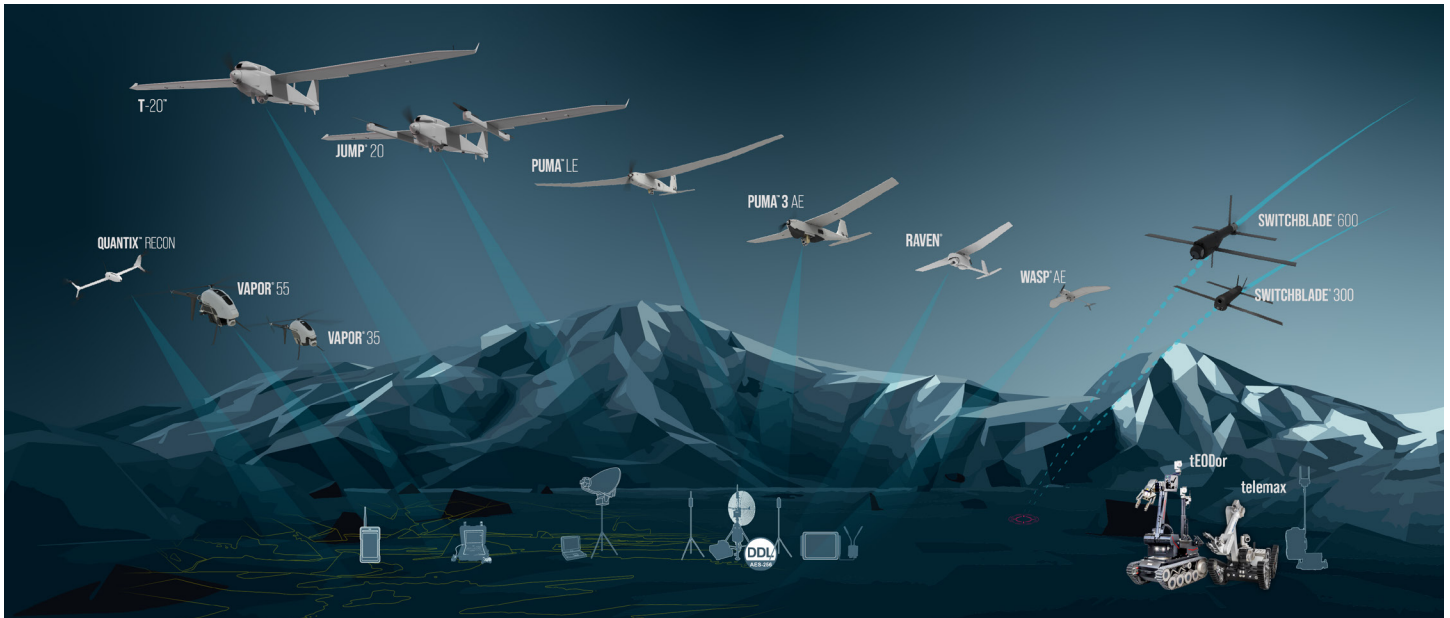


# Art of Resistance: How AeroVironment's future-defining capabilities enable operations in the grey zone



The role of technology on the modern battlefield remains as important as ever as armed forces prepare to engage with highly capable adversaries in the age of Great Power Competition.

Examples include NATO's eastern flank, where a re-assertive Russian Federation continues to destabilize the region, and the Indo-Pacific where the People's Republic of China consistently shifts the regional balance of power.

Across both theaters of operation, the U.S. Department of Defense (DoD) and its regional allies face increasingly sophisticated and disruptive hybrid threats, particularly in contested environments rife with cyber and electronic warfare.

This evolution in the character of conflict will lead to campaigns of unconventional warfare to influence the conflict through clandestine means, such as small unit teams (SUTs) deploying behind enemy lines to conduct intelligence gathering and precision strike operations below

the threshold of conventional conflict.

In response, the DoD seeks to exploit technologies associated with the 'Fourth Industrial Revolution' (4IR) - including autonomy and robotics, sensors, analytics and connectivity - in order to provide a battle-winning capability to the armed forces of today and tomorrow.

Examples include the development of intelligent unmanned aircraft systems (UAS) and loitering missile systems that can be deployed by SUTs operating at the tactical edge to ensure freedom of movement across contested battlespaces to defeat an enemy force or regime.

## AEROVIRONMENT SOLUTIONS

For 30 years, California-based military technology specialist AeroVironment has been at the forefront of next-generation innovations that provide warfighters with future-defining capabilities in robotics, sensors, analytics and connectivity.

As a global leader in the design, development

and manufacturing of tactical unmanned aircraft systems (UAS), tactical missile systems (TMS) and supporting network connectivity software, AeroVironment continues to serve all branches of the DoD, in addition to more than 50 allied nations around the world.

In the 1980s, AeroVironment created the first portable, hand-launched UAS for intelligence, surveillance and reconnaissance (ISR) missions. Since then, the company has competed for and won a majority of DoD competitions for small UAS programs of record, with an expanding range of solutions including RQ-20 Puma™, RQ-11 Raven®, and RQ-12 Wasp®.

The most recent additions to the company's portfolio include an evolving family of TMS that provides warfighters with mission critical information, increased standoff range and the ability to deliver precision strike capabilities at the tactical edge. Rapidly deployable, highly maneuverable and with extended loitering endurance and scalable munition payloads,

TMS enable the warfighter to quickly launch, fly, track and engage a variety of beyond-line-of-sight targets with lethal effects while minimizing collateral damage in built-up areas.

Today, AeroVironment's advanced and multi-mission UAS and TMS continue to protect soldiers, marines, airmen, naval and special operation forces across theaters of operation around the globe under the toughest of conditions and in the harshest environments.

## EMERGING CONCEPTS OF OPERATION

The ability to conduct "tip of the spear" warfare across the contemporary operating environment remains critical to governments seeking a more clandestine means of resolving situations below the threshold of conventional conflict.

For example, a special operations team embedded with indigenous forces in Eastern Europe could be tasked with gathering intelligence about an enemy force in addition to conducting follow-on precision-strike missions aimed at disrupting and disabling critical infrastructure or neutralizing high value targets.

AeroVironment's integrated portfolio of intelligent and multi-domain robotic solutions is ideally positioned to support SUTs tasked with undertaking clandestine warfare in any operating environment.

AeroVironment's family of tactical UAS can be deployed to gather intelligence even in the most austere battlefield environments. As an example, the hand-launched [Puma™ LE](#) provides team leaders with a Group 2 UAS capability in the form factor of a Group 1 airframe, allowing SUTs to gather intelligence over extended ranges and periods of time.

With a maximum range of 60 km and 6.5 hr endurance, [Puma LE](#) is equipped with the Mantis™ i45 gimbaled EO/IR sensor and Night Vision Goggle-visible laser illuminator. It also retains the capacity to carry an additional payload to satisfy specific mission requirements.

SUTs are also likely to be tasked to operate within dense urban environments. AeroVironment's vertical take-off/landing [Quantix™ Recon](#) is designed to deliver rapid, automated and hands-free reconnaissance to team leaders seeking to quickly generate

**"Innovation is core to AeroVironment's DNA and drives everything we do, from expanding the operational capabilities of our tactical UAS to creating cutting edge TMS solutions that provide increased force projection across a full spectrum of combat operations. When the stakes are highest, customers trust AeroVironment's solutions to deliver the actionable intelligence and precision firepower needed to take that next step for mission success."**

*- Wahid Nawabi, President and Chief Executive Officer, AeroVironment*

enhanced situational awareness across an area of interest.

With the ability to cover up to 20 km in a single 45-minute flight, [Quantix Recon](#) can autonomously navigate through GPS-denied areas using pre-determined waypoints in an RF-silent mode to reduce its electro-magnetic signature and avoid detection by enemy forces. The unmanned aircraft is fitted with dual 18 MP RGB and multispectral cameras to capture image intelligence.

Once a target has been confirmed by an AeroVironment unmanned aircraft system,

targeting data can then be rapidly distributed via machine-to-machine, sensor-to-shooter connectivity to an AeroVironment tactical missile system. Options include the [Switchblade® 300](#), which is already in service with U.S. Armed Forces as part of the Lethal Miniature Aerial Missile System (LMAMS) program. Backpackable and rapidly deployed within two minutes, [Switchblade 300](#) enables beyond-line-of-sight precision strikes against static and mobile targets with lethal effects and also features a patented wave-off capability to minimize the possibility of collateral damage.





The latest addition to AeroVironment's family of TMS is the [Switchblade® 600](#) loitering missile system. It comprises a self-contained, tube-based launcher designed to give SUTs the ability to track and, if necessary, engage targets across the battlespace. Featuring a multi-purpose, anti-armor warhead, [Switchblade 600](#) can 'dash' at speeds up to 115 mph to engage static, mobile and armored targets.

Equipped with a high-performance electro-optical/infrared (EO/IR) gimbaled optics suite, precision flight control and over 40 minutes of endurance, [Switchblade 600](#) delivers unprecedented levels of tactical reconnaissance, surveillance and target acquisition (RSTA).

The [Switchblade 600](#) can transit between 50-70 km to a target area before conducting multiple confirmatory orbits and engaging a target without any reliance upon external ISR or Joint Fires assets.

AeroVironment's portfolio of UAS and TMS also features on-board AES 256 digital

encryption and SAASM GPS, providing SUTs with secure and resilient communications against attacks, even in the most contested battlefield environments.

#### FUTURE-PROOFED TECHNOLOGY

Seeking to further expand its multi-mission capabilities, AeroVironment remains actively involved in future-forward research and development efforts with leading industry partners to create fully integrated system solutions.

In 2020/21, AeroVironment further consolidated its market-leading position with the acquisition of three UAS, advanced perceptive autonomy and ground robotics companies. These include: MUAS specialist Arcturus UAV® (which is currently contracted to support USSOCOM's Mid Endurance UAS capability); Progeny Systems Corporation's Intelligent Systems Group (ISG) - a leader in the development of artificial intelligence-enabled computer vision, machine

learning and perceptive autonomy technologies, particularly relevant to the automatic target recognition of UAS and TMS; and finally, German ground robotics specialist, Telerob.

These acquisitions will significantly accelerate AeroVironment's development of advanced autonomy capabilities for the company's growing portfolio of intelligent, multi-domain robotic systems in support of the full spectrum of missions across the contemporary operating environment, and particularly clandestine warfare.

#### CONCLUSION

AeroVironment remains committed to realizing its 'Vision of the Future Battlefield,' which promises armed forces the means to maintain the tactical advantage in any environment while maximizing survivability in contested arenas.

Ideally suited to support the requirements of clandestine SUTs, AeroVironment's portfolio of UAS, TMS, and advanced AI, computer vision and machine learning technology is reshaping modern battlefield capabilities, providing a game-changing capability to warfighters at the tactical edge.

AeroVironment is committed to empowering the warfighter with real-time situational awareness, increased stand-alone precision and long-range lethality to enable freedom of movement and the ability to win decisively.