



Defense industry insights

# Enhancing military force readiness through innovative technology

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# Introduction

In the context of the Great Power Competition, the strategic importance of employing technology from trusted sources cannot be overstated. With adversaries like China and Russia integrating strategies such as “intelligentized warfare,” the reliance on sensors and data collection has never been more critical. Nothing has illuminated the impact of UAS more than the conflict in Ukraine, where small, mass-produced quadcopters have become the antidote to Russian tanks.

The U.S. government, recognizing this impact, has launched [The Replicator Initiative](#) to develop small, smart, and attritable Uncrewed Aircraft Systems (sUAS), “[at a scale of multiple thousands, in multiple domains, within the next 18 to 24 months.](#)”



Under this program, the U.S. plans to develop and manufacture low-cost, intelligent, and numerous combat units using unmanned AI-powered systems to counter China’s military while capitalizing on U.S. ingenuity.”

HON Kathleen Hicks, U.S. Secretary of Defense

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Winning requires readiness not only on the battlefield but also in operations and supply chains. Integration of [cutting-edge technology](#) into military tactics and strategy is pivotal in ensuring an agile and responsive defense posture in an increasingly complex global landscape.

# Tactical ISR: a critical need

[Tactical ISR \(Intelligence, Surveillance, and Reconnaissance\)](#) is an essential component of modern military operations, providing critical information that shapes strategic decisions and tactical actions. The use of traditional ISR tools like satellites, crewed aircraft, and large Uncrewed Aerial Systems (UAS) often encounters limitations in terms of deployment agility, response time, and operational flexibility. Because these assets are inorganic — squads on the ground have to radio them when they need them, resulting in slow and often unavailable ISR for operators in the field.



We're here to revolutionize the battlefield through UAS."

[Col. Danielle Medaglia PM, Uncrewed Aircraft Systems - Program Executive Office Aviation](#)

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Drones can be organic, meaning they are in the field with the unit and available as soon as needed. The evolution of squad-based sUAS (small Uncrewed Aerial Systems) has introduced a dynamic shift in the realm of Tactical ISR, addressing these limitations effectively.

### **Limitations of satellites:**

- Satellites operate at high altitudes and have significant orbit constraints, which limits their ability to provide real-time intelligence.
- The imagery from satellites often lacks the granularity required for tactical decision-making due to the significant distance from the target area.
- There are also delays in satellite data acquisition and processing, which can render the information outdated by the time it reaches ground forces.

### **Cumbersome UAS deployment:**

- Large UAS systems, while capable of longer endurance and carrying sophisticated sensors, are often cumbersome to deploy. Many of these systems even need runways or require the warfighter to stand and expose themselves to risk.
- Deployment usually requires specialized launch and recovery equipment, along with multiple personnel, which is not always feasible in forward-operating or hostile environments.
- These systems can be vulnerable during launch and recovery, as they require open spaces that can be targeted by enemy forces.
- The time taken to deploy large UAS can be problematic in fast-evolving tactical situations, potentially leading to missed opportunities or increased risks for ground forces.

Accurate, timely intelligence is vital for mission success. Currently, options like large UAS and satellites are limited by their high-altitude operations and slow response times. Smaller, squad-based sUAS provides a solution: enhanced situational awareness at the unit level. Advanced AI technology enables effective human-machine teaming to gain that intelligence while reducing the cognitive load of the operator.

## Did you know?

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The Department of Defense (DoD) is focusing on increasing investment in multidisciplinary research to understand the drivers of trust in human-machine teams, especially under operational conditions. This research is critical for safely and effectively employing machines as trusted partners to human operators, enhancing military effectiveness and readiness ([Center for Security and Emerging Technology](#)).

# ISR Case Study: impact in Ukraine

The conflict in Ukraine has brought about a groundbreaking shift in modern warfare tactics, prominently highlighted by the impactful use of small ISR drones. These compact yet technologically advanced drones have revolutionized battlefield reconnaissance and intelligence-gathering processes.



Russia's invasion of Ukraine, and Ukraine's furious response to it, have opened the eyes of militaries around the world to the role small UAS can play in warfare."

[Inside Unmanned Systems](#)

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Drones offer unprecedented real-time aerial surveillance capabilities, enabling forces to monitor enemy movements, assess battleground conditions, and make informed strategic decisions with greater agility and precision.



# U.S. SOF has become so reliant on ISR that it is often briefed as part of the ground maneuver plan.”

Ivan F. Ingraham, Task & Purpose

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The deployment of these drones in Ukraine symbolizes a new era in warfare where technological supremacy, particularly in the realm of uncrewed aerial systems, plays a critical role in shaping the dynamics of conflict and influencing outcomes. This evolution underscores a significant transformation from traditional combat methods to more sophisticated, technology-driven approaches, enabling smaller, agile units to conduct effective operations against larger, well-equipped adversaries.

These lessons can be integrated into the strategic approach of defense forces worldwide, including the United States, to enhance their capabilities in modern warfare. [Ukraine is readily burning 10,000 drones a month](#) and trying to build more given the positive impact they're having. The massive attrition is completely worth it for the tactical and strategic advantage that also helps reduce risk to operators in the field.





[Watch: Prosecuting war crimes in Ukraine with drones-collected evidence](#)

# Asset inspection: addressing a multi-billion dollar challenge

Asset health is not just a logistical concern; it's the foundation of operational readiness and effectiveness. Every asset, from armored vehicles and aircraft to communication systems and infrastructure, is crucial for mission success. Traditionally, inspecting these assets has been labor-intensive and time-consuming fraught with risk for personnel, operational downtime, and inconsistent record-keeping. This approach has led to reactive maintenance, where issues are addressed only after they arise, potentially compromising mission readiness.

The advent of AI-powered tools like small Uncrewed Aerial Systems (sUAS) is set to revolutionize the critical process of asset inspection. These systems offer a shift from reactive to proactive and condition-based maintenance strategies. They ensure consistent, precise

[monitoring of asset health](#), enabling real-time, data-driven decision-making. Using sUAS for asset inspection not only enhances safety by reducing human involvement in potentially hazardous inspection environments but also ensures uniform data capture, regardless of the operator.

In an era where defense resources are increasingly constrained and recruitment numbers are dwindling, dual-purpose technologies serving both the commercial and defense sectors offer a proven and more sustainable solution.



The kinds of commercial and rapidly developed drones that Ukraine has used to great effect for intelligence, reconnaissance, and surveillance, as well as targeting and attack, may provide one pointer to the sorts of systems that Replicator may yield, but the program is altogether much wider.”

HON Kathleen Hicks, U.S. Secretary of Defense

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[Multi-purpose technology](#) empowers human inspectors without necessitating separate solutions or software platforms that improve military readiness on and off the battlefield. Moreover, they align with the various depths and frequencies of inspections required in military operations:

### **Routine checks**

Quick, routine inspections before takeoff and after landing can be efficiently managed by sUAS, ensuring immediate assessment of any operational wear or potential issues.

## Semi-annual inspections

More in-depth examinations, traditionally conducted every six months, can be significantly enhanced with AI-driven systems, providing comprehensive data while minimizing the need for extensive manpower.

## Annual overhauls

For thorough annual inspections, sUAS can provide detailed data across every asset component, leading to a holistic view of asset health and preemptive maintenance strategies.

By integrating these advanced systems, military units can build a continuous picture of asset health and readiness. This proactive approach allows for timely interventions — fixing issues as they arise or even before they become problematic. Such a strategy avoids the pitfalls of waiting for system failures (reactive maintenance) or unnecessary replacements based on arbitrary schedules (premature maintenance), both of which consume resources without necessarily enhancing readiness.

The adoption of dual-purpose AI-powered technology like sUAS in military asset inspection marks a new era of efficiency, safety, and proactive asset management. It supports a continuous, data-driven understanding of asset health, enabling defense forces to maintain peak readiness, optimize resource utilization, and ensure operational success.

## Site security: evolving threats demand advanced solutions

Standard security standard security tools offer limited visibility and can delay threat detection. Effective perimeter security is paramount in protecting military bases and installations and traditional security measures at military installations often face challenges such as limited visibility and delayed response to intrusions. The need for an advanced, [proactive security system](#) is more critical than ever. Enter AI-powered drones — the game-changers in site security.

These advanced drones, integral to the Replicator initiative, are designed to “galvanize progress in the too-slow shift of U.S. military innovation,” focusing on leveraging platforms that are small, smart, affordable, and abundant. They complement more expensive and less prolific systems, providing a collaborative security network that enhances overall defense capabilities.

## Did you know?

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AI applications in logistics and sustainment are viewed not just as cost-saving measures but as enablers of military readiness and effectiveness in combat. AI's role in enhancing the functionality and longevity of military equipment and streamlining personnel management is pivotal for operational readiness and interoperability with allies ([Center for Security and Emerging Technology](#)).

## Unmatched accessibility

AI-powered drones excel in reaching areas that are unsafe or impossible for humans to access. Whether it's navigating rugged terrain, surveying hazardous zones, or conducting surveillance in confined spaces, these drones ensure no area is left unchecked.

## Rapid deployment and automated intervention

The speed of deployment is a crucial advantage. Upon detecting a security threat, these drones can be deployed almost instantaneously. They are programmed to automatically respond to specific triggers, ensuring swift action and minimizing the time between threat detection and response.



Units are no longer reliant on large platforms and layers of command and control that delay their use on the battlefield.”

Ivan F. Ingraham, Task & Purpose

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### **Centralized security operations**

Rather than relying on multiple, expensive security outposts, AI-driven drones centralize security operations. This approach not only reduces maintenance costs but also streamlines the process of [monitoring and responding to threats](#), ensuring a cohesive and coordinated security strategy.

### **Forensic-quality data for analysis**

These drones not only deter and respond to threats in real-time but also provide high-quality data for post-event analysis. The forensic-level detail captured by their sensors aids in understanding security breaches, improving future responses, and holding perpetrators accountable.

# Key benefits for military installations

## Enhanced perimeter security

AI drones provide continuous, vigilant surveillance around military bases, offering an additional layer of security that adapts to evolving threats.

## Improved personnel safety

By taking on high-risk surveillance tasks, drones minimize the exposure of security personnel to potential threats, thereby enhancing their safety.

## Cost-effectiveness

The shift to drone-based security reduces the need for extensive physical infrastructure and manned patrols, leading to significant cost savings without compromising on security.

AI-powered drones represent a significant leap forward in [military site security](#). They bring speed, safety, reach, and intelligence to security operations, positioning military installations at the forefront of modern, efficient, and effective defense strategies.

## Essential attributes of sUAS for military operations

[AI-powered American innovation](#) will result in “fewer people in the line of fire, and [they] can be changed, updated, or improved with substantially shorter lead times. We’ll counter the PLA’s mass with the mass of our own, but ours will be harder to plan for, harder to hit, harder to beat.”



Watch: Locating a lost operator from a laptop 500 miles away

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The U.S. Army is now operating more aircraft than the U.S. Air Force, including its unmanned aircraft, and ‘our tactical-level users are screaming for more.’”

#### [Inside Unmanned Systems](#)

However, not all sUAS vendors are created equal. Technology providers must not only be able to deliver hardware systems that are reliable and useful, they must be able to continue supporting and managing the growth, development, and needs of sUAS programs by offering training and procurement support to facilitate rapid scaling and deployment of these systems in mission-critical tactical scenarios. Unlike other drone systems out there, AI-powered drones



can provide significant compute headroom and hardware extensibility that other providers simply can't provide.

### **Did you know?**

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The integration of predictive maintenance and big data analytics into military operations enables proactive management of equipment and assets. This technological innovation ensures that even the most complex weapon systems are mission-capable, supporting warfighters' readiness ([Aviation Week Network](#)).

The battlefield is constantly changing and operators need a solution that can evolve with it. The ability to assist in rapid deployment at scale. It's also important to know whether a vendor has a proven track record of delivering to large programs of record, building trust and reliable support within the DoD. The following attributes are essential to maximize the potential value of sUAS for improving military readiness both on and off the battlefield:

## **For tactical operations:**

### **Ruggedness and reliability**

Built to withstand the rigors of military operations, offer exceptional durability and resilience. Their robust construction should ensure reliable performance in diverse environments, from harsh weather conditions to challenging terrains.

### **Advanced sensor capabilities**

Equipped with state-of-the-art sensors, drones provide unparalleled situational awareness. High-resolution imaging, thermal detection, and night vision capabilities enable precise surveillance and reconnaissance, day or night.

## **Robustness to electronic warfare**

Designed to operate effectively in contested EMS environments, these drones demonstrate exceptional [resistance to electronic warfare](#). Their ability to navigate and communicate in areas with heavy electronic jamming and interference ensures uninterrupted mission execution.

## Did you know?

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Drones powered by AI technology are designed to counteract electronic warfare (EW) by enabling visual navigation when satellite signals are jammed. This capability ensures that drones remain operational and effective, even in the face of advanced EW threats ([Military Embedded Systems](#))

# For technology integration:

## Team integration

These drones are engineered to [seamlessly integrate with existing military systems](#) and teams. They enhance collaborative operations, providing real-time data and support to ground forces and command centers.

## Data streaming and fusion

Offering advanced [data streaming capabilities](#), the drones ensure that critical information is relayed instantly to decision-makers. Their ability to fuse data from various sources into a coherent operational picture enhances strategic planning and response.

## Processing for immediate action

With [onboard processing power](#), these drones can analyze data in real time, enabling immediate action based on their findings. This capability is crucial for rapid decision-making in dynamic combat scenarios.

## For deployment across the defense enterprise:

### Tailored implementation and training

The team provides [specialized training programs](#) tailored to the specific needs of defense units. This includes hands-on sessions to ensure that personnel are proficient in operating the drones and leveraging their full capabilities. The training is designed to accelerate the learning curve and enable rapid deployment of drones in the field.

### Ongoing technical support and troubleshooting

They offer continuous technical support and troubleshooting to ensure seamless drone operations. This includes providing quick responses to any operational issues, firmware updates, and guidance on best practices for drone maintenance and utilization. This ongoing support is crucial in maintaining operational readiness and ensuring that drones are always mission-ready.

### Strategic consultation for scalability and integration

The [customer success team](#) assists in strategic planning for the scalable deployment of drones across different units and missions. They provide expertise in integrating drones into existing military systems and workflows, ensuring that drones complement and enhance current defense capabilities. This strategic consultation is key to maximizing the impact and effectiveness of drone technology in defense operations.

## Did you know?

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The deployment of 5G technology in military operations accelerates real-time decision support and ensures hyper-converged connectivity. It optimizes logistics and enables the transfer of vast data amounts to remote sensors and weapons, thus enhancing situational awareness and battlefield capabilities ([StartUs Insights](#)).

## The need for trusted technology sources

The modern battlefield demands equipment that is not only technologically advanced but also secure and reliable. The fact that the vast majority of sensors and ISR tools currently come from countries potentially hostile to U.S. interests raises significant security concerns. This reality underscores the need for a domestic, [trusted source of manufacturing](#) for these critical devices. U.S.-based production of interconnected sUAS devices ensures that the technology aligns with national security interests and adheres to stringent security standards.



Replicator is intended to continue and build upon the U.S. ability to “outmatch adversaries by out-thinking, out-strategizing, and outmaneuvering them; we augment manufacturing and mobilization with our real comparative advantage, which is the innovation and spirit of our people.”

**HON Kathleen Hicks, U.S. Secretary of Defense, speaking at the National Defense Industrial Association’s Emerging Technologies conference in Washington.**

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[Watch: Quinn Palmer \(CBP\) discusses the impact of on-scene drone response at the U.S. border](#)

**With the recent influx of sUAS manufacturers, it can take time to decide on the right sUAS provider. Here's a list of things to keep in mind:**

- Evaluate past vendor mission success teams that ensure satisfaction before purchasing.
- Secure software delivery is a must to track record of updates, delivering improved features and capabilities that will allow forces to innovate and adapt at the speed of software.
- Drone technology utilizing on-board compute and open architecture (via RAS-A and MAVLINK) is set up to support integrated tech stacks and extend new capabilities at the tactical edge, allowing teams to communicate effectively, and should be prioritized at all costs.
- Vendor speed and efficiency are critical when selecting a technology partner. When you choose sUAS that are built for enterprise scale — and adapted to meet defense requirements, get visionary cameras and the most advanced technology and protocols

to support program growth.

### **Did you know?**

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Drones have become a pivotal element in warfare due to their affordability and operational efficiency. With costs as low as \$20,000, they offer a cost-effective solution for conducting surveillance and attack missions, even allowing smaller states to participate in advanced warfare strategies ([MIT Technology Review](#)).

Manufacturing Readiness needs to scale production to equip forces in time for the next conflict and is often a tripping point for smaller-scale UAS manufacturers. Reviewing manufacturers with programs of record is a tried and tested strategy for selecting trusted, DoD-approved military technology vendors. Incorporating Uncrewed Aerial Systems (UAS) from Programs of Record (PoRs) offers several advantages:

### **Validation and reliability**

UASs from PoRs have been rigorously evaluated and tested, meeting the DOD's stringent standards for performance, reliability, and mission suitability. This extensive vetting reduces procurement risks.

### **Standardization and interoperability**

PoRs standardize equipment across military branches, ensuring UAS compatibility for joint operations and support, thus enhancing mission effectiveness.



## **Sustainment and support**

UASs in PoRs receive guaranteed government support, including maintenance, upgrades, training, and spare parts, ensuring operational effectiveness throughout their service life.

## **Budgetary approval and funding security**

Being part of the DOD's budgeting and planning process, PoRs provide financial stability, essential for the long-term success of the program and confidence for both the military and vendors.

## **Continuous improvement and upgrades**

UASs within PoRs are more likely to receive updates and improvements, enabling them to evolve with changing operational requirements and new technologies.

## **Regulatory compliance and oversight**

PoRs ensure that UASs adhere to military standards and legal requirements, maintaining high safety, security, and operational readiness levels.

## **Strategic alignment**

Selecting UASs from PoRs aligns with the DOD's broader strategic goals and operational doctrines, emphasizing commitment to systems critical for current and future missions.

### **Did you know?**

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The integration of artificial intelligence and autonomy in drones enhances military operations by enabling more complex, autonomous missions. This technological evolution supports the vision of all-domain attritable

autonomous systems, emphasizing the importance of human-machine teaming in future military strategies ([Center for Security and Emerging Technology](#)).



# Integration with military systems and processes

For military effectiveness, technology vendors must provide solutions that integrate seamlessly with Joint All-Domain Command and Control (JADC2). This integration is crucial for ensuring that new technologies such as sUAS enhance, rather than disrupt, current operational capabilities. AI-powered drones with onboard computers and advanced software-defined architecture can adapt and evolve, becoming increasingly capable over time. This adaptability ensures that they remain compatible with evolving military technologies and strategies.



AI will not just be needed for autonomy, but also for parsing absolutely massive amounts of data produced by these systems which can quickly clog critical communications bandwidth ‘pipes.’”

Thomas Newdick, The Drive

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## Conclusion

In an era where technological superiority is synonymous with operational dominance, the US military must invest in [sUAS technology](#) that not only meets current needs but also evolves with the rapidly changing landscape of modern warfare. AI-powered drones, like those developed by Skydio, offer a potent combination of versatility, security, and adaptability, making them indispensable tools for maintaining military readiness and superiority in the face of global challenges.

UAS are no longer a tactical nice-to-have, they are a strategic imperative that impacts the readiness level of the military at both peace- and wartime. The enemy’s perception of our readiness and willingness to take on warfare are direct contributors to the military’s two main objectives: to deter conflict and win a conflict.



We must ensure the PRC leadership wakes up every day, considers the risks of aggression and concludes today is not the day.”

HON Kathleen Hicks, U.S. Secretary of Defense

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### **Did you know?**

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Skydio supports every branch of the U.S. military and has committed to the defense sector extending beyond the Army's SRR program. The company has worked closely with the Defense Innovation Unit (DIU) to facilitate the acquisition of autonomous drones for the Department of Defense (DoD), establishing a trustworthy supply chain for production at scale.



*Lloyd J. Austin III receives a demo of Skydio X2 from Adam Bry, Co-founder and CEO of Skydio.*

# About Skydio

[Skydio](#) is trusted by every branch of the U.S. Department of Defense, all Five Eyes countries, and across NATO, demonstrating unparalleled reliability and commitment to advancing autonomous flight technologies. With deep industry expertise, Skydio provides cutting-edge solutions that encompass AI-powered drone technology, seamless integrations with existing maintenance infrastructure, and a comprehensive suite of services designed to ensure successful deployment and operations.

At the core of Skydio's innovation is a dedication to security and efficiency, making its drones indispensable tools for a wide range of military, public safety, and enterprise applications. From enhancing tactical ISR capabilities and asset inspection processes to revolutionizing site security and creative content production, Skydio drones empower users to achieve mission-critical objectives with unprecedented ease and precision.

Skydio's commitment to excellence is evident in its robust partnerships and the trust it has garnered from the most demanding and security-conscious organizations worldwide. By choosing Skydio, customers not only gain access to the forefront of autonomous flight technology but also become part of a journey towards smarter, safer, and more productive operations.

Discover how Skydio is shaping the future of autonomous flight and providing [sUAS solutions that meet the rigorous demands of today's operational environments](#).

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Learn more at [Skydio.com](#).