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
Understanding the Lifecycle of 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

• 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*
Dealing With Data
Case Study: Cathx Laser Photogrammetry System

- Generates High Resolution Photomosaics & 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

Source Data → Loaded To Database → Custom Database Solution → Processor calculations → End-User Workstation
New Workflow

Source Data → Smart Data Encoding → Custom Database Solution → Streamlined Delivery → End-User Platform
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
Methodology & Results

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

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

Dataset | Complete Load Time
---|---
Managed Raster Catalog (File Geodatabase) | >15 min
Public Domain Online WMS | 9.26s
Custom WMS | 1.08s
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)
Increased Data Accessibility Makes Any Device A Complete Technical Workstation
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?