Unlocking the Skies: The Transformative Role of Drone Technology in the Geospatial Workforce

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ILGISA Past President

Topics

- Introduction to UAS industry
- Expanding role of drones in geospatial practice
- FAA Part 107 certification
- Workforce skills and training needs
- Opportunities and challenges
- Resources

Introduction to UAS technology

- Commercial industry: Fast growth
- Several key applications driving growth
- Remote pilot certifications
- Technological advancements

Category	Number
Total Registered Drones	822,039
Commercial Drone Registrations	433,407
Recreational Drone Registrations	388,632
Certificated Remote Pilots (Part 107)	460,375
TRUST Certificates Issued	1,121,891

As of the end of 2024 (FAA, 2025)

Expanding Role of Drones in Geospatial Practice

How are drones reshaping the work of geospatial and remote sensing professionals?

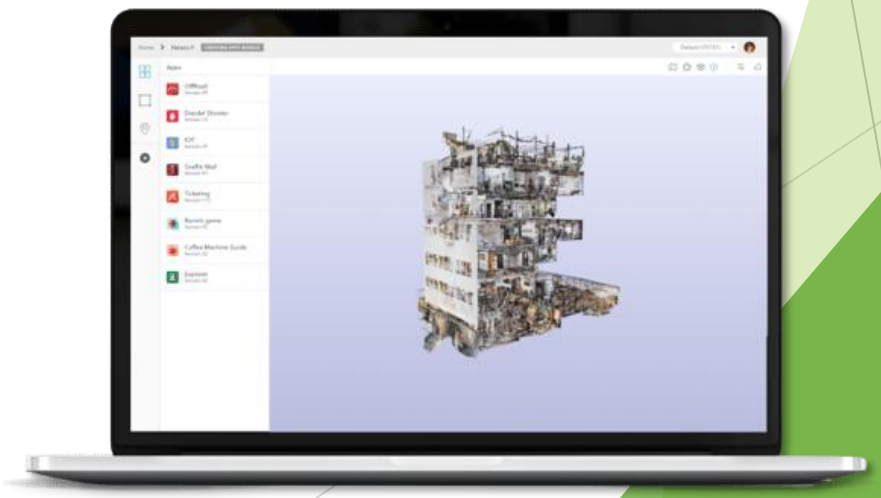
1. **Faster, On-Demand Data Collection**
2. **Higher Spatial and Temporal Resolution**
3. **New Data Types**
4. **Cost Savings and Accessibility**
5. **Safer Fieldwork**
6. **Improved Workflow Integration**
7. **Expanding Professional Roles**

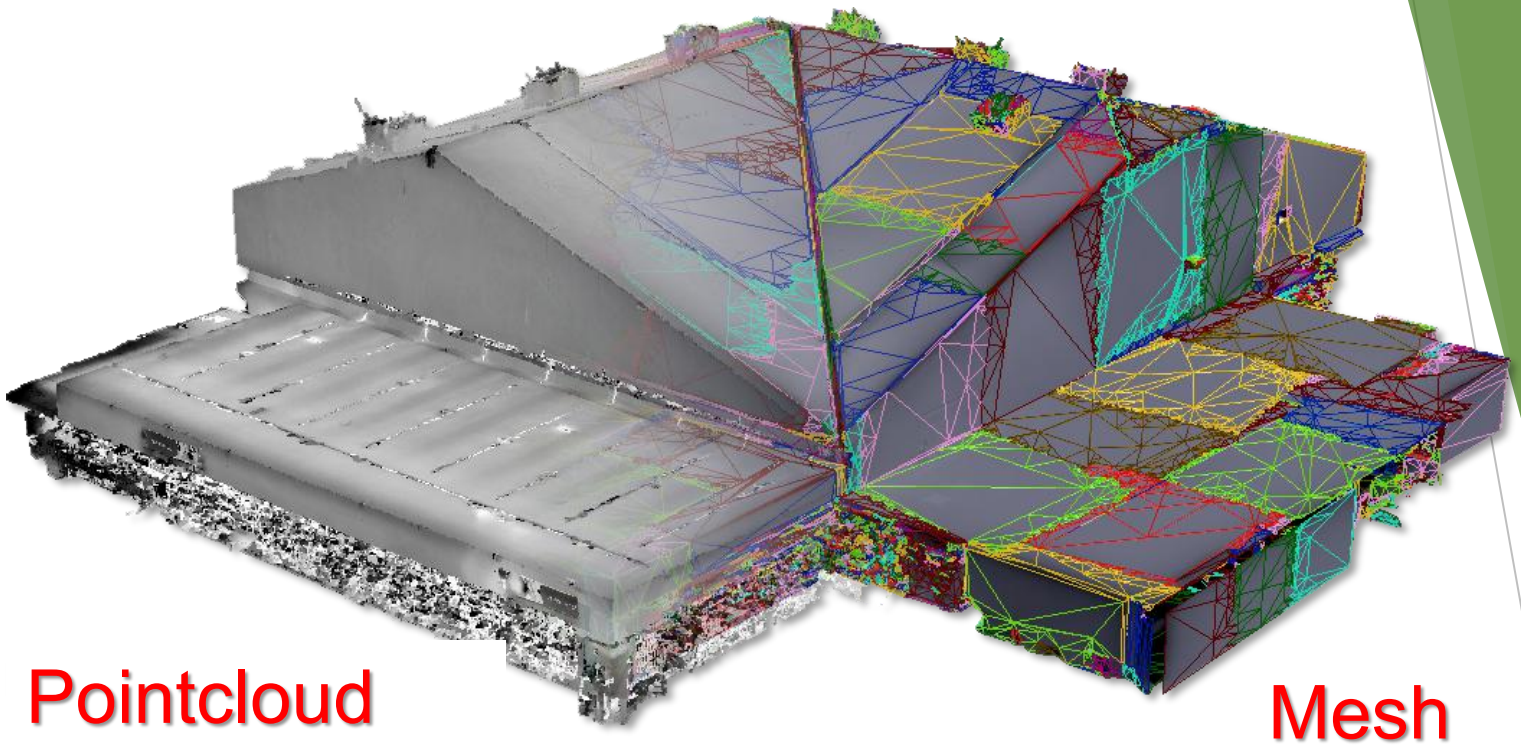
Mapping and Orthophotography Applications

- High-resolution mapping for land surveying and urban planning
- Improved efficiency and accuracy compared to traditional methods

3D Modeling & Digital Twins

- Applications in urban settings:
  - construction,
  - infrastructure, and
  - heritage sites
- Drone data enables detailed 3D reconstructions





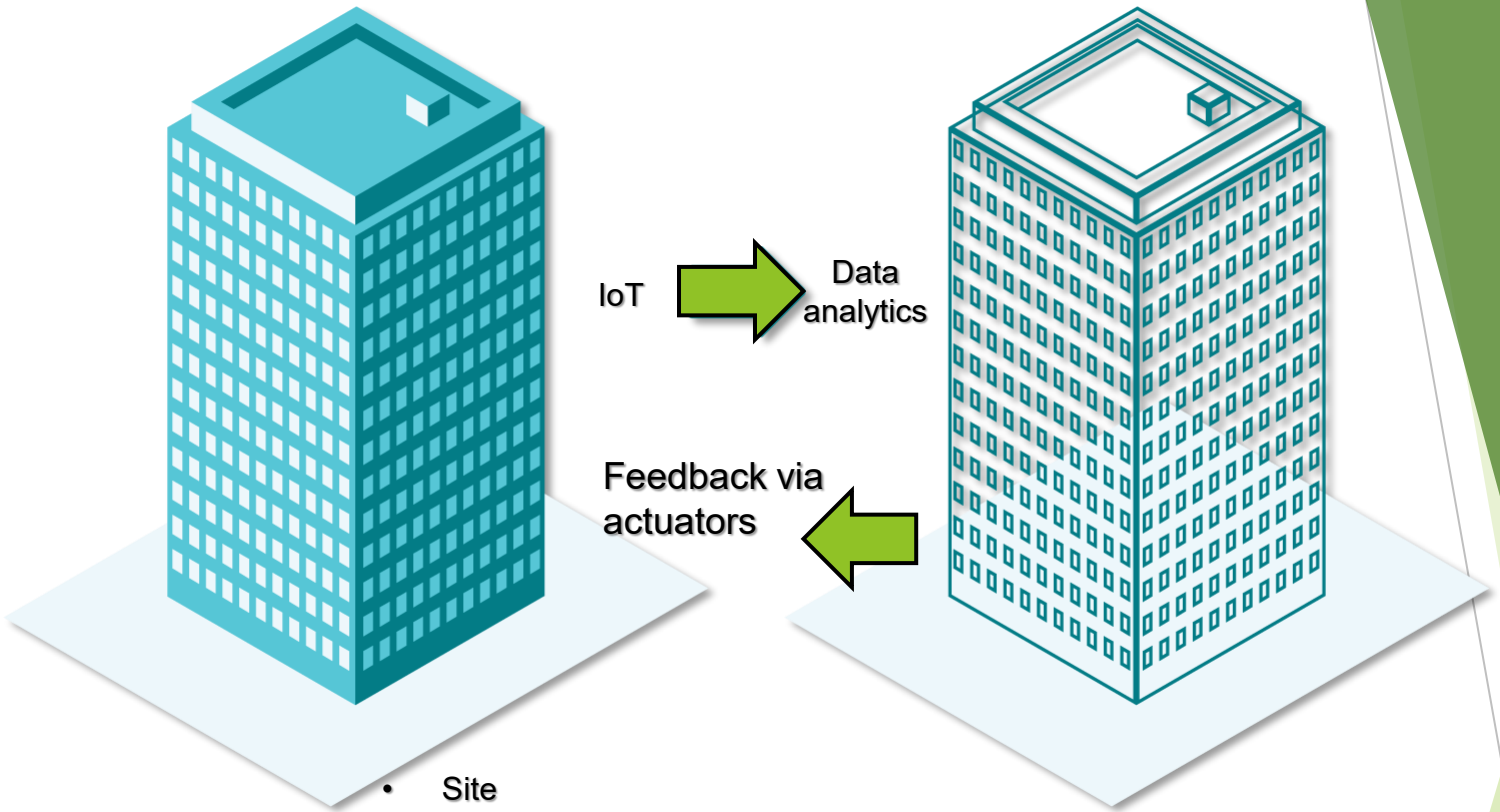
Pointcloud

Mesh

A **point cloud** is a set of data points in 3D space, while a **mesh** is a collection of interconnected triangles that form a surface. Both are used to represent a building in 3D, but they differ in how they represent the building's geometry.

Point clouds offer high accuracy for measurements and analysis, while meshes are better for visualization and creating realistic 3D models.

Platform	Strengths	Limitations	Best For
Drone2Map	Seamless integration with the ArcGIS ecosystem; offers automated and semi-automated processing tools	Requires an active ArcGIS license; slower processing for extremely large datasets	Creating orthomosaics, DSMs/DTMs, and 3D models
Pix4D	Industry-standard; multiple modules; strong accuracy	Expensive; requires powerful hardware	Mapping, surveying, engineering
Agisoft Metashape	High-quality; flexible workflow; perpetual license	Steeper learning curve; less automation	Research, cultural heritage, advanced users
DroneDeploy	Cloud-based; easy to use; team collaboration	Subscription model; limited offline use	Construction, agriculture, fast results
ESRI Site Scan	Native ArcGIS integration; enterprise-ready	Subscription required; ESRI lock-in	ArcGIS organizations
OpenDroneMap (ODM)	Free; open source; customizable	Requires setup; slower; less polished	Education, NGOs, budget projects



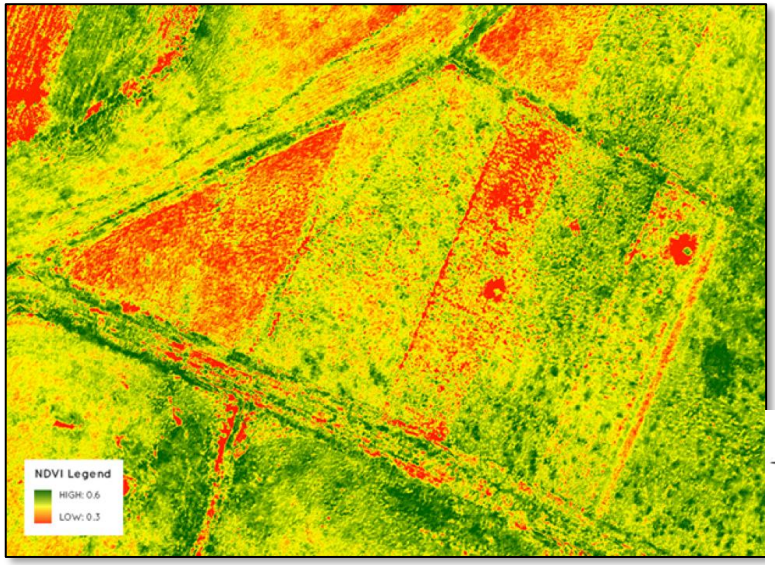
- Site
- Space
- Equipment
- Systems
- Sensors
- Actuators
- Reality capture Technologies

- BIM data
- Augmented reality
- Reports
- Dashboards

Digital Twins

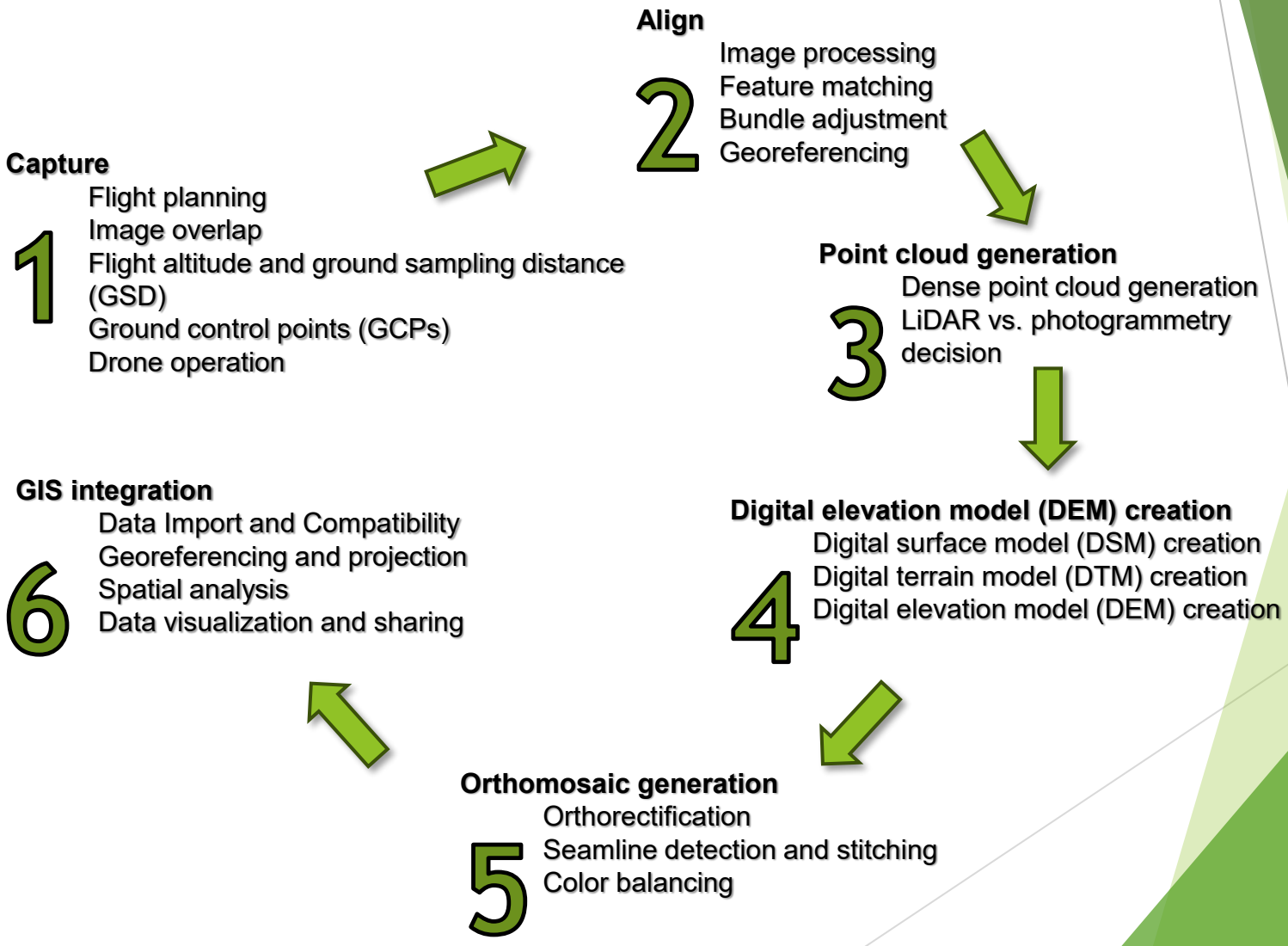
Environmental Monitoring Examples

- Vegetation and Crop Health (NDVI Monitoring)
- Forest Health and Deforestation Monitoring
- Water Resources Monitoring
- Wildlife and Habitat Surveys
- Air Quality and Pollution Monitoring
- Disaster and Environmental Impact Assessment



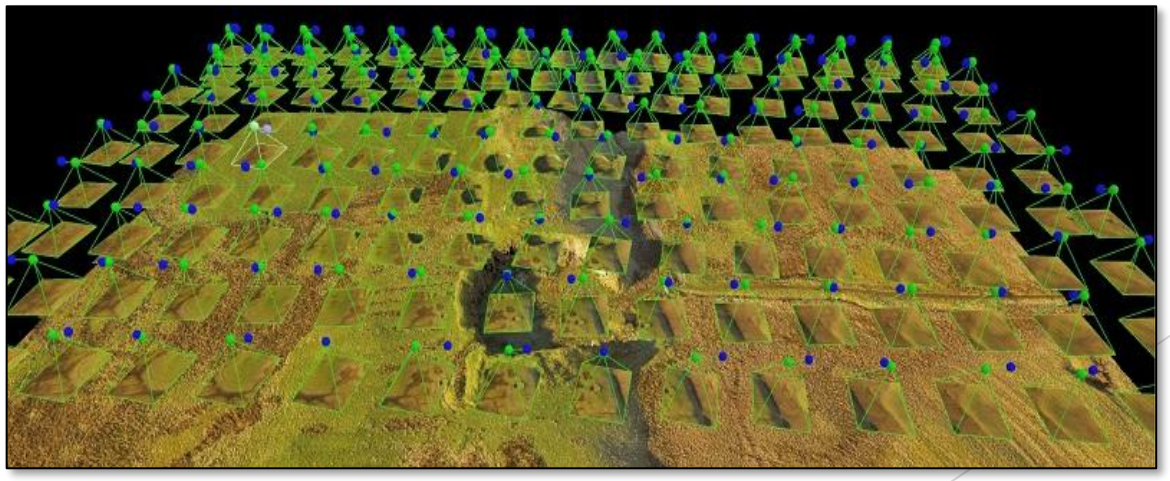
Normalized Difference Vegetation Index (NDVI)

Drone workflow: from capture to GIS integration



Additional Geospatial Applications for Drones

- Supports search-and-rescue, damage assessment, emergency mapping
- Infrastructure inspections: bridges, power lines, railways, pipelines



So...

You want to become an FAA Part 107 remote pilot...

FAA Part 107 Certification

Do You Need a Part 107 Remote Pilot License?

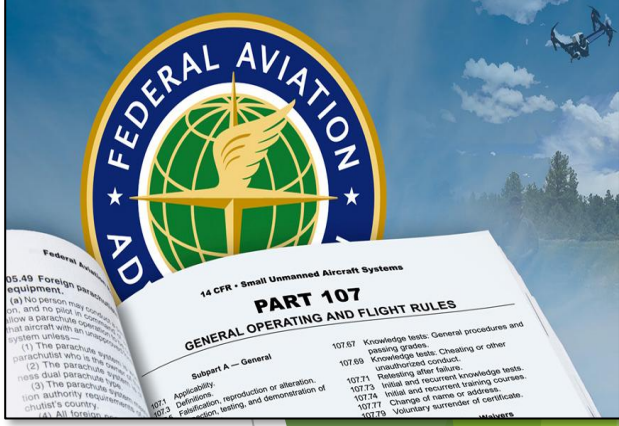
Fly Drones Recreationally

- **No**, however, as of June 2021 the FAA implemented **TRUST** (The Recreational UAS Safety Test), this requires all recreational drone pilots in the United States to **pass an online test**.

Fly Drones Commercially

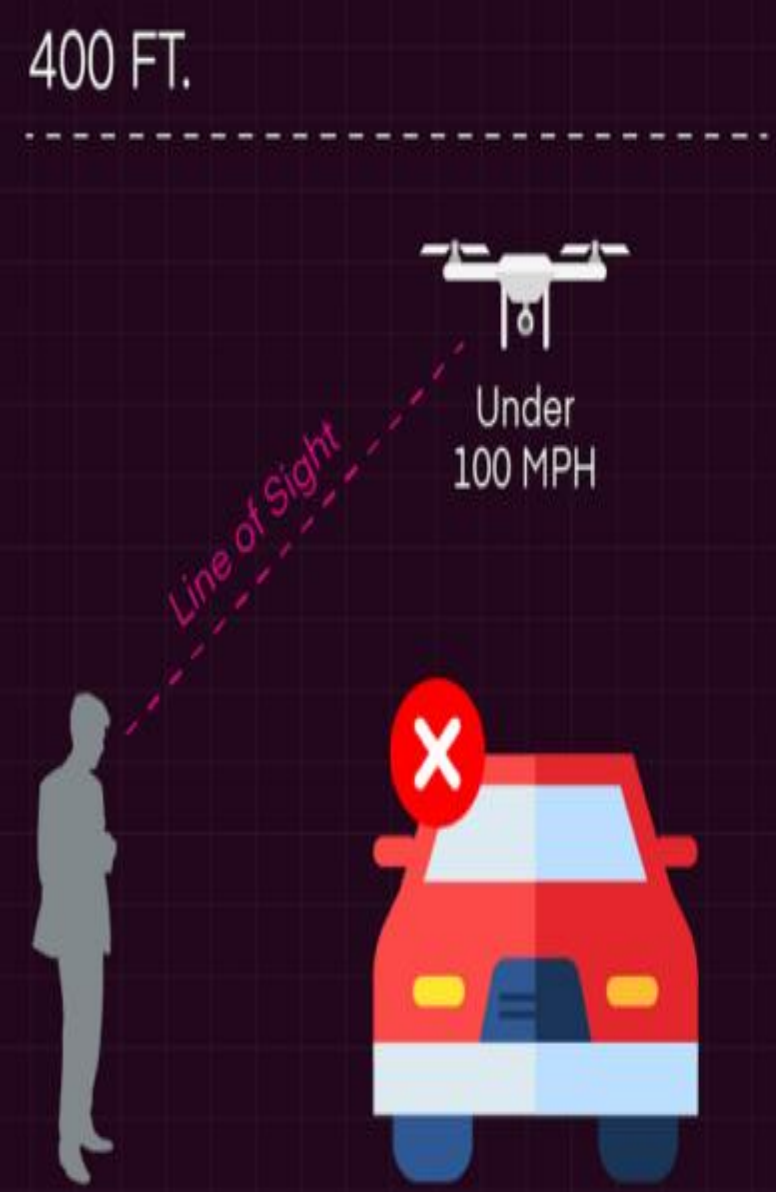
- **Yes**, if you plan to use your drone for commercial purposes you must get a Part 107 certification, then register your drone with the FAA and comply with Remote ID regulations.

Step-by-Step Guide to Obtaining Your FAA Part 107 Certification



1. Check Eligibility
2. Study the Exam Topics
3. Use Study Resources from FAA
4. Take Practice Exams (i.e., Rupprecht Law)
5. Schedule the Test
6. Take the Exam
7. Receive Your Results
8. Apply for Remote Pilot Certificate
9. Maintain Certification
10. Refresher certification (available for free online)

Operating Under the Part 107 License



- Register all commercial drones ($5 each, valid 3 years).
- Label drones with visible reg numbers.
- Fly under 400 ft, under 100 mph, in daylight, and within line of sight.
- No flying over people or from moving vehicles (unless remote).
- Use LAANC for controlled airspace.
- Keep license, registration, and flight logs.

What's on the Test?

UAS Topics	Percentage of Items on Test
I. Regulations	15-25%
II. Airspace & Requirements	15-25%
III. Weather	11-16%
IV. Loading and Performance	7-11%
V. Operations	35-45%
Total Number of Questions	**60**

🔑 **Big Four to Focus On:**
- **Regulations**
- **Airspace**
- **Weather**
- **Sectional maps**

(these account for nearly **50% of the exam**).

Section	Content	Approx. Weight
1. Regulations	Part 107 rules, waivers, operating limitations	15–20%
2. Airspace Classification & Requirements	Class B–G, SUA, ATC authorization	15–20%
3. Flight Restrictions	TFRs, NOTAMs	3–5%
4. Aviation Weather Sources	METARs, TAFs, charts	5–10%
5. Weather Effects on UAS	Winds, clouds, density altitude	5–10%
6. UAS Loading & Performance	Weight, balance, center of gravity	7–10%
7. Emergency Procedures	Lost link, flyaways, contingencies	3–5%
8. Crew Resource Management	Team communication, workload mgmt.	3–5%
9. Radio Communication Procedures	ATC phrases, monitoring traffic	2–3%
10. Performance Determination	Flight performance calculations	3–5%
11. Physiological Factors	Fatigue, drugs, stress, vision	3–5%
12. ADM & Judgment	Risk management, decision-making	5–7%
13. Airport Operations	Markings, signage, traffic patterns	7–10%

Staying Current

- Recurrent training required every 24 months
- Keeping up with evolving regulations and best practices

Certificate of Achievement

This is to certify that

has successfully completed the
FAA Safety Team Aviation Learning Center Online Course

Part 107 Small Unmanned Aircraft Systems (sUAS)

Course Number ALC-451

Presented by Online Courses

June 24, 2016

Federal Aviation Administration

Certificate Number

Valerie G Palazzolo, National Manager, FAA Safety Team

Workforce Skills and Training Needs for Geospatial Professionals

- FAA Part 107 certification
- Drone flight skills
- GIS/remote sensing expertise
- Drone data processing of data
- Photogrammetry and data QA/QC

Career Pathways: Opportunities and Challenges

- Opportunities
  - Environmental science,
  - Infrastructure,
  - Public safety
  - Disaster situational awareness
  - Emergency search and rescue
  - Urban planning
- Challenges
  - Industries develop and change
  - Keeping up with new developments
  - Takes time to develop skills
  - New technologies can be expensive

Volunteer Positions with FAA

- FAASTeam Representative (Educational)
- FAA DronePro (Enforcement)
- FAASTeam Industry Members (Organizations)

Down the Road

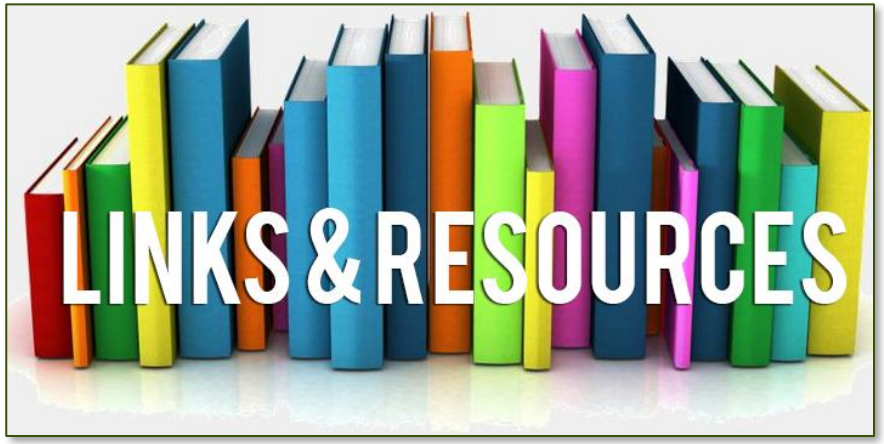
- AI & automation in drone workflows
- BVLOS (Beyond Visual Line of Sight) regulations
- Privacy, ethics, and community acceptance

Summary: Current vs. Proposed BVLOS Regime

Context	Current (Part 107)	Proposed (Part 108)
BVLOS Allowed?	Only via FAA waiver	Yes, via permits or certificates
Safety Requirements	Case-by-case; waivers only	Performance-based standards
Use Cases	Limited, skilled waivered operations	Scalable use across sectors
Process	Complex, slow	Structured, tiered (permit vs. certificate)
Public Safety (TBVLOS)	Allowed under restrictive COA waiver	Could shift into standard permit framework
Timeline	Right now only waiver-based	NPRM open until Oct 2025; final by Q1 2026

Key Takeaways

- Drones are transforming geospatial workflows
- FAA Part 107 certification is the professional gateway
- Processing software bridges drone data and GIS analysis
- Expanding career pathways for geospatial professionals



Resources available upon request

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Q/A

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