

***Bellum ex machina*: reflections on artificial intelligence and the future of operational art**

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In Greek theater, the expression *deus ex machina* (“god from the machine”) designated the unexpected intervention of a divinity that artificially resolved an insoluble conflict. The proposal for *bellum ex machina* (“the war coming from the machine” or “the war produced by the machine”) inverts this logic. Instead of the machine solving a conflict, it becomes the very means to conceive, conduct, or transform the characteristics of war.

Historically, operational art has evolved in response to technological changes and transformations in socio-political structures that offer new challenges or paradigms to the way of conducting war (Friedman, 2021; Vego, 2025). With the increasing integration of complex defense systems—especially weapons systems enabled by artificial intelligence (Oliveira *et al.*, 2021) and autonomous platforms in contemporary warfare—arguments have proposed a kind of “revolution” in operational art, echoing a reasoning similar to that of the revolution in military affairs and its emphasis on speed, accuracy, and automated decision-making (Jensen, 2025). This shift from AI as the commander’s tool to AI as the organizing logic of war precisely makes the issue urgent. When the machine ceases to support human judgment and begins to structure, it will bring an operational risk and a risk that war will lose its properly human dimension even before this loss is perceived or named.

Such is the reason a critical analysis of these claims is required. A conceptual framework is proposed to show that the diffusion of machine “reasoning” in military operations generates unprecedented risks for the very “art” that defines operational art.

Thus, it is necessary to retrieve the theoretical and conceptual framework that focuses on operation planning and conduct as the central domain of operational art. In this scope, planning remains the main mechanism articulating objectives, resources, and actions toward a desired end state (Figueiredo; Moreira, 2022).

Debates on network-centric warfare and the advancement of concepts and acronyms such as C4ISR (command, control, communication, computers, intelligence, surveillance,

and reconnaissance) point out how AI and similar systems could affect decision-making cycles, command relationships, and the pace of operations (Ferris, 2013). However, the results are often tentative and not always positive. While automation can increase efficiency in sequencing tactical engagements, over-reliance on these platforms risks reducing warfare to mere target selection and attrition, depriving it of the judgment, creativity, and adaptability required by operational art. Human actions and reactions in war remain inherently unpredictable, eluding certain measurements. No algorithmic system can replace the commander's ability to understand ambiguous environments and exercise reasoned judgment (Sookermany; Slensvik, 2026).

At the heart of this argument lies the practice of command itself. Operational art requires commanders and staff to execute, understand, advise, and explain decisions under profound uncertainty. The "art" in operational art lies precisely in the ability to act creatively and innovatively when almost everything is ambiguous and imprecise. AI systems can calculate but they are unable to judge (Hunter; Bowen, 2024). Thus, concepts such as human-machine integration or meaningful human control, rather than only depending on humans being in or on the loop, rely on the ability of commanders and staff officers to logically reason together with intelligent systems.

A conceptual framework is proposed to preserve operational art as a fundamentally human enterprise. Rather than prescribing a fixed model for AI integration, it is necessary to define a set of guiding parameters by which commanders and staff can use AI as a multiplier of combat power without giving up the irreducible dimension of the art of command. Intelligent systems enhance but are unable to replace the commander's ability to exercise judgment, creativity, and adaptability under profound uncertainty. In this context, while professional and military training have traditionally acknowledged the human dimension intrinsic to strategy and the art of command, the incorporation of AI into officer training carries risks reinforcing ways of thinking that are excessively algorithmically driven at the expense of critical judgment. Thus, the development of technologically trained officers must be accompanied by a renewed emphasis on ethical reasoning, critical thinking, and responsible decision-making. The implications are doctrinal and conceptual: as AI systems become increasingly embedded in the planning and execution of operations, the development of human reasoning must remain the organizing imperative of commander training and staff improvement.

REFERENCIAS

FERRIS, J. Netcentric warfare, C4ISR and information operations. In: ANDREW, C.; ALDRICH, R. J.; WARK, W. K. (eds.). **Secret Intelligence**. Abingdon: Routledge, 2013, p. 477-479.

FIGUEIREDO, T. A.; MOREIRA, N. X. Coordenação e planejamento: categorias centrais nas relações interagências. **Coleção Meira Mattos**, V16, n. 56, p. 279-293, 2022.

FRIEDMAN, B. **On operations**: operational art and military disciplines. Annapolis: Naval Institute Press, 2021.

HUNTER, C.; BOWEN, B. E. We'll never have a model of an AI major-general: Artificial Intelligence, command decisions, and kitsch visions of war. **Journal of Strategic Studies**, V. 47, n. 1, p. 116-146, 2024.

JENSEN, B. Operational Art in the Age of Battle Networks. In: JONES, S. G.; DANIELS, S. P. (eds.) **War and the Modern Battlefield**: Insights from Ukraine and the Middle East. Washington, DC: Center for Strategic and International Studies, 2025, p. 33-41.

OLIVEIRA, W. L. *et al.* Encomendas tecnológicas em processos de obtenção de sistemas complexos de defesa. **Coleção Meira Mattos**, v. 15, n. 53, p. 127-145, 2021.

SOOKERMANY, A. D.; SLENSVIK, T. Military Operational Thinking in an Age of Artificial Intelligence. **War on the Rocks**, 18 mar. 2026. Disponível em: <https://warontherocks.com/2026/03/military-operational-thinking-in-an-age-of-artificial-intelligence/>. Acesso em: 10 jul. 2026.

VEGO, M. **Operational Art**: Theory and Practice. Abingdon: Routledge, 2025.