

Neil Fretwell explores the growing number of different applications that unmanned aerial vehicles are now being used for

THE SKY IS NOT THE LIMIT



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A terrorist atrocity has just taken place in Central London. A vehicle-borne device has exploded in one of the busiest thoroughfares in the world. An effective search and rescue phase has been completed and the scene has been locked down for a stand-off period in case of any secondary devices. Unfortunately, in recent times, an all too familiar scenario in many European capital cities, but what happens next?

What used to happen was the post-blast bomb scene examiner would enter the scene with his camera, pen, ruler and paper to draw his plans. This was the most important document at the scene, as it enabled the examiner to identify zones to allow a full forensic examination to take place. This would also identify areas of concern and what areas to prioritise, like the bomb

crater. This could take many hours and hindered the goal of returning the area to normality as soon as possible. Unfortunately it was, and still is, a vital part of the scene examination process.

But that is starting to change. Law enforcement and military assets are increasingly moving towards utilising Unmanned Aerial Vehicles (UAVs) for this purpose, allowing for more rapid planning by scene commanders and examiners. They are utilised for aerial photography and identifying hard to reach areas where vital evidence may have fallen. This is just one of the areas that UAVs are being put to use in a rapidly expanding market.

But UAVs are not new. Their history can be traced back to the Montgolfier brothers in France who in 1782 started experimenting with balloons. During the American

Affordable and durable UAVs are being employed in a number of different applications



Civil War, the Northern Union utilised unmanned aerial balloons to carry incendiary bombs with the intention of starting wildfires on the Southern Confederacy side of the battle lines.

The development of what we now know as the modern UAV actually started during and after the first World War where they were initially devised to tackle the ever-increasing threat of the zeppelins. They were developed originally for reconnaissance and attack purposes, mainly within the USA, and were utilised during World War II, using remote controlled aircraft. Further development took place during the Cold War period, but mainly in the reconnaissance or target practice fields. In the Vietnam conflict in the 1960s, UAVs were successfully utilised by the US military. They were used in a number

of ways, including dropping propaganda leaflets and for surveillance. It is reported around 80 were shot down during the conflict, but this figure pales into insignificance against the reported 34,000 missions flown.

We are all aware of the battlefield UAVs that have been, and are being, deployed against military targets during recent conflicts, but these are sophisticated, expensive, highly technical offerings not suitable for domestic, law enforcement or commercial use. During recent years a new generation of UAVs have hit the marketplace, making them affordable to a much wider audience. Domestic use has exploded over the last 10 years.

These UAVs are now being used in the areas of search and rescue, crime scene investigation, workplace inspections and disaster recovery relief to name but a few. One of the ways that the US Customs and Border Protection Agency protect and control the border with Mexico is with UAVs. This is a much cheaper alternative to building a wall. The deployment of UAVs usually takes place "under the radar" and there are a large number of organisations already using them for a myriad of purposes. The scalability of them also make UAVs deployable inside buildings and their use is widespread in search and rescue scenarios.

But where do we go from here? New uses are proliferating to include chemical, biological, radiation and nuclear detection, the use of infra-red and the introduction of solar-powered technology to enable the UAV to travel further and for longer than ever before. Infra-red cameras today have the capability of identifying the heat signature of a body from an altitude of 10,000 feet. This makes the UAV the ideal search and rescue tool.

One of the great advantages of utilising UAVs is to enable the operator to stay safe many miles from where the action is taking place, while allowing them to have first-hand information of what is taking place at the scene. No longer does the operator have to forward deploy to obtain an "eyes-on" view of the action.

So, what else is new and innovative in this fast-paced, ever-changing marketplace? One of the limitations of UAVs in the past has been that once deployed, they would record the incident onto an SD card but would have to return to base to allow the imagery to be downloaded and viewed. Some of the more advanced offerings now allow for live video streams from any location via UAV back to Command and Control, negating this need.

Imagine having an eye in the sky at any scene at any time, being able to monitor events on your tablet, mobile or computer wherever you are. This is the reality that is now being offered in an affordable package. In a rapidly changing landscape, the commander can be monitoring and advising on the next steps from the comfort of his own home without having to forward deploy to the rendezvous point. The UAVs offered for this type of work are extremely portable and rapidly deployable, making them a favourite with units that have to carry their own kit. This also means they can be deployed to inaccessible, hard to reach places, where wheeled vehicles can't take you.

Previously, aircraft and helicopters were the only

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way of getting the information required, but these were costly and sometimes difficult to organise at short notice. If you add in the complication that no fly zones are imposed around major crime scenes, to avoid disturbance from downward wind drafts, these flights were normally a non-starter. Now, at a fraction of what would be the cost of a conventional plane or helicopter, the same goals can be achieved. UAVs are available nowadays at a price that makes them almost disposable. They can be deployed at a cost that conventional aerial technology can't compete with. With minimal downward wind draft they can fly over areas when other aerial vehicles can't.

Also, the availability of networks today means that these video streams are highly accessible. They work via Wi-fi, satellite 3G or 4G connection. You can stream multiple feeds live from the scene, or any number of scenes, from anywhere in the world.

Imagine having on-the-ground insights from the heart of the action, direct to the control room. In the command control room you now have the ability to track your assets and activities on multiple platforms, all on the same screen. Multiple streams can be accessed at one time. Individuals outside the command control centre can be invited in to watch it as well, and it affords an opportunity for assets on the ground at another location to view as well.

Together with the live video stream, you can communicate with the UAV, and the commander or operator can dictate what single or multiple images are taken and relayed back. These can be stored within a cloud environment in an evidential manner for use in any future legal proceedings. The metadata will also be stored alongside each image and video stream therefore ensuring its integrity.

If the modern UAV should experience difficulties, and lose contact with the operator for any reason, most are now fitted with a "return to home" feature, which will

return them to the exact location they started their flights. It will calculate how much battery life they have left and likewise, if they are running low on power, will return them to their starting points, calculating exactly how much they need to return safely. If a UAV is lost, due to the recording of the live stream, these videos are saved onto a secure cloud platform and therefore users don't have to rely on the drone having to return. It can be seen as an expendable piece of kit which could assist assets on the ground to catch more significant footage.

UAVs are proving invaluable in today's attack-planning, both in a military and law enforcement setting, but their uses are only bound by our imagination. Parcel delivery companies are already utilising UAVs in trials. They are being deployed on a regular basis in the areas of traffic management and crowd control. Commercial applications include oil and gas pipeline inspections, fisheries and forestry management and even crop dusting. They are starting to become a vital tool in the areas of maritime and mountain search & rescue together with mineral exploration and geophysical surveys. They have even been used to deliver pizza (but only in New Zealand!). As the saying goes, they can "go where no man has gone before". They are regularly deployed at sporting events and during times of crowd disorder. They are deployed as mobile close circuit television units (CCTV) and can help identify offenders quickly and efficiently.

As technology improves, there are no limits to which direction UAVs will go next. Battery technology limits distance and speed at present due to weight and size factors, but who remembers the size and weight of the batteries on the first mobile phones? Look at them now. As batteries get smaller and lighter the uses for UAVs become more abundant. The list of applications is ever growing and will continue to do so. In this rapidly moving, innovative marketplace I think that we can safely say that: "The Sky is not the limit".

UAVs are able to get round no-fly zones to provide unrestricted access to hard-to-get-to locations

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