



# Esri Perspective

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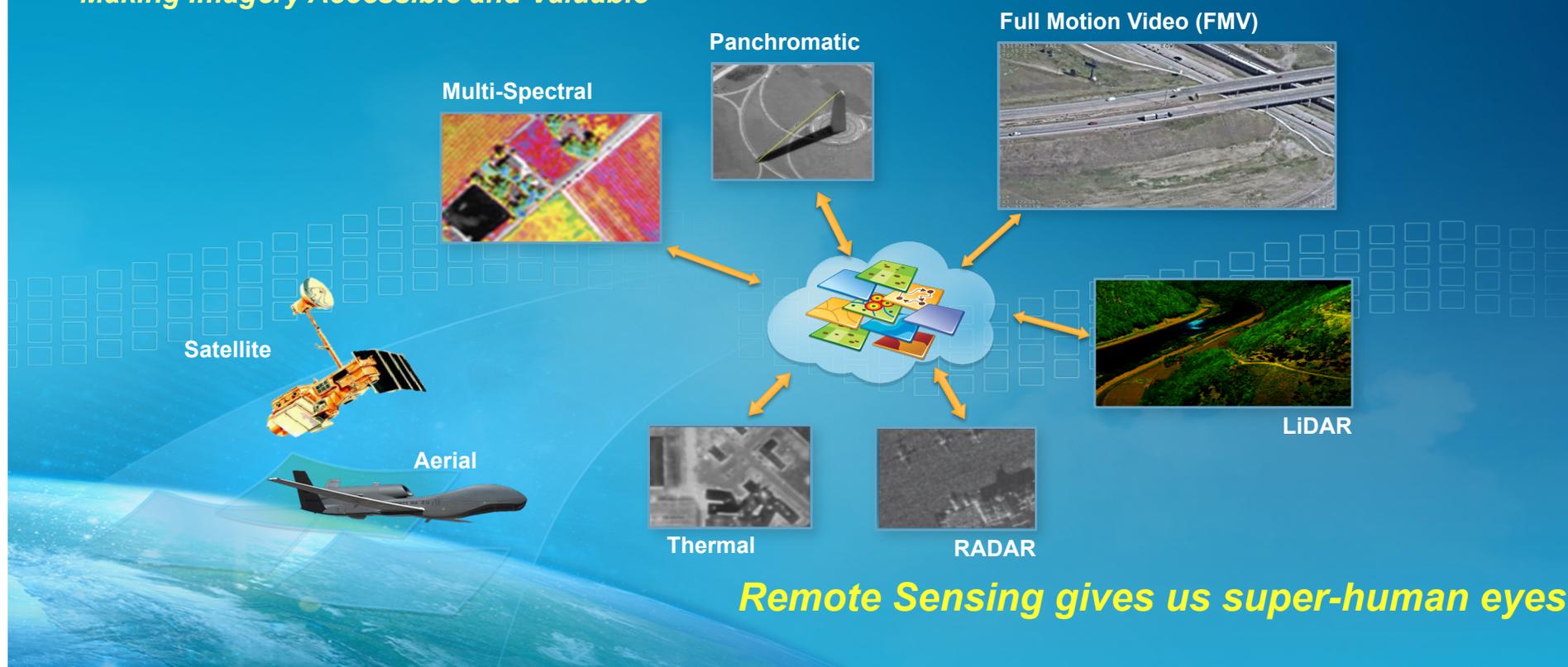
## Topics

- Imagery extends our human vision
- History demonstrates the value of imagery
- We have learned from the esri ecosystem
- There could be more...
- Closing remarks

# Imagery in ArcGIS

Integrating all Types, Sources, and Sensor Models

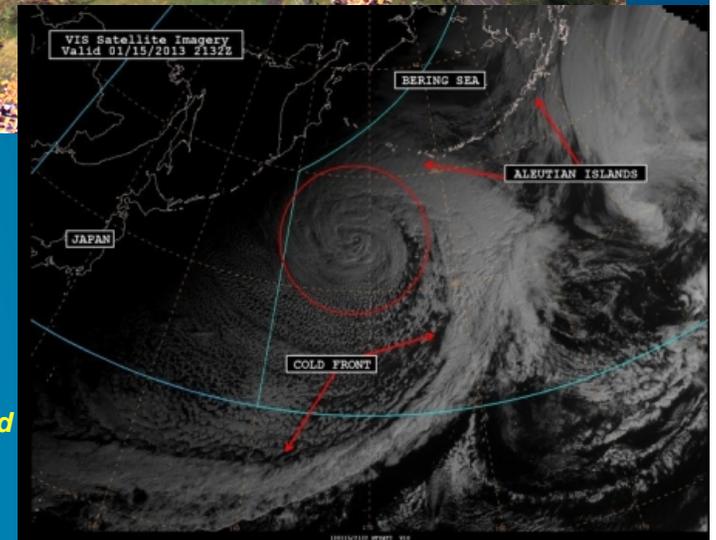
*Making Imagery Accessible and Valuable*



*Remote Sensing gives us super-human eyes*

## The value of imagery

- It saves lives!
  - Weather warnings (before Wx imagery)
    - 1900 – 12K fatalities, Galveston, TX
    - 1928 - ~4K fatalities, FL & PR
    - 1938 – 600 fatalities, New England
  - Drought forecasts
  - Storm recovery
  - Earthquake recovery
  - Humanitarian crisis
- It helps us understand our resources



*Imagery is critical when you need to act on the ground*

# Remote Sensing – The Time Machine

## *Landsat*



- Sometimes the change was so slow, I missed it... but the imagery didn't

MSS 11 Oct 1972

OLI 7 Nov 2016



## The Esri ecosystem... our user community

### *We learn from them*

- From AGOL, they request more than 1B screen requests (maps) every day.
  - **60% of the screen requests are imagery**
- There is a hunger for more data, ...that data can come from imagery
  - **The challenge is to extract the information from the imagery**
- Don't just tell me something is happening, tell me where the impacts are
  - **Predictive analysis – actionable information**
  - **Evaluate information with existing GIS data**
- What if I give you this information, will it help you with the image...
  - **Agriculture – if you know what the crop is it simplifies the math!**
- Don't just bring the image to the map, bring the map to the image

*I actually don't want to think about the image, just show me the geography*

# We need to communicate Story Maps – *produced in the thousands every day*

## Transit Corridors



Finland

## Social Conflict Events



Africa  
Tesla Government

## Climate Change



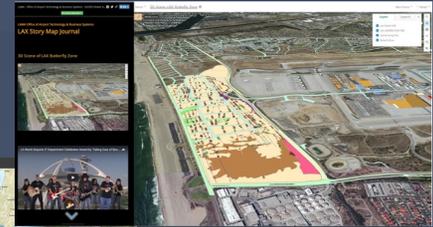
Global

## Archaeology



Ecuador

## Butterfly Zone



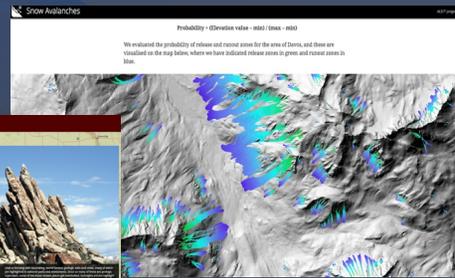
California  
Los Angeles World Airports

## Postcard Collection



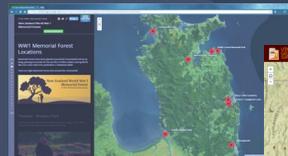
Japan

## Snow Avalanches



Switzerland

## Memorial Forest Locations



New Zealand  
Thames-Coromandel District Council

## Geological Sites



Utah Geological Survey

## Rail Stations



Italy  
Comune di Milano

## Inequality



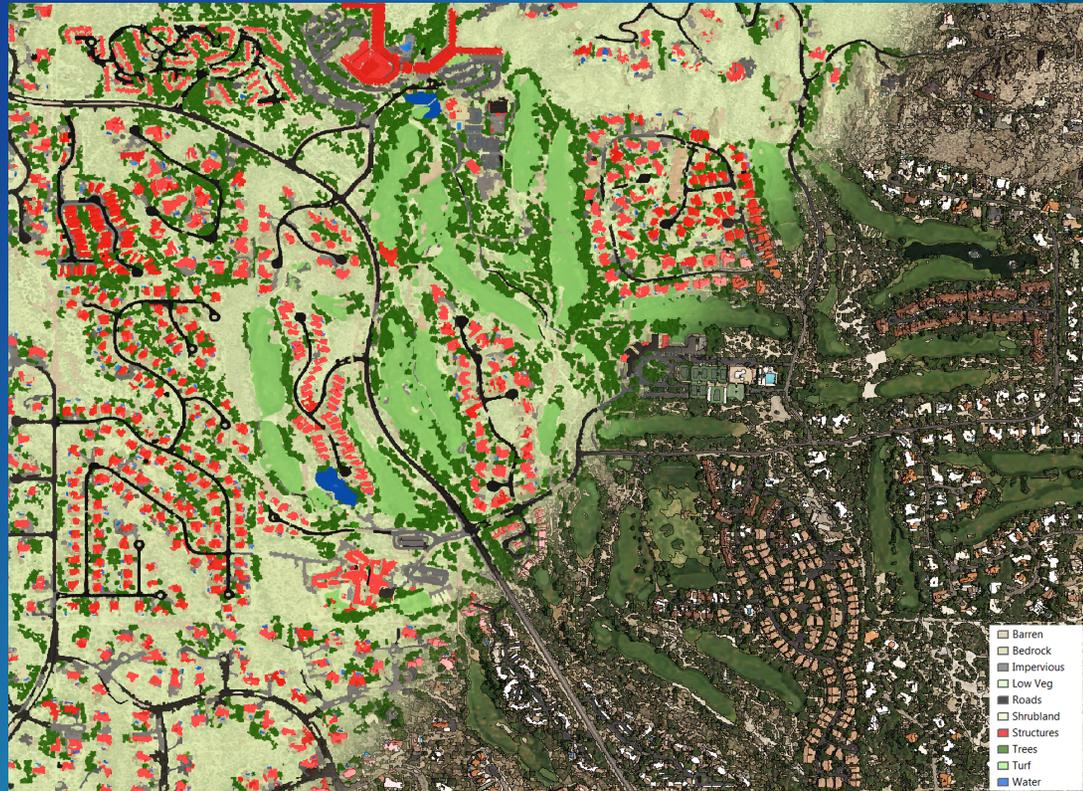
Virginia

*Building value begins by communicating stories effectively*

## Chesapeake Conservancy LULC

### Land Use/Land Cover Classification

- Image Segmentation
- Random Trees Classification
- Raster Analytic Scaling
- Identify riparian gaps
- 1m land cover is actionable
- You need data from multiple scales to be effective



*Medium resolution data can influence policy, but high resolution drives action*

# Remote Sensing Analysts Focus On

Remote sensing should be about image analysis, not technology

- Answering questions using imagery and other sources
- Making observations on the features in the image
- Sharing information for decision-making

What is the status of the environment?

What is changing?

Where is the Wildfire?

What is the current situation?



Providing the image analyst with a contextual, focused, and immersive, image centric experience

# Underlying Design Principles

## ArcGIS Imagery Information Model

- **Only process what you need, ...when you need it**
  - Operate on the original source imagery – no preprocessing
  - Request-Based processing
- **Intelligent use of the metadata**
  - Virtual Products (e.g. NDVI on-the-fly)
  - Mensuration
- **Optimize storage requirements**
  - reference the imagery files - don't move or make copies
  - derive many products from a single source and storage
- **Scale to massive collections of imagery and make them easily accessible**
  - manage imagery in the enterprise (Mosaic Datasets) – Cloud enabled
  - web-enable imagery (Image Services, ArcGIS Online, Portal for ArcGIS, caching tools,...)
  - Process with Raster Analytics – elastic processing for server and cloud



# ArcGIS | A Complete GIS Platform

A System for Managing and Applying Geographic Information

Services Based

Deployable On-Premises and in the Cloud

Distributed

Open

Available as SaaS

*Supporting Individuals, Teams, and Organizations*



# ArcGIS Content | A Fundamental Part of the Platform

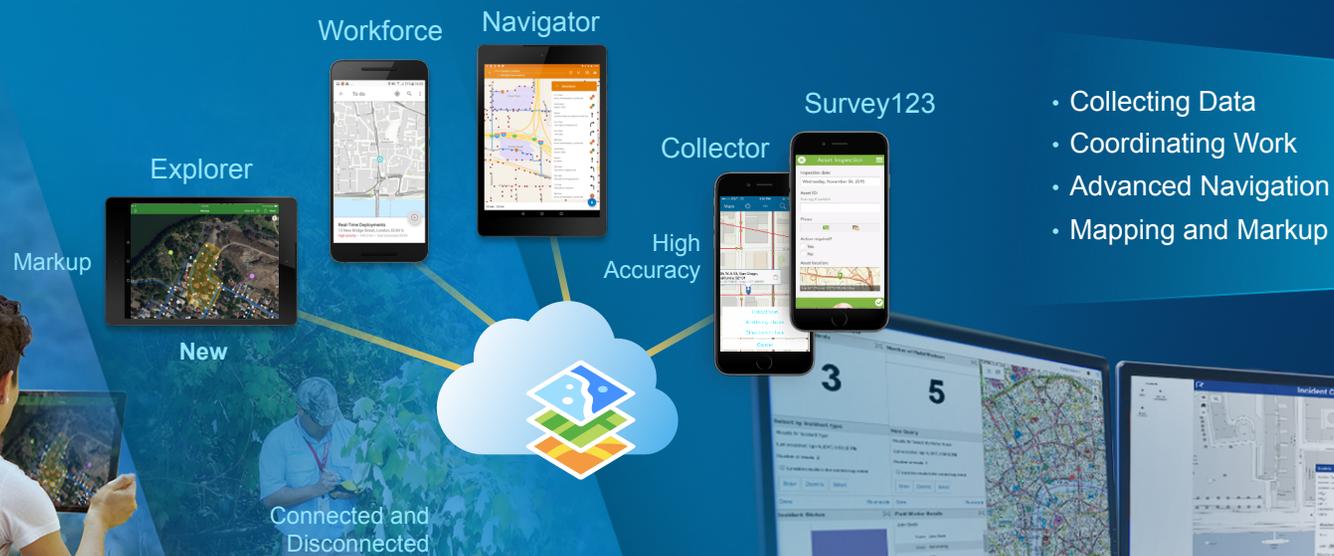
Thousands of Ready-to-Use Maps  
and Datasets from Esri

**Basemaps** **Soils**  
Agriculture Topo Maps Addressing  
Ecology Sentinel Earthquakes **Traffic** Rainfall  
Geology **Vegetation** Roads  
**Imagery** **Land Cover** **Scientific**  
Stream Gauges **Landsat** Species NAIP Planes Lifestyle  
Water MODIS Biology **Elevation** POIs  
**Demographics** Protected Areas  
**Hazards** Climate DigitalGlobe **Floodplains** Distribution  
Weather Historical Maps Landscape Oceans Stream Forecasts  
**Population** **Boundaries** OSM  
Sea Temperature Wildfires Railroads

Millions of Maps and Layers  
Shared by Users

*The Foremost Collection of Global Geographic Information . . .  
. . . A Living Atlas for the Planet*

# Field GIS | Taking ArcGIS Beyond the Office



- Collecting Data
- Coordinating Work
- Advanced Navigation
- Mapping and Markup

*Connecting the Field with the Enterprise*

## GIS Provides Benefits for the Image Analyst

- **Access to all the information**
  - Image services provide collections, not just an image
  - GIS context provide search reduction
- **Platform integration provides efficiency**
  - Cost effective workflows
  - Extensibility at the algorithm level leverages the entire system
- **Ability to both find an answer and assess its relevance**
  - Characterize the event by impact to humans, or infrastructure, etc

*Focus on the question, not the technology*

# Where is GIS and Imagery headed?

Understanding our world better

- **More timely imagery sources**
- **Better analysis**
  - Distributed computing
  - Deep learning for feature extraction
- **Integration with IoT**
- **Telling the stories more clearly**

*Higher impact, clearer value, faster analysis*

# Summary

Remotely sensed imagery has increasing relevance and value

- Imagery lets us see situations that reach beyond our human vision
- Imagery applications save lives and save money
- The Esri community has taught us many lessons
  - Better ways to exploit these imagery resources
  - Connect the analysis with to the impacts
  - Communicate the value
- Shape a better future from choices we make with information that imagery provides.



esri

THE  
SCIENCE  
OF  
WHERE