KAUTILYA
SCHOOL OF
PUBLIC POLICY

Issue Brief Series

“Policy-friendly Lexicon of Emerging Technologies”

Issue Brief: IB-2026-42

Submitted by: Abhijeet Raut (MPP Cohort, 2024-26)

Under the Supervision of: AVM (Retd.) Dr. Arjun Subramaniam, Visiting Instructor, Kautilya School of Public Policy

Cite this Report as: Raut, A. (2026) “Policy-friendly Lexicon of Emerging Technologies” [online]. Available at: https://www.kspp.edu.in/issue-brief/policy-friendly-lexicon-of-emerging-technologies.

Policy-friendly Lexicon of Emerging Technologies

Abstract

This paper develops a policy-friendly lexicon to improve understanding of emerging military technologies among policymakers without technical backgrounds. It argues that unclear and complex terminology limits effective strategy, regulation, and international coordination. The study proposes a flexible lexicon framework consisting of technology families and policy-relevant classifiers, rather than a rigid taxonomy. Fourteen technology families are identified, alongside six classifiers covering use, intent, integration, regulation, and geopolitical impact. The framework is demonstrated using examples from major defense reports. The paper concludes that a simplified, shared lexicon can enhance policy communication, decision-making, and international cooperation on emerging technologies.

Introduction

War is the ultimate realization of modern technology.
- Don Delillo (in his 1985 novel, *White Noise*)

Technology has always been a crucial part of military infrastructure interventions and we see technology becoming a key feature of the changing character of war. With rapid advancements in technology, it appears that technology often plays an integral part in strategy development as well as designing military trajectory. Not surprisingly, emerging technology also has huge implications in military interventions, as they might completely change the course and tactics that are deployed in modern warfare. Rotolo et al. (2015) define emerging technology as having five characteristics, namely radical novelty along with prominent impact, coherence and relatively fast growth and uncertainty and ambiguity. For the purposes of this paper, we shall adhere to the definition of emerging technology to be any new age technology or any modern innovation and existing technology that can be integrated into military usage, or can have a use case that aligns with any strategic requirement of the nation.

Policymakers often tend to be generalists that might lack a comprehensive ability to have such a deep understanding of these technical jargons. While the lack of knowledge doesn't stop

one from undertaking large-scale technological reforms, with Mark Esper being an epitome of the said phenomena (Rich, 2019), it's still cruising for the existence of a lexicon or a taxonomy that is policy friendly or is easily comprehensible to policy professionals. Entities such as NATO and the Atlantic council have reiterated the need for such a shared lexicon (Soare, 2021) in order to have coherence in the strategy building of allies. Such a simplified lexicon not only improves public communication with domestic stakeholders, but also improves the ability to better express and negotiate treaties when it comes to international diplomacy. A simplification of emerging technologies is a sine qua non for better interdisciplinary integration when it comes to defense policy.

Methodology

The paper proposes to develop a new lexicon system. The proposed system will have 2 distinct aspects, Descriptors and Allied information. It is important to note that this paper doesn't intend to make a taxonomy, but rather, a lexicon system, meaning that every technology can be understood through various facets, and the facets can be omitted or included as per the suitability of the usage of the same (i.e. where is the lexicon being used, inter alia, whether is it for policy communication or internal reporting). The study finally uses 2 examples from 4 reports, namely, Velocity Magazine's Special Edition Report, ORF's Special Report No. 209, IISS's China Security Project Report and CRS Report on Emerging Military Technology; to explain how those particular technologies can be attributed to different classifiers and a technology family, as per the new lexicon system.

Proposed Lexicon

As discussed before the lexicon system would have 2 key aspects. The first aspect is going to be descriptors that shall describe the broader technology families. These families have been made by studying taxonomies such as the Velocity's Top 10 report as well as the Department of Defense's 14 critical technology areas. Following the descriptors are 6 policy relevant sets of classifiers that shall provide policy professionals with crucial information that shall better help them comprehend the role of emerging technologies in the current defense landscape.

Descriptors (Technology Family)

The first family of technologies is **Artificial intelligence and Autonomous Systems**, which involves technologies such as machine learning, artificial intelligence software, large language models and autonomous systems for decision support and robotics. This family of technology is not only cost-cutting enabler, as it not only hastens the process of analysis or process of decision-making, but the autonomy that it grants helps the systems to act with very minimal human intervention (Annett & Giordano, 2024).

Advanced Computing and Software is a second family when it comes to emerging technologies, which include high performance and over the edge computing systems, generally also include quantum and photonic computing. Some advancement such as neuromorphic chips, FPGA-accelerated systems and 3D chiplets are some of the examples of technologies in the family (Mattjackson, 2025).

The third family is **Cybersecurity and Cryptography** technologies, that play a crucial role in safeguarding information communications as well as control the system from any kind of unauthorized access that might take place during a systemic attack. Many techniques are used within this technology which include layered encryption or multi-factor authentication or even practices to secure networking, which involve proactive threat detection and deterrence (Joshi, 2025).

Communication and Networking is the fourth family when it comes to technologies and in the defense sector they're important to have secured, resilient and high-speed data exchange, particularly when there is operational contest or even mechanisms to jam the environments to hamper communications. While the technology already existed, it is the modernization efforts that makes it emerging, particularly with the use of next generation tactics like artificial intelligence-powered radios and even the fifth or sixth generation of network (Bhute, 2025).

The fifth family of emerging technology is **Quantum Scientific Technology** which consists of breakthrough capabilities, particularly in the role of computing, secure communication and timing. Quantum key distribution is like a theoretically unhackable channel that can unleash the next wave of positioning navigation and timing resilience, and it's

excessively important for command-and-control operations (Krelina & Stockholm International Peace Research Institute, 2025).

Bio-technology and Bio-engineering is the sixth family of technology and is basically defined as the application of Life Sciences and the knowledge of the living system, particularly to defense machines. The technology is not only for defense capabilities, but it is also used particularly in offensive capacity. Bio sensors, antidotes, and rapid vaccination mechanisms are just examples of technologies in this family ("Strategic Report on Research and Development in Biotechnology for Defense Innovation," 2024).

The seventh family is **Advanced Materials and Manufacturing** which encompass the development and manufacturing of high performance, structural elements which can include a variety of materials such as polymers that are fibre-reinforced, meta-materials, nano-materials, or even additive parts that can be manufactured and whose intention is to make the current equipment, lighter, more robust and stronger or make it easier for individuals to survive in difficult conditions (*2025 Advanced Materials Summit*, n.d.).

Directed Energy Systems is the eighth family of emerging technologies, particularly as high powered lasers, microwaves or electromagnetic frequencies, and pulses are leveraged to use as speed of light attacks on targets. They are not only more precise, but also have deeper abilities to attack with virtually unlimited shots and have a significantly low logistical burden compared to other conventional munitions. They are also key responses to other emerging technologies such as counter-drone mechanisms or anti-missile defenses for perimeter security and recently even for anti-satellite roles (Gangwar, 2025).

The ninth family, when it comes to emerging technology, is **Hypersonic and High-speed systems**. These systems basically refer to speeds which are called Mach 5 or 5 times higher the speed of sound, taking it to around 1560 metres per second. These speeds not only dramatically shortened engagement but they are way ahead of any current missile defense system. They virtually change the complete paradigm regarding the metric of distance as the excessively high velocities make distance look miniscule (Wallner & Wallner, 2025).

Space systems is the tenth family of technologies, and they comprise not only satellites but smallsats, launch vehicles and even on-orbit servicing solutions and space-based sensors.

They serve a multitude of purposes, such as enabling real-time threat detection and targeting, protecting the resiliency of satellite communication and position navigation and timing, as well as maintaining a freedom of maneuver (Swayne, 2024).

The eleventh family is that of **Microelectronics and Semiconductors**, which are the key to almost all the other emerging technologies that are discussed over here. Just as quantum computing provides an excessively high-speed of data processing, micro electronics and semiconductors are like the basic physical infrastructure required for conducting any kind of operation using emerging technology (*2025 Advanced Materials Summit*, n.d.).

Energy and Power systems is the twelfth family of emerging technology, and just like the previous family they are important as most of the emerging technologies have excessively high energy consumption, making it difficult to sustain the operations without a steady and stable supply of energy through robust power systems. There are multiple innovations in this field, including advanced fuel cells, energy harvesting and hide entry batteries.

The thirteenth family of emerging technology is the **Human-Machine Interface and Augmentations**, as they are one of the most innovative systems with augmented and virtual reality systems, brain computer interface, exoskeletons and nowadays even the rise of wearables sensors. Hence, this is one field that has the most amount of research required from an ethics perspective, particularly to the perspective of trust, security and safety, both of the personnels and the larger ecosystem (Upadhyay, 2024).

Positioning, Navigation and Timing or PNT is the last family of emerging technology. Technologies such as resilient mesh networks, quantum clocks or even celestial navigations are used as the attempts are not only to use them for offensive capabilities but also to deter any kind of offense that might be triggered from the adversary side, particularly through spoofing, jamming or denying environments. (Krelina & Stockholm International Peace Research Institute, 2025).

Families of Emerging Technology	
	Artificial intelligence and Autonomous Systems
	Advanced Computing and Software
	Cybersecurity and Cryptography
	Communication and Networking
	Quantum Scientific Technology
	Bio-technology and Bio-engineering
	Advanced Materials and Manufacturing
	Directed Energy Systems
	Hypersonic and High-speed systems
	Space systems
	Microelectronics and Semiconductors
	Energy and Power systems
	Human-Machine Interface and Augmentations
	Positioning, Navigation and Timing

Figure 1: Table listing all the families (Source: Author)

Allied Information (Classifiers)

It is important to note that technological readiness is a key classifier, when it comes to understanding the innovation and development of emerging technologies. There's already a well-developed, important system of classification called Technological Readiness Level which was developed by NASA (Manning, 2023). Hence this lexicon system will focus more on the other classifiers.

Primary Military Use Case refers to what exactly is the use of the given technology when it comes to military operations or the defense sector. It is important to note that when trying to regulate any kind of technology, it is important to understand what the technology is intended to do and what its requirements are, the risks and capabilities that need to be considered, hence, understanding the primary military use of any technology becomes a key classifier (Walsh et al., 2023). The levels are as follows:

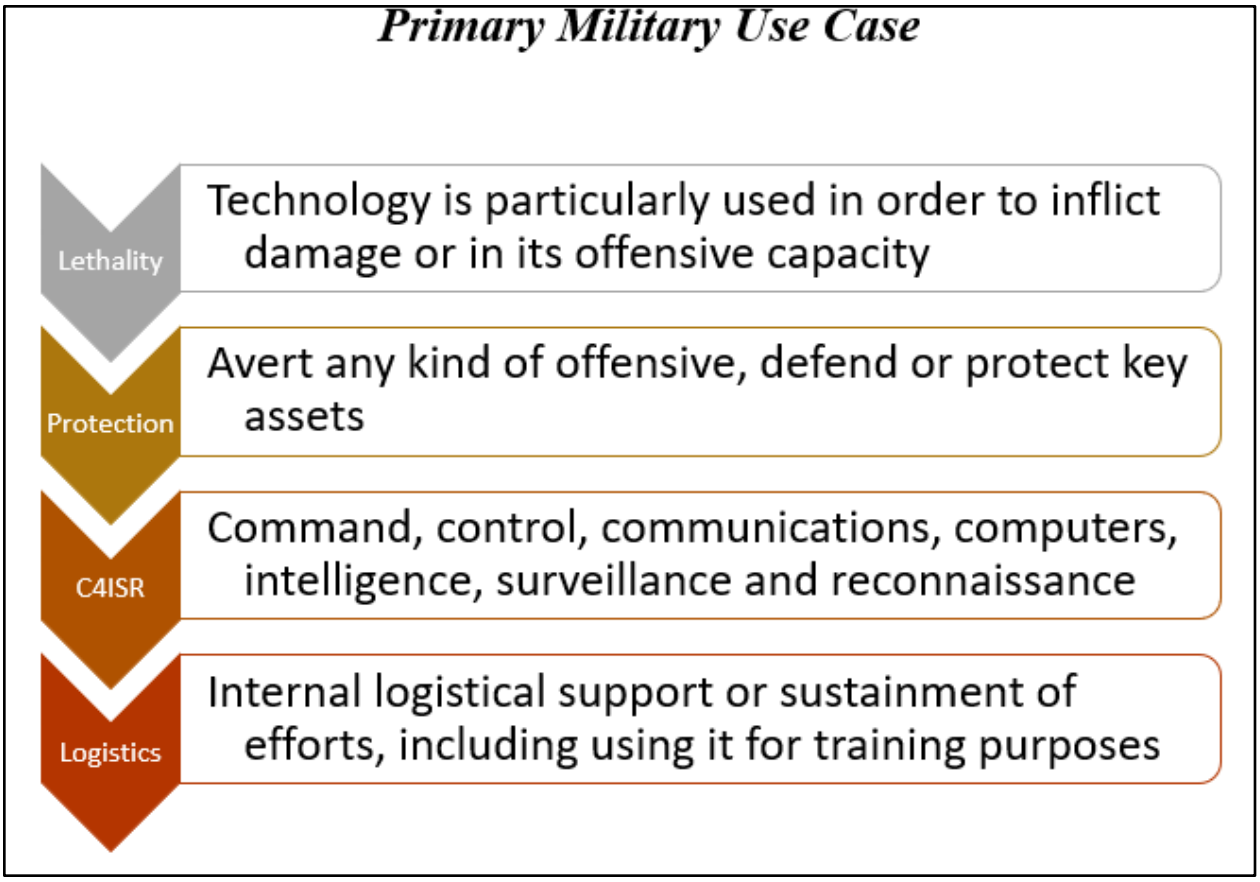

Figure 2: Levels of the Classifier - Primary Military Use Case (Source: Author)

Strategic Intent is another crucial classifier, which highlights, what exactly is the intent of the emergent technology when it comes to the broader design of the intervention, and how exactly is the technology to be leveraged. Seraphin and Miles (2023) highlights that it is important to have a shared understanding to understand the intent behind any new technology to identify its alignment with international norms and strategic goals, and to avoid any kind of risk of escalation or misaligned intent. The levels are as follows:

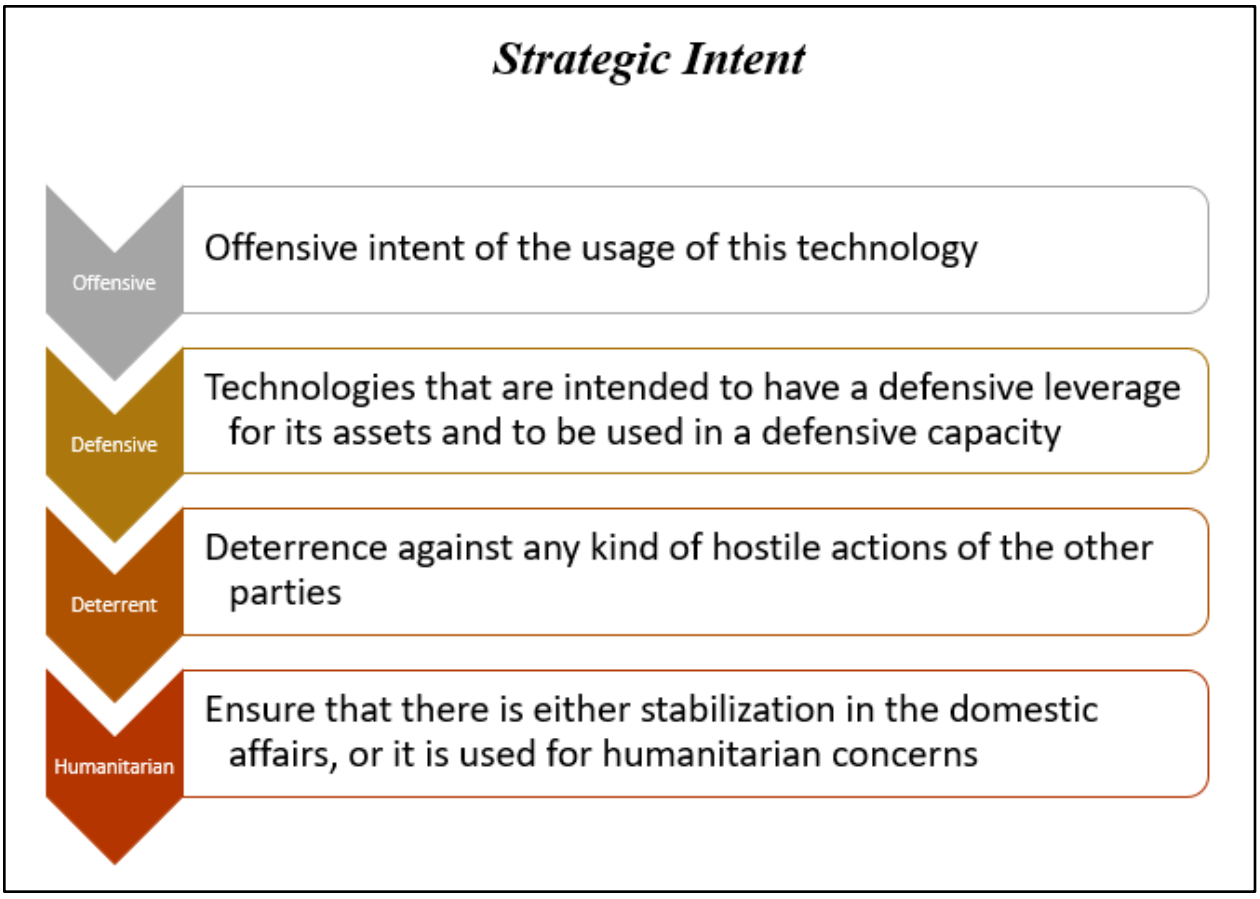

Figure 3: Levels of the Classifier - Strategic Intent (Source: Author)

Commercial Investment is one key classifier that must be highlighted time and again, particularly as we consistently move in the direction of public and private partnerships in the defense sector. Studies highlight that higher commercial investments are associated not only with higher return on investment, but also higher defense returns, and are hence less risky and are more likely to scale rapidly (Haessler et al., 2022). Policymakers will hence find it as one of the most crucial classifiers, as it helps them tackle more alarming questions of whether private players must be involved, and if yes, then to what extent. The levels are as follows:

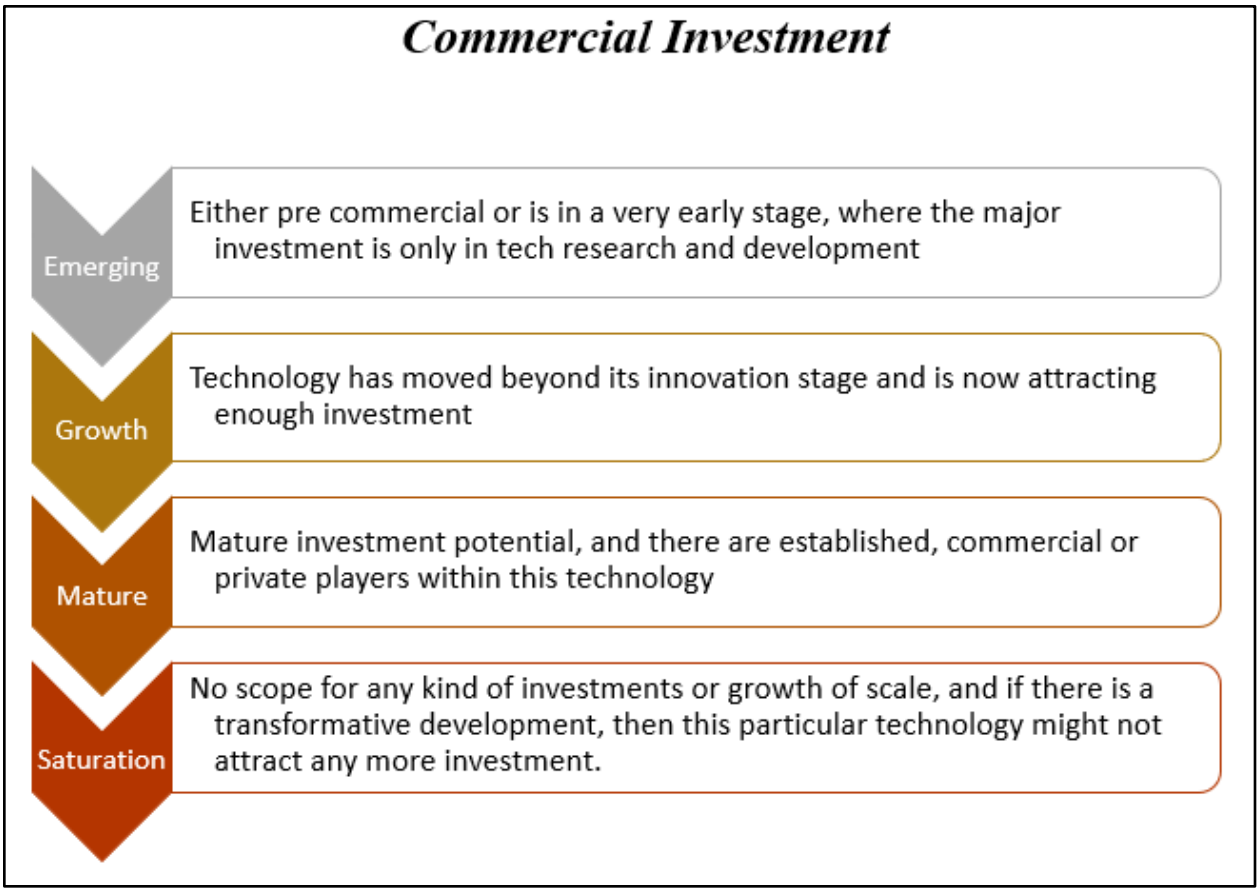

Figure 4: Levels of the Classifier - Commercial Investment (Source: Author)

Integration Complexity refers to how difficult it is for this new technology to be integrated within the current defense and military technology ecosystem. Three key aspects of the same are Technology readiness, which is whether the technological knowhow for the same is ready and available, Manufacturing readiness, referring to the manufacturing and scaling capabilities, whether existing manufacturing infrastructure is enough or new infrastructure is needed and Integration readiness, whether it can be integrated with existing military technology. It is important to assess the interoperability, architecture and functioning as they are crucial to understand whether the sub-systems integrate or not (Jovel & Jain, 2009). The levels are as follows:

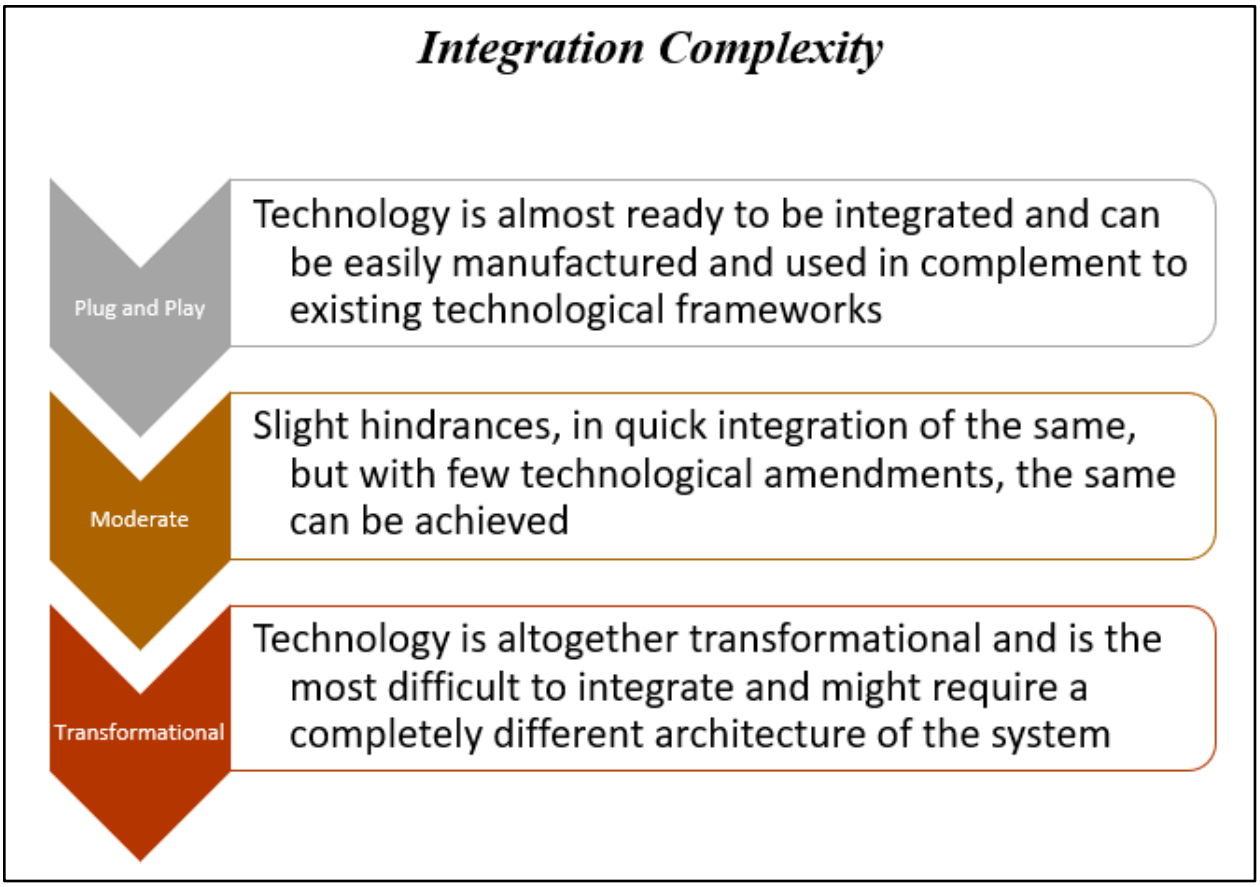

Figure 5: Levels of the Classifier - Integration Complexity (Source: Author)

Regulatory Sensitivity is the next classifier, which highlights to what level will this technology either challenge or align with the existing ethical as well as treaty obligations and debates that might be ongoing. Reports suggest that due to the rapid technological developments, there are various challenges to existing laws of war and informal methods or mechanisms are used to develop norms (*International Humanitarian Law-making and New Military Technologies*, 2022). It hence becomes important to identify the regulatory sensitivity of the new technology, particularly for policy professionals, who would have to develop these standards. The levels are as follows:

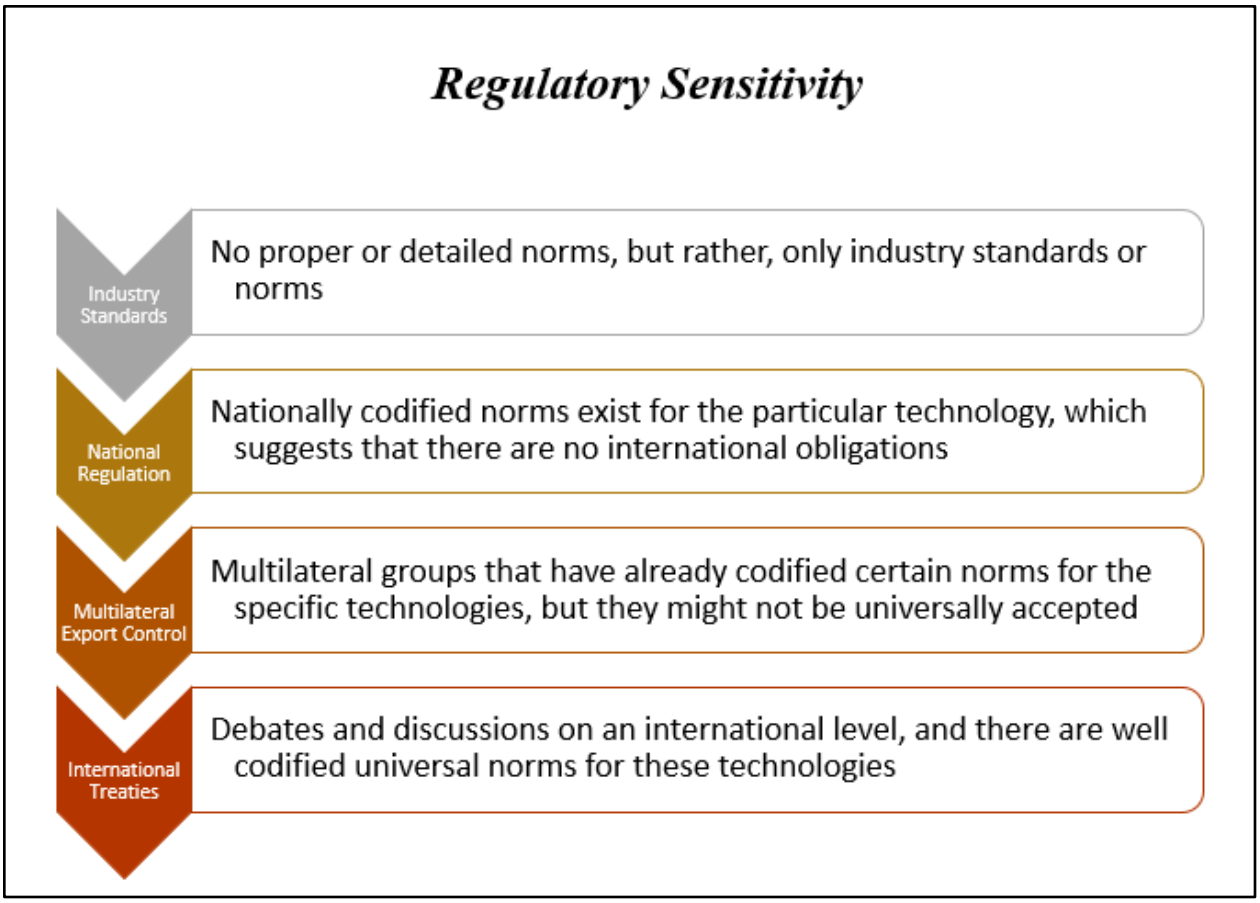

Figure 6: Levels of the Classifier - Regulatory Sensitivity (Source: Author)

Geopolitical Sensitivity is another and the final classifier, which is of excessive importance, particularly when trying to gain a competitive advantage over other players. Swartz and Brukardt (2025) suggests how global competition has led technology to be one of the new frontiers of wars, as there is a technological race for parties to try and reach the required development. There's also the more crucial aspect of identifying where exactly your opponent is when it comes to the development of this technology. The hostile state might either be ahead, or be on the same parity, or possibly even be behind the nation state when it comes to identifying technological progress. This classifier will decide how urgent it is for public policy to respond to the emergence of this new technology. The levels are as follows:

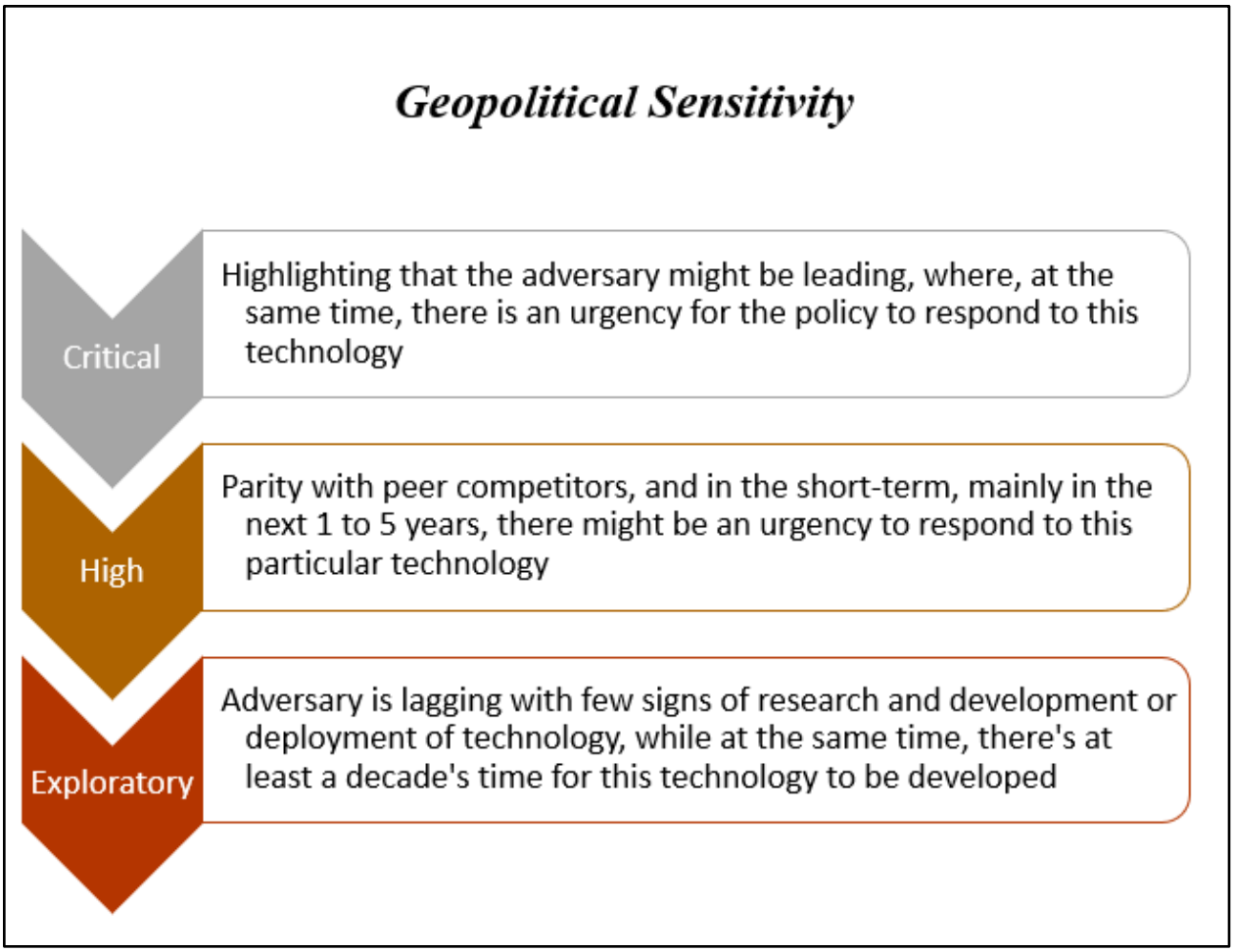

Figure 7: Levels of the Classifier - Geopolitical Sensitivity (Source: Author)

Examples of Applying the Lexicon

The lexicon will now be applied to 8 different technologies across the 4 different reports. The tables attached below illustrate the same.

Technology	*Family*	*Primary Military Use case*	*Strategic Intent*	*Commercial Investment*	*Integration Complexity*	*Regulatory Sensitivity*	*Geopolitical Sensitivity*
AI-accelerator Chips	Advanced Computing and Software	C4ISR	Defensive	Growth	Moderate	National	Critical
Generative AI Software Development	Artificial intelligence and autonomous systems & Advanced computing and software	C4ISR	Deterrence	Growth	Moderate	National	High
Hypersonic Weapons	Hypersonic and high-speed systems	Lethality	Offensive	Emerging	Transformational	Export Control	Critical
Directed Energy Weapons	Directed energy systems	Force Protection	Defensive	Growth	Moderate	National	High

Technology	*Family*	*Primary Military Use case*	*Strategic Intent*	*Commercial Investment*	*Integration Complexity*	*Regulatory Sensitivity*	*Geopolitical Sensitivity*
Quantum Sensing	Quantum Science and Technology	C4ISR	Defensive	Emerging	Transformational	Export Control	Critical
Domain Awareness Technology	Space systems	C4ISR	Defensive	Growth	Moderate	Export Control	Critical
Space-Ground Integrated Information Network	Space systems	C4ISR	Defensive	Growth	Transformational	Export Control	Critical
Lethal Autonomous Weapon System	Artificial intelligence and autonomous systems	Lethality	Offensive	Emerging	Transformational	National	Critical

Conclusion

A simplified lexicon has been hence developed that wherein technology can not only be grouped into a family to get a basic understanding of how exactly the technology works, but at the same time, by using classifiers, allied information can be provided, which could help policy-makers make a more informed decision. The intention behind this lexicon is not to oversimplify the technology or miss out any granular information but to simply make it more accessible even for professionals who come from non-technical backgrounds. The future scope of this paper is to validate this lexicon through proper psychometric methodologies and to make a more uniform system that can be adopted globally and usher informed debates over the use of critical and emerging technologies.

Appendix

Technology	**Family**	**Primary Military Use Case**	**Strategic Intent**	**Commercial Investment/Market Maturity**	**Integration Complexity**	**Regulatory Sensitivity**	**Geopolitical Sensitivity**
Additive Manufacturing / 3D Printing	Advanced Materials & Manufacturing	Logistics & Sustainment	Deterrent	Growth	Moderate	National Regulation	High
Additive Manufacturing /	Advanced Material	Logistics &	Deterrent	Growth	Moderate	National	High

On-demand production	s & Manufacturing	Sustainment				Regulation	
Advanced Fuels / Resilient Microgrids	Energy & Power Systems	Logistics & Sustainment	Defensive	Growth	Moderate	National Regulation	High
Advanced Materials (composites, meta-materials, nanomaterials)	Advanced Materials & Manufacturing	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
AI Accelerator Chips / Specialized Microelectronics	Microelectronics & Semiconductors	C4ISR	Offensive	Growth	Transformational	National Regulation	Critical
Alternative PNT	Positioning,	C4ISR	Defensive	Growth	Moderate	National	Critical

(Alt-PNT, LEO PNT, quantum clocks)	Navigation & Timing (PNT)					Regulation	
Anti-Satellite (ASAT) / Counterspace	Space Systems & Domain Awareness	Lethality/ Offense	Offensive	Emerging	Transformational	International Treaties	Critical
Artificial Intelligence (AI)/Machine Learning (ML)	Artificial Intelligence & Autonomous Systems	C4ISR	Offensive	Mature	Moderate	National Regulation	Critical
Augmented Reality / Virtual Reality (AR/VR)	Human-Machine Interfaces & Augmentation	Logistics & Sustainment	Defensive	Growth	Moderate	Industry Standards	High

Automation / Driverless Vehicles	Artificial Intelligence & Autonomous Systems	Logistics & Sustainment	Defensive	Growth	Moderate	National Regulation	High
Autonomous Systems / Swarms	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Growth	Transformational	Multilateral Export Control	Critical
Big Data Analytics	Advanced Computing & Software	C4ISR	Offensive	Mature	Moderate	Industry Standards	High
Biomanufacturing / Vaccine & Antidote Tech	Biotechnology & Bioengineering	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
Biometrics / Multimod	Sensors, ISR & Electroni	C4ISR	Defensive	Growth	Moderate	National	High

al Analytics	c Warfare					Regulation	
Bio-sensors / Biomedical Devices	Biotechnology & Bioengineering	C4ISR	Defensive	Growth	Moderate	Industry Standards	High
Biotechnology / Synthetic Biology / CRISPR	Biotechnology & Bioengineering	Force Protection /Defense	Offensive	Emerging	Transformational	International Treaties	Critical
Cislunar Infrastructure / xGEO Sensors	Space Systems & Domain Awareness	C4ISR	Defensive	Emerging	Transformational	International Treaties	High
Cloud Computing / Edge Computing	Advanced Computing & Software	C4ISR	Defensive	Mature	Plug-and-play	Industry Standards	High

Counter-UAS (kinetic & non-kinetic)	Directed Energy Systems	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
Custom ASIC / FPGA / Neuromorphic / IMC	Microelectronics & Semiconductors	C4ISR	Offensive	Emerging	Transformational	National Regulation	High
Cyber-offense / Cyber weapons	Cybersecurity & Cryptography	Force Protection /Defense	Offensive	Emerging	Transformational	International Treaties	Critical
Cybersecurity (network security / cyber defense)	Cybersecurity & Cryptography	C4ISR	Defensive	Mature	Moderate	National Regulation	High
Deepfake / Info Ops (AI-enabled)	Artificial Intelligence & Autono	C4ISR	Offensive	Growth	Moderate	National Regulation	High

	mous Systems						
Digital Supply Chain Security / Trusted Foundries	Microelectronics & Semiconductors	Logistics & Sustainment	Defensive	Growth	Moderate	National Regulation	Critical
Digital Twins	Advanced Computing & Software	Logistics & Sustainment	Defensive	Growth	Moderate	Industry Standards	High
Directed Energy Weapons (Lasers, HPM)	Directed Energy Systems	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
Drone Swarms / Swarm Tactics	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Growth	Transformational	Multilateral Export Control	Critical

Drones (combat, surveillance, logistics, loitering munitions)	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Mature	Moderate	Multilateral Export Control	Critical
Electromagnetic Weapons / Counter-ISR	Directed Energy Systems	Force Protection /Defense	Defensive	Emerging	Transformational	National Regulation	High
eVTOL	Advanced Materials & Manufacturing	Logistics & Sustainment	Stabilization/ Humanitarian	Growth	Moderate	National Regulation	High
Fuel Cells / Microreactors / Energy Harvesting	Energy & Power Systems	Logistics & Sustainment	Defensive	Emerging	Transformational	National Regulation	High

Generative AI	Artificial Intelligence & Autonomous Systems	C4ISR	Offensive	Growth	Moderate	National Regulation	High
High-Density Energy Storage (next-gen batteries)	Energy & Power Systems	Logistics & Sustainment	Defensive	Growth	Moderate	National Regulation	High
High-Performance Computing	Advanced Computing & Software	C4ISR	Offensive	Mature	Moderate	National Regulation	High
Human Enhancement / Exoskeletons / BCI	Human-Machine Interfaces & Augmentation	Force Protection /Defense	Defensive	Emerging	Transformational	National Regulation	High
Hypersonic Weapons	Hypersonic & High-	Lethality/ Offense	Offensive	Emerging	Transformational	International Treaties	Critical

(HGVs, glide vehicles, scramjets)	Speed Systems						
Internet of Military Things (IoMT) / IoT	Communication & Networking	C4ISR	Defensive	Growth	Moderate	Industry Standards	High
Laser Weapon Systems (HEL)	Directed Energy Systems	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
Lethal Autonomous Weapon Systems (LAWS)	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Emerging	Transformational	International Treaties	Critical
Liquid Organic Hydrogen Carriers / Metal-Air	Energy & Power Systems	Logistics & Sustainment	Stabilization/ Humanitarian	Emerging	Moderate	National Regulation	High

/ Solid-State Batteries							
Medical Diagnostics / Biomedical Devices	Biotechnology & Bioengineering	Logistics & Sustainment	Defensive	Mature	Plug-and-play	Industry Standards	High
Mesh Networks / Software Defined Radio	Communication & Networking	C4ISR	Defensive	Growth	Moderate	Industry Standards	High
Multimodal AI	Artificial Intelligence & Autonomous Systems	C4ISR	Offensive	Growth	Moderate	National Regulation	High
Multi-spectral / Data Fusion ISR	Adavanced Computing & Software	C4ISR	Defensive	Growth	Moderate	National Regulation	High

Next-Gen Comms / PNT Resilience	Communication & Networking	C4ISR	Defensive	Growth	Moderate	National Regulation	Critical
Non-Kinetic Counter-UAS (jamming, HPM)	Directed Energy Systems	Force Protection /Defense	Defensive	Growth	Moderate	National Regulation	High
Photonic Chips	Advanced Computing & Software	C4ISR	Offensive	Emerging	Transformational	National Regulation	High
Post-Quantum Cryptography	Cybersecurity & Cryptography	C4ISR	Defensive	Growth	Moderate	National Regulation	Critical
Predictive Maintenance with AI	Advanced Computing & Software	Logistics & Sustainment	Defensive	Growth	Moderate	Industry Standards	High

Quantum Communication / QKD	Quantum Science & Technology	C4ISR	Defensive	Emerging	Moderate	Multilateral Export Control	Critical
Quantum Computing	Quantum Science & Technology	C4ISR	Offensive	Emerging	Transformational	International Treaties	Critical
Quantum Sensing / Quantum Clocks	Quantum Science & Technology	C4ISR	Defensive	Emerging	Moderate	National Regulation	High
Rapid Prototyping / Microfabrication	Advanced Materials & Manufacturing	Logistics & Sustainment	Deterrent	Growth	Moderate	National Regulation	High
Robotics (industrial & military)	Artificial Intelligence & Autono	Logistics & Sustainment	Deterrent	Growth	Moderate	Industry Standards	High

	mous Systems						
Satellites / SmallSats / LEO/MEO/GEO	Space Systems & Domain Awareness	C4ISR	Deterrent	Growth	Moderate	Multilateral Export Control	Critical
Secured Communications / 5G / Next-Gen Comms	Communication & Networking	C4ISR	Defensive	Growth	Moderate	National Regulation	High
Semiconductors (general)	Microelectronics & Semiconductors	C4ISR	Deterrent	Mature	Transformational	International Treaties	Critical
Sensors (EO/IR, Radar, Lidar, SIGINT)	Adavanced Computing & Software	C4ISR	Defensive	Mature	Moderate	National Regulation	High

Smart Factories / Digital Manufacturing Platforms	Advanced Materials & Manufacturing	Logistics & Sustainment	Stabilization/ Humanitarian	Growth	Moderate	Industry Standards	High
Smart Materials / Bio-inspired Materials	Advanced Materials & Manufacturing	Force Protection /Defense	Stabilization/ Humanitarian	Emerging	Transformational	National Regulation	High
Software-defined Systems / DevSecOps	Advanced Computing & Software	C4ISR	Defensive	Mature	Moderate	Industry Standards	High
Space Domain Awareness / On-Orbit Servicing	Space Systems & Domain Awareness	C4ISR	Defensive	Growth	Moderate	Multilateral Export Control	High
Space Launch Vehicles /	Space Systems &	C4ISR	Deterrent	Growth	Transformational	National	Critical

Reusable Rockets	Domain Awareness					Regulation	
Space-Ground Integrated Information Network (SGIIN)	Space Systems & Domain Awareness	C4ISR	Defensive	Emerging	Transformational	National Regulation	High
Supply Chain Tech / Logistech	Advanced Materials & Manufacturing	Logistics & Sustainment	Defensive	Growth	Moderate	National Regulation	Critical
Surveillance Networks / State Surveillance	Adavanced Computing & Software	C4ISR	Defensive	Mature	Moderate	National Regulation	High
Tracking & Data Relay	Space Systems &	C4ISR	Deterrent	Mature	Moderate	Multilateral	High

Satellites (TDRS)	Domain Awareness					Export Control	
Unmanned Aerial Vehicles (UAV / UCAV)	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Mature	Moderate	Multilateral Export Control	Critical
Unmanned Ground Vehicles (UGV)	Artificial Intelligence & Autonomous Systems	Lethality/ Offense	Offensive	Growth	Moderate	National Regulation	High
Unmanned Underwater Vehicles (UUV)	Artificial Intelligence & Autonomous Systems	C4ISR	Offensive	Growth	Moderate	National Regulation	High
Voice / Natural Language HMI	Human-Machine Interfaces &	C4ISR	Defensive	Growth	Plug-and-play	Industry Standards	High

	Augmentation						
Weaponisation of Space / Space-based Weapons	Space Systems & Domain Awareness	Lethality/ Offense	Offensive	Emerging	Transformational	International Treaties	Critical

References

2025 Advanced Materials Summit. (n.d.). https://advancedmaterialssummit.com/

Annett, & Giordano. (2024). Autonomous Artificial Intelligence in Armed Conflict: Toward a Model of Strategic Integration, Ethical Authority, and Operational Constraint. In *Institute for National Strategic Studies*. https://inss.ndu.edu/Publications/View-Publications/Article/4306224/autonomous-artificial-intelligence-in-armed-conflict-toward-a-model-of-strategi/

Bhute, R. (2025, August 6). Military Communication Market Share & Trends 2025-2032. *Coherent Market Insights*. https://www.coherentmarketinsights.com/industry-reports/military-communication-market

Bommakanti, K. (2024, May 10). Emerging technologies and India's defence preparedness. *Observer Research Foundation*. https://www.orfonline.org/research/emerging-technologies-and-india-s-defence-preparedness

Booz Allen. (2025, July 17). *Top 10 emerging technologies for DOD and national Security.* https://www.boozallen.com/insights/defense/top-10-emerging-technologies-for-dod-and-national-security.html

Gangwar, P. (2025, September 16). Directed Energy Weapons. *Centre for Joint Warfare Studies*. https://cenjows.in/directed-energy-weapons/

Haessler, P., Giones, F., & Brem, A. (2022). The who and how of commercializing emerging technologies: A technology-focused review. *Technovation*, *121*, 102637. https://doi.org/10.1016/j.technovation.2022.102637

International humanitarian law-making and new military technologies. (2022, November 1). *International Review of the Red Cross*. https://international-review.icrc.org/articles/international-humanitarian-law-making-and-new-military-technologies-920?utm_source=chatgpt.com

Joshi, S. (2025). Cryptography and Cybersecurity: A symbiotic relationship. *International Journal for Research in Applied Science and Engineering Technology*, *13*(5), 3058–3062. https://doi.org/10.22214/ijraset.2025.70789

Jovel, J., & Jain, R. (2009). Impact of Identified Causal Factors to "System of Systems" Integration Complexity from a Defense Industry Perspective. *Global Journal of Flexible Systems Management*, *10*(4), 45–54. https://doi.org/10.1007/bf03396571

Krelina, M. & Stockholm International Peace Research Institute. (2025). *MILITARY AND SECURITY DIMENSIONS OF QUANTUM TECHNOLOGIES a primer*. https://www.sipri.org/sites/default/files/2025-07/0725_military_and_security_dimensions_of_quantum_technologies_0.pdf

Manning, C. G. (2023, September 27). Technology readiness levels - NASA. *NASA*. https://www.nasa.gov/directorates/somd/space-communications-navigation-program/technology-readiness-levels/

Mattjackson. (2025, March 10). Advanced computing technologies. *Cambridge Consultants*. https://www.cambridgeconsultants.com/deep-tech/advanced-computing/

Rich, G. (2019, July 16). Master of this technology will dominate battlefield, says Pentagon chief nominee. *Investor's Business Daily*. https://www.investors.com/news/artificial-intelligence-called-top-emerging-defense-technology-secretary-mark-esper/

Rotolo, D., Hicks, D., & Martin, B. R. (2015). What is an emerging technology? *Research Policy*, *44*(10), 1827–1843. https://doi.org/10.1016/j.respol.2015.06.006

Sayler, & Kelley. (2024). Emerging Military Technologies: Background and Issues for Congress. *CRS*. https://www.congress.gov/crs-product/R46458

Seraphin, A., & Miles, W. (2023). Toward a balanced approach: bridging the military, policy, and technical communities. *Ethics & International Affairs*, *37*(3), 272–286. https://doi.org/10.1017/s0892679423000321

Soare, S. (2021). Innovation as adaptation: NATO and Emerging technologies. *German Marshall Fund of the United States*. https://www.gmfus.org/news/innovation-adaptation-nato-and-emerging-technologies

Strategic Report on Research and Development in Biotechnology for Defense Innovation. (2024). *National Academies Press eBooks*. https://doi.org/10.17226/27971

Swartz, D., & Brukardt, R. (2025). Creating a modernized defense technology frontier. *McKinsey & Co.* https://www.mckinsey.com/industries/aerospace-and-defense/our-insights/creating-a-modernized-defense-technology-frontier?utm_source=chatgpt.com

Swayne. (2024). Quantum, AI And Space Anchor Pentagon's Deep Tech Convergence Strategy. *Quantum Insider*. https://thequantuminsider.com/2025/07/03/quantum-ai-and-space-anchor-pentagons-deep-tech-convergence-strategy/

Nouwens, M. & Legarda, H. (2018). Emerging technology dominance: what China's pursuit of advanced dual-use technologies means for the future of Europe's economy and defence innovation. *The International Institute for Strategic Studies.* https://merics.org/sites/default/files/2020-05/181218_Emerging_technology_dominance_MERICS_IISS.pdf

Upadhyay, A. (2024, October 18). Virtual reality, augmented reality, and warfare. *Observer Research Foundation*. https://www.orfonline.org/research/virtual-reality-augmented-reality-and-warfare

Wallner, S., & Wallner, S. (2025, March 11). Discover the top 10 military technology trends and innovations in 2025. *StartUs Insights*. https://www.startus-insights.com/innovators-guide/military-technology-trends/

Walsh, M., Seher, I., Prasad, P.W.C., Elchouemi, A. (2023). The Integration and Complications of Emerging Technologies in Modern Warfare. In: Mukhopadhyay, S.C., Senanayake, S.N.A., Withana, P.C. (eds) Innovative Technologies in Intelligent Systems and Industrial Applications. *CITISIA 2022. Lecture Notes in Electrical Engineering, vol 1029. Springer, Cham.* https://doi.org/10.1007/978-3-031-29078-7_40