NATIONAL SECURITY COMMISSION ON ARTIFICIAL INTELLIGENCE

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**U.S. House Appropriations Subcommittee on the Department of Defense**

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Chairwoman McCollum, Ranking Member Calvert, and esteemed Members of the Committee, thank you for the opportunity to speak with you today.

I am here today to discuss a topic that is tremendously important for our national security -- artificial intelligence. As a former Commissioner of the National Security Commission on Artificial Intelligence (NSCAI), I led the line of effort charged with examining the implications of AI and associated technologies for the U.S. national security and defense workforce, and to make recommendations for government action and reform.

Before I begin, I wish to note that I am here speaking in my personal capacity, as the Commission sunset on October 1, 2021, per our congressional mandate.

I am truly grateful for the opportunity to have served on the NSCAI. The Commission was composed of a diverse group of technologists, business executives, academic leaders, and national security professionals, all nominated by Congress or the Executive Branch. Over the past two years, we operated in a transparent manner and emphasized the need for action. We executed our congressional mandate by hearing from and engaging a wide range of stakeholders, and delivering several sets of recommendations. This work culminated in our final report delivered to the Congress and President in March. We commend Congress for adopting a number of our recommendations in last year's defense authorization legislation, and look forward to seeing further authorization and appropriation in this year's NDAA.

The United States still leads the world in AI, but our lead is rapidly shrinking and China is catching up.

China moved aggressively forward in 2016 -- when they saw the AI program known as AlphaGo defeat the best Go player in the world. More than 250 million Chinese citizens watched this game live. This astounding moment set policymakers in China to swiftly organize for an AI and global technology competition. Since then, they have created strategies and focused enormous resources towards dominating technologies that we consider fundamental for us to maintain global advantage.

As I stated before, the Commission delivered our final report to Congress and the President earlier this year in March. Taken as a whole, our report gives Congress a clear blueprint for how

to stay ahead. We need your help to enact all the recommendations to ensure that we remain competitive in these critical technologies.

Before I speak to the Commission's recommendations focused on talent and workforce, I would like to provide you with a high-level overview of our main conclusions and recommendations.

The NSCAI Final Report presents an integrated national strategy to reorganize the government, reorient the nation, and rally our closest allies and partners to defend and compete in the coming era of AI-accelerated competition and conflict. It is divided into two parts.

- Part I, "Defending America in the AI Era," outlines the stakes, explains what the United States must do to defend against the spectrum of AI-related threats, and recommends how the U.S. government can responsibly use AI technologies to protect the American people and our interests.

- Part II, "Winning the Technology Competition," addresses the critical elements of the AI competition and recommends actions the government must take to promote AI innovation to improve national competitiveness and protect critical U.S. advantages.

The recommendations are designed as interlocking and mutually reinforcing actions that work best when taken together. The 16 chapters in the Main Report provide top-line recommendations. The accompanying Blueprints for Action outline concrete steps that Congress and the Executive Branch can take to implement the recommendations. The Commission has provided as much specificity as possible—including by drafting proposed legislative text and executive orders—to help the President and Congress move rapidly.

Overall, we reached a few **overarching judgments:**

- First, the government is not organized or resourced to win the technology competition against a committed competitor nor is it prepared to defend against AI-enabled threats.

- Second, the nation must be AI-Ready by 2025 to defend and compete in the coming era of AI-accelerated competition and conflict.

Further, there are **four priority areas for government action:**

- **First, leadership.** We need organizational structures that accelerate the government's integration of AI and the government's promotion of AI across the country. This should include a Technology Competitiveness Council at the White House.

- **Second, talent.** We have a huge talent deficit in government. We need to build new digital talent pipelines and expand existing programs. More broadly, we need to cultivate AI talent nationwide, and ensure that the world's best technologists come and stay in the United States. I'll expand on this priority area shortly.

- **Third, hardware.** We are too dependent on semiconductor manufacturing in East Asia and Taiwan in particular. Most cutting-edge chips are produced at a single plant separated by just 110 miles of water from our principal strategic competitor. We must revitalize U.S. cutting-edge semiconductor fabrication capabilities, and implement a national microelectronics strategy. The goal should be to stay two generations ahead of China in state-of-the-art microelectronics.

- **Fourth, innovation.** AI research will be very expensive. We need the government to help set the conditions for broad-based innovation across the country. That should include a national AI research infrastructure. And we should reach $40 billion in annual funding in the next five years to cover AI R&D for defense and non-defense research.

Finally, **two themes** cut across these pillars:

- The first is **partnerships**. We need to build coalitions with like-minded nations to advance the development and use of AI and other emerging technologies in ways that support democratic values.

- The second is **responsible use**. In the face of digital authoritarianism, the U.S. needs to present a democratic model of responsible development and use of AI for national security. Public trust will hinge on justified assurance that the government's use of AI will respect privacy, civil liberties, and civil rights. We have a set of recommendations to help ensure this.

This brief overview brings us to the primary purpose of why this Committee has called for this hearing today.

**Talent is the centerpiece of any winning AI strategy.** The Commission has examined the government's current shortcomings and concluded that existing programs will not bring enough

digital talent into public service to meet serious shortages. Scholarship and service programs are limited in scale and will not create a common set of ideas, shared experiences, professional culture, or a common mission to improve the government's digital talent. We must fundamentally re-imagine the way the U.S. Government recruits and builds its digital workforce. Incremental change will not be enough.

Each time my fellow commissioners discussed the workforce, we arrived at the same conclusions:

- The military needs to have expertise, both in and out of uniform, or it will be unable to build the systems or perform the tasks described in our report.

- And, the DoD is unlikely to develop that expertise quickly enough, on its own.

- As a result, if the Department of Defense is going to become AI-ready, especially by 2025 as we have recommended, congressional action will be needed.

More specifically, there are **four high priority workforce recommendations in the report.**

**First and most critical for the AI workforce, is the need for military and civilian career fields** in software development, data science, and artificial intelligence. The inability of our military digital subject matter experts to spend their careers working in digital fields, is arguably the single most important issue impeding modernization. Without this career path, DoD will continue to struggle to recruit new talent, identify talent, and retain the talent it already has. I should note that many of the military and civilian experts we spoke with when the Commission started, have since left government service, because they were unable to continue working on AI. We must stop bleeding talent. This is a well-known problem, and the creation of career fields is a relatively straightforward solution.

**Our second priority is training junior leaders.** We must fundamentally change how junior leaders use and interact with AI, and other information processing agents. Junior leaders must not only understand how to team with machines, but learn when to trust machine outputs. We recommend the military services integrate AI topics into pre-commissioning and entry-level training for junior officers and training for both junior and senior non-commissioned officers.

**Our third priority is to incentivize emerging technology literacy among senior officers.** We often speak of the need for a culture change in DoD. The most effective way to change culture is to change incentives. Using the Goldwater-Nichols Act's incentivization of joint competency as a

model, Congress should require DoD to create an emerging technology certification process and critical billets. Service members would earn their certification by serving in non-critical emerging technology billets, fellowships with industry and academia, graduating certified courses, and earning commercial certifications.

Finally, in addition to the reforms above, **we have made two significant workforce proposals:**

1. **Build the U.S. Digital Service Academy:** The U.S. Government should create a United States Digital Service Academy (USDSA), an accredited, degree-granting university, that produces technically educated graduates with a service obligation as civil servants. The USDSA would be an independent entity within the federal government, advised by an interagency board that would be assisted by a federal advisory committee composed of commercial and academic leaders in emerging technology. The academy would be a partnership between the public and private sectors, both working together towards a common goal of developing a modern, digitally proficient workforce. The Academy would help meet the government's needs for expertise in artificial intelligence, software engineering, electrical engineering, computational biology, and several other areas. Students would attend the school tuition free, and receive a highly technical education. Graduates would then enter the government as civil servants, with a five year service obligation.

2. **Establish a National Reserve Digital Corps.** Many of the most talented technologists in the United States are eager to serve their country but are unlikely to become full time government employees or military reservists. The government needs a mechanism to tap this talent reservoir. The government should establish a National Reserve Digital Corps modeled after the military reserves that allows civilians to work for the government 38 days a year as advisors, instructors, and developers. We could incentivize participation with a training and education fund and a scholarship program modeled after Reserve Officer Training Corps or ROTC. While short-term volunteers are not a substitute for full-time employees, they can help improve AI education for both technologists and non-technical leaders, perform data triage and acquisition, help guide projects and frame technical solutions, build bridges between the public and private sector, and other important tasks.

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Let me close by saying that just as AI is poised to impact all sectors of society, it is also poised to impact all dimensions of national security.

While the Commission has formally sunset, former NSCAI staff and Commissioners standby ready to assist and work with you on further details of each recommendation. For your convenience and consideration, we have produced draft legislative language for each of these recommendations in the final report to review. I urge you and your colleagues in Congress to review the full range of national security problems addressed in the Report, and adopt our recommendations to address them.

Thank you again for the opportunity to appear before you.

# Appendix E: Funding Recommendation Table

## Funding Recommendation Table

| Chapter | Recommendation | | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|---|
| Chapter 1 – Emerging Threats in the AI Era | 1 | Create a Foreign Malign Influence Response Joint Interagency Task Force (JIATF). | Office of the Director of National Intelligence | $30 million | - |
| | 2 | Increase DARPA funding for media media authentication, disinformation detection, attribution, and disruption. | Department of Defense: USD(R&E) - DARPA | $60 million to $80 million | - |
| | 3 | Fund a machine speed AI-enabled cyber defense acceleration study. | Department of Homeland Security | $10 million | - |
| | 4 | Increase DARPA funding for AI-enabled cyber defense research. | Department of Defense: USD(R&E) - DARPA” | $20 million | - |
| | 5 | Increase National Institute of Standards and Technology AI testbed funding. | National Institute of Standards and Technology | $25 million | - |
| | 6 | Provide funding for a SolarWinds threat review. | Cyberspace Solarium Commission | $6.5 million | - |

| Chapter | Recommendation | | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|---|
| **Chapter 2 – Foundations of Future Defense** | 1 | Establish a dedicated AI Fund. | Department of Defense: USD(R&E) | $200 million | - |
| | 2 | Increase investments in AI R&D. | Department of Defense | $8 billion | - |
| | 3 | Establish a fund to to accelerate procurement and integration of commercial AI solutions for business applications. | Department of Defense: Joint Artificial Intelligence Center | $100 million | - |
| | 4 | Provide funding to build enterprise data sets. | Department of Defense: Office of the Chief Data Officer | $125 million | - |
| | 5 | Provide funding for technology scouting tools, data, and a technology fellows program. | Department of Defense, USD(R&E) | $10 million | - |
| **Chapter 3 – AI and Warfare** | 1 | Develop innovative operational concepts that integrate new warfighting capabilities with emerging technologies. | Department of Defense: USD(R&E) | $5 million | - |
| | 2 | Incentivize experimentation with AI-enabled applications through the Warfighting Lab Incentive Fund (WLIF). | Department of Defense: USD(R&E) | $10 million | - |
| | 3 | Encourage a culture of “Thinking Red.” | Department of Defense: Joint Warfighting Analysis Center | $2.5 million | - |

| Chapter | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|
| **Chapter 3 – AI and Warfare** | 4 | Direct the military services, in coordination with the Under Secretary of Defense (for Acquisition and Sustainment), the Joint Staff, and the Defense Logistics Agency, and enabled by enterprise services and expertise at the JAIC, to prioritize integration of AI into logistics and sustainment systems wherever possible. | Department of Defense: Office of the Deputy Secretary of Defense | $100 million | - |
| | 5 | Define a joint warfighting network architecture by the end of 2021. | "Department of Defense: Office of the Chief Information Officer" | $5 million | - |
| **Chapter 5 – AI and the Future of National Intelligence** | 1 | Work with the intelligence community to establish a 10-year, $1 billion, Program of Record to provide long-term, predictable funding for technologies identified in the technology annex to the National Intelligence Strategy. | Office of the Director of National Intelligence | $1 billion annually for FYs 2022-2032 | - |
| **Chapter 6 – Technical Talent in Government** | 1 | Congress should create a National Reserve Digital Corps. | Office of Management and Budget | $16 million | - |
| | 2 | Congress should establish a STEM Corps. | Department of Defense | $5 million for FY 2022 & $5 million for FY 2023 | - |
| | 3 | Congress should create a United States Digital Service Academy. | New Entity | $40 million initial appropriation | - |

| Chapter | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|
| **Chapter 7 – Establishing Justified Confidence in AI Systems** | 1 | Appoint responsible AI leads and supporting staff in each agency critical to national security. | Department of Defense; Office of the Director of National Intelligence; Department of Homeland Security; Federal Bureau of Investigation; Department of State; Department of Energy; & Department of Health and Human Services | $21.5 million | This funding supports one responsible AI lead and two supporting staff. Additionally, the funding includes responsible AI leads for each of the armed services in the Department of Defense and each of the agencies of the Intelligence Community. |
| **Chapter 8 – Upholding Democratic Values** | 1 | Congress should establish third-party testing center(s) to allow independent, third-party testing of national security-related AI systems that could impact U.S. persons. | National Institute of Standards and Technology | $1.2 million | - |
| **Chapter 9 – A Strategy for Competition and Cooperation** | 1 | Create a Technology Competitiveness Council. | The White House: Executive Office of the President | $2 million | - |
| **Chapter 10 – The Talent Competition** | 1 | Congress should pass a new National Defense Education Act. | Department of Education; National Science Foundation | One time apprporiation of $8.2 billion | - |
| **Chapter 11 – Accelerating AI Innovation** | 1 | Establish a National Techology Foundation. | New Entity | $30 million initial appropriation for start-up expenses; $1 billion for FY 2022; $5 billion for FY 2023; $10 billion for FY 2024; $15 billion for FY 2025; & $20 billion for FY 2026 | - |

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| Chapter 11 – Accelerating AI Innovation | 1 | Increase federal funding of Non-Defense AI R&D at compounding levels. | Multiple agencies, including: the NSCAI proposed National Technology Foundation; National Science Foundation; Department of Energy; National Institute of Standards and Technology; National Institutes of Health; & National Aeronautical and Space Administration | $2 billion for FY 2022; $4 billion for FY 2023; $8 billion for FY 2024; $16 billion for FY 2025; & $32 billion for FY 2026 | - |
| | 2 | Expand the Network of AI Research Institutes. | National Science Foundation | $200 million for FY 2022; $200 million for FY 2023; & $200 million for FY 2024 | - |
| | 3 | Establish an AI Innovator Award. | National Science Foundation | $125 million | - |
| | 4 | Establish a team-based AI Award. | National Science Foundation | $50 million for FY 2022; $100 million for FY 2023; $150 million for FY 2024; $200 million for FY 2025; & $250 million annually for FYs 2026-2028 | - |
| | 5 | Implement the NAIRR Roadmap. | National Science Foundation | $30 million | - |
| | 6 | Fund an AI Data Program. | Department of Energy | $25 million | - |
| | 7 | Sponsor an Open Knowledge Network. | National Science Foundation | $25 million | - |
| | 8 | Form a network of Regional Innovation Clusters. | National Institute of Standards and Technology | $200 million for FYs 2022-2026 | Funding recommended at $20 million per Regional Innovation Cluster |

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| Chapter 13 – Microelectronics | 1 | Increase federal grants for microelectronics manufacturing. | Department of Commerce | $15 billion total | $3 billion per project on average |
| | 2 | Increase funding for DARPA's Electronics Resurgence Initiative (ERI). | Department of Defense: USD(R&E) - DARPA | $400 million for FY 2022 & $5 billion total for FYs 2022-2026 | These funding levels should ramp up on an annual basis as absorptive capacity increases |
| | 3 | Increase funding for National Science Foundation semiconductor research. | National Science Foundation | $300 million for FY 2022 & $2.5 billion total for FYs 2022-2026 | These funding levels should ramp up on an annual basis as absorptive capacity increases |
| | 4 | Increase funding for Department of Energy semiconductor research. | Department of Energy | $400 million for FY 2022 & $4.5 billion total for FYs 2022-2026 | These funding levels should ramp up on an annual basis as absorptive capacity increases |
| | 5 | Establish the Advanced Packaging National Manufacturing Program. | National Institute of Standards and Technology | $1 billion for FY 2022 & $5 billlion total for FYs 2022-2026 | - |
| | 6 | Establish the National Semiconductor Technology Center. | Department of Commerce in collaboration with the Department of Defense and Department of Energy | $100 million FY 2022 & $2 billlion total for FYs 2022-2026 | - |

| Chapter | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
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| **Chapter 15 – A Favorable International AI Order** | 1 Provide funding for U.S. International Development Finance Corporation to execute development financing for technology infrastructure projects. | U.S. International Development Finance Corporation | $1 billion | - |
| | 2 Provide funding to support U.S. International Development Finance Corporation development financing initiatives. | Department of State; U.S. Agency for International Development | $200 million | - |
| | 3 Provide funding for U.S. Agency for International Development Digital Strategy. | U.S. Agency for International Development: Bureau of Democracy, Development, and Innovation | $200 million | - |
| | 4 Provide funding for an Interagency AI Standards team to support National Institute of Standards and Technology AI Standards Coordinator and fund travel and other administrative needs. | National Institute of Standards and Technology; Department of Defense; Department of State; Office of the Director of National Intelligence; Department of Energy; Department of Homeland Security; U.S. Agency for International Development | $3.3 million | Funding includes five full-time employee (FTE) from National Institute of Standards and Technology and one FTE from each of the following departments and agencies: Department of Defense, Department of State, Office of the Director of National Intelligence, Department of Energy, Department of Homeland Security, and U.S. Agency for International Development. |
| | 5 Provide funding to support grants for small- and medium-sized businesses to participate in international data and technical standards efforts. | Small Business Administration | $1 million | - |

| Chapter | Recommendation | | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|---|
| Chapter 15 – A Favorable International AI Order | 6 | Funding for administrative costs associated with establishing an U.S. Center of Expertise relationship with GPAI/OECD. | National Science Foundation | $1 million | - |
| | 7 | Funding for the Multilateral AI Research Initiative (MAIRI), including establishing and maintaining physical center; supporting research initiatives; created a trusted learning cloud resource; and supporting U.S. researchers' travel and involvement in workshops, conferences, and events. | National Science Foundation; Department of State; Department of Energy | $12.15 million annually for FYs 2022-2027 | $10 million to National Science Foundation/ Department of State/ Department of Energy for research and personnel; $2M to National Science Foundation for infrastructure; $150,000 to National Science Foundation for administrative costs. |
| | 8 | Provide funding for trusted learning cloud to facilitate collaborative R&D with allies and partners (envisioned as a component of MAIRI). | National Science Foundation; Department of State | $11.3 million | Funding includes underlying infrastructure, data storage and sharing capacity, grants for researchers, foreign assistance grants. |
| | 9 | Provide funding to support grants for scholars and researchers to participate in international data and technical standards efforts. | Department of State | $5 million | - |

| Chapter | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
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| **Chapter 15 – A Favorable International AI Order** | 10 | Provide funding for immediate augmentation and training of U.S. diplomatic corps for efforts related to AI and emerging technology (funding does not include future funding needs which we recommend be determined by a focused planning effort to be undertaken by Department of State). | Department of State | $8 million | $550,000 - STAS; $550,000 - Office of Communication and Information Policy; $400,000 - Office of Science and Technology Cooperation; $3.8 million - Regional Technology Officers (12 locations); $1.25 million - Office of the Special Representative to Silicon Valley; $450,000 - FSI training. |
| | 11 | Provide funding for the Bureau of Cyberspace Security and Emerging Technologies. | Department of State | $20 million | - |
| | 12 | Provide funding for public diplomacy and engagement activities on AI innovation and democratic values. | Department of State | $5.5 million | - |
| | 13 | Provide funding for AI exchange programs to support U.S. values and fund participation by developing countries in multilateral AI activities. | Department of State | $8.5 million | - |
| | 14 | Provide funding for efforts to promote U.S. innovation and values and support American Spaces, Tech Camps, Maker Spaces, Speakers Program, and other initiatives. | Department of State | $3 million | - |

| Chapter | | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
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| Chapter 15 – A Favorable International AI Order | 15 | Provide funding for tracking and analysis of public opinion to measure impact of engagement efforts and guide strategic planning. | Department of State | $1 million | - |
| | 16 | Provide funding for U.S. Science Envoys and Embassy Science Fellows programs. | Department of State | $1 million | - |
| | 17 | Provide funding to support U.S. leadership in AI through Emerging Technology Coalition and internal programs. | Department of State: Office of the Under Secretary for Economic Growth, Energy, and the Environment (E) | $5.5 million | Funding includes ETC support, creation of an advisory committee on emerging technology, private sector engagement, multilateral R&D efforts, tech-oriented diplomatic efforts, innovation enhancements. |
| | 18 | "Funding to support promotion of human rights and fundamental freedoms in AI context through civil society initiatives, promoting AI and emerging tech to counter censorship, and supporting research and awareness campaigns" | Department of State: Office of the Under Secretary for Civilian Security, Democracy, and Human Rights (J): Bureau of Democracy, Human Rights, and Labor (DRL) | $1.5 million | - |
| | 19 | Provide funding to support use of AI for national security/ military applications through cooperation with allies and partners, to include joint exercises, grants, fellowships, and other activities. | "Department of State: Office of the Under Secretary of State for Arms Control and International Security (T)" | $3 million | - |

| Chapter | Recommendation | Cabinet Departments, Major Agencies, and Program Offices | Amount | Appropriations Detail |
|---|---|---|---|---|
| Chapter 15 – A Favorable International AI Order | 20 | Provide funds to support building technical capacity in emerging democracies and market economies to counter malign influence. | Department of State | $3 million | - |
| | 21 | Provide funds to support research grants on malign influence in AI ecosystems. | Department of State | $2 million | - |
| | 22 | Provide funds to support public diplomacy intiatives on international AI standards and tracking and reporting of impact on public engagement. | Department of State | $2 million | - |
| | 23 | Provide funds to support US Global Innovation through Science and Technology (GIST) Initiative. | Department of State | $1 million | - |
| | 24 | Provide additional funding to support foreign assistance activities around emerging tech and digital infrastructure, to include planning, assessments, and provision of assistance. Funds would support targeted, digital programs in several areas, including rule of law (INL), democracy and human rights (DRL), security cooperation (AVC/PM/ISN), and technical assistance (EB, STAS, others). | Department of State | $230 million | - |

*Unless otherwise noted funding is annual beginning in Fiscal Year 2022.
**All funding figures should be considered initial estimates for consideration by Congress and the Executive Branch.