RISE OF THE DRONE

In the first of a series of articles about innovation and the future, Seppe Cassettari traces the evolution of aerial imaging and how the rise of the drone poses a significant challenge for traditional suppliers

An exercise in crystal ball gazing is always likely to stimulate debate and alternative views, and I was once advised, 'Report the facts don't forecast the future, you are always on a hiding to nothing.' Nevertheless, here goes.

So where to start? For this first article let's consider a primary source we have been using over the past century to generate our map bases – aerial imagery, traditionally captured by manned, fixed-wing aircraft. This remains a very important part of the geospatial process, with our national aerial survey programme based on using such platforms equipped with large format aerial survey cameras.

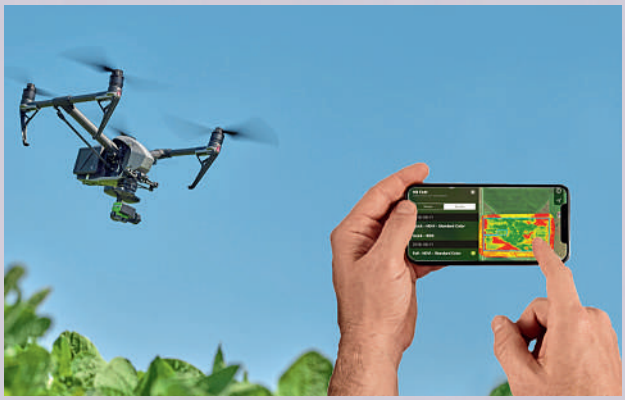
Flying aerial photography has, like most cutting-edge technology changed beyond all recognition since the early 1980s. Then, most imagery was captured in the form of nine inch black and white negatives for use in traditional photogrammetric plotters. The move to colour had a big impact on the way aerial imagery could be used, but the greater impact was the move to digital data.

Early steps were taken in the UK with the GeoDAS solution from Geonex (a long gone survey company), and this was followed by initiatives such as Getmapping's first national flying programme, ultimately leading to the ubiquitous imagery on Google maps and the like. In fact, the 'googlisation' of aerial imagery that made it freely available on desktops and mobile devices, gave the vertical air photo a new and much wider audience.

Emerging threats

But even in the 1980s, those capturing imagery using manned aircraft were threatened by the launch of Earth Observation satellites featuring ever higher resolutions and new business models. They managed to stay ahead of the game by improving image resolution and quality for, even today, the best satellite resolutions at 30cm are some way off the 5-10cm resolutions being used routinely by

Using manned aircraft, aerial mapping company Bluesky completed another successful survey season in the UK and Ireland during 2019, capturing around 70,000 square kilometres of aerial photography – of which about 70 percent is high resolution. The total area flown equates to around twice the size of the Netherlands. Photo: Bluesky International Ltd



As technology integration increases the capability of drones in leaps and bounds, new applications emerge. Here, by combining GPS and INS (Inertial Navigation System) positioning with its industry-leading multispectral cameras and AI, Septentrio has developed cutting-edge sensors for precision farming. Photo: Septentrio N.V.

professional imagery users across the UK.

So from where does the current threat come? Primarily it is a cost and access issue. Flying imagery is an expensive activity requiring specially-adapted aircraft that need regular maintenance and skilled crews. The requirement to fly at a set altitude to achieve the desired image resolutions often brings aerial surveyors into conflict with the demands of commercial passenger aircraft and Air Traffic Control (ATC) ... a conflict that will always put the survey aircraft way down the priority list.

#Enter the drone. The revolution ushered-in by this technology over the last few years has been nothing short of staggering. There is now a huge range of fixed and rotary-wing platforms and a variety of sophisticated and versatile solutions for creating rectified and mosaiced image bases. In directly competing with the manned survey aircraft, drones will deliver 2-3cm resolution images in a highly cost-effective manner across small survey areas.

Safety first

But therein is the rub. Safety concerns over drones that stray beyond visual line of sight from the operator limit their formal use, and recent near miss incidents around airports have led the authorities to tighten the rules on their use, especially over urban areas.

At the moment we have a quite neat three-layered solution – satellites down to 30cm over wide areas; manned survey aircraft in the 5-10 cm layer over broad areas, and drones for the detailed small area work. But as with all things, this is going to change and the likelihood is that manned fixed-wing operators may well loose out.

Both manned aircraft and drone solutions suffer from the problem of cluttered skies and the generally not unreasonable demands of ATC. In the long term who will come out on top?

Flying higher (and lower)

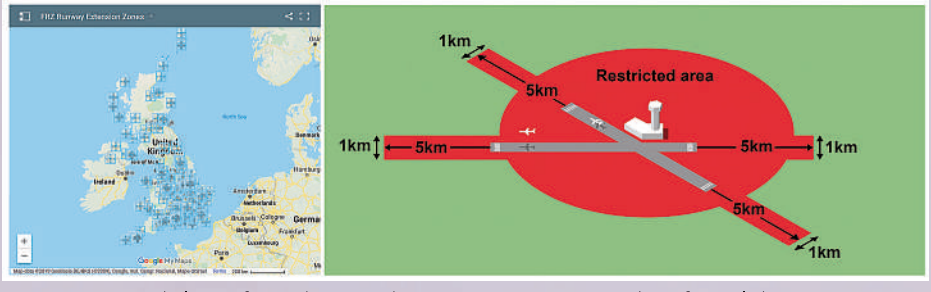
Recent advances in camera and lens technology have effectively extended the operating altitude for manned survey platforms, thereby avoiding the need to impinge on the no-go areas that surround our large and busy airports. This helps a lot potentially, but cameras are expensive, and each radical change is another cost that survey companies must factor into their pricing.

Drones are still generally small and operator-driven from a console, so they can operate below the primary ATC levels of concern. But we are already seeing larger drones that have the capacity to fly much higher and for much longer, with cameras that can still achieve the best resolutions. The next generation of drones is bound to infringe the tier that is currently the sole preserve of manned fixed wing aircraft.

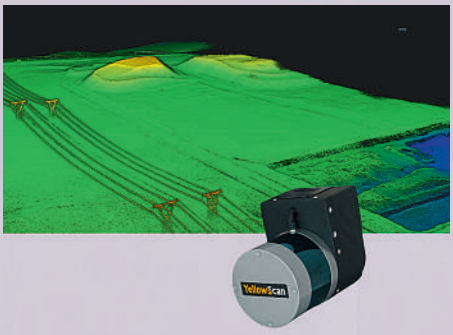
If larger, military-style drones can resolve the ATC dilemma more effectively than current, manned fixed-wing solutions, then there is no reason why we can't have commercial drone fleets operated from central operation centres. These would probably be in direct contact with ATC and on continuous patrol across our skies. They could capture a national aerial survey at 5cm resolution or better and update the imagery more regularly than the standard three year-intervals to which we are accustomed. They could also include other sensors, including LiDAR, and capture oblique imagery in a way that would challenge the latest aircraft sensors such as the Leica CityMapper.

I see no end to the demand for vertical aerial imagery, but is the era of manned fixed-wing aerial surveys drawing to a close? Not yet. But it is possible to see the current three-tier solution being compressed into two, with a combination of satellite and drone providing the best resolutions at the most competitive prices.

Dr. Seppe Cassettari is a GIS professional, with more than 25 years' experience in developing and applying geospatial technologies in the public, private and educational sectors. He was most recently CEO of The Geoinformation Group (now Verisk's Geomni UK business)



In a recent move to bolster safety and security, drone operators must remain clear of new Flight Restriction Zones imposed around UK airports (left). It is now illegal to fly any drone at any time within the boundaries of these zones (right) without ATC or airport permission. Images: NATS/CAA



Compact and lightweight LiDAR (Light Detection and Ranging) sensors for drones, such as the Surveyor Ultra from Yellowscan pictured here, can quickly generate dense and accurate point cloud data that are compatible with GIS/CAD systems