



DRONES AND INSURANCE

New technologies allow new capabilities and require new risk management

INTRODUCTION

Major progress in some key technologies has enabled an already existing class of aircraft, drones or Unmanned Aerial Vehicles (UAV) or Unmanned Aircraft Systems (UAS), to develop impressive capabilities for a wide field of activities.

After providing concrete examples of drone usage, this publication will focus on how all parties involved, i.e. drone owners and operators, drone manufacturers, authorities and insurers, have to adapt their risk management processes to mitigate potential damage caused by drones.



WHAT ARE DRONES AND WHAT ARE THEY USED FOR?

Drones are aircraft without a human pilot aboard. Their flight is controlled either autonomously by an on-board computer or by radio control from a remote pilot. They can vary in size and weight from a few grams up to a maximum take-off weight of 7 tons for a Global Hawk.

The miniaturization of components and progress in autonomous flight without human input makes it possible today to buy a drone from the high street. These drones have capabilities comparable to very expensive military hardware of a few years ago – as well as some capabilities that were not available at all in the recent past.

Regulation distinguishes between drones for private use – drones flown strictly for hobby and recreational use only – and for professional and/or commercial use.

Drones for private use are normally only lightly regulated, like model aircraft. Stricter rules apply for commercial use.

Sales of drones for private use have exploded in the last few years but now, in addition, commercial drone activity is growing exponentially.



KEY EXAMPLES OF COMMERCIAL ACTIVITIES

DISASTER RELIEF

A Canadian humanitarian organization used drones to survey the regions hit by the 2015 Nepal earthquake, in order to prioritize services and to check for clear roads. In addition, a thermal camera load searched for body heat from survivors.

PRECISION AGRICULTURE

The Yamaha RMAX unmanned helicopter sprays fungicides in a hilly area of the Napa Valley vineyard region of Northern California. Yamaha Motor Corp. has sold 2,700 of its unmanned helicopters, which spray pesticides and fertilizers onto 40% of all the rice fields in Japan.



CLAIMS HANDLING

The US Insurer USAA (United Services Automobile Association) has permission to use its drones to collect images and data from areas with a high volume of claims. In particular, the use of drones will improve its ability to respond swiftly to claims from hurricanes, tornados and floods, by providing aerial images of areas claims adjusters can't get to.

FUTURE USES FOR DRONES

The number of drones and the areas in which they are being used are growing rapidly. Drones can fly low or high, in buildings and vehicles, and below ground in canals and mines. They can land in tight spots, float on the water, land on the palm of your hand or attach to any vehicle. They

INSPECT AND EXPLORE INACCESSIBLE PLACES

A good example of this is ELIOS, a collision-tolerant drone designed for industrial inspection professionals. It carries a video camera and a thermal video viewer, and allows an operator access to complex, cluttered or indoor spaces.

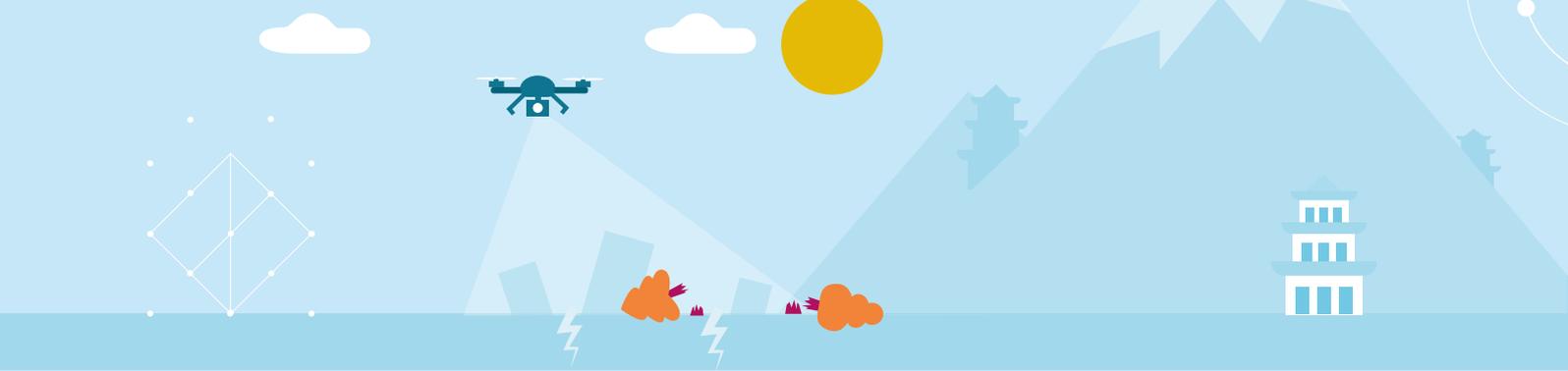


LOGISTICS

One of the most interesting activities in terms of logistics can be found in Rwanda. Worldwide more than two billion people lack adequate access to essential medical products, often due to challenging terrain and gaps in infrastructure. Because of this, over 2.9 million children under the age of five die every year. And up to 150,000 pregnancy-related deaths could be avoided each year if mothers had reliable access to safe blood.

Through a partnership with the Government of Rwanda, UPS/Zipline has been using drones to deliver blood products to twenty hospitals and health centers since 2016, improving access to healthcare for millions of Rwandans.

can be slow or fast and can carry added cameras, sensors, microphones, lights or robotic arms. They can be tiny or huge and will ultimately be able to carry every kind of freight imaginable.



This huge flexibility is inspiring scientists and enthusiasts to develop new applications that will radically change our lives in the future. Below are just two examples of such potential future uses:

POLICE STATIONS

Drones could replace police cars in most of the outdoor activities of a police force and in most cases, the policeman would not even have to leave the office.

A drone would patrol the neighbourhood and search with its camera for suspicious objects. It would be sent first to any problem reported to the police like a traffic jam, car accident, burglary or fire. A special payload including a thermal imaging camera and a smell detection device could be used to search for missing persons or even missing pets. A specialized high speed drone would replace the police car for potentially dangerous high-speed chases.

AIR TAXI DRONE

Drones could dominate the future of individual people transportation. The aim of building personal transportation drones is one of the major areas of current development work. As these drones will be fully autonomous there is no need for a pilot on board, and they could circumvent traffic jams and motorway building sites by using the uncongested low-altitude airspace. Several projects are in the prototype phase already, for example the chinese Ehang 184, as the picture below.



© Ehang

MAIN RISKS AND RISK MANAGEMENT APPROACH

MAIN RISKS

By definition an unmanned (and therefore potentially uncontrolled) aircraft poses severe risks in today's heavily used airspace and over populated areas. The main risks are:

♦ **The risk of collision** with other aircraft, in the worst case scenario with an airliner carrying hundreds of passengers. There has not yet been a major disaster but there have been many close calls.



♦ **The risk of infringement of personal privacy.** Small drones equipped with video cameras and GPS tracking devices can hover silently and unnoticed in residential neighborhoods.

Progress in video technology allows this to happen even during night time, and it remains questionable how much protection legislation can give you.

The best-known example of this risk was the intrusion and crash of a drone in front of the White House in January 2015, despite the heavy security around that building

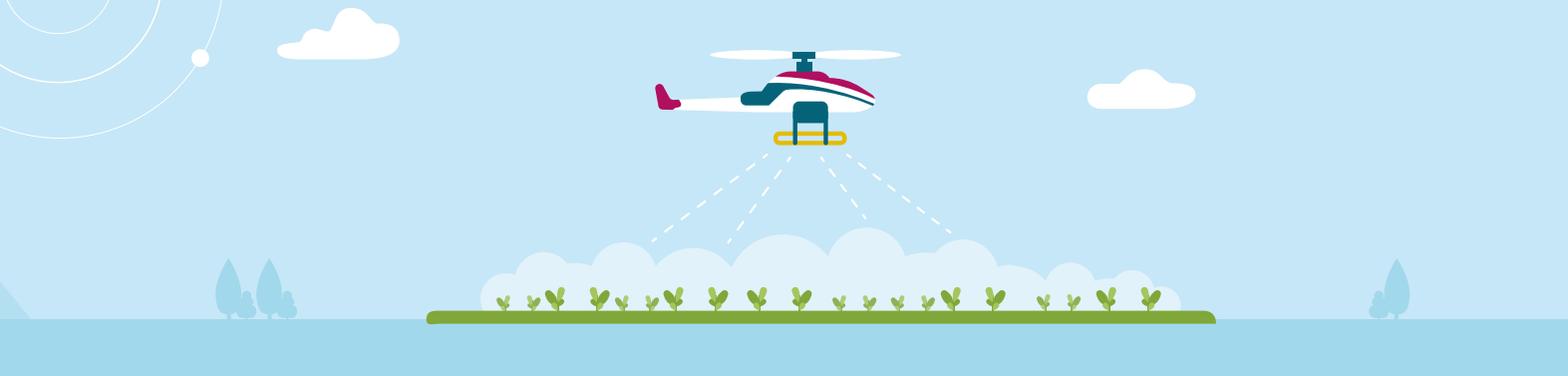
♦ **The risk of causing damage on the ground,** either by hitting people or by damaging property.

For example:

- A woman knocked unconscious by a falling drone during Seattle's Pride parade
- A drone cutting the power to hundreds of residents in California
- A car being hit by a drone

RISK MANAGEMENT

All parties involved, i.e. drone owners and operators, drone manufacturers, authorities and insurers, have to adapt their risk management processes to mitigate potential damage.



RISK MANAGEMENT: AUTHORITIES

A comprehensive regulation framework which sets clear rules for drone operators is paramount.

Such regulations did not exist in the past and not every country has developed or introduced them yet.

Currently, national regulations around the world show a wide variety of rules applying to potential drone operators. These range from the very lightly regulated private use of drones in the US, to the total ban on any drone use in Saudi Arabia.

Typical regulation items are:

- ◆ No-fly areas like populated areas, crowds, infrastructure
- ◆ Minimum distances from airports
- ◆ Visual line-of-sight (VLOS) flights in daylight only
- ◆ Maximum altitude and maximum groundspeed
- ◆ Minimum requirements for remote pilots
- ◆ Weight restrictions

The Italian authorities have introduced compulsory third party legal liability insurance for all drones used for commercial purposes.

Not all countries have released rules for commercial drone operation. In August 2016 the US FAA administration released new rules for the commercial use of drones, which could become the model for international regulation¹.

The integration of higher performance drones into a controlled airspace environment will be the next big challenge for national authorities. With similar rules to those for airlines, international co-ordination and harmonization will be needed to allow such drones to use their full potential.

RISK MANAGEMENT: DRONE MANUFACTURERS

The products offered by drone manufacturers can include the following features to reduce risk:

- ◆ Incorporate new technologies like geofencing² and automatic recovery if a pilot loses control.



- ◆ Provide end-users with comprehensive handling manuals, translated into all languages needed, as well as high-quality after-sales support.
- ◆ Offer attractive and affordable training courses for remote pilots.

RISK MANAGEMENT: DRONE OWNERS / OPERATORS

The following best practices can be implemented by drone owners and operators from a risk management perspective:

- ◆ Use a drone-specific Safety Management System (SMS), i.e. using safety documents like pre-flight checklists, logbooks and Standard Operating Procedures (SOP);
- ◆ Train all remote pilots using drones: key topics to be covered are laws & regulations, weather and micrometeorology, the airspace class system, and drone flight operation including emergency operations. This training should be followed by tests, including a test flight;
- ◆ Follow the maintenance schedule provided by the manufacturer to reduce the probability of a sudden power loss.
- ◆ Buy third party legal liability Insurance as a minimum; such cover can be bought separately, or for privately used drones can be included into existing homeowner or commercial/professional/farmers liability insurance.
- ◆ Add directors' and officer's liability, professional indemnity and employer's liability insurance for commercial drone operators.

1. <https://www.faa.gov/uas/>

2. Technology to prevent a drone from flying into restricted airspace - see example above



INSURANCE FOR DRONES

Manned aircraft operators around the world are required by law to hold adequate levels of liability insurance in order to meet their liabilities in the event of an accident. For drones, many countries require compulsory third party legal liability insurance for commercial operations but only a few require such insurance for private users.

LIABILITY INSURANCE

Accidents with drones involving bodily injury and/or property damage are grabbing the headlines, and the chances are high that they will provoke legal action.

Therefore drones for both private and commercial use should have legal liability insurance to cover third party damage (bodily injury and property damage), despite such cover only being compulsory in a few countries. Typical sums insured can reach several million USD, but are still modest in comparison to the limits issued for manned aircraft. Liability cover for lawsuits involving the invasion of privacy is a possible additional cover.

Product liability insurance protects drone manufacturers, parts and software suppliers and maintenance providers from lawsuits if their products fail and contribute to a loss. This cover becomes even more important with the increase in capabilities and the progress of (partially) autonomous operations, which transfers a greater share of the liability burden to the manufacturer.

HULL INSURANCE

In addition, hull insurance can be bought for the vehicle, the payload (such as cameras and sensors), and the ground equipment (e.g. starting and landing devices, remote control and power supply). The hull rates applied tend to be much higher than in the manned aviation world due to:

- ♦ Higher accident rate per flight hour in comparison to manned aircraft;
- ♦ Imminent risk of theft due to the smaller size of the drone and its attached equipment.

Insurance coverage wordings are still under development. As a reaction to the scant regulation of the drone sector, many insurance contracts list mandatory safety rules for the insured that exceed the legal requirements.



UNDERWRITING CONSIDERATIONS

The main concern of any insurer quoting cover for a commercial drone operator is the possibility of a drone injuring people on the ground. Such bodily injury losses have the potential to be substantial and even to exceed the usually modest sums insured. The insurer typically reviews the following factors:

- ♦ Proximity of people (especially crowds of people)
- ♦ Intended use of the drone
- ♦ Weight and reliability of drone used
- ♦ Training and experience of operator and pilot
- ♦ Use of Standard Operation Procedures (SOP) for maintenance, preparation and flight

Differences in pricing and insurability can be larger than in manned aviation. A drone used for agricultural purposes in the Midwest of the US has a completely different risk profile to a similar-sized drone used for taking spectacular videos during a crowded sports event.

REGULATION

Regulation is a key factor for insurers' confidence in this new technology. Currently, no uniform regulation exists for drones. Insurance has to be tailored around diverse national regulations, whilst being flexible enough to adapt to the frequent changes made.

THE INSURANCE MARKET

Low hull insurance values, limited liability limits and the plentiful insurance capacity available have already led to overcapacity in this new segment of the Aviation insurance market. Expertise and historical data are scarce, but underwriters are using their experience of the manned classes to assess the risk and/or to limit their exposure.



CONCLUSION

We expect much more drone activity in the skies in a few years. To guarantee safe operation authorities and drone manufacturers must respond fast to changes due to the rapid development of capabilities and the ever increasing air traffic at low altitude. New and little-understood risks will require an agile and flexible response from all parties. And a safety first approach by the drone operators will be key to make the public comfortable with the new vehicles in the sky.

The Aviation insurance industry has every reason to develop tailored solutions for drone operators, owners and manufacturers. Currently only a very limited history in terms of operation, reliability and actual claims is available. Insurers have taken a proactive approach to fill the gaps in knowledge and to offer a comprehensive cover for all stakeholders. They will play a vital role in making drones a prominent part of our future.

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