



INTERIOR SPACE SCANNING 3D PCD RGBXYZ

BROOKHAVEN COLLEGE

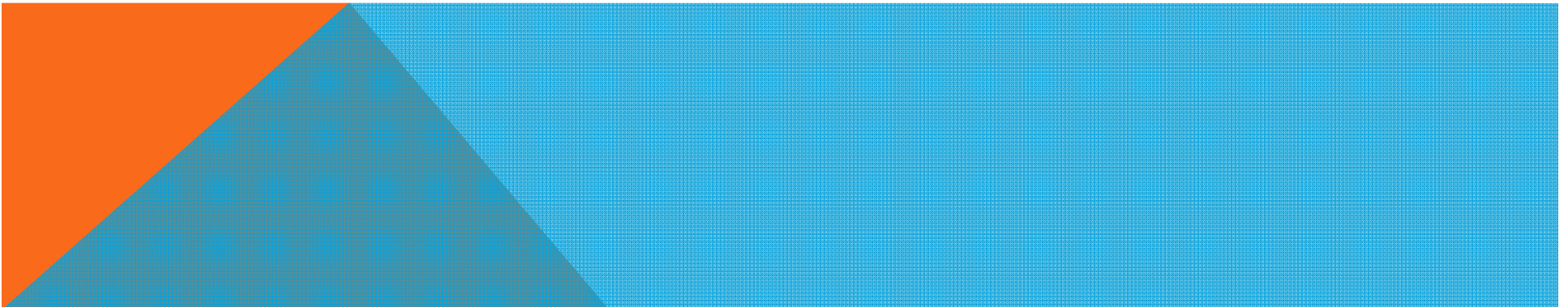
**GEOSPATIAL TECHNOLOGY PROGRAM
GISC1391 SPECIAL TOPICS IN GIS**

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.



WHAT IS THIS?

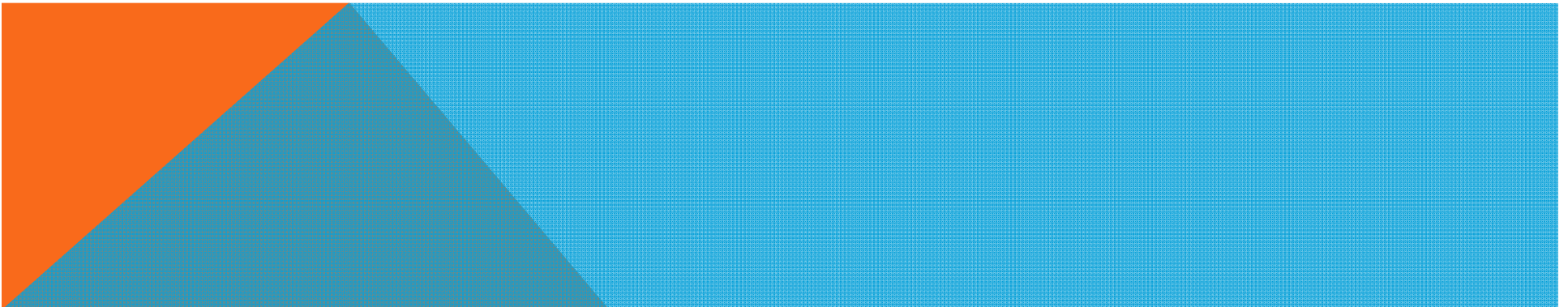
3DPCD – 3D Point Cloud Dataset

RGBXYZ – Red Green Blue X Coordinate Y Coordinate Z Coordinate point dataset

Why is this important

New applications of technology

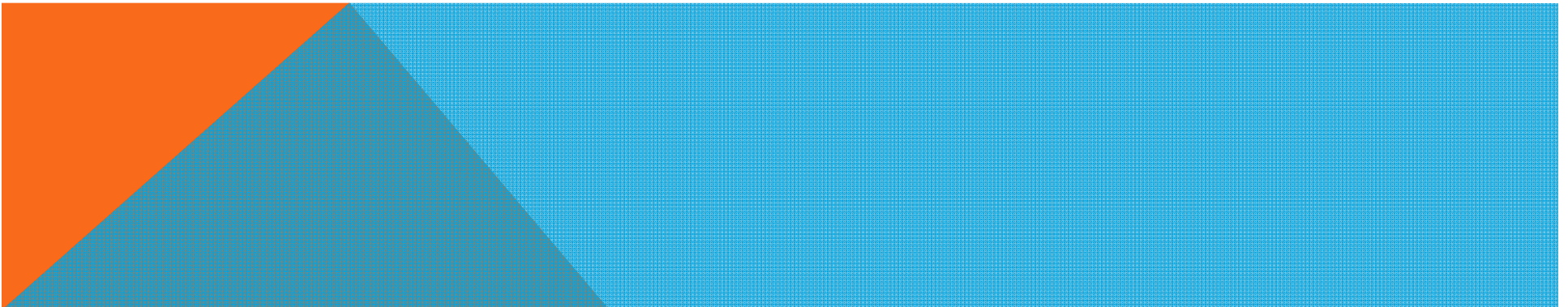
Workforce/Careers/Income/Poverty Level Arguments



THE NEXT GAME CHANGER

Technology Shifts

- Workstation **TO** PC
- Desktop **TO** Web
- Platform/Sensor Services **TO** BADYO (Build & Deploy Your Own)
 - Shorter Deployment Time
 - Cheaper
 - Easier
 - Shorter Time from Field to Use

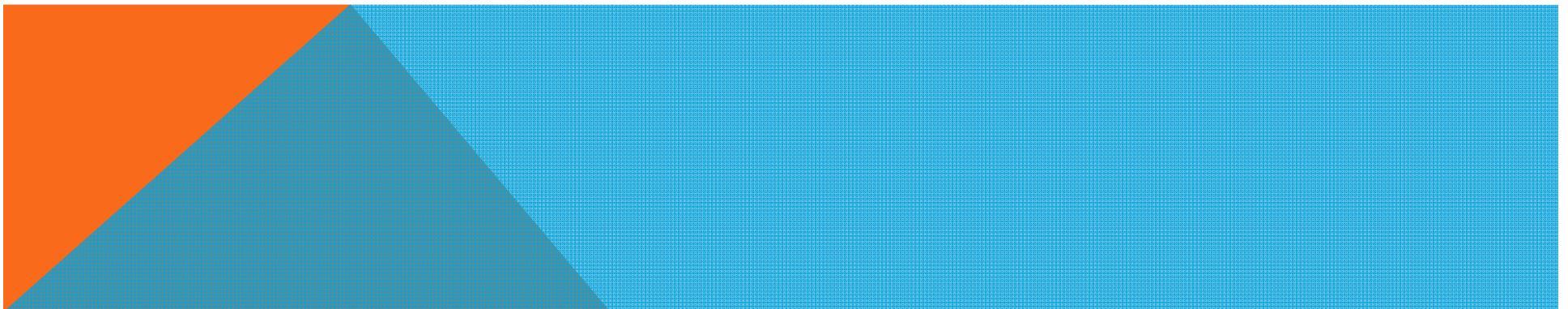


STANDARD OPERATING PROCEDURE (SOP)

‘Figured out’ Fall 2015 Brookhaven College

Updating SOP now, Final my end of May, Available for sharing

Presenting at the Esri UC this summer



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



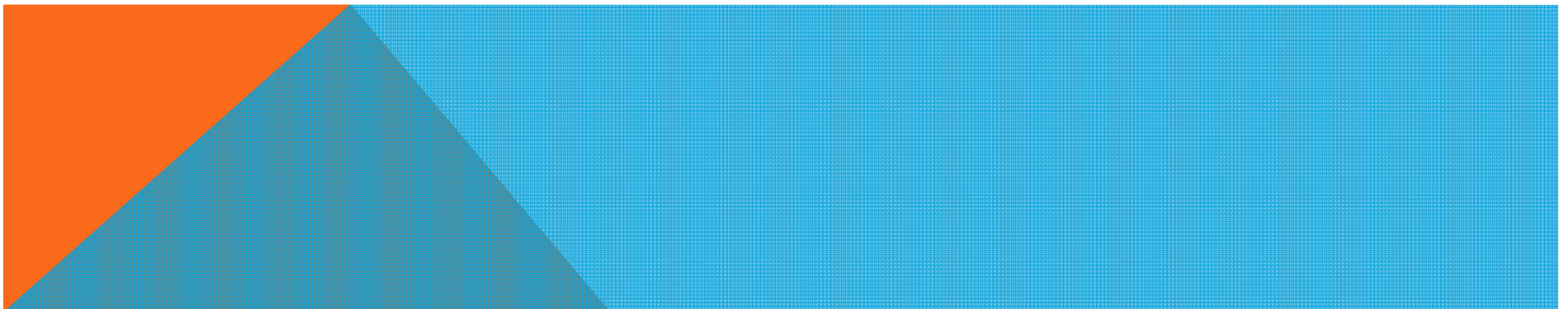
SOFTWARE & DATA REQUIREMENTS

CAD file with appropriate real-world coordinates

A 3D Recorder (Paracosm's Recorder)

ESRI's ArcMap & ArcScene or ArcGIS Pro

CloudCompare program (freeware)





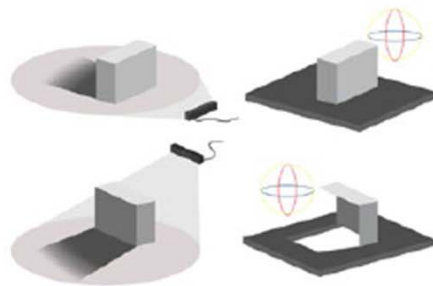
DEMO OF EQUIPMENT ASSEMBLY

HOW TO GET READY TO SCAN

SCANNING TECHNIQUE

SCANNING TECHNIQUE

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.



— Detail Capturing
— World Building

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.

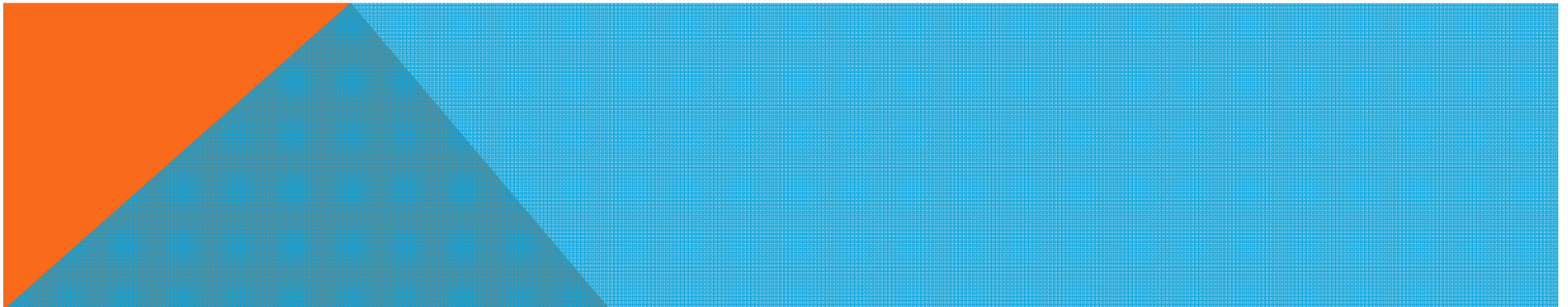
OUR VERSION OF THE SCANNING PROCESS

Standard Operating Procedure (SOP)
for
Interior Space Scanning with Paracosm
Software

Team 5

Jake Gardner
Christopher Hare
Lavanya Vasudevan

Fall 2015
GIS 1391

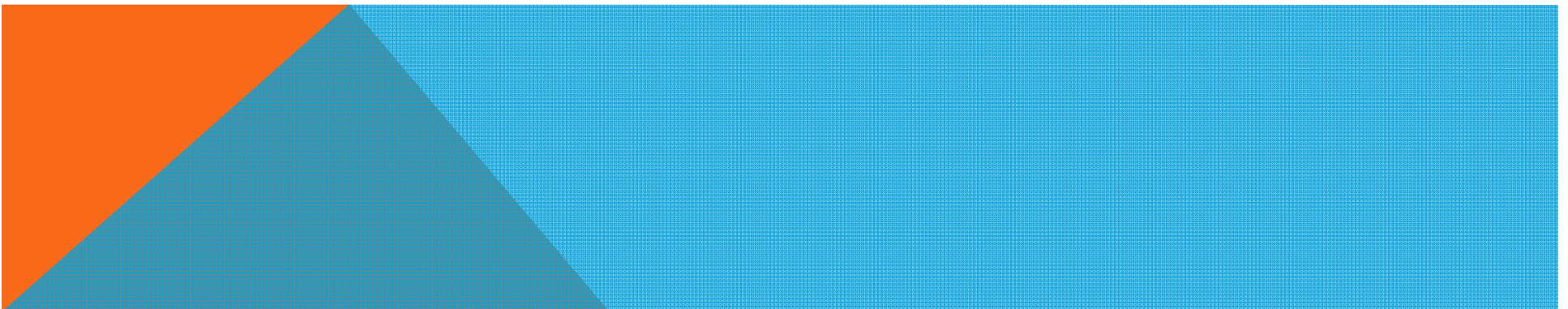


A SUCCESSFUL SCAN

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.



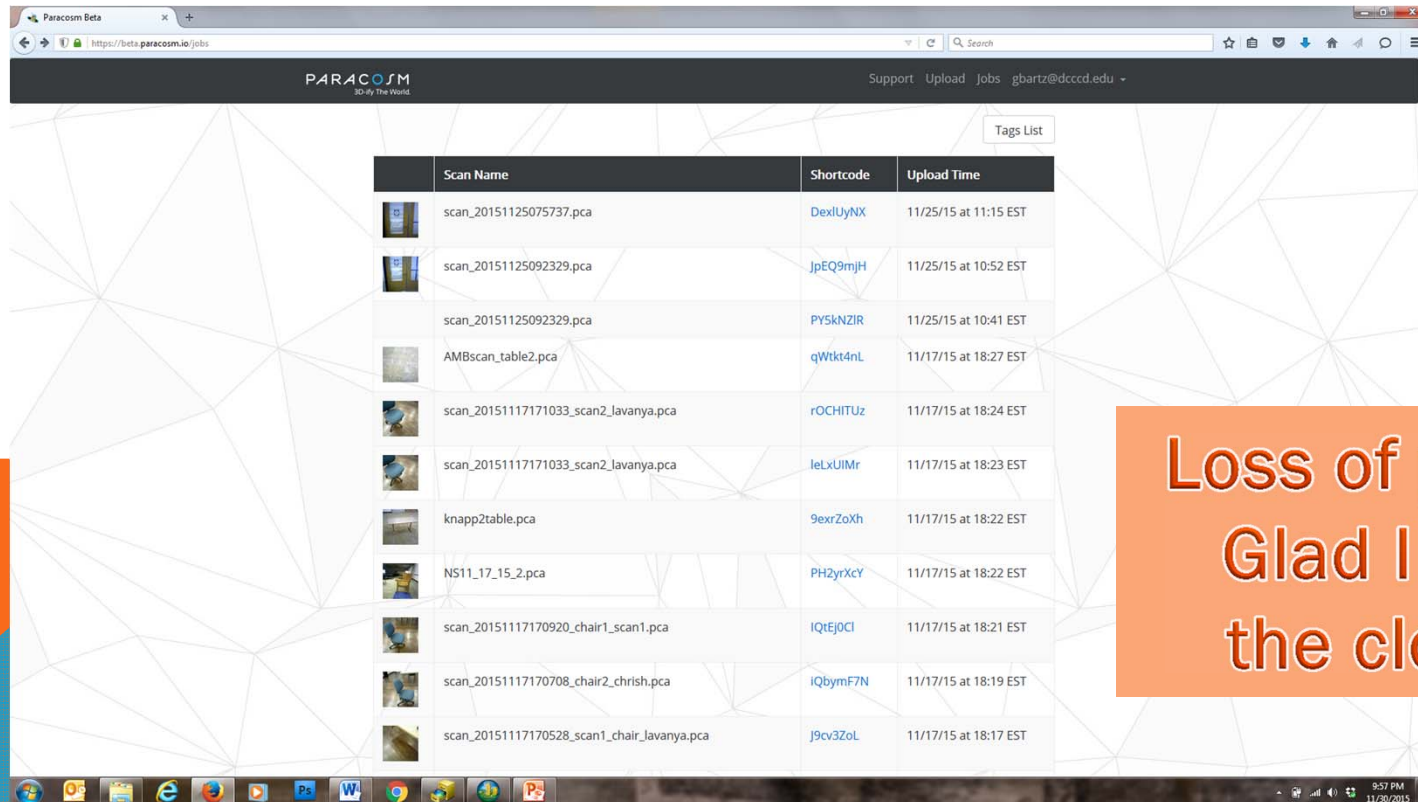
FOLLOWING SCAN

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



The screenshot shows the Paracosm Beta web interface. The browser address bar displays 'https://beta.paracosm.io/jobs'. The page header includes the Paracosm logo and navigation links for Support, Upload, Jobs, and a user profile 'gbartz@dccc.edu'. A 'Tags List' button is visible in the top right. The main content area features a table with the following data:

	Scan Name	Shortcode	Upload Time
	scan_20151125075737.pca	DexUyNX	11/25/15 at 11:15 EST
	scan_20151125092329.pca	JpEQ9mJH	11/25/15 at 10:52 EST
	scan_20151125092329.pca	PY5kNZIR	11/25/15 at 10:41 EST
	AMBscan_table2.pca	qWtk4nL	11/17/15 at 18:27 EST
	scan_20151117171033_scan2_lavanya.pca	rOCHITUz	11/17/15 at 18:24 EST
	scan_20151117171033_scan2_lavanya.pca	leLxUIMr	11/17/15 at 18:23 EST
	knapp2table.pca	9exrZoXh	11/17/15 at 18:22 EST
	NS11_17_15_2.pca	PH2yrXcY	11/17/15 at 18:22 EST
	scan_20151117170920_chair1_scan1.pca	lQteJ0Cl	11/17/15 at 18:21 EST
	scan_20151117170708_chair2_chrish.pca	lQBymF7N	11/17/15 at 18:19 EST
	scan_20151117170528_scan1_chair_lavanya.pca	J9cv3ZoL	11/17/15 at 18:17 EST

Loss of power
Glad I had
the cloud!


VIEWING A PROCESSED SCAN

PROCESSING STATUS

Processing is complete! Download your point cloud below.

Scan name: scan_20151105143700_scan1_lavanya.pca [edit](#)

3D PREVIEW



[Launch 3D Preview](#)

Preview privacy settings

☐ Private - Only you can view this scan

☒ Public - People you share the link with will have access to the in-browser preview

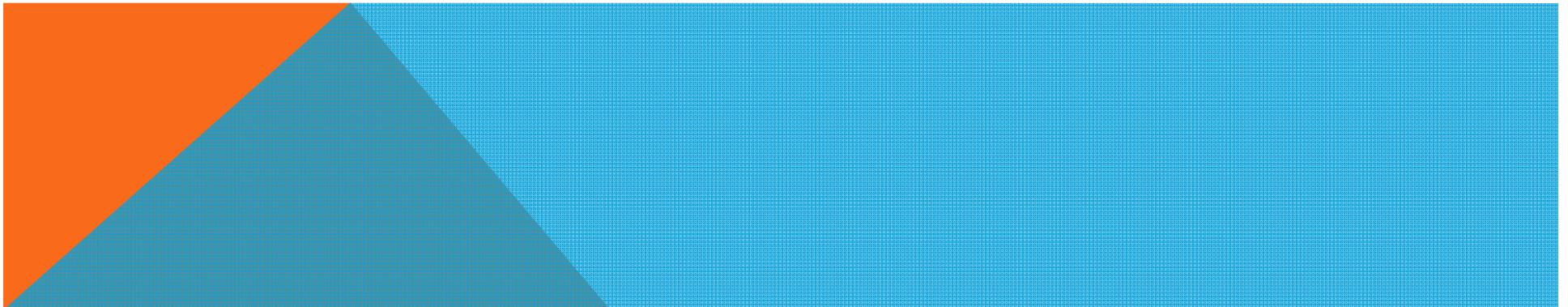
[Update settings](#)

DOWNLOADS

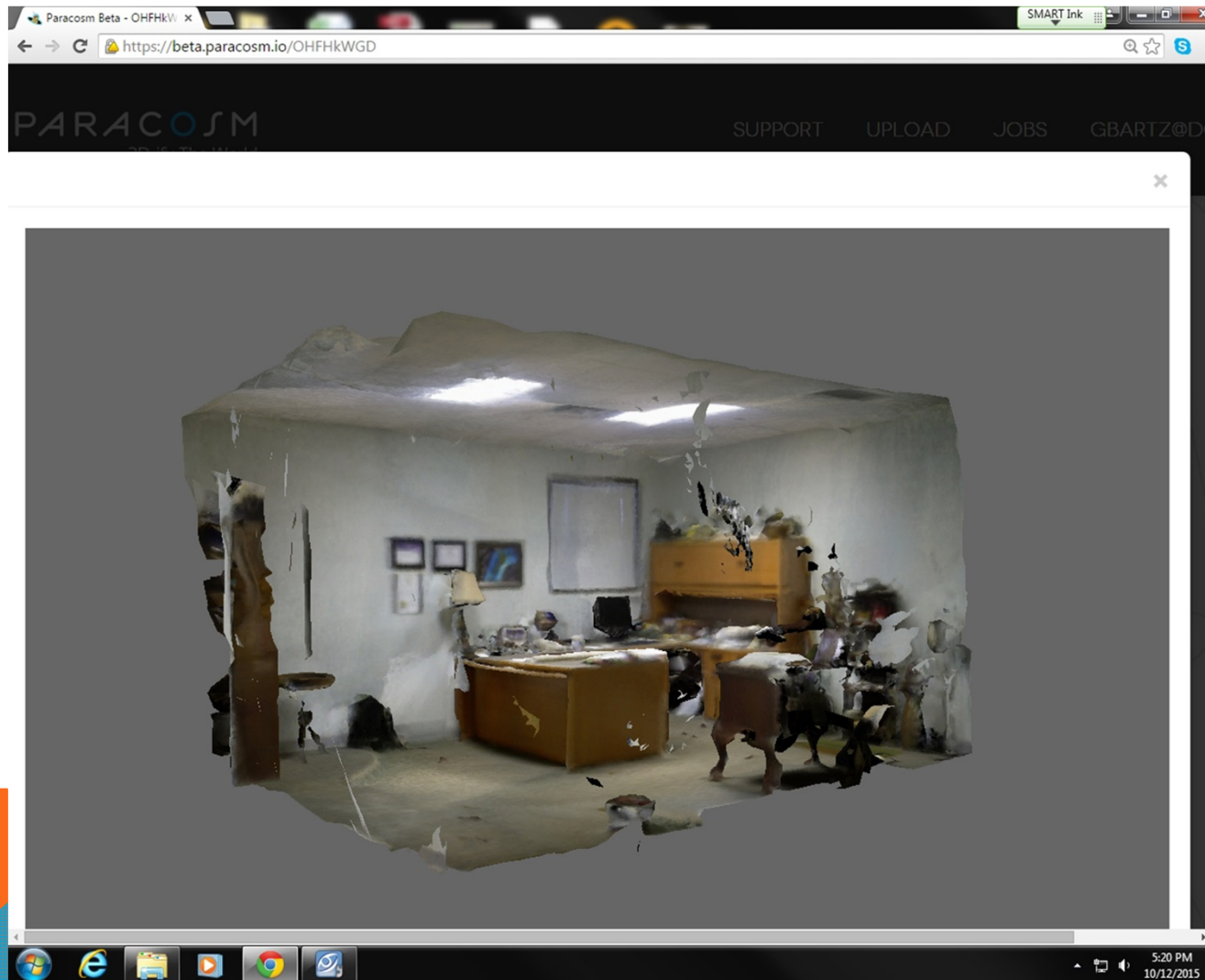
Format:

LAS ▼

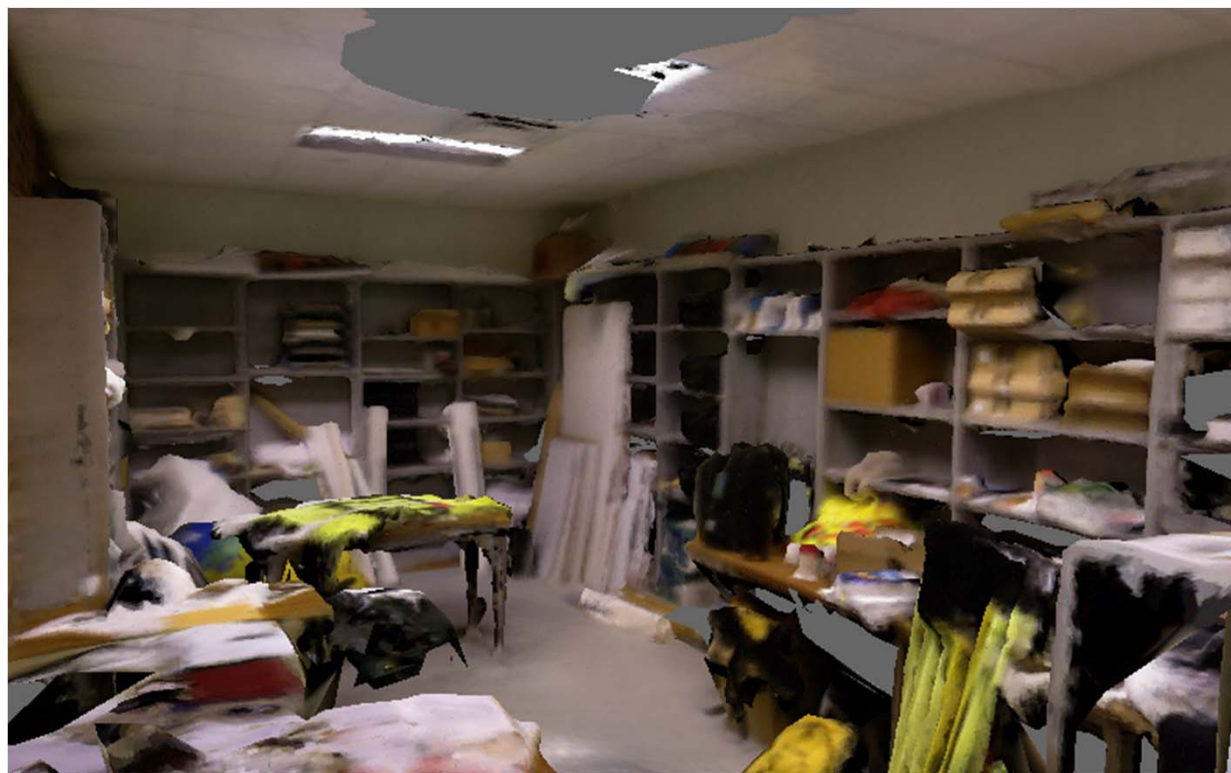
[Download](#)



RESULT OF SCAN (PARACOSM VIEWER)

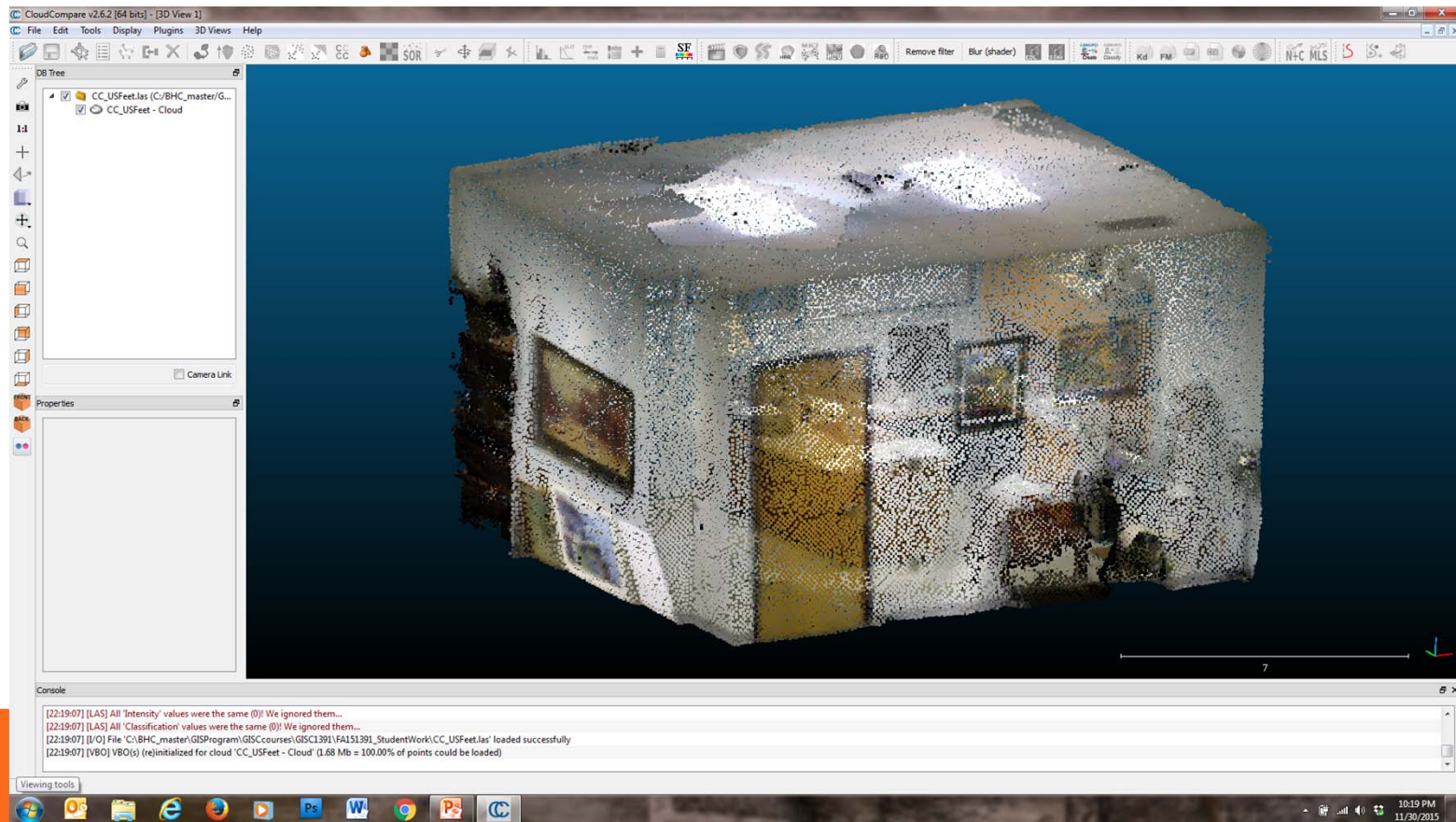


ANOTHER SCAN RESULT



TRIM, ORIENT & SPATIALLY ADJUST LAS FILE

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

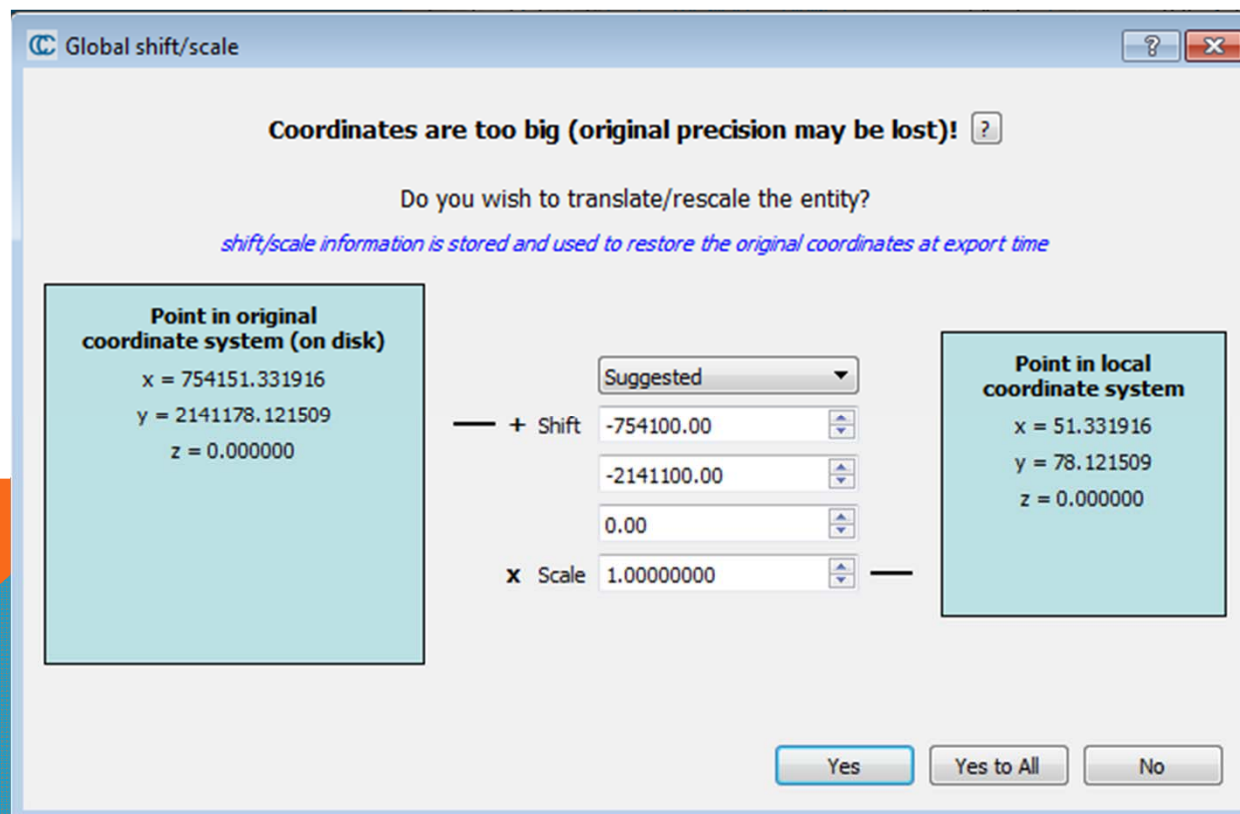


SPATIALLY ADJUST USING A SHAPEFILE

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.

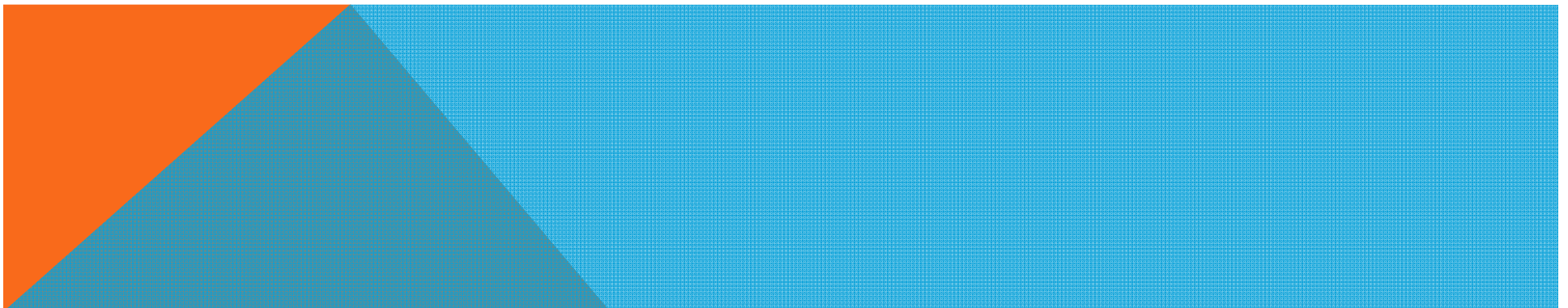
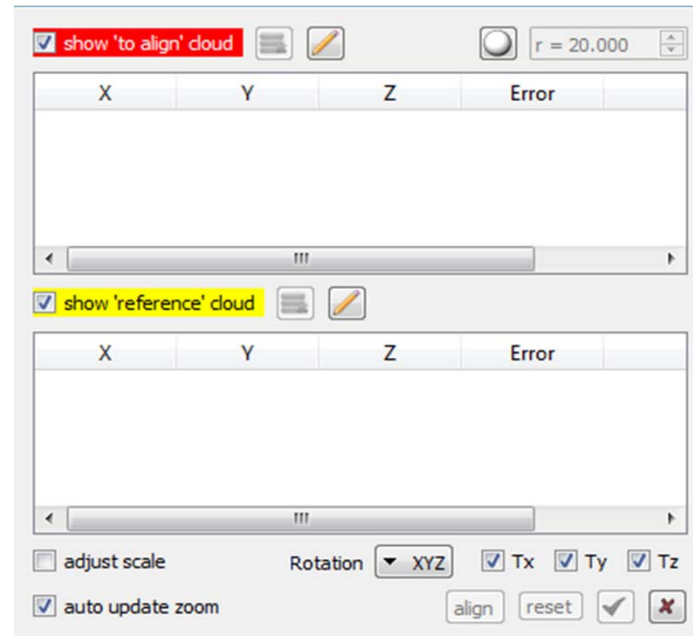
Make a near adjustment from 0,0,0 PCD to the real world shapefile control points



REFINE TO ACCURATE REAL WORLD COORDINATES

Using CloudCompare

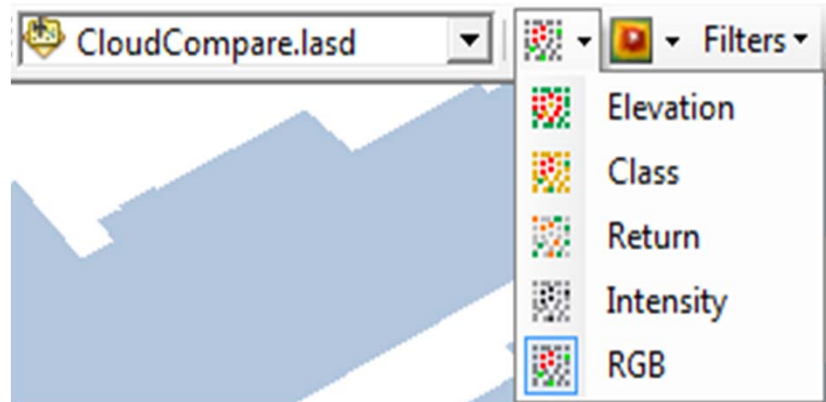
Once you have an alignment that you're satisfied with, make sure and **SAVE** your work! You now have a “referenced” pointcloud in .LAS file format



CREATE AN LASD AND ADD THE LAS FILE

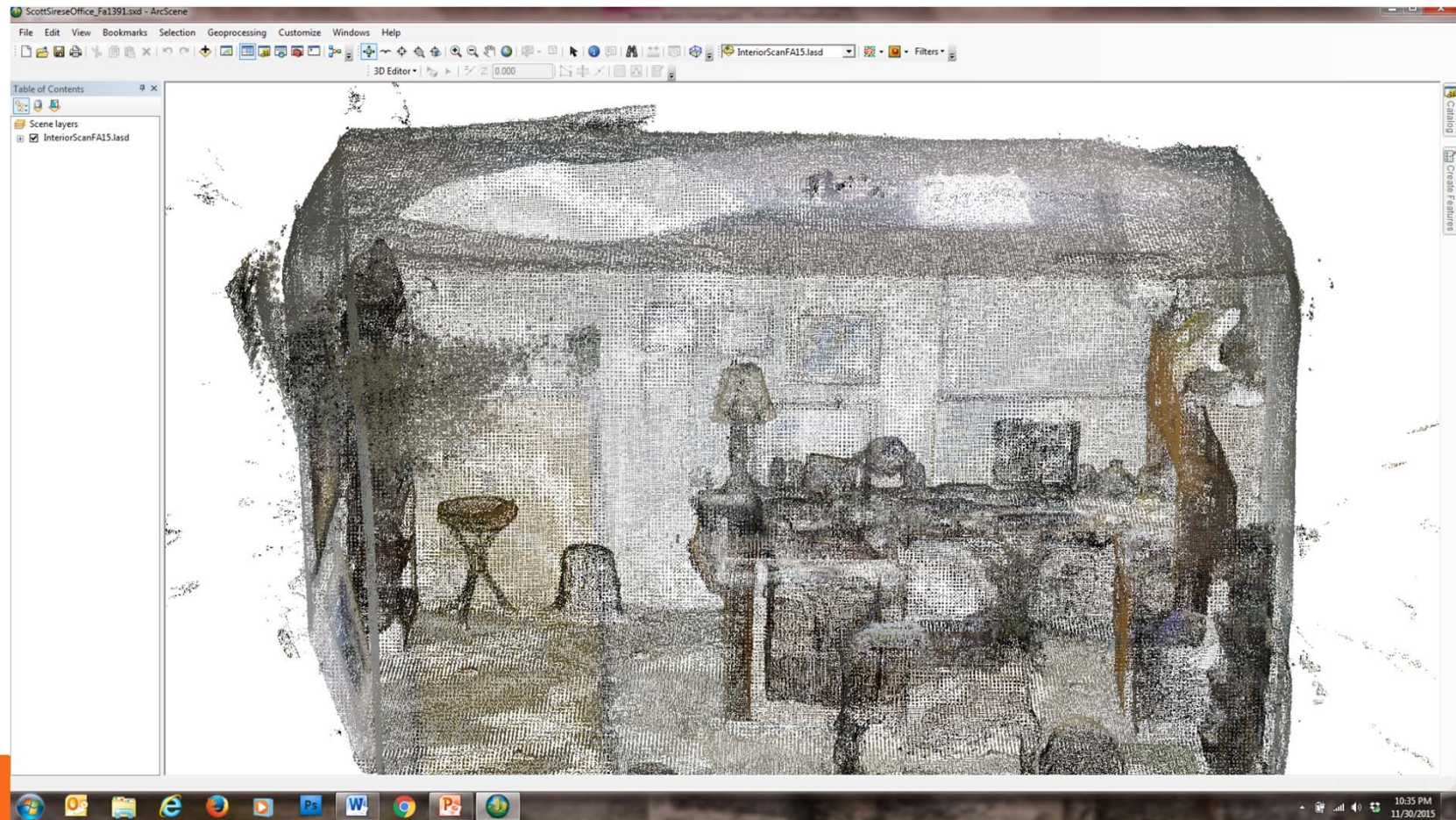
Use ArcGIS to create a new dataset consumable in desktop ArcGIS applications

In ArcScene symbolize the PCD with their imbedded RGB values



Properties
Reveal the
Details

WHAT YOU WILL SEE IN ARCSCE



NEXT STEPS

Feature classification

Feature extraction

LiDAR processing applications

Email ssires@dcccd.edu to get a copy of the updated SOP
(available in June 2016).

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Professor & Coordinator – Brookhaven College Geospatial Technology

972-860-4362



Thank You!