Normalized Difference
- Landsat Antarctic Imagery: Panchromatic with I
- Landsat Antarctic Imagery: Normalized Differe

Find more items...

Query 1

Definition Query Table

Select All Visible Operations Explore Raster Items

Sort Resolve Overlap

Method JPEG

Quality 75

Compression

Processing Templates

Variables

Download Rasters

Export Raster

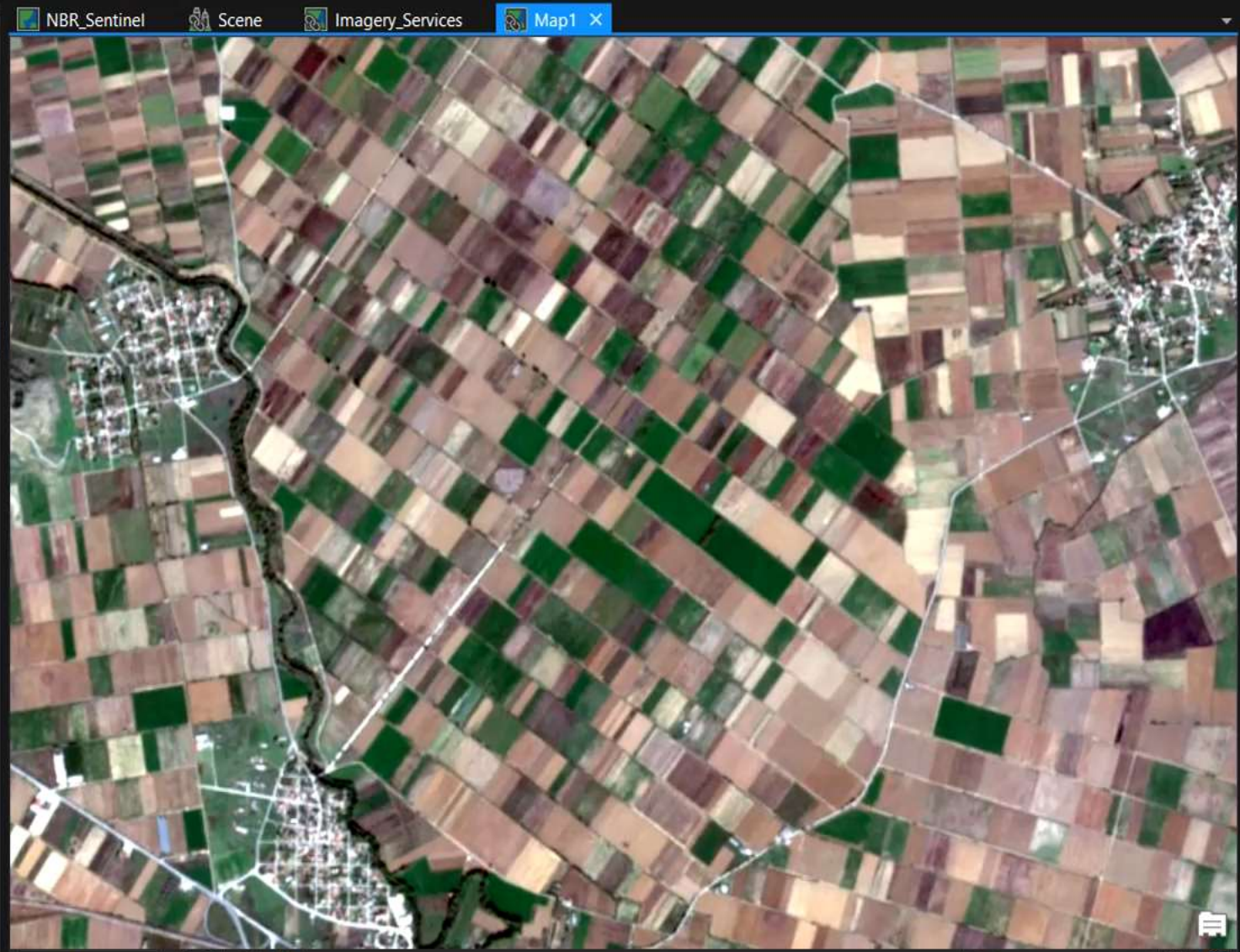
Create Chart

Contents

Search

Drawing Order

- Map1
 - Clip_Sentinel-2 Views
 - Corine Land Cover 2018
 - Sentinel-2 Views
 - Cyprus Topographic Map
 - World Topographic Map



Raster Functions

Find Raster Functions

Project System Custom

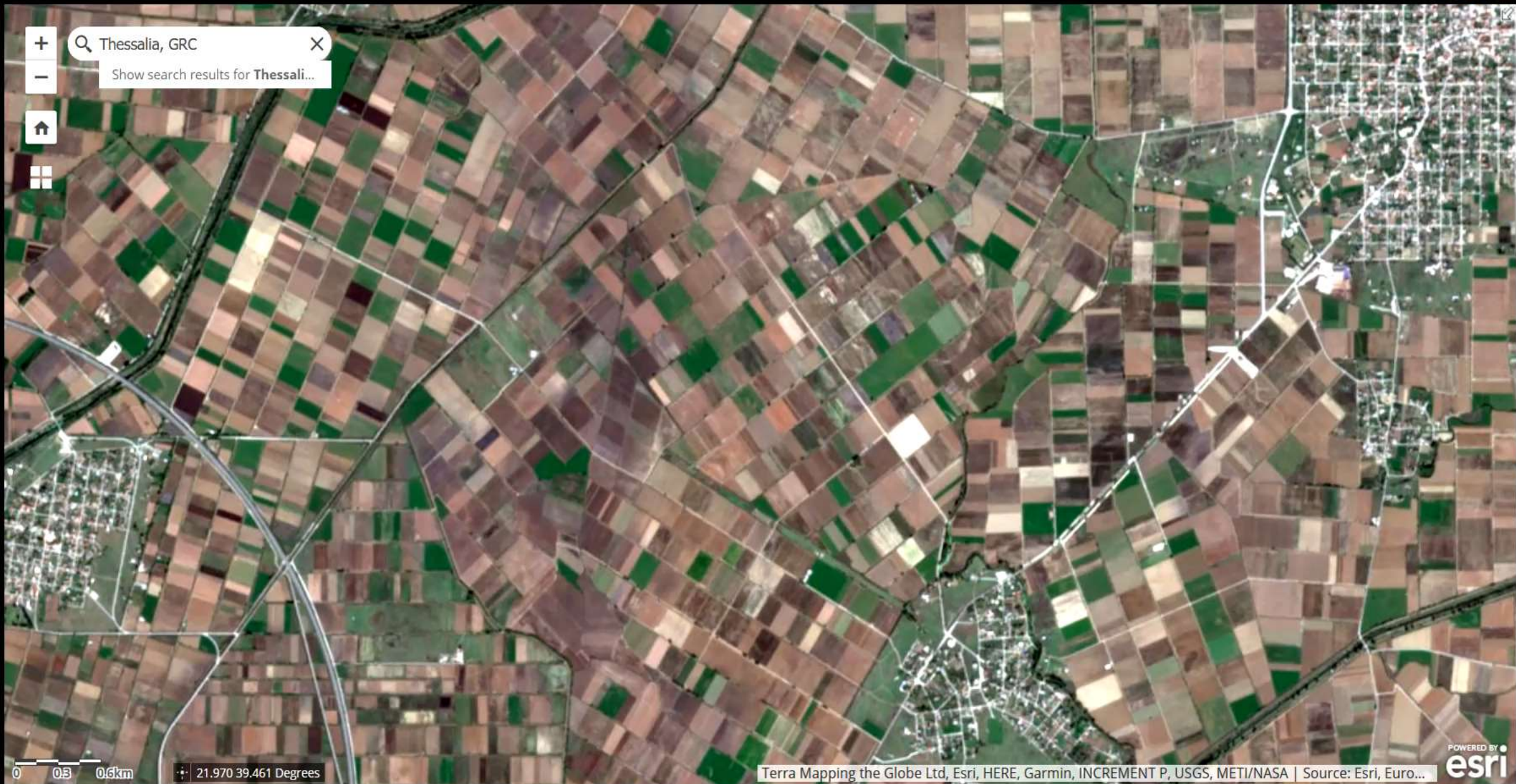
Project1

- Normalized Difference...
- Soil Adjusted Vegetation...

Catalog Locate Geoprocessing Raster Functions

- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 
- 

+ Thessalia, GRC X
- Show search results for Thessali...



0 0.3 0.6km
21.970 39.461 Degrees

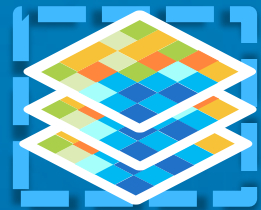


ArcGIS Image Analyst

Extension to Pro for Advanced Analytics



Mosaic Dataset
 Virtual
 Points to the Imagery
 Collection of many
 Treats as One



Analysis Products



Image Functions

104 Common Functions
 Dynamic, On-the-Fly
 Function Chains



Image Analyst – Unlock the potential of every pixel

Advanced image visualization and image analytics



ADVANCED VISUALIZATION

Stereoscopic and native sensor viewing capabilities that transport you to a more natural viewing environment.



MENSURATION MADE EASY

Photogrammetrically accurate 3D cursor enables the measurement and capture of 3D features.



INTUITIVE CLASSIFICATION

Apply machine learning to pixels and objects to unlock the potential of every pixel.



POWERFUL IMAGE PROCESSING

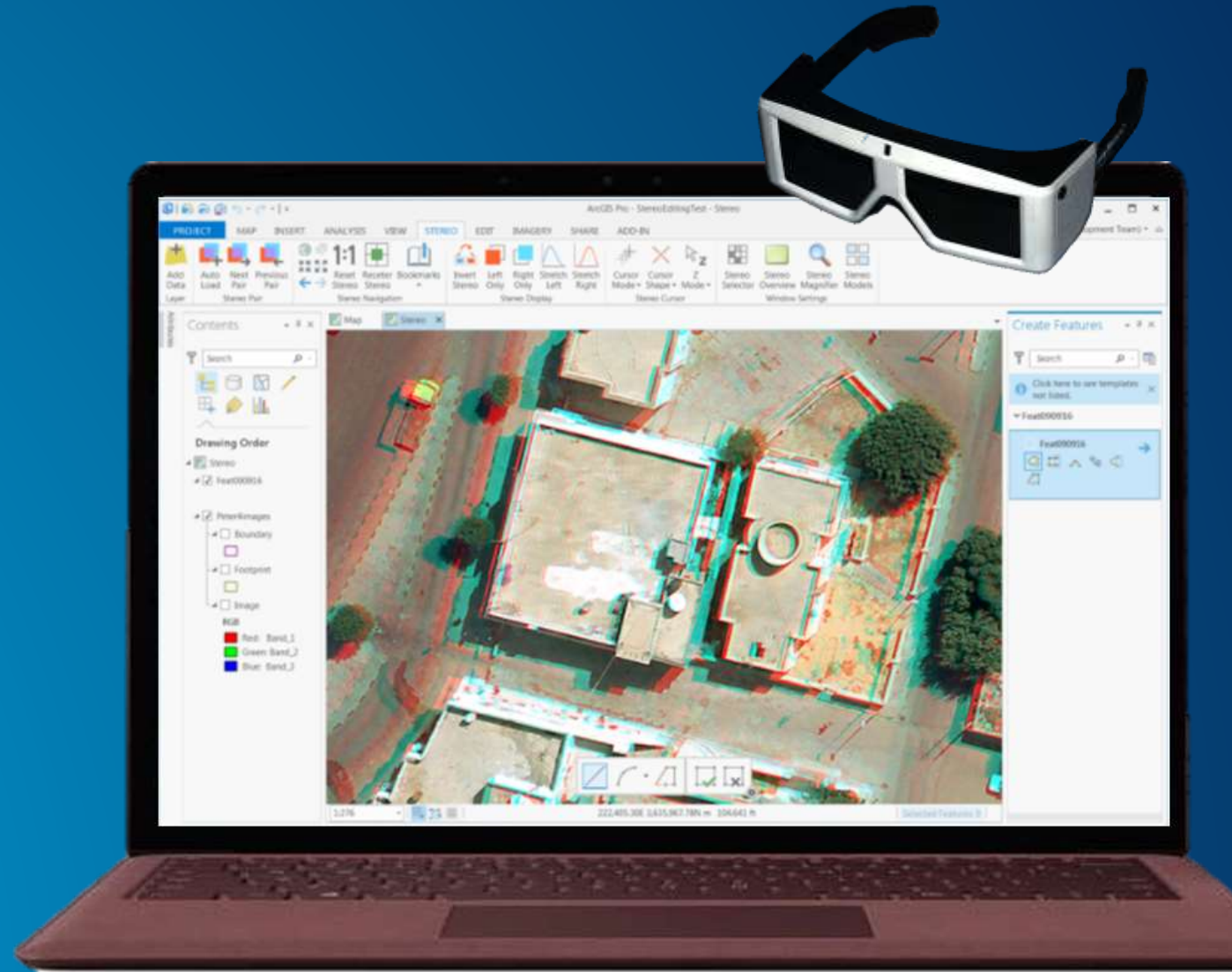
Streamlined image exploitation with the power of extensive raster functions.

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

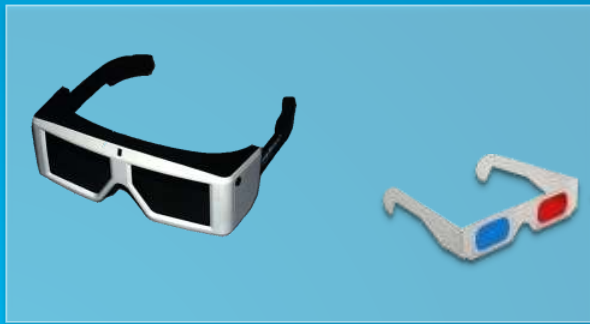


Stereo Mapping

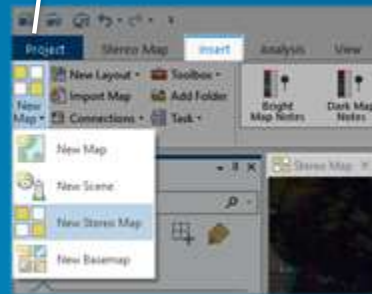
Visualize and capture data in 3D using stereo imagery



Multiple sources



Active Shutter Glasses
Anaglyph stereo viewing



New stereo view



New cursor shapes and modes

Works with Pro Editing UX

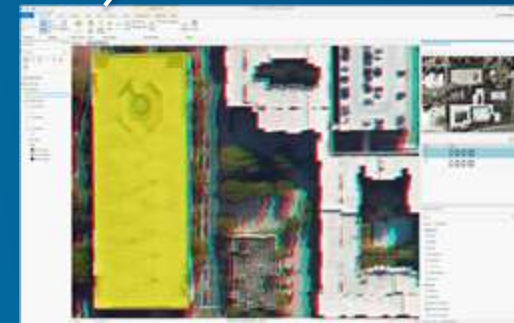
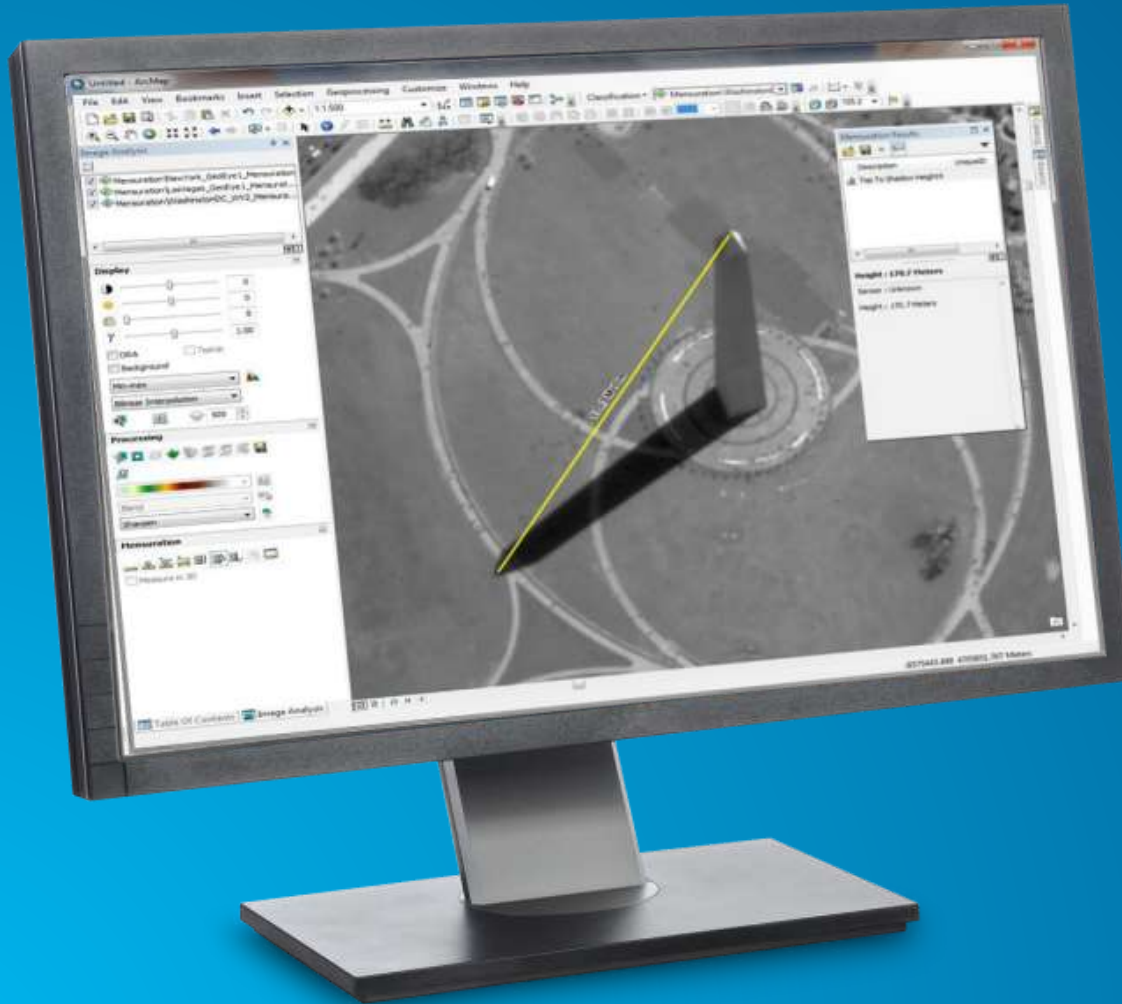


Image Analyst extension



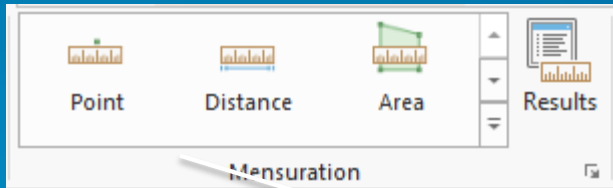


Capabilities:

- 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



Image Space Analysis - Mensuration



Tools for georeferenced imagery

Requires sensor model

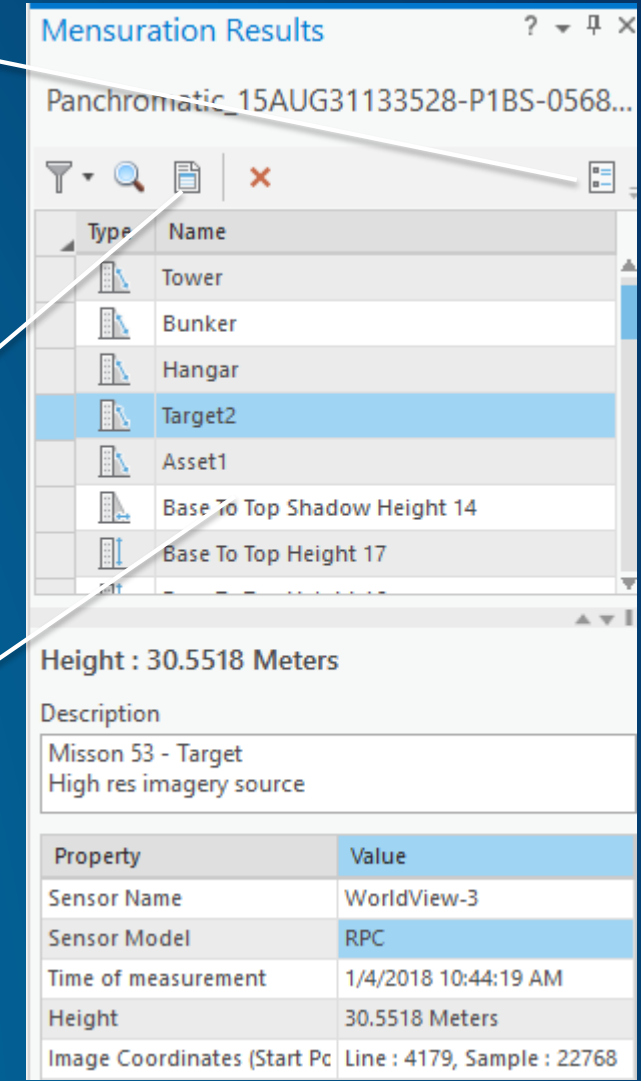
Requires sun angle

With user-configurable DEM

Style/Annotate

Generate reports for decision makers

Track, store, manage measurements



Mensuration Results

Panchromatic_15AUG31133528-P1BS-0568...

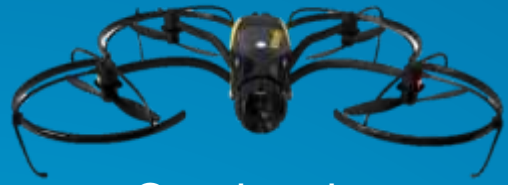
Type	Name
[Icon]	Tower
[Icon]	Bunker
[Icon]	Hangar
[Icon]	Target2
[Icon]	Asset1
[Icon]	Base To Top Shadow Height 14
[Icon]	Base To Top Height 17

Height : 30.5518 Meters

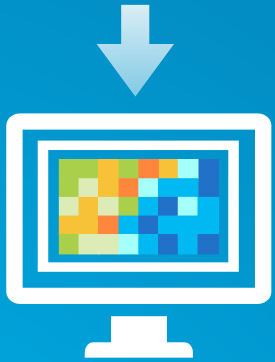
Description

Mission 53 - Target
High res imagery source

Property	Value
Sensor Name	WorldView-3
Sensor Model	RPC
Time of measurement	1/4/2018 10:44:19 AM
Height	30.5518 Meters
Image Coordinates (Start Pc	Line : 4179, Sample : 22768



Overlapping
Static Aerial Photos



2D Image Maps:

- Ortho Photos
- Digital Surface Models (DSM)
- NDVI



3D Elevation Products:

- Point Cloud (LAS)
- 3D Mesh Models
- 3D Site Models (PDF)

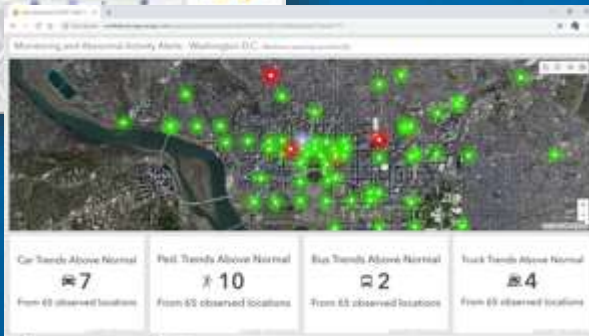
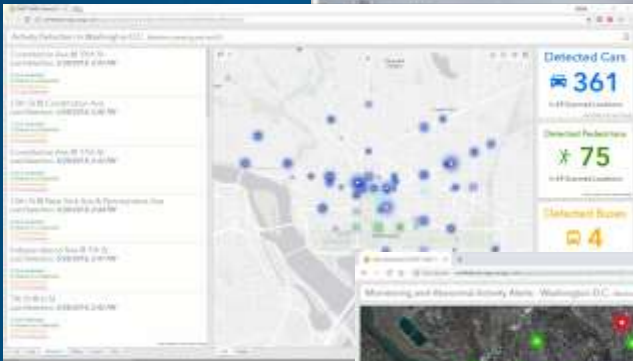


Smart Inspection :

- Non-Distorted but Map Accurate
- Works for vertical and oblique
- Complete 3D Measurements
- Cataloging for site inventories

AI and Computer Vision

Target Identification & Tracking

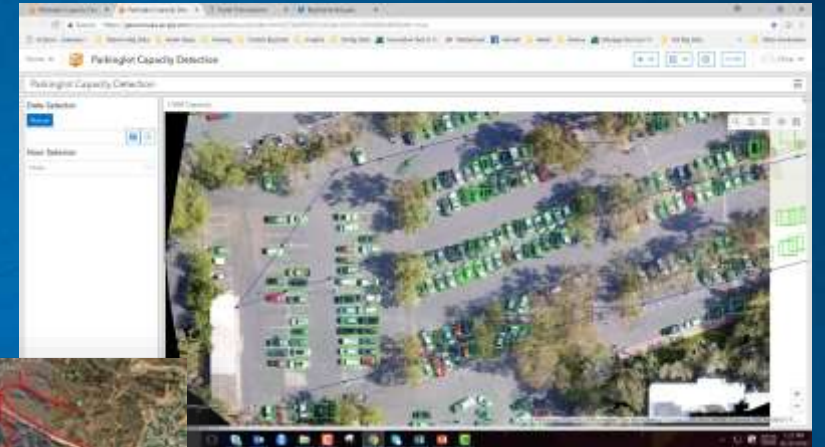


Anomaly Detection

Surface to Air Missile Launcher Sites Detection



SOM: Activity Identification via Car Counting per Area & Time



Hidden Road Detection

High Resolution Change Detection
Detecting New Piers



ArcGIS Imagery Management

*Making Imagery Accessible –
Image Management and Dissemination*



New graphic needed



ArcGIS Pro

- Authoring Mosaic Datasets
- Raster Types/Products



ArcGIS Image Server

- Scalability
- Dynamic Image Services



ArcGIS Excalibur

A new, modern **web** experience
for ArcGIS Enterprise v10.7

For: Analysts, Imagery Specialists, and
Imagery/GIS Managers

Who: Need to discover, analyze, report and
efficiently disseminate information derived from
imagery analysis and workflows.



Integrating Imagery Exploitation and Observation Management

Raster Functions

Large Collection of Raster Functions

Multiband Math Arithmetic Band Arithmetic	Correction Apparent Reflectance Geometric Correction Speckle Filtering (Lee,Frost,Kuan) Thermal noise * Radiometric Calibration *	Visualization & Appearance Contrast and Brightness Convolution Pansharpener Resample Statistics and Histogram Stretch	Analysis: Distance & Density * Euclidean Distance Cost Distance Least Cost Path Kernel Density	Analysis: Overlay Weighted Overlay * Weighted Sum **	Python Custom Algorithms																																																															
Math ** <table border="0"> <tr> <td>Calculator</td> <td>ACos</td> <td>Bitwise</td> </tr> <tr> <td>Abs</td> <td>ACosH</td> <td>And</td> </tr> <tr> <td>Divide</td> <td>ASin</td> <td>Left Shift</td> </tr> <tr> <td>Exp</td> <td>ASinH</td> <td>Not</td> </tr> <tr> <td>Exp10</td> <td>ATan</td> <td>Or</td> </tr> <tr> <td>Exp2</td> <td>ATan2</td> <td>Right Shift</td> </tr> <tr> <td>Float</td> <td>ATanH</td> <td>Xor</td> </tr> <tr> <td>Int</td> <td>Cos</td> <td>Boolean</td> </tr> <tr> <td>Ln, Log10</td> <td>CosH</td> <td>And</td> </tr> <tr> <td>Log2</td> <td>Sin</td> <td>Not</td> </tr> <tr> <td>Minus</td> <td>SinH</td> <td>Or</td> </tr> <tr> <td>Mod</td> <td>Tan</td> <td>Xor</td> </tr> <tr> <td>Negate</td> <td>TanH</td> <td>Equal To</td> </tr> <tr> <td>Plus</td> <td>Con</td> <td>Greater Than</td> </tr> <tr> <td>Power</td> <td>Set Null</td> <td>Greater Than</td> </tr> <tr> <td>Round Down</td> <td></td> <td>Equal</td> </tr> <tr> <td>Round Up</td> <td></td> <td>Is Null</td> </tr> <tr> <td>Square</td> <td></td> <td>Less Than</td> </tr> <tr> <td>Square Root</td> <td></td> <td>Less Than</td> </tr> <tr> <td>Times</td> <td></td> <td>Equal</td> </tr> <tr> <td></td> <td></td> <td>Not Equal</td> </tr> </table>	Calculator	ACos	Bitwise	Abs		ACosH	And	Divide	ASin	Left Shift	Exp	ASinH	Not	Exp10	ATan	Or	Exp2	ATan2	Right Shift	Float	ATanH	Xor	Int	Cos	Boolean	Ln, Log10	CosH	And	Log2	Sin	Not	Minus	SinH	Or	Mod	Tan	Xor	Negate	TanH	Equal To	Plus	Con	Greater Than	Power	Set Null	Greater Than	Round Down		Equal	Round Up		Is Null	Square		Less Than	Square Root		Less Than	Times		Equal			Not Equal	Data Management & Conversion Raster to Vector Vector to Raster Colormap Colormap To RGB Complex Grayscale Remap / Reclass Spectral Conversion Unit Conversion Vector Field LAS to Raster LAS Dataset to Raster Clip Composite Extract Bands Mask Mosaic Rasters Rasterize Features Reproject Nibble **	Interpolation Interpolate Irregular Data - Nearest Neighbor - IDW - EBK Swath	Analysis: Band Math & Indices NDVI / NDVI Colorized SAVI / MSAVI / TSAVI GEMI GVI (Landsat TM) PVI Tasseled Cap (Kauth-Thomas) Binary Thresholding	Statistics: Zonal Statistics ** Cell Statistics ** ArgStatistics
Calculator	ACos	Bitwise																																																																		
Abs	ACosH	And																																																																		
Divide	ASin	Left Shift																																																																		
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Square		Less Than																																																																		
Square Root		Less Than																																																																		
Times		Equal																																																																		
		Not Equal																																																																		
		Surface Generation & Analysis Aspect Curvature Elevation Void Fill Hillshade Shaded Relief Slope Viewshed *	Analysis: Image Segmentation & Classification ** Segmentation (Mean Shift) Training (ISO, SVM, ML) Supervised Classification	* Requires Spatial Analyst Ext. in Pro or * Requires Image Analyst Ext.in Pro All functions are accessible on Image Server																																																																

Chain functions together into Raster Models and apply them to answer complex questions

Imagery Capabilities – Product Summary

ArcGIS Pro – Basic

- Access to an extensive range of image formats
- Access to a wide range of raster products (DG, Airbus, etc.)
- Access to imagery from both static and dynamic image services
- Access to all the imagery from the Living Atlas on ArcGIS Online
- Over 60 raster functions
- Python raster functions
- Tools for image enhancement
- Length and size measurement from orthophotos
- Height mensuration from on-the-fly orthophotos
- Ability to export to a wide range of formats
- Ability to publish image datasets to ArcGIS Enterprise
- Pro is the primary client and authoring tool for Raster Analytics running on ArcGIS Image Server.

ArcGIS Pro – Standard

- Contains all the features in Basic plus the following additional components
- Tools to create and manage mosaic datasets
- Tools for measurement of tie points and control points as well as block adjustment, color correction, creation of seamlines, and creation of overviews

ArcGIS Pro – Advanced

- Contains all the features in Standard plus the following additional components
- Ortho Mapping tools for the generation of digital terrain models and orthophoto mosaics

ArcGIS Pro – Spatial Analyst extension

- Adds spatial modeling and analysis tools
- Includes tools for image segmentation and classification with machine learning
- Adds over 60 additional raster functions such as classify, segment mean shift, and weighted overlay

ArcGIS Pro – Image Analyst extension

- Adds Stereo Mapping capabilities
- Adds Image Space analysis
- Includes tools for image segmentation and classification with machine learning
- Includes math operators in raster functions and associated geoprocessing tools



esri

*The Science of
Where*