Signal From Noise

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Begin, the Drone Wars Have.

Ukraine's "Spiderweb" drone attack on June 1 destroyed, by some estimates, a third of Russia's strategic cruise missile carriers. The destruction reportedly included A-50 surveillance planes and Tu-160, Tu-22, and Tu-95 bombers. The operation, which took 18 months of secret planning (so secret that the White House confirmed that even President Donald Trump was given no advance knowledge of it, even though he had met Volodymyr Zelensky in the White House about three months earlier) caused numerous news outlets to fawningly and breathlessly use words like "audacious," "outside-the-box," and "transformational."

In fact, Ukraine's effective use of drones constitutes an excellent example of the role they can play in asymmetrical warfare. Drones are a major reason why Ukraine has been able to hold out so long against Russia, which before the war's inception was regarded as having a far stronger and more capable military.

But perhaps nobody has summarized the implications of the attack more succinctly than the noted defense-policy analyst Max Boot. In the *Washington Post*, he wrote: "This attack confirms the lesson we've been learning for more than three years in Ukraine: Drones are the future of warfare."

Among the points he made: Drones have inflicted 70% of the casualties in the Russia-Ukraine war. Furthermore, while Ukraine demonstrated how drones gave it the ability to successfully conduct devastating strikes on military bases deep within Russia (2,500 miles from the Russia-Ukraine border), it also showed that similar drones can be used against any number of soft, but strategically important civilian targets in any country – power stations and airports, data centers, and hospitals – the list goes on.

In case that wasn't clear enough, consider Israel's attack on Iran this month. Israel used drones smuggled into Iran months earlier to incapacitate Iran's anti-air defenses, clearing the way for the country's fighter jets to quickly achieve air supremacy over Iranian airspace with minimal cost. Boot's argument about drones being the future of warfare might lead some to conclude that traditional forms of airpower are on their way out. This is not the case: If Ukraine demonstrated the potency of drones in modern warfare, Israel showed that they do not necessarily replace conventional air power – they enhance it.

Source: X, Emanuel (Mannie) Fabian, Times of Israel military correspondent.

Either way, the U.S., long considered the giant gorilla in the world of defense, is far, far behind. The Defense Department estimates the current annual U.S. drone-manufacturing capacity at 100,000. "That sounds like a lot," Boot wrote. "But actually, it's a pittance. Last year, Ukraine produced 2.2 million drones, and this year it's aiming to build 4.5 million."

But Ukraine is producing for its own uses, rather than manufacturing for profit. When assessing the drone industry, there's China to consider once again. In terms of global market share, China is the undisputed leader in drone sales.

Source: Bloomberg Intelligence/Fundstrat

The U.S. and its allies are trying to catch up.

On June 6, 2025, President Donald Trump signed an executive order, "Unleashing American Drone Dominance." It's a somewhat misleading title – you can't "unleash" dominance that doesn't quite exist – not yet, anyway. But it is nevertheless good to see the White House recognizing the importance of building a "strong and secure domestic drone sector."

That's easier said than done. Various companies have been working for years to develop and market drones for various military applications, and to be fair, there have been some impressive accomplishments. However, these have been focused on large, heavy, jet engine-powered unmanned aerial vehicles.

Jet-engine drones

Jet-engine powered drones are typically preferred for their high velocities (including supersonic speeds) and higher-altitude capabilities, making them suitable for uses that require greater power or heavier payloads, such as long-range missions, missions that require quick response, and missions that require heavier payloads (multiple missiles, bombs, high-powered sensors, etc.). Missions like this include establishing long-range defensive perimeters, negating enemy defenses (typically by acting as decoys to help draw out and locate enemy air-defense systems), and penetrating well-defended enemy airspace.

Jet-engine drones can also directly engage in combat. Jet-powered drones used in combat – often known as Hunter-Killer drones, have captured much of public attention in this regard (both due to the ethical concerns of drone strikes raised by critics and perhaps through the use of the term in the *Terminator* film franchise)

Within the jet-powered drone space, the new trend seems to be Collaborative Combat Aircraft (CCAs), also known as "Loyal Wingman" drones. In military parlance, these act as "force multipliers" for conventional fighter jets. The idea is to deploy them to fight alongside a human-piloted fighter jet. CCAs can be autonomous (AI-piloted), or controlled through a second pilot inside the main fighter jet.

A fighter jet accompanied by CCAs can carry a much larger arsenal. The CCAs can be sent ahead of the main fighter for reconnaissance and threat identification, to jam electronics and communications of enemy planes, or to serve as decoys (thus, improving pilot safety). With the help of AI, the hope is that a human pilot could start serving more as a mission commander, assigning tasks for drones to execute without direct human supervision or any need to detail specific steps.

Elon Musk has been a vocal proponent of military drones, though with regard to the rise of AI-enhanced or AI-driven drones, he had this to say: "Minimize the Terminator risk. But I mean, essentially, when you're making military drones, you are making Terminators." | Image source: Skydance Media

Unsurprisingly, those involved in jet-engine drones include (but are not limited to) some of the most well-known companies in the military- and commercial-jet industry. In addition to the privately held General Atomics and Anduril, companies in this space include:

- **Northrop Grumman ($NOC)**
- **Lockheed Martin ($LMT)**
- **Boeing ($BA)**
- **Airbus ($EADSF)**
- **Kratos Defense and Security Solutions ($KTOS)**
- **Mitsubishi Heavy Industries ($MHVYF)**

It's worth noting that many jet-powered drone companies rely on engines made by companies including

- **GE Aerospace ($GE)**
- **Pratt & Whitney – an RTX ($RTX) company**

- **Honeywell ($HON)**
- **Rolls Royce ($RYCE)**

It makes sense for such companies to be diversifying into drone technology, especially since they reduce the need for hugely expensive fighter jets and human-piloted bombers. Jet-engine drones can seem like a bargain relative to traditional fighter jets. For example, the General Atomics Aeronautical Systems' MQ-9 Reaper has an estimated average unit cost of $33 million, while a single F-35 can cause almost $110 million. Aerospace manufacturers can arguably expect fighter-jet revenues to erode as drone warfare becomes more prevalent, but adding drones to their product lineups would help to offset this – particularly CCAs that are designed to work alongside traditional human-piloted aircraft, and thus help set a floor for future manned-aircraft sales.

Yet what the recent military drone applications illustrate is the usefulness of far cheaper drones – smaller, propeller-driven drones. These are the ones used by Ukraine and Israel recently – and also by their respective adversaries, Russia and Iran. Propeller-driven drones include those powered by piston engines and those driven by turbine engines, and they are orders of magnitude cheaper than even the jet-engine drones mentioned above. The drones Ukraine used in Operation Spiderweb, for instance, are estimated to have cost under $1,000 each – with some suggesting that the cost was as low as $400 a piece.

Propeller-powered drones are unsurprisingly better suited to drone applications that require vertical take-off and landing, hovering, and efficiency and endurance. However, they typically have lower maximum speeds and lower altitude capabilities.

While such drones are well suited for surveillance and reconnaissance, they can also be used offensively. "Loitering munition" or "kammikaze" drones, for instance, are single-use kamikaze drones designed to deliver munitions to a generalized area, hover nearby until a target becomes viable, and then detonate them on impact.

For military applications, propeller-driven drone companies include:

- **AeroVironment ($AVAV) –** Perhaps the most prominent U.S. company focused on drone and drone-related technologies, AeroVironment's lineup includes military and civilian-focused applications, counter-drone defensive technology, and drone-related support offerings.
- **Textron ($TXT)** – makers of the Aerosonde and RQ-7 families of drones, long used by the U.S. military for reconnaissance and target acquisition.
- **MDBA** – a joint venture of Leonardo ($FNMY), BAE ($BAESY), and Airbus ($EADSY)
- **Insitu** – a wholly owned subsidiary of Boeing ($BA) (note that as of this writing, news outlets have reported that Boeing is considering spinning off Insitu.)
- **Teledyne FLIR** – a unit of Teledyne Technologies ($TDY), the company's signature drone is the Black Hornet, a nanodrone weighing 0.15 pounds (70g) used by soldiers to "see around corners" and scout ahead for threats. Teledyne's lineup also includes a 10-pound quad-prop drone capable of both reconnaissance and use as a loitering munition drone.
- **Airo ($AIRO)** – A recent IPO, Airo's reconnaissance RQ-35 Heidrun drone has seen action in Ukraine and use by NATO forces. The company also has a robust civilian drone business.

Lockheed Martin and Northrop Grumman are also expanding their prop-driven respective drone lineups. Other competitors in this industry include Israel's Elbit ($ESLT), Germany's Rheinmetall ($RNMBF), France's Thales, and Anduril.

Drone Defense

In the aftermath of the Spiderweb attacks, Kelly Grieco, an air-war researcher at the Stimson Center, remarked that each time that Ukraine has come up with a fresh, innovative way to use drones in battle, Russian military leaders have been left "scrambling to figure out how to defend against [them], and prevent another one."

Countering drones is a separate but integral part of the new arms race. If the legendary Alabama football coach Bear Bryant is to be believed, it's more important: "Offense wins games, but defense wins championships," he is said to have proclaimed.

Currently, "we currently lack the robust, integrated cyber tools needed to execute these tactics at scale" said Maj. Gen. David Stewart, the U.S. Army's director of counter-unmanned aircraft systems office. For example, although the U.S. certainly has a long history with radar, existing military radar systems were designed to track larger, faster-moving threats – missiles, aircraft, and large drones (typically jet-powered drones weighing more than 55 pounds flying at altitudes above 3,500 feet). Smaller drones can evade such systems, often looking like regular battlefield clutter to existing radar systems.

New, dedicated technology is needed. To that end, the U.S. Army is working with multiple companies such as Leonardo and the BlueHalo (which was acquired by AeriVironment on May 1) to develop effective but economically proportional defenses to smaller, lower-flying prop-driven drones.

Cost effectiveness is crucial. The U.S. is still arguably the wealthiest nation on the planet, but as Gen. David Perkins would put it, when Houthi terrorists attacking Red Sea shipping can routinely take out the U.S. Navy's $30 million Reaper drones with a cheap $2,000 drone, and when the current state-of-the-art defense against a $200 drone is a $3 million Patriot missile, "I'm not sure that's a good economic exchange ratio." It's not just about the cost of a Patriot missile, either. It's about how easily that missile can be replaced: RTX and Lockheed Martin together make just 550 PAC-3 missiles a year and are working on increasing annual production capacity to 650 by 2027.)

As is always the case for any threat, from attack drones to muggers and burglars, the best defenses are multi-layered, with no single solution being viewed as a panacea. Good drone defenses incorporate technologies for detection, identification of the drone being deployed, and neutralization. In this last category, neutralization can be categorized as either hard (using something with kinetic energy to destroy the threat, such as a high-powered laser or projectile) or soft (disabling a drone without inflicting physical damage, for instance by spoofing or jamming the GPS signals drones use to navigate).

- **Dedrone** – an Axon ($AXON) subsidiary specializing exclusively in drone defense.
- **RTX** – a wide-ranging defense contractor whose anti-drone offerings include radiofrequency sensors, specialized radar systems, control-frequency jammers, and high-energy lasers.
- **Lockheed Martin** – The aerospace giant is developing specialized drone-specific radar and high-powered microwave and laser weapons, with focus on systems that can address both individual and swarming drone attacks.
- **MBDA** – The company has developed specialized radars, electro-optical systems, and radio-frequency jammers, as well as hard-kill options such as net launchers, specialized machine guns, directed energy weapons, and hit-to-kill drone interceptors.
- **Saab ($SAABY)** – A maker of several drone-specialized radar systems
- **L3Harris**: The company has an array of electronic warfare and RF-sensing technologies.
- **Teledyne**: The thermo-imaging and electro-optical cameras used in the company's drones can also be repurposed for drone tracking

A note about the Golden Dome

As powerful militaries consider the need for improved drone defense, the tendency to "fight the last war", as military historians put it, must be guarded against.

Some believe Trump's Golden Dome proposal could ultimately become an example of such "last war" thinking. Boot views the proposal as evidence that "instead of looking to the 2020s and beyond, the commander in chief has his eyes firmly fixed on the 1980s."

Though the name alludes to Israel's lauded Iron Dome defense against slower short-range missiles (and artillery shells), the true inspiration for the Golden Dome is President Ronald Reagan's 1983 proposed Strategic Defense Initiative (SDI), which in addition to largely being a failure – as Trump himself acknowledges, was primarily focused on long-range ballistic missile attacks. Similarly, Trump's Golden Dome announcement focused on the still-very-real threat from such attacks, as well as from newer, faster hypersonic missiles. However, he did not mention the rising threat of drone attacks.

Still, with the Pentagon and U.S. Northern Command yet to actually draw up the requirements and capabilities they will require from Golden Dome (at least as of this writing), and with senior Air Force officers calling out the need to consider such threats, there is still hope that this mistake can be avoided. Some of the traditional "big metal" defense contractors present at the president's announcement are among those working on counter-drone technology, including RTX and LH3 Harris ($LHX).

Conclusion

Although many traditional aerospace and defense companies are working on drone applications, the field has given rise to a multitude of new specialized competitors – both publicly traded companies like AeroVironment, Kratos Defense & Security Solutions, and Airo, as well as privately held ones like Anduril and General Atomics.

The aggressive pursuit of drone technology could have applications beyond the battlefield. While we will cover pure civilian drone applications in the future, military drone technology could assist (or are already assisting) in a number of military-adjacent applications, including border security and capturing drug lords. Conversely, civilian-focused drone development might have military applications as well – for instance, cargo-shipping technology will likely also have implications for military logistics.

This piece hopefully provides investors interested in benefiting from the increasing military use of drones with some ideas for further research. As always, *Signal From Noise* should not be used as a source of investment recommendations. We encourage you to explore our full Signal From Noise library, which includes deep dives on the presidential effect on markets, the America First trade, wonky economic indicators, and the rising wealth of women. You'll also find discussions about the use of artificial intelligence in health care, the TikTok demographic, and weight loss-related investments.

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