Introduction: Objectives and Major Themes

The Atlantic Council's *Forward* Defense program is pleased to provide an abridged version of the second installment of our bi-monthly Defense Technology Monitor reports.

These reports are designed to **track** selected developments in global defense technology and adoption advancement; **provide high-level analysis** of key trends, drivers, uncertainties, and challenges associated with key technologies and capabilities and their implications for defense, international security, and geopolitics; **highlight notable innovations and acquisitions** in the global defense and commercial high-tech industry; and **identify** non-technical trends and broader competitions that are shaping technology adoption and the future fight.

Each Defense Technology Monitor will be divided into sections examining categories of technology or capability, such as:

- Artificial Intelligence and Data
- Autonomous Systems
- Platforms and Weapons Systems
- Computing Power
- Sensors and Detection
- The Information Domain, Cyber, and Electronic Warfare
- Manufacturing and Industry

The report highlights stories that amplify the emerging trends in defense technology development and capability adoption. Firstly, innovation and changing capabilities that are driving shifting competitions. Innovation in technology, tactics, and operational concepts has been a catalyst for crucial military competitions and conflict. Ukraine's adoption of commercial drone technology has resulted in Russian adaptation with counter-drone electronic warfare capabilities, placing new pressures back on Ukraine. Next, balancing the transition from experimentation to adoption. The report also highlights the challenge associated with balancing the need to transition emerging technologies from experimentation to implementation with the importance of implications for safe and responsible adoption. This challenge is being addressed by the Department of Defense's investigation of the utility and risks associated with generative AI, the establishment of a new Task Group within Task Force 59 focused on operational adoption, and the publication of a new Atlantic Council report on defense innovation adoption. Finally, the systems of systems challenge. The systems of systems challenge directly relates to US competitors and potential adversaries viewing conflict with the United States and its partners and allies as a conflict between systems of systems. The recent reveal of the on-going effort by hackers associated with China to target US civil and military infrastructure via cyber-attacks serves as a useful example of targeting critical nodes in the system to reduce the capacity to respond.

Artificial Intelligence (AI) and Data

Generative AI and the Department of Defense: Bias Bounties and Task Force Lima

The recent boom in commercial development and use of generative AI tools such as Chat GPT-4 has triggered both interest and concern from defense and intelligence communities throughout the world. This is certainly the case with the US Department of Defense (DoD), which established Task Force Lima within the Chief Digital and Artificial Intelligence Office's (CDAIO) Algorithmic Warfare Directorate in August 2023 to investigate the opportunities and risks of generative AI adoption. On January 29, CDAIO

launched the first of two artificial intelligence "bias bounty" exercises designed to identify unknown or unanticipated risk areas in large language models (LLMs).

Autonomous Systems

The shifting drone war in Ukraine

Ukrainian Armed Forces received an initial batch of new AQ400 Scythe kamikaze drones made by Ukrainian company Terminal Autonomy in December 2023. The Scythe's design, supply chain, and manufacturing gave Ukraine an easily produced and assembled long-range UAS that was highly effective against Russian forces. The drone war has appeared to have entered a new phase, however. This sentiment was put forth in a *Foreign Affairs* article by Eric Schmidt that assessed that the combination of increased Russian capacity, responsive and adaptive Russian tactics, and "Russia's superior electronic warfare capabilities [that] allow it to jam and spoof the signals between Ukrainian drones and their pilots" have altered the dimensions and balance of the drone conflict in Ukraine.

Platforms and Weapons Systems

It carries aircraft, but don't call it an aircraft carrier: Modified Kaga destroyer carries out sea trials (Asahi Shimbun and NavalNews)

In mid-November, the Japan Maritime Self-Defense Force (JMSDF) Izumo-class destroyer Kaga began sea trials following modifications of its deck to allow F-35B fighter jets to take off and land on the ship. Although JMSDF has carefully avoided referring to Izumo-class destroyers as aircraft carriers due to post World War II constitutional provisions, the government decided to convert the Kaga and its sister destroyer, the Izumo, into ships capable of carrying the short take-off / vertical landing capable F-35B amidst growing concern over China's more assertive territorial claims to the Senkakus in the East China Sea.

Computing Power

NATO releases summary of first ever quantum strategy (NATO)

On January 17, NATO offered its perspective on the importance of quantum technologies to the future of military-technological competition and how the Alliance can gain and maintain an advantage in these crucial technologies with the release of a summary of its first ever quantum strategy. The summary begins by noting that advancement in quantum technologies are bringing the Alliance closer "to a profound shift for science and technology—one that will have far-reaching implications for our economies, security and defence." It goes on to offer a strategic vision for "a quantum ready Alliance" and emphasizes the need to "prevent the formation of new capability gaps in a world where peer competitors adopt quantum technologies themselves."

Sensors and Detection

Chinese scientists claim world's most sensitive submarine detection sensor

In late December, a team of Chinese scientists published a paper in the Chinese-language journal *Cryogenics and Superconductivity* that claimed they had developed an ultra-sensitive version of Superconducting Quantum Interference Devices (SQUIDs) at reduced costs. SQUIDs are highly sensitive detectors used to measure extremely weak magnetic fields. Improving undersea detection and operations is an understandable priority for the People's Liberation Army (PLA) as the United States has long been perceived as having a significant undersea advantage.

Information Domain, Cyber, and the EM Spectrum

Volt Typhoon and rising risks against infrastructure

On January 31, the US Cybersecurity and Infrastructure Security Agency (CISA) urged manufacturers of small office / home office (SOHO) routers to ensure their devices are secure against ongoing cyber attacks attempting to hijack them, especially those coordinated by Chinese hacking group Volt Typhoon (also known as Bronze Silhouette). The CISA announcement followed acknowledgement from the US Federal Bureau of Investigation (FBI) that it had sought and received court authorization to remotely disable a KV botnet attack from Volt Typhoon targeting US critical infrastructure by using access to certain brands of SOHO routers to hide their activity. These types of penetrations of US civil and military infrastructure hold significant, multi-layered risks that include the collection of sensitive information on US infrastructure, the ability to hold this infrastructure at risk, undermine the capacity of the United States to respond to a crisis, and reduce domestic political will for confrontation.

Manufacturing and Industry

Addressing the Innovation Adoption Challenge (Atlantic Council)

On January 16, the Atlantic Council concluded its Commission on Defense Innovation Adoption with the release of the project's final report. The Commission was launched in 2022 with the primary objective to "take the DoD's acquisition process, and Congress' role in that system, out of the Cold War era." The result was ten recommendations for Congress and DoD policymakers, high-level summaries of which can be found in the full Defense Technology Monitor report.

If you are interested in learning more about emerging defense technologies and capabilities and would like to read this month's *full* issue of the Defense Technology Monitor, please contact *Forward* Defense deputy director, Kathryn Levantovscaia, or program assistant, Abigail Rudolph.