



Student Applied Innovations to Support Indoor Real-world Solutions

Dallas College Facilities Floor Plan Project

INDUSTRY / COLLEGE / STUDENT / INTERN / ME



the abstract

- ▶ Our project is to **digitally map interior space** for 110 college buildings (4.8M sq. ft.). Deliverables are a **geodatabase of features** for each room, must-have **attributes**, and a **web app providing the workflow** experience facilities users need. GIS courses are **contextualizing GIS lessons** with students performing all steps to **study the project, develop workflows, tools, and resources**. As paid part time employees they **collect point cloud data and attributes**, and process the data creating up to date, as-built, floor plan vector features. The impacts include improved student **experiences, portfolio** content and **project-heavy resumes**. The project supports several facilities workflows and the implementation of ArcGIS Indoors.
- ▶ Our project includes: 1. ArcGIS Indoor Information Model, 2. Survey123, 3. Lidar - 3D, 4. Dashboard



Purpose today

- ▶ Takeaways
- ▶ Resources
- ▶ Workflows
- ▶ Successful case study
- ▶ Workforce
- ▶ Abandonment of your concern (*Validation*)

Audience additions?

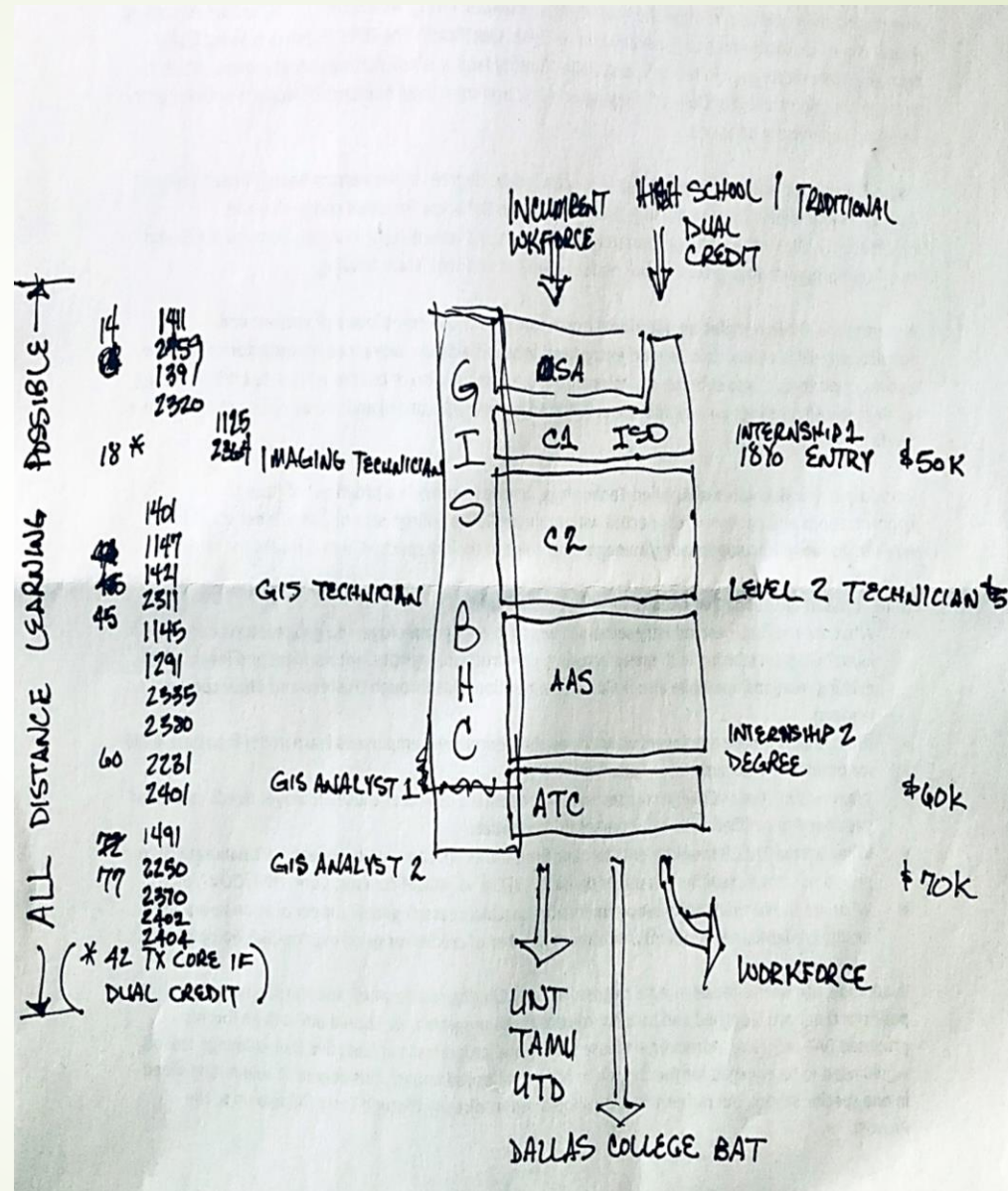
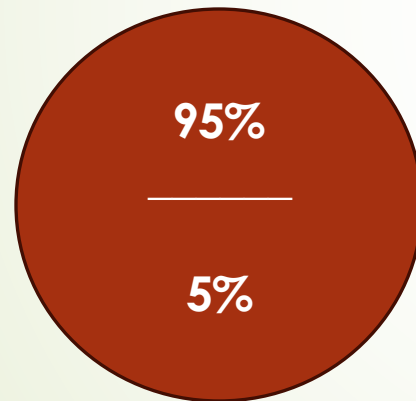


Top level workflow elements

- ▶ Collect
 - ▶ Survey (123)
 - ▶ Attributes (Room#, type, windows, doors, name, FICM code, photos)
 - ▶ Scan (SLAM)
 - ▶ Create campus floor plan features -14 locations, 110 buildings, 4.8M Sq. Ft.
- ▶ Process
 - ▶ ArcGIS Survey123 Connect
 - ▶ GeoSLAM Connect Viewer
 - ▶ ArcGIS Pro
- ▶ Share
 - ▶ Create online portal for client viewing
 - ▶ ArcGIS Dashboards

Context in the curriculum

- Design
- Field test
- Deploy at scale
- Survey
- Scan
- Upload
- Process
- Slice
- Digitize
- Share



ArcGIS Survey 123 Connect

- Smart form used to gather data
- Web designer vs desktop version
- Can be updated as needed
- Currently being used to obtain room features
- Collected data will be exported to ArcGIS Pro

Using the web designer



Blank survey

- Start from scratch
- Design your own survey
- Use a drag-and-drop editor

Get started



Template survey

- Browse industry templates
- Pre-configured questions
- Use a drag-and-drop editor

Get started

Using Survey123 Connect



Survey123 Connect

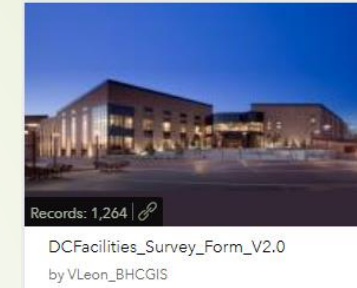
- Use a desktop application
- Full smart form capabilities
- Edit an XLSForm spreadsheet

Get started

3rd Version
millwork

ArcGIS Survey 123 Connect

A	B	C	D	F	G	H	I
type	name	label	hint	appearance	required	required_message	readonly
note	survey_note	Survey Purpose	This survey is designed for data such as window size, door openings, images of rooms, and to be added to Lidar collected data for the s				
note	survey_note2	Contact information: ssires@dallascollege					
text	WorkOrderID	WorkOrderID			yes		
begin group	room_details	Room Details					
note	note_room_details	The following lines are used to select the appropriate car	hidden				
select_one site_location	site_id	Site	Campus or center location	minimal	yes		
select_one building_bhc	facility_bhc_id	BHC Building		minimal	yes		
select_one building_cvc	facility_cvc_id	CVC Building		minimal	yes		
select_one building_efc	facility_efc_id	EFC Building		minimal	yes		
select_one building_ecc	facility_ecc_id	ECC Building		minimal	yes		
select_one building_mvc	facility_mvc_id	MVC Building		minimal	yes		
select_one building_nlc	facility_nlc_id	NLC Building		minimal	yes		
select_one building_rlc	facility_rlc_id	RLC Building		minimal	yes		
text	facility_center_id	College Centers					
text	facility_operations_id	College Operations					
text	level_id	Floor Level			yes		
text	unit_id	Room Number	Letter and number (ex: H		yes		
text	name	Room Name	Official name of room				
text	room_description	Room Description					
image	photo_room_plaque	Room Plaque Photo	Take a photo of the roomne.				
image	photo_room	Room Photo	Take a photo of the entirey.		yes		
begin group	spike_full_measure_group	Height of the Room					
note	note_room_height	Following lines are used to pull data from Spike unit when used to measure the height of a room.	hidden				
image	spike_fullrh	Spike	Take ONE photo that includes a wall from ceiling to floor.	spike-full-measure			
note		<center>WARNING: perform a <u>single length</u> measurement</center>					
decimal	lengthrh	height of room (m)	height of the tallest wall from floor to ceiling	hidden			
decimal	lengthrh_inches	Room Height	Height of the tallest wall from floor to ceiling. Dimensions are in inches		yes		
hidden	imagedescriptionrh	Image Description		multiline			
hidden	dest_point_fullrh	Text Point					
end group							
select_one FICM_list	FICM_code	FICM Code	See the Facilities invento	autocomplete			
end group							
begin group	door_details	Entry Door Details					
note	note_door_details	Initial focus is the main entry doorway and additional co	hidden				
select_one swing_name	door_swing	Door Swing	With the door open and y	compact	yes		
text	door_swing_other	If other is chosen, explain			yes		
select_one direction_name	door_direction	Door Direction	Does the door open into	compact	yes		
text	door_direction_other	If other is chosen, explain			yes		
integer	door_additional	How many additional doors are	(not including the entranc	numbers	yes		
select_one swing_name	door_swing_1	Door 1 Swing		compact			



DC Facilities Room Report

Survey Purpose
This survey is designed for the collection of facilities data such as window size, door openings, images of rooms, and to be added to Lidar collected data for the same location.

Contact information: ssires@dallascollege.edu

WorkOrderID *

Room Details

Site *
 Campus or center location

BHC Building *

Floor Level *

Room Number *
 Letter and number (ex: H105)

Room Name
 Official name of room

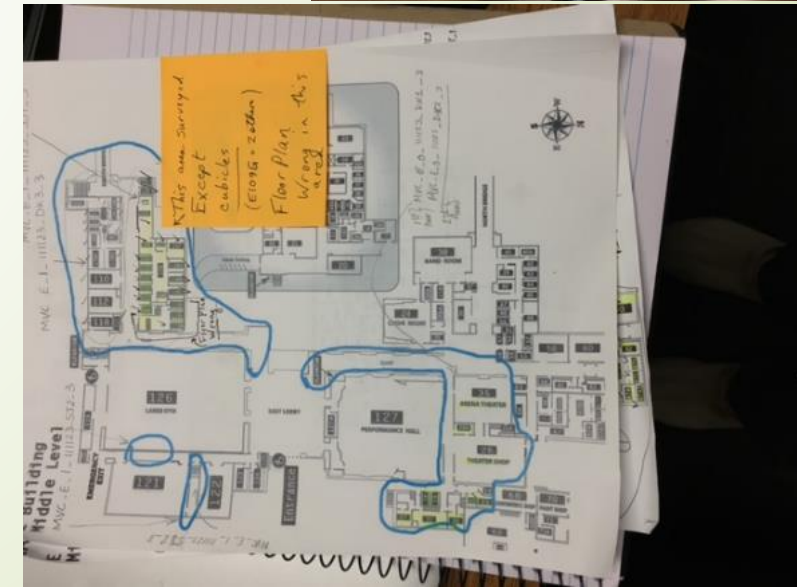
GeoSLAM Connect Viewer

Hardware:

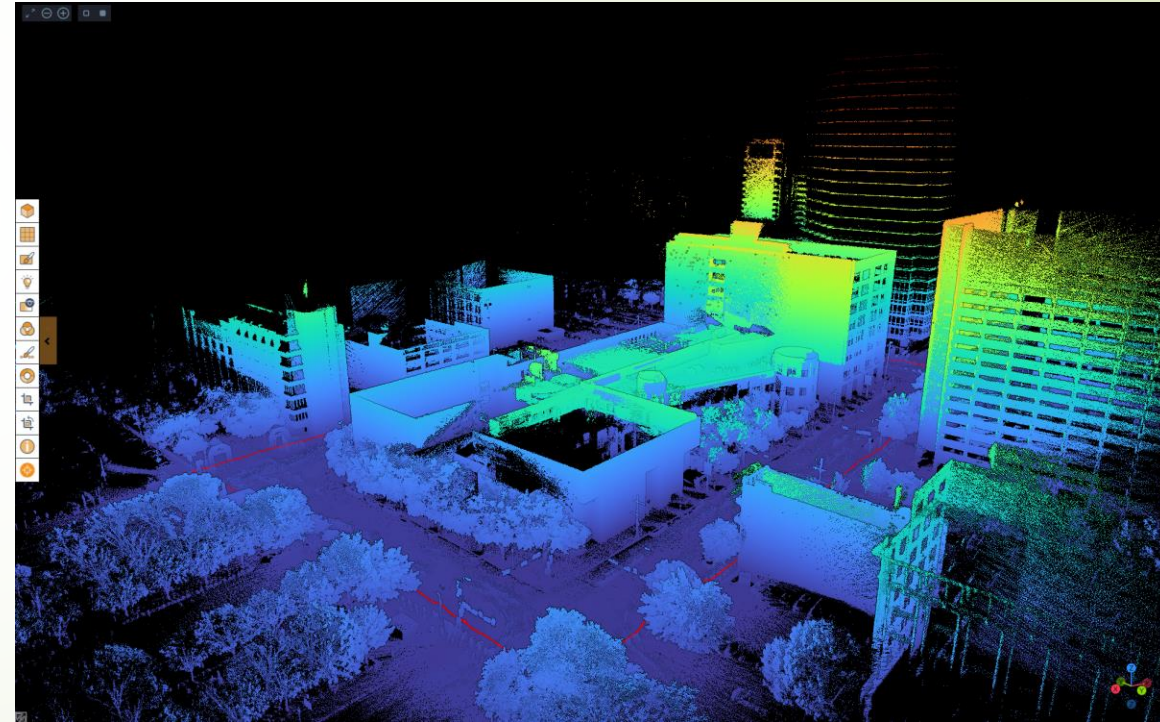
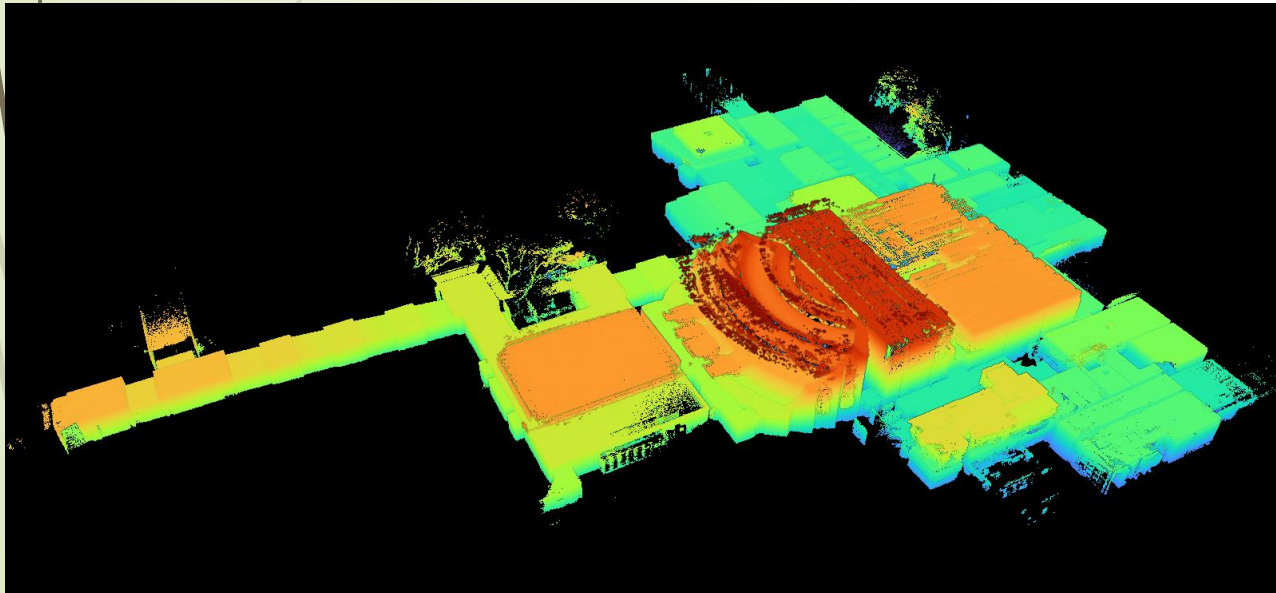
- ZEB Horizon
 - LiDAR
 - 300,000
 - 3D Models
- ZEB Vision
 - RGB
- ZEB Locate
 - GNSS
- ZEB Revo RT

Software:

- Connect Viewer
 - Imports GeoSLAM file
 - Filter
 - Colorize
 - Georeference
 - Floorslice
- Hub
- Draw



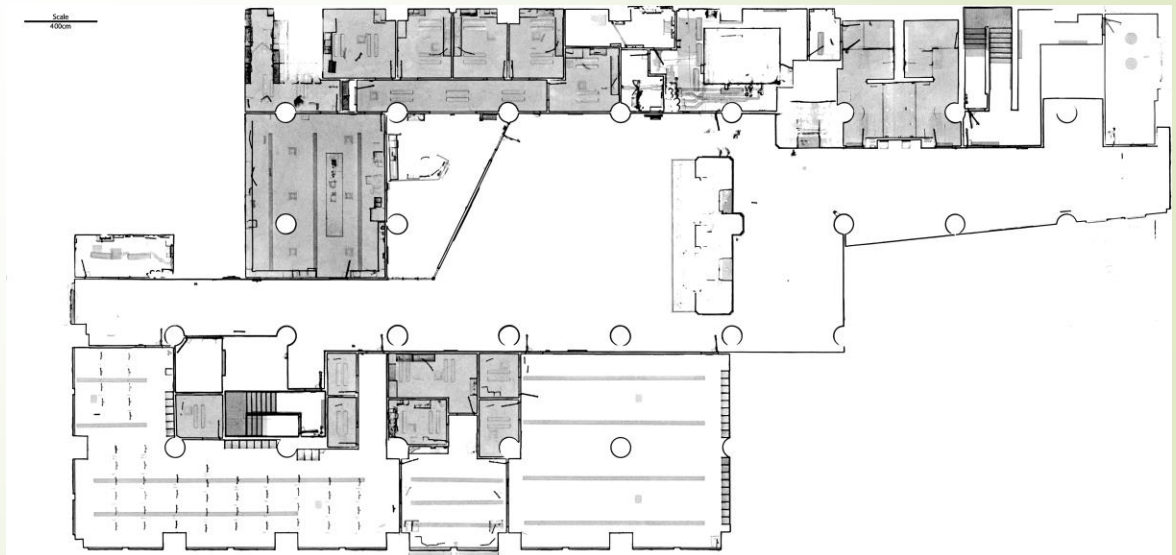
GeoSLAM Connect Viewer

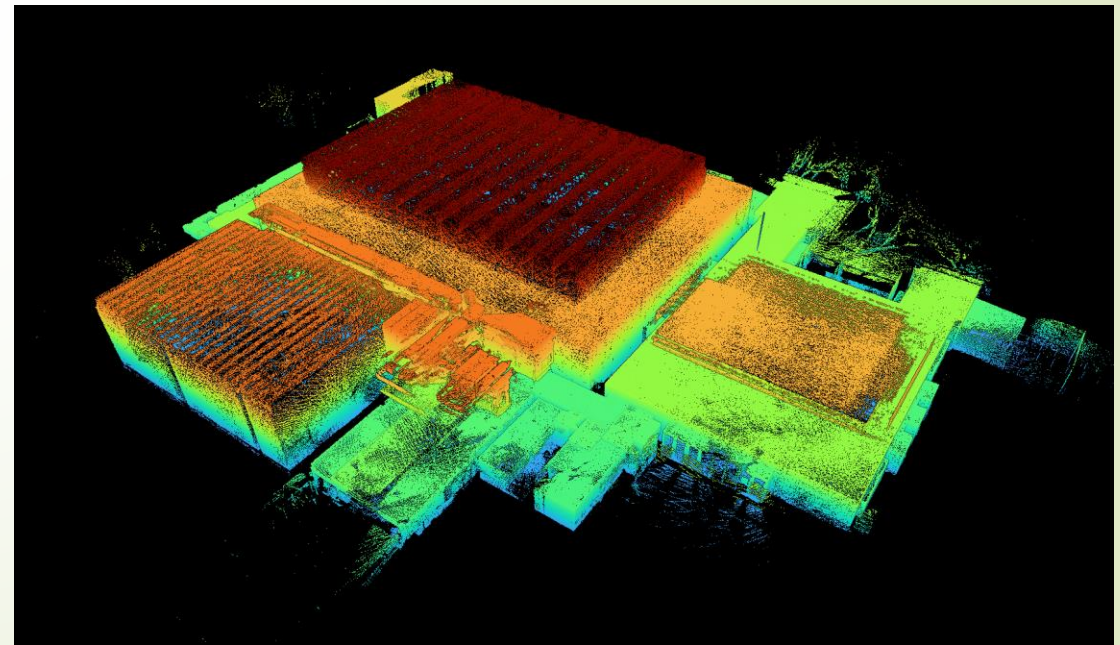
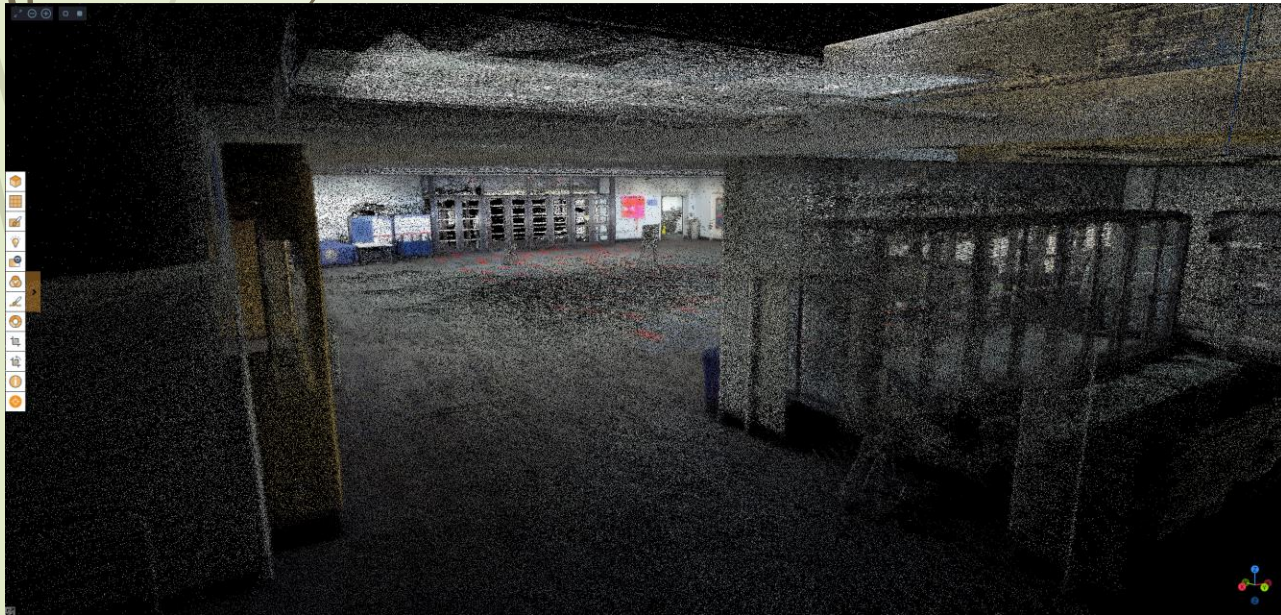
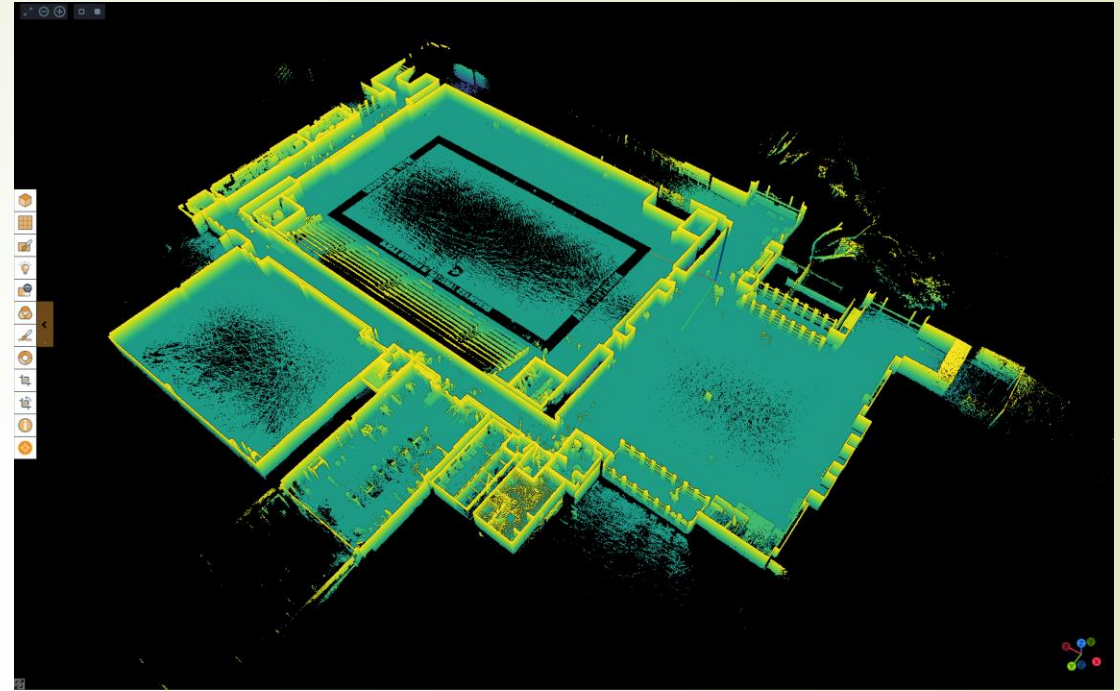


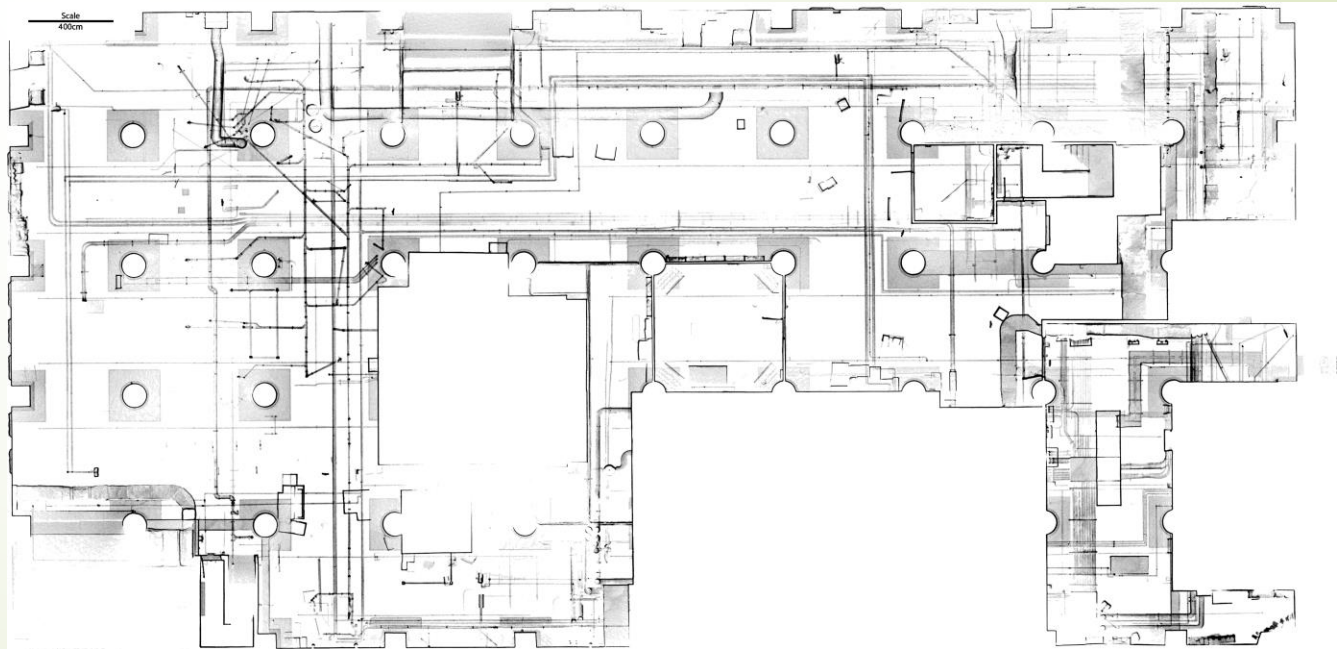
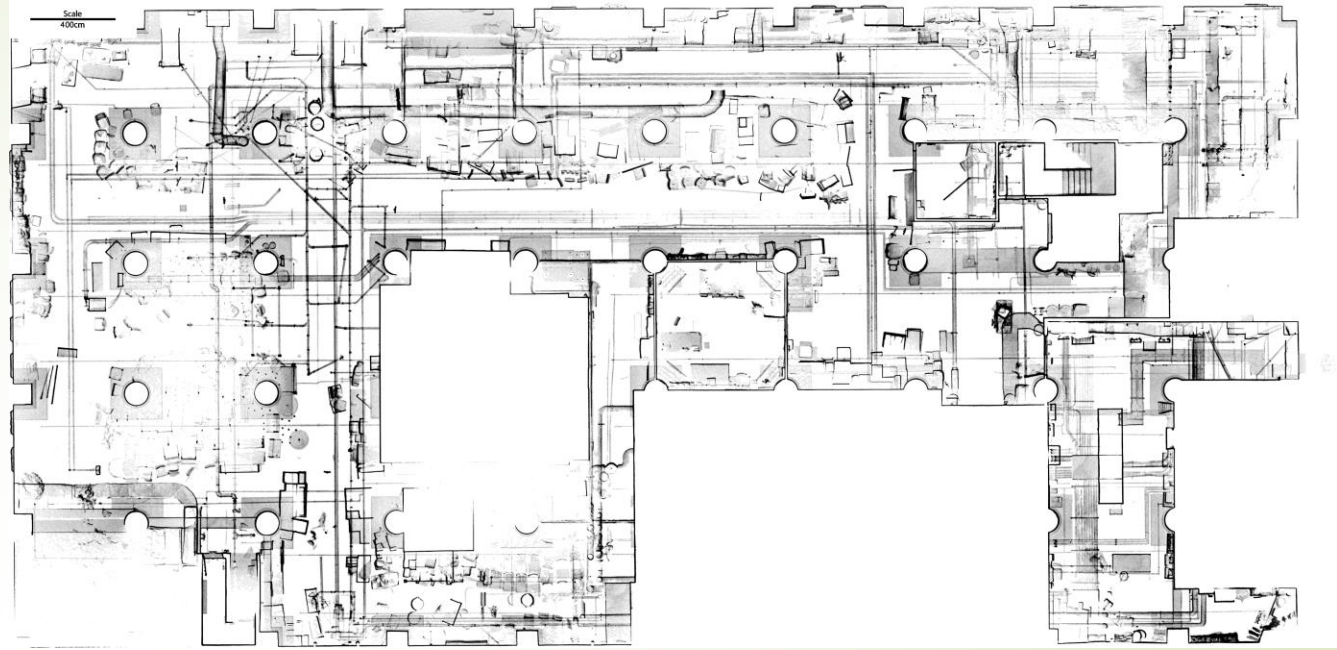
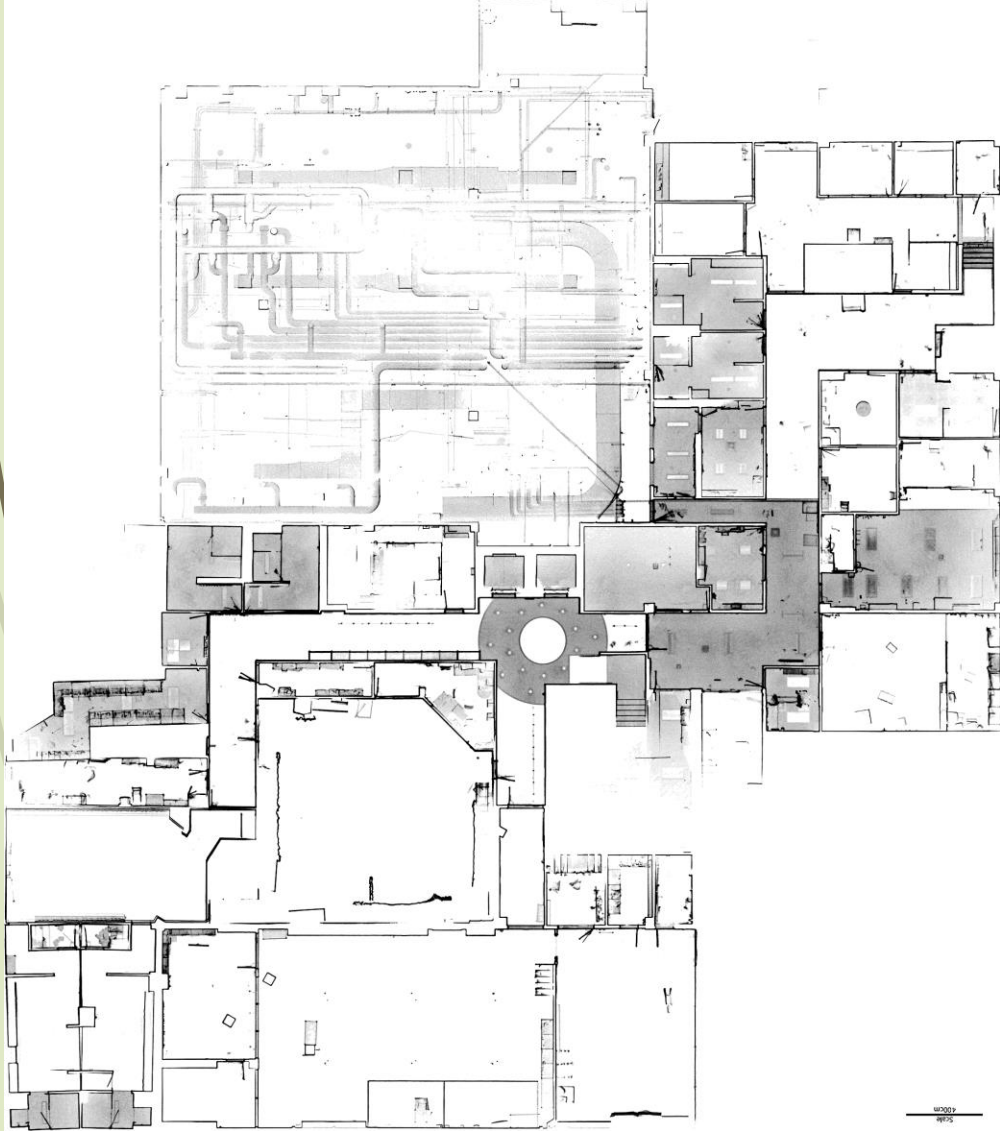
GeoSLAM Connect Viewer



They
didn't ask
for this.



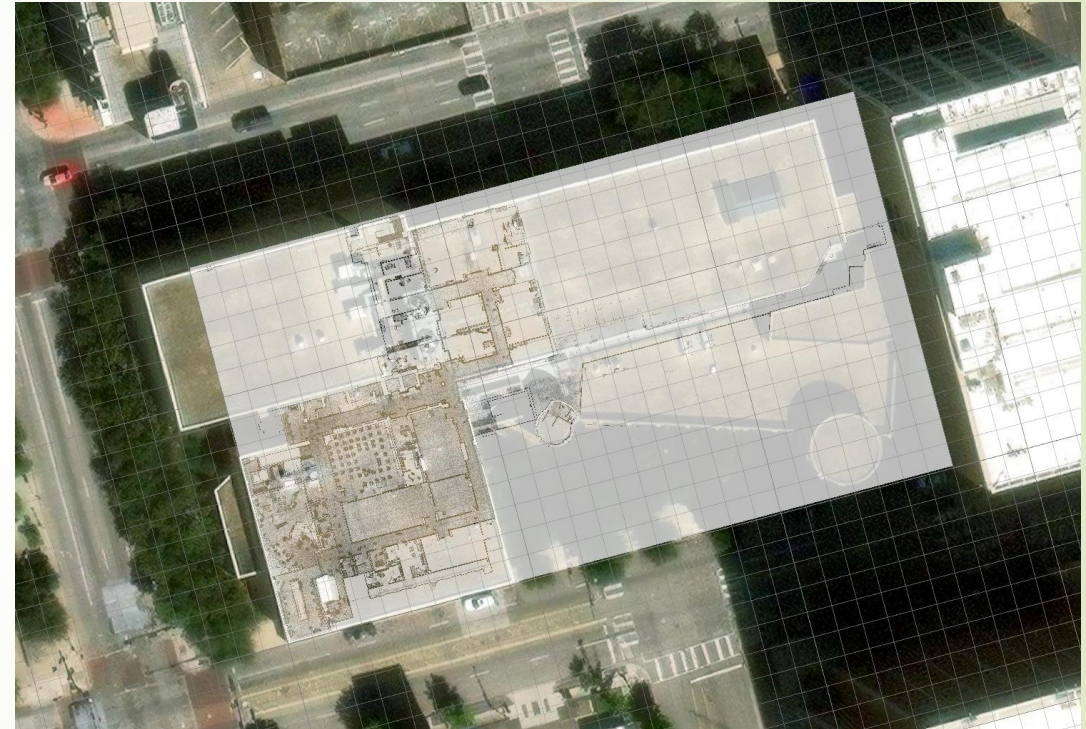




ArcGIS Pro

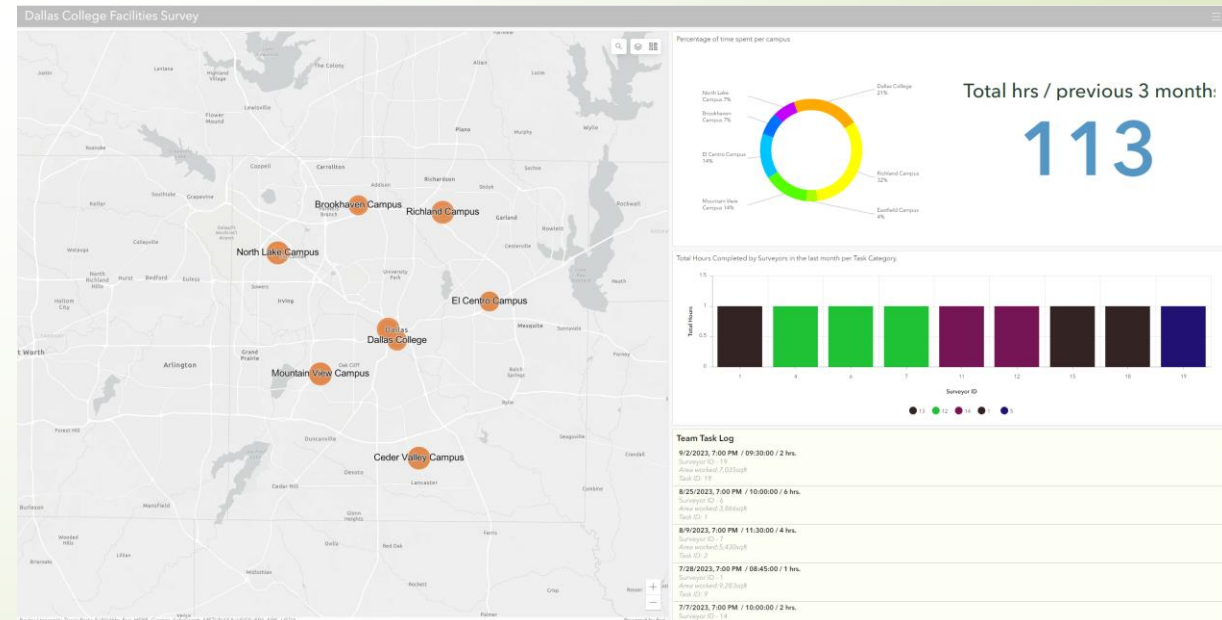
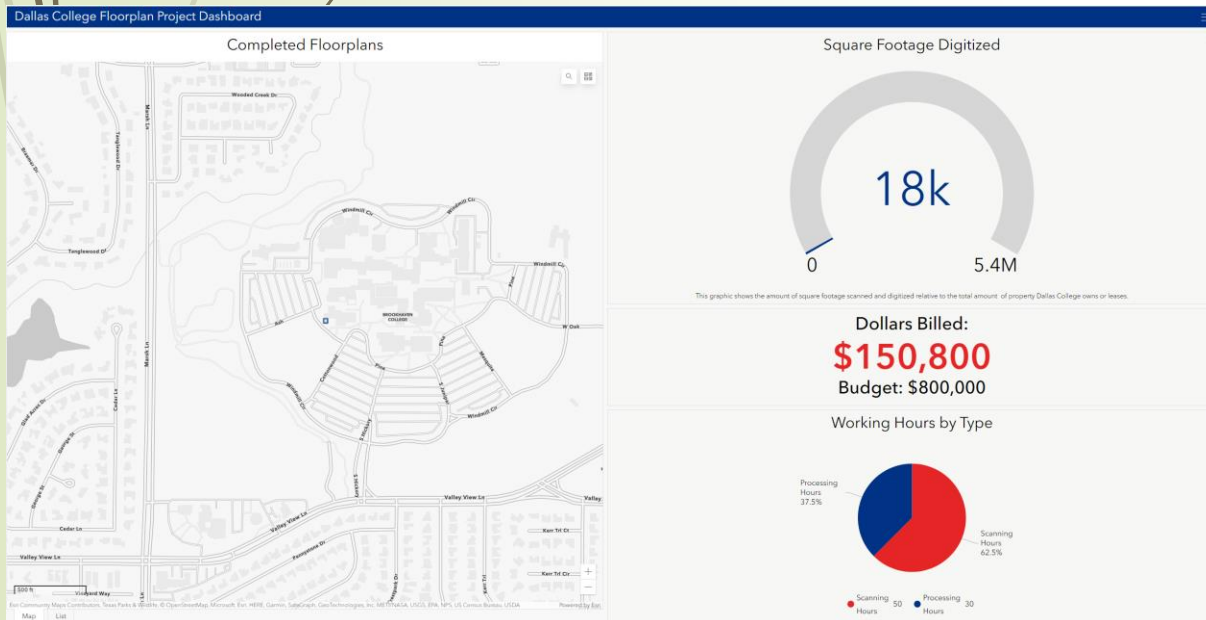
- Georeference floorslices
- Digitize features
- Import/append survey records
- Export web map and dwg file

	OBJECTID *	SHAPE *	Shape_Length	Shape_Area	Room Number
1	1	Polygon Z	39.193666	58.199923	H114
2	3	Polygon Z	20.140722	24.717402	H115
3	4	Polygon Z	50.505765	155.447139	H112
4	5	Polygon Z	43.471822	117.566703	H113
5	10	Polygon Z	43.195367	115.71329	H105
6	12	Polygon Z	81.517413	326.720587	H126
7	13	Polygon Z	11.455214	8.147799	<Null>
8	14	Polygon Z	25.934386	35.533332	H122
9	15	Polygon Z	95.960387	491.948114	H125
10	16	Polygon Z	15.358637	11.976997	<Null>
11	17	Polygon Z	12.6165	9.159945	<Null>
12	18	Polygon Z	33.644133	68.256577	H129
13	19	Polygon Z	214.825884	394.374065	<Null>
14	21	Polygon Z	25.296346	35.941431	H111
15	25	Polygon Z	17.6874	19.554424	H110
16	26	Polygon Z	11.412955	8.082454	<Null>



ArcGIS Dashboards

- Compile and present metrics
- Monitor progress
- Aug 2023 Launch
- 1.8M Sq. Ft. as features
- 38% complete
- Scans made
- Number of rooms
- Slices created
- Features created
- Issues / Anomalies





Students / Interns as **Co-Owners**

all-hands meetings per each campus deployment

➤ PIER analysis

- Plan
- Implement
- Evaluate
- Revise

➤ SWOT analysis

- Strengths
- Weaknesses
- Opportunities
- Threats



**\$30M
Curtailed**



Student Reflections

- ▶ Important elements:
 - ▶ Understanding and experiencing the entirety of the project can reinforce the fact that even the most mundane tasks will impact the latter portions of the workflow.
 - ▶ Scope of work can change. Be prepared to adapt when possible, and change where needed, within reason.
 - ▶ Window features take a long time to do thus captured features were reduced
 - ▶ New buildings were added to scope thus a new survey is created with additions
- ▶ What skills have I learned that will support my career?



More from a student

Project management

- ▶ Direction of the team's efforts during deployment
- ▶ Multitasking to complete deliverables

Troubleshooting

- ▶ Correcting equipment handling by individuals
- ▶ Solving equipment anomalies

Adaptability

- ▶ Training cannot cover every single scenario
- ▶ Must be flexible in situations with outliers

Data Quality

- ▶ Ensuring accuracy and completeness of scanned environments



Student Final Thought

Found anything surprising? Learn something unexpected?

- ▶ Important to “love your data”
 - ▶ Not everyone may understand or care about your work and its implications
 - ▶ It’s essential to be able to communicate your vision when questioned
 - ▶ Stay true to the quality of your work



Another student's reflections

► Career lessons:

- Experiencing the whole project lifecycle: planning, execution, follow up, tweaking, re-executing etc.
- Being a self-starter/working without direct supervision. Having to make our own work happen and our own decisions
- Interacting with the public as were out scanning and having to navigate the interpersonal stuff
- Interacting with stakeholders and attending meetings with non-GIS oriented individuals
- Interpersonal skills: training people, keeping people on task, making sure everyone has a role and is effectively contributing to the project



More from this student

- ▶ Things that were surprising/unexpected:
- How many people you encounter on campus that are interested in the project or are happy to participate with us
 - This also stresses the importance of the “elevator speech” where you briefly explain the project as you encounter people while you work
- How it was easier than I expected to execute this giant scope of work if you plan well and take it one step at a time
- How much we could achieve “despite” being turned loose and doing it our own way



Next Steps

Floor Plan Project

- ▶ Spring 2025 completion of 7 majors
- ▶ Fall 2025 completion of all properties
- ▶ BH campus 4 of 7 – **May 2024**

GIS Academics

- ▶ GIS Across the College
 - ▶ 27 librarians
 - ▶ Embedding GIS in other disciplines
- ▶ AI data mining
 - ▶ Fire planning
- ▶ ArcGIS Indoors
- ▶ Clery Compliance
- ▶ Lab Specialist
- ▶ 2nd GIS Faculty
- ▶ Geotechnology Institute professional venue

Facilities Operations

- ▶ Hotel Officing
- ▶ Routing / ADA
- ▶ Sustainability
- ▶ Safety and Security

THANK YOU



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