• VICE PRESIDENT AND CHIEF SCIENTIST, SANBORN

• “FROM DATA DISCOVERY TO DATA VISUALIZATION AND DATA DISSEMINATION: HANDLING LARGE LIDAR DATASETS FOR A STATEWIDE CUSTOMER”

DR. SRINI DHARMAPURI, CP, CMS, PMP
sdharmapuri@sanborn.com
Light Detection and Ranging (LiDAR) Data Storage and Dissemination Solutions

Presented by:
Srini Dharmapuri PhD, CP, PMP
Vice President / Chief Scientist
Sanborn – Mapping Leader Since 1866

- Ground control survey 1866
- Aerial mapping since 1966
- Pioneered Digital orthophotography 1988
- Aerial Lidar Mapping since 1999
- Digital Imagery Sensors since 2004
- Oblique Imagery Mapping since 2012
Company Overview

• **Data Map Production**
  – Lidar, Digital Oblique & Orthophotography, Photogrammetric, Topographical Maps

• **Value-Added Services**
  – Master Addressing Repository
  – Change detection
  – Other imagery analysis services/viewers
  – Land use and land cover analyses

• **Decision Support Systems**
  – Wildfire Management
  – Forestry and Ecosystem Management
  – Emergency Response

• **Visualization Systems**
  – 2D
  – 3D
  – Prism 4D
  – Common Operating Picture

• **Software Applications**
  – GIS Software Development (Enterprise/Desktop/Web)
  – Cloud Services
  – Portals and Distribution Tools

©2020 The Sanborn Map Company, Inc.
▪ Increasing use of Lidar in multiple applications over a period of time.

▪ Periodic Lidar data collection in the past 2 decades.

▪ Multitude of lidar with in an organization (State clearing house).

▪ Logistical challenge of Storing, Managing and Retrieving data for distributed end users.

▪ The problem becomes more acute, in an emergency situation.
• 40% of engineering time is spent locating and validating information.¹

• Significant challenges exist when managing data discovery and dissemination for Lidar data sources:
  – Data storage
  – Data discovery
  – Data analysis
  – Data visualization

• This is a complex problem involving
  ✓ Mapping
  ✓ Data Management
  ✓ Software Development
➢ Our solution is ..... 

Sanborn Geo-Data Explorer™ with Sanborn Lidar Analyst™
Scenario

• An end user needs Lidar data for a given AOI and would like to review all the Lidar data available and select a particular year/years dataset.

• Log into GeoData Explorer™ website and can see the different datasets available.

• Narrow down the search of the AOI, based on geographic and attribute filters.

• In order to see the data quality, preview option is possible in the Lidar Web-viewer™

• Tasks like elevation profiling, measurements, vector overlays, or change the point cloud display method is possible in Lidar Web-viewer™

• Once satisfied, data can be clipped and downloaded for immediate offline consumption.

• After removing noise from the data, able to submit it back to the data repository for future use.
End User Workflow

Managed through a spatial database framework hosted in the public cloud/Server - involves five distinct sections:

a) Populating the database
b) Building a spatial hierarchy that supports lookup of the available data sources
c) Generating a visualization of Lidar data (or its subset) in a WebGL enabled web-application viewer
d) Data analytics
e) Upload/Download of the data
**Geographic filters:**
- Search text box, such as city, county, etc.
- Latitude/longitude coordinates
- Bounding box coordinates
- Interactively through bounding box of the current map view
Geographic filters:
- Search text box, such as city, county, etc.
- Latitude/longitude coordinates
- Bounding box coordinates
- Interactively through bounding box of the current map view
Geographic filters:
- Search text box, such as city, county, etc.
- Latitude/longitude coordinates
- Bounding box coordinates
- Interactively through bounding box of the current map view
Geographic filters:
• Search text box, such as city, county, etc.
• Latitude/longitude coordinates
• Bounding box coordinates
• Interactively through bounding box of the current map view
Data Discovery: Search

Geographic filters:
- Search text box, such as city, county, etc.
- Latitude/longitude coordinates
- Bounding box coordinates
- Interactively through bounding box of the current map view
Data Discovery: Search Options

Attribute filters

- Agency
- Collection Method
- Cloud Cover
- File Format
- ISO Category
- Licensed
- Acquisition Date
- Test

Apply Filter

Features Selected: 0
Total Size: 0 MB

View Previous Saves
Data Discovery: Search Options

Input a location using one of the following inputs or select the Filters button above to apply filters:

- search term Example: Denver
- lat/long coordinate Example: [38.95, -104.79]
- bounding box coordinates [left, right, bottom, top]
  Example: [-105.29, -104.29, 38.16, 39.16]

You can also use the current map view as a boundary by clicking the button 'Select Using Current Map View'.

Locations:
- Boulder
- Boulder City
- Boulder County
- Coal Creek Boulder Creek Huc10 Watershed
- South Boulder Creek Huc10 Watershed
- Headwaters Boulder Creek Huc10 Watershed

Features Selected: 0  Total Size: 0 MB
• Data products stored:
  – Raw point cloud (LAS, or LAZ)
  – Classified Lidar point clouds
  – Intensity images
  – DEM
  – Breaklines
  – Any relevant vector data (parcels, building footprints, etc.)

• The data should include the following metadata for versioning:
  – Projection
  – Acquisition Date
  – Sensor Information
  – Version
  – Project ID
The end user is able to:

- View data online in a web-based LiDAR Analyst™ that allows users to manipulate the point cloud in 3D, measure features, annotate and export screenshots

- Download the data

- View a raster version of the data served as a WMS/WMTS for consumption in any OGC-compliant software.
• Backend dashboard that allows admins to create/remove users, grant users privileges, reset passwords, and monitor user history.

• Multi-factor authentication (MFA) for both authentication and authorization.

• Admins can login as users to troubleshoot problems or add subscription leases to user accounts.
• Allowing end users the flexibility to preview Lidar datasets in a web-application viewer, bring in their own vector layers and run data analytics is empowering and democratizes the processing.

• Running the data pipeline in the cloud allows unprecedented scalability, reliability and performance from both the storage and compute perspectives.

• Allowing users to contribute edited/enhanced datasets back to the database can make the application a living repository of data.
Thank You

sdharmapuri@sanborn.com