The security drones report 2017
The prevalence, growth prospects, applications and regulatory challenges of drones and anti-drone tech in the global security market.
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About the sponsor: Aviat Drones
Aviat Drones is a UK-based aerial platform supplier specialising in operating a variety of drones for a range of security applications, including long-range tracking and observation, thermal vision, crowded areas and night operations. Assisted by experts in the aviation, security and photography/film sectors they also offer bespoke solutions to clients based in the UK and internationally. With the benefits of extensive market research and experience, Aviat Drones is a leader in its field and looking to expand its client base.
About $127bn (£98.5bn) worth of labour and business services could be replaced by drones by 2020, a report published in May 2016 by PricewaterhouseCoopers has estimated.

The technology has its origins – in common with thermal cameras and many other security technologies – in the military. Referred to as UAVs (unmanned aerial aircraft), they have been invaluable in reconnaissance and the surgical dispatch of terror suspects at a fraction of the cost of conventional, manned aircraft for longer than many people probably realise.

Military historians agree that the first modern military drone was the Tadiran Mastiff, put into service by the Israeli military in 1973. Weighing 138kg and 3.3m long by 0.89m high it streamed real-time high resolution video and could fly continuously for seven hours. UAVs were used widely during the first Gulf War and, not without controversy, in recent campaigns across the Middle East.

In recent years, however, unmanned aircraft have been repurposed for civilian applications. A kind of successor to the remote-control helicopter, drones are used as toys by children and adults alike – and that in itself creates security risks (which we explore on page…). And organisations in a growing range of sectors are finding operational efficiencies in a plethora of imaginative ways as prices fall and the technology becomes more sophisticated. Commercial drones are already used in the aerial surveillance of crops, as a much cheaper alternative to helicopters in search and rescue operations and the delivery of medical supplies to remote or inaccessible regions. Less dramatically they are even used by everyday small businesses like estate agents and wedding photographers.

But the most widely publicised example is surely Amazon, which successfully trialled its Prime Air drone delivery service in Cambridge, UK in December 2016. It doesn't take a quantum mental leap to foresee how that trial’s outcome – the delivery of a TV streaming stick and bag of popcorn directly to a customer’s garden – could be used for nefarious ends.

Which brings us to anti-drone technology: systems that disable or wrest control of rogue drones, or impede encroachments via physical or virtual barriers. Whatever the method deployed (and they are myriad, as we explore on page…), such systems are eliciting interest in high-security environments like airports, which have reported a number of serious drone-related incidents, and prisons, where drug or weapon-delivering drones have been known to breach the perimeter. Anti-drone tech can also protect organisations against the theft of intellectual property and invasion of personal privacy through unauthorised surveillance.

Drone-service providers Aviat Drones commissioned this report to gauge how widely both drone and anti-drone technology is already used in the security industry and the level of demand among those yet to deploy it.

The security drones report 2017 also sets out to ascertain levels of demand for various applications – from aerial surveillance to licence plate identification and thermal imaging. We explore the potentially transformative effect of what remains a relatively novel technology in this industry.

However, this very novelty also means best practices and regulatory frameworks are still works in progress. Therefore the report examines the state of play in terms of UK and international regulations as well as technological challenges around battery life and inclement weather and how they might be surmounted.

The survey was completed by hundreds of security professionals, facility managers and senior executives from around the world (although the UK accounted for the largest portion).
For all the hype, drone sales in the consumer market have recently fallen well below expectations. Venture capital financing for drone companies plummeted 59% year-on-year in the third quarter of 2016, from $134m (£105m) to $55m (£43m), according to data research firm CB Insights. Having raised $125m (£97m) from investors, one much-vaunted California-based start-up, 3D Robotics, has now effectively abandoned the consumer market.

But if demand among hobbyists was overestimated, then that doesn’t seem to be the case for commercial drones. Already worth $2bn (£1.5bn), the global market for commercial applications was projected to be worth $127.3bn (£88bn) by 2020 – a staggering 6,000% jump in three years – by a PwC report published in May 2016. And security is set to account for $10bn (£7.8bn) worth of the market, behind only infrastructure, agriculture and transport. The US aviation regulator believes the size of the commercial drone fleet in the US will grow to 10 times its current size by the end of the same period.

Drones are already more widely used in the security industry than many might have realised, if our survey is any barometer. Sixteen percent of respondents – mostly comprising security professionals, heads of security and other senior executives – say they already deploy the technology. Given that a total of 60% either already use drones or can foresee themselves doing so eventually, it doesn’t seem hyperbolic to describe the growth trajectory for this market as heading sharply upwards. In fact, a mere 16% indicated that they “probably won’t ever need drone technology for any security application”, the other 24% admitting that they don’t know enough about the technology to commit either way.

**Case studies: How respondents deploy drones**

- “Critical infrastructure (substations, ventilation fans for people working underground, remote sites)”
- “During night-time to view/inspect the area for suspicious activity if an alarm sounds before security checks”
- “Football, rugby, rally car [events] and political functions”
- “Over populated [areas] with a lot of vehicular traffic”
- “Hydroelectric power plant and oil pipeline”
- “Building surveying security – perimeter patrols”
- “Numerous locations from city centre to rural”
- “Bush areas where suspects are hiding after a burglary and when solar equipment theft occurs”
- “Hospital environment and site including car parks”
- “Police operations, which can be rural or urban”
- “Our claims department uses the drone technology as part of their assessment procedures”
- “For surveying and media”
- “During big functions like concerts in the parking lot”
- “For a “complex grouping of industrial buildings and services”
- “To check what’s happening across a large mountainous region. The area we use surveillance for is also used by shepherders who not only have to look out for wild predators but also human beings who try to steal their livestock”
- “Because we are an innovation consultancy, the design process can incorporate a vast amount of user observation at the front end of a project. Using a drone in some situations could provide a great deal of vital information. Also, one area of our expertise is metrology (diagnostics, testing and monitoring). Quite often, these products are used in hazardous or difficult-to-access areas, therefore drone involvement could become commonplace”
Of those who don’t already use drones but expect to at some future juncture, 42% considered drones ‘important to how we achieve our goals’ and wanted to deploy them as soon as practically possible. The other 58% expected to make the investment only when prices fall low enough.

And prices are dropping fast. Accelerated by low-cost competition from China – notably DJI, which dominates the consumer market and is making inroads into the commercial space – this is making security drones and anti-drone tech accessible to a widening range of businesses and sectors.

**Demand and growth potential**

We already use drone technology 16%
Yes – it’s important to achieving our security goals and we plan to use ASAP 19%
Yes – but only when prices drop to low enough levels 25%
No – we probably won’t ever need drone technology for any security application 16%
Not sure – I don’t know enough about the technology yet 24%

*We use drones “on an ad-hoc basis – supplied and driven by a third-party provider.”*

Africa-based facilities manager in the residential housing market
Drones as a service
And investment needn’t be frontloaded. Replicating a model gaining ground in access control and long dominant in intruder alarms, the provision of drones as a service is likely to suit businesses that only need drones periodically, want the flexibility to scale their operation up or down rapidly, or simply want to test the concept without making a big investment in hardware and training.

Unlike more established security technologies like CCTV, access control and intruder alarms, drone use does not benefit from the accumulation over several decades of guidance, operational methodologies and technical standards. They represent if not unchartered territory, then certainly lightly explored terrain. Few organisations can draw on a wellspring of expertise within their organisation or readily find candidates with eclectic skillsets that happen to include expertise in this niche discipline.

Within this context, this observation made by Adam Lisberg, DJI spokesman for North America, to Reuters in 2016, seem perceptive. “Four years ago, it was enough to take something out of a box, you push a button and it flies. The smart money is now in drone services.”

ROI: Making the case for investment
Security professionals review the performance of their security systems as tech evolves on a fairly regular basis. This is perhaps understandable given the pace of breathless pace of change in what is now a software driven-market.

Asked how often they review their ‘current security systems with a view to investing in new technologies to boost security and/or cut costs’, 42% said once a year or less. A further 27% did so every 1-3 years and 25% reviewed things on an ad-hoc basis, the implication being that they would happily consider investing in technologies as and when they become aware of them. That leaves just 6% of respondents who tend to review systems less regularly that every three years.

Such apparently widespread willingness to consider investing in cutting-edge security technology is a real spur to a disruptive sector like commercial drones.
How often do you review your current security systems with a view to investing in new technologies to boost security and/or cut costs?

- Once a year or less: 42%
- Every 1-3 years: 27%
- Every 4-6 years: 3%
- Every 7-9 years: 1%
- Every 10 years or longer: 2%
- It varies wildly; we review technology on an ad-hoc basis: 25%

Persuading budget holders to sanction investment in drones becomes a lot easier if the outlay can be recouped – and then some – through operational efficiencies. Consider the most well-known commercial deployment of drones, by Amazon, during trials in 2016: delivering a 2kg package within a 10km radius would cost the retail giant between $2-$8 in ground transport costs, whereas delivery by drone costs a mere 10 cents – between 20 and 80 times cheaper.

It’s not difficult to imagine how substantial savings could also be achieved in the security market if drones could be deployed in place of security guards, network cameras or helicopters in certain contexts (find out more on page...).

**Education gap**
The strong demand for commercial drone use would be greater still if only more people in the industry were aware of such transformative benefits. Admittedly, most security professionals are aware that drones can capture bird’s eye images (84%) and three quarters know they can be operated remotely via smartphones and other mobile devices (76%).

However, somewhere in the region of one in two are unaware that:
- Drones can track suspicious persons or vehicles over long distances (44%)
- Drones can be used for crowd control purposes during protests, sports events and other large gatherings (48%)
- Drones can perform a similar role to security guards, potentially reducing spending on manned guarding (52%)
- Anti-drone tech can detect, locate, track and take over ’rogue’ drones to protect buildings, people and other assets (55%)

Fewer still – around two thirds (64%) – are unaware that drones can automatically read licence plates.

Of those who neither already use drones nor are inclined to in the future, 60% said they didn’t yet know enough about the technology to know whether it would have a worthwhile application in their organisation. The equivalent figure for anti-drone tech is similar at 57%. It is clear then that educating the industry on the merits and applications of drone and anti-drone technology is essential if the commercial drone sector is to unlock the potential of the security market.

“**We’re looking for low-cost, industrial scale and autonomous drones.**”
Australasia-based head of security in commercial property sector
Video surveillance

The British Security Industry Association (BSIA) estimates that there are between 4-5.9 million network cameras in the UK – about one camera for every 11 people. With so much of our urban environment already under surveillance, might hard-nosed security professionals write surveillance drones off as an expensive gimmick? Perhaps yes, and understandably so, in certain contexts – most obviously in the surveillance of building interiors.

And yet, as well as being unmanned and equipped with on-board cameras, the other obvious facts about security drones are that they are mobile and airborne. This means they can do things that are impossible for regular fixed surveillance cameras – like birds-eye views over large areas or dispatching rapidly to areas of interest. Consider this in combination with the enormous size of the global surveillance market – worth more than $30bn (£23bn), according to MarketsandMarkets – and the enormous, disruptive potential of this technology becomes clear.

It is understandable, then, that aerial overview surveillance should have the widest appeal among security applications, with 61% of respondents expressing an interest. The aerial capture of footage or imagery is drones’ most obvious USP – and not just in security, with aerial photography now an affordable tool for estate agents or wedding planners.

Every surveillance application becomes much easier – or feasible at all – at night-time with the deployment of thermal cameras, which are of interest to 45% of respondents.

 Asked which types of images they require, every option was ticked by at least 44% of those polled, so a wide range of image types are popular.

<table>
<thead>
<tr>
<th>Which types of images do you require in your security operations?</th>
<th>69%</th>
<th>63%</th>
<th>52%</th>
<th>49%</th>
<th>44%</th>
<th>7%</th>
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<tbody>
<tr>
<td>Observation images</td>
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<td>Identification images</td>
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<td>Recognition images</td>
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<td>Infra-red night-time images</td>
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<td>Thermal images</td>
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<tr>
<td>NONE OF THE ABOVE</td>
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Similarly, there wasn’t a big gulf between the most and least favoured video formats (range 18-32%).

<table>
<thead>
<tr>
<th>Which video format would best suit your needs if you were to use surveillance drones?</th>
<th>32%</th>
<th>20%</th>
<th>19%</th>
<th>18%</th>
<th>8%</th>
<th>4%</th>
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<tr>
<td>HD 1080</td>
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<td>Analytics</td>
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<td>4K</td>
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<td>Recognition</td>
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<td>NONE OF THE ABOVE</td>
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<tr>
<td>Other (please specify)</td>
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Tracking
Drones are hundreds of times cheaper to hire or run than a helicopter, not to mention infinitely more nimble and discrete in tracking suspects. Both short- and long-range tracking were popular functions among survey respondents, with 39% and 35% respectively keen.

Security guard tours applications are the second most sought after application, with just shy of one in two (49%) of those polled expressing an interest. Licence plate identification was of interest to more than one in four respondents (27%).

Security guard tours
Capable of patrolling more rapidly and extensively than human guards, as well as being unimpeded by physical barriers on the ground, drones are an intriguing option for the 46% of respondents who have manned patrols. Of that segment, 64% said they would consider using security guard tour applications. Perhaps unexpectedly, one in two (50%) who don’t deploy manned patrols also expressed an interest in the same functionality – suggesting that drones make unmanned patrols a viable, desirable tool for organisations that eschew or cannot afford manned patrols.

Where sensors detect an intrusion at the perimeter, a drone can be dispatched much faster than a person on foot. And once at a scene – perhaps deploying a thermal camera – they can more readily spot, track and report the movements of an intruder than a flashlight-wielding security guard. This also removes humans from harm’s way.

Offering rapid situational awareness drones can therefore be an invaluable aid to first responders in emergency situations involving casualties.

Drones don’t get distracted and need neither sleep nor food. That said, they still need refuelling in a way that is much more limiting than a human guard’s need for food and water.

| Ariel Overview: (Images from above the subject/Location) | 61% |
| Security guard tour applications (Manned Patrols) | 49% |
| Thermal Imaging | 45% |
| Short Range Tracking (Closer than 1 Mile/1500 Metres) | 39% |
| Long Range Tracking (Further than 1 Mile/1500 Metres) | 35% |
| License plate Identification | 27% |
| Crowd Control | 21% |
| NONE OF THE ABOVE | 12% |
| Other (please specify) | 4% |
Battery/energy limitations

The capacity of drones to support and reduce numbers of fixed cameras and ‘boots on the ground’ is constrained more than any other factor by battery life – and drones are currently deficient in this regard.

At present, commercial drones can typically fly continuously for only about 25 minutes. Surveillance monitoring is a 24-7 undertaking so it’s a major drawback – albeit one obviously solved by rotating multiple drones in shifts. Requiring a larger fleet, however, this obviously increases costs.

It was perhaps with this problem in mind that a UK-based security professional in the transport sector said: “I’m still not convinced drones will be able to replace manned guarding. But they could partner the manned guarding already used in my business. This however is an additional cost and not a replacement, so I cannot justify the budget spend as savings cannot be made.”

The race is on then to develop batteries that are lighter, higher capacity and less hazardous (lithium batteries being fire hazards). Hydrogen fuel cells, which are lighter and more efficient than electric batteries, are one promising avenue being explored by researchers. In some commercial contexts fuel-burning engines are still used.

“A Spanish startup recently unveiled a drone that can fly for six times longer than the average commercial drone thanks to innovative hybrid technology. Quaternion’s multirotor HYBRiX drone is equipped with a range extender that transforms fuel from a small combustion engine to electric power for the propellers. Permitting a maximum continuous flight time of up to four hours, the innovation could extend the viability of drones into a plethora of industrial applications – replacing helicopters and aircraft in some instances.

A less sophisticated solution – and somewhat incongruous one given the trend towards going wireless – is to tether the drones to a power source on the ground. Limited in range but capable of non-stop monitoring, tethered drones from companies like Elistair are useful in traffic monitoring, industrial inspections, air monitoring and public safety.

Weather

Drones are also, like any manned aircraft, affected by the weather, with humidity, temperature, density altitude and, most of all, wind all posing challenges. One respondent expressed misgivings in “changeable British weather” because in “my view drones can only be used in fair weather.”
Rogue drones

Prisons
Intrusion by unauthorised drones accounted for 33 incidents at prisons in England and Wales in 2015 – a huge jump from the two recorded in 2014 and none at all a year before that.

In one case drones were used as part of a plot to flood prisons with contraband worth around £48,000.

A specialist team of prison and police officers has been set up to combat the problem. Law enforcement agencies and HM Prison and Probation Service will inspect drones recovered from jails in order to identify, track down and prosecute those involved in drone-enabled smuggling.

Aviation
In April 2016, a drone crashed into a British Airways jet over Heathrow shortly before, luckily, it managed to land intact (it was even quickly cleared for its next flight). The potential for catastrophe – say if terrorists equipped it with explosives or it was flown deliberately or accidentally, into the engines – is obvious. “Frankly it was only a matter of time before we had a drone strike given the huge numbers being flown around by amateurs who don’t understand the risks and the rules,” said Steve Landells, flight safety specialist for the British Airline Pilots Association (Balpa), following the incident.

The UK Airprox Board (UKAB) recorded 23 near misses between aircraft and drones between April and October 2015, of which 12 were categorised as posing “a serious risk of collision”. This was nearly double the 12 recorded in half the time between July 2014 and July 2015, seven of which were categorised as near misses. In one incident a drone passed within 25 metres of a Boeing 777.
Anti-drone tech
It’s no surprise then that the aviation sector is taking a keen interest in the proliferation of anti-drone tech on the market. The Federal Aviation Authority (FAA) in the US is currently trialling a system that emerged from a collaboration between three UK firms: Enterprise, Chess Systems and Blighter. Resembling a mounted turret, the anti-UAV Defence System (Auds) takes drones out of the sky by firing radio waves. Unlike conventional multidirectional jamming systems, the system’s directional radio antennas don’t interfere with mobile phones and other electrical equipment operating within the same portion of the radio spectrum. US-based Gryphon Sensors and Finland’s Sensofusion are also involved in the trial.

Nearly half (47%) of respondents either already use anti-drone technologies or intend to at some point. There is less apparent understanding of the field than of drones themselves, with 30% unsure whether they will ever use them for want of knowledge about the benefits, drawbacks and costs, compared to 24% for drones.

Do you think you will ever use anti-drone technology to enhance your security operation?

<table>
<thead>
<tr>
<th>Response</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>We already use drone technology</td>
<td>5%</td>
</tr>
<tr>
<td>Yes – it’s important to achieving our security goals and we plan to use ASAP</td>
<td>20%</td>
</tr>
<tr>
<td>Yes – but only when prices drop to low enough levels</td>
<td>22%</td>
</tr>
<tr>
<td>No – we probably won’t ever need drone technology for any security application</td>
<td>23%</td>
</tr>
<tr>
<td>Not sure – I don’t know enough about the technology yet</td>
<td>30%</td>
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</table>

Anti-drone technology: 5 examples

**DroneTracker by Dedrone**
- **Method:** Uses acoustic tech and radio frequencies to detect drones and distinguish legitimate UAVs from unwanted intruders.
- **Deployments:** US Presidential Debate 2016, World Economic Forum in Davos, Suffolk County Correctional Facility in New York.

**MESMER by Department 13**
- **Method:** Wrests control of rogue drones by hacking into their protocols.
- **Deployments:** Critical national infrastructure like military bases, prisons, and airports

**SafeSky by Advanced Protection Systems**
- **Method:** Supported by cameras and machine learning-based software, proprietary radar, acoustic and vision sensors detect small drones from up to 1,000 metres away.
- **Deployments:** Airports, government buildings, utilities, VIPs.

**Net Gun X1 by Drone Defence**
- **Method:** Handheld gun fires a net that wraps around and brings down unwanted drones from up to 4.5 metres away.
- **Deployments:** Law enforcement.

**DroneShield**
- **Method:** Acoustic technology detects incoming drones from up to 137 metres away and alerts a monitoring service if a perimeter is breached.
- **Deployments:** Several prisons and the Boston Marathon.
If being mobile and airborne gives drones a powerful selling point that traditional security technologies lack, then it also creates a regulatory minefield. Conducting surveillance they are bound not just by CCTV and data protection laws but also aviation regulations.

Anxious to create a workable framework for safe use without making the UK an unwelcoming environment for a booming industry, the Department for Transport launched a consultation on the use of drones in December 2016. In a statement Lord Ahmad of Wimbledon set out the aims of Unlocking the UK’s high tech economy: consultation on the safe use of drones in the UK: “To create an environment and enabling infrastructure (legal and regulatory framework and policy) in the UK that: drives growth in the private drone sector (users, manufacturers, services); facilitates public sector adoption (increasing efficiency and capability); and provides reassurance on societal concerns (safety, security, privacy, data protection).”

In March 2015 the House of Lords EU Committee recommended the introduction of an online database for commercial drones. “Public understanding of how to use drones safely may not keep pace with people’s appetite to fly them. It would just take one disastrous accident to destroy public confidence and set the whole industry back,” said Committee Chairman Baroness O’Cathain last March. “That is why a key recommendation is that drone flights must be traceable, effectively through an online database, which the general public could access via an app. We need to use technology creatively, not just to manage the skies, but to help police them as well.”

She also warned of the dangers of recording images of individuals without their consent. Courts might interpret such actions as a breach of the Data Protection Act...
and the CCTV Code of Practice, which was recently amended to cover the public use of drones.

It is illegal to use a drone for commercial purposes without commercial insurance and approval from the Civil Aviation Authority (CAA).

International regulations
The US Federal Aviation Administration (FAA) recently simplified licensing requirements for commercial drone use. In force from August 2016, the new regulations have opened up the industry to smaller organisations.

However, as one respondent pointed out, the regulations still prohibit the flying of drones – commercially or recreationally – beyond ‘line of sight’ or without a remote pilot. Drones are also barred – although operators can apply for exemptions – from flying below 400 feet, at night, faster than 100mph and directly over people.

These regulations rule out autonomous drone flight and undermine their potential to replace manned patrols and perform many other tasks, especially in urban areas.

Though rules vary from jurisdiction to jurisdiction, similar limitations and rules apply consistently across the world.

Aviation authorities will relax regulations only when they see convincing evidence that it is safe to do so. This is why much drone research centres on making autonomous avoidance (or ‘sense and avoid’) systems more reliable and effective. As technology improves we can expect restrictions to loosen as no government wants to unreasonably stifle a technology with such transformative potential.

“Legislation is slow to take off in South Africa so we are restricted,” lamented a senior security professional employed in the manufacturing sector. Another professional based in Africa expressed similar sentiments, saying that “privacy laws in our country also affect the use of drones at this stage.”

Another respondent complained of the “many restrictions in Europe”. The European Aviation Safety Agency (EASA) has admitted that commercial drones in the EU are operated “under a fragmented regulatory framework. Basic national safety rules apply, but the rules differ across the EU and a number of key safeguards are not addressed in a coherent way.”

The agency is developing proposals for an “operation centric, proportionate, risk- and performance-based regulatory framework for all unmanned aircraft (UA).”

UAV Coach has compiled and regularly updated a global directory of drone laws and regulation, which you can find at: https://uavcoach.com/drone-laws
Designed for easy setup, using numerous open ports and often controlled using unencrypted communications, drones are eminently hackable. McAfee Labs highlighted ‘dronejacking’ as one of the top cybersecurity threats in its 2017 Threats Predictions Report. “Someone looking to ‘dronejack’ deliveries could find a location with regular drone traffic and wait for the targets to appear,” said McAfee’s cybersecurity and privacy director, Bruce Snell. “Once a package delivery drone is overhead, the drone could be sent to the ground, allowing the criminal to steal the package.”

He also posited a “highly charged” scenario “like a protest or active shooter situation” in which “a police drone would be a tempting target for someone looking to remain unseen by law enforcement.”

McAFee also warned of the emergence of drone exploit toolkits on the internet and dark web. “Once these toolkits start making the rounds, it is just a matter of time before we see stories of hijacked drones showing up in the evening news,” said Snell.

Students attending a GCHQ-certified cybersecurity bootcamp launched by the UK government in 2016 will learn how to hack into drones.

Asked how concerned they are about the cyber security vulnerabilities linked with drone technology, 88% were concerned about the cyber risks, with 36% ‘very’ concerned.

How concerned are you about the cybersecurity vulnerabilities linked with drone technology?

- Very concerned: 36%
- Fairly concerned: 52%
- Not concerned at all: 12%
Digging deeper into the data

Critical national infrastructure
Professionals tasked with protecting what we might define as critical national infrastructure – government, healthcare, industrial/mining, transport, utilities and agriculture – were more likely to have manned patrols (58% versus 37%), perimeter security (63 versus 56%) and K9 patrols (16% and 7%) than their counterparts in other sectors. Their use of video surveillance was roughly the same.

They were also much more likely to use drones, with 24% using them compared to 9% for lower security industries. As you might expect, budgets were on average much higher, with 44% ticking the top bracket of ‘more than £100,000’ compared to 19% for other sectors. No surprise then that they were much less likely to see price as a barrier, with 57% of those not currently using drones, but hoping to eventually, only willing to do so once prices come down, against 65% for all other sectors. They were also more likely, in general, to be aware of these applications.

They review whether existing systems are still fit for purpose much more often than their counterparts in other sectors, with 50% doing so once a year or less against 31% for the rest.

Critical national infrastructure is a prime target for cyberterrorists, with hackers blamed, for instance, for the power cut in Ukrainian capital Kiev in December 2016. Unsurprising then that the vulnerability of drones to hackers should be of greater concern to respondents employed in these sectors, with 42% professing to be ‘very worried’ against 34% in other sectors.

Security professionals versus the c-suite
It also stands to reason that those working in the security field should be more concerned about the hacking threat than facilities managers or other senior executives: 41% of the former were ‘very worried’ against 15% of the latter and 11% and 15% respectively were not worried at all.

A comparison of security professionals and facilities managers on the one hand and CEOs, owners and other senior executives on the other yields some interesting results about demand. Filtering results to organisations that don’t yet use drones, the proportion who hoped to use them eventually was about the same in both instances (58% and 60%). However, filtering results to those hoping to use drones eventually, senior executives were much more likely to see price as a barrier, with 70% saying so, versus 51% for security professionals and facilities managers.
So security professionals can be confident of finding a willing audience in the boardroom when it comes to pitching spending on drone services. However, they are well advised to shop carefully in terms of value and make a compelling pitch when it comes return on investment.

**Big versus small business**

Organisations with more than 1,000 employees were more likely to review security tech once a year or less: 53% versus 37% for smaller organisations. Naturally, they have vastly bigger budgets too. Neither is it revelatory that they are more likely to already deploy drones as well, although not dramatically so – 19% against 14% – as well as counter-drone tech: 10% versus 3%. Price was, unsurprisingly, a barrier for a much smaller proportion of the largest organisations intending to use drones at some point: 43% against 64%.

They were more likely to want to use drones for manned patrols (58% against 43%) and licence plate identification (32% against 23%).

They were slightly more concerned about the cyber threat, with 39% ‘very concerned’ and 55% ‘somewhat concerned’ – compared to 34% and 50% respectively for smaller organisations.
Urban versus remote/rural areas

Given the regulatory constraints in place against using drones over populated areas, it is unsurprising that respondents operating in rural or remote locations are much more likely to already use drones (32% against 12%) or as a proportion of the rest, to expect to do so eventually (67% versus 50%). Prevalence of anti-drone tech was similar (7% against 5%) while demand was somewhat higher (53% and 45%).

UK versus international

At 16% versus 17%, the prevalence of drone use for security purpose was similar in the UK compared to the rest of the world. However, a much higher proportion of professionals working in the UK said they did not expect to ever use them (27% versus 6%) and admitted they did not know enough about the technology to make a commitment (32% versus 17%). The same patterns apply to anti drones – those splits being 32%-14% and 36%-26%.

UK professionals were nevertheless much less concerned about the cyber threat, with 28% very concerned against 43%.
A 2016 report from PriceWaterhouseCoopers has highlighted the potential of drones to one day perform myriad tasks now carried out by people, sometimes in hazardous environments, more safely, effectively and cost-efficiently than at present. Clarity from above: PwC global report on the commercial applications of drone technology projects that the security drone market will be worth $10.5bn (£8bn) by 2020, surpassed only by infrastructure, agriculture and transport.

Equipped with on-board CCTV and mobile in three dimensions, drones are essentially flying cameras that create hitherto undreamed-of possibilities in surveillance, tracking, guarding, crowd control, emergency management and, no doubt, a plethora of applications yet to be conceived. They are a powerful tool for enhancing security and generating operational efficiencies.

However, with novelty and potential comes risk. Such disruptive technologies will not be adopted lightly – not until security departments have conducted risk assessments and are satisfied of strict regulatory compliance by properly trained personnel.

Regulatory matters are complicated by the fact that – unlike, say, intruder alarms, surveillance cameras or security barriers – drones are not just mobile but airborne. They can encroach into airspace or onto private property with ease. They are therefore subject worldwide not just to CCTV codes of practice but aviation regulations as well – and these are still being fine-tuned as aviation authorities puzzle over the best way to promote safe use without stifling innovation.

Driven by improvements in ‘sense and avoid’ technologies, we can expect to see regulations eased in the coming years to permit long-distance autonomous flight, increasingly optimised by machine learning algorithms, opening up a raft of new applications and opportunities.
If security professionals are inherently, and rightly, cautious about adopting such new technology, our survey findings attest to an enthusiasm for a breed of technology that has powerful applications in a range of sectors. As one respondent said: “We are always open to new technologies.”

Given the compelling case for, yet hurdle-strewn path to, adoption, specialist providers of drone services, alongside drone developers, stand to gain the most from the boom in commercial drones.

### The top commercial drone markets by 2020*

1. Infrastructure ($45.2bn)
2. Agriculture ($32.4bn)
3. Transport ($13bn)
4. Security ($10.5bn)
5. Media and entertainment ($8.8bn)
6. Insurance ($6.8bn)
7. Telecoms ($6.3bn)
8. Mining ($4.4bn)

* Clarity from above: PwC global report on the commercial applications of drone technology

### View from the report sponsor: Aviat Drones

The drone market is changing at an amazing pace. We've seen this in our dealings with manufacturers and clients. Off the back of these developments we are providing solutions for clients with functionality the clients didn't even know was possible. With the ability to fly long range, 20-plus hour flights Aviat Drones employs thermal and tracking technology that helps organisations reduce costs and improve services.

Given the regulatory, licensing and training required to fly drones safely and legally, companies are increasingly turning to specialist operators like ourselves to carry out operations on their behalf.

Drones are being hailed as the future of crowd (or even riot) control. In fact, drones can help monitor the movement of a crowd, predict the course of its progress and highlight particular trouble ‘hot spots’. All they need to do is fly over the crowds and monitor their movements. Such technology could, in fact, prove to be revolutionary if used well. It could have been particularly influential during incidents like the 2011 London riots.

The age of the drones has arrived and technological leaps are now making what was once impossible not just possible but routine. For example, the areas one drone can cover from a surveillance perspective are now almost limitless. In the past this kind of overview was either impossible or prohibitively expensive. As an example, a fixed-wing surveillance drone can provide an eagle-eye view of an area stretching to 10km in all directions.

Flexibility is also important. Using the right platform and technology, drone surveillance can provide facial recognition, thermal night-time images and a growing range of exciting options.

*Rob Kidner, head of security services, Aviat Drones*