SUMMARY OF THE NATIONAL SECURITY COMMISSION ON ARTIFICIAL INTELLIGENCE'S (NSCAI) FIRST QUARTER RECOMMENDATIONS

TAB 1 — Increase Artificial Intelligence (AI) Research & Development (R&D)

Summary: Research is the lynchpin of America's global leadership in AI. However, as the Commission assessed in our Interim Report, the United States Government's support for AI R&D has not kept pace with the field's revolutionary potential. As competitors accelerate their own investments and as the field grows in size and importance, the United States needs an injection of new resources to stay at the leading edge.

Objective: Lay the groundwork for our future national security and economic competitiveness by bolstering non-defense AI R&D funding, investing in priority research areas, and advancing a nation-wide AI R&D infrastructure to democratize access to AI R&D.

Issue 1: AI R&D Funding Levels

Recommendation 1: Double non-Defense AI R&D Funding for Fiscal Year (FY) 2021. Congress should roughly double the funding level of non-defense AI R&D for FY 2021 to begin to immediately address the funding deficit in the field and build the capacity for compounding higher levels of funding and investment in future years. Investments should be made in the National Science Foundation (NSF), Department of Energy (DOE), National Institute of Standards and Technology (NIST), National Institutes of Health (NIH), and National Aeronautics and Space Administration (NASA); as well as to expand a range of existing fellowship vehicles to support students and faculty pursuing AI-related degrees and research.

Recommendation 2: Prioritize Funding for Specific Areas of AI. Apply additional AI research funding to advance six key areas critical to lay a foundation for the nation's future security: 1) Novel machine learning directions; 2) Testing, Evaluation, Verification, and Validation of AI systems; 3) Robust machine learning; 4) Complex multi-agent scenarios; 5) AI for modeling, simulation, and design; and 6) Advanced scene understanding.

Issue 2: AI R&D Infrastructure

Recommendation 3: Launch a Task Force Study and Pilot Program to Establish a National AI Research Resource. Congress should authorize a task force to produce a roadmap laying out ownership, governance, capabilities, and sustainment of a National AI Research Resource that

would provide researchers and students with access to compute resources, co-located with AI-ready government data sets, educational tools, and user support; and appropriate funding a five-year pilot program to develop, implement, and sustain the infrastructure.

TAB 2 — Accelerating AI Application in the Department of Defense (DoD)

Summary: There is a long tradition of senior leaders across the DoD and Intelligence Community (IC) coming together to face global challenges. A high-level steering committee is necessary to drive change, focus, and action on AI and related technologies that would otherwise not be prioritized, while the Joint Artificial Intelligence Center (JAIC) should be empowered as a change agent.

Objective: These recommendations are critical first steps to accelerate AI application in DoD. They focus on creating top-down leadership mechanisms that directly address three of the consensus judgements in the Commission's *Interim Report*: 1) that AI can help the United States execute core national security missions; 2) that successful AI application is threatened by bureaucratic impediments and inertia; and 3) that top-down leadership is needed to overcome organizational barriers and create strategic change.

Issue 1: Senior Leadership Review and Prioritization of Emerging Technology

Recommendation 1: DoD and the Office of the Director of National Intelligence (ODNI) should establish a Steering Committee on Emerging Technology tri-chaired by the Deputy Secretary of Defense, the Vice Chairman of the Joint Chiefs of Staff, and the Principal Deputy Director of ODNI. Establishing such a tri-chaired committee will integrate DoD and IC AI efforts and provide the top-down focus needed for DoD to overcome the bureaucratic challenges impeding AI application. Specifically, it will help enhance intelligence analysis related to emerging technology, connect strategic vision to organizational change; focus concept and capability development on emerging threats; guide defense investments that ensure America's strategic advantage against near-peer competitors; and provide the authority to drive technology adoption and application by the Department.

Issue 2: DoD AI Reporting Issues

Recommendation 2: The Director of the JAIC should report directly to the Secretary of Defense, who may delegate this authority to the Deputy Secretary of Defense. This change ensures senior leadership oversight of DoD AI efforts and alignment with Department priorities by elevating JAIC's reporting authority, which currently runs through the Chief Information Officer (CIO), to the Secretary of Defense or his Deputy. This recommendation seeks to give the Secretary of Defense, or Deputy by delegation, the ability to exercise authority and direction over the JAIC.

Issue 3: Requirements for the Director of the JAIC

Recommendation 3: Maintain the Director of the JAIC as a three-star general or flag officer with proven operational experience. Three-star leadership allows the JAIC to engage with the services at a senior rank and within their command structure. Operational experience enables the Director to understand how AI can serve operational requirements and better communicate with the services as to how AI meets capability needs.

TAB 3 — Strengthen the AI Workforce

Summary: Our defense and intelligence agencies need a workforce with expanded AI skills and expertise, including software engineers, data engineers and scientists, mathematicians, and machine learning experts. Their knowledge is required to buy, build, and use AI tools effectively. However, as the Commission assessed in our *Interim Report*, the United States Government has been slow to recognize the importance of these technical skills, and is struggling to attract, develop, organize, and retain an AI-ready workforce. These deficits make it difficult to implement AI solutions.

Objective: The government does not have enough in-house expertise to quickly build an AI workforce. Doing so will also require the government to aggressively recruit talent from universities and the private sector to become U.S. officials (or, when appropriate, contractors). Unfortunately, today's bureaucratic barriers make the United States Government hiring and security clearance processes both difficult and time consuming, putting the government at a tremendous disadvantage. For the government to compete in the AI job market, it needs to improve its hiring process for AI practitioners at all levels and across a wide array of agencies.

Issue 1: The Excepted Service

Recommendation 1: Expand the Cyber Excepted Service (CES). The United States Government should expand the CES to explicitly include AI positions, which should include positions that accomplish tasks described by Section 1051(f) of the John S. McCain National Defense Authorization Act of FY 2019 (Pub. L. 115-232), which provides a working definition of AI for defense and national security purposes.

Issue #2: The Role of Human Resource Teams

Recommendation 2: Increase Human Resource Team AI Literacy. The Departments of Defense, Homeland Security, Federal Bureau of Investigation (FBI), and the (IC) should establish a training and certification program for Human Resource (HR) professionals that ensures: 1) familiarity with their organization's goals regarding AI; 2) hiring practices outside of the competitive service; and 3) software development, AI, and AI workforce literacy for HR

teams, hiring managers, and recruiters.

Recommendation 3: Rebalance the Hiring Triangle. The Secretary of Defense should issue a memorandum of intent that rebalances the hiring triangle. The Armed Services committees should require the DoD to provide referral bonuses to software development, data science, and AI experts.

Recommendation 4: Grant Exemption from Office of Personnel Management (OPM) General Schedule Qualification Policies for Specific Billets and Position Descriptions. Two-star and above commands and their civilian equivalents should be authorized to declare individual billets and position descriptions exempt from OPM qualification standards without approval from OPM or any more senior authority within the DoD.

Issue 3: The Effect of the Security Clearance Process on Hiring

Recommendation 5: Accelerate Security Clearance Investigation and Adjudication. The United States Government should allow leaders of two-star and above commands and their civilian equivalents to prioritize personnel hired under the CES and for AI, data science, and software development positions during the security clearance process, and set a standard that they have an interim secret clearance within 20 days and an interim top secret clearance within 30 days.

Recommendation 6: Create Unclassified Workspaces. National security departments and agencies need to establish facilities where employees waiting on security clearances can perform unclassified work until they receive a clearance.

Issue 4: The Use of Resumes During the Hiring Process for AI Practitioners

Recommendation 7: Use ePortfolio Reviews. The Departments of Defense, Homeland Security, and the IC should develop and implement an ePortfolio review process for software development, data science, and AI positions and invite applicants to submit ePortfolios.

Issue 5: Developing End Users' Baseline Understanding of Artificial Intelligence

Recommendation 8: Mandatory AI Training. The Departments of Defense and Homeland Security should require mandatory training designed to improve baseline AI literacy, either online or in person. The training should focus on end users and their ability to collect and manage data, and include a short introduction to AI with an emphasis on machine learning, data management, the capabilities and limitations of AI, software decision-making, probabilistic reasoning, and an introduction to the responsible and ethical development and fielding of AI.

Recommendation 9: Certified Self-Development. The Departments of State, Defense, Commerce, Homeland Security, the FBI, Bureau of Industry and Security, and the IC should develop a list of approved online courses related to AI. Lists should include at least one course addressing the ethical and responsible use of AI.

Issue 6: Identifying Existing and Potential Talent Within the Government

Recommendation 10: Measure and Incentivizing Programming Proficiency. The Departments of Defense, Homeland Security, the FBI, and the IC should create tests comparable to the Defense Language Proficiency Test (DLPT) that include coding languages and a second test for AI competency, and expand their use to non-DoD organizations.

Recommendation 11: Adjust the ASVAB to Identify Computational Thinking. The Under Secretary of Defense for Personnel and Readiness should oversee adjustments to the ASVAB to include measurements of computational thinking.

Issue 7: Building Recruitment Pipelines

Recommendation 12: Create Opportunities for Students to be Exposed to Government Work by Hiring University Professors as Part-Time Government Researchers. Authorizing committees should mandate that the Departments of Energy, Defense, Commerce, Homeland Security, and the IC begin programs to hire university faculty with relevant science, technology, engineering, and mathematics (STEM) expertise as part time researchers at Los Alamos National Laboratory, Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, Army Research Laboratory, Air Force Research Laboratory, Naval Research Laboratory, National Security Agency Laboratory for Advanced Cybersecurity Research, and other laboratories at their discretion.

Recommendation 13: Increase the Use and Utility of Pathways Internships. OPM should expand the Pathways Internship Program. National security departments and agencies should increase their student recruitment efforts, with a focus on recruiting undergraduate and graduate students with computer science, mathematics, electrical engineering, and computer engineering majors.

Recommendation 14: Expand the CyberCorps: Scholarship for Service (SFS). The Armed Services committees should broaden the CyberCorps: SFS to include digital engineers, as defined by section 230 of the National Defense Authorization Act for FY 2020. It should also pay for up to four years of scholarships, and include the opportunity to begin the security clearance process.

Issue 8: Improving Talent Exchanges

Recommendation 15: Increase the Number of Fellowships and Partnerships with Industry, and Increase the Number Focused on Artificial Intelligence and Software Development. Authorizing committees should amend 10 U.S.C. § 1599g to direct the DoD and the ODNI to exchange talent and promote training with the commercial tech sector working on AI applications. The Office of the Secretary of Defense, military service secretaries, and the ODNI should provide an annual report to the authorizing committees about the status of their talent exchange programs.

TAB 4 — Propose U.S. Leadership in AI Hardware & 5G

Summary: In the First Quarter, the Commission recommended expanding the United States Government's AI-enabling microelectronics programs to develop novel and resilient sources for producing, integrating, assembling, and testing AI-enabling microelectronics; stating research priorities, increasing United States Government R&D funding, and articulating a national strategy for microelectronics and associated infrastructure in order to maintain global leadership in AI-enabling hardware. The *First Quarter Memorandum* also provided limited, near-term recommendations to bolster U.S. fifth-generation cellular wireless (5G) capabilities, including by recommending policies and funding opportunities that would advance spectrum-sharing and 5G commercial licensing, support R&D in critical technical areas, and further the development of open-access radio networks.

Objective: Lay the groundwork for long-term access to resilient, trusted, and assured microelectronics for AI advantage, and takes a portfolio-based approach to ensure that the United States continues running faster than potential adversaries in the field of cutting-edge microelectronics. Bolster the 5G capabilities of the United States in order to accelerate U.S. adoption and foster alternatives to Huawei.

Issue 1: Expand United States Government AI-Enabling Microelectronics Programs

Recommendation 1-1: Create an AI chip prototype through DoD's existing advanced packaging, assembly, and testing program by adding $50 million. DoD lacks access to domestic facilities capable of producing, integrating, assembling, and testing state-of-the-art (SOTA) microelectronics at scale, to include custom AI chips. This recommendation would create a trusted, state-of-the-art AI hardware demonstration prototype for multi-chip packages, expanding the existing Navy-led, DoD-wide SOTA Heterogeneous Integrated Packaging prototype program by reprogramming $50 million in FY 2020 or appropriating $50 million in FY 2021.

Recommendation 1-2: Fund site survey by ODNI for a U.S.-based semiconductor split-manufacturing facility. The United States lacks a state-of-the-art semiconductor fabrication and packaging facility in the United States that would meet United States Government technical and security needs for high-end semiconductors and help achieve cutting-edge performance levels. This recommendation would fund an accelerated site survey by the ODNI for a U.S.-based, commercial, front-end-of-line semiconductor manufacturing facility by reprogramming funding in FY 2020 funding or by appropriating funding in FY 2021.

Recommendation 1-3: Continue fully funding DoD's Trusted and Assured Microelectronics Program in FY 21. The Commission endorses DoD's FY 2021 Trusted and Assured Microelectronics Research, Development, Test, and Evaluation budget request, which includes $489 million for advanced component development and prototypes and $108 million for system development and demonstration.

Recommendation 1-4: Improve metrics for transitioning AI-enabling microelectronics from research programs to operating forces and the commercial sector. Despite successful research efforts to advance the fields of microelectronics and AI, pathways for transitioning advanced capabilities to the battlefield remain challenging. As a first step toward these goals, DoD should clarify its approach and plans for transitioning research efforts on advanced microelectronics to battlefield advantage through existing programs of record.

Issue 2: Maintain Global Leadership in Microelectronics R&D

Recommendation 2-1: Prioritize research into beyond-CMOS AI hardware capabilities for national security. While there has been limited publicly funded research on beyond-CMOS AI hardware capabilities, United States Government funding has been heavily weighted towards applied research, rather than the basic research that is necessary to achieve breakthroughs. The United States Government must prioritize R&D into technologies and techniques that can extend the life of classical computing, ensuring continued growth in processing power until alternative computing architectures such as quantum or neuromorphic computing are readily available.

Recommendation 2-2: Increase the Defense Advanced Research Projects Agency's (DARPA) Electronics Resurgence Initiative to $500 million. The Electronics Resurgence Initiative (ERI) is DARPA's primary mechanism for funding advanced microelectronics research, investing approximately $250-300 million annually. This recommendation would expand the budget for ERI to $500 million annually in FY 2021, building on a 2018 Defense Science Board recommendation.

Recommendation 2-3: Increase NSF's topline budget by $50 million and apply these funds to microelectronics research. Congress should appropriate an additional $50 million to the NSF FY 2021 budget and highlight the importance of research into semiconductors and microelectronics targeted to enhance AI capabilities. This increased funding level would reverse NSF's decline in funding for basic research in advanced microelectronics design techniques.

Recommendation 2-4: Fund a pilot $20 million prize challenge for AI-enabled hardware through Intelligence Advanced Research Projects Activity (IARPA). Congress should appropriate $20 million to IARPA in FY 2021 to run a pilot program creating prize challenges specifically associated with advancing AI-enabled hardware, with the goal of spurring advances in scaling post-Moore's law. This challenge, or series of challenges, could encourage innovation towards specific goals, such as developing secure electronic design automation libraries or shrinking the time to transition from an algorithm to an ASIC in one year.

Recommendation 2-5. Develop a national microelectronics strategy within 180 days and assess the viability of a national microelectronics laboratory and incubator. The Commission recommends the FY 2021 National Defense Authorization Act include language requiring the creation of a national microelectronics strategy with components focused on national security, U.S. leadership, and competitiveness within 180 days, with participation from the Departments of Defense, Energy, State, Commerce, the ODNI, and the NSF. Part of this

strategy should include an assessment of the viability, efficacy, and cost of developing a national laboratory focused on microelectronics research and development, which could serve as a hub for federal microelectronics research and also host an incubator for early-stage microelectronics startups.

Issue 3 Accelerate 5G Adoption in the United States and Foster Global Alternatives to Huawei.

Recommendation 3-1: Appropriately resource 5G spectrum sharing R&D, particularly for mid-band spectrum. It is a national security imperative for the U.S. military to have access to a powerful and trusted 5G network to enable future AI capabilities and prevent competitors from accessing U.S. AI systems. DoD must enhance its mid-band spectrum sharing capabilities to make this a reality, and the Commission supports increased research and development to improve the United States Government's ability to share the sub-6 GHz mid-band spectrum with 5G operators for commercial and civilian use.

Recommendation 3-2: Urge the Federal Communications Commission (FCC), DoD, and National Telecommunications and Information Agency (NTIA) to expand sub-6GHz spectrum-sharing licensing for commercial 5G. The Commission recommends that the FCC, DoD, and NTIA expand spectrum-sharing programs, such as the Citizens Broadband Radio Service, and work to license additional sub-6GHz spectrum to wireless carriers and equipment makers for commercial 5G use. Expanding commercial access to the mid-band while ensuring DoD retains unrestricted access in the event of an emergency will allow the United States to more quickly develop its domestic 5G networks and compete with Huawei globally.

Recommendation 3-3: Pass the Utilizing Strategic Allied (USA) Telecommunications Act. The Commission urges Congress to pass the USA Telecommunications Act, which would provide $750 million in funding for R&D of 5G software, hardware, and microprocessing technology, including for open-access radio networks (O-RAN). This would be a positive step toward posturing U.S. and allied firms to better compete with Huawei on 5G, and directly counter Huawei's advantages rooted in inexpensive, proprietary hardware.

TAB 5 — Improve AI Cooperation Among Partners and Allies

Summary: In the First Quarter, the Commission focused on recommendations to address dimensions of Five Eyes and broader allied cooperative planning, data sharing, procurement, and interoperability. The recommendations are specifically directed for the Executive Branch. The Commission will continue to develop options for cooperation with other key U.S. allies and partners in subsequent recommendations. The Commission identified two significant issues to address based on consultations with the Departments of Defense, State and the IC. The United States Government lacks a National Security Policy Framework for AI and international Cooperation as well as an AI-related Military Concept and Capability Development with Allies and Partners, which erodes U.S. competitive military advantage.

Objective: The Commission's research and recommendations built a baseline understanding of Five Eyes efforts within DoD and the IC and sought to catalyze key departments and agencies to bring AI into Five Eyes, earlier and in a more concerted way. This will set the stage for a more comprehensive approach to an international cooperation framework on AI.

Issue 1 : Lack of a National Security Approach for AI

Recommendation 1-1: The United States should establish a National Security Point of Contact for government-wide AI collaboration with allies at the principal level. The United States should encourage allied governments to do the same. The Defense and IC professionals observe that there are approximately 200 Five Eyes-related committees and working groups. Yet the United States Government lacks a coherent and commonly understood National Security Framework for Five Eyes AI cooperation.

Recommendation 1-2: Under the purview of the National Security Point of Contact, the United States Government should conduct an assessment of the comparative allied strengths in AI-related technologies and applications, beginning with the Five Eyes and then expanding to include the North Atlantic Treaty Organization (NATO) and other allies. Defense and IC professionals observe that the USG lacks a coherent and commonly understood National Security Framework to guide Five Eyes AI collaboration. The Five Eyes senior leadership forums in defense and intelligence are beginning to include AI on the agenda, but more complementarity needs to be developed.

Recommendation 1-3: Based on the assessment of allied comparative strengths, the U.S. National Security Point of Contact for AI should convene a multilateral working group for AI collaboration and interoperability, beginning with the Five Eyes, to develop a plan for deeper AI collaboration. The plan should include combined research priorities; development objectives; experimentation plans; data sharing agreements; common standards for testing, evaluation, verification, and validation of AI-enabled systems; and interoperability standards and requirements for data, algorithm, communications, and sensor sharing that can be expanded to include U.S. NATO and Asian allies.

Issue 2: Lack of AI-related Military Concept and Capability Development with Allies and Partners Erodes U.S. Competitive Military Advantage

Recommendation 2-1: The Secretary of Defense should designate a point of contact to advance U.S. military concept and capability development cooperation with allies and partners. Concept and capability development would consist of the activities below, with appropriate interagency participation and leadership.

Recommendation 2-2: The Secretary of Defense should host an AI Wargame and Experimentation Series, beginning with the Five Eyes, and as appropriate could expand to other allies and partners. AI wargaming and experimentation would inform development of allied and joint warfighting concepts and capabilities for all-domain operations.

Recommendation 2-3: The Secretary of Defense and the Director of National Intelligence should conduct several AI demonstration pilot projects with Five Eyes partners over the next three years, some of which should test the use of shared allied cloud computing resources. Significant opportunity exists to pursue a Five Eyes Roadmap for AI that catalyzes innovation needed to compete with U.S. adversaries.

TAB 6 — Advance Ethical and Responsible AI

Summary: The Commission's *First Quarter Recommendations* are focused on actionable steps and best practices to implement commonly agreed upon AI principles. The Commission recommended integrating ethical and responsible AI training within general AI courses; sharing ethical and responsible AI training courses broadly with U.S. law enforcement organizations; establishing an expert body to brief the Federal Government on emerging issues in AI ethics and responsibilities; developing strategies for documentation and engineering practices in order to ensure traceability, auditability, accountability in the data, model, and system; and undertaking self-assessments on resources for documentation and adequate multi-disciplinary support for AI procurement.

Objective: To ensure that departments and agencies take foundational steps that are critical for the responsible development of AI through training, documentation, and procurement processes.

Recommendation 1: Integrate Ethical and Responsible AI Training within General AI. Courses. The Departments of Defense, Homeland Security, FBI, and the IC should integrate ethical and responsible AI considerations into their general training programs. AI literacy training for end-users should include an introduction to the responsible and ethical development and fielding of AI, and certified self-development programs should include at least one course addressing the ethical and responsible use of AI.

Recommendation 2: Share Courses on Ethical and Responsible AI with Law Enforcement. Congress should require that the Secretary of Homeland Security and the Director of the FBI share their ethical and responsible AI training programs with state, local, tribal, and territorial law enforcement officials through the National Network of Fusion Centers. The Department of Homeland Security and the FBI should keep a record of those jurisdictions that avail themselves of the offered training, and report this information to Congress annually for five years.

Recommendation 3: Establish an expert body to brief the Federal government on emerging issues in AI ethics and responsibilities. Congress should require that the Director of NIST, in collaboration with the Director of NSF, establish a voted upon Board of interdisciplinary experts qualified to speak on emerging considerations for ethical and responsible AI. This body should provide, at a minimum, an annual brief on emerging concerns and best practices for ethical and responsible AI to nominated members from the Departments of Defense, Homeland Security, FBI, and the IC, including procurement officers, legal advisors, technologists, Designated Agency Ethics Officials and Inspectors General.

Recommendation 4: Develop Strategies for Documentation. Congress should require that NIST lead the coordination of the Departments of Defense, Homeland Security, FBI, and the IC to develop a single documentation strategy for all future datasets, AI models, and systems that the agencies acquire, develop, and/or use. Documentation requirements must include documentation of the origins of datasets and their intended use; model performance and testing; connections between and dependencies within systems, and associated potential complications; and ongoing maintenance requirements.

Recommendation 5: Conduct Agency Self-Assessments on Resources for Documentation. The Departments of Defense, Homeland Security, FBI, and the IC should conduct individual self-assessments to determine if they have adequate resources to support the documentation practices described in Recommendation 4. If an agency determines that adequate resources do not currently exist, the agency should identify the additional resources needed and request an appropriation from Congress.

Recommendation 6: Conduct Agency Self-Assessments of Adequate Multi-Disciplinary Support for AI Procurement. Congress should require that the Secretary of Defense, the Director of National Intelligence, the Secretary of Homeland Security and the Director of the FBI conduct self-assessments for their departments and agencies as to whether they have access to adequate multi-disciplinary expertise (e.g., ethical, legal, and technical), and whether current procurement processes sufficiently encourage and/or require such expertise to be utilized. If resources or processes are inadequate, the above secretaries and directors should inform Congress of the shortfalls and additional support required.