Interior Space Scanning 3D PCD RGBXYZ

Brookhaven College

Geospatial Technology Program

GISC1391 Special Topics in GIS

WHAT IS INTERIOR SPACE SCANNING

A method for creating a 3-dimensional digitized scan of an interior space, such as a room inside a building.

The process requires the use of a tablet PC, a sensor, and a scanning program, the scanning program used in this SOP is provided by Paracosm – www.paracosm.io.

REQUIRED EQUIPMENT

Recommended hardware requirements
Microsoft Surface Pro 3 or later
64-bit operating system
Windows 7 or later
Core i7 processor
Maximum RAM (8 to 16 GB)
Sensor with USB connection

SOFTWARE & DATA REQUIREMENTS

- CAD file with appropriate real-world coordinates
- A 3D Recorder (Paracosm's Recorder)
- ESRI's ArcMap & ArcScene or ArcGIS Pro
- CloudCompare program (freeware)

DEMO OF EQUIPMENT ASSEMBLY

How to get Ready to scan

SCANNING TECHNIQUE

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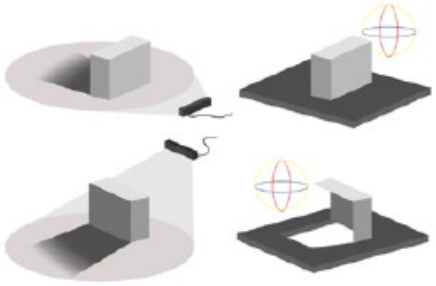
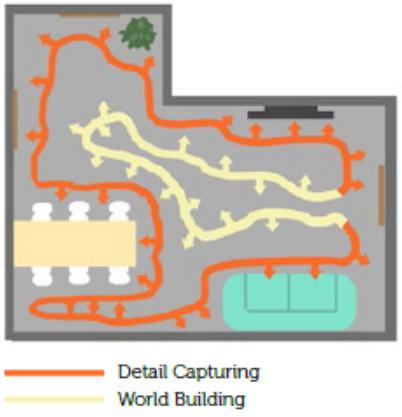
It's important to scan at a slow, even pace. Quick movement can create gaps in the scan data, and blurry video frames will make a blurry 3D model. Two different data collection techniques are required to capture all the information needed for a good scan: detail capturing, and world building. We find it's helpful to divide a scan into two phases, focusing on only one scanning technique at a time.



What you see is what you get; be sure to capture objects from all angles

Phase 1: Detail Capturing

In this phase, the focus should be on capturing detail from all objects in a room, ignoring large flat surfaces like walls and floors. Start from your anchor point and work slowly around the room, making sure to capture every nook and cranny. If the camera doesn't see a surface, it won't be included in the 3D model, causing holes in the mesh. This includes moving above, under and around all objects. After this phase is complete, you should find yourself back at the anchor point.



Phase 2: World Building

In this phase, the focus is on building the world by visually connecting all objects and surfaces in the room. From the anchor point, take another pass of the space at a wider angle. Focus on capturing the entire room, and try to find views where distant objects appear in the same frame. This includes capturing all walls, floors, and ceilings if you want them. Creating visual connections between wide areas helps ensure the 3D model is globally accurate.

A SUCCESSFUL SCAN

depends on pattern recognition. Areas of similar patterns, such as the floor, ceiling, and cabinets, represent areas of poor pattern recognition, and must be made unique in order to scan well.

Texture helps; variation is beneficial.

White wall, with white ceilings and white floors and an area without furniture is tough.

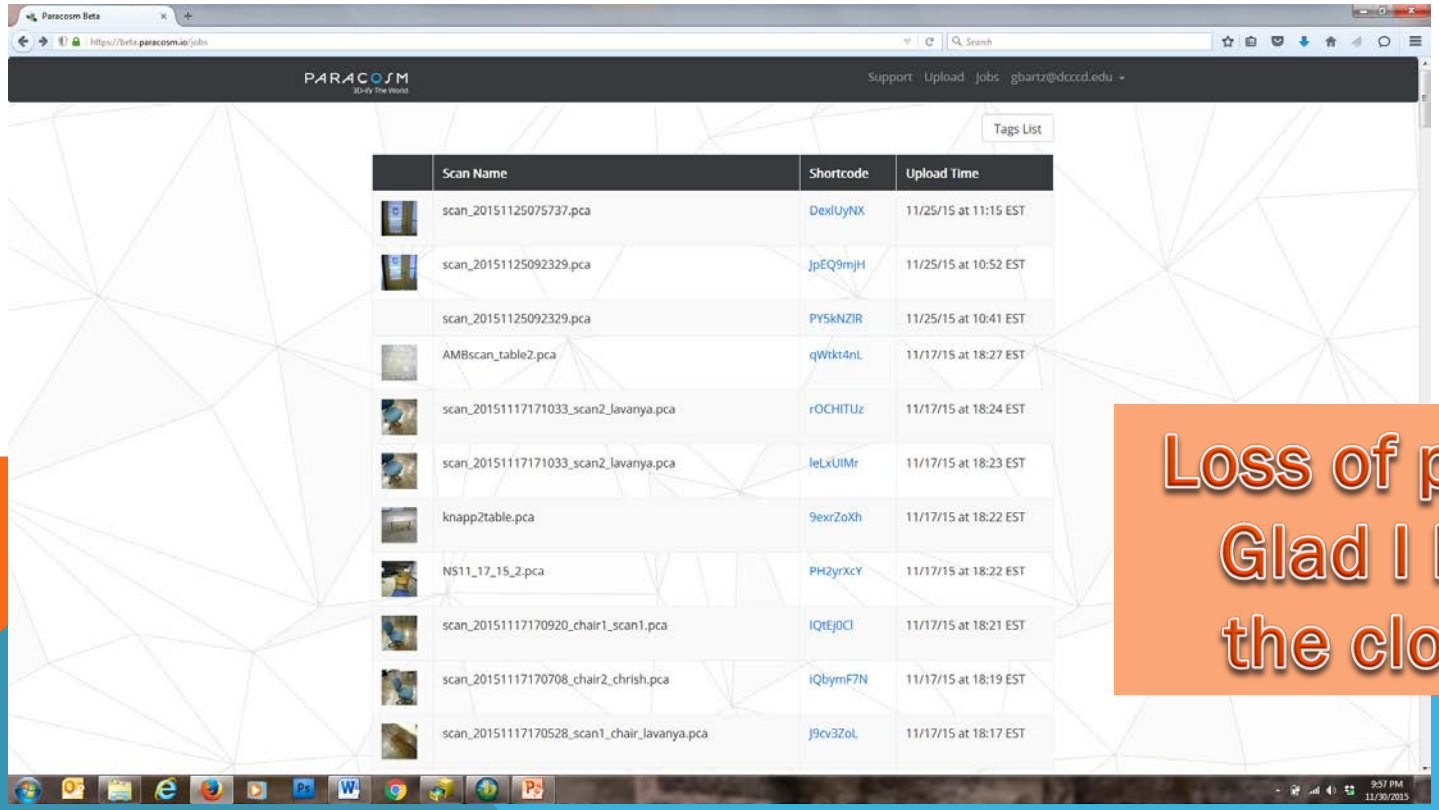
FOLLOWING SCAN

Stop the Recorder software and Process the recorded video.

- In our case Paracosm Recorder and Paracosm cloud server processing

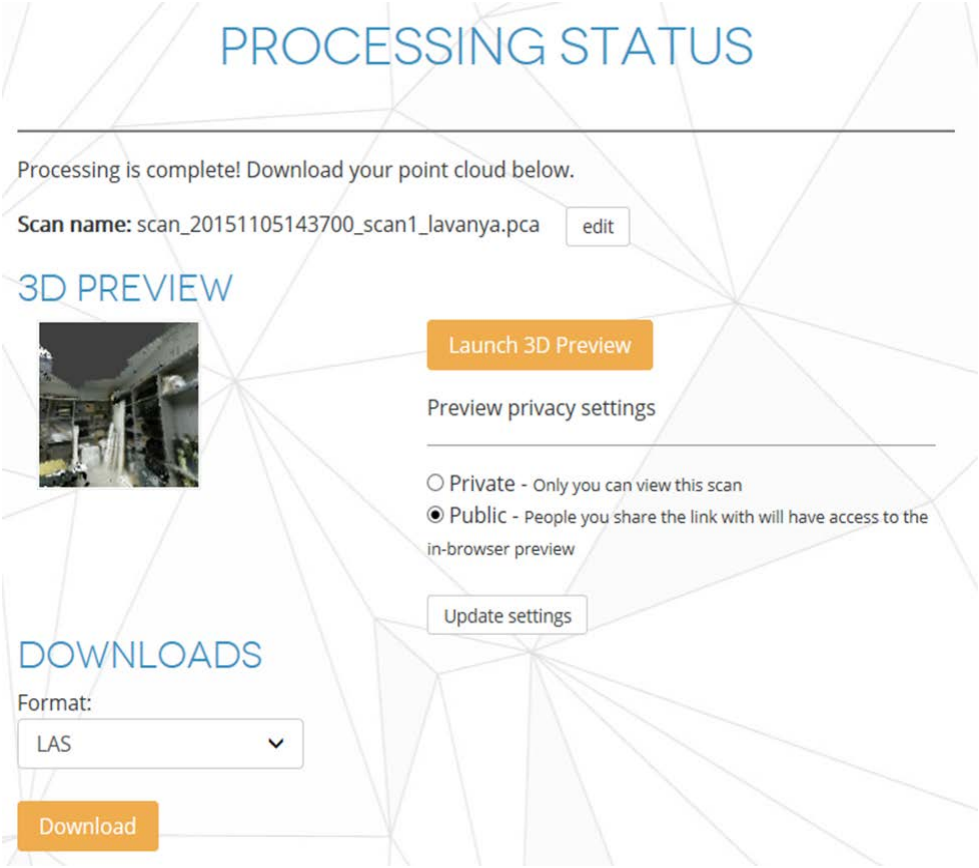
Access results

- In our case Paracosm cloud server
  - Beta.paracosm.io – demonstration

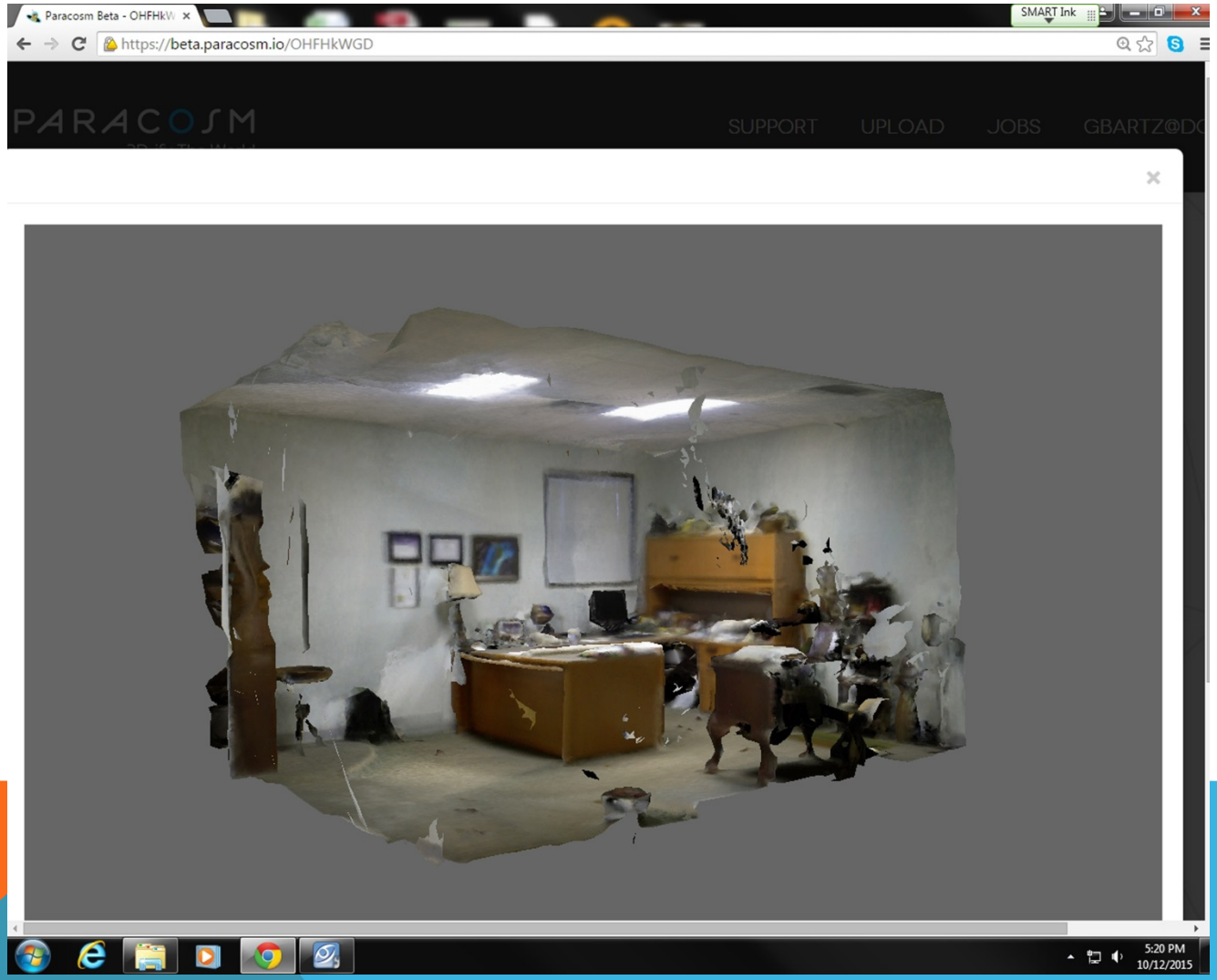


Loss of power
Glad I had
the cloud!

VIEWING A PROCESSED SCAN

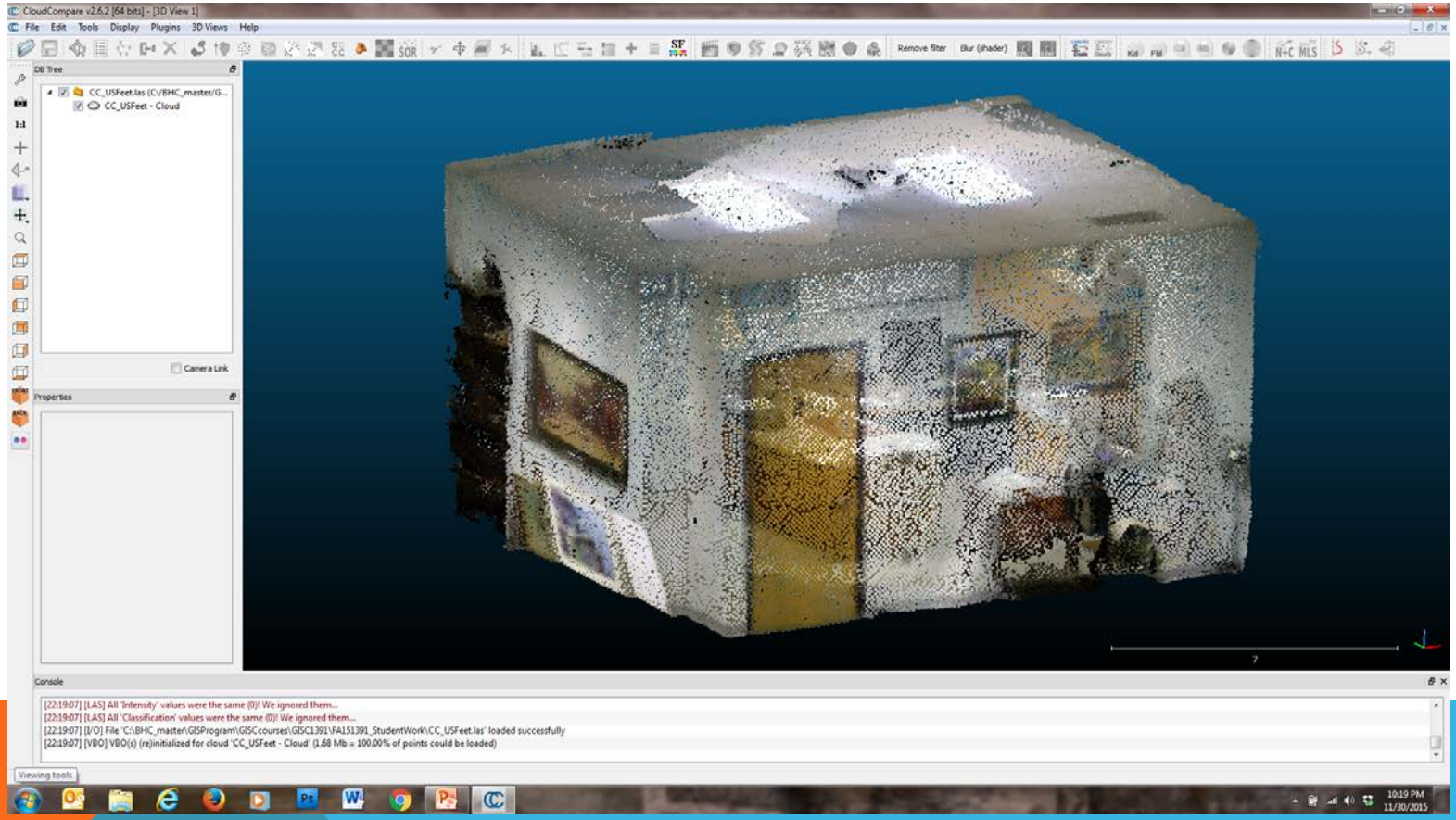


RESULT OF SCAN (PARACOSM VIEWER)



TRIM, ORIENT & SPATIALLY ADJUST LAS FILE

Use CloudCompare (download from: http://www.danielgm.net/cc/)

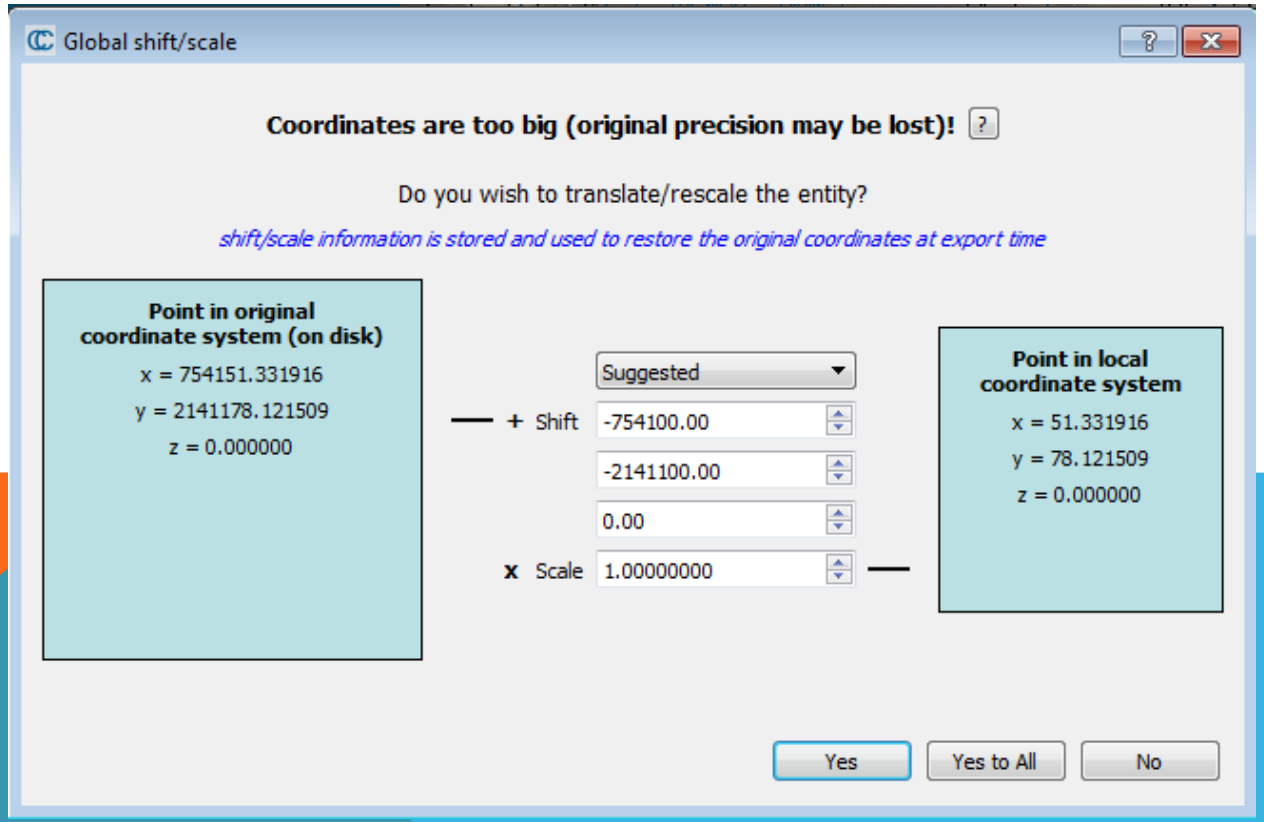


SPATIALLY ADJUST USING A SHAPEFILE

CloudCompare accepts a shapefile dataset.

Export room control points (for example CAD file corners) in real world coordinates to a shapefile and consume that file in CloudCompare.

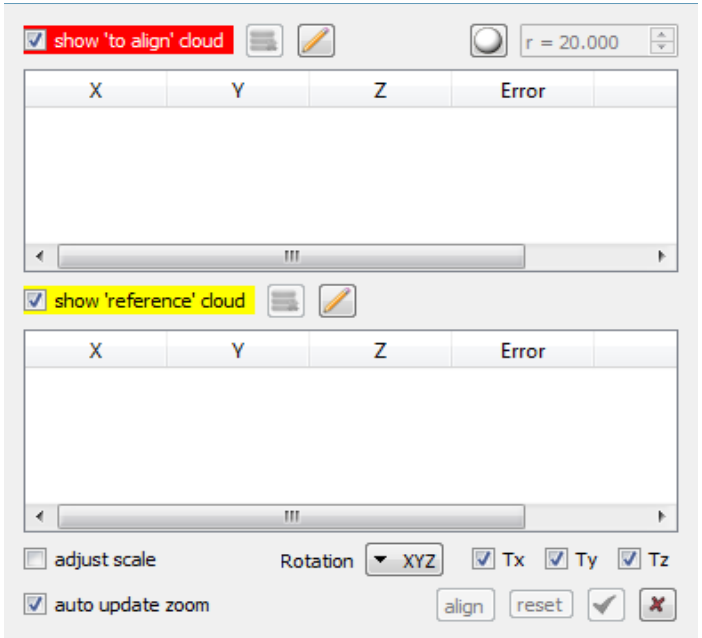
Make a near adjustment from 0,0,0 PCD to the real world shapefile control points



REFINE TO ACCURATE REAL WORLD COORDINATES

Using CloudCompare

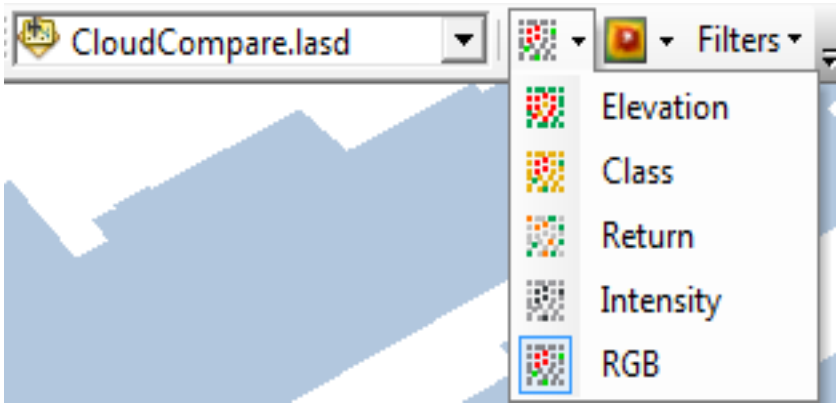
Once you have an alignment that you're satisfied with, make sure and SAVE your work! You now have a "referenced" pointcloud in .LAS file format



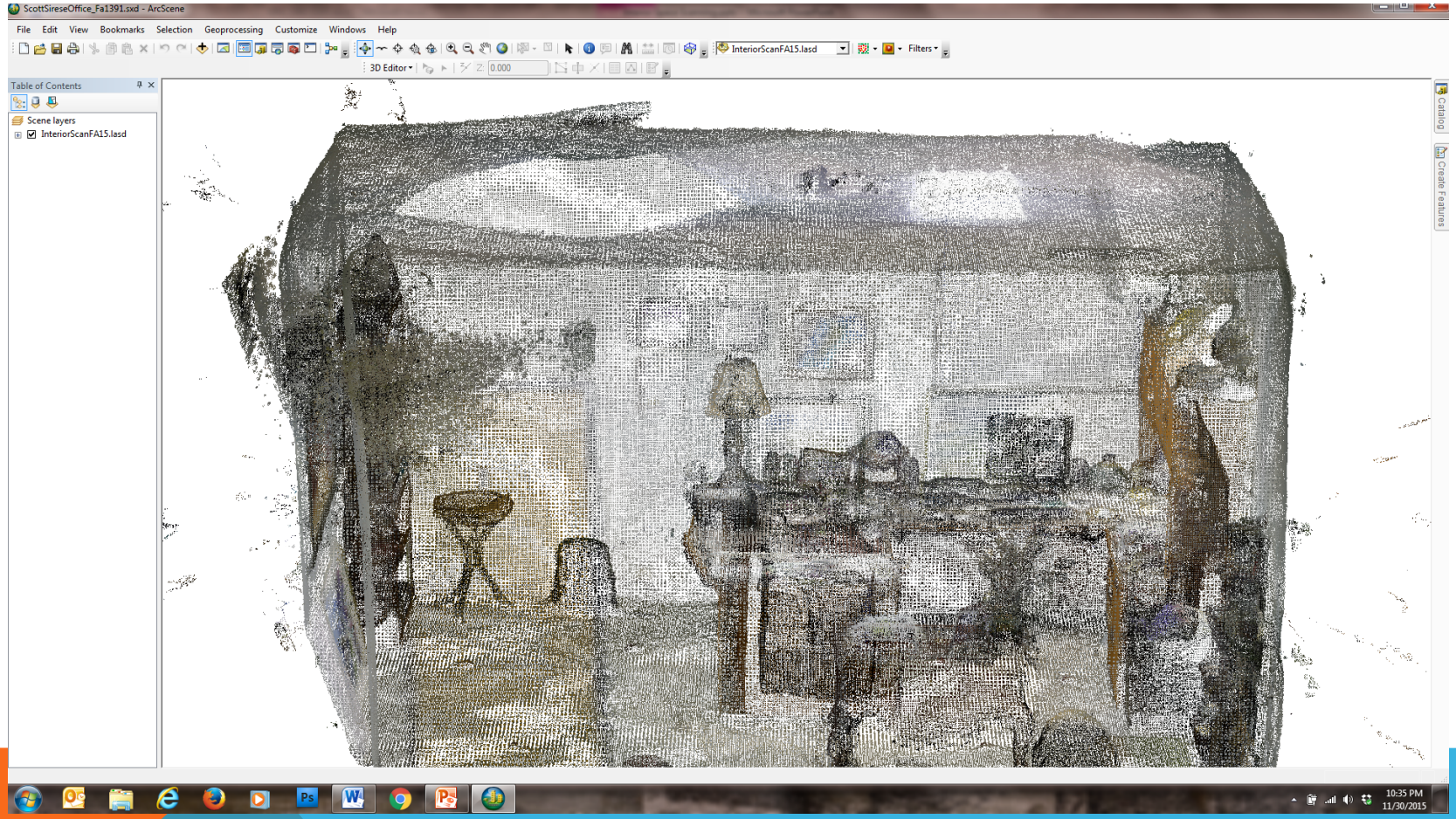
CREATE AN LASD AND ADD THE LAS FILE

Use ArcGIS to create a new dataset consumable in desktop ArcGIS applications

In ArcScene symbolize the PCD with their imbedded RGB values



WHAT YOU WILL SEE IN ARCSCENE



NEXT STEPS

Feature classification

Feature extraction

LiDAR processing applications

Email ssires@dcccd.edu to get a copy of the detailed SOP and workflow diagram (available in January 2016).

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Thank You!