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Everything You Need to Know About Drones

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Drones in Popular Culture

Drones in Popular Culture

Evolving Drone Use

- **Solar:** Initial site surveying, now expanding dramatically to inspections and other aerial imagery collection
- **Infrastructure:** Cost and safety benefits have been augmented by greater abilities than aircraft or comparable systems

- **Film:** Speed up and reduce the cost of filming
- **Agriculture:** Reduce costs and improve efficiency
- **Delivery:** Packages, internet, people(?)
- **Others:** Conservation, emergency preparedness

Drone Clients

New Sensors, New Software, New Services

- Miniaturization of sensors and increased processing power allows drones to be an airborne platform for host of technologies
- If it can be attached to an iPhone, it can be attached to a drone

Inputs

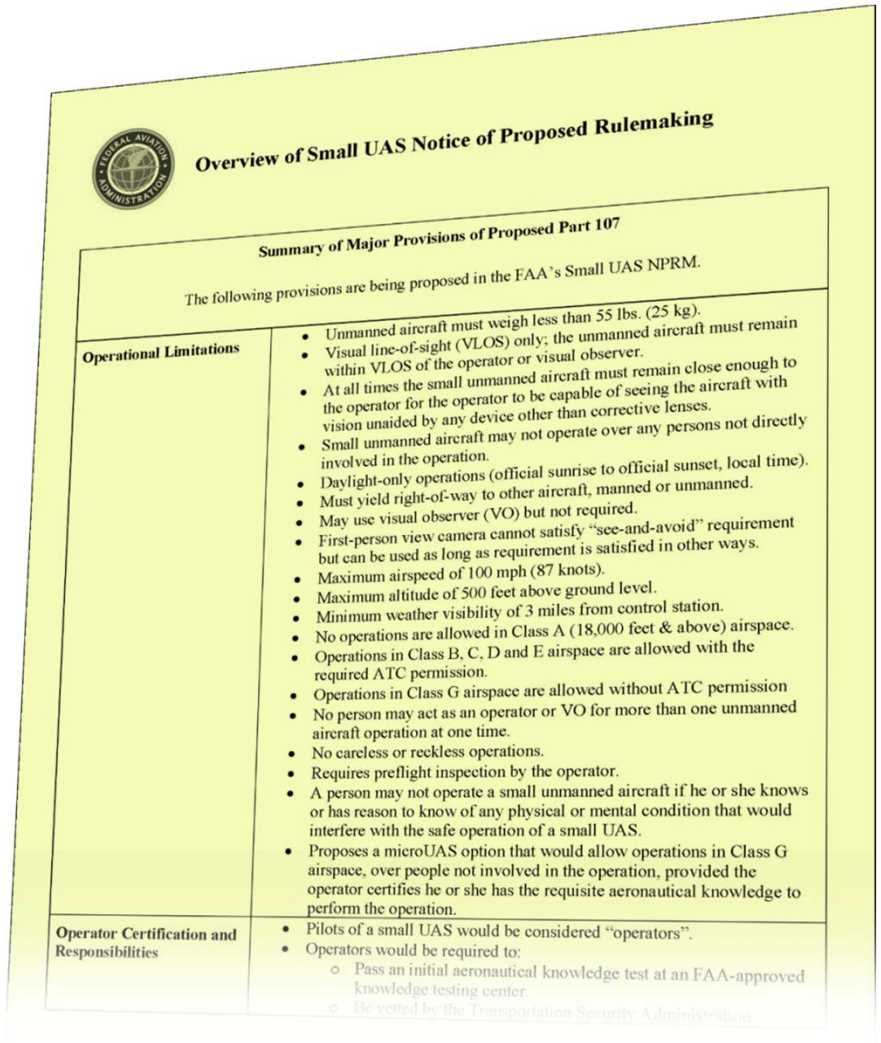
- Visual spectrum
- Multispectral
- Hyperspectral
- Thermal
- LiDAR
- Optical gas imaging
- Physical sampling

FAA 2007 Drone Policy

- Bottom line: FAA views drones as aircraft, so aircraft rules apply.
- "No person may operate a UAS in the National Airspace System without specific authority."
- "All drone operators . . . must apply directly to the FAA for permission to fly."

FAA Modernization Act of 2012

- FAA tasked with developing a plan for "safe integration" of UAS into the NAS
- Mandated that the FAA issue a final rule on integrating "small" UAS into the NAS by August 2014
- FAA NPRM (2/15/15)



Overview of Small UAS Notice of Proposed Rulemaking

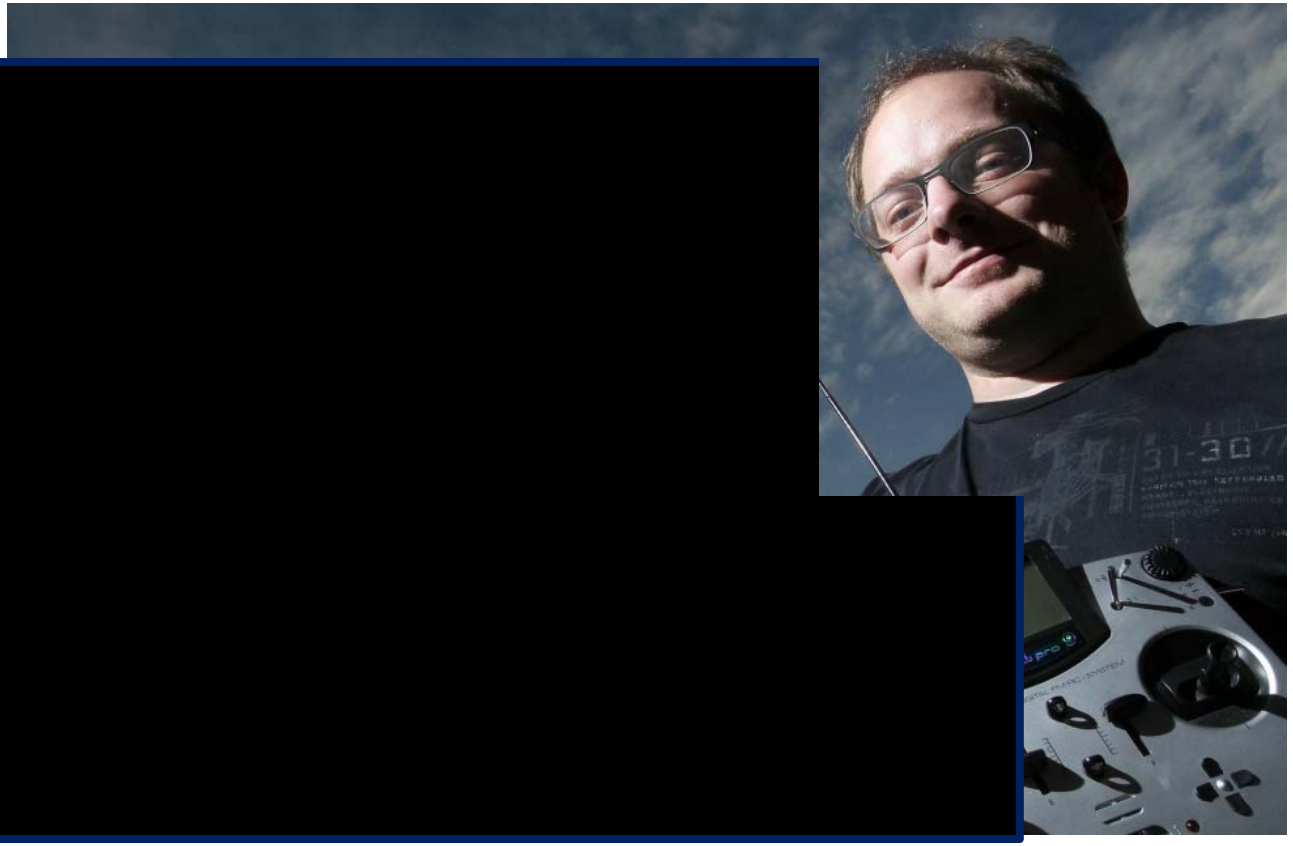
Summary of Major Provisions of Proposed Part 107

The following provisions are being proposed in the FAA's Small UAS NPRM.

Operational Limitations	• Unmanned aircraft must weigh less than 55 lbs. (25 kg). • Visual line-of-sight (VLOS) only; the unmanned aircraft must remain within VLOS of the operator or visual observer. • At all times the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses. • Small unmanned aircraft may not operate over any persons not directly involved in the operation. • Daylight-only operations (official sunrise to official sunset, local time). • Must yield right-of-way to other aircraft, manned or unmanned. • May use visual observer (VO) but not required. • First-person view camera cannot satisfy "see-and-avoid" requirement but can be used as long as requirement is satisfied in other ways. • Maximum airspeed of 100 mph (87 knots). • Maximum altitude of 500 feet above ground level. • Minimum weather visibility of 3 miles from control station. • No operations are allowed in Class A (18,000 feet & above) airspace. • Operations in Class B, C, D and E airspace are allowed with the required ATC permission. • Operations in Class G airspace are allowed without ATC permission • No person may act as an operator or VO for more than one unmanned aircraft operation at one time. • No careless or reckless operations. • Requires preflight inspection by the operator. • A person may not operate a small unmanned aircraft if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of a small UAS. • Proposes a microUAS option that would allow operations in Class G airspace, over people not involved in the operation, provided the operator certifies he or she has the requisite aeronautical knowledge to perform the operation.
Operator Certification and Responsibilities	• Pilots of a small UAS would be considered "operators". • Operators would be required to: ○ Pass an initial aeronautical knowledge test at an FAA-approved knowledge testing center. ○ Be vetted by the Transportation Security Administration

Challenging the FAA: *Pirker*

- Raphael Pirker's Ritewing Zephyr joy ride at UVA.



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Challenging the FAA: *Pirker*

- But Round 1 goes to Pirker: Administrative Law Judge holds that Pirker's drone was not an "aircraft" for purposes of FAA regulation.

- FAA appealed to the NTSB

UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF ADMINISTRATIVE LAW JUDGES

MICHAEL P. HUERTA,
ADMINISTRATOR,
FEDERAL AVIATION ADMINISTRATION,

Complainant,

v.

Docket CP-2

RAPHAEL PIRKER,

Respondent.

DISMISSED

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DECISIONAL ORDER

Challenging the FAA: *Pirker*

- Round 2 to the FAA:
  - NTSB holds that Pirker's drone was an aircraft:
    "'any' 'device' that is 'used for flight'"
  - Also holds that drones are subject to regulatory prohibition on reckless operation of aircraft
- No Round 3:
  - Pirker and FAA settle for $1,100

SERVED: November 18, 2014

NTSB Order No. EA-5730

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Politics and Policy

U.S. Federal Aviation Administration Settles With Videographer Over Drones

Deal Ends Court Case Challenging Government's Authority to Regulate Unmanned Aircraft

By JACK NICAS

The U.S. Federal Aviation Administration reached a settlement with the videographer to whom it issued its first fine for reckless drone use, ending a court case that challenged the government's authority to regulate unmanned aircraft.

Raphael Pirker agreed on Thursday to pay the FAA $1,100 to settle the agency's $10,000 fine for allegedly flying a drone recklessly to film the University of Virginia in 2011. Under the settlement terms, Mr. Pirker doesn't admit to guilt and the FAA agreed to drop some of its accusations against Mr. Pirker.

needed to finish the case and recent comments by the FAA "have diminished the utility of the case to assist the commercial drone industry in its regulatory struggle." The FAA has said its authority to regulate drones stems from a 2012 statute that post-dates Mr. Pirker's flight.

The FAA fined Mr. Pirker, a dual national of Austria and Switzerland, in 2012. The case gained attention after a federal administrative law judge ruled this past March that Mr. Pirker's plastic-foam drone was a model aircraft and thus not subject to FAA rules for manned aircraft. The decision cast

ty to regulate drones.

Transportation Safety

n and ruled that drones

viation laws, affirming

over the devices.

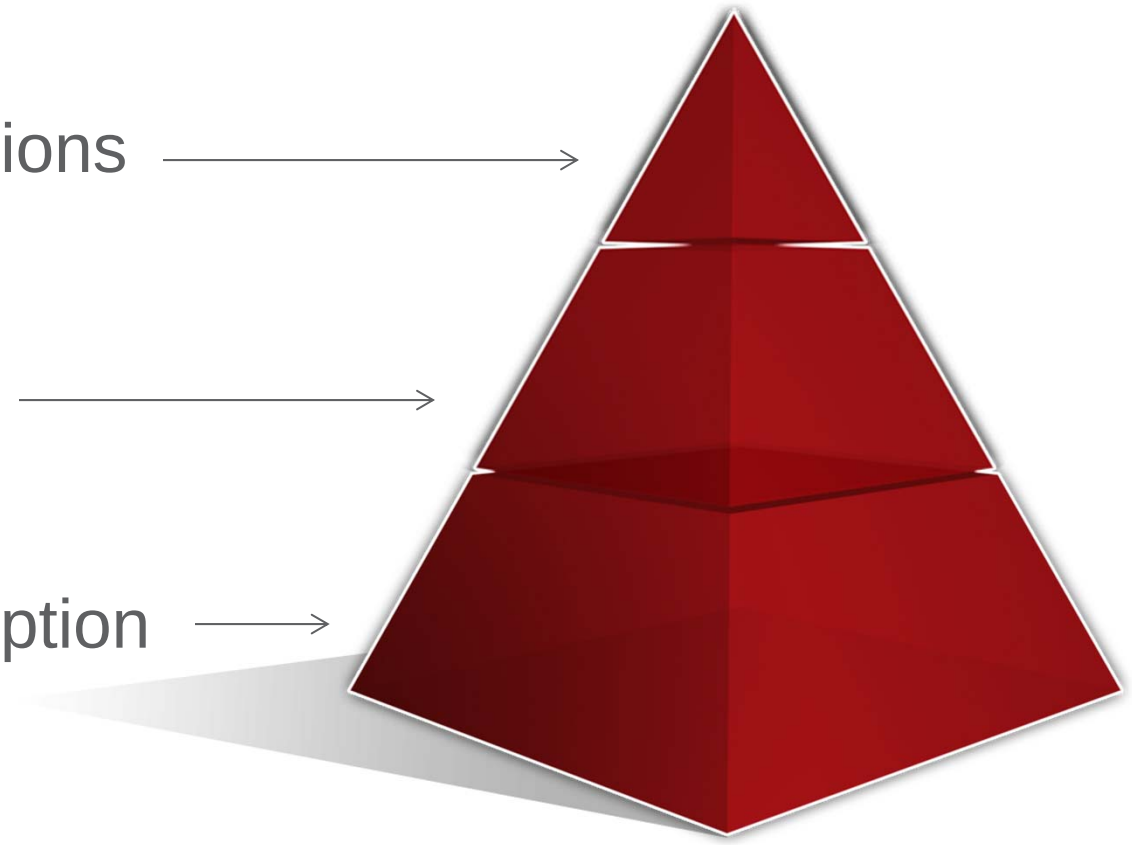
Title 49 U.S.C. § 40102(a)(6) defines "aircraft" as "any contrivance invented, used, or designed to navigate, or fly in, the air." Similarly, 14 C.F.R. § 1.1 defines "aircraft" for purposes of the FARs, including § 91.13, as "a device that is used or intended to be used for flight in the air." The definitions are clear on their face.

Permitted Commercial Use

- Two ways to obtain FAA permission to operate UAS for commercial purposes:
- Section 333 Exemption: show the use is safe
- Special Airworthiness Certificate: meet certification requirements

Phased Approach

- Three options for integration:
  - Tethered Operations
  - R&D Exemption
  - Full Scale Exemption

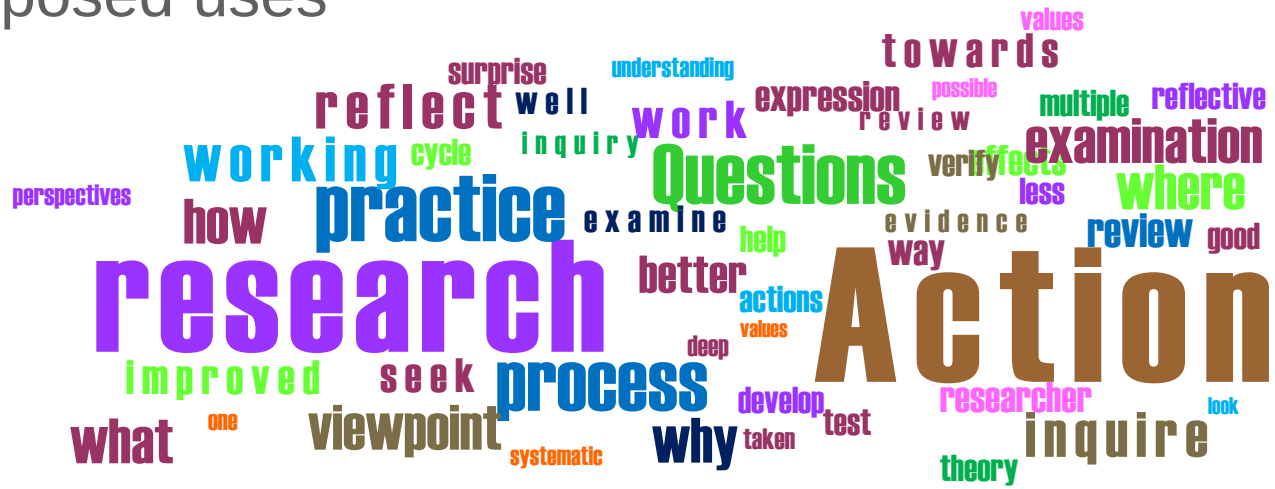


Tethered Operations

- When tethered to the ground, the FAA no longer defines the device as an unmanned aircraft
- Several drone manufacturers operating in this space
- Low risk method that may allow for testing and analyzing the benefits of integrating UAS

R&D Exemption

- "Test the waters" with the FAA and with the technology before full-scale integration
- Limited Section 333 Exemption Request
  - Identify test sites and airspace
  - Identify proposed uses



Full Scale Exemption

- Piggy-back off of the R&D Exemption
- Benefit of the data collected during R&D period
- Gives the FAA time to evaluate the proposed use

Granted Exemptions

- Over 3,000 exemptions granted to date for a wide variety of operations
  - Aerial Surveying
  - Construction Site Monitoring
  - Oil Rig Flare Stack Inspections
  - Precision Agriculture
  - Real Estate Photography
  - Film Company
  - Aerial Inspection

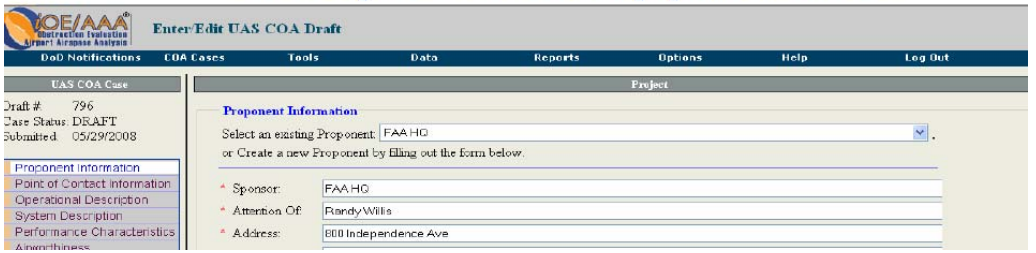
Granted Exemptions

- Standard Conditions
  - Pilot's License (Private or Sport)
  - Operations at speeds less than 45 knots
  - No higher than 400 feet above ground level
  - UAS must be within visual line of sight (VLOS)
  - Operations require a visual observer
  - Comprehensive preflight inspection of UAS before flight
  - Pilot training program and experience requirements
  - Flight must be 5 miles from an airport
  - Permission from landowner must be obtained
  - FAA approved flight manuals and maintenance manuals

COAs

- In addition to a 333 exemption, operators must also receive a Certificate of Authorization
- FAA issues "blanket" COAs with each grant of exemption
  - Blanket COA is more restrictive than exemption
    - Slower speeds
    - 200 v. 400 feet AGL
- Want to go beyond blanket COA, need to apply to the FAA through an online process

Sample COA Application



Other Options

- Special Airworthiness Certificate
  - **Highly restricted** – FAA says 14 CFR § 91.319 applies
  - Practically speaking, these are simply not available; given at the discretion of the FAA
  - Insitu ScanEagle
- Submit petition for rulemaking for particular use or type of UAS
- Small UAS Regulations – NPRM 2/15/15
  - Regulations are *proposed* still
  - Final regulations not expected until mid to late 2016

FAA's Proposed Rules

- Stated authority for NPRM is Section 333 of FAA Modernization and Reform Act of 2012 – permits certain safe operations in advance of "comprehensive" rulemaking
- Similar to wholesale Section 333 Exemption

Authorized

- Daytime operations only
- VLOS
- Less than 87 knots
- Less than 500 feet AGL
- But open to special rules for "microdrones"

What's Next for Complex Operations

- Proposed rules are not the "comprehensive regulations" mandated under Section 332
- FAA is taking an incremental approach
- Future Section 332 regulations likely to address operations not authorized under current NPRM:
  - Autonomous ops
  - BVLOS ops
  - Sense and avoid technology
- No doors have been closed, and the pace of change is accelerating

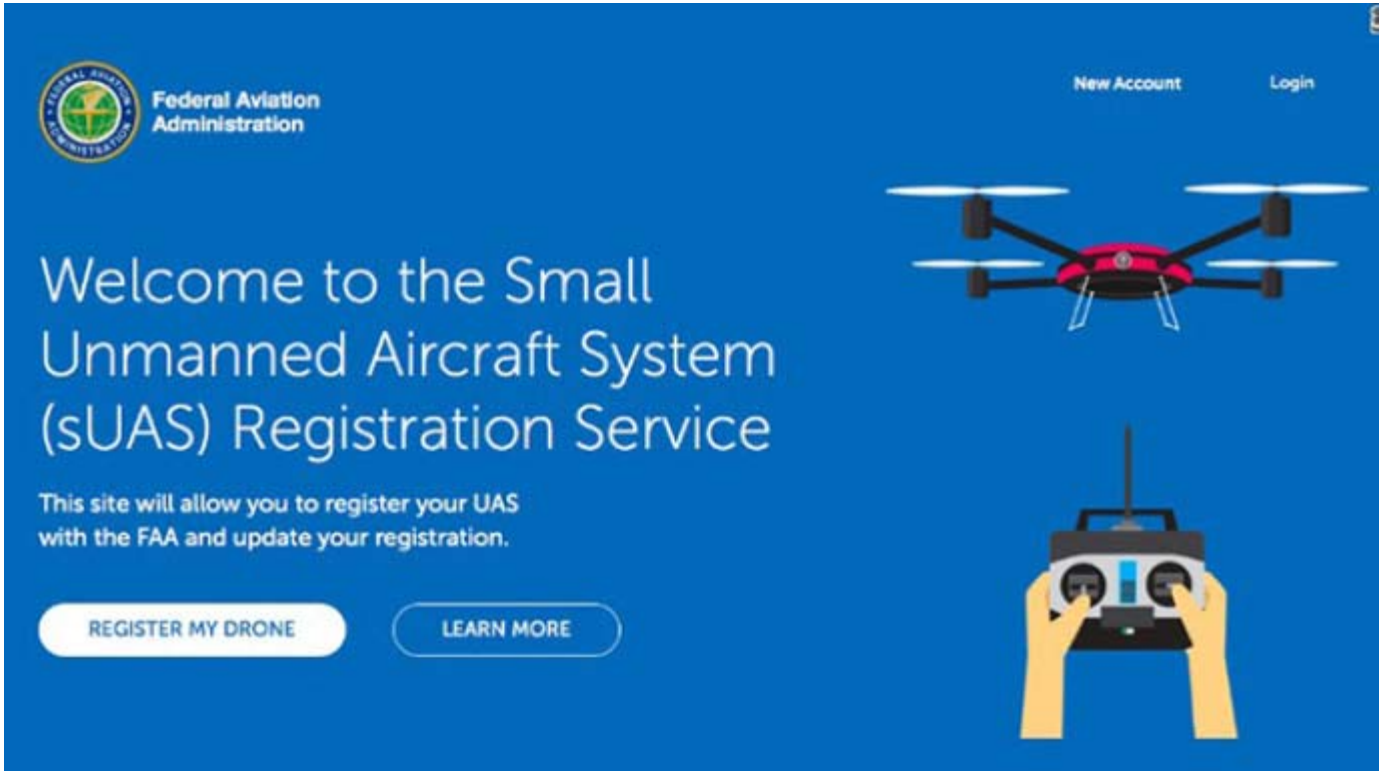
State and Local Regulations

- Considered or passed by dozens of states across the country
- Driven by privacy and special interest concerns
- Creates the risk of inconsistent laws, criminalization of previously lawful activity, and eventual preemption

Issues Regulated

- Privacy/surveillance
- Law enforcement use
- Wildlife monitoring
- Use in hunting
- Use to interrupt hunting
- Flights over private property
- “Drone paparazzi”

Hobby - Registration



Hobby - Registration

- Registration is not new for commercial users
- Online process
- Provides unique registration number to the owner of the drone (not specific to the drone)
- All drones weighing over about ½ a pound must be registered
- Potential legal challenges to “emergency rulemaking” procedures
- Read more: http://www.roboticsbusinessreview.com/article/the_faa_home_of_the_250k_drone_fine_seriously

International Issues

- International Civil Aviation Authority (ICAO) developing standards and recommended practices ("SARPs")
- Joint Authorities for Rulemaking on Unmanned Systems (JARUS) recommending a single set of technical, safety and operational requirements for the certification and safe integration of UAS
- Various groups (RTCA, EUROCAE) developing industry consensus standards for detect and avoid and command and control technology
- Global harmonization on regulation going to take significant effort

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Questions??