Navigating the AI and Nuclear Nexus

By

Muhammad Shahzad Akram

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As the world gears up for the 2026 Nuclear Non-Proliferation Treaty (NPT) Review Conference, a new and multifaceted factor is complicating the global strategic calculus: Artificial Intelligence (AI). The "nuclear-AI nexus" has evolved from a niche technical interest to a prominent feature in global security discussions, with implications for every aspect of the NPT's three pillars: non-proliferation, disarmament, and peaceful uses of nuclear energy. However, as experts recently cautioned at the "Atoms for Algorithms" webinar, we need to cut through the speculative "AI hype" to ensure this technology remains a means for peace, not an avenue for unintentional escalation.

To regulate the nuclear-AI connection, we first need to understand the technology. As a United Nations Institute for Disarmament Research researcher, Dr. Yasmina Fina suggests, AI is not a monolithic entity, but a "construct" and a "system of systems," made up of code, software, data, hardware, and sensors. It is a system used to fulfill certain functions, not a threat capable of usurping human decision-making. The risk is the "speed and scale" of AI, which can have myriad implications for performance and strategy. Moreover, Fina warns that comparing nuclear governance to AI governance is unhelpful because the technologies are not the same; nuclear materials are limited and tangible, whereas AI is ubiquitous and digital.

In the context of non-proliferation, AI is touted as a game-changing verification tool. The International Atomic Energy Agency (IAEA) could potentially use "AI agents," semi-autonomous machines capable of processing large data streams and satellite images to verify the accuracy of declarations by states at a pace humans cannot match. However, Dr. Ian Stewart, Executive Director of the CNS Washington, states that AI will not help states develop nuclear weapons they could not otherwise build, for two physical reasons: AI cannot "magic up" fissile material, and there is no evidence that large language models can transfer the "tacit knowledge" necessary for weaponization.

When it comes to AI and nuclear weapons, political concerns are high. States have been reluctant to allow the IAEA to use open-source data or "black box" algorithms. Should an AI detect an event, the absence of "explainability" or how the machine arrived at its decision could lead to a crisis of political legitimacy for the safeguards system.

The most fraught part of the nexus is disarmament. We are now seeing a "race to adopt" AI in military strategies due to the perceived speed advantage it offers. AI can speed up threat identification and data integration, potentially freeing up more time for decision-making (or, on the other hand, reducing decision-making cycles to the point that humans are simply rubber-stamping decisions).

Aliche Sultini, senior research lead at the Rhode Island School of Design, explains that AI systems create new levels of uncertainty. If a state cannot grasp how an adversary's AI operates in its decision-making, it might fall into worst-case scenarios, reinforcing alert postures that prevent disarmament. To support disarmament, AI must be used to enhance technical verification and confidence, not to shorten the path to war. Possibly the most disruptive aspect of this interaction is the NPT's third pillar: peaceful nuclear energy applications. According to Mr. Shota Kamishima of the IAEA, an "affinity" is emerging between nuclear power and AI. We are now moving into a world where energy-hungry AI data centers need the clean, scalable, and reliable power offered by nuclear power, and where nuclear generation and maintenance are improved through AI.

This alliance is especially important for the rollout of Small Modular Reactors (SMRs), for which AI-optimized construction schedules and supply chains are critical. By enhancing predictability and avoiding cost overruns, a major issue for nuclear construction, AI could make nuclear projects more "bankable" and thus more attractive for the global shift towards clean energy. Despite technological progress, the experts agree: human responsibility is essential. Whether it is a safeguards inspector at the International Atomic Energy Agency (IAEA) or a human commander in a nuclear-armed nation, humans are the "last line of defence".

"Black box" systems are incompatible with a strong safety culture. Governance policies must ensure that AI is implemented with transparency, traceability, and "explainability". We must also be alert to the potential for AI to be employed by "agents" to monitor sites, which could result in disinformation and the distortion of threat perception through "anomaly detections." As the 2026 Review Conference draws near, policymakers' mission should be to "denoise." Nuclear policy decisions must not be based on science fiction or fear of competition. Rather, we should prioritize "lower stakes" opportunities where AI can help us now, such as employing AI agents to navigate the overwhelming output of the NPT process — making it searchable and highlighting inconsistencies in delegation positions.

The relationship between nuclear and AI is not a bug to be fixed with more software, but a circumstance to be managed by the international community. By prioritizing evidence-based policy and law, human-in-the-loop systems, and the common ground of the peaceful "Atoms for Algorithms" alliance, we can ensure that the digital revolution supports, rather than undermines, the global nuclear order. In the end, the fate of the NPT will not be determined by algorithms, but by human intelligence.

Muhammad Shahzad Akram is a Research Officer at the Centre for International Strategic Studies, AJK. He holds an MPhil in International Relations from Quaid-i-Azam University, Islamabad. He is an alumnus of the Near East South Asia (NESA) Centre for Strategic Studies, National Defence University (NDU), and Washington, DC. His expertise includes cyber warfare and strategy, arms control, and disarmament. Views expressed in this article are the author's own.