Silent Reach, Decisive Strike: The Evolution of Unmanned Warfare

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Abstract

This article examines the growing integration of Unmanned Systems (UxS) into the modern battlespace and its transformative impact on the character of warfare. Once confined to missions considered 'Dull', 'Dirty', or 'Dangerous', UxS have now evolved into decisive tools enabling both tactical lethality and information dominance. The article traces the progression of these systems from early rudimentary pilotless vehicles to sophisticated multi-domain autonomous platforms. It further analyses their disruptive operational impact in recent conflicts. The article concludes that the large-scale employment of UxS necessitates a doctrinal recalibration, particularly in areas such as command architecture, targeting cycles, and data-link interoperability across the entire kill chain.

Introduction

Unmanned Systems (UxS) constitute a transformative continuum in the evolution of modern warfare. Spanning from micro aerial sensors to heavily armed terrestrial and maritime platforms, these systems have swiftly evolved from niche enablers to central force multipliers. Originally conceived for missions deemed excessively risky or monotonous for human operators, their operational spectrum has expanded exponentially through advances in autonomy, control architecture, and cost-efficient manufacturing. This technological diffusion marks the fourth major 'Revolution in Military Affairs', redefining traditional constructs of concealment, mobility, and force projection across domains.

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The Genesis of Pilotless Vehicles (1849–1945)

The concept of utilising unmanned platforms for conflict dates to Jul 1849, marking the earliest recorded offensive use of air power in naval aviation during the Austrian incendiary balloon attack on Venice[1], involving balloon carriers, which were the precursors to modern aircraft carriers. However, the initial development of modern pilotless aircraft began in Britain and the United States (US) during the World War I (WWI). Britain developed the radio-controlled 'Aerial Target', first tested in Mar 1917, while the American aerial torpedo, known as the 'Kettering Bug', flew in Oct 1918.[2] Despite successful flight tests, neither system achieved operational deployment during WWI.

Development continued between the wars, focusing on target practice and training. In 1935, the British produced radio-controlled target aircraft, one of which, the DH.82B Queen Bee[3], inspired the widely adopted term 'Drone'. During World War II, this technology was leveraged by companies like Denny's Radioplane Company to produce models used both for anti-aircraft gunner training and, occasionally, for attack missions.[4]

Dedicated Intelligence, Surveillance, and Reconnaissance (ISR) in the Cold War Era (1950–1990)

The post-war era delivered significant maturation of target and tactical UxS, exemplified by platforms such as the Ryan Firebee (first flight in 1951), which codified the core avionics, telemetry, and expendable-recovery technologies that underpin subsequent operational UxS.[5] The Vietnam conflict represented the inaugural large-scale employment of reconnaissance Unmanned Aerial Vehicles (UAVs), demonstrating persistent ISR utility in contested environments and validating remote sensor integration into operational Command and Control (C2) networks.

The 1973 flight of the Israeli Mastiff[6] marked a pivotal shift in the UAV evolution. By integrating secure data-links and real-time video, it transformed remotely piloted platforms into networked intelligence assets. This breakthrough shifted UxS from expendable targets into multi-mission tools for decoy operations, missile delivery, and psychological warfare. These innovations established the doctrinal precedent for integrating UxS as essential components of modern combined arms tactics rather than mere training aids.

Unmanned Systems Taxonomy by Domain and Operational Systems

Contemporary military UxS are categorised by operational domain and mission role, delineating a capability spectrum that ranges from high-cost, high-performance strategic systems to low-cost, widely proliferated tactical platforms. This bifurcation drives divergent acquisition, sustainment, and force-structure requirements—prioritising long-endurance, survivable assets at the strategic end and scalable, attritable designs for tactical massing.

Aerial Systems (UAVs/Unmanned Aircraft System [UAS]/ Unmanned Combat Aerial Vehicle [UCAV]). Air-domain UxS range from small tactical reconnaissance platforms to UCAVs optimised for precision strike. These remotely piloted or autonomous aircraft have fundamentally reshaped modern warfare, ISR, and military logistics. They are broadly classified by altitude and endurance, which determine range and persistence; by function, which defines mission roles and payloads; and by emerging hybrid designs, enabled by advances in propulsion, autonomy, and materials.

- **Operational Stratification by Altitude: Endurance Parameters**. UAS are usually classified by their operating altitude and endurance, ranging from micro-UAVs to high-altitude pseudo satellites. Micro and mini-UAVs—for example, the Black Hornet Nano[7] (the United Kingdom [UK]–Norway) and India's Netra V Series[8]—operate below 400 m for short-duration tactical reconnaissance. Low-altitude, short-endurance systems such as the Elbit Skylark 3[9] (Israel) and India's SWITCH UAV extend endurance up to about four hrs for battalion-level observation. Tactical UAVs, including the RQ-7 Shadow[10] (US) serve brigade-level surveillance roles. Medium-Altitude, Long-Endurance (MALE) platforms—exemplified by the MQ-9 Reaper[11] (US) and India's Heron Mk-II[12]—can operate for more than 24 hrs and can carry munitions. High-Altitude, Long-Endurance (HALE) UAVs such as the RQ-4 Global Hawk[13] and Israel's Heron TP[14] provide strategic ISR coverage exceeding 30 hrs. The emerging high altitude platform systems category, including the Airbus Zephyr S[15] (UK), remains in the near-space domain for months, offering persistent communications and surveillance; India's

Defence Research and Development Organisation (DRDO)-led prototypes are exploring similar solar-electric platforms for monitoring Himalayan borders.

- **Mission-Oriented Functional UAS**. By operational use, UAVs are classified as reconnaissance, target acquisition, combat, logistics, Electronic Warfare (EW), and swarm systems. Reconnaissance and surveillance UAVs—for example, the Israel Aerospace Industries (IAI) Searcher Mk-II[16] and India's TAPAS-BH-201 (Rustom-II)[17]—dominate ISR missions. Combat UAVs or UCAVs, such as the MQ-9 Reaper and Turkey's Bayraktar TB2[18], combine long endurance with strike accuracy. India's forthcoming Ghatak UCAV[19] uses a turbofan engine and stealth features for autonomous precision strikes. Loitering munitions, like the IAI Harop[20], blur the line between missiles and UAVs; India's DRDO Air-Launched Flexible Asset-Swarm[21] (ALFA-S) performs a similar tactical role. EW UAVs, for instance China's CH-7[22] and the US's RQ-170[23] Sentinel, carry electronic intelligence payloads, while logistics UAVs such as India's Cargo Hexacopter by ZUPPA[24] are built for high-altitude supply drops. Swarm-capable micro-drones, like India's ALFA-S, reflect the increasing use of Artificial Intelligence (AI) for coordinated, decentralised attack and reconnaissance missions.

- **Next-Generation Hybrid UAVs**. Emerging hybrid UAV categories combine multi-domain versatility, autonomy, and endurance. Vertical take-off and landing fixed wing hybrids, such as the AeroVironment Jump 20[25] (US), pair vertical take-off with the long-range endurance of a fixed wing aircraft, allowing rapid deployment from unprepared sites. Solar electric and hydrogen fuel UAVs, for example, the Persistent High Altitude Solar Aircraft-35 (UK), offer ultra endurance capabilities useful for communications relay and climate monitoring. Loyal wingman UAVs, typified by the Boeing MQ 28 Ghost Bat[26] (Australia) and India's Combat Air Teaming System (CATS) Warrior by Hindustan Aeronautics Limited, are built to fly alongside manned fighters, share data, and carry out semi autonomous strikes. Underwater and air–surface hybrid drones, like India's experimental maritime UAS, extend unmanned operations across domains. Finally, AI-driven swarm and biomimetic UAVs—modelled on bird or insect flight—represent the next generation of unmanned warfare, capable of adaptive decision making, stealthy operations, and networked autonomy in contested airspace.

Ground Systems (Unmanned Ground Vehicle [UGV]/ Unattended Ground Sensor). UGVs have evolved into critical force multipliers for modern militaries, delivering autonomous combat, reconnaissance, logistics, and explosive ordnance disposal capabilities while minimising human exposure in high-threat environments. The Russian Uran-9[27], developed by Kalashnikov Concern, exemplifies a tracked, diesel-electric-powered combat UGV armed with a 30 mm 2A72 autocannon, Ataka Anti-Tank Guided Missiles (ATGMs), and a 7.62 mm machine gun for direct fire support and urban warfare. The US Robotic Combat Vehicle (RCV) family[28], under the next-generation combat vehicle programme, includes RCV-Light and RCV-Medium variants employing hybrid diesel-electric propulsion for extended endurance beyond 250 kms, reduced acoustic and thermal signatures, and modular payloads comprising the gun, ATGM launchers, and multi-sensor ISR suites. Israel's Guardium MK III[29] and RoBattle[30], developed by IAI and Elbit Systems, integrate hybrid diesel-electric drives and AI-based autonomous navigation, with endurance of 08-10 hrs, carrying 7.62 mm or 12.7 mm remote weapon stations and modular sensor payloads for persistent surveillance and border security. The Estonian-origin[31] Tracked Hybrid Modular Infantry System, fielded by North Atlantic Treaty Organization and the UK forces, demonstrates a diesel-electric hybrid configuration with 08-10 hrs operational endurance and 1,200 kg payload capacity, adaptable for ISR, cargo transport, or direct fire roles. Similarly, France's compact Nerva LG, designed by Nexter Robotics, is a battery-electric reconnaissance UGV with 02-04 hrs endurance, optimised for Chemical, Biological, Radiological, and Nuclear (CBRN) reconnaissance, tunnel surveillance, and urban operations. Collectively, these systems illustrate the global transition from remotely controlled to semi-autonomous and fully autonomous ground platforms, integrating precision firepower, resilient C2 architectures, and modular payloads to enhance tactical flexibility and survivability across diverse combat theatres.

India's Indigenous UGV Development. India's indigenous UGV development has progressed rapidly under the *Atmanirbhar Bharat* (self-reliant India) and Make in India initiatives, reflecting a strategic drive toward technological sovereignty in autonomous land systems. The DRDO spearheads this effort through the Muntra[32] series—the nation's first operational UGV platform. Developed with Combat Vehicles Research and Development Establishment, the Muntra family fields specialised UGV variants for surveillance (Muntra-S), mine detection (Muntra-M), and operations in nuclear or chemical-contaminated environments (Muntra-N). Mounted on a BMP-II chassis, Muntra provides 360-degree Electro Optical (EO) surveillance, integrated CBRN sensors, and remote operation to five kms line-of-sight. Complementing this capability, the Daksh robot—developed by DRDO's Research and Development Establishment (Engineers)—is a battery-electric explosive ordnance disposal UGV with nearly 90-minute endurance, optimised for detection, handling, and neutralisation of Improvised Explosive Devices (IEDs) and unexploded ordnance. Parallel private-sector efforts, including Torus Robotics' Autonomous Combat Vehicle and DRDO-wheeled UGV concepts, incorporate hybrid-electric propulsion, AI-assisted navigation, and modular payloads for tactical support, casualty evacuation, and autonomous perimeter defence—advancing India toward operational self-reliance in robotic warfare across high-risk combat zones.

Maritime Systems (Unmanned Surface Vehicle [USV]/ Unmanned Underwater Vehicle [UUV]). Maritime UxS encompass autonomous or remotely-controlled platforms operating on or under the sea: USVs travel on the water's surface, and UUVs operate submerged. These systems are used for missions such as surveillance, Mine Counter-Measures (MCM), reconnaissance, anti-surface and anti-sub-surface strike, logistics, and force protection.

Unmanned Maritime Warfare. Unmanned maritime systems now conduct ISR, MCM, and precision strike missions across surface and subsurface domains. Israel's Silver Marlin USV[33] provides armed maritime surveillance, while the BlueWhale UUV enables persistent undersea ISR and MCM through integrated sonar, electronic intelligence, and satellite communications. The US Sea Hunter USV exemplifies near-autonomous, long-endurance Anti-Submarine Warfare (ASW) and maritime surveillance. The Ukraine conflict has operationally validated these platforms. Ukraine's Sea Baby and Magura V5 USVs have executed long-range, global positioning system-guided maritime strikes against Russian naval assets, including Olenegorsky Gornyak, Sergey Kotov, and the

Crimean Bridge, forcing Black Sea Fleet redeployment. In Dec 2024, the Magura V7, armed with R-73 missiles, successfully engaged Russian helicopters and Su-30 aircraft.[34] These operations confirm maritime drones as low-cost, asymmetric deterrence multipliers.

India's Indigenous Maritime UxS. India's indigenous maritime UxS programme is progressing steadily across surface and subsurface domains under *Atmanirbhar Bharat*. The Matangi USV (Sagar Defence) achieved a key milestone in Oct 2024 with autonomous Mumbai–Thoothukudi transit[35], validating navigation, endurance, and Maritime Domain Awareness (MDA) roles, albeit with limited payload. DRDO's Naval Science and Technological Laboratory's high endurance autonomous underwater vehicle, a six tonne, nearly 09.75 m UUV with up to 15 days submerged endurance, 300 m depth, and ASW, MCM, and ISR roles, marks a major technological leap. Complementing this, Larsen and Toubro's Adamya autonomous underwater vehicle offers submarine-launch capability, nearly eight-hour endurance, and 500 m dive depth. Collectively, these platforms reflect growing indigenous competence in mission-specific maritime autonomy tailored to Indian Ocean operational demands.

Impact of UxS in 21st Century Conflicts (Post-2000). Persistent aerial ISR has negated traditional concealment, driving a doctrinal shift toward sensor-dominated warfare. Forces are restructuring infantry and combined arms units to integrate UxS at platoon and company levels for continuous sensing, precision engagement, and autonomous support. Acquisition has shifted from legacy timelines to rapid, modular fielding. Failure to adapt force structures and command architectures to networked unmanned warfare will result in decisive operational disadvantage in high-intensity, sensor-saturated battlespaces.

The US War on Terror and Targeted Strike Doctrine. The US has employed armed UAS—principally the MQ-1 Predator and MQ-9 Reaper—as core ISR–strike platforms in counter-terror and counter-insurgency campaigns across Afghanistan, Iraq, Pakistan, Yemen, and Syria. These operations prioritised leadership decapitation through precision kinetic targeting of high-value individuals within transnational jihadist networks. Confirmed neutralisations include Ayman al-Zawahiri, Qasem Soleimani, Anwar al-Awlaki, Mohammed Emwazi, Hassan Ghul, Abu Yahya al-Libi, and Maulana Fazlullah.

Nagorno–Karabakh Conflict (2020). The 2020 Nagorno-Karabakh conflict between Armenia and Azerbaijan provided a seminal case study in the decisive combat utility of armed UAVs and loitering munitions. Azerbaijan's systematic integration of Turkish Bayraktar TB2 UAVs and Israeli-made loitering munitions such as the Harop, Orbiter-1K, and SkyStriker fundamentally reshaped the tempo and outcome of the conflict. These platforms enabled near-continuous ISR coverage, precision targeting, and real-time battle damage assessment, resulting in the widespread destruction of Armenian air defences, armoured formations, and logistics nodes. Verified combat footage and satellite imagery confirm the destruction or capture of over 255 Armenian tanks, of which 146 were destroyed, six damaged, and 103 captured[36], alongside multiple 2S1 and 2S3 self-propelled howitzers and short-range Surface-to-Air Missiles (SAM) including Osa and Strela-10, decisively shifting operational tempo and outcomes.

The Israel–Hamas Conflict (2023–Present). The Hamas-led offensive against Israel on 07 Oct 2023 represented a defining case study in the operational employment of UxS by a non-state actor within an asymmetric warfare framework. Hamas integrated compact, commercially adaptable drones[37] as key enablers in a coordinated combined-arms assault—leveraging single-use Kamikaze platforms to strike high-value defensive nodes, disable surveillance towers, and degrade communications infrastructure.

Precision UAS Targeted Killings. Targeted elimination of militant leadership via precision UAS strikes remains central to Israel's counter-militancy doctrine across Gaza, Lebanon, and Syria. Confirmed high-value neutralisations include Ahmed Jaabari during Operation Pillar of Defence, Raed al-Atar in Rafah during Operation Protective Edge, and Baha Abu al-Ata in Gaza. Subsequent drone-assisted strikes eliminated Yahya Sinwar in Rafah, Ibrahim Muhammad Raslan in southern Lebanon, Muhammad Abu Shreiea in Gaza City, and Alkaman Abd as-Salam Khalil Anbar in Gaza. This list is representative rather than exhaustive, reflecting a sustained campaign of precision attrition targeting senior and mid-tier command elements of Hamas, Palestinian Islamic Jihad, and Hezbollah. Israeli UAS have concurrently executed interdiction missions against Hezbollah operatives involved in weapons transfer and cross-border attack planning across multiple theatres.

The Russia–Ukraine War (2022–Present). The Ukraine conflict exemplifies the decisive impact of UxS in modern warfare. Persistent drone employment for ISR, artillery cueing, and precision strike has reshaped tactics, prioritising real-time situational awareness, decentralised targeting, and distributed lethality, while compressing sensor-to-shooter timelines across the battlefield. The operational consequences are quantifiable. Since the commencement of the conflict, Russian forces have lost approximately 13,742 tanks and armoured vehicles, 353 aircraft, and 22 naval vessels. Ukrainian forces, in comparison, have suffered losses of approximately 5,423 tanks and armoured vehicles, 192 aircraft, and 35 naval vessels.[38] Open-source assessments suggest that approximately 70 per cent of war casualties[39] are attributable to drone-enabled reconnaissance and fire correction.

Drone Warfare in the Ukraine Conflict. Russia has employed Shahed-136 loitering munitions to systematically target Ukraine's energy and civilian infrastructure, aiming to erode power generation, fuel supply, and societal resilience through sustained winter-time disruption. Ukraine's maritime and aerial drone capabilities have extended this campaign to the Black Sea theatre, where domestically produced surface drones have damaged or sunk multiple Russian naval assets, including the landing ship Olenegorsky Gornyak and the Buyan-class corvette Serpukhov. In coordinated long-range operations, Ukrainian drones have struck major Russian airbases—including Olenya, Belaya, Dyagilevo, and Ukrainka—resulting in confirmed destruction and damage to several strategic bombers (Tu-95MS, Tu-22M3) and fighter aircraft (Su-30, Su-34).[40] These actions underscore Ukraine's growing capacity to project precision effects deep into adversary territory through indigenous, low-cost UxS platforms, redefining strategic reach and deterrence in contemporary conflict.

India's Unmanned Systems Strategy, Progress, and Doctrine

India is positioning itself in the UxS domain through indigenous development and strategic procurement, underpinned by a clear imperative to secure its borders against multifaceted threats.

- **Indigenous Progress and Counter-UxS Infrastructure**. India has demonstrated mature UxS–air defence integration with Operation Sindoor, marking a milestone in indigenous capability. On the night of 07-08 May 2025, the Integrated Counter-UAS Grid, supported by a layered air defence architecture, ensured 100 per cent neutralisation of Pakistani drone and missile attacks against Northern and Western airbases. The AKASH SAM, leveraging mobility and robust electronic counter-countermeasures, showed high operational effectiveness, underscoring India's growing self-reliance and networked air defence resilience.
- **Strategic Deployment Doctrine against Pakistan (Line of Control [LoC]/Western Front)**. India's UxS doctrine along the LoC focuses on countering asymmetric threats while preserving conventional deterrence through persistent ISR, precision engagement, and force protection. MALE and HALE platforms deliver continuous EO, synthetic aperture radar, and signal intelligence for time-sensitive targeting with reduced political risk. Layered Counter-UAS grids integrate detect–classify–soft or hard kill measures, denying adversary drone use. Concurrently, UGVs enable route clearance, mine detection, forward reconnaissance, casualty evacuation, and autonomous logistics, sustaining tempo and combat power.
- **Strategic Deployment Doctrine against China (Line of Actual Control [LAC]/Northern Front)**. India's UxS posture along the LAC is designed to offset conventional asymmetry and sustain operations in extreme altitude. High-endurance ISR and logistics drones such as Airawat enable persistent surveillance and rapid resupply. Loyal-Wingman UCAVs, notably CATS Warrior, provide expendable penetration and stand-off strike using loitering munitions and smart anti-airfield weapon, enabling airbase denial from outside dense anti-access/area denial envelopes. Integrated HALE or MALE ISR, attritable UCAVs, and precision glide weapons together constitute a calibrated deterrent below the nuclear threshold, complicating People's Liberation Army escalation calculus.
- **Strategic Deployment Doctrine against Bangladesh (Maritime Boundary)**. India's strategy against threats from the Bangladesh border prioritises strengthened MDA and

denial of illegal infiltration along the International Maritime Boundary Line. Lessons from Ukraine highlight surface warships' vulnerability to drones, underscoring the need to rapidly integrate USVs and UUVs. These systems enhance surveillance, reconnaissance, and area denial while reducing risk to manned platforms. UUVs offer transformational underwater capability through stealthy ISR, seabed mapping, mine countermeasures, and deep-sea intelligence collection. Integrated with dornier, coastal radar chains, and patrol vessels, UxS will deliver persistent situational awareness and credible deterrence across India's eastern maritime frontier.

- **Supplementation: Manned-Unmanned Teaming (MUM-T) Integration**. MUM-T integrates manned platforms with UxS to deliver distributed lethality, expanded situational awareness, and reduced risk. Human operators retain command while supervising autonomous assets for ISR, EW, and precision strike. Acting as force multipliers, UxS extend sensors and absorb attrition. Effective MUM-T requires secure data links, integrated C2, cross-platform interoperability, and reliable algorithms in contested electromagnetic environments.

- **Air Force Integration: The Loyal-Wingman Concept**. The air domain leads MUM-T adoption, with India's CATS Warrior as the flagship response. This autonomous loyal-wingman UCAV is designed to operate with light combat aircraft Tejas and future advanced medium combat aircraft, executing ISR, target-cueing, and strike in contested airspace. As a lower-cost, attritable forward sensor and strike node, it enhances attrition tolerance, enables massed employment, and accelerates sensor-to-shooter cycles through real-time manned–unmanned data fusion.

- **Army Integration: Mechanised and Ground Operations**. The Indian Army manned–unmanned teaming integrates UGVs within mechanised and infantry formations to enhance survivability, tempo, and lethality. Indigenous UGV trials have validated concepts in which tanks, infantry combat vehicles, and dismounted troops operate with UGVs equipped for remote fires, logistics, casualty evacuation, and high-risk tasks. Effective MUM-T demands a resilient, plug-and-play digital architecture enabling manned platforms to orchestrate multiple UGVs and UAVs simultaneously. Combat engineers employ UGVs for route clearance, mine, and IED neutralisation, breaching, bridging support, CBRN reconnaissance, and demolition tasks. Integrated tactical UAVs further compress sensor-to-shooter timelines and amplify indirect fire effectiveness.

- **Naval Integration: Sub-Surface and Surface Superiority**. Indian Navy integration of UxS is central to securing maritime interests and achieving dominance across surface, subsurface, and aerial domains. UUVs provide stealth-enabled reconnaissance, hydrographic survey, and intelligence collection, extending reach and persistence well beyond littorals. UUVs and USVs act as force multipliers by reducing risk to manned patrols and enabling continuous surveillance of critical sea lanes and chokepoints. Effective man–machine interoperability requires advanced combat management system capable of fusing data from manned and unmanned platforms into a unified maritime picture. The end-state is a balanced fleet where UxS absorb attrition and extend reach, while manned assets deliver command and decisive effects.

The Future of Unmanned Warfare: 2025–35

Human Command in AI Warfare. The next decade will witness rapid maturation of autonomy and collaborative UxS, compressing warfare toward machine-speed execution. However, UxS effectiveness remains decisively contingent on human ingenuity, adaptability, and command judgement. AI accelerates sensing, targeting cycles, and task execution, but remains bounded by programmed logic, training data, and predefined constraints. Decisive advantage, therefore, rests with the commander's ability to interpret ambiguity, anticipate adversary action, and employ unmanned assets with tactical imagination and precision. AI multiplies combat power; human intelligence delivers victory.

Lethal Autonomy and Swarming Tactics. Advancing autonomy and AI and machine learning integration are driving the emergence of lethal autonomous weapon systems, enabling sensor-to-shooter automation and large-scale, low-cost UxS swarms capable of saturating layered defences and compressing adversary decision cycles beyond human response thresholds.

Resilient Networks for Autonomous Warfare. Future autonomous and swarming UxS effectiveness depends on resilient, jam-resistant networks capable of sustaining operations in contested EW environments, enabling seamless integration of unmanned platforms across land, surface, and sub-surface domains in support of multi-domain joint force operations.

Conclusion

UxS have irreversibly transformed contemporary warfare, shifting tactical advantage toward persistent ISR, distributed precision strike, and saturation effects over reliance on limited numbers of high-value platforms. Ongoing global conflicts confirm that adaptation to this UxS-centric battlespace is no longer discretionary but essential for force survivability. As unmanned platforms increasingly undertake high-risk ISR, strike, and penetration missions in contested environments, human exposure in these roles will correspondingly decline.

India's operational experience—demonstrated by the performance of the integrated counter-UAS grid during Operation Sindoor and sustained investment in the indigenous loyal-wingman concept—reflects early recognition of this shift. However, technology alone is insufficient. Enduring military advantage requires organisational and doctrinal transformation: establishment of a unified Joint-Service UxS Command; accelerated autonomy and swarming research and agile, low-cost acquisition and iteration cycles; and prioritisation of resilient, jam-resistant command, control, communications, computers, ISR, and combat management systems enabling manned–unmanned teaming. Mastery of UxS is central to sustaining conventional deterrence against China and Pakistan, enhancing multi-domain awareness, and preserving future operational relevance through decisive institutional adaptation.

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