Aerial Imagery – types, uses, and practical applications in GIS

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Presentation Goals:

• Introduction
• Discussion about current imagery uses and needs
• Overview of Imagery (satellite, aerial photography- Nadir/Oblique, terrestrial, Raster (elevation, Elevation Data,)
• Discuss **Indianapolis/Marion County** enterprise GIS imagery and other agency imagery needs and uses, how elevation data affects imagery accuracy
• Emerging trends affecting business as usual
Introduction

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What are your current imagery uses and needs?
Imagery Overview

• Satellite
• Aerial Photography (Planes, Helicopters, UAVs (fixed wing, quadcopter))
• Terrestrial/Mobile, land based
Satellite Imagery
Satellite Imagery Market

Harris Geospatial Marketplace
WOLDVIEW4_30cm
As shown in our *WorldView-3 slide examples*, customers can more easily determine the type of vehicle (cars, trucks, sedans, mini vans) and its speed and direction, which is valuable for a range of industry vertical customers. With 30 cm super-spectral imagery, quantitative assessments of the state of highway networks — including surface wear — can provide valuable maintenance planning information to national, state, and local governments.
Google Maps Satellite Imagery – “Landsat/Copernicus, Map data c2017...”
Satellite Imagery or Aerial?

Google Maps Aerial Imagery – “Imagery c2017 Google, Map data c2017...”
Satellite Imagery or Aerial?

Google Maps Aerial Imagery – “Imagery c2017 Google, Map data c2017 Google, Indiana University....”
IMAGERY

Traditional- Rolls of Film in a 9”x9” negative format, Vertical or Obliques, B&W or RGB or IR

Today- Digital “frame” or “push broom”, Vertical or Oblique, Vertical and Oblique, PAN, RGB, NIR, IR, Hyperspectral, from airplanes, helicopters, UAVs, the sky’s (or sensor) the limit.....
Figure 1: Development history of aerial cameras; from a handheld camera to complex system solutions.
Multi Sensor Camera System
UAV/UAS System
UAV/UAS System
Aerial Photography before Digital Acquisition
The ‘90s version of digital imagery
Todays Digital Solution - no darkroom or film/scanning
Aerial Imagery Examples
Indy GIS 2015 RGB with NIR
Indy GIS 2015 Normalized Difference Vegetation Index (NDVI) utilizing the NIR band
Oblique Imagery – Pictometry in ArcMap
RebuildIndy, Site Inventory, Zoning, MAPs Public Safety, Election Results, Stormwater Impervious Surface

MapIndy
http://maps.indy.gov/MapIndy/index.html
MapIndy with Oblique inset

http://maps.indy.gov/MapIndy/index.html
DPW Stormwater Impervious Area Application with 2017 Standard Delivery
MapIndy Application same area 2016 ortho
UAV Imagery 5 cm GSD
UAV Imagery 5 cm GSD in ArcMap enviroment
UAV Imagery DSM from correlated RGB
Nearmap Example

Google Earth, ~12-inch (Outdated, low quality)

Nearmap PhotoMaps™, 2.8-inch (Mar. 5, 2017)

Image quality obscured

Sharp, ultra-clear images showing features, detail

You can’t quote what you can’t see

Imagery Comparison – Vienna, VA
Nearmap Example
Clear – high resolution provides sharp detail
Austin, TX – Construction Detail
2017 Pictometry 3” Standard Delivery
2016 Pictometry 3” Accuplus Delivery
2016 12” State Ortho- Push Broom
2015 Orthophoto 6” - Push Broom Camera
2015 Orthophoto 6” - Push Broom Camera
2016 Pictometry Accuplus 3”
2016 Pictometry 3” Accuplus Delivery
2017 Pictometry Standard Delivery 3”
2016 24” Raster (DSM)
Terrestrial/Mobile
Structure Detail

Terrestrial Stereo Pair
Street Views

Google Maps Street View
Example of Uses in GIS
Planimetric Layers Update
Data Reconciliation
Data Reconciliation DSM from LiDAR
Data Reconciliation 3” Accuplus
Indy GIS Imagery Initiatives 2017/2018

- Aerial Orthophotograph – 3” Color Standard Del.
- Aerial Orthophotography – 3” Color and NIR Accuplus
- Oblique Aerial Photography - N,S,E,W, Nadir Views
- Nearmap (DPW)
- Planimetric Updates – new and updated features from the new photography
Considerations

- Surface accuracy
- Resolution
- Radial Displacement (Building Lean)
- Ground Conditions
- Timeliness of delivery
- Control
- Specifications
Emerging Trends

Emerging trends may (and probably will) affect business as usual!

• Higher resolutions! 2”, 1” coming so get ready
• Cloud computing, storage, delivery, processing
• Emerging camera (higher altitude collection) and processing (image matching algorithms) technologies
• Convergence of imaging technologies (Satellite, Planes, UAVs, Terrestrial/Mobil, Social Media, Security Cameras?)
• Need for more imagery, more often, at higher resolution, quality, and spectral abilities.
STOP

• Questions?