PRESIDENTIAL TRANSITION: PRIORITY TOPIC MEMO OCTOBER 2024

MITRE Center for Data-Driven Policy

AUTONOMOUS SYSTEMS AND COUNTER-AUTONOMY POSITIONING THE UNITED STATES FOR ECONOMIC AND SECURITY ADVANTAGE

Autonomous systems (e.g., drones and other uncrewed platforms) are revolutionizing commercial and defense sectors, promising unprecedented advancements and efficiencies at an increasingly rapid pace. However, the potential for exploitation necessitates the administration's proactive focus on enhancing capabilities and safeguarding national interests.

# **The Case for Action**

As autonomous systems continue to become increasingly integral to public and government operations, there is growing urgency to manage risk and ensure public trust. Commercial advancements in sectors like transportation, logistics, and even recreation are outpacing regulations, creating potential safety risks, regulatory gaps, and latent legal and ethical challenges. Additionally, as autonomous system use expands, so does the surface for cyber-physical attack. However, the adoption of autonomous systems also presents opportunities. The use of autonomous technologies in complex operational environments, such as transportation, has the potential to significantly enhance safety. The rapid evolutions and cost-effectiveness of autonomous systems also present an opportunity for the government to augment public services and operations, particularly in areas facing staff and resource shortages (e.g., public safety).

In defense, autonomy is transforming warfare, offering significant advantages over traditional tactics and equipment. The proliferation of autonomous weapon systems, as seen in the recent Russo-Ukrainian and Gaza Strip conflicts, underscores this shift. If the United States does not adapt swiftly, it risks losing strategic advantage to foreign powers. These weapon systems are becoming more accessible and affordable, particularly to foreign and domestic hostile actors who may not abide by the same moral and ethical principles. Developing robust defensive strategies including counter-autonomy (i.e., the neutralization of an autonomous system's decision making and actions) is crucial to maintaining strategic advantage and safeguarding critical infrastructure. The incoming administration must prioritize both U.S. innovation and manufacturing of autonomous systems through programs like the Department of Defense's (DoD's) Replicator<sup>1</sup> initiative in response to new threats and opportunities posed by these technologies.

An "autonomous system" herein refers to a physical platform with the ability to make informed decisions that drive actions to alter the platform's own state or that of the environment, based on externally and internally generated information or perception, at a level comparable to a human operator.

MITRE's mission-driven teams are dedicated to solving problems for a safer world. Through our public-private partnerships and federally funded R&D centers, we work across government and in partnership with industry to tackle challenges to the safety, stability, and well-being of our nation.



SOLVING PROBLEMS

# **Key Challenges and Opportunities**

Opportunities and challenges are continuously emerging as autonomous systems become increasingly integrated into commercial and defense sectors. In the commercial realm, autonomous systems are transforming industries like transportation, logistics, and infrastructure inspection, servicing, and protection, necessitating a comprehensive legal and liability framework and concerted efforts to build public trust. The rapid pace of the development and maturation of these technologies also presents an opportunity for the government to leverage these systems to further enhance public services and operations.

In defense, autonomous systems are reshaping how effects are delivered on the battlefield. The need to align these technologies with U.S. principles and values, even when adversaries do not, is crucial to maintaining our military advantage. The convergence of autonomous systems technologies between commercial and defense sectors has increased access for all. This presents challenges, including resource competition, dependencies on foreign-controlled raw materials or manufacturing, and an asymmetric battlespace where high-cost defenses combat low-cost and potentially swarming autonomous systems.

Meanwhile, the capabilities of adversaries are expanding swiftly with the rapid adoption and advancement of autonomous systems, making counter-autonomy a critical need. An example is protecting the homeland and its vital assets (e.g., critical infrastructure) from autonomous system attack. Furthermore, this evolving landscape creates a perpetual cat-and-mouse game between autonomy and counter-autonomy. Policymakers have an opportunity to advance counter-autonomy technologies to stay ahead of emerging threats and ensure national security by prioritizing ongoing research and development (R&D) initiatives.

# **Data-Driven Recommendations**

## 1. MONITOR ADVANCEMENTS IN AUTONOMOUS SYSTEMS TECHNOLOGIES

Implement a whole-of-government approach to consistently track and evaluate progress in autonomous systems technologies across commercial and defense sectors, identifying potential opportunities and threats to economic and national security. The approach should:

• Establish a dedicated team for continuous monitoring of autonomous systems technologies.

- Develop a system for (at a minimum) annually updated assessments on the projected impacts of these technologies.
- Identify potential opportunities and threats to economic and national security.
- Ensure a focus on both commercial and defense domains.

This action will ensure that the government stays ahead of the curve in understanding and responding to rapid advancements in autonomous systems technologies, thereby enhancing economic and national security.

## 2. LEVERAGE AUTONOMOUS SYSTEMS FOR FORCE-MULTIPLYING ESSENTIAL GOVERNMENT OPERATIONS

Promote government use of autonomous systems in essential government operations, specifically in areas facing staffing and resource shortages such as Air Traffic Control and Border Patrol/United States Coast Guard. Departments and agencies should:

- Identify priority government use cases for autonomous systems including public services and operations.
- Develop an action plan for implementing these systems and supporting sustainment and growth of existing government applications.

This action will enhance the efficiency and coverage of essential government operations, addressing staffing and resource shortages, and ultimately improving public service delivery.

## 3. ACCELERATE THE IMPLEMENTATION AND INTEGRATION OF AUTONOMOUS TRANSPORTATION SYSTEMS

Execute a comprehensive strategy to identify and establish new standards, policies, and laws for the safe and effective integration of autonomous systems into the existing transportation infrastructure, involving collaboration between federal transportation agencies. The strategy should address:

• Regulation and certification of new self-driving or driver-assistive technologies, as well as integration of self-driving cars with existing roadways, infrastructure, and legacy vehicles

- Strategy for blending the seams between autonomous transportation modalities (e.g., integration of ride-share services between surface and air transport)
- Integration of autonomous systems for mass transit and cargo delivery applications within the national airspace, highways, and waterways, particularly within commercial trucking and shipping port operations, leading to significantly improved safety and efficiency
- Addressing the challenges to the workforce when introducing autonomous systems, including the need for re-training, changes to workload, and impact to existing human interface systems (e.g., Certified Professional Controller and National Airspace System)
- Development of a liability framework for autonomous systems involved in accidents or incidents, and addressing data ownership and privacy for onboard sensors (e.g., cameras)

This action will ensure a seamless transition toward autonomous transportation, enhancing public safety, increasing efficiency, and paving the way for technological advancement in the transportation sector.

## 4. UPDATE/DEVELOP A DOD STRATEGY FOR ENHANCING AND COUNTERING AUTONOMOUS SYSTEMS IN COMBAT OPERATIONS

Conduct a comprehensive evaluation of the use of autonomous systems in both offensive and defensive combat operations across all armed services. The strategy should address:

- Development of cohesive guidance for strategy and tactics in autonomous system warfare, including the rules of engagement for lethal autonomous systems (e.g., DoD Directive 3000.09: Autonomy in Weapon Systems)
- Establishment of a streamlined pipeline for R&D, validation, and procurement of emerging autonomy capabilities across the armed services

This action will help mitigate the imminent risk of open conflict and clandestine operations/terrorism posed by autonomous weapon systems, improve the speed of technology transition to the frontlines, and ensure the United States keeps pace with rapid advancements in this field.

## 5. RESEARCH AND DRAFT A LEGAL/LIABILITY FRAMEWORK FOR USING AUTONOMOUS SYSTEMS IN DOMESTIC LAW ENFORCEMENT

Establish guidelines to address legal challenges and liability concerns for use of autonomous systems in law enforcement applications. The plan should address:

- Updating legality and rules of engagement for lethal and less-than-lethal autonomous systems in domestic law enforcement and correctional institutions
- Understanding the effects of autonomous systems on evidence collection, including impacts on chain of custody and auditing
- Reviewing and amending existing laws that may be affected by the use of autonomous systems in law enforcement operations (e.g., Title III and its applicability to autonomous system video collection)
- Considering the government's need for secure, realtime verification of authorized autonomous systems, similar to how state police verify driver status through crosschecks of motor vehicle license and registration databases

This action will ensure that the implementation and use of autonomous systems are in line with the law, reducing potential legal disputes and enhancing the efficiency and effectiveness of law enforcement operations.

## 6. PRIORITIZE GOVERNMENT R&D FOR AUTONOMOUS SYSTEMS AND COUNTER-AUTONOMY

Form an interagency working group comprising government agencies responsible for funding and conducting research in autonomous technologies and capabilities. Charge this group with creating and maintaining a national strategy for autonomy R&D addressing both commercial and defense sectors, the convergence of the two sectors, and counter-autonomy. The national strategy should include:

- Prioritizing current and future national needs/uses for technologies enabling autonomous systems
- Identifying leading industry and academic R&D entities in autonomous systems and facilitating government collaborations with entities such as the Defense Innovation Unit (DIU)<sup>2</sup>

• Assessing current funding levels and identifying/ coordinating potential areas for increased and shared investment in autonomous system R&D

This action will ensure the United States maintains its technical leadership and strategic advantage in the development and use of autonomous systems, which is crucial for economic and national security.

# **Implementation Considerations**

## FIRST 100 DAYS:

Establish a National Science and Technology Council subcommittee in cooperation with the Intelligent Robotics and Autonomous Systems Inter-Agency Working Group (IRAS IWG) to develop and maintain a national strategy to **prioritize government R&D for autonomy and counter-autonomy.** 

Task the Office of Management and Budget to issue a memorandum that directs agencies that could benefit from autonomous systems to identify high-priority use cases and develop corresponding action plans to **leverage autonomous systems for force-multiplying essential government operations.** 

#### **FIRST 6 MONTHS:**

Assign tasks within the Office of the Under Secretary of Defense and its Research and Engineering and Acquisition and Sustainment offices to **update/develop a DoD strategy for enhancing and countering autonomous systems in combat operations.** 

#### **FIRST YEAR:**

Prioritize and resource the work currently underway at the Department of Transportation's Office of the Assistant Secretary for Research and Technology to **accelerate the implementation and integration of autonomous transportation systems.** 

Commission a joint investigation between the National Institute of Justice and the Department of Justice's Office of Legal Policy to research and draft a legal/liability framework for using autonomous systems in domestic law enforcement.

#### **ONGOING:**

Task the Department of Commerce to collaborate with the IRAS IWG and create a purpose-built public-private partnership to implement a whole-of-nation approach to continuously **monitor advancements in autonomous systems technologies.** The partnership should enlist participation from key government agencies (both civilian and defense), industry leaders, and academia. This can be modeled after the Special Competitive Studies Project's hybrid model for horizon technology scanning<sup>3</sup> and the Quantum Economic Development Consortium.<sup>4</sup>

# **MITRE Resources and Support**

MITRE brings over 50 years of multidisciplinary experience in autonomy, counter-autonomy, and robotic systems, enabling advanced technologies in both public and defense sectors. Highlights include:

D. Blackburn, et al. A National Science and Technology Council for the 21st Century. August 2021. MITRE. https://www.mitre.org/sites/default/files/2021-09/pr-21-2388national-science-technology-council.pdf.

D. Blackburn, et al. Collaborative Horizon Scanning. February 2023. MITRE. <u>https://www.mitre.org/sites/default/</u> <u>files/2023-02/PR-22-01891-15-COLLABORATIVE-HORIZON-</u> <u>SCANNING.pdf</u>.

Z. LaCelle. Transportation Safety of Highly Automated Vehicles: From Design to Deployment. 2021. MITRE. <u>https://www.mitre.org/sites/default/files/2021-12/pr-21-1726-</u> <u>transportation-safety-of-highly-automated-vehicles-fromdesign-to-deployment.pdf</u>.

CARPE Dronvm: Revolutionizing Drone Defense with Smartphone Technology. 2023. SOFREP. <u>https://sofrep.</u> <u>com/news/carpe-dronvm-revolutionizing-drone-defense-with-</u> <u>smartphone-technology/</u>.

B. Hague. From Playgrounds to Battlefields, MITRE Helps Sponsors Shape Our Uncrewed Flying Future. 2023. MITRE. <u>https://www.mitre.org/news-insights/impact-story/playgrounds-</u> <u>battlefields-mitre-helps-sponsors-shape-our-uncrewed-flying</u>.

# About the Center for Data-Driven Policy

The Center for Data-Driven Policy, bolstered by the extensive expertise of MITRE's approximately 10,000 employees, provides impartial, evidence-based, and nonpartisan insights to inform government policy decisions. MITRE, which operates several federally funded research and development centers, is prohibited from lobbying. Furthermore, we do not develop products, have no owners or shareholders, and do not compete with industry. This unique position, combined with MITRE's unwavering commitment to scientific integrity and to work in the public interest, empowers the Center to conduct thorough policy analyses free from political or commercial pressures that could influence our decision-making process, technical findings, or policy recommendations. This ensures our approach and recommendations remain genuinely objective and data-driven.

Connect with us at policy@mitre.org.

# **Endnotes**

- <sup>1</sup> See <u>https://www.diu.mil/replicator</u>.
- <sup>2</sup> The mission of DIU is to accelerate the adoption of commercial technology within the Department of Defense, including autonomous systems. See <u>https://www.diu.mil</u>.
- <sup>3</sup> Platforms Interim Panel Report. SCSP. November 2022, p. 55. <u>https://www.scsp.ai/wp-content/uploads/2023/01/</u> <u>Platforms-Panel-IPR.pdf</u>.
- <sup>4</sup> See <u>https://quantumconsortium.org</u>.

