

Insurance and the Rise of the Drones

Anthony Mormino, Casualty Actuarial Society RPM Seminar, March 2016



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Mr. McCarthy is an Associate of the Casualty Actuarial Society (CAS) and a member of the American Academy of Actuaries (AAA). He is also a Past President of the Casualty Actuaries of Greater New York (CAGNY). Mr. McCarthy received his BS in Mathematics in 1995 from Loyola College.

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Past & Current Uses of Drones

Invasion of the Drones!



- FAA estimated 1.6 million drones sold in 2015 alone!
- US sales may top 2.8 million drones in 2016
- Worldwide consumer drone sales est. to be in billions of \$ by 2018-2020
- Amazon is selling more than 10,000 drones a month
- FAA estimates global drone sales could exceed \$90 billion in a decade, equating to 200,000 units sold each month.
- A drone popular in the US is called the “Phantom” by Chinese drone maker DJI:
 - Annual sales zoomed from **\$4.2 million in 2011** to **\$130 million in 2013**.
 - 2015 sales estimate = \$1 billion!
- Technology experts are bullish about future sales of drones



SKU: 14004979 ★★★★★ 78 reviews [Write a review](#)

~~\$80.14~~ **\$51.98**

Target (in store)



What are “drones”?

- “Drone” = slang
- drone = aircraft
- UA = Unmanned Aircraft
- UAV = Unmanned Aerial Vehicle
- UAS = Unmanned Aerial System
 - Includes:
 - Vehicles
 - Operator
 - Radio Controller
- RPA = remotely piloted aircraft systems
- Difference between recreational & Commercial drone?
 - none!

Brief history of the drone



- 1800's
 - 1849, Austria v. Republic of Venice, 200 pilotless balloons loaded with bombs
 - 1861, US Civil War, Union forces used balloons for aerial reconnaissance
 - 1898, Spanish-American War, US fitted camera to a kite to gather intel
- WWI
 - British Royal Navy, radio-controlled Queen Bee, used for target practice
- WWII
 - German V-1, flew 150 miles before dropping 2,000 lb bomb
- Cold War
 - US Flying Bombs, officially known as “drones,” target practice
 - US Ryan Firebee Drone & Lightning Bugs, remote pilot, camera, dropped bombs
 - Israeli Scout & Pioneer, pre-cursor to modern military drones, gather photo intel
- 1990's to Present
 - Modern combat drones first used in the Gulf Wars
 - 2002, flew 200 combat drones, since then, 11,000 combat drones flown



Drones are very popular with the public

- Rock concerts use drones to get close up of band, e.g., Enrique Inglesias, YouTube

But they are not popular with everyone!

- **April 2014** – Deer Trail, CO considered drone hunting licenses
- **Nov 2014** - Modesto, CA man shoots neighbor's drone out of the sky, thought was "CIA surveillance device."
 - Drone operator wins suit for \$1,000 to replace drone
- **June 2015** - Huntington Beach, CA shirtless man swats drone out of air, filming instructional video
 - \$1,300 drone, man afraid that drone would fly over his home
- **July 2015** - Kentucky, man shoots down drone hovering above yard
 - Court drops criminal firearm discharge charge, "had a right to shoot"
 - Jan 2016: Drone operator sues, says wasn't trespassing
 - P alleges airspace above property was NAS, D had no right to shoot
 - Court will settle gray area of law: airspace rights of property



Motion pictures

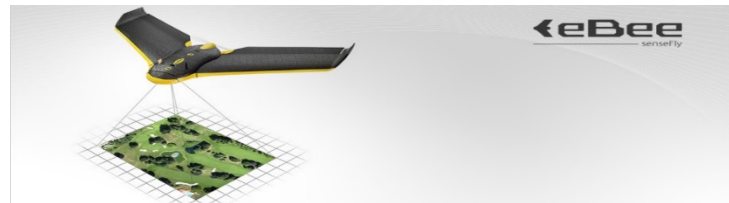
- Hollywood was first major commercial industry to receive limited licensing from the FAA to fly drones.
- Motion Picture Association of America ("MPAA") successfully applied for FAA exemptions on behalf of seven film companies for to fly drones for filming.
- MPAA argued that flying drones would be:
 - much safer than flying helicopters for aerial filming.
 - Keep filming in the U.S.
 - Movies like the Lord of the Rings Trilogy and James Bond, Skyfall, were shot outside of the U.S. with the use of drones.
- FAA exemptions for closed-set filming are becoming increasingly common.





Agricultural and Farm Surveys

- Farm field surveillance one of very common commercial drone uses in US
 - Though few farmers have FAA clearance
- Drones can help yield better crop! Think of farms covering hundreds of acres
 - The PaceSetter (\$17,500) can map 160 acres in 10 minutes
- The eBee (\$23,000) takes infrared pictures of a field and uploads the data to a handheld device, like an iPad.
 - Helps a farmer determine where his crop field needs more water or fertilizer
 - Can upload information to a tractor for immediate change in production strategies to improve yield.
- Japan using Yamaha's RMAX unmanned helicopter (\$100,000) for more than 20 years
 - In 2010, 30% of Japan's rice fields and 1,000 hectares farmland sprayed with unmanned helicopters.





Real estate and marketing photography

- Drone photos of homes for sale become very popular and common
- Douglas Trudeau was the first real estate agent to be approved for drone photography by the FAA (approved in January, 2015).
 - He is approved to take photos and video of available real estate for marketing purposes.
- A handful of real estate agents have FAA permission, most do not
- Use of drones for real estate sales photos or video now common around the world
 - Australian Eview Real Estate used pictures taken by a drone to advertise a property
 - Did not realize they included an image of a neighbor, Mandy Lindgard, sunbathing in just a thong in her back garden.
 - Eview unintentionally published photos of to market a neighboring property
 - Posted photo in ads in a magazine, on the internet, and a billboard
 - Removed the advertisements when error realized

Insurance Underwriting and Claims

- Insurance companies received FAA permission to use drones for claims and UW
- Plan to use drones for roof, home, and building inspection
- Combination of drones with infrared technology is especially powerful and efficient
 - An asphalt shingle can be seen with enough detail to count surface granules is achievable, so being able to review hail damage (or lack of it), nail pops, roof blisters, and other common issues remotely is possible.
- Fly drones over disaster site to assess the extent of damage for more accurate claim evaluation.



So many potential commercial drone uses . . .



- **Power, Oil, & Gas Infrastructure Mapping**
 - Precision aerial surveying oil, power, and gas facilities
- **Flare Stack & Utility Pole Inspection**
 - Safer way check on miles of power lines and pipelines
- **Cell Tower Inspection***
 - Cell towers can be very tall and are numerous, need to be inspected regularly for safety.
- **Cargo train and track inspection**
 - Some rigs can be very long, traverse remote rail lines
- **Drones as a Service***
 - FAA approved use of a fleet of 324 drones, Sept 2015
 - Start up company called “Measure” based in Wash, DC
 - Drone consulting and service provider
 - Focus: data collection , no package delivery
 - Agriculture, oil and gas, insurance, other industries that need aerial photography and other data

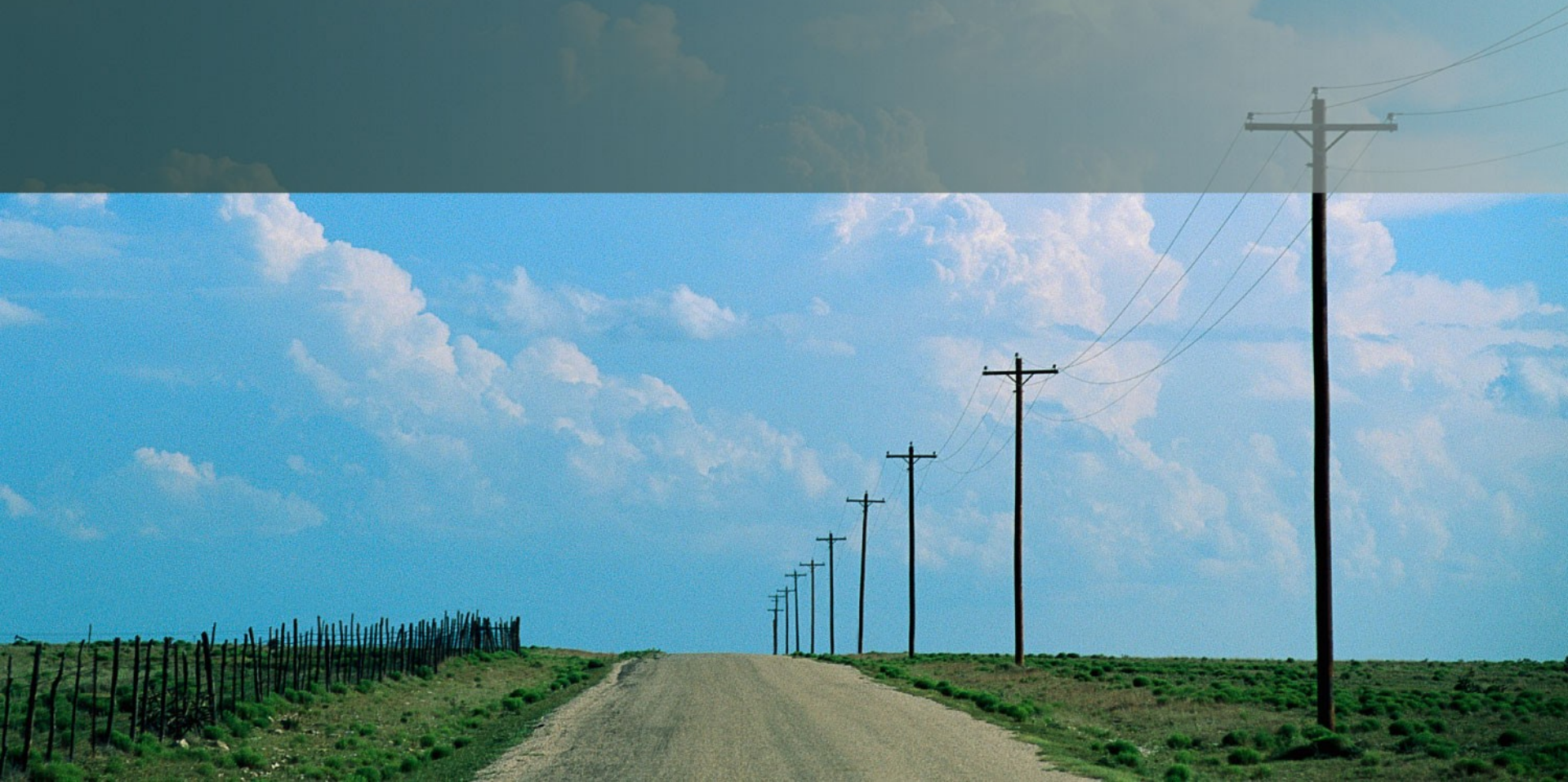
First thousand FAA permits

The first 1,000 exemptions span more than 25 major industries:

- General aerial photography, 512
- Real estate, 350
- General aerial surveying, 301
- Agriculture, 164
- Construction, 134
- Film and television, 91
- Utility inspection, 78
- Environmental uses, 61
- Search and rescue, 52
- Emergency management, 38
- Insurance, 25

Source: AUVSI - <http://auvsilink.org/advocacy/Section333.html>

Drone Law & Regulation



Everything is new!

- Modern drones are new, operators are new, the law is new
- Most countries' aviation laws didn't originally contemplate public use of drones
- Law is catching up to technology
- US regulation of drones in state of flux
 - US drone regulations currently complicated, some legal issues open or unclear
 - Change: FAA published new draft drone rules Feb. 15, 2015 for comment



Drones are a federal affair

- US Supreme Court – US v. Causby - 1946
 - Airspace above above US land is in the public domain
 - Flights over private land regulated by FAA
 - Flights over private land not a “taking” by the feds
- US federal government
 - Primary regulator of national airspace
 - All government, military and civilian purposes
 - Federal Aviation Administration (FAA) - 1926



FAA Enforcement: Details hundreds of reckless drone sightings

- Reckless drone operation is driving FAA rules and enforcement!
- 2014:
 - March: US Airways flight over Tallahassee FL *nearly collides* with UAS at 2,300 ft.
 - May – Unauthorized UAS *crashed* into stands during event, Virginia Motor Speedway.
 - July – pilot of passenger airplane at 2,200 ft. saw drone *pass underneath* near DCA.
 - Oct – In the UK, passenger aircraft landing county of Essex *nearly collides* with UAS.
- Jan. 26, 2015 (3am) – Small drone *crashes* into tree on White House lawn
- The international ski federation is banning camera drones from its World Cup races after one of the flying objects crashed and nearly hit Austrian skier Marcel Hirscher during a slalom in Italy.
- **2015 alone, FAA received reports of over 1,000 close encounters with planes**
 - Dozen cases of drones flying near aircraft attempting to fight wildfires in California, forcing groundings and delays in battling the blazes
- *FAA worried about reckless drone operators!*



Current Federal law regulating drones not entirely clear

- **Unclear** - 1981 to 2008: FAA issues numerous guidelines on
 - Voluntary rules for operation of “model aircraft”, non-commercial & recreational (non-binding)
 - Strict guideline for commercial operation but not properly enacted
 - *Result: rules for commercial drone operation unenforceable*
- **Clear** - FAA Guidance for recreational use
 - 55 pounds or less
 - VLOS
 - No permit required
 - Voluntary safety rules
 - No commercial use whatsoever
 - Reckless or commercial use = FAA can levy big fines
- **Clear** - FAA regulations for non-Recreational Use
 - **Government or government funded or research use** (schools, colleges, police, fire, municipalities)
 - *Certificate of Waiver or Authorization (COA)* required
 - **Commercial non-government use**
 - *Special Airworthiness Certificate (SAC)* required
- *Both COA & SAC require operator to have a **pilot's license** = compliance low!*



Drone users fight FAA – court decisions make law unclear

- **Huerta v. Pirker** (2011): Advertising firm takes/ sells photos of university via drone
 - FAA says photographer (Rafael Pirker) reckless
 - FAA says Pirker needed an SAC or permit for commercial use
 - FAA fine Pirker \$10,000 (settled for \$1,100)
 - Admin judge rules
 - FAA model aircraft rules are voluntary
 - FAA’s regs on commercial use of model aircraft unenforceable because (1) were for internal use only, or (2) not properly enacted
 - NTSB issues decision:
 - FAA has authority to regulate and fine unsafe use of “aircraft”
 - Let stand Admin judge’s ruling, FAA rules for commercial use unenforceable = law unsettled!
- **UAS America v. FAA** (2014)
 - Commercial and model aircraft interests sue FAA to stop enforcement of new (post-Pirker), restrictive FAA rules on commercial use of drones, case on hold
 - Can FAA enforce its rules while challenge pending?



FAA Fines drone startup \$2 million for unlicensed flights

- FAA reported on Oct 6, 2015 a fine for drone startup SkyPan International
 - Specializes in panoramic photographs of city skylines.
- Fine of \$1.9 million for allegedly conducting 65 drone flights
 - without the required authorization
 - near airports without control tower permission
 - lacked other gear required by FAA
- Largest civil penalty ever by FAA on a drone company
- Between March 2012 and December 2014, allegedly flew drones over NYC and Chicago to take aerial imagery.
- SkyPan filed for license (§333 exemption) in Dec. 2014, received April 2015
- *Retroactive* application, seems clear FAA getting tough, setting example!

The FAA Modernization and Reform Act of 2012 (FMRA)

- Congress provided specific guidance to the FAA as respects the regulation of drones:
 - Defined drone as an "unmanned aircraft system" or UAS
 - Instructed the FAA to "develop a comprehensive plan to safely accelerate the integration of civil unmanned aircraft systems into the national airspace system . . . [no] later than September 30, 2015
 - Section 333 of FMRA: FAA has authority to give **exemptions to COA or SAC** as long as safe to operate in the National Airspace System (NAS)
 - Relaxed application requirements
 - Pilot's license still required but can be private OR recreational or sport
 - No medical certificate required
 - Guidelines for Submitting a Petition for Exemption:
<http://aes.faa.gov/Petition/home.html>
- Section 333 exemptions = Today main way get permission to operate
 - FAA issued **3,500+ SAC** exemptions to date, summary grants (quick)
 - FAA issued **~600 COAs** as of 2014 mostly to universities, military, gov't agencies, municipal police departments

TODAY!

FAA proposes new rules for commercial use, lowers the bar

- Published draft rules February 16, 2015
- Lead to new era in US in which UAS flights become common!
- Huerta: “Most flexible regime for small drones in the world”
- Drone interests favors new rules, good first step!
- New and simple process for commercial operators 55 pounds or less
 - Operational requirements much easier!
- 60 day period of public comment is over, FAA mulls
- Final rules could be published as soon as 2016, maybe 2017
 - *Means current SAC & COA requirements remain in force (or get exemption)*

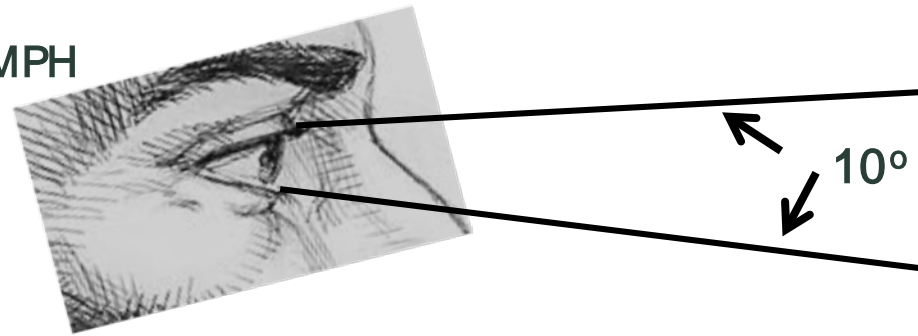
TOMORROW



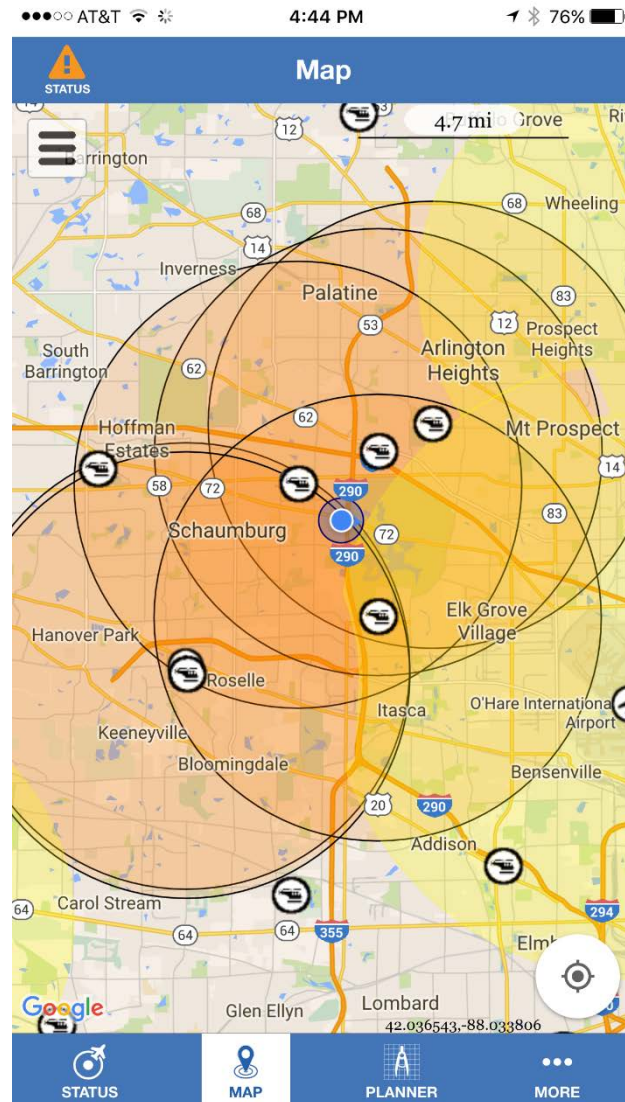
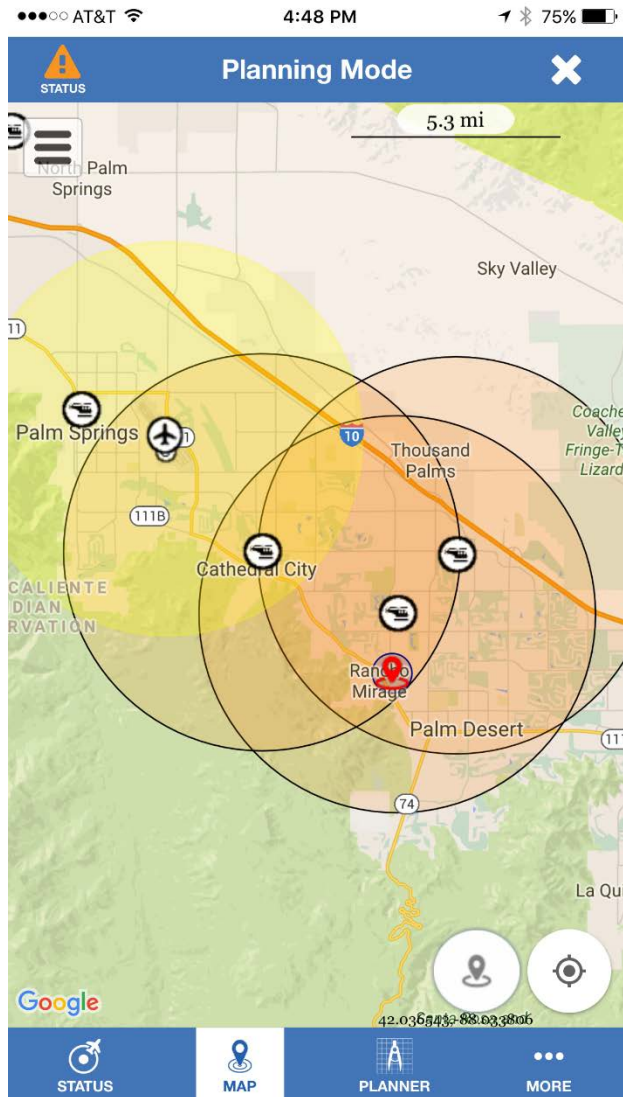
Details of FAA's New Proposed Rules

- Operator passes written exam every 2 years for FAA certificate
 - Cost \$150
 - FAA will publish all info needed to pass exam
 - No medical test, no pilot license required (required today for § 333 exemption)
 - Background check by DOT
- **Safety rules must be followed!**
 - Weigh 55 pounds or less
 - Max 500 feet above ground & max 100 MPH
 - Daytime flight only
 - VLOS
 - No flights near airports or over people
 - Always cede way to manned aircraft even if risk loss of drone
- ***Goal: Less burdensome rules = more compliance, lower enforcement costs***
- **No effect** on existing voluntary FAA recreational drone rules, except reckless

TOMORROW



Flying a drone away from other aircraft can be complicated!

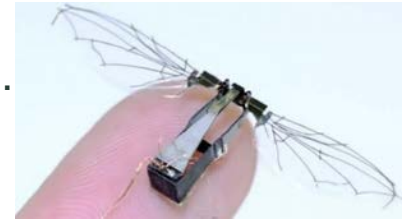


“airports” include actual airports, regional, municipal, & commercial + hospital and police “heliports”

Source: FAA iOS app, B4UFLY

FAA's Pathfinder Program

- Existing and new FAA's UAS rules: operate only during **day light hours** and only within the **visual line of sight** of the UAS operator.
 - Big impediment to unlocking the full potential of commercial UAS, e.g.
 - Inspecting or spraying crops on large commercial farms,
 - delivering small packages to remote consumers
 - Insurance companies that want to underwrite or claim adjust remote risks
- To try to mitigate this problem, on May 5, 2015, FAA announced its "UAS Pathfinder Program"
 - Research ways to extend commercial UAS operations outside the current visual line of sight limitation.
 - Partners: CNN, PrecisionHawk, BNSF Railroad, & CACI Int'l
 - Evaluate drones for news gathering, rail inspection, use in vicinity of airports.
- First FAA-approved test package delivery success: July 2015, "Flirty," medicine, rural Virginia
- Success for the Pathfinder program would open the door to potentially even larger scale use of UAVs by insurance companies.
 - **Sell drone insurance coverage + use drones in claims and UW**



FAA Requires Registration of Drones with DOT

- FAA issued its requirement that recreational drone users must register aircraft with Department of Transportation:
 - Hobby drones never flown purchased **after** December 21, 2015, register before first flight
 - Hobby drones purchased & flown **before** December 21st, register by Feb 19, 2016
 - Non-hobby drones register using same hobby drone registration: March 31, 2016
- Registration on-line, \$5 for each non-hobby drone, \$5 for entire fleet of hobby drones, good for 3 years
- FAA issues registration number to be marked on drones' hulls
- Goal: forcing owners to register drones will make them think twice about responsibility to fly safely, could be held accountable for an accident.
- Penalty for failure to register: **FAA interim rule says may “result in civil penalties up to \$27,500. Criminal penalties for failure to register can include fines of up to \$250,000 and/or imprisonment up to 3 years.”**

Drone Regulation in Other Countries



- Do you need permission from Transport Canada to fly?
 - No permission required:
 - Recreational use + less than 35 kgs/77lbs
 - Commercial use + less than 25kgs/55lbs (exceptions where SFOC needed)
 - SFOC required:
 - Recreational use + more than 35kgs/77lbs
 - Commercial use + more than 25kgs/55lbs



- Mainland Europe operates under the jurisdiction of the European Aviation Safety Agency (EASA),
- Need certification in any situation
- Certification granted on a case-by-case basis
- Requests proposing flight in unpopulated areas usually approved



- No Civil Aviation Authority regulations on UAV users
- Government encourages UAV use
- UASs used to monitor drug trafficking and university research.



- Brazil a leading player in UAV use: Uses UAVs to patrol its borders
- No laws that cover civilian use



- UASs have been in use since 1980
- Mainly agricultural purposes –response to aging farming population
- Vast majority of crops are sprayed using unmanned helicopters and drones



- 20 kg (or 44 pounds) – considered “small unmanned aircraft”
- Need “Permit to Fly” classification, relatively easy to acquire
- If heavier or used for aerial photography requires a “Permit to Carry Out Aerial Work;” has tougher restrictions
- Pilot qualification, design & construction certificates.



- An “Unmanned Aircraft System” profit-seeking “air work,” has requirements including pilot certification, but relatively easy to meet
- “model aircraft, flown for sport & recreation and education,” which essentially are not regulated (except VFR required)

Drone Insurance Legal Issues



Insurability: Potential legal issues raised by use of drones



- **Violating FAA Rules**

- Fines can be very large
- Injunction stopping use
- Ex. § 336 FMRA requires recreational drone operators give notice to airports within 5 miles of use. Will every model aircraft user comply every time?

- **Physical damage and bodily injury**

- What if your drone crashes into property or people on the ground?
- State tort laws may impose liability, negligence and strict liability
- BUT drone strikes a passenger plane? Loss could be in the tens of millions!

- **Nuisance**

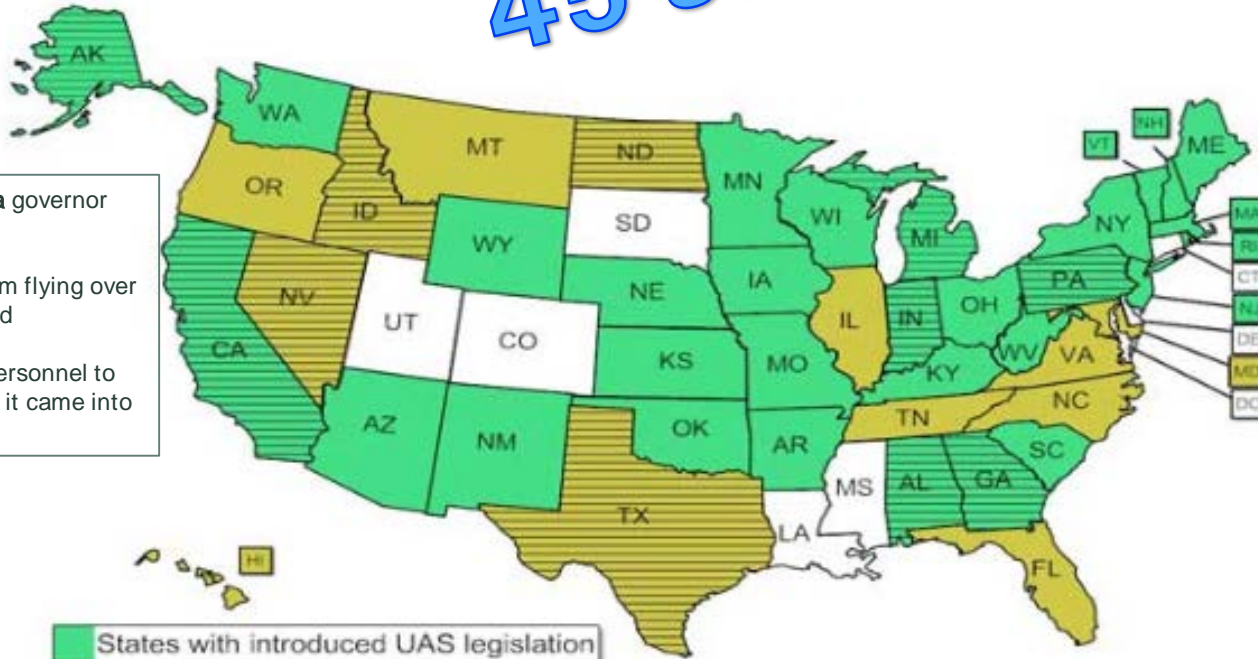
- Depending on drone size, noise or kicking up dust onto neighbor's property
- Interfere with neighbor's use of property = lawsuit for nuisance

- **Trespass**

- State laws prohibiting drone use over private property without owner consent, private cause of action
- Some states prohibit use of drone to capture of image with intent of surveillance
- Property boundaries may sometimes be difficult to notice for a drone operator

As of 2016

45 states, 168 bills



26 states have laws

Insurability: More potential legal issues in use of drones

- **Invasion of privacy**
 - By private individuals:
 - Some states passed laws forbidding photos or video by drones (TX, ID, MO)
 - Reasonable expectation of privacy then publication?
 - Abuse by law enforcement/ gov't:
 - US 4th Amendment, unreasonable searches
 - Some US states require police to obtain search warrant to gather criminal evidence by drone
 - New draft US federal privacy rules introduced Feb 2015 for gov't & private use
- **Stalking and harassment**
 - Drones could be used by criminal voyeur or stalker and in harassment by paparazzi
- **Wiretap laws**
 - Drone could be used to intercept oral communications
 - Commercial microphones can record sound up to 300 feet away
 - Could violate federal wire tap statutes
- **In sum: Simple to operate, but quietly create complicated legal problems for users and their insurance companies**



Takeaways



- **Fully leveraged, drone use in underwriting and claims has big benefits**
 - Cut audit or adjustment costs – send multiple drones to multiple risks, not people
 - Reduce risks to people – no ladders on roof tops, no adjusters in dangerous areas
 - Provide better data and insight – get big picture aerial views, infra-red data
- **Drone insurance = completely new market for insurance products**
 - Potential new source of business
 - Currently no limits on which type of insurers can write, so open to all
 - Sell as stand alone
 - Sell as add on to existing products
- **Drones present big potential risks but also big potential rewards!**



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