



DIAMOND DATA SYSTEMS



# Production of Digital Elevation Models from LIDAR Data

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# UNO/DDS Collaboration

- Each organization brings specific qualifications to the proposal
  - DDS – Software Engineering
    - Scientific Data Integration
  - UNO – Algorithm Development
    - Image processing
- This was brought out directly in the proposal
  - End-to-end software solution
  - Respected algorithms

# Innovation

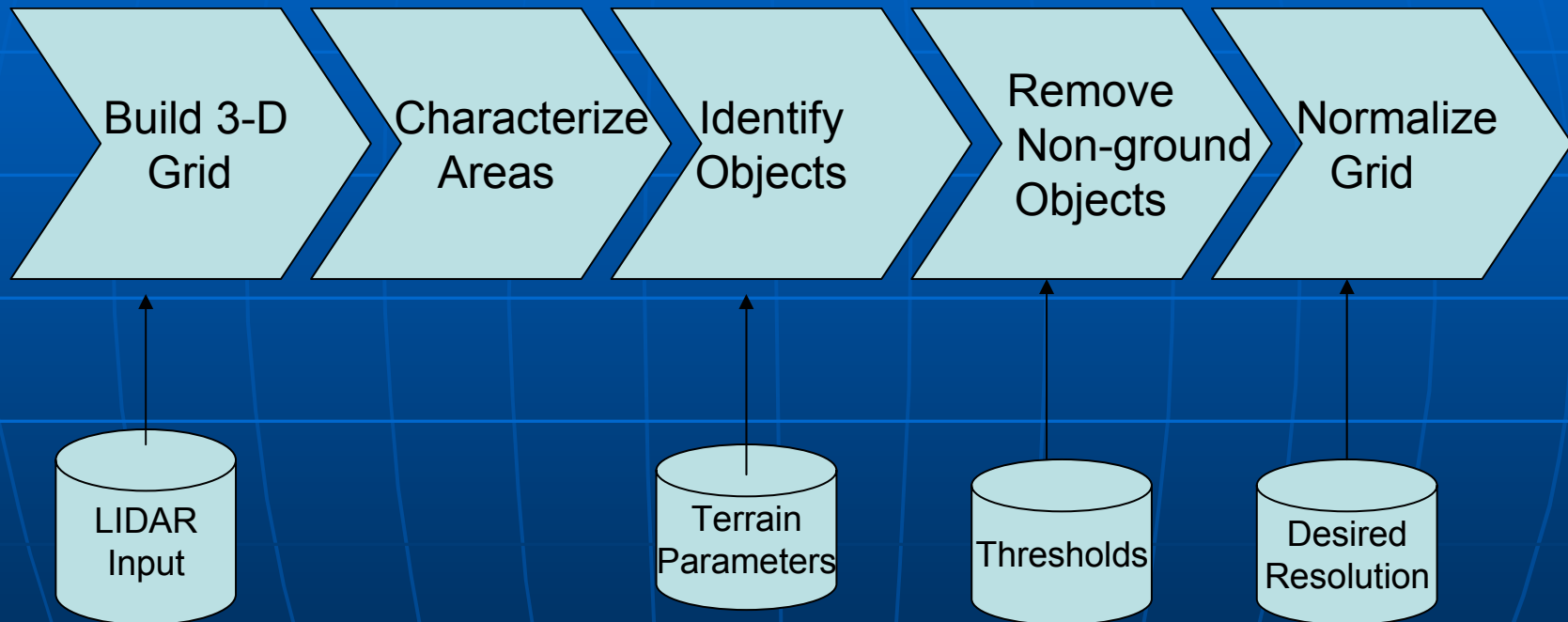
## We Proposed...

- A complete end-to-end system instead of a solution that addresses only a single step of this complex problem.
- A system that is designed to minimize human interaction and manual data entry.
- The implementation of multiple algorithms to perform the data processing, as well as an extensible software architecture which allows new algorithms to be incorporated into the system in the future.

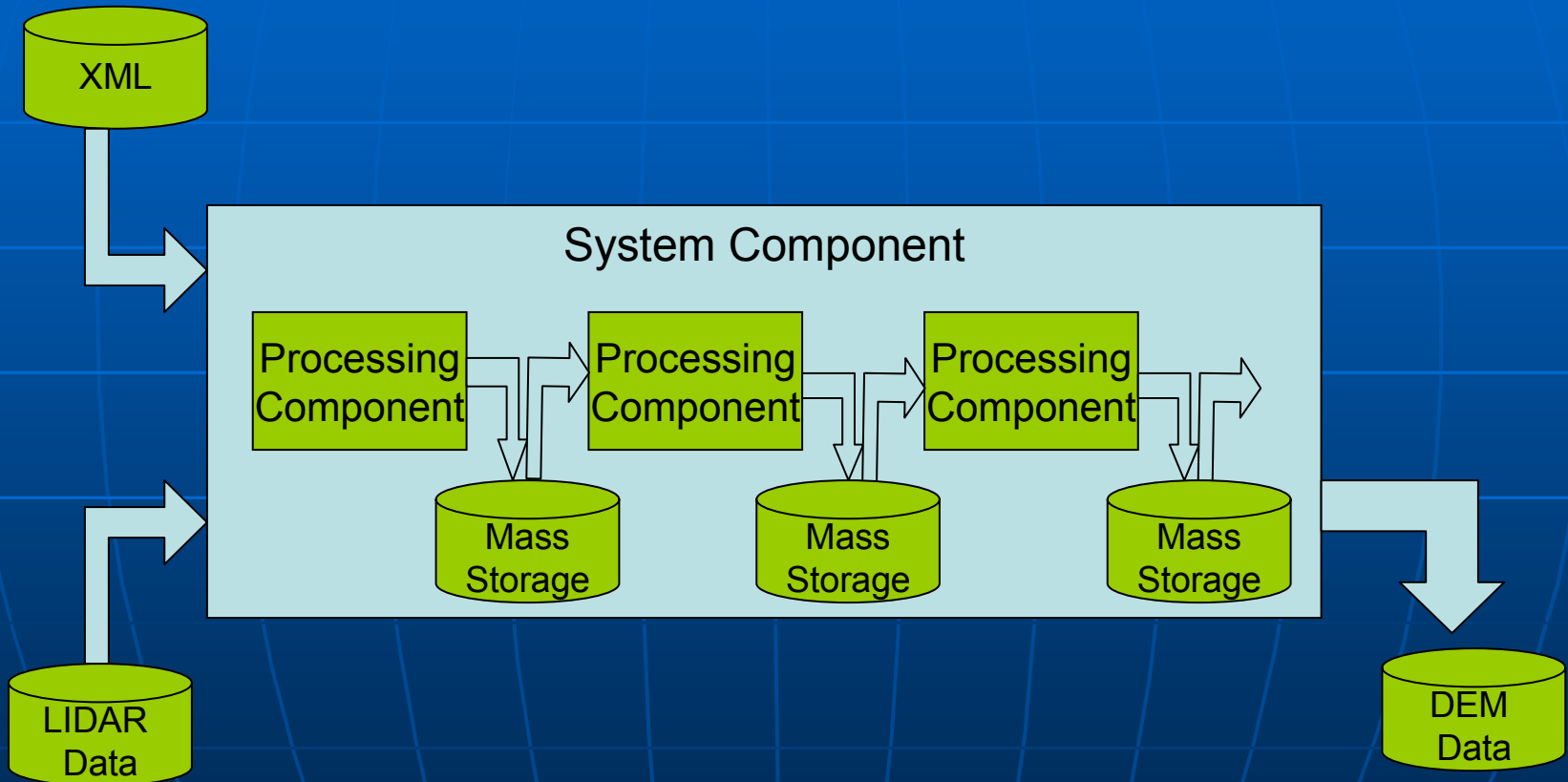
# End-to-end Solution

- Includes defined processes for data processing
  - Well defined software architecture basis
- Includes component based design concepts
  - Replaceable algorithms
- Include integration capabilities
  - Integration with Graphical User Interfaces
  - Integration with multiple input data
  - Integration with multiple output data

# Define Processes for Data Processing



# Component Based Design Concepts

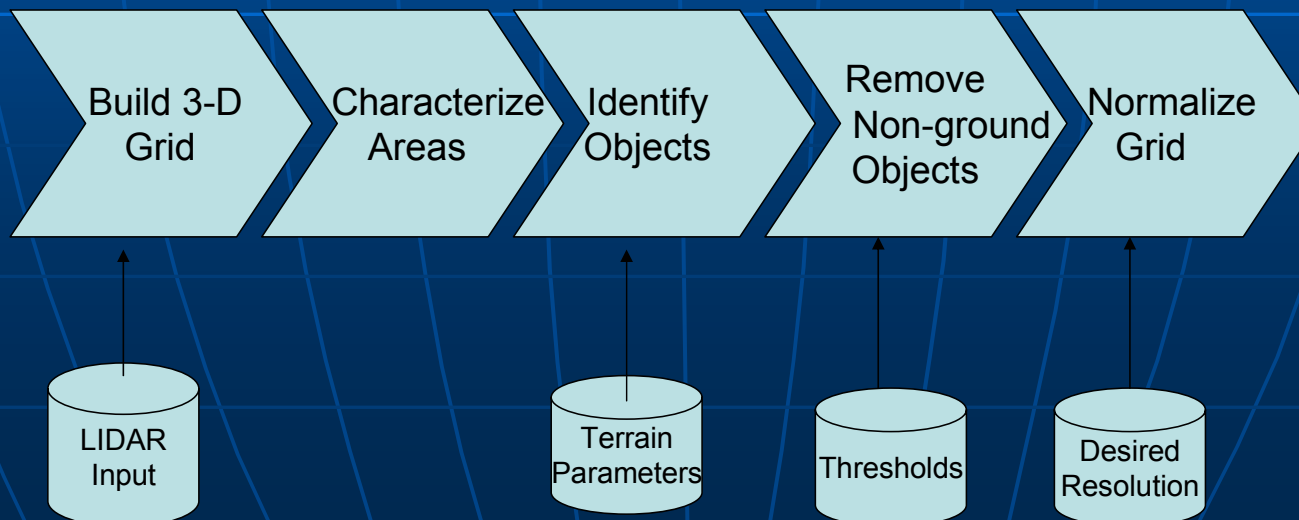


# Integration

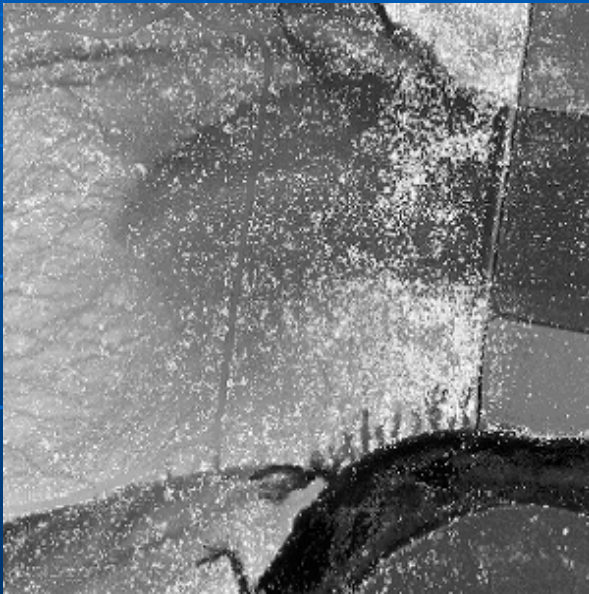
- Well defined set of input interfaces to the system
  - XML control interface
  - Standard LIDAR data formats
- Well defined interface between components
  - Part of SBIR proposal is to define and document these interfaces
- Well define output interfaces
  - Define standard DEM output formats
  - Support modular output formatters to allow expansion in the future.

# Algorithms

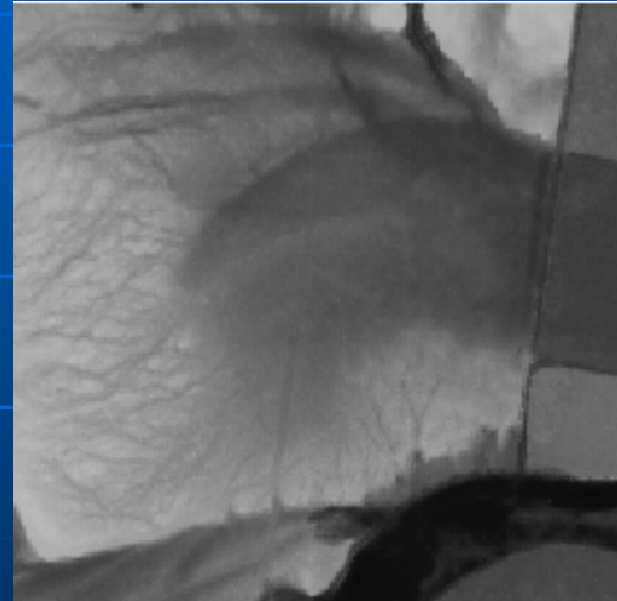
- Build 3D Grid
- Characterize Areas
- Identify Objects
- Remove non-ground Objects
- Normalize Grid



# Typical DEMs

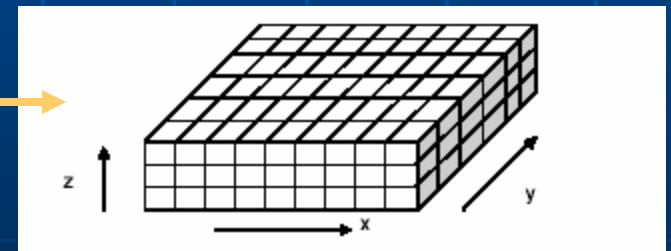
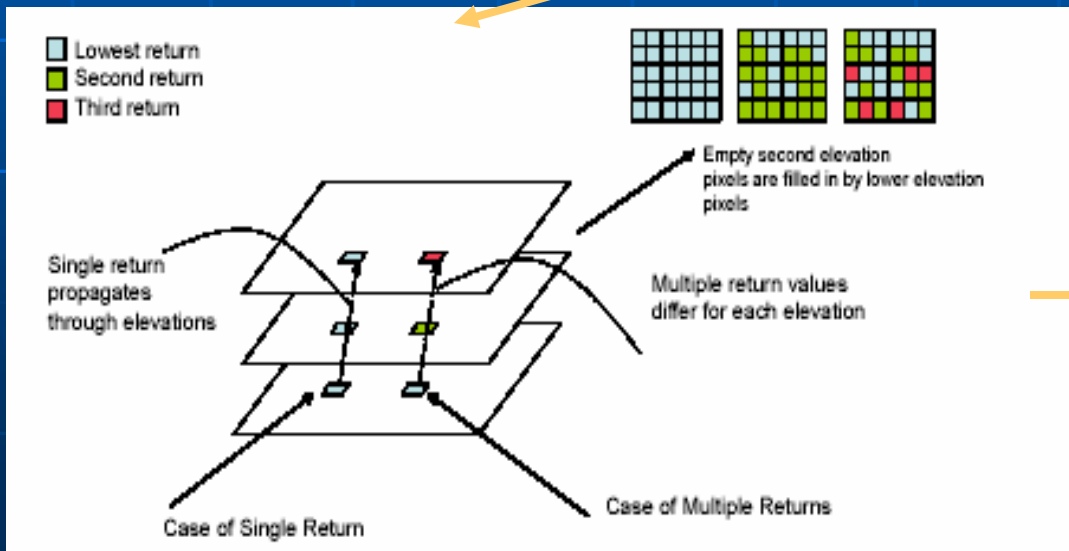
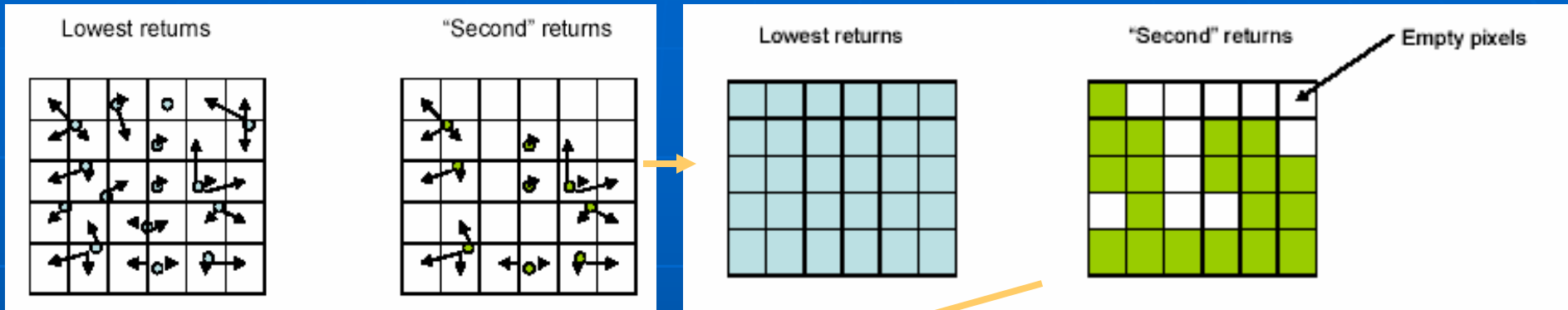


Gridded Data Considering  
Lowest LIDAR Return



Processed Data

# Build 3D Grid



# Objects/Remove Non-Ground Objects

- Use features including 3D textural descriptors
- Multifractals have been shown to be suitable for similar remote sensing data
- The goal is to segment the grid into several statistically or structurally uniform parts
  - Man-made structures
  - Vegetation
  - Other

# Summary

- Diamond Data Systems (DDS) and University of New Orleans (UNO) propose the development of a new, advanced architecture, algorithms and software to support the end-to-end processing of LIDAR data to derive a Digital Elevation Model (DEM).
- Each organization brings their own qualifications to the project
  - DDS – Software Engineering
  - UNO – Algorithm Development