Allianz Global Corporate & Specialty

Rise of the Drones

Managing the Unique Risks Associated with Unmanned Aircraft Systems

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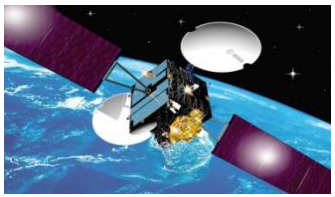
- Aviation Practice Leader – Head of UAS, Regional Head of General Aviation
- Aviation Underwriting for 13 Years
- Commercial Licensed Pilot and Part 107 Drone Operator
- Licensed Attorney in California / Graduate of Embry-Riddle Aeronautical University
- U.S. Marine Veteran
- Founding Member of UAS Insurance Association

UAS INSURANCE ASSOCIATION

Allianz Aviation – leading capacity for a wide range of risks



General Aviation: Hull and liability cover for small and medium-sized aircrafts & helicopters including private pilots, commercial fleets, corporate jets, unmanned aircraft & ground service providers

Airlines: Hull and liability protection for passenger and cargo airlines, including regional operators and international flag carriers

Aerospace: Physical damage and liability cover for manufacturers, products and suppliers as well as for airports, refuelers and associated providers

Space: Coverage through SpaceCo, an AGCS subsidiary, including production plant / launch pad property damage, pre-launch and launch, and in-orbit

Workers' Compensation: Coverage providing wage replacement and medical benefits to employees injured in the course of employment

Offering global expertise and specialist cover to our partners worldwide, from individual aviation clients to the largest players in the aviation industry

100 Years of Allianz Aviation Insurance

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1915: Allianz starts its aviation insurance business in Germany, insuring airships. Aviation in in infancy. Risks were high-innovation key.

1928: First transatlantic flight from East to West in a Junkers W 33 aircraft by Hünefeld, Köhl and Fitzmaurice, insured by Allianz.

1937: Allianz makes claims payments for one the most publicized air disasters in history – the Hindenburg crash.

1952: Launch of the jet age and the first commercial jet liner, the De Havilland Comet, enters service.

2006: AGCS, which insures aviation and a number of other corporate risks, begins writing aviation products for UAS mfg's

2013: Expansion of our tradition of service to the aviation industry by focusing dedicated resources to the Unmanned Aircraft Industry and innovating to develop new products

https://www.youtube.com/watch?v=NpgGQCv642o&index=2&list=PLj8kmZ6kpXqg8KWiJu34PWmMMPZrkyjU-

Introduction to UAS

- Like many advancements in Aviation, UAS is rooted in military use and development.
  - First known use in mid 1800's when unmanned balloons were loaded with explosives and sent toward enemy targets.
  - Military use continues to grow
  - Technology allows for days of continuous flight and control from anywhere in the world
  - No human pilot at risk

Introduction to UAS

- UAS, UAV, RPA, Drone? Many names, but all refer to an aircraft that does not carry a human pilot on board.
    - Small UAS - Civilian aircraft that weigh .55 lbs to 55 lbs
        - Average 20 min of duration
        - Most popular are 3-7 lbs
        - Prices start <$1,000

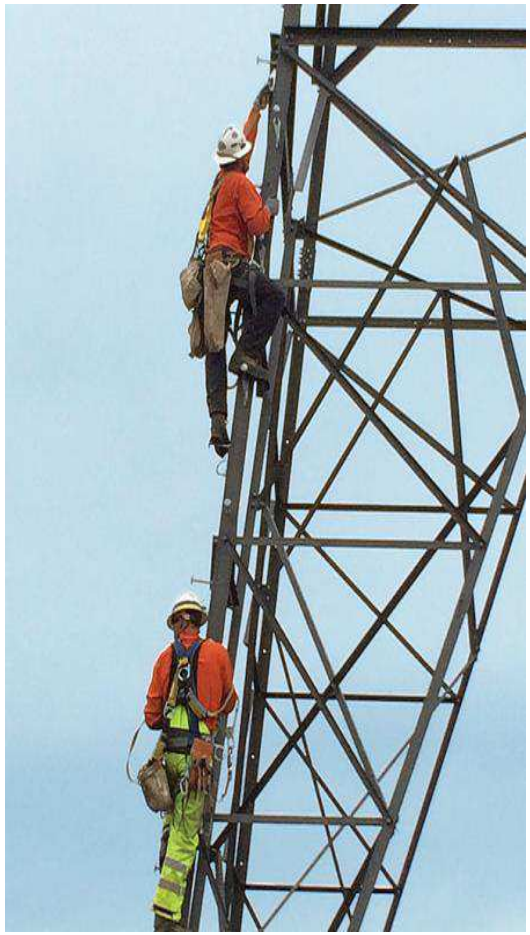
Introduction to UAS

- Types of UAS Flying Today
  - Fixed wing, Rotor Wing, Quad Copters, Multi-copters
  - Power plant – Predominantly electric, but larger units gas powered
  - Most have automated take-off and landing sequences
  - GPS guidance, return to home, automated flight planning, geofencing
  - Controlled by RC type controller, tablet or laptop
  - Sophisticated cameras and sensors – often most valuable piece

Uses for UAS

Civilian Uses: Dull, Dirty, Dangerous and Delivery

- Low barrier to entry + ease of use
- Provides an easy view from above
- Limits human exposure to dangerous situations



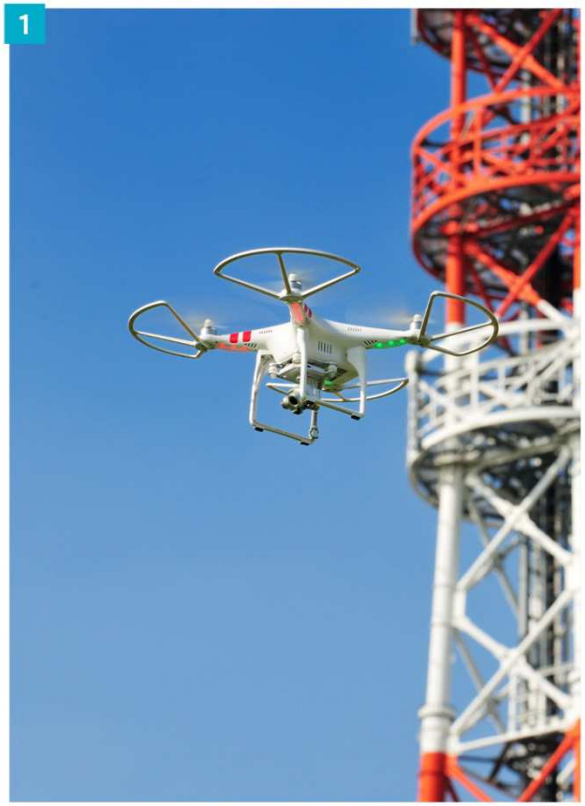
Two broad use categories:

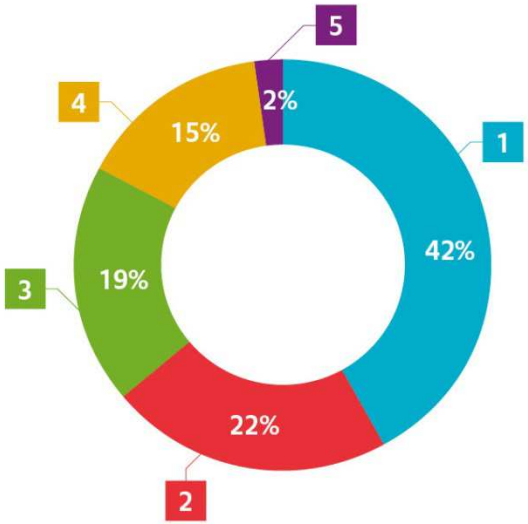
1. Closed set film production
2. Aerial data collection

The FAA foresees two categories for commercial use

1. Low End Commercial UAS = $2,500 and below – **90% of demand**
2. High End Commercial UAS = $40,000 and above – 10% of demand

Top 5 UAS markets (by industry)





1 **Industrial inspection** 42%
bridges, roofs, cell towers

2 **Real estate/Aerial photography** 22%

3 **Agriculture** 19%
crop surveying and analysis

4 **Insurance** 15%
risk assessment, claims adjusting, damage determination

5 **Government** 2%
law enforcement, border surveillance, fire departments, municipalities

Source: FAA Aerospace Forecast FY2016-2036. Graphic: Allianz Global Corporate & Specialty

Rapidly Developing Technology

https://www.youtube.com/watch?v=jZkXdywXwPE

https://www.youtube.com/watch?v=qmHwXf8JUOw

Unmanned Aircraft in the Press

"Aerial photographer gets 30 days in prison for crashing drone into woman"

"Stampede! Drone puts elk on the run in western Wyoming"

"The Pilot Who Crashed a Drone into the Space Needle Could Face Charges"

"Drone Smashes Through Womans Apartment Window"

"Drone-Plane Near Misses, Other Incidents Surged 46% in U.S."

Regulatory Overview

"Safety is the FAA's top mission, and the agency maintains the world's safest aviation system. As a provider of air traffic control services, the FAA also must ensure the safety and efficiency of the nation's entire airspace."

FAA FACT SHEET – *Unmanned Aircraft Systems*, Jan. 6, 2014

Regulatory Overview

"The FAA retains the responsibility for enforcing Federal Aviation Regulations, including those applicable to the use of UAS."

- From FAA "Law Enforcement Guidance for Suspected Unauthorized UAS Operations"

Regulatory Overview

- Regulations around the world vary greatly
- The single biggest hurdle to growth continues to be on the regulatory side
- Night Waivers / BVLOS

Hobby and Recreation	Commercial Benefit or Business	Government or Public Entity
AC91-57 – Model Aircraft Rules Registration Required .55 lbs+ FAA can enforce against “careless & reckless” ops	FAR Part 107	FAR Part 107 Or Certificate of Authorization (COA) needed

Regulatory Overview

Part 107 Highlights

- Operations:
  - UAS under 55 lbs - under 500 feet agl – under 87 knots
  - Visual line of sight – “see and avoid” / Daylight only / 3 miles visibility
  - No class A, but B,C,D and E with ATC permission. Class G allowed without ATC permission
- Pilot / Operator:
  - Aeronautical knowledge test
  - Small UAS rating / recurrent written test every 24 months
  - Accident Reporting to FAA for any BI or PD
- Aircraft Requirements:
  - No airworthiness cert required
  - All aircraft must be registered and display an N#
  - No insurance requirements for commercial UAV’s

UAS overview in the United States

Market Potential

- 23,000 have earned part 107 licenses (3 Allianz UW's)
- 670,000 registered UAS
- An overhyped market in many respects but tremendous growth opportunities as the industry and regulations continue to evolve – BVLOS

Fleet size projections (millions sales of UAS units – annual)

Vehicle type	2016	2017	2018	2019	2020
Hobby aircraft (incl. model)	1.9	2.3	2.9	3.5	4.3
Commercial use aircraft (excl. model)	0.6	2.5	2.6	2.6	2.7
Total	**2.5**	**4.8**	**5.5**	**6.1**	**7.0**

Active US general aviation (GA) fleet:
204,408

US general aviation deliveries (2015):
1,581 *(most of them exported)*

Source: FAA Aerospace Forecast 2016-2036, Graphic: Allianz Global Corporate & Specialty

Risk Management for UAS

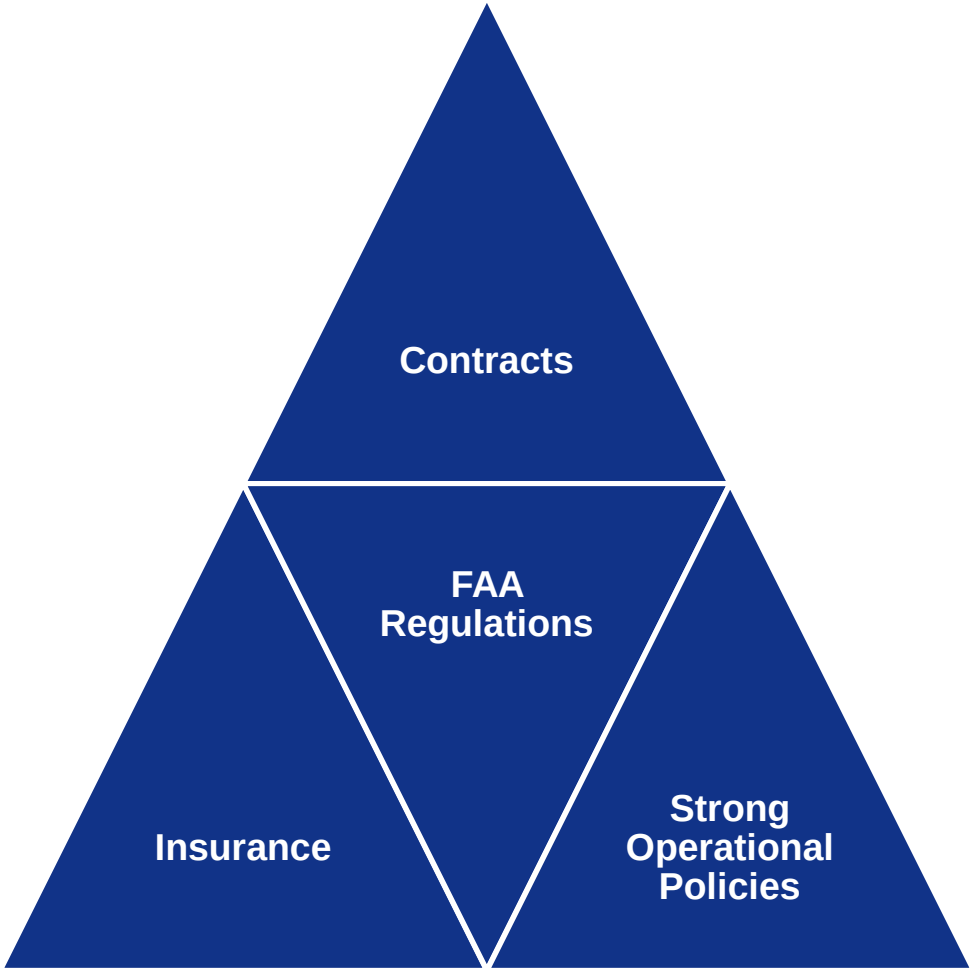
Accidents Happen

UAS Incidents

Managing the Risks

Managing the Risks

Risk Management Considerations



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3 Simple Steps for Managing Risk in General

1. Safe and Responsible Operations:

- Develop training system for all employees – recurrent and constant training
- Make safety number one priority – safety focus in all operations
- Follow regulatory guidance – OSHA, applicable laws and regulations
- Involved in industry groups and sharing of best practices

2. Contractual Transfer of Risk

- Formalize all business dealings with a written agreement/contract
- Contractual limitation of your liability - hold harmless
- Contractual protection from other parties – indemnification, AI, waiver of rights
- Require other party to carry adequate insurance

3. Insurance

- Backstop if the first 2 steps break down
- Transfer of foreseen and unforeseen risks
- Locate and work with the right brokers and underwriters – expertise matters
- Purchase adequate limits to protect what matters most

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The UAS Owner and Operator

1. Safe and Responsible Operations:

- FAA Approval to operate – Part 107
- Factory training from UAS manufacturer
- Use of checklists and standard operating procedures

2. Contractual Transfer of Risk

- Maybe difficult to obtain if you are UAS service provider
- Negotiate to limit liability to greatest extent possible – no consequential damages, value of contract, limited to insurance available, etc

3. Insurance

- Find a knowledgeable broker who knows about UAS insurance
- Purchase aviation specific UAS coverage – No aviation exclusions
- Hull & liability coverage and/or General liability coverage
- Purchase adequate limits for exposure and type of operation

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The UAS Manufacturer

1. Safe and Responsible Operations:

- FAA legal to operate for testing – part 107
- FAA legal for sales demonstrations – part 107
- Adopt high quality manufacturing standards

2. Contractual Transfer of Risk

- Require all suppliers to indemnify, hold harmless and carry adequate coverage
    - Example – If batteries are supplied by 3rd party – huge risk mitigation to indemnification & hold harmless
- Strong and thorough user warnings on all products – mitigate failure to warn
- Require purchasers to complete online training prior to operation

3. Insurance

- Purchase aviation specific products liability
- Specialty UAS coverages – No aviation exclusions
- When able, encourage all purchasers to carry liability coverage – shields mfg
- Consider local insurance issues and international insurance issues

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Hiring a UAS Operator or Service Provider

1. Safe and Responsible Operations:

- Require a copy of their FAA approval documents – Part 107
- Ask about their safety record – accidents, claims, etc.
- Ask about the experience level of their pilots – hours, accidents, etc.

2. Contractual Transfer of Risk

- Require the UAS operator to carry insurance from a recognized company
- Require high limits of liability that match the exposure
- Require full indemnity and hold harmless
- Require a certificate of insurance with AI, Primary, Severability of Interest

3. Insurance

- Purchase Non-Owned UAV coverage
- Provides you with your own coverage excess of the operator
- Provides you with your own defense
- Manned aircraft exposure can be added to fully cover non-owned aviation exposure

Insurance Coverage Widely Available

Robust and Competitive Market for UAS Insurance

- Variety of Products Designed or UAS Operations:
  - Physical Damage (Hull) – UAV, cameras, sensors, ground station – Up to $1 mil+
  - Liability – Up to $750 mil
  - Aviation CGL
  - Aviation Products Liability
  - Non-Owned Aviation Liability
  - Privacy
- Other Options:
  - By the hour plans
- ISO and Coverage on standard market policies:
  - ISO forms released June 2015 – exclusions and write backs
  - Used on standard market forms – very narrow and full of exclusions
  - Unknowledgeable companies adding UAV cover to regular CGL policies

Underwriting Challenges

- Small class of business
- Lack of Shared fate
- New and rapidly changing technology
- Low cost of entry
- Aviator vs Tech Mindset
- Loss Pic Still Developing

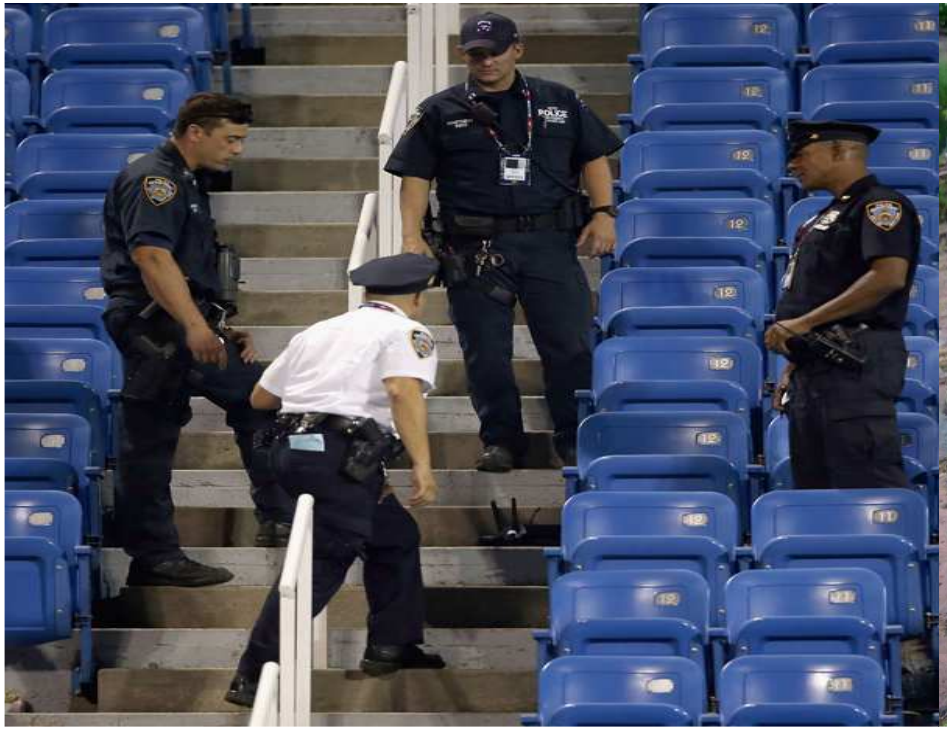
Underwriting Considerations

- Applications
- Equipment make & model
- Operator Qualifications
- Loss History
- Rural vs Urban Ops
- Equipment make & model

Insurance Coverage Widely Available

Huge Value in Aviation – UAS specific coverage:

- Expertise and experience matter
- Knowledgeable broker & advisor will close gaps
- Knowledgeable insurance company will craft policy tailored to the exposure
- Claims expertise is key when things go wrong



Concluding Thoughts

1. FAA will continue to educate public
2. Law Enforcement and FAA will increasingly become less tolerant of violators
3. FAR Part 107 has opened floodgates on industry
4. Proliferation of use will continue:
   - There are applications in almost every industry
   - You should be on the lookout for drone exposure on almost every account you handle
   - You will see your clients operating this equipment in the very near future
5. Technology will continue to evolve and improve
6. Stay tuned and stay informed!

Questions?


Oh, I'm sorry. Did you want coffee, too?
STARBUCKS DRONE DELIVERY
BIZARROCOMICS.COM


There are some glitches in the returns process...
amazon.com
MEW

Thank You!

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Additional Questions:

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Additional Resources:

- *https://www.agcs.allianz.com/assets/PDFs/.../AGCS_Rise_of_the_drones_report.pdf*
- https://www.faa.gov/uas/
- http://knowbeforeyoufly.org/
- https://www.modelaircraft.org
- http://www.auvsi.org/home