

Webinar on Unmanned Aerial Systems: The reality and consequences today and in the future

Online Event, 29 July 2020 at 16:00 CET
Answers to the questions asked during the webinar

Questions	Drone Experts – Geoff Moore	Operators / Regulator Expert – Tomas Bieda, Rob White
1 Do drones pose a threat?	As the example in France with Greenpeace demonstrates, yes, it is a possibility, but we should not overstate this issue. Depending on the availability and market to purchase drones in your country, you are the best decision maker on this. Your government should not be naïve. Nuclear operators and governments around the world are taking this issue (UAS, UAV, drones flying over nuclear or radiological facilities) very seriously. Some countries take this more seriously than others. But, generally speaking, the international consensus is that this is definitely a threat.	
2 Is it cost effective to invest in drones to perform the detection function of a NPP physical protection system?	Where the site is large and the terrain/climate is conducive to drone operations for security, then it is possible. Cost effectiveness must be seriously considered.	Many places in the world are starting to use drones as a detection resource and, for example, to handle potential crime scenes. We think that each facility should consider this technology creatively. It is important to at least start considering the issue, and then see how to start developing more professional capabilities.
3 Do drones have night flight capabilities?	Yes. It's more difficult to pilot them at night without thermal cameras, but it is very possible. Difficult weather - high wind and heavy rain - can be more of a challenge for small drones.	N/A
4 Could a drone be used to change the parameters of communication as a cyberattack if it enters a facility and has the capability to interfere with how machines communicate with each other?	Yes, particularly if poor cybersecurity practices are in place at the facility. This is another good reason to follow best practice all of the time - even when you think your facility is remote and safe.	N/A

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5	How do we balance the use of UAS to monitor facilities against threats and drones employed by adversaries for malicious purposes?		<p>This is a challenging issue, but I would suggest coordinating with other agencies from a non-nuclear perspective. It is very important to understand the regulations and norms that already exist in your country and see how you can develop regulations for the nuclear sector. The different norms provided by the regulator, or national laws or general regulations on such topics, will tell you how to fight drones (or at least guide you), but also how to use them to protect the facility. It is very important to work together with the regulator. It is also important to note that the use of a formalised risk assessment process is critical in evaluating the use of technology whether used by a potential adversary or for defensive purposes. This process should identify and evaluate the benefits and risks as well as the roles and responsibilities for all stakeholders. Therefore, it is important to coordinate with multiple stakeholders such as law enforcement, federal agencies, etc.</p>

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6	<p>Could you give an example of an effective anti-drone solution for NPP?</p>	<p>Every site is different, and it is important to match your countermeasures to the type of threat. In general, what any site needs is an effective incident response system with well-trained operators who know what a successful outcome to an incident looks like. In support of that core requirement, you should select and configure a range of sensors to detect the style of drone you believe is the primary threat (which could be radio frequency detection and direction finding, radar and a variety of cameras). These should be connected to a security management system that is able to take data from all of the sensors to detect and classify drone incursions, providing automatic tracking of the drone and (if possible) the pilot. In addition, you should be working to identify areas of potential vulnerability to information theft, hostile surveillance and reconnaissance, and installing “hardening” features to make these sorts of activity more difficult (i.e. window film, removing signage/maps and other wayfinding aids that might provide useful information to an intruder). All of these features should be integrated into a single physical security and incident management solution, and a set of standard operating procedures should be established and drilled to ensure that personnel know what to do and are able to act quickly in the event of a detection. Locking down and waiting for the drone to go away may sound defeatist, but it is often the quickest thing to do while you gather intelligence and look to identify the source and intent of the incursion.</p>	<p>An effective solution is not only technical; defending facilities against drones requires defence in depth, intelligence, security management, integrated systems and interagency coordination.</p>
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7	Although no fly zones exist around nuclear facilities, the use of UAVs and their increased capability places increased responsibility on operators and authorities to mitigate the threat presented, regardless of whether it is part of the DBT. Is there evidence that this is occurring?	One of the biggest problems is that in order to know definitively whether – and not just suspect – drones are in the area, you need to invest a little in some detection equipment. Unfortunately, a lot of people simply deny that drones are a problem and so do not invest in any equipment, which means they never gather the data to prove the problem exists. We know anecdotally that drones are being flown in restricted zones (it’s not difficult to get around the geofenced no-fly zones and fly wherever you want), but it is not being proven with hard data frequently enough. It can be done relatively simply and at relatively low cost. But for many the question is, do you really want to know? If the physical drone threat is low, knowing they are there simply compels you to do something about the problem, and that can get expensive. It’s a can of worms that some people are happy to keep closed right now.	This is an issue. In many countries we have seen increasing use of UAVs, and sites (not only nuclear ones) are starting to consider them a real problem. Like Geoff explained during his presentation, they’re used not only to conduct attacks but specifically for recon assignments. It is very important to find ways to bring it up at DBT meetings. Countries should at least start considering this an issue. When considering the DBT, one area that is often overlooked is roles and responsibilities as they relate to the DBT. It may not be practical (or legal) for the operator to be solely responsible for defending against a particular threat vector. This should not mean that the threat vector is not considered in a broader, integrated response plan for a given facility, perhaps at a national or state level. Regarding no-fly zones, it is important to understand who defines them and coordinate with them.
8	Drones could/will become a tool of the adversary. What is the legal right to control this issue?	There is a lot to do before that question can be properly answered.	It is related to the process of regulations and security norms and protocols. Drones are “just” a tool like any other.

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9	How would you advise newcomer countries on nuclear security by design? Also, how could these countries control drone supply chains, access and licensing.	<p>It's virtually impossible to control the supply chain. Licensing and regulation do not prevent criminals or terrorists from doing what they do. The most important first step is just awareness. Take apart your incident response processes and reconsider how they would work if the adversary is travelling at 50km/h in a straight line 20m above the ground. The concept of deter-detect-delay-respond looks very different in that context.</p> <p>Educate your security staff on what to do if they see a drone in the sky. Build those processes into everyday operations and run tabletop exercises from end to end. Technology is the last step in the process.</p>	The most important thing is to raise awareness. Each country has specialists and experts that could advise you on how to start incorporating drones into the national perspective. Start working with the security forces from non-nuclear sites to see what to do if a drone flies close to a nuclear site. Scenario case discussions and tabletop exercises will help you start developing these topics.
10	As UAS traffic management systems (UTMS) begin to mature, how much of a role do you see them playing in counter-UAS systems and the control of drones over nuclear facilities?	UTMS will make a huge difference, but it is very unlikely to be widely deployed for a long time. Counter-UAS drones will always need to be in place to mitigate risks from anonymous drones or drones that “pretend” to be cooperative	N/A
11	UAVs are enjoying more positive uses in various industries. These also include nuclear operators. What technologies are being explored, such as geofencing?	Geofencing is one of a number of useful measures right now, but it is entirely reliant on satellite navigation. It's very easy to jam or spoof GPS. Geofencing is a good start, but it is not comprehensive.	N/A

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12	What's easier: neutralising a drone flying over a NPP or arresting the drone operator?	<p>Both are hard to do depending upon the environment and flight style. It is always good to find the pilot, but that can be difficult to prove without strong digital forensic evidence. That requires equipment and training, and often requires the involvement of law enforcement. Lots of laws and training are needed yet. I think it is clear that you really do not want to bring a drone down out of the air if you do not know what is onboard. Explosives have a wider blast radius than you'd expect, and we often speak about "white powder" attacks, where the drone could be carrying some other substance that you do not know about. Even the potential for physical damage and injury from a falling drone are things you need to really think about. Insufficient legal precedent exists to fully understand where liability for injury and damage lies in incidents where drones are brought down by a third party. Interfering with a drone in flight remains illegal in many countries.</p>	<p>In my experience, coming from less developed countries, sometimes it is easier to develop capabilities that rely on human protocols than buying new technologies. Of course, both things would be ideal, but if you don't have the budget to buy equipment, it is best to start developing detection through information alerts and try to chase the drone operator.</p>
13	What legislation has been established about the neutralisation of a drone in the air?	<p>The laws are slightly different in different places. It's hard to comment without more context. The question would be: How do you intend to neutralise a drone in the air? They're large and small, fast and slow, fly high and low. They don't all travel in a straight line. What collateral damage are you willing to accept?</p>	<p>This depends on the country. Different countries are starting to develop regulations regarding the whole UAS industry, not only a potential malicious act. Regulation is a big topic and something that countries should start working together on. Also any state should coordinate interagency efforts.</p>

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14	In your professional opinion, how long do you think it will be before UAV technology is considered a significant risk to nuclear facilities?	Personally I think it already is. The Aramco incident is ample demonstration of that, and anyone with nuclear facilities within 1,000km of a hostile state should be highly concerned about similar styles of attack on critical infrastructure. If you mean when will drones with sufficient takeoff lifting capacity to carry a significant amount of explosives be readily available on the general market, they're here already. Plenty of rotary drones on the market can carry a payload of more than 25kg. That's a lot of explosives. But what about theft of copper from sites? What about identifying key staff and then extorting information from them? Drones are very useful tools for things other than dropping bombs.	It is already a significant risk to nuclear facilities. Each country should start reviewing whether they are going to consider this in their national DBT. But the threat is real. When considering risk, one needs to be more specific and utilise a risk assessment methodology to evaluate it. One should consider threat, vulnerability and consequences. There is risk in everything we do. However, it is more important to understand how much risk one is willing to accept. There is also a reputational dimension in all this to consider.
15	Do I hold the authority to safeguard my premises via drone technology? Is there a legal compliance approval involved globally or is it more country specific?	It is entirely country specific.	This depends on the country. But many countries are starting to use these technologies to guard the perimeter as well.
16	At what point would you suggest a drone could be a potential threat at an oil refinery? Would this be at the perimeter or when it approaches the catalytic cracker?	Most drones in the commercial space with lifting capacities of 25kg or so can travel at speeds up around 45kmph (around 13 metres per second), so if it is 1km from the fence to the catalytic cracker, a detection solution that spots a drone at the fence line has just over 1 minute to do something. That's not very long, so I would suggest that any drone in the area is a threat.	In the countries that we are familiar with, a drone near any strategic facility is considered a potential threat. Nevertheless, each facility is unique and the specific risk to any given facility needs to be evaluated independently.

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17	What is the regulatory framework for this new advancement?	There are many regulations in different countries, but most are in a very early stage and don't have any specific guidance for nuclear.	This is, of course, nationally based, and there are no IAEA standards or recommendations for this yet. But there are multiple drone regulations in different countries that can be used as input to develop your own.
18	Do drones represent more a capability of an adversary than an isolated threat?	Drones are very powerful tool for offence and defence. The computing power and the capability of the sensor technologies make them incredibly useful.	Drones are a way to enhance already existing capabilities and let you do things differently. But, like any other technology, after X years, physical protection systems and protocols will adapt to them. They are a “new” thing nowadays, but of course it will not remain like this forever.
19	Excluding military UAVs, what is the maximum weight of explosive that a weaponised domestic drone could realistically deliver right now?	The current world record for a commercial, off-the-shelf drone is over 200kg, but that's a real exception. Commercial drones used for movie making have lift capacities in excess of 25kg. Larger ones are coming, but it is generally a trade-off between take-off weight and maximum flight time. With hydrogen fuel cells etc., that is stretching.	N/A

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20	<p>Sooner or later, drones will be a tool used in many ways. How will we know or detect the ones which represent a threat? It's going to be hard because drones have so many ways to hide their location or sneak into places without detection.</p>	<p>Right now, drones are a threat because they're rare and facilities are not prepared. In future, as drones become common, identifying the good and bad will be like looking at a crowd of people and trying to identify which are good and which are bad. It's not easy. Certainly, we will not look at the problem the same way in a few years' time, so we do need to be very careful about making large investments in technologies that are likely to become obsolete. But that doesn't mean none of today's tech is of use. You just need to be able to separate the "smoke" from the "mirrors".</p>	<p>The answer is the motive and the actions it does. If a person is walking near a nuclear site, you don't know their intention either. It all depends on what the drone is doing. In the future we will be used to seeing drones in our surroundings (not only nuclear sites).</p>