Going Beyond the Base Map

Understanding Elements of Remote Sensing

Importance of Mapping Standards

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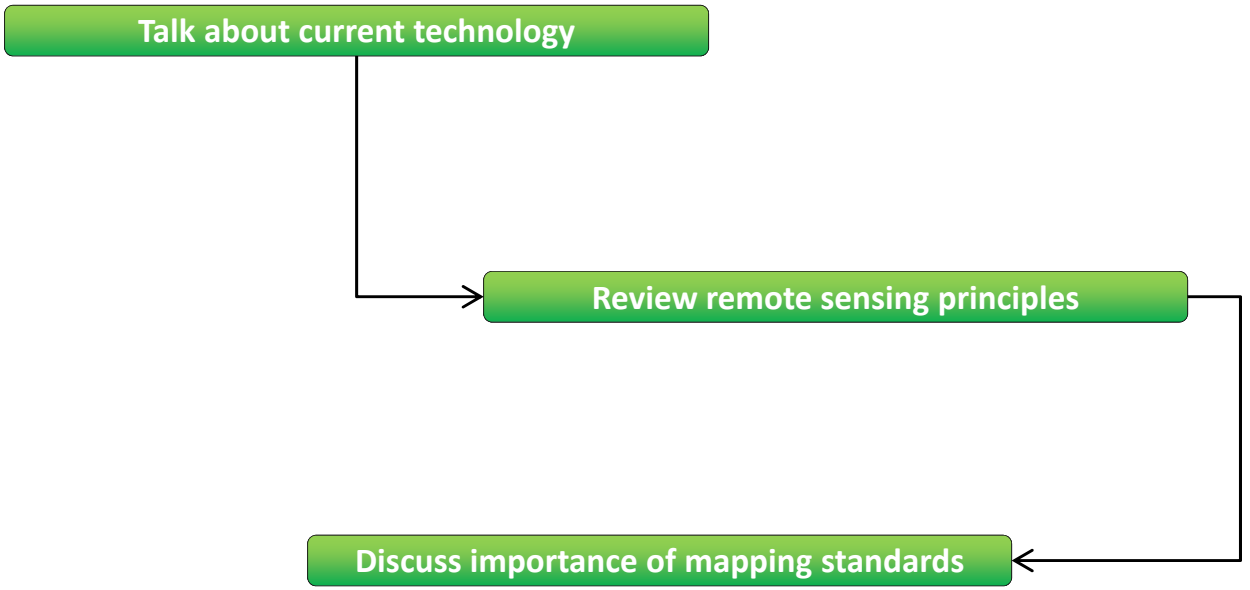
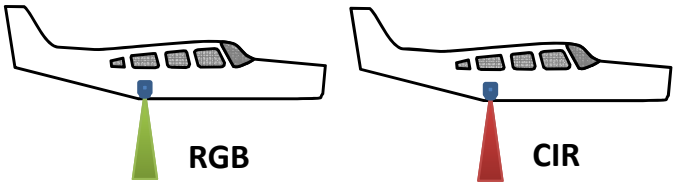
Talking Points



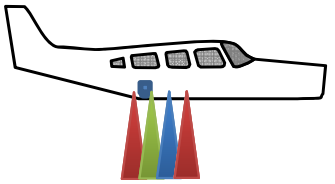
Technology Trends

In the Past: Two flights for two products

Film Cameras



Digital Cameras



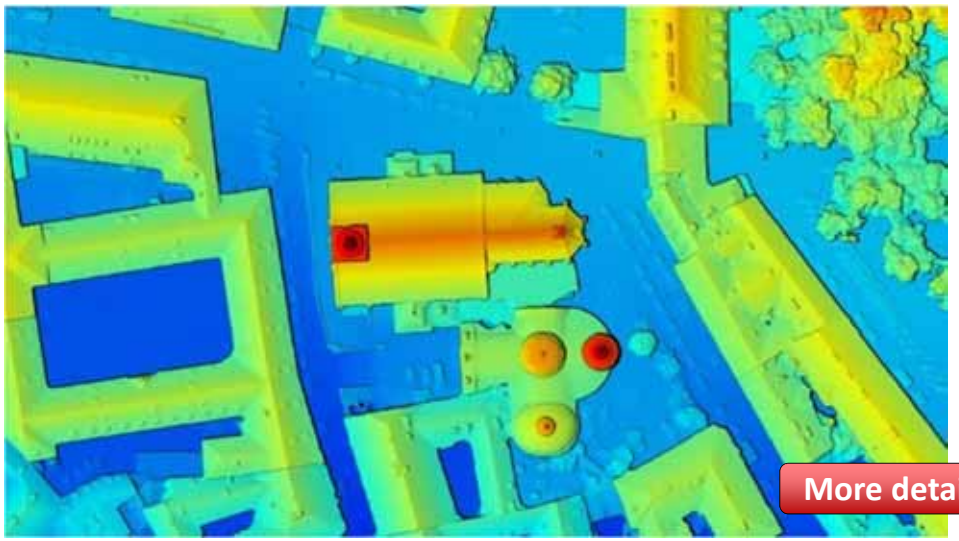
Enables one flight for RGBN

Technology Trends

Moving into era of higher spatial resolution

- 5-cm engineering design
- 3-inch high value mapping
- 6-inch urban
- 1-foot rural

Higher image overlap



- Ultra dense surface models
- Less building lean

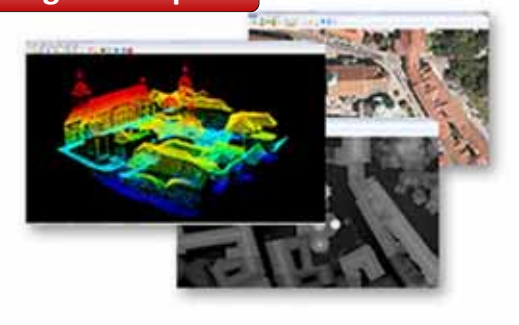
More detail than LiDAR

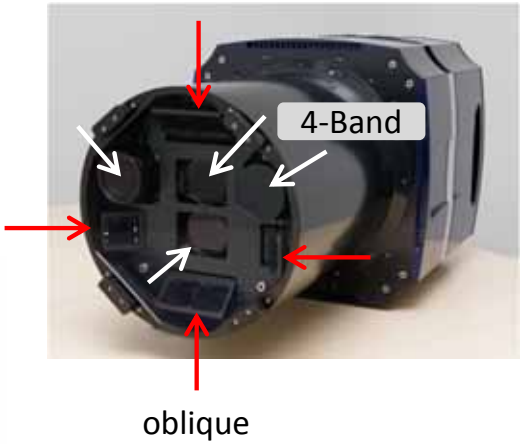
Technology Trends

Sensor Fusion

- Color + LiDAR
- 4-band + Thermal
- LiDAR + Color, Thermal, Oblique
- Thermal + Hyperspectral

3D Modeling & Obliques





Types of Image Resolution

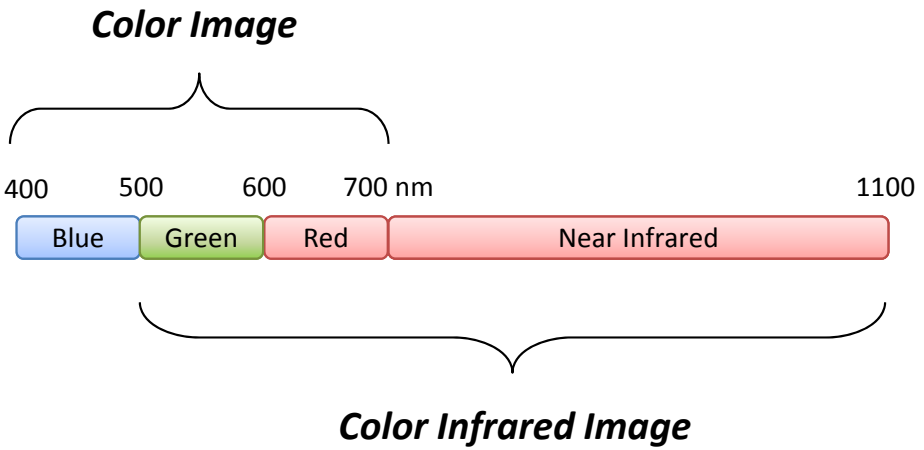
Spatial	Pixel Size	*3-inch, 6-inch, 1-meter*
Spectral	“Bands”	*blue, green, red, NIR, thermal*
Radiometric	Shades of Gray	*8-bit, 12-bit*
Temporal	Image Frequency	*monthly, annually, every few years*

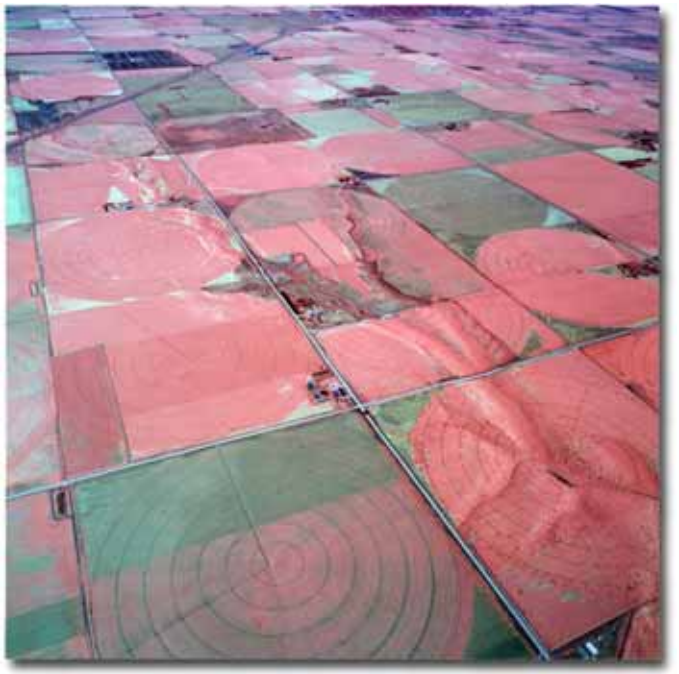
Types of Data Accuracy

In context of remote sensing

Accuracy	Lines up in the right area, but not with good repeatability
Precision	Seamless, but with a horizontal-vertical bias
Consistency	Uniform accuracy and precision throughout dataset

What is Infrared Aerial Photography?

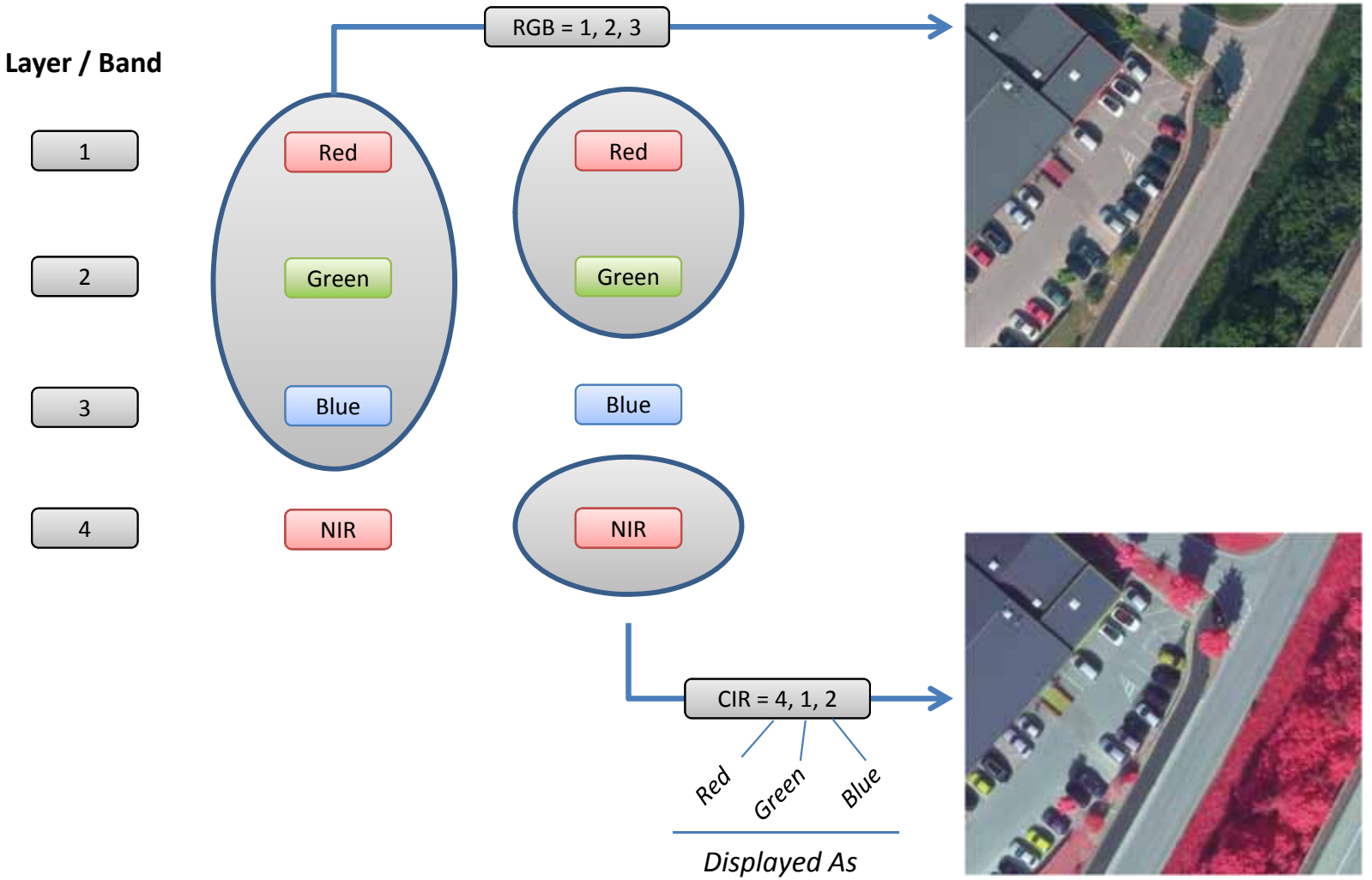




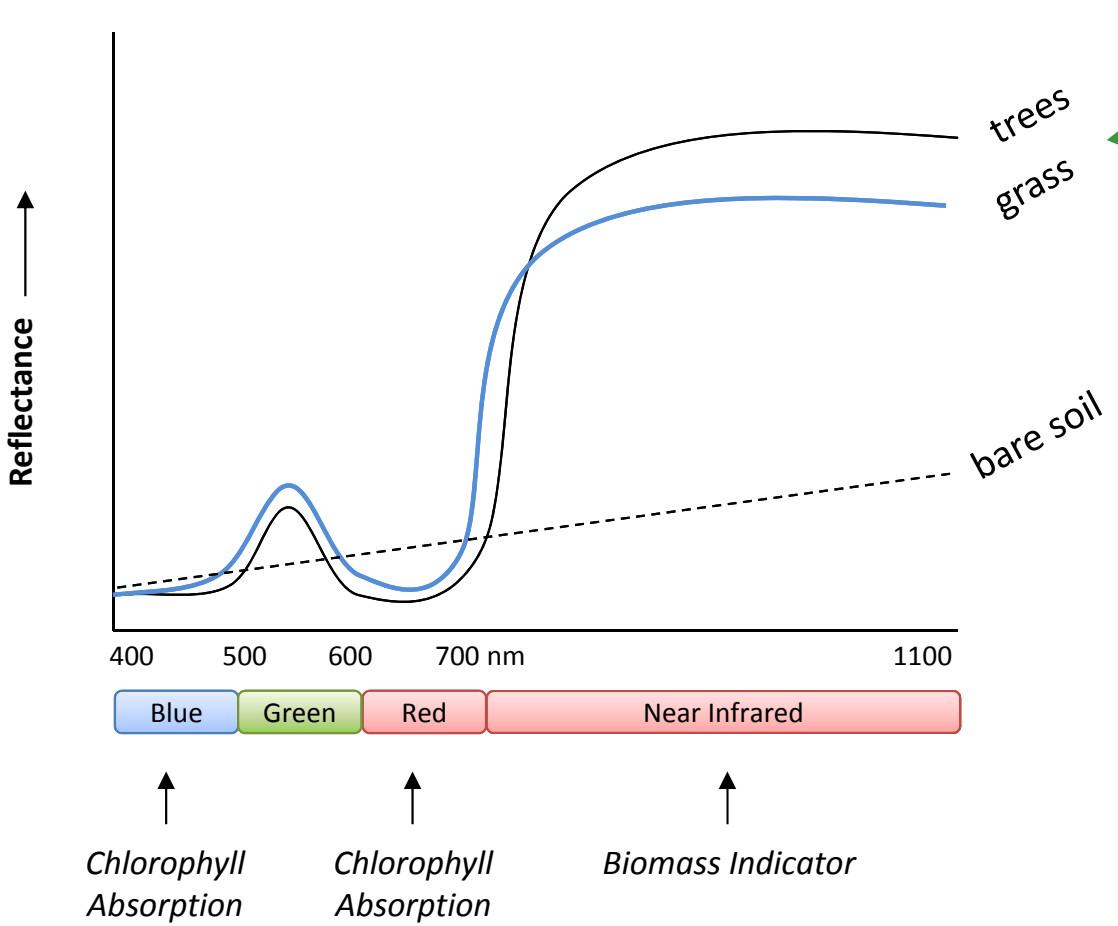
Infrared Imagery is

<u>RED</u> in color

Band Combinations



Features of Near-Infrared



Plant Tissue Structure

Affects the NIR reflectance
Thus creating a "signature"

Near-Infrared Detects Vegetation

Color

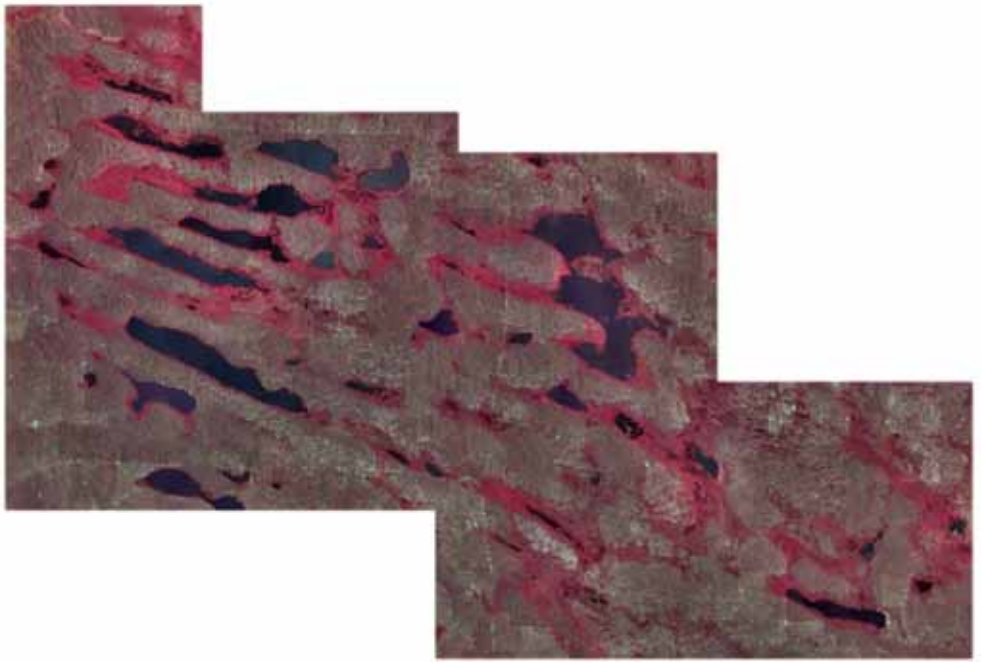
Synthetic Turf
"looks real"

Color-Infrared (CIR)

Living Vegetation = Red

Applications for CIR

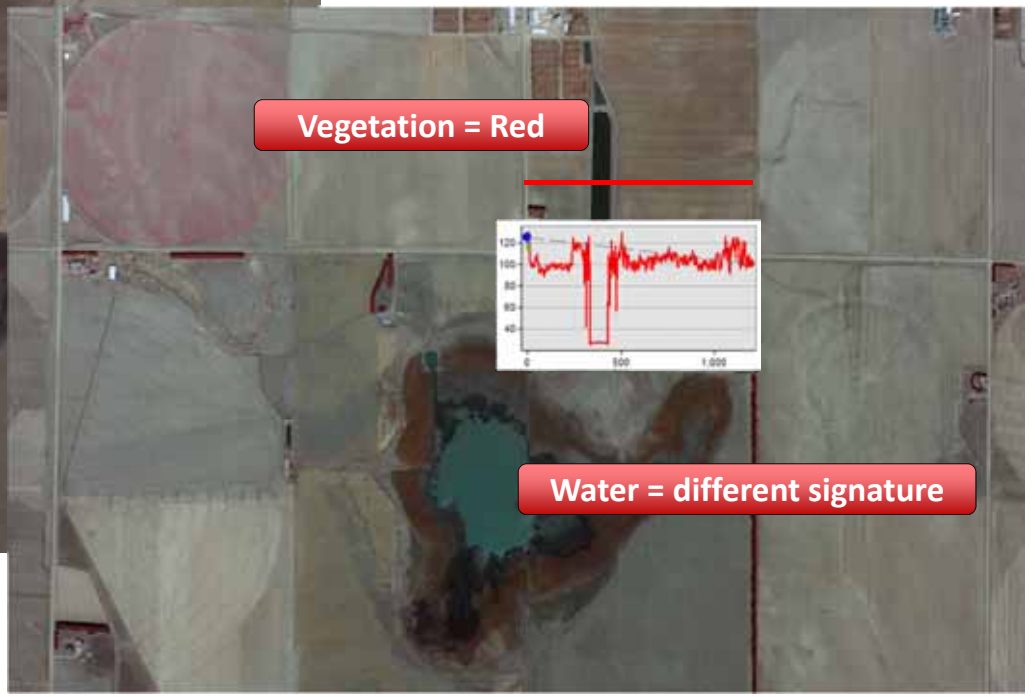
- Impervious Surface Area
- Land Cover – Land Use
- Wetland Delineation
- Crop Analyses *(precision agriculture)*
- Invasive Species *(river management)*



Color & CIR

Wetland Mapping

Color



CIR

Camera Sensitivity

End Product

Most people use 8-bit imagery

2^8 = 256 values (0-255 DN)

Data Acquisition

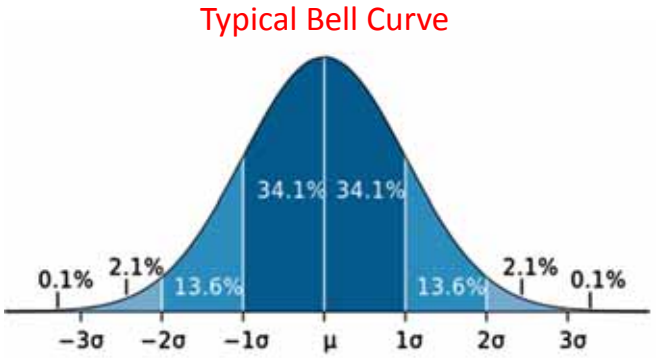
Quality sensors acquire data at 12-bits or higher

2^{12} = 4096 values (0-4095 DN)

It is common to optimize 12-bit data for 8-bit output

- Enhance detail in shadows
- Reduce effects of haze
- Atmospheric corrections

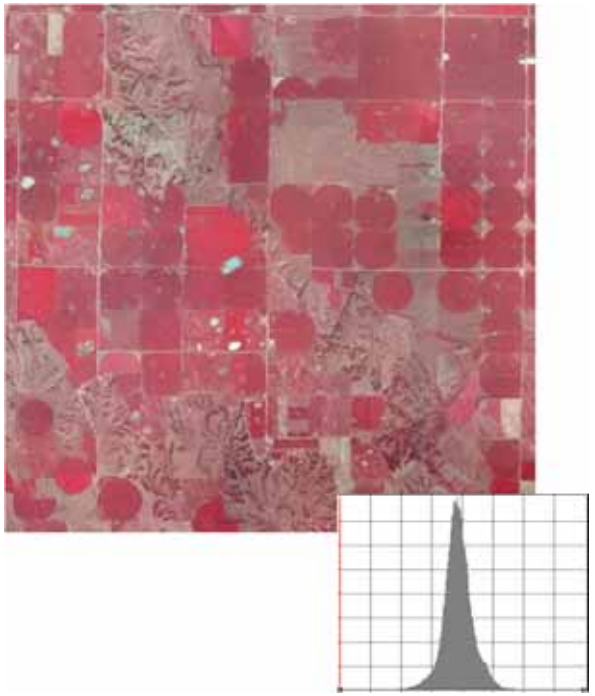
Histogram Assessment



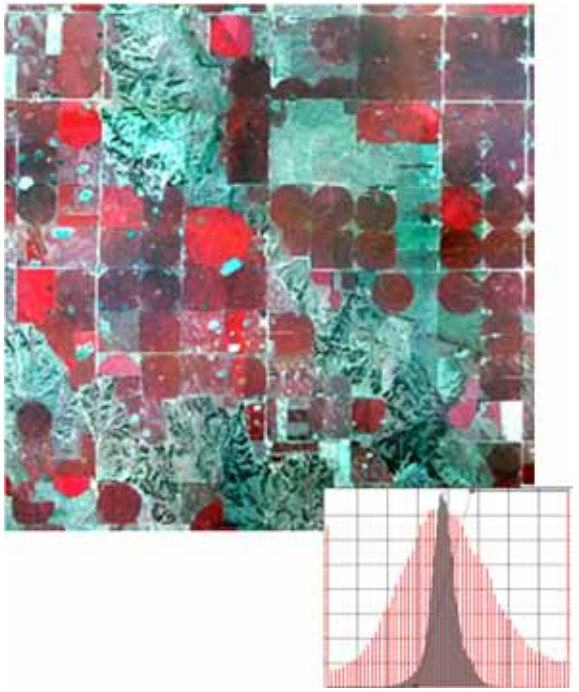
NIR | Red | Green

Histogram Stretching

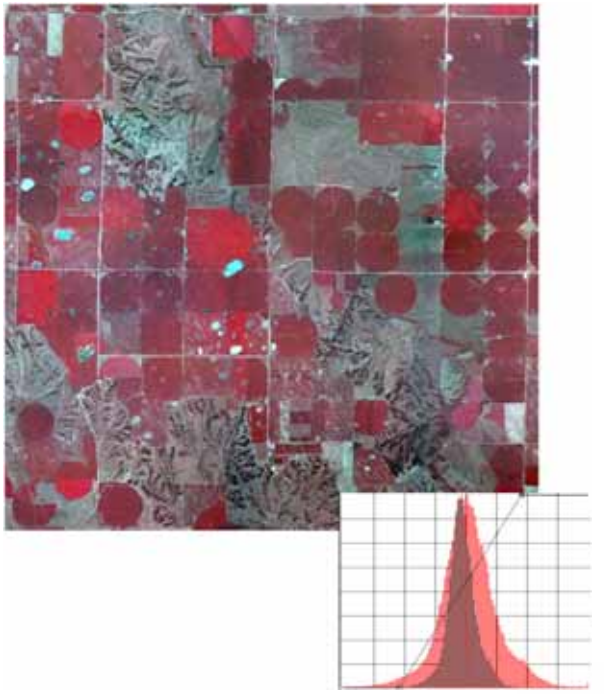
Original



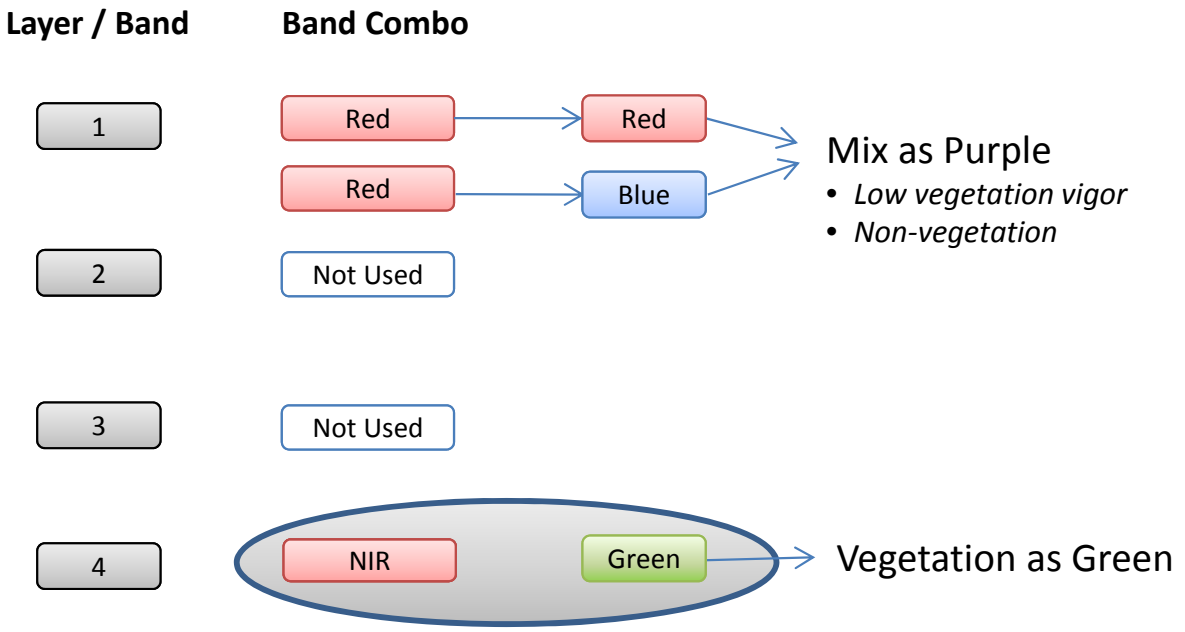
Standard Deviation Stretch

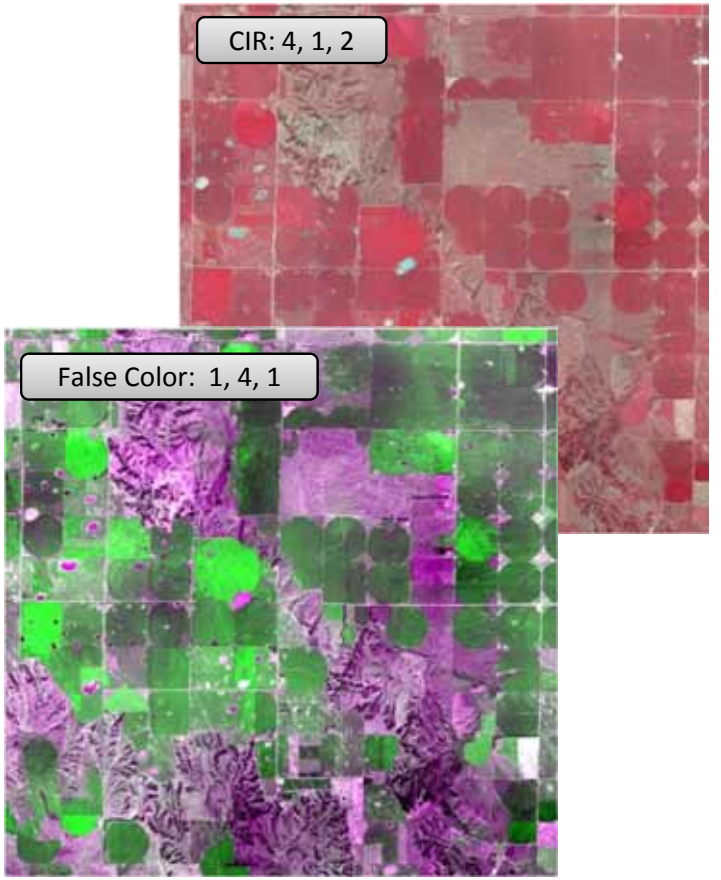


Min-Max Stretch



Band Combinations



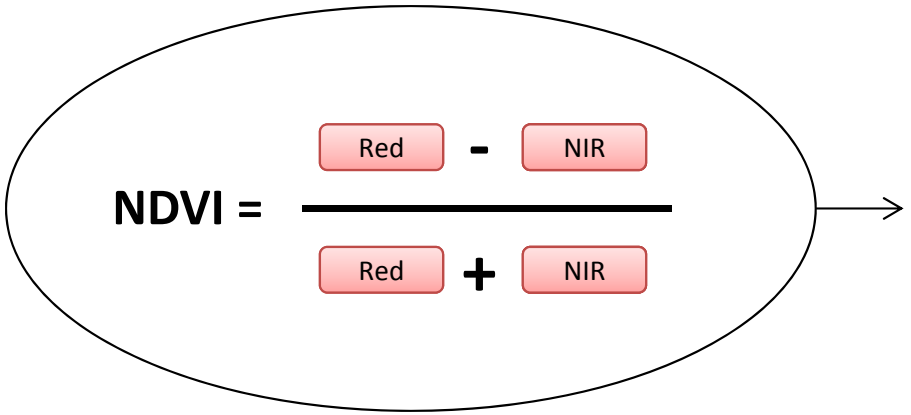


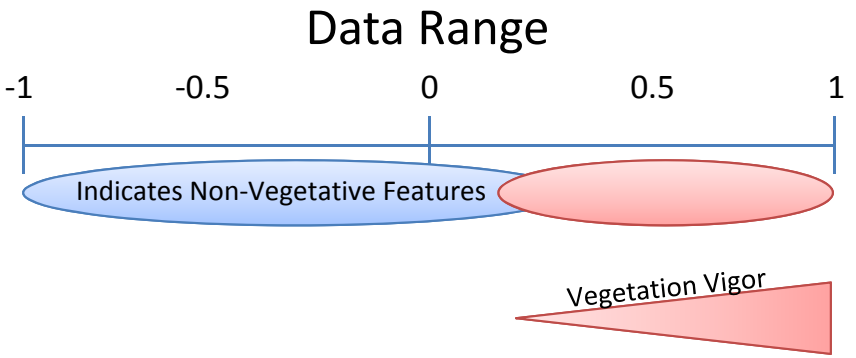
For Display Purposes Only

- Does not affect pixel values -

Band Ratios

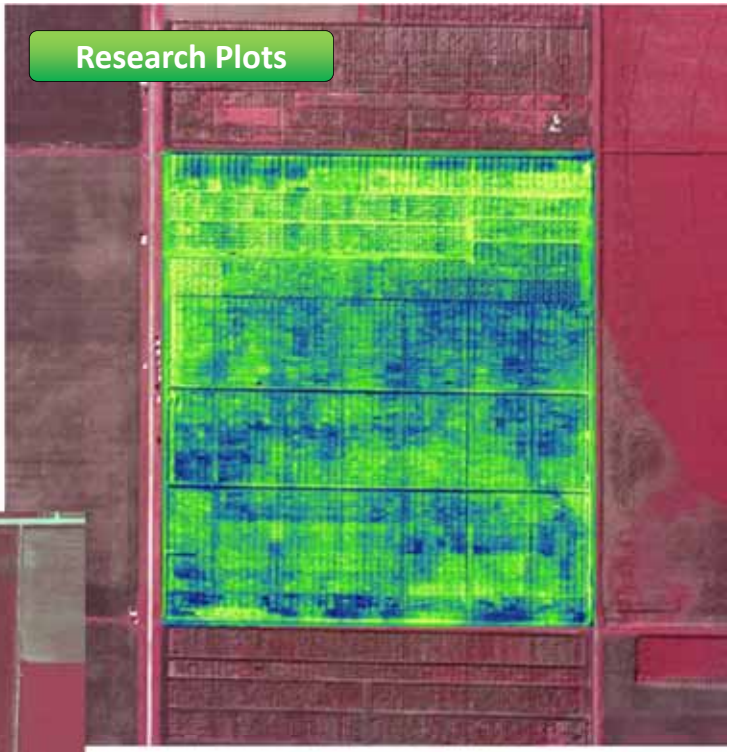
NDVI – Normalized Difference Vegetation Index

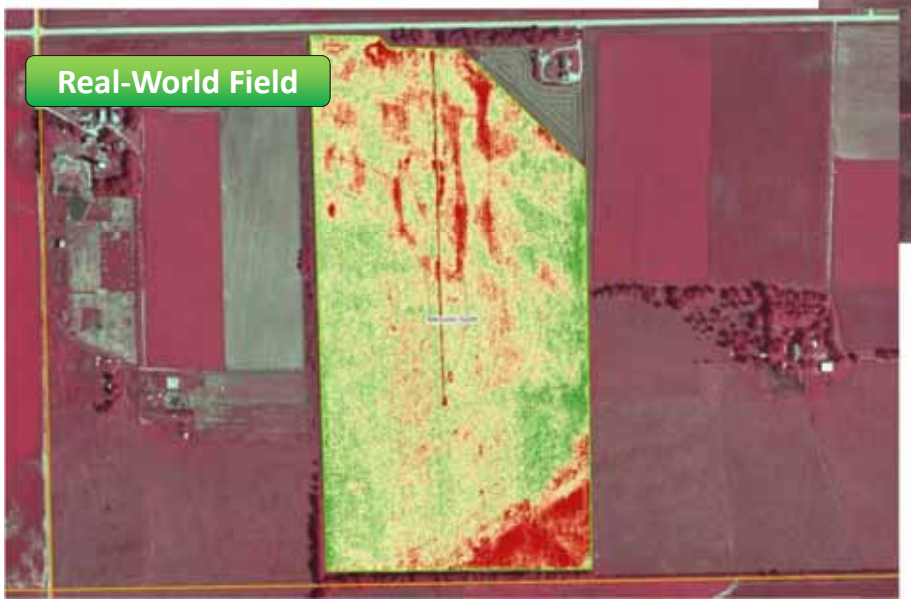




NDVI

Enhance crop vigor differences within a crop





Mapping Standards

Why they are so Important !

Business Economics

"It's unwise to pay too much, but it's worse to pay too little.

When you pay too much, you lose a little money - that's all.

When you pay too little, you sometimes lose everything…"

- John Ruskin

Accuracy = Higher Cost

If project pricing is all over the board

Look at the mapping accuracy being delivered

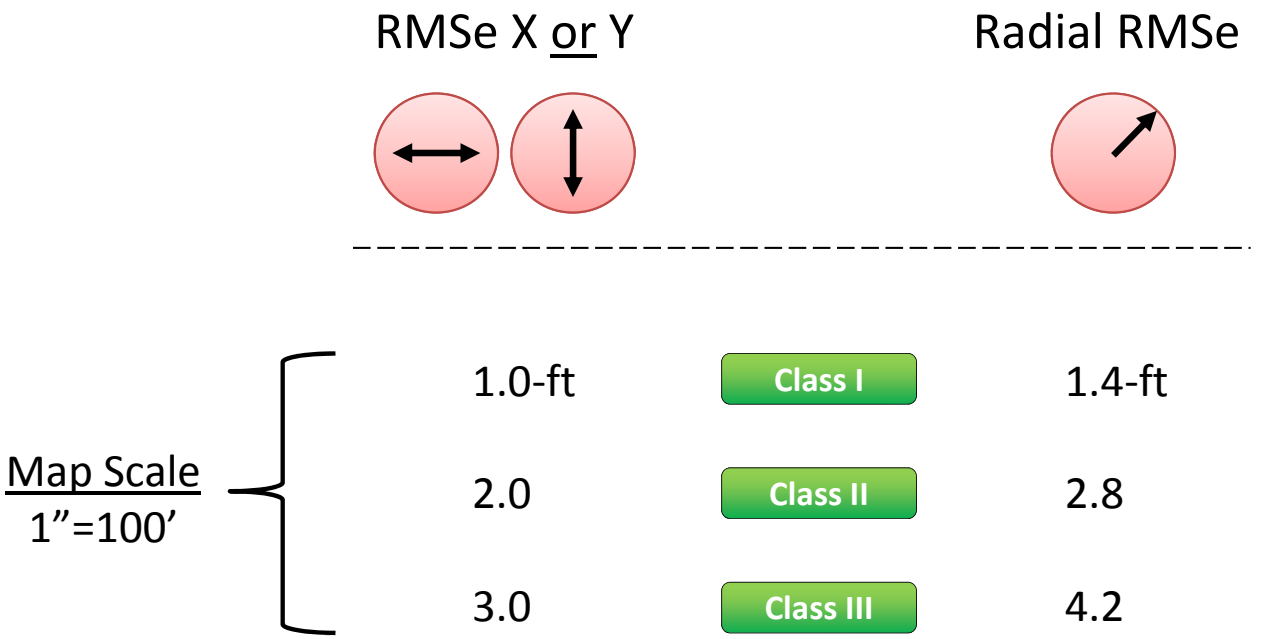
Unusually low cost often translates into below mapping standards

Understanding Accuracy Standards

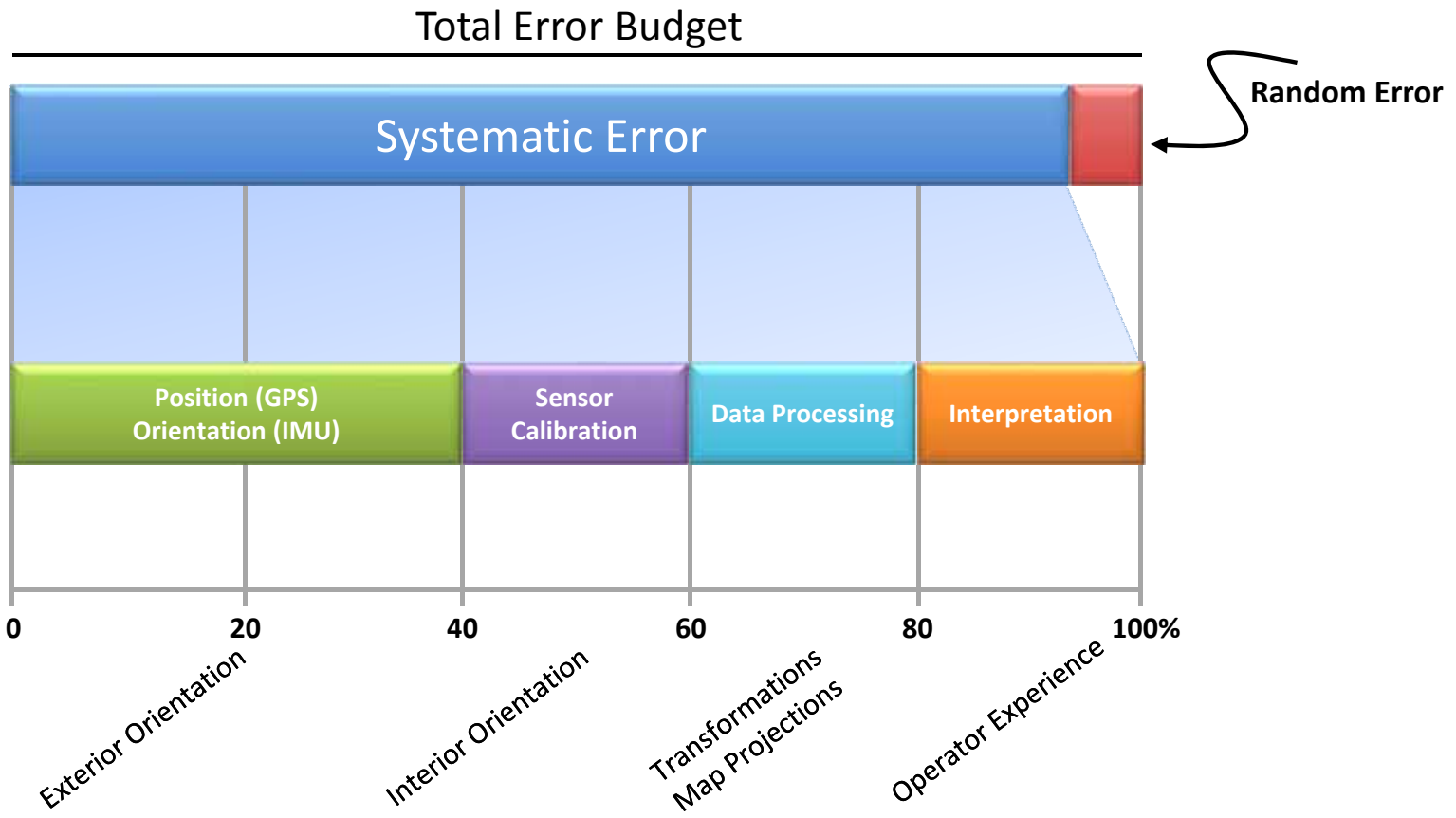
NMAS	Era of hard copy, fixed-scale mapping
ASPRS	Adapted NMAS to account for the dynamic scaling of digital data
NSSDA	Scale-independent statistical measure

Understanding Accuracy Standards

ASPRS *for 6-inch GSD orthophotography*



Controlling Error



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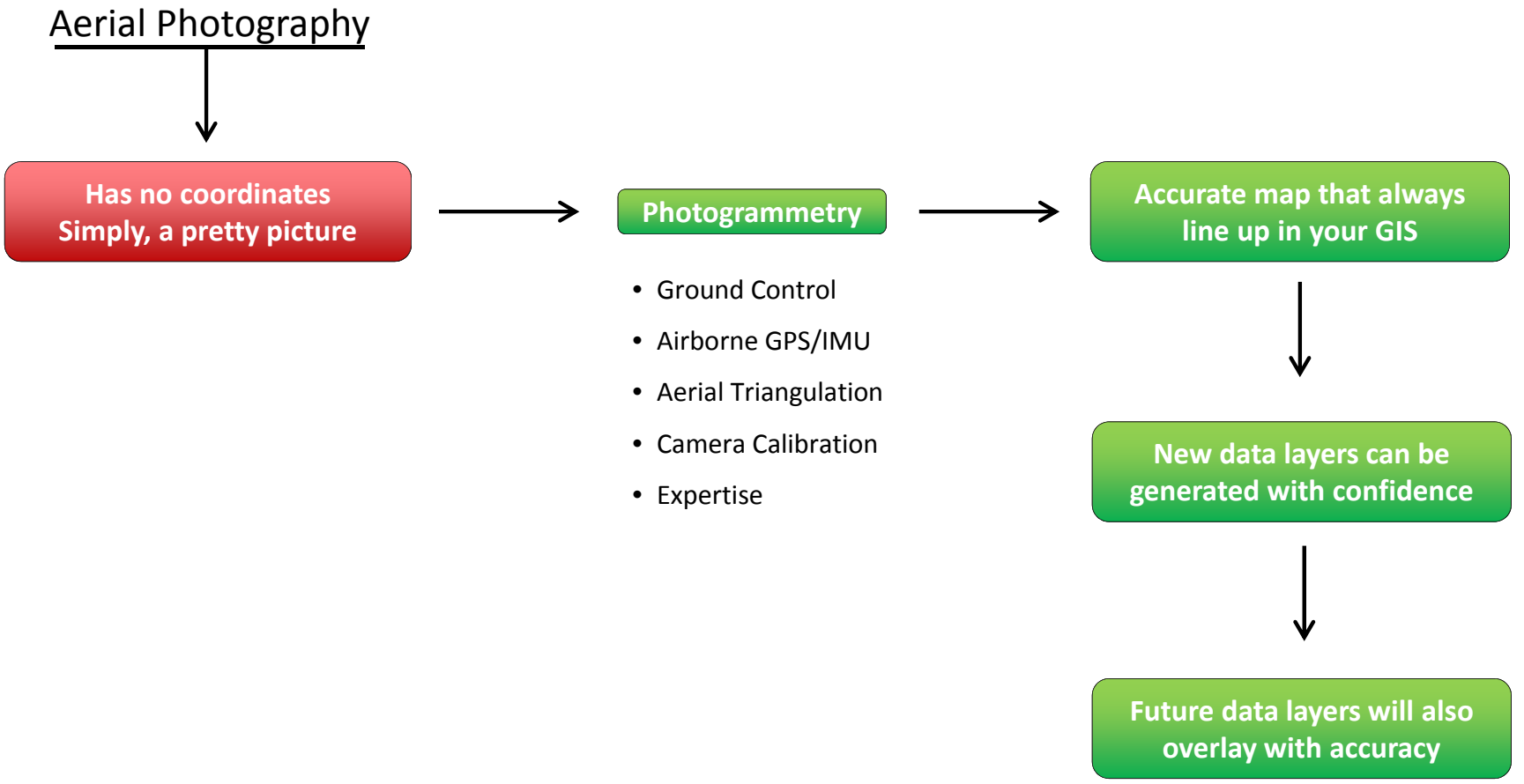


Data Accuracy

Data fusion will only be successful if the spatial accuracy is consistent

Avoid having to say . . .

- Wish it was better
- Its always been that way

The “low cost approach” can cost more in the long run

Real Cost of Lower Quality Data

What are down stream costs of poor accuracy ?

- Re-do a project from scratch?
- Extensive editing to cleanup data?
- Poor classification results?

Quality of your base map (and other layers) will directly affect your GIS applications

How to procure imagery

Don't *"copy & paste"* requirements from another proposal

- *Take the time to understand your needs*
- *Pretty picture vs. accuracy*

Identify your needs

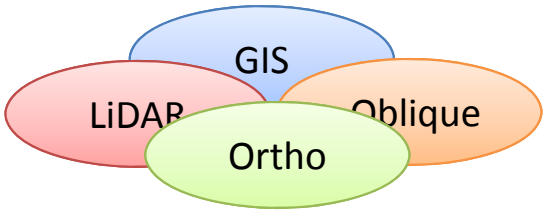
Determine your budget

Gather information from vendors

Bundling Services

Bundling Services can be Counter Productive

Often a Better Value to use Multiple Vendors



- *Adds a middle-man for communications*
- *Sometimes more overhead and project cost*
- *Get to choose best vendor per deliverable*

Review Sample Products

Request Samples

Evaluate the Imagery

- Highlights / Shadows
- Color / Tone Balance
- Undesirable Characteristics

Multispectral Technology has Numerous Applications

Don't Forget about Mapping Standards!

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