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AUTONOMOUS SYSTEMS AND HUMAN CONTROL: CHALLENGES TO MILITARY LEADERSHIP AND DECISION-MAKING IN THE AGE OF ARTIFICIAL INTELLIGENCE

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***Summary:** Artificial intelligence is reshaping military decision-making by introducing autonomous systems that affect human control, authority, and responsibility. This article examines how autonomy influences leadership and command structures, focusing on the interaction between human judgment and algorithmic systems. It argues that maintaining meaningful human control is essential for ensuring accountability, operational effectiveness, and trust in AI-mediated environments.*

***Keywords:** artificial intelligence; autonomous systems; military leadership; human control; decision-making*

INTRODUCTION

The rapid advancement of artificial intelligence has significantly transformed contemporary military systems, driving a shift from traditional automation toward increasingly autonomous and AI-enabled capabilities integrated into core functions such as intelligence analysis, command and control, and operational decision-making (European Defence Agency, 2023; NATO Allied Command Transformation, 2021). In this context, autonomy has evolved from a prospective development into an operational reality, shaping the speed, scale, and structure of military decision-making processes (Stanford HAI, 2024; NATO, 2023).

While these developments offer substantial advantages in terms of data processing, situational awareness, and operational responsiveness, they also introduce fundamental challenges related to human judgment, authority, and responsibility. In particular, the growing reliance on algorithmic systems creates a structural tension between machine-generated recommendations and human control within military command environments (OECD, 2023; UNIDIR, 2023).

This tension has direct implications for military leadership. As AI-enabled systems increasingly influence decision-making processes, there is a risk of cognitive reliance on algorithmic outputs, which may constrain

critical judgment and obscure lines of accountability. Although such systems enhance efficiency, their perceived analytical authority may lead to reduced scrutiny of machine-generated recommendations, thereby reshaping the balance between human agency and technological mediation in command structures (OECD, 2023; UNIDIR, 2023).

Despite the growing body of literature on artificial intelligence in the military domain, existing analyses have largely focused on strategic, technological, and regulatory dimensions, often overlooking the practical implications of autonomy for leadership and decision-making in operational contexts. In particular, the functioning of human control in high-tempo, AI-mediated environments remains insufficiently examined.

Against this background, this article analyses the interaction between autonomous systems and human decision-makers in military settings, with a particular focus on how increasing levels of autonomy affect leadership, command authority, and responsibility. The study adopts a qualitative, case-based analytical approach, examining selected examples of AI-enabled systems in order to assess how human control is exercised in practice and under what conditions it may be weakened or reinforced.

The article argues that effective military leadership in the age of artificial intelligence depends on maintaining adaptive and context-sensitive forms of human control. Rather than maximizing autonomy, the preservation of meaningful human involvement should be understood as a strategic requirement for ensuring accountability, operational trust, and the integrity of command in AI-mediated environments.

1. AUTONOMOUS SYSTEMS AND MILITARY DECISION-MAKING

The increasing integration of artificial intelligence into military systems has introduced varying degrees of automation, autonomy, and algorithmic support into decision-making processes (OECD, 2023; NATO, 2023). Although often used interchangeably in policy discourse, distinguishing between these concepts is essential for understanding their implications for military command and leadership.

Automation refers to systems that execute predefined tasks according to fixed rules, without adaptive behavior. Such systems have long been embedded in military functions, including logistics, navigation, and sensor management, where their operation remains predictable and bounded (OECD, 2023). While automation enhances efficiency, it does not alter the locus of decision-making authority, which remains with human operators.

Autonomy, by contrast, entails a higher degree of system independence. Autonomous systems are capable of perceiving their environment, processing information, and selecting actions with limited or indirect human intervention. In military contexts, these systems are increasingly deployed in

areas such as surveillance, target identification, and navigation, marking a qualitative shift in the relationship between human operators and technological systems, with direct implications for control and responsibility (European Defence Agency, 2023; NATO, 2023).

Decision-support systems occupy an intermediate position, assisting rather than replacing human decision-makers. By processing large volumes of data and generating predictive assessments, these systems enhance situational awareness and support planning processes within command-and-control (C2) environments. However, despite the formal retention of human decision authority, increasing reliance on algorithmic outputs can significantly influence judgment and choice (NATO Allied Command Transformation, 2021; European Defence Agency, 2023).

Within contemporary C2 processes, AI systems play a critical role in managing complexity and accelerating decision cycles. The ability to rapidly process multi-domain data enables commanders to operate under conditions of uncertainty and time pressure. At the same time, this acceleration compresses decision timelines and limits opportunities for deliberation, while the opacity of complex models may constrain understanding of how recommendations are generated (OECD, 2023; UNIDIR, 2023).

As a result, AI-enabled systems reshape not only operational processes but also the cognitive dynamics of decision-making. Commanders increasingly operate in environments where algorithmic mediation influences how information is interpreted and how options are evaluated. While this enhances efficiency, it also introduces risks of overreliance on machine-generated outputs and reduced critical oversight (European Defence Agency, 2023; NATO, 2023).

These dynamics are particularly evident in high-tempo operational environments, where autonomous systems operate at speeds that exceed human cognitive capacities. In such contexts, commanders may shift from direct decision-making roles to supervisory functions, focusing on monitoring and selective intervention. This transformation has significant implications for situational awareness and independent judgment (UNIDIR, 2023).

At the same time, the growing reliance on AI complicates the attribution of responsibility within military organizations. Although commanders remain formally accountable, their ability to assess, challenge, or override algorithmic recommendations may be constrained by system complexity and operational tempo. This creates a structural tension between authority and effective control in AI-mediated environments (OECD, 2023; UNIDIR, 2023).

Furthermore, while AI systems can reduce uncertainty through large-scale data analysis, they may also introduce new uncertainties related to model behavior, data quality, and vulnerability to adversarial manipulation.

In contested environments, where systems may be deliberately targeted or deceived, the reliability of algorithmic outputs cannot be assumed, reinforcing the importance of human judgment and critical oversight (NATO, 2023; European Defence Agency, 2023).

Taken together, these developments indicate that autonomous systems do not merely enhance existing decision-making processes but fundamentally reshape the conditions under which military leadership is exercised. Ensuring effective integration requires maintaining human agency, situational awareness, and accountability, while leveraging the operational advantages of AI-enabled autonomy.

2. HUMAN CONTROL AND MILITARY LEADERSHIP

The integration of artificial intelligence into military systems has introduced varying degrees of automation and autonomy into decision-making processes, fundamentally reshaping contemporary command environments (NATO Allied Command Transformation, 2021; Stanford HAI, 2024). Although these concepts are often used interchangeably in policy and public discourse, distinguishing between automation, autonomy, and decision-support systems remains essential for understanding their distinct implications for military leadership and command authority.

Automation refers to systems designed to execute predefined tasks according to fixed rules or programmed sequences, without independent adaptation to changing conditions. In military contexts, automated systems have long been employed in areas such as logistics, navigation, sensor management, and defensive mechanisms, where their behavior remains predictable and bounded by clearly defined parameters. While automation enhances efficiency and reduces human workload, it does not fundamentally alter decision-making authority, which remains firmly under human control.

Autonomy, by contrast, entails a higher degree of system independence. Autonomous systems are capable of perceiving their environment, processing information, and selecting courses of action with limited or indirect human intervention. These systems may adapt to new inputs, learn from data, and operate in dynamic environments where predefined rules are insufficient. In contemporary military operations, autonomy increasingly characterizes systems involved in surveillance, target identification, navigation, and, in some cases, the application of force (European Defence Agency, 2023; NATO, 2023). The introduction of autonomy therefore represents a qualitative shift in the relationship between human operators and technological systems, with direct implications for command responsibility and control.

Decision-support systems occupy an intermediate position between automation and autonomy. Rather than acting independently, these systems assist human decision-makers by collecting, processing, and synthesizing

large volumes of data to generate recommendations or predictive assessments. In modern C2 environments, AI-enabled decision-support tools enhance situational awareness, assess operational risks, and support planning processes (European Defence Agency, 2023; NATO Allied Command Transformation, 2021). Although final decisions formally remain with human commanders, increasing reliance on algorithmic outputs can significantly influence judgment and choice.

Within C2 processes, artificial intelligence plays a central role in managing complexity and accelerating the decision cycle. Contemporary military operations generate vast amounts of data across multiple domains, including land, air, sea, space, and cyberspace. AI systems enable the rapid fusion and analysis of this information, supporting commanders in forming a coherent operational picture under conditions of time pressure and uncertainty (NATO Allied Command Transformation, 2021). As a result, decision-making processes are increasingly mediated by algorithmic systems, particularly in high-tempo or contested environments.

At the same time, the integration of autonomous and decision-support systems transforms the nature of military decision-making itself. By accelerating the processing of information and the generation of options, AI systems compress decision timelines and reduce opportunities for reflection and deliberation. In parallel, the complexity and limited transparency of some AI models may constrain commanders' ability to fully understand how recommendations are produced. This combination of increased speed and reduced transparency introduces new forms of uncertainty, even as it mitigates others (OECD, 2023; UNIDIR, 2023).

As a result, AI-enabled systems do not simply enhance operational effectiveness; they reshape the cognitive and organizational dimensions of decision-making. Commanders must operate in environments where decisions are increasingly influenced by autonomous and semi-autonomous systems, balancing the advantages of speed and data-driven analysis against the risks of overreliance on algorithmic outputs (OECD, 2023; NATO, 2023). Understanding this balance is critical for assessing how autonomy affects military leadership and for identifying the conditions under which human judgment remains central.

Beyond their functional distinctions, automated, autonomous, and decision-support systems differ in how they transform the cognitive processes underlying military decision-making. Traditional command structures rely on human experience, intuition, and professional judgment developed through training and operational practice. The introduction of AI-enabled systems redistributes these cognitive tasks between human actors and algorithmic processes, often in ways that are difficult to fully anticipate or control (OECD, 2023).

Autonomous systems, in particular, challenge established decision-making models by operating at temporal and spatial scales that exceed human cognitive capacities. In high-tempo environments, such systems can identify patterns, generate options, and execute actions at speeds that make continuous human supervision impractical. As a result, commanders increasingly shift from direct decision-making roles to supervisory functions, focusing on monitoring system performance and intervening selectively. This transformation has significant implications for situational awareness, as reduced direct engagement with information flows may limit independent assessment of evolving situations (UNIDIR, 2023).

Decision-support systems similarly reshape command dynamics by prioritizing specific types of information and analytical outputs. Although designed to assist rather than replace human judgment, their outputs often carry implicit authority due to perceived objectivity and computational sophistication. In complex operational contexts, commanders may rely on these assessments to manage uncertainty and cognitive load, particularly when confronted with incomplete or contradictory information. Over time, this reliance may lead to patterns of deference to algorithmic outputs, subtly influencing how decisions are framed and evaluated (OECD, 2023).

The growing role of AI within command-and-control processes also complicates the distribution of responsibility within military organizations. When decisions are informed by autonomous or algorithmic systems, attributing responsibility for outcomes becomes more complex, particularly in cases of failure or unintended consequences. Commanders remain formally accountable; however, their ability to meaningfully assess, challenge, or override algorithmic recommendations may be constrained by technical complexity or operational tempo (UNIDIR, 2023). This raises fundamental questions regarding the relationship between authority, responsibility, and control in AI-mediated environments.

Furthermore, the integration of autonomous systems intensifies the interaction between speed, complexity, and uncertainty in military operations. While AI systems can reduce uncertainty through large-scale data processing, they may also introduce new uncertainties related to model behavior, data quality, and system robustness. Adversarial environments—characterized by deception, cyber interference, and electronic warfare—further complicate these dynamics, as AI systems may be deliberately targeted or manipulated (NATO, 2023; European Defence Agency, 2023). In such contexts, the reliability of algorithmic outputs cannot be assumed, reinforcing the need for critical human oversight.

From an organizational perspective, increasing reliance on autonomous systems also affects military culture and training. As decision-making becomes more technologically mediated, the competencies required of military leaders evolve accordingly. Commanders must not only understand

operational and tactical factors, but also develop sufficient literacy in AI-enabled systems to critically evaluate their outputs and limitations. Without such capabilities, the risk of misinterpretation, overconfidence, or inappropriate delegation of authority to machines increases, potentially undermining operational effectiveness (NATO, 2023).

Taken together, these developments demonstrate that autonomous systems do not merely enhance existing decision-making processes but fundamentally reshape the conditions under which military leadership is exercised. The central challenge for contemporary armed forces lies in integrating AI-enabled systems in ways that preserve human agency, situational awareness, and accountability, while still leveraging the operational advantages of autonomy. Addressing this challenge requires a nuanced understanding of how different forms of automation and autonomy interact with human cognition and organizational structures in military decision-making (European Defence Agency, 2023).

3. CASE ANALYSIS: AUTONOMOUS SYSTEMS AND HUMAN DECISION-MAKING

This study adopts a qualitative analytical research design aimed at examining how AI-enabled autonomous systems reshape military decision-making and leadership practices. Rather than relying on quantitative metrics or large-scale datasets, the analysis focuses on the interaction between human judgment and algorithmic processes in complex operational environments characterized by uncertainty, time pressure, and information overload (OECD, 2023; Stanford HAI, 2024).

The analytical framework is based on a structured case-based approach, enabling a comparative examination of selected autonomous and semi-autonomous systems deployed in military contexts. The purpose of the selected cases is not to provide exhaustive empirical coverage, but to illustrate recurring patterns in the relationship between autonomy, human control, and command responsibility, as emphasized in recent defence and governance analyses (European Defence Agency, 2023; UNIDIR, 2023).

Case selection is guided by three analytical criteria. First, the degree of autonomy exhibited by the system is considered, ranging from decision-support functionalities to semi-autonomous operational execution. Second, the level and modality of human involvement are examined, with particular attention to the role of commanders and operators in supervising, validating, or overriding system outputs. Third, the analysis evaluates the extent to which AI systems shape the decision-making environment, including their impact on situational awareness, operational tempo, and cognitive judgment.

The study acknowledges several limitations. The analysis relies on publicly available sources and does not incorporate classified operational data, which may constrain empirical depth. Furthermore, the selected cases

are illustrative rather than representative of the full spectrum of military AI applications. Nevertheless, the approach provides a robust analytical framework for examining the implications of autonomy for leadership, responsibility, and human control, while avoiding overgeneralization (European Defence Agency, 2023; OECD, 2023).

Case 1: AI-Supported Targeting and Command Responsibility

AI-supported targeting systems increasingly shape not only the identification and prioritization of targets, but also the framing of operational risk, proportionality, and urgency. By integrating multi-source intelligence inputs and generating probabilistic outputs, these systems influence how decision-makers interpret the operational environment and evaluate courses of action. As a result, algorithmic systems do not merely support decisions but actively structure the decision space itself (European Union, 2024; NATO, 2023).

A central challenge concerns the limited explainability of advanced AI models. In many cases, the reasoning behind system-generated recommendations is not fully transparent to human operators. This lack of transparency constrains the ability of commanders to critically assess and contextualize algorithmic outputs, increasing the risk of automation bias and uncritical reliance (OECD, 2023).

These dynamics complicate the attribution of command responsibility. While commanders formally retain decision authority, the increasing reliance on AI-mediated assessments blurs the boundary between human judgment and algorithmic influence. In post hoc evaluations, reconstructing decision pathways and justifying reliance on algorithmic outputs becomes increasingly complex. This highlights the need to conceptualize human control not only at the point of authorization, but across the entire targeting lifecycle, including data selection, model configuration, and post-action assessment (UNIDIR, 2023).

Case 2: Semi-Autonomous Weapon Systems and Human-on-the-Loop Control

Semi-autonomous weapon systems represent a further stage in the delegation of operational functions to AI-enabled technologies. These systems execute predefined tasks - such as navigation, tracking, or engagement—within specified parameters, while remaining subject to human supervision. In this context, the human-on-the-loop model replaces direct control with supervisory oversight.

However, in high-tempo operational environments, the effectiveness of such oversight is significantly constrained by system speed and complexity. When decision cycles exceed human cognitive and reaction capacities, the ability to intervene becomes practically limited. Although commanders retain formal override authority, limitations in situational awareness and delayed feedback reduce their capacity to exercise meaningful control. This

creates a structural gap between nominal authority and effective control (NATO, 2023; European Defence Agency, 2024).

The delegation of operational autonomy also raises questions regarding the boundaries of human responsibility. As systems operate with increasing independence, reliance on predefined rules of engagement and embedded safeguards becomes more pronounced. However, such safeguards may prove insufficient in conditions of environmental uncertainty, adversarial interference, or system malfunction. In these situations, effective human oversight depends on the commander's ability to understand system behavior and intervene under pressure (UNIDIR, 2023).

Case 3: Autonomous Systems in NATO Training and Simulation

Autonomous and AI-enabled systems are increasingly integrated into training and simulation environments to support decision-making, scenario generation, and performance evaluation. These systems simulate complex operational environments, emulate adversary behavior, and provide adaptive feedback, thereby enhancing realism and accelerating learning processes (European Defence Agency, 2023; NATO, 2023).

From a leadership perspective, AI-driven training environments exert a formative influence on decision-making patterns. By repeatedly presenting algorithmically optimized responses and reinforcing specific behavioral pathways, such systems shape commanders' cognitive habits and expectations regarding system reliability. While this can improve efficiency and consistency, it may also foster overreliance on algorithmic outputs and overconfidence in AI systems (Stanford HAI, 2024; OECD, 2023).

A key challenge lies in the transferability of skills acquired in simulated environments to real-world operations. Unlike controlled training settings, operational environments are characterized by uncertainty, incomplete information, and adversarial adaptation. Commanders accustomed to the predictability of simulation may overestimate the reliability and controllability of AI systems in real deployments, potentially affecting situational awareness and decision-making under stress.

At the same time, training environments offer opportunities to strengthen meaningful human control. When deliberately designed to include system failures, degraded performance, and unexpected behaviors, simulations can enhance critical thinking, adaptability, and resilience. In this sense, training and simulation environments serve as a key platform for developing the competencies required to manage autonomy effectively (OECD, 2023; UNIDIR, 2023).

Cross-Case Analysis and Key Findings: The comparative analysis of the three cases reveals several recurring patterns in the interaction between autonomous systems and human decision-making. Despite differences in operational context, common challenges emerge in relation to human

control, leadership authority, and accountability in AI-mediated environments.

First, algorithmic systems increasingly shape the framing of decisions. Across all cases, AI systems influence how problems are defined, which options are prioritized, and how risk is interpreted. This framing effect extends beyond technical support and directly affects cognitive and organizational dimensions of decision-making.

Second, a persistent tension exists between formal authority and practical control. While commanders remain legally responsible for decisions, their ability to exercise meaningful control is contingent upon system transparency, operational tempo, and cognitive constraints. This results in a growing gap between nominal responsibility and effective agency (UNIDIR, 2023).

Third, time pressure and cognitive load act as amplifiers of algorithmic influence. Autonomous systems are typically deployed in high-complexity environments where human cognitive capacities are already strained. Under such conditions, reliance on algorithmic outputs becomes functionally necessary, increasing the risk of reduced critical oversight (OECD, 2023).

From a leadership perspective, these dynamics indicate a transformation of the commander's role. Commanders increasingly function as supervisors of human-machine interaction, integrators of algorithmic and human inputs, and managers of uncertainty. This shift requires new competencies, including algorithmic literacy, critical evaluation of system outputs, and the ability to intervene effectively in complex socio-technical systems (European Union, 2024).

Finally, the analysis demonstrates that meaningful human control cannot be reduced to static models such as human-in-the-loop or human-on-the-loop. Instead, it should be understood as a dynamic, context-dependent practice shaped by system design, organizational processes, training, and leadership culture.

The findings suggest that the integration of autonomous systems into military operations fundamentally reshapes decision-making processes and leadership practices. While AI-enabled systems offer significant advantages in terms of efficiency, speed, and information processing, they also introduce new risks related to control, accountability, and cognitive dependence.

Ensuring effective and accountable military leadership in this context requires a reconceptualization of human control as a continuous, system-wide process rather than a discrete point of intervention. Addressing these challenges is essential for maintaining operational effectiveness, legal responsibility, and ethical integrity in the age of artificial intelligence (European Union, 2024).

4. IMPLICATIONS FOR MILITARY LEADERSHIP AND GOVERNANCE

The findings of this study have significant implications for military leadership and governance in the context of the increasing integration of AI-enabled autonomous systems. These implications extend beyond technical considerations and directly affect core dimensions of military doctrine, command culture, and leadership development, as emphasized in recent international policy and governance frameworks (European Union, 2024; NATO, 2023).

From a doctrinal perspective, the integration of autonomous systems necessitates a fundamental re-evaluation of established concepts of command and control. Traditional doctrinal models are based on clearly identifiable human decision points and hierarchical chains of authority. However, the introduction of AI-mediated processes disrupts these assumptions by embedding algorithmic systems within decision cycles and by accelerating operational tempo. As a result, military doctrine must evolve to explicitly define the role of autonomy in operational planning, clarify the conditions under which human intervention is required, and establish clear frameworks for responsibility and accountability in AI-supported decision-making environments (European Defence Agency, 2023; UNIDIR, 2023).

At the level of command culture, increasing interaction with autonomous systems has the potential to reshape established norms of leadership and accountability. Military leadership has traditionally been grounded in individual judgment, professional experience, and personal responsibility. However, as algorithmic systems become more influential in structuring decision environments, there is a growing risk that decision authority may gradually shift toward technological processes, even when formal accountability remains with human commanders. Addressing this risk requires deliberate institutional efforts to preserve a command culture that prioritizes critical thinking, professional skepticism, and the active interrogation of algorithmic outputs. Maintaining the primacy of human judgment is essential for ensuring both operational effectiveness and accountability in AI-mediated contexts (OECD, 2023).

The education and training of military leaders represent a critical domain for adaptation. Future commanders must be equipped not only to operate advanced AI-enabled systems, but also to understand their limitations, vulnerabilities, and potential failure modes. Training frameworks should therefore incorporate complex scenarios involving system degradation, adversarial manipulation, and unexpected behavior, enabling leaders to develop the cognitive and operational skills required to maintain situational awareness and exercise effective control under pressure. In this context, training environments-particularly those enhanced by AI-driven simulation, play a key role in preparing commanders for the realities

of human–machine interaction in operational settings (NATO, 2023; Stanford HAI, 2024).

These developments highlight the need for adaptive models of human control that can respond to varying operational contexts and levels of autonomy. Static categorizations such as human-in-the-loop or human-on-the-loop are increasingly insufficient to capture the complexity of real-world deployments. Instead, military organizations should adopt flexible, context-sensitive approaches that allow the degree of human involvement to be dynamically calibrated based on mission requirements, system behavior, and risk levels. In this sense, human control should be conceptualized as a continuous and distributed process embedded across system design, operational procedures, and organizational structures (UNIDIR, 2023; OECD, 2023).

Finally, the governance of military artificial intelligence must be aligned with broader national, regional, and allied frameworks. Within NATO and the European Union, ongoing efforts to establish shared principles, standards, and interoperability requirements are critical for ensuring coherence, trust, and operational compatibility among allies. In particular, the emerging regulatory framework under the EU approach to artificial intelligence underscores the importance of accountability, transparency, and human oversight as foundational governance principles (European Union, 2024; OECD, 2023).

National implementation strategies must therefore strike a careful balance between enhancing operational effectiveness and adhering to shared legal and ethical commitments. Effective governance of autonomous systems in the military domain depends on the ability to integrate national capabilities within these broader frameworks while preserving the central role of human leadership, responsibility, and control (European Union, 2024; European Defence Agency, 2023).

CONCLUSIONS

This article examined the impact of AI-enabled autonomous systems on military leadership and decision-making, with a particular focus on the role of human control in increasingly AI-mediated operational environments. Through qualitative analysis and structured case-based observations, the study explored how autonomy reshapes command authority, responsibility, and the practical exercise of leadership across different military contexts.

The findings demonstrate that autonomous systems do not merely support military decision-making but actively structure the conditions under which human judgment is exercised. By influencing how information is processed, how options are generated, and how risks are assessed, AI systems increasingly shape the decision environment itself. While these capabilities enhance operational effectiveness in terms of speed, efficiency,

and data processing, they simultaneously introduce new challenges related to algorithmic influence, limited transparency, and compressed decision timelines.

A central insight emerging from the analysis is the growing divergence between formal authority and practical control. Although commanders retain legal and operational responsibility, their ability to meaningfully assess, challenge, and override algorithmic outputs is increasingly constrained by system complexity and operational tempo. This creates a structural tension between responsibility and agency, which has direct implications for accountability and the integrity of command.

In response to the central research question, the study concludes that the integration of autonomous systems fundamentally transforms military leadership. Commanders are no longer solely primary decision-makers, but increasingly act as supervisors of human-machine interaction, integrators of algorithmic and human inputs, and managers of uncertainty in complex socio-technical environments. In this context, effective leadership depends not on reducing autonomy, but on maintaining adaptive and context-sensitive forms of human control.

The article argues that meaningful human control should be understood not as a fixed technical mechanism, but as a dynamic and continuous process embedded across system design, operational procedures, training, and organizational culture. Preserving such control is not only an ethical or legal requirement, but a strategic necessity for ensuring accountability, operational trust, and the effectiveness of military command in AI-mediated environments.

The scientific contribution of this study lies in linking conceptual debates on autonomy and human control with concrete decision-making dynamics observed in military contexts. By integrating insights from targeting processes, semi-autonomous operations, and training environments, the analysis provides a more grounded understanding of how autonomy reshapes leadership and governance in practice.

From a policy and governance perspective, the findings highlight the importance of aligning military AI integration with broader regulatory and institutional frameworks. Emerging approaches within NATO and the European Union underscore the need for transparency, accountability, and human oversight as foundational principles. However, their effective implementation depends on translating these principles into operational doctrine, training systems, and command practices.

Future research should further examine how adaptive models of human control can be operationalized across different mission types and levels of autonomy, including empirical studies of decision-making behavior in AI-supported environments. Additional work is also needed to assess how evolving regulatory frameworks and alliance-level governance mechanisms

will shape the practical deployment of autonomous systems in military operations.

Ultimately, the study suggests that the challenge is not whether autonomous systems will transform military leadership, but how this transformation can be governed in a way that preserves human agency, responsibility, and control in the age of artificial intelligence.

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