AUT 2015

I put a Laser on an AUV! Now How Do I Use the Data?

Overview

Overview
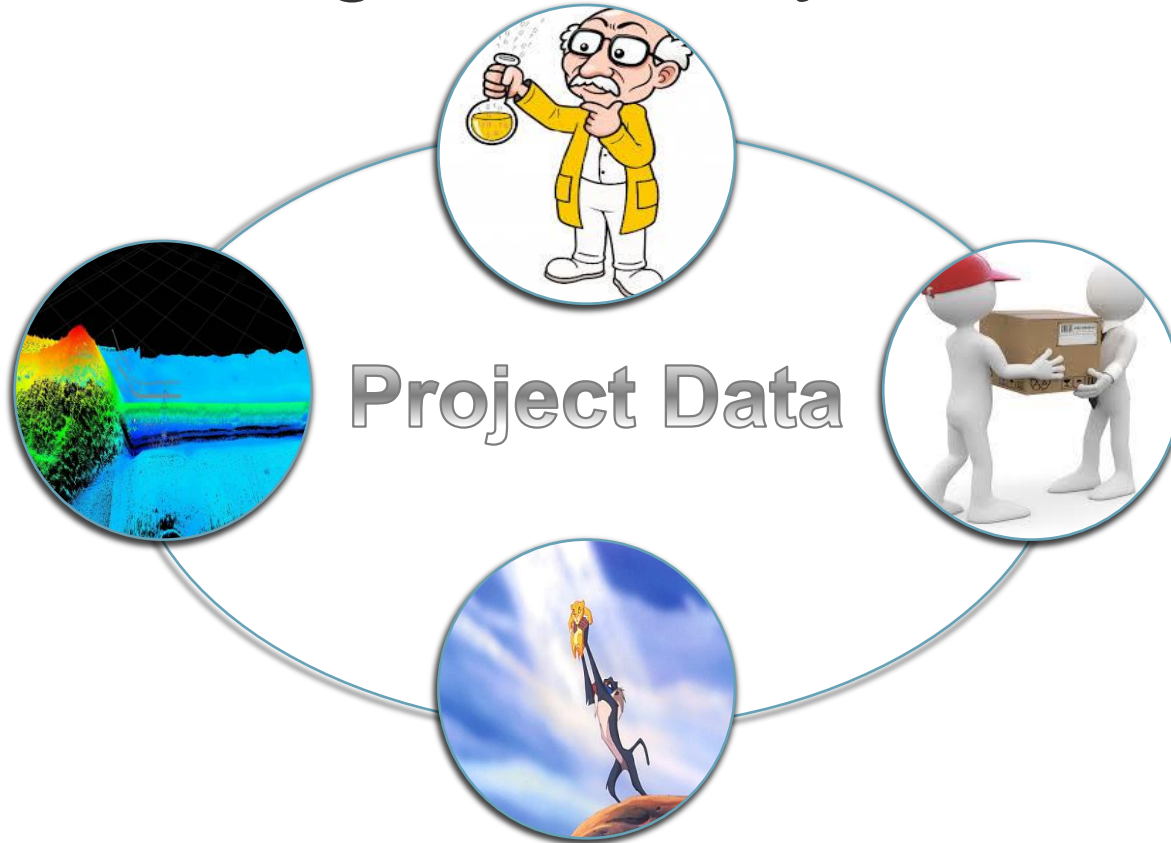
- Data Lifecycle

- Dealing with Data

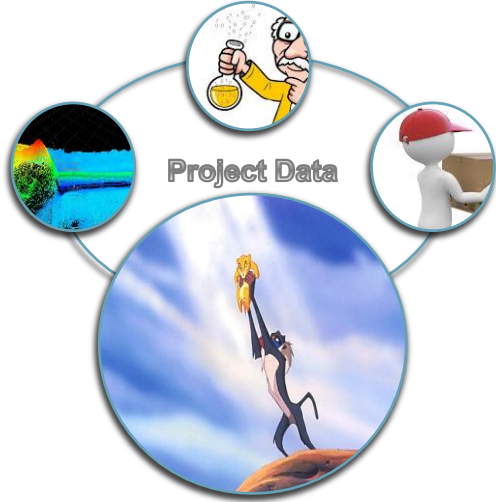- Wrap Up

Data Lifecycle
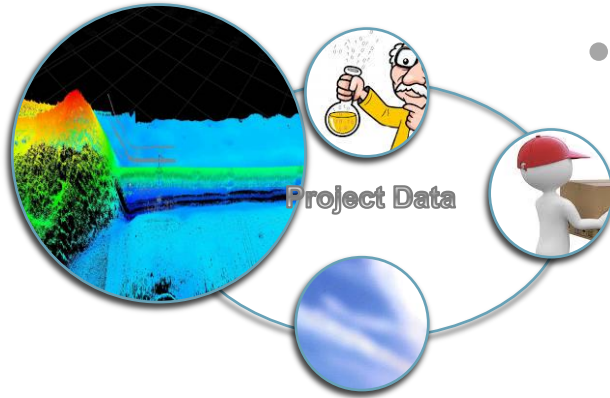
Understanding the Lifecycle of Data

Project Data

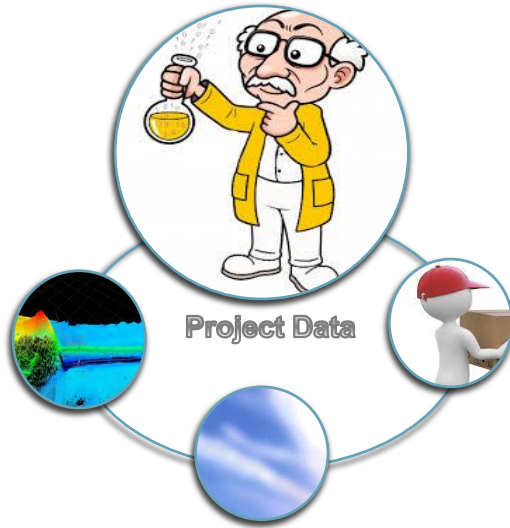# Understanding the Lifecycle of Data

Project Data

- ## Data Genesis Considerations
  - Technical Requirements of Platform
  - Storage Available on Platform
  - Sensor Data Format
  - Old Hat!

Understanding the Lifecycle of Data

- **Data Processing Considerations**
  - Process For Cleaning
    - Storage Space
    - Adequate Software Tools
    - Efficient Workflow
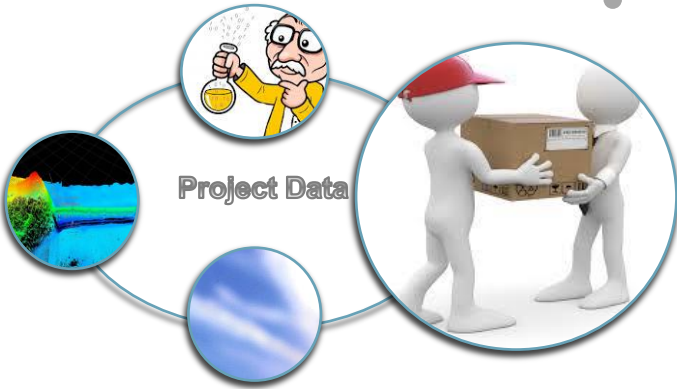 - Data Dependencies

Understanding the Lifecycle of Data

Project Data

- Interpretation Considerations

  - Extraction of Information From Data

  - Adequate Software

  - Adequate Storage Space

  - Tools for Export and Analysis

Understanding the Lifecycle of Data

- Data Delivery Considerations
  - Industry Standard Formats
  - Manageable Size
  - Data Product Friendly
  - Shelf vs. Digital Life

Data Lifecycle Shortfalls

- It's Easy to Bolt Things to an AUV Now!

- Data Processing Packages Are Robust

- *Interpretation and Data Delivery Need Innovation*

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Dealing With Data

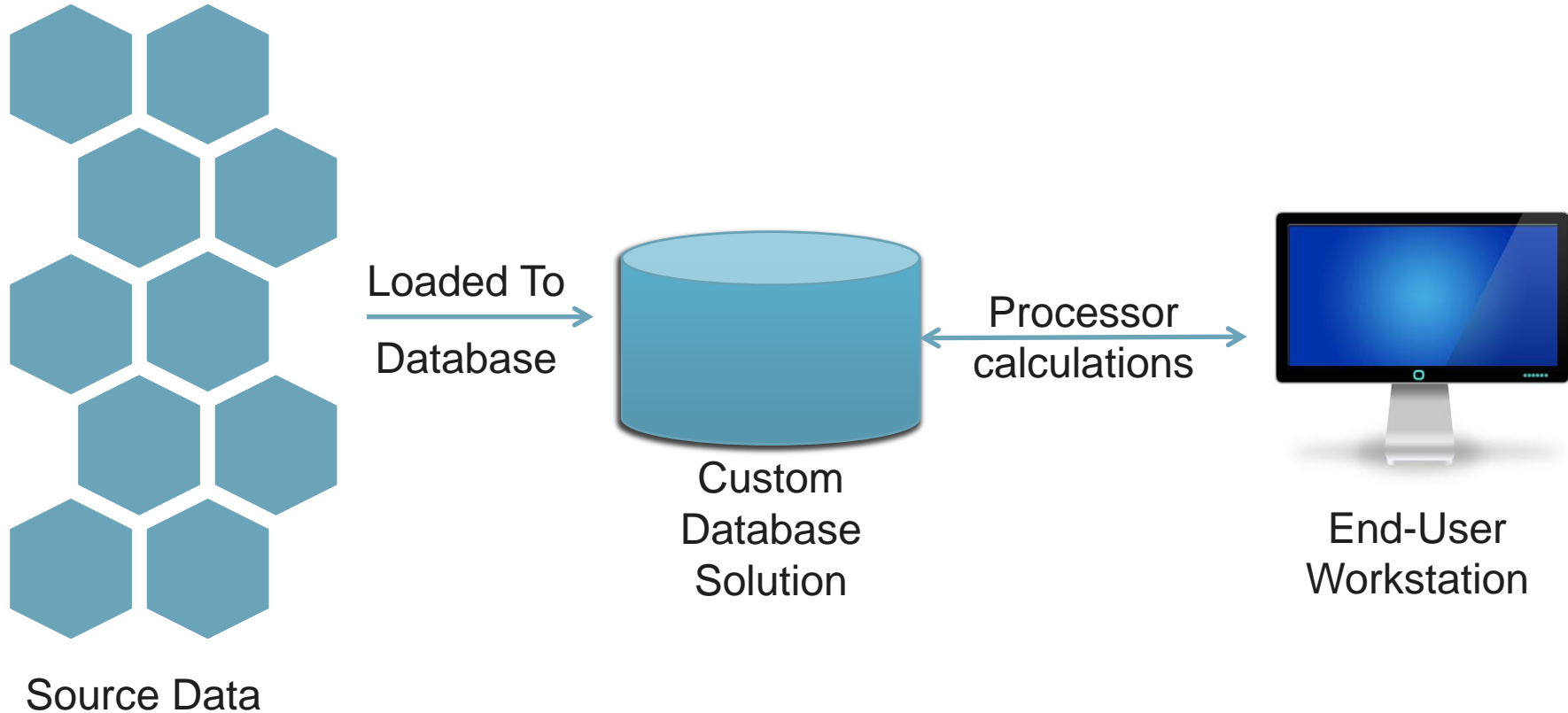# Case Study: Cathx Laser Photogrammetry System

- Generates High Resolution Photmosaics & Laser 'Microbathymetry' at 1mm resolution

- Data volume of > 20GB on 300km pipeline route and 300m corridor

- How do we interpret it?
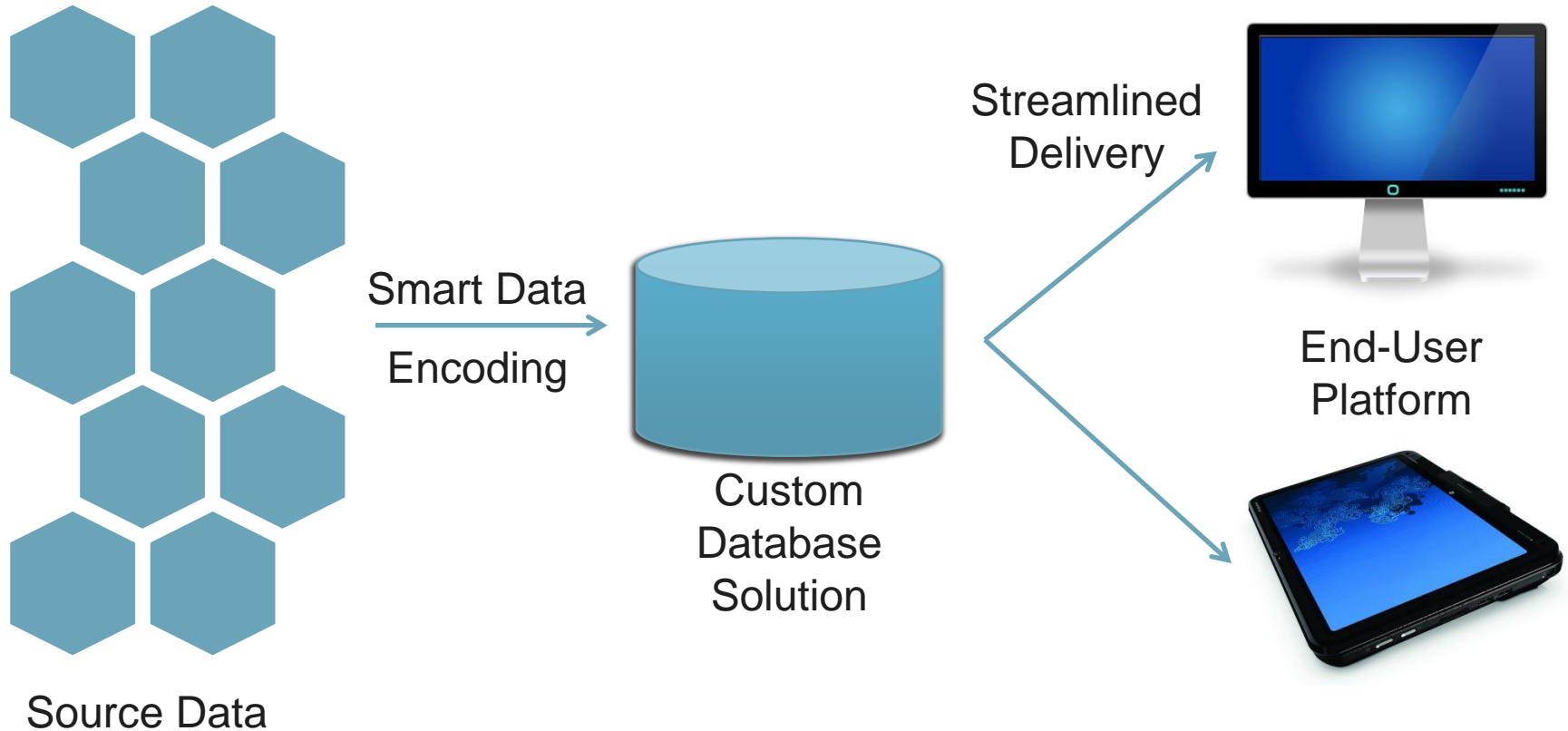
- How do we deliver it?

Management of Enormous Datasets

- De-Couple Hardware and Software

- Increase Flexibility & Accessibility

- Concentrate on Flow of Information

- Machine Independent 32bit Raster Storage and Delivery

- Workstations No Longer Required!

Old Workflow

Loaded To
Database

Processor
calculations

Custom
Database
Solution

End-User
Workstation

Source Data

New Workflow

Smart Data Encoding

Custom Database Solution

Streamlined Delivery

End-User Platform

Source Data

Real World Testing

Test: High Resolution Sat Imagery along a 11,294km Pipeline & Floating Point Bathy in GoM
- 11,891 Loaded GeoTIFFs
- 0.3m – 1m resolution
- 254GB Disk Space

Proxy: AUV Pipeline Inspection
- 55,000km @ 25cm Resolution (Downsampled, Legacy Data)
- 300km @ 0.5cm Resolution (New Process)

Delivery Platform: Custom WMS
- Standard Data Processing Computer
- Data Streamed via Custom, Local WMS (*Web Map Service*) instance from 2TB External Drive
  •Connected via standard USB (Not USB3.0)
  •Loaded as ArcGIS WMS Layer

Legend
- ☆ National and Provincial Capitals
- ○ Other Major Cities
- — Demonstration Pipeline

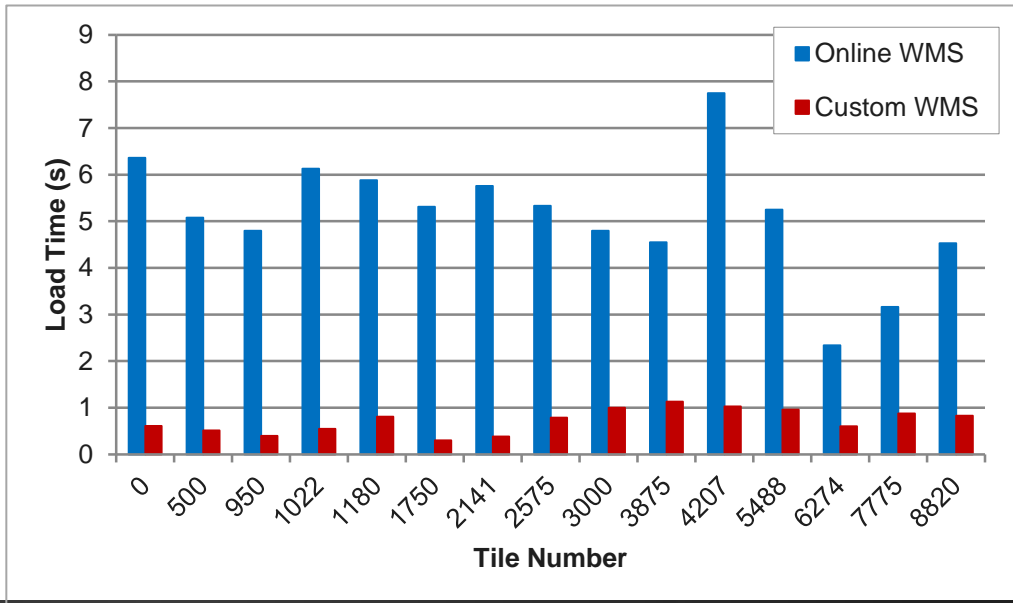0 250 500 1,000 1,500 2,000
Kilometers

Methodology & Results

Load Complete Dataset to Workspace
- Modeled Task: Project Loading To Begin Work
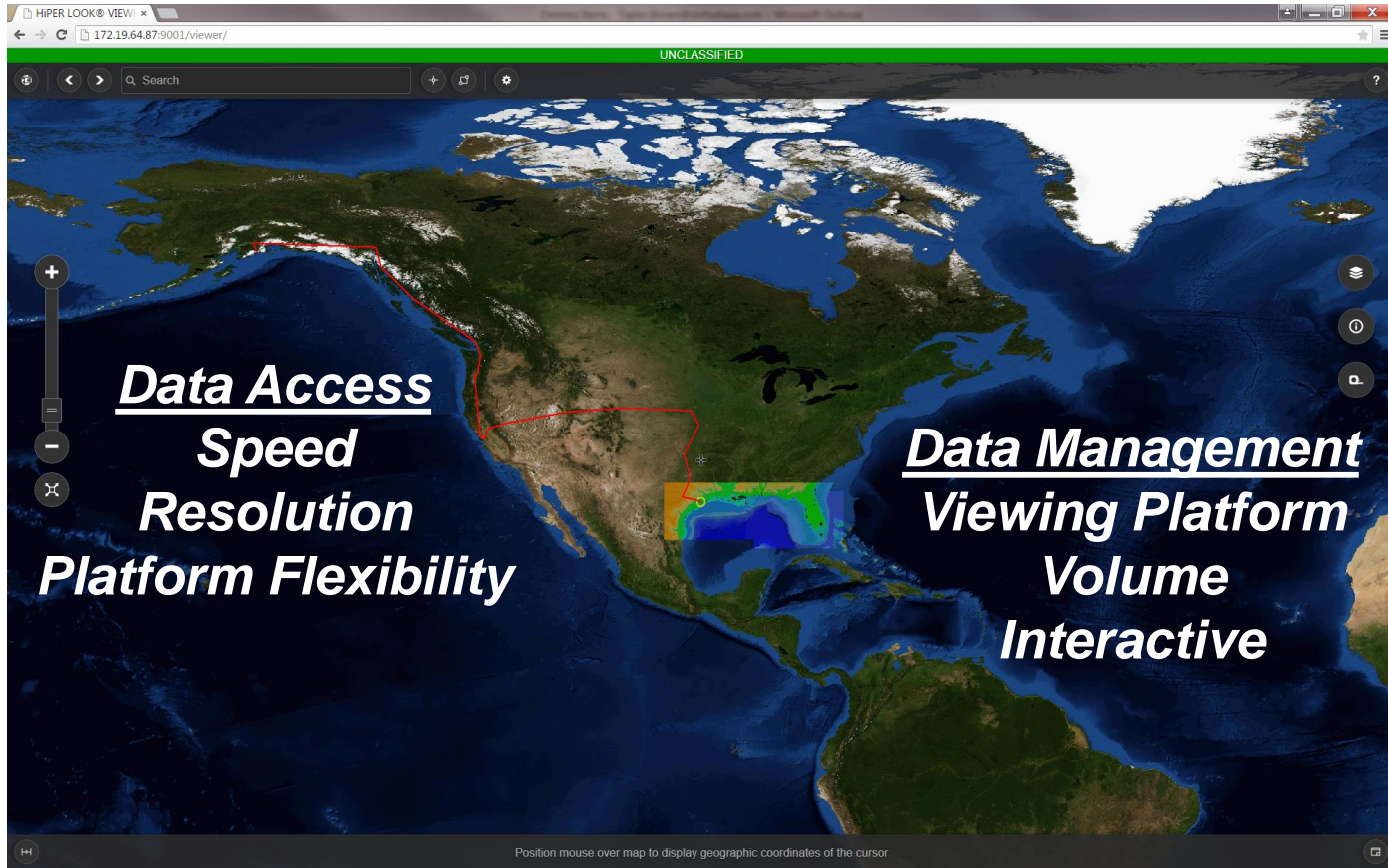- WMS Solution ≈ 10^2 Faster than Local GDB

Dataset	Complete Load Time
Managed Raster Catalog (File Geodatabase)	>15 min
Public Domain Online WMS	9.26s
Custom WMS	1.08s

Load Individual Tiles
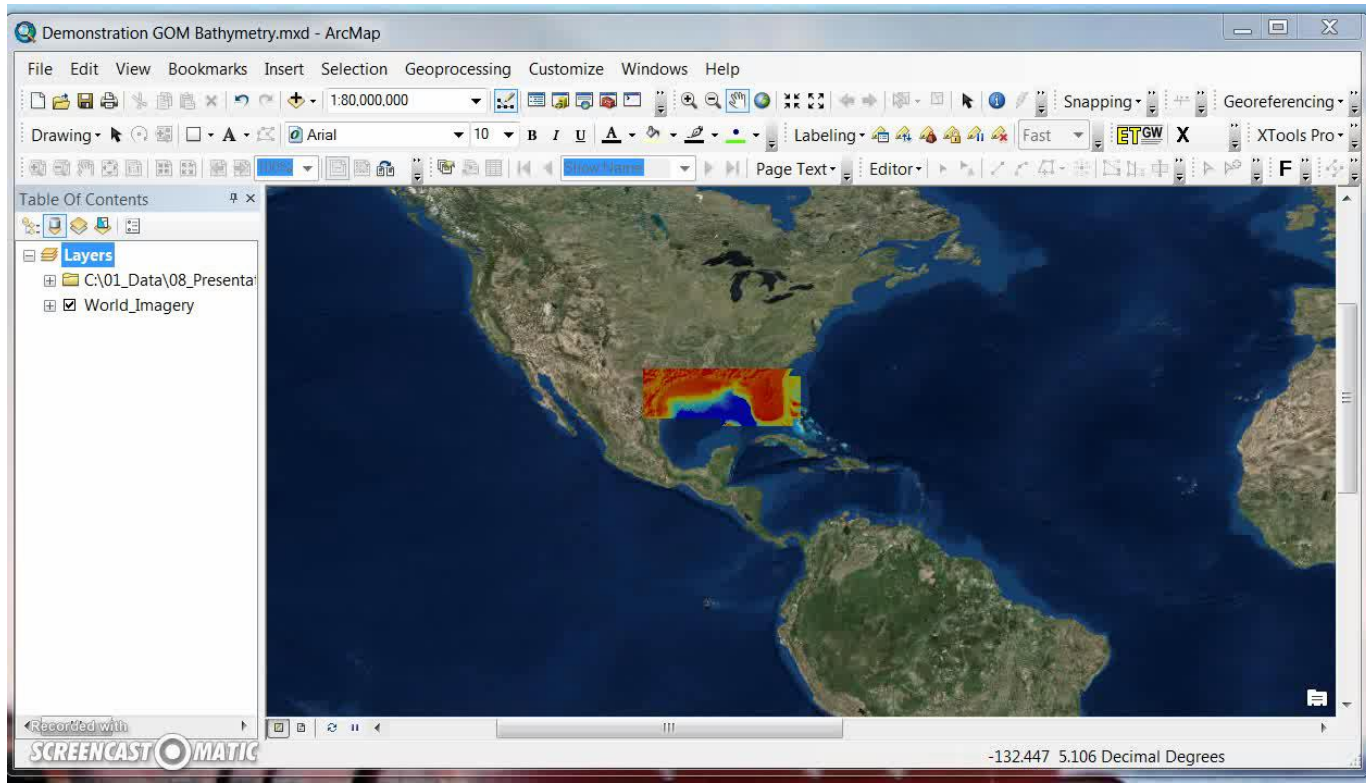- Modeled Task: Zoom to AOI
- >7x Faster from Custom WMS
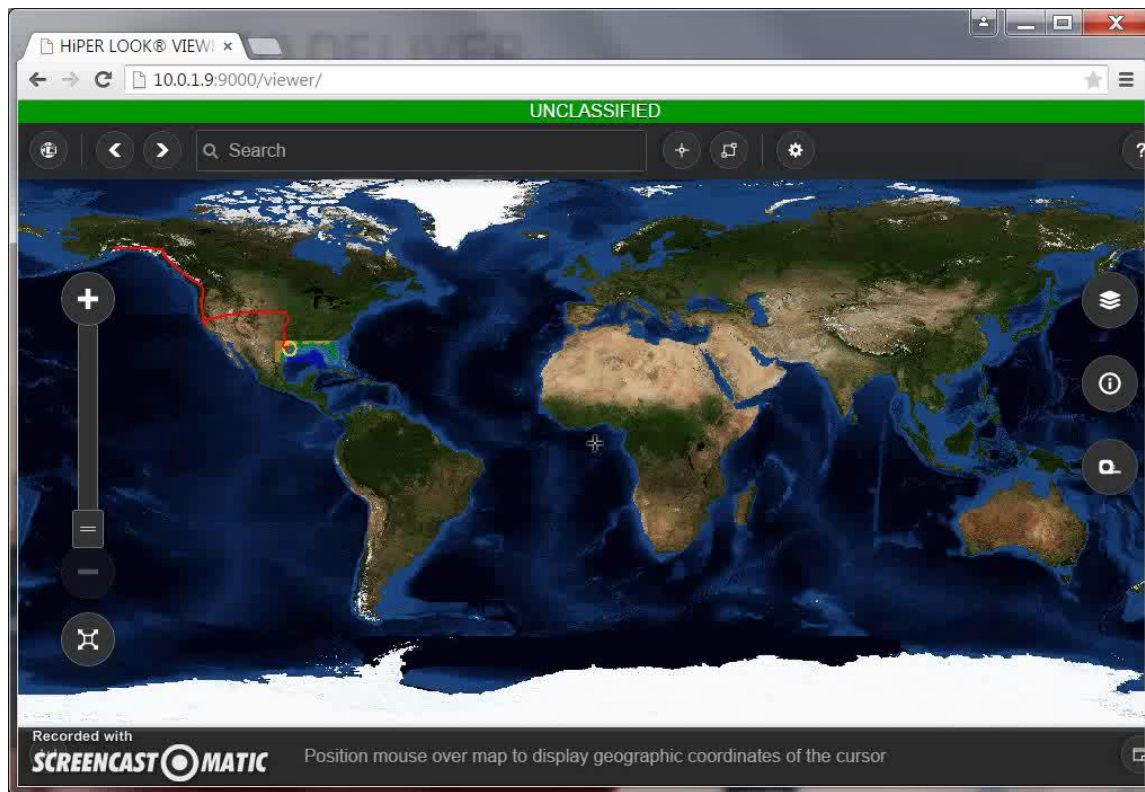 - Online Avg = 5.14s
  - Local WMS Avg = 0.72s

Demonstration

Data Access
Speed
Resolution
Platform Flexibility

Data Management
Viewing Platform
Volume
Interactive
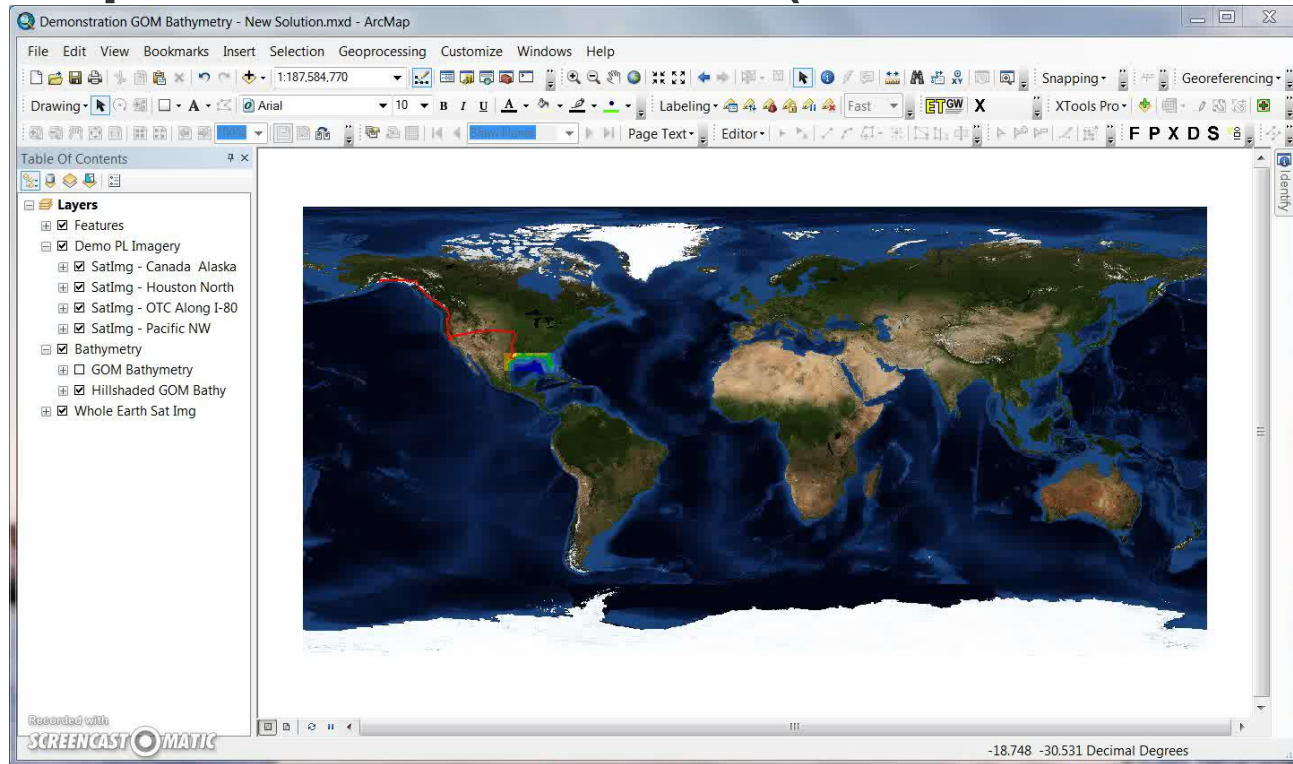
The Old (current) Way of Working With Data

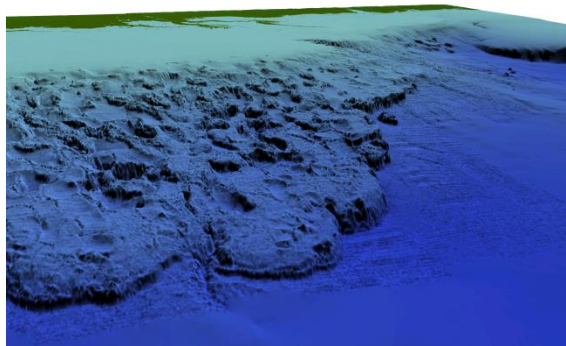# Our Proposed Method (Outside of ArcGIS)

Our Proposed Method (Inside ArcGIS)

Hardware De-Coupled Accessible Data

*Increased Data Accessibility Makes Any Device
A Complete Technical Workstation*

IMMR & Seabed Data

GIS Software

End Users

Subsea Engineers

Geologists

Project Managers

Subcontractors

Web Browser

Mobile Client

Wrap Up

In Summary

- Let the Software Do The Work of Legacy Hardware

- Data Adoption == Data Accessibility

- Data Downsampling Not Required Anymore

- Relentlessly Pursue Resolution In Smarter Ways

- It's About The End Product – Not The Sensor Integration!

Questions?