

Chapter 6: Technical Talent in Government

Blueprint for Action

The United States Government needs digital experts now or it will remain unprepared to buy, build, and use AI and its associated technologies. Expanding digital expertise is the most important step the government can take to modernize. While this challenge is recognized, few parts of government have adequately invested in building their digital workforce.

To expand its digital and AI digital workforce, the government needs to:

- *Organize* technologists within government through a talent management system designed to house highly skilled specialists.
- *Recruit* people that already have the skills the government needs, such as industry experts, academics, and recent college graduates.
- *Build* its own workforce by training and educating current and future government employees.
- *Employ* its digital workforce more effectively to ensure digital talent can perform meaningful work once they are in government.

Organize

Recommendation

Recommendation: Create Digital Corps for Cabinet-Level Departments and Select Agencies to Organize the Government's Technical Workforce

How a digital workforce is organized is as important as the workforce's level of expertise. We propose creating Digital Corps for Cabinet-level departments and select agencies that would recruit, train, and educate personnel; place personnel in and remove personnel from digital workforce billets; manage digital careers; and set standards for digital workforce qualifications. Agencies would create billets for members of the Digital Corps, and provide guidance to members of the Digital Corps about the work they perform.

Existing Models: The Army's Medical Corps. Full scaling of specialized talent will only happen if hired personnel have freedom to solve technical challenges. Many existing strategies for personnel management are inadequate due to a shortage of people in government agencies who can properly manage such specialized talent. A notable counterexample to this, which serves as an inspiration to our Digital Corps model, is the U.S. Army's Medical

Corps. The Medical Corps organizes experts with specialized health care skills that do not fit into the Army's traditional talent management framework.¹ Nurses and doctors receive education and training as civilians, but their skill sets are crucial to the Army's health care system. So, the Medical Corps talent management framework was created to house these medical professionals in a way that maximizes their ability to practice medicine within the Army. Like the Medical Corps, the Digital Corps should have specialized personnel policies, guidelines for promotion, training resources, and certifications for personnel to demonstrate proficiency in new digital areas.

Notably, a Digital Corps would not be comparable to either the Marine Corps or a Space Service, as it would not have a service secretary or a distinct theater or domain, and its members would work for existing services or agencies.

Roles Within the Digital Corps. Career fields are distinct from core competencies—skills that every Digital Corps member should possess prior to hiring—such as modern stack software development, deployment, and data-informed decision-making. Training resources for each career field should be made available to Digital Corps members across every agency. Departments and agencies must also be cognizant that digital talent is rarely interchangeable across different skill sets; for example, database architecture, machine learning, and user experience design all fall into different career fields with near-zero overlap. Digital Corps members should be allowed to focus on any one of the following additional career fields:

- Software development
- Data science
- Artificial intelligence
- DevOps and site reliability engineering
- Human-centered product design
- Product management
- Security
- Data governance and use
- Emerging technologies²

Digital Corps technologists should be able to continue to promote without leaving their focus area and move upward into management. Many private tech companies distinguish between their engineering and engineering management tracks, so that skilled engineers are not incentivized to become managers solely for the sake of career advancement. The Army's Medical Corps follows a similar model. Once promoted, officers highly competent in their medical specialty can either continue as clinicians or become administrators and managers within the Medical Service Corps.

Staffing and Digital Corps Billets. Cabinet-level departments and select agencies should develop their own Digital Corps rather than relying on a single, government-wide Digital Corps. For Corps members, this approach creates well-defined tracks for career progression and stronger incentives to stay. This approach also makes it easier for departments and agencies to identify and invest in in-house talent for future technology projects.

Each Cabinet-level department and select agency should create designated billets to be filled by qualified members of its Digital Corps based on skills and experience. In addition, each should maintain a central talent repository with Corps members' portfolios of prior digital projects completed with the agency. Departments and agencies can then search this repository to find the most suitable Corps member to fill each billet. Taking inspiration from software development companies, one method of reliably measuring skill proficiency is to conduct digital interviews consisting of case questions and whiteboarding exercises. We recommend that billets be filled based on candidates' performance in these interviews, chosen career field, and prior project experience (possibly while filling other billets within the same agency at an earlier date).

Actions for Departments and Select Agencies:

- **Allocate resources toward the creation of Digital Corps modeled after the Army's Medical Corps.**
- **Develop Digital Corps training resources in the forms of licensed instructional videos, tutorials, and coursework for each of the nine career fields listed.**
- **Create agency-specific talent repositories where Corps members can list project portfolios, source code (where permitted), and career field training badges.**
- **Create billets and fill them through interviews, evaluation of Corps members' career field training, and other relevant experiences.**
- **Develop parallel management-oriented and technical-oriented tracks for each Corps member's career progression, with set standards for promotion per agency.**

Recruit

The government needs to improve its ability to attract scarce AI talent from the private sector, academia, and recent college graduates. Doing so requires making paths to service as easy as possible for as many technologists as possible.

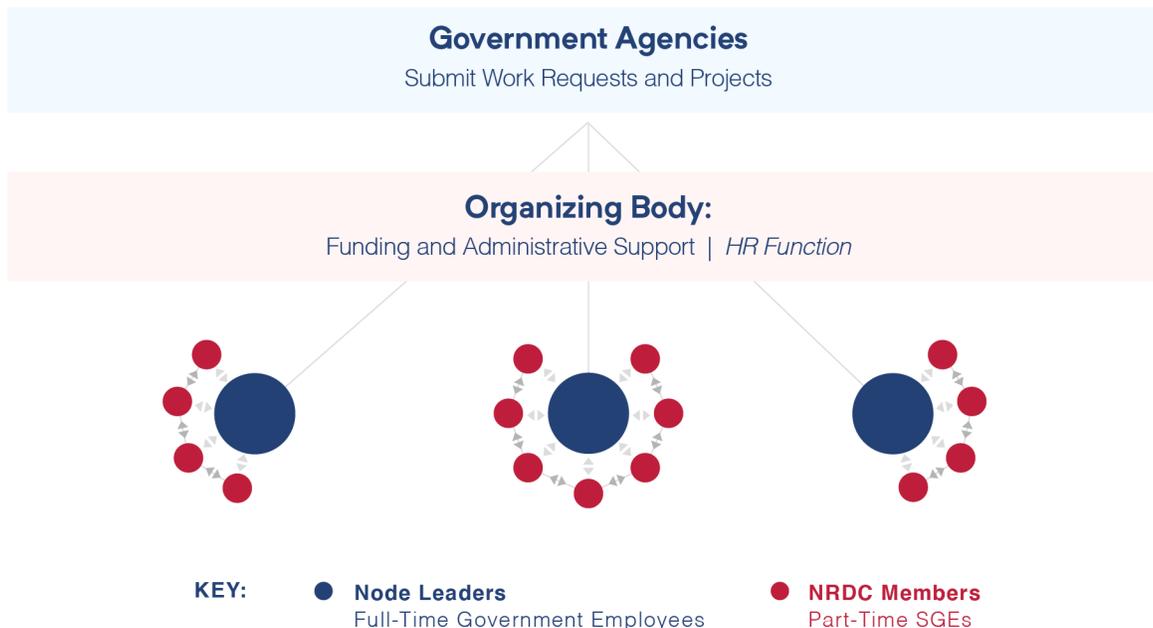
Many AI and other digital practitioners are interested in working with the government and can and would do so as either full-time employees or part-time employees. Of those desiring full-time employment, some seek an entire career as a government civilian or in the military. Others, while willing to work with the U.S. Government full-time, are less willing to make long-term commitments or to dedicate as much of their time, and instead desire to become short-term employees, fellows, talent exchange participants, or military reservists. A third group is willing to work with or for the government part-time, but are unwilling to become full-time civilian employees and have no desire to serve as part of the military. To improve recruiting, the government needs to improve the hiring process and build mechanisms for part-time civilian service.

Recommendation

Recommendation: Create a National Reserve Digital Corps

The government would benefit from access to a larger portion of the country’s total digital workforce. Many government digital projects suffer from lack of access to digital expertise. The U.S. Government should establish a civilian National Reserve Digital Corps (NRDC) modeled after the military reserves’ service commitments and incentive structure. Members of the NRDC would become civilian special government employees (SGEs),³ and work at least 38 days each year as short-term advisors, instructors, or developers across the government.⁴ Longer-term positions would be established on an individual basis. 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.⁵ Several AI practitioners within the United States Government have said during interviews with the NSCAI that their projects would benefit from the kind of reserve corps we propose here.

National Reserve Digital Corps.



General Structure. We recommend establishing and managing the NRDC as a set of nodes that fall under the supervision of the Office of Management and Budget (OMB). Each node would be aligned with a full-time government employee leader selected by OMB rather than geography, digital applications, or government agency. In effect, OMB would select node leaders, who would then be responsible for recruiting and organizing their team. In addition to selecting node leaders, OMB would establish standards, ensure nodes meet government client requirements, provide funding and administrative support, maintain security clearances, establish access to an agile development environment and tools, and facilitate technical exchange meetings, when appropriate, to ensure stovepipes are not created.

Recruitment. Each node would be responsible for recruiting and screening its digital experts. Notably, OMB would not be responsible for establishing qualification standards for members of the NRDC. While volunteers would need to be able to pass a background check and would not be employees of a foreign government (though they might be foreign nationals), node leaders would be empowered to screen and select volunteers, and to recruit experts from within NRDC for specific tasks. OMB would provide administrative support, much like a human resources team in a private sector company.⁶

Project Selection. Projects would be selected in three ways:

- **Selection by a node after contact with a government client**
- **OMB would direct a node to take on a project**
- **Node leadership would approve individual projects driven by a perceived need that is not tied to a request from a government client**

Government clients would directly contact node leaders or OMB. Nodes would be responsible for establishing relationships with government agencies and selecting projects, but OMB would be responsible for ensuring that agencies' requests are received and that nodes contribute to NRDC's mission and vision. Individual projects that are not driven by a government client's request would be pursued at the node leadership's discretion.

Relationship with Government Agencies. Members of the NRDC would work with agencies on a project-to-project basis, such as consulting for a specific project or teaching a specific course. They would not have a commitment to work with the same agency consistently. Government agencies would be responsible for paying for their projects, including the cost for reservist time.

Relationship with Civilian Employers. Members of the NRDC and their civilian employers would be bound by the same rules as the military reserve under the Uniformed Services Employment and Reemployment Rights Act (USERRA).⁷ Members would be responsible for identifying conflicts of interest and removing themselves as appropriate. Employers would not be able to discriminate against members of NRDC, fire them, or delay promotions as a consequence of spending time serving in NRDC.⁸ Implementation could take the form of a legislative recommendation to modify USERRA or a proposal modeled after USERRA.

Incentivizing Reservist Participation. Civilian reservists in this program would benefit in several ways. They would gain an opportunity to contribute to their country, do exciting, meaningful work, and attain awareness of work and advances in a community that differs from their own. They may also benefit from the following incentives:

- **The government should create an NRDC scholarship program modeled after the Reserve Officer Training Corps. Universities would select students through a competitive process to receive full tuition and study specific disciplines related to digital technology. In return for accepting the scholarship, graduates would spend part of their summers during school in government internships. Between their freshman**

and sophomore years, students would spend six weeks becoming familiar with a range of U.S. Government departments and agencies. Between their sophomore and junior years, students would spend six weeks as an intern at a specific government agency or office. Between their junior and senior years, students would spend another six weeks interning at a specific agency or office. Upon graduation, scholarship recipients would spend five years serving in the NRDC, beginning as a GS-7 and advancing to a GS-11 over the course of five years. Students would also begin the security clearance process at least two years before graduating.⁹

- The NRDC should include a training and continuing education fund for all members. The NRDC would pay up to \$50,000 to each reservist to attend training and educational opportunities related to AI or to pay for student loans. Educational opportunities would include conferences, seminars, degree and certificate granting programs, and other opportunities. An incentive explicitly tied to continuing education would increase the perceived and actual competency of AI reservists. It would also attract those with an active interest in continuing education, especially new practitioners seeking to establish themselves.

How NRDC Would Work: An Example. The following is a hypothetical example of how the NRDC would function. In this example, OMB would begin creating a node by selecting a leader that would be trusted to establish and manage a team of reservists. OMB selects “Jennifer,” a full-time government employee working within the NRDC division of OMB, to lead a new NRDC node. Jennifer decides to organize her node functionally rather than regionally. Using existing government tools and her professional contacts, she recruits people from across the country, most of whom have backgrounds in health care data management or recent graduates with degrees related to the field. She also recruits from within the NRDC by posting open positions on online job boards. During the recruitment process, OMB provides financial support for recruitment efforts, travel money, and processes new reservist administrative paperwork, including security clearance applications.

After the node is established and the team is in place, a government agency—in this example, the Centers for Disease Control and Prevention (CDC)—realizes it has two digital needs it cannot meet internally: improving a database and training their workforce in new data management practices at the National Center for Chronic Disease Prevention and Health Promotion. After reaching out to OMB, they determine that Jennifer’s node is the best fit, and request assistance. After examining the request and her team’s workload, Jennifer determines that she would support the CDC’s database improvement request with a four-person team and support workforce training with a two-person team. The four-person team spends 14 days examining the existing database and making updates to the database. The two-person team spends 10 days on site at the National Center for Chronic Disease Prevention and Health Promotion speaking with leaders and employees about their data management needs and the current state of the workforce’s skill level, developing curriculum, and teaching data management best practices.

The teams Jennifer selects to support the CDC include Michael. Michael received a four-year scholarship from NRDC to study computer science as an undergraduate. After graduating three years ago, he began working full-time as a data analyst at a health care company and working part-time on NRDC projects he coordinates with his node leader. He also used his education stipend to pay for an online course from MIT last year. This hypothetical shows that an NRDC can effectively increase the U.S. digital talent, connect private-sector workers with a government agency, and create a pathway for that connection to solve an actual problem.

Actions for Congress:

- **Pass legislation establishing the NRDC within OMB**

- o Grant OMB direct-hire authorities to hire node leaders and reservists.
- o The NRDC should offer full tuition scholarships to students studying specific disciplines related to national security digital technology for up to four years in exchange for five years of service as a member of the NRDC. This could be done by including service in the NRDC as an option for people with degrees in digital fields to pay off service obligations incurred as a result of education received in the Defense Civilian Training Corps.¹⁰
- o Legislation should authorize up to \$50,000 in educational benefits for courses, seminars, conferences, and other educational opportunities that are approved by OMB. It should also ensure that members of the NRDC receive the same employment protections as military reservists under USERRA. This can be done by amending USERRA to cover “service in the uniformed services or the National Reserve Digital Corps.”
- o Congress should make a two-year appropriation of \$16 million to pay for initial administrative, scholarship, and education benefits.

- **Evaluate NRDC Success**

- o Use three metrics to evaluate NRDC’s success: 1) The number of technologists who participate annually; 2) Evaluations of results from government clients; and 3) Evaluations of results from reservists. OMB should establish the central, organizing function for the NRDC within six months of the passage of legislation, and establish five nodes and a mechanism for distributing educational benefits within nine months of the passage of legislation.

Actions for OMB:

- **Immediately upon receiving authority from Congress, establish a National Reserve Digital Corps with systems and processes designed to:**

- o Select and hire node leaders
- o Encourage potential government clients to contact NRDC nodes, or OMB, with potential problems to resolve
- o Ensure government client needs are met by NRDC nodes
- o Provide funding for education supplements and scholarship programs

- o Provide administrative support (including for security clearances)
- o Establish node access to development environments and tools
- o Facilitate technical exchange meetings
- o Match recipients of NRDC scholarships with node leaders
- **At the outset, establish five NRDC nodes. Each node leader should be responsible for:**
 - o Recruiting and hiring reservists
 - o Ensuring the quality of their work
 - o Partnering with government agencies

Recommendation: Create Digital Talent Recruiting Offices Aligned with Digital Corps

Recommendation

Executive branch agencies should create agency-level digital talent offices of up to 20 personnel responsible for recruiting both early career and experienced professionals. Recruiting offices would monitor their agencies' need for specific types of digital talent. The offices would be empowered to recruit technologists virtually, by attending conferences, career fairs, recruiting on college campuses, and offering scholarships, recruiting bonuses, referral bonuses, non-traditional recruiting techniques such as prize competitions, and other recruiting mechanisms. A recruiting office would assume responsibility for their agency's digital talent recruitment efforts, e.g., Science, Mathematics and Research for Transformation (SMART) Scholarship-for-Service, and partner with agency human resources offices to use direct-hire authorities and the Intergovernmental Personnel Act (IPA) to accelerate hiring. This would help scale digital talent recruitment by creating a central, empowered organization that focuses on a specific mission; concentrates expertise and funds; would help experts move in and out of government positions throughout their career; and can develop relationships with universities and private-sector companies.

Actions for Congress:

- **Amend Section 230 of the FY2020 NDAA. (Armed Services Committees)**
 - o The DoD should be required to appoint a civilian official responsible for digital engineering talent recruitment policies and their implementation.
 - o The civilian official should be supported by a digital talent recruiting office with the Office of the Under Secretary for Personnel and Readiness, as described above.
- **Require the Office of the Director of National Intelligence (ODNI) to create a digital talent recruiting office. (Intelligence Committees)**
 - o The office should work with the IC to identify their agencies' needs for specific types of digital talent.
 - o Recruit technologists by attending conferences, career fairs, and actively recruiting on college campuses.

- o Integrate federal scholarship for service programs into agency recruiting; offer recruitment and referral bonuses.
- o Partner with their agencies' human resource teams to use direct-hire authorities to accelerate hiring.
- **Require the Department of Homeland Security (DHS) to create a digital talent recruiting office. (Senate Homeland Security and Governmental Affairs Committee and the House Committee on Homeland Security)**
 - o The office should work with DHS to identify their agencies' needs for specific types of digital talent.
 - o Recruit technologists by attending conferences, career fairs, and actively recruiting on college campuses.
 - o Integrate federal scholarship for service programs into agency recruiting; offer recruitment and referral bonuses.
 - o Partner with their agencies' human resource teams to use direct-hire authorities to accelerate hiring.
- **Require the Department of Energy (DoE) to create a digital talent recruiting office. (Senate Committee on Energy and Natural Resources and the House Committee on Energy and Commerce)**
 - o The office should work with DoE to identify their agencies' needs for specific types of digital talent.
 - o Recruit technologists by attending conferences, career fairs, and actively recruiting on college campuses.
 - o Integrate federal scholarship for service programs into agency recruiting; offer recruitment and referral bonuses.
 - o Partner with their agencies' human resource teams to use direct-hire authorities to accelerate hiring.

Actions for DoD, including U.S. military services, DOE, DHS, and the ODNI:

- **Create digital talent recruiting offices.**
 - o Offices should work with their agencies to identify their need for specific types of digital talent.
 - o Recruit technologists by attending conferences, career fairs, and actively recruiting on college campuses.
 - o Integrate federal scholarship for service programs into agency recruiting; offer recruitment and referral bonuses.
 - o Partner with their agencies' human resource teams to use direct-hire authorities to accelerate hiring.

Recommendation: Grant exemption from OPM General Schedule Qualification Policies for Specific Billets and Position Descriptions

Recommendation

AI practitioners applying for positions within the federal government and their hiring agencies are constrained by OPM minimum qualification standards. While these standards are important, and have increased fairness in hiring, they also prevent expert technologists that do not have master's degrees—and in some cases, bachelor's degrees or comparable work experience—from joining the government at a reasonable level of compensation. For example, a 19-year-old software developer or AI practitioner might have a proven track record on cybersecurity or in AI competitions, but can only enter the government as a GS-7. To reduce this hiring challenge, the government should allow agencies to exempt certain billets from OPM general schedule qualification policies, and instead allow local hiring managers to make an independent decision about both hiring and pay grade based on evaluations, prior work, alternative certification programs, or practical experience.

Actions for Congress:

- **Direct the Office of Personnel Management to amend 5 C.F.R. § 338.301, on service appointments.**
 - Allow service secretaries and cabinet officials to create exceptions from the Qualification Standards for General Schedule Positions by individual billet or position description.

Actions for OPM and Military Services:

- **OPM should create and execute a process by which federal departments and agencies can apply for billets or position descriptions to be exempt from general schedule qualification policies.**
- **Two-star-and-above commands and their civilian equivalents should declare individual billets and position descriptions exempt from OPM qualification standards without approval from OPM or any more senior authority.**

Recommendation: Expand the CyberCorps: Scholarship for Service

Recommendation

The CyberCorps: Scholarship for Service (SFS) is a recruiting program designed to attract students studying IT, cybersecurity, and related fields into the USG. Expanding it could bring in more people with AI-related skills. It is managed by the National Science Foundation in partnership with the Office of Personnel Management and the Department of Homeland Security. Students enrolled in the program receive a scholarship in exchange for an obligation to work in an approved government agency for a period of time equal to the time covered by the scholarship. Seventy undergraduate and graduate institutions participate in SFS by selecting students for the program, and since 2001, 3,600 students have received scholarships, 94% of whom went on to serve in government.¹¹ Hiring typically takes place during annual online and in-person career fairs.¹²

It should be noted that cyber and AI are different fields. Expanding CyberCorps: SFS to CyberCorps and AI: SFS would avoid increasing administrative burdens. This should not be taken as an indication that AI and cyber are synonymous, as the education and skills for each field differ.

Actions for Congress:

- **Amend the CyberCorps: SFS, as defined by Section 230 of the National Defense Authorization Act for Fiscal Year 2020.**
 - Include digital engineers.
 - Pay for up to four years of scholarships.
 - Include the opportunity to begin the security clearance process.
- **Amend 15 U.S.C. § 7442 subsection (a).**
 - ... recruit and train the next generation of information technology professionals, digital engineers, artificial intelligence practitioners, data engineers, data analysts, data scientists, industrial control system security professionals, security managers, and cybersecurity course instructors to meet the needs of the cybersecurity mission for Federal, State, local, tribal, and territorial governments.
- **Amend 15 U.S.C. § 7442 subsection (b).**
 - Provide an opportunity for scholarship recipients to initiate their security clearance process at least one year before their planned graduation date.
- **Amend 15 U.S.C. § 7442 subsection (c).**
 - Allow the scholarship to last for 4 years.

Actions for the National Science Foundation and Office of Personnel Management:

- **Broaden the CyberCorps: SFS.**
 - Pay for up to four years.
 - Include fields falling under digital engineering, as those fields are defined by the National Defense Authorization Act for Fiscal Year 2020 (Pub. L. 116–92, section 230): the discipline and set of skills involved in the creation, processing, transmission, integration, and storage of digital data, including data science, machine learning, software engineering, software product management, and artificial intelligence product management.

Recommendation

Recommendation: Establish a STEM Corps

A bipartisan group of members of the House Armed Services Committee have proposed H.R. 6526, STEM Corps Act of 2020. The proposal would authorize the appropriation of \$5 million per fiscal year, with \$500,000 for administrative costs and an advisory board. The program provides a maximum scholarship of \$40,000 per student per year. Scholarship recipients would serve in different capacities within the DoD for a minimum of three years,

with an option to either remain in the DoD or transfer to a private-sector company that has contributed to STEM Corps funding. The proposal requires participants to be paid at a rate not less than GS-6 for the first three years of their obligation and at not less than as a GS-10 during their fourth year. This proposal has the potential to significantly increase the number of personnel with STEM backgrounds in the DoD civilian workforce for a relatively low cost if a sufficient number of private-sector companies contribute. The potential for recipients to transfer to the private sector after three years of government service may create retention issues, but it may also serve as a mechanism to create bridges between the DoD and private sector companies.

Actions for Congress:

- **Establish a STEM Corps in the FY2022 NDAA.**
- **Set aside \$5 million for a STEM Corps for FY2022 and each fiscal year thereafter.**

Actions for the DoD:

- **With congressional authorization and appropriation, establish an office to manage and establish a STEM Corps as described above.**
- **Include a scholarship program, advisory board, private-sector partnership program, and STEM Corps member management program.**

Build

The government will not be able to come out of its workforce deficit through recruiting alone. AI and digital talent is simply too scarce in the United States. In 2020, there were more than 430,000 open computer science jobs in the United States, while only 71,000 new computer scientists graduate from American universities each year.¹³ To overcome the challenges presented by AI and digital talent scarcity, the government should deliberately focus on building its AI and digital workforce.

Recommendation: Create a United States Digital Service Academy

Recommendation

The United States needs a new academy to train future public servants in digital skills. Civil servants play a critical and often underappreciated role in government. They hold much of the government's niche, long-term expertise. This is especially true for the digital expertise that is badly needed for the government to modernize. Methods like the competitive service and scholarship for service programs have helped recruit talent, but as the government's needs changed, those approaches will no longer address the full scope of the government's needs. Bolder measures are necessary to produce the broad, diverse, and technically educated workforce the government needs.

Our proposed United States Digital Service Academy (USDSA) would be an accredited, degree-granting university that receives government funding,¹⁴ be an independent entity

within the federal government, and have the mission to help meet the government's needs for digital expertise. It would be advised by an interagency board that would be assisted by a federal advisory committee composed of commercial and academic leaders in emerging technology.

Existing Models: The Military Service Academies. The USDSA should be modeled off of the five U.S. military service academies but should produce trained government civilians not only to the military departments, but also to civilian departments and agencies beyond DoD.¹⁵

The five military service academies each produce commissioned officers for the armed forces.¹⁶ The academies select cadets and midshipmen through a congressional and presidential nomination process, followed by a competitive admissions process. The cadets and midshipmen, who are government employees, exchange a commitment to serve after graduation for a tuition-free education. Many choose this path for the opportunity to serve; the free tuition and education often are considered a bonus. Those who depart prior to meeting the minimum requirements for graduation still incur either a service commitment or financial requirement to pay back education received upon their departure from the schools.

The academies contribute between 15% and 20% of the new junior officers to their respective services each year—the largest single commissioning source. Academy graduates also play an outsized role in the military services' senior leadership.¹⁷ As a result, the academies help shape the identity and culture of their services, including their standards and ethical norms. USDSA would be comparable to the other service academies in many ways. It would be a degree-granting institution focused on producing leaders for the United States Government. USDSA students, like military service academy students, would not pay for tuition, or room and board, and would have a post-graduation service obligation. Americans should expect USDSA graduates to seek to serve, to lead the nation's digital workforce, and to ensure the United States sets an example of intelligent, responsible, and ethical high-tech leadership.

Key Differences Between USDSA and the Military Service Academies. The USDSA would differ in significant ways. First and foremost, USDSA students would enter the institution to become civil servants. They would know that their education would be repaid in the form of a five-year obligation to serve in government, which would begin upon graduation when they become a civil servant at a GS-7 level. Exclusively producing civil servants would eliminate the need for students to complete commissioning requirements, simplifying the school's curriculum and administrative burdens, and reduce the need for expansive campus real estate for training and parade grounds. It would also make USDSA less redundant, as the military service academies already produce hundreds of computer scientists, electrical engineers, and mathematicians every year.

USDSA students would also have a more STEM-focused education. While the core curriculum would ensure broad exposure to different fields, students would have a highly technical education. A wide variety of technical majors could include AI, software engineering, electrical science and engineering, computer science, molecular biology, computational biology, biological engineering, cybersecurity, data science, mathematics, physics, human-computer interaction, robotics, and design. Students could also blend those majors with humanities and social science disciplines such as political science, economics, ethics and philosophy, or history.

A third difference would be that USDSA graduates would serve across the Federal government. To avoid both perceived and real parochial bias from the organizations that administer service academies, USDSA would be administered as an independent Federal entity. The minimum and maximum number of graduates who would serve in each department or agency would be determined annually by an interagency board.¹⁸

Mission Statement of the USDSA. We propose the following: “The United States Digital Service Academy’s mission is to develop, educate, train, and inspire digital technology leaders and innovators and imbue them with the highest ideals of duty, honor, and service to the United States of America in order to prepare them to lead in service to our nation.”

The Student Experience. During their first year, students would begin the Academy’s core curriculum, explore some electives to help determine their major, and take a summer internship or fellowship. The core curriculum is envisioned to include, among other things, American history, government, and law, as well as composition, mathematics, computer science, and the physical and biological sciences. Once summer arrives, students would participate in summer internships with private sector companies.

Students would select their major early in their second year, begin concentrating on their technical field, and continue their core curriculum. They would also initiate their security clearance application process. The goal would be for all students to graduate with at least a secret clearance. After completing the classroom portion of their second year, students would complete internships in two government agencies, which would help them focus their goals for government service.

During their third year, USDSA students would increase the focus on their major, complete the majority of their core curriculum, and begin committing to a government agency. Similar to the military service academies, attendance of the first day of class at the start of their third year serves as a commitment to five years of government service upon graduation. After completing the classroom portion of the third year, students would participate in another private sector internship.

Students would commit to a particular government agency and career field during the first weeks of their fourth year and begin the job placement process. To select a

department and career field, students would create a rank ordered list of career fields within departments, agencies, and services. The USDSA would then match student preferences to the government's needs as identified by an annual interagency process. After successfully completing all academic requirements, students would graduate as GS-7s, with the potential to progress rapidly to GS-11. After completing their service obligation, USDSA graduates would have the opportunity to transition to the NRDC.

Accreditation. In order to receive federal funding, the USDSA would take the required steps to complete the accreditation process through a regional accreditation organization. The accreditation organization would be determined based on the physical location of the institution and recognized by the Department of Education and Council for Higher Education Accreditation.¹⁹ Membership in such an organization ensures academic quality throughout the institution's life span, as accreditation requires ongoing assessment for improvement. Future employers are able to affirm the credentials of USDSA graduates, the academy is able to accept charitable donations, and post-graduate programs recognize the validity of undergraduate degrees through accreditation. Based on the location of USDSA, the institution would also work with the hosting state to determine compliance with all core standards and processes.²⁰

Proposed Blueprint for Action for the USDSA:

Phase One (Years 1-2)

- Identify and secure an appropriate site for initial USDSA buildout with room for future expansion.
- Identify gaps in the government's current and envisioned digital workforce by an interagency task force under Office of Personnel Management leadership.
- Establish the USDSA administration as a new Executive branch agency with an individual appropriation that will be responsible for the phased Blueprint for Action plan and the management of the institution.
- Recruit tenure-track faculty.
- Recruit adjunct faculty, primarily from private-sector technology companies.²¹
- Grant the USDSA the authority to accept outside funds and gifts from individuals and corporations for startup, maintenance, and infrastructure costs.
- Appropriate \$40 million to pay for administrative costs.
- Satisfy the necessary requirements set by the Department of Education as well as the state USDSA is in for degree-granting approval.
- Apply for degree-program-specific accreditation through Computing Accreditation Commission on Colleges of Accreditation Board for Engineering and Technology.²²
- Apply for accreditation with a Regional Accrediting Organization approved by the Department of Education and Council for Higher Education Accreditation in order to be granted "Candidate" status.

- Construct initial physical infrastructure.
- Appropriate additional costs for the selection and purchase of the physical location and construction of infrastructure.

Phase Two (Years 3-5)

- Begin classes with an initial class of 500 students at the beginning of year three.²³
- Demonstrate compliance with all requirements and standards of the regional accrediting organization in order to be granted Membership status.

Phase Three (Years 6-7)

- Graduate the first class.
- Ongoing improvement through accreditation assessments.
- Assess, and as appropriate, expand class sizes.

Actions for Congress:

- **Authorize the establishment of the USDSA.**
 - An independent entity with a mandate to establish the institution described above.
 - Appropriate \$40 million over two years to pay for the USDSA's initial administrative costs.

Actions for the Office of Personnel Management:

- **Begin an interagency process to identify skill and personnel gaps in the federal government's digital workforce.**

Employ

Digitally talented people should be able to reasonably expect to spend a career performing meaningful work focused on their field of expertise in government. Without such an expectation, they are unlikely to join the government workforce, and without their experience matching expectations, they are unlikely to stay for long.

Recommendation: Establish Career Fields for Government Civilians in Software Development, Software Engineering, Data Science, Knowledge Management, and Artificial Intelligence

Recommendation

Government civilians play a critical role in the national security enterprise. A significant portion of the government's AI talent is likely to exist in the civilian workforce. Government civilians currently do not have career paths outside of research and development that

allow them to focus on software development, data science, or AI for the majority of their career. This results in a highly limited ability to recruit talent from outside of government, an inability for an individual to focus on a skill set for an extended time, a lack of continuing education opportunities for these government civilians, and retention issues. It also causes the government to struggle to identify and manage the software development, data science, and AI talent within its workforce.²⁴ Digitally focused occupational series will better allow the government to track and manage its digital workforce, to attract new talent that wants to focus on a technical skill set, and to create new positions.

The government should create software development, software engineering, data science, knowledge management, and AI occupational series. This combination of occupational series would significantly improve the government's ability to recruit and manage experts that will supervise the collection and curation of data, build human-machine interfaces, and help end users generate and act on data-informed insights. Many successful private-sector organizations use a version of this combination of skills.²⁵ The government should follow their example.

Actions for Congress:

- **Require OPM to draft software development, software engineering, data science, knowledge management, and artificial intelligence occupational series classification policies no later than 270 days after the passage of the legislation.**

Actions for OPM:

- **Create software development, software engineering, data science, knowledge management, and artificial intelligence occupational series.**
- **Accelerate the creation of new digital occupational series.**
 - o Rather than waiting for agencies to provide a formal request for a new occupational series, ask agencies to provide supporting documents and subject matter experts to study and draft a classification policy for each occupational series.

Recommendation

Recommendation: Establish Digital Career Fields for Military Personnel

Digital subject matter experts' inability to spend a career working on digital topics while serving in the military is arguably the single most important issue impeding military modernization.²⁶ Much like their civilian counterparts, U.S. military personnel do not have career paths that allow them to focus on software development, data science, or AI for the majority of their career.²⁷ The military has established career fields for doctors and lawyers that allow them to focus on a technical field, develop their skill over time, and advance within their service. The military is choosing not to do the same for many types of digital talent. While some of the services train some operational research and systems analysis (ORSA) personnel to perform machine learning and AI tasks, these personnel may be shifted to work on other ORSA tasks rather than AI. Phrased differently, AI practitioners have some background in ORSA, but not all ORSA personnel are trained to work in machine learning or AI.²⁸

This results in a reduced ability to recruit talent outside of the government, an inability to focus on a skill set for an extended time, a lack of continuing education opportunities, and retention issues. It also causes the government to struggle to identify and manage the software development, data science, and AI talent within its workforce.²⁹ These problems are particularly acute for military personnel, who are required to regularly change positions and move into manager roles or face eventual discharge from the military. The lack of digital career fields also causes the military services to struggle to identify and manage the software development, data science, and AI talent within their workforces.³⁰ As long as this state continues, the military should not expect to achieve better results for its digital modernization than its legal and medical fields would have without career fields for lawyers and doctors.

The military services should have primary career fields that allow military personnel to focus on software development, data science, or artificial intelligence for their entire career, either as managers or technical specialists.

Actions for Congress:

- **Require the military service chiefs to create career fields focused on software development, data science, and artificial intelligence.**
 - o Congress should amend section 230 of the FY2020 NDAA to require the military service chiefs to create career fields focused on software development, career fields focused on data science, and career fields focused on artificial intelligence for both commissioned officers and enlisted personnel, and, as appropriate, warrant officers.
 - o Military personnel should be able to join these career fields either upon entry into the military, or by transferring into the field after serving a period in another career field. These career fields should have options that allow personnel to either follow a path to senior leadership positions, or specialize and focus on technical skill sets. Those that specialize and focus on technical skill sets should not have to leave their focus area and move into management positions to continue to promote. Legislation should not restrict the military services to only two career fields, but rather require each service to create at least two career fields, and more at their discretion. The military services should be required to create the career fields within one year of passage of legislation.

Actions for the Military Services:

- **Create career fields that allow military personnel to focus on software development, career fields that allow military personnel to focus on data science, and career fields that allow military personnel to focus on artificial intelligence.**
 - o While remaining consistent with service personnel policies and procedures, these career fields should be open to both enlisted personnel and commissioned officers, and, as appropriate, warrant officers.
 - o Military personnel should be able to join these career fields either upon entry into the military, or by transferring into the field after serving a period in another career field.

- o These career fields should have options that allow personnel to either follow a path to senior leadership positions, or specialize and focus on technical skill sets. Those that specialize and focus on technical skill sets should not have to leave their focus area and move into management positions to continue to promote.

Recommendation

Recommendation: Provide Government Technologists with World-Class Tools, Data Sets, and Infrastructure.

Highly skilled technologists working in government are regularly denied access to software engineering tools. They have to jump bureaucratic hurdles to accomplish basic job functions such as sharing source code or downloading data sets, leading to frustration and periods of idling. To perform meaningful work in government, employees within the digital workforce need access to enterprise-level software capabilities at par with those found in the private sector. Capabilities include software engineering tools, access to software libraries, open-source support, and infrastructure for large-scale collaboration. Employees within the AI career field in particular will need access to further specialized resources such as curated data sets and compute power.

In order to be effective, developers need to be able to find and view source code written by other developers before them. Being unaware of existing code repositories often leads to writing redundant software that meets a different set of quality standards and robustness than existing software. To prevent this, each member of the AI career field needs access to a shared, enterprise-level repository of AI software and tools, similar to that recommended in Chapter 2 of this report for the Department of Defense. This repository should house source code available to all AI developers within a government agency.

Each government agency should create enterprise-scale solutions for source code management across multiple software projects. This does not mean that every developer in an agency will be able to modify every single project in a repository—with protocols for delegated access, a system administrator can set project-specific read and write permissions for each AI developer. New software projects should be set up to allow ubiquitous unit testing as code is written, and automatic integration into a code review process to ensure robust and bug-free output. Following these guidelines will promote a culture of software engineering excellence, emphasizing to technologists that it is possible to work in government while remaining at the forefront of a digital field.

For new developers who join an agency, onboarding procedures must include separate instructions for pushing their new code to this repository as well as instructions on how to navigate the software catalog and search for existing source code.

All career fields also need unobstructed access to the latest open-source libraries and tools. Over time, technologists develop individual preferences for their software development environment, opting for custom software development kits (SDKs), debugging tools, cloud tools, version control software, and data visualization platforms on local machines. To

ensure productivity and developer satisfaction, agencies must give each developer the authority to install vetted, authorized tools on their local machines.

AI developers use open-source software libraries for training machine learning models and making them production-ready for real-world use. To harness the full power of these essential libraries, AI developers should have access to vetted libraries, but also to compute power while training their machine learning models. Models train very slowly on a local machine because of the complexity of underlying mathematical calculations in the training process. As a result, AI developers prefer to train them rapidly through automatic deployment pipelines on commercially available platforms, or another external service. Smoothing the transition from local software development to cloud services is critical for any organization using AI and ML.³¹

Actions for Departments and Agencies (including, but not limited to, the Department of Energy, Department of Homeland Security, Department of State, Department of Commerce, and Department of Justice):³²

- **Ensure software developers and engineers, data scientists, and AI practitioners:**

- o Have access to systems with capabilities comparable to Repo One and Platform One.
- o Are authorized to install custom software licenses, debugging tools, cloud deployment tools, version control software, and data visualization platforms on their computers.
- o Have agency-specific resources for cloud-based compute power that AI developers can harness to train machine learning models with greater speed.

Blueprint for Action: Chapter 6 - Endnotes

¹ Jim Perkins, et al., *Don't Just Copy and Paste: A Better Model for Managing Military Technologists, War on the Rocks* (Aug. 24, 2020), <https://warontherocks.com/2020/08/dont-just-copy-and-paste-a-better-model-for-managing-military-technologists/>.

² These fields were selected from a combination of NSCAI's Third Quarter recommendations and Partnership for Public Service's *Tech Talent for 21st Century Government*. See *Interim Report and Third Quarter Recommendations*, NSCAI (October 2020), <https://www.nscai.gov/previous-reports/Tech-Talent-for-21st-Century-Government>, Partnership for Public Service: *Tech Talent Project* (April 2020), <https://ourpublicservice.org/wp-content/uploads/2020/04/Tech-Talent-for-21st-Century-Government.pdf>.

³ A special government employee is "an officer or employee of the executive or legislative branch of the United States Government . . . who is retained, designated, appointed, or employed to perform, with or without compensation, for not to exceed one hundred and thirty days during any period of three hundred and sixty-five consecutive days." 18 U.S.C. § 202.

⁴ Members of the military reserves typically serve two to three days a month, and one 14-day obligation a year, averaging around 38 days a year.

⁵ Organizations that employ full-time technical experts in temporary positions, such as the United States Digital Service or Defense Digital Service, already exist, and have proven successful. The NRDC is an alternative for experts that cannot or do not want to pursue a full-time route.

⁶ Some administrative functions, such as background checks, security clearance processing, processing tax paperwork, and others, would place an unnecessary burden on local nodes and should be addressed by a central body such as OMB.

⁷ *Uniformed Services Employment and Reemployment Rights Act of 1994*, U.S. Department of Justice (Aug. 6, 2015), <https://www.justice.gov/crt-military/userra-statute>.

⁸ Frank Whitney, *Employment Rights of the National Guard & Reserve*, U.S. Department of Justice (last accessed Jan. 1, 2021), <https://www.justice.gov/sites/default/files/usao-ednc/legacy/2011/04/29/EmploymentRights.pdf>.

⁹ All reservists would apply for security clearances, but this should not imply that reservists would work primarily on classified materials. A large part of the work needed to modernize the government is unclassified.

¹⁰ The Defense Civil Training Corps was created by the National Defense Authorization Act for Fiscal Year 2020. See Pub. Law 116-92, sec. 860, National Defense Authorization Act for Fiscal Year 2020, 116th Congress (2019).

¹¹ Engagement with government officials on Aug. 22, 2019, Feb. 7, 2020, and March 9, 2020.

¹² *CyberCorps: Scholarship for Service*, U.S. Office of Personnel Management (last accessed Jan. 1, 2021), <https://www.sfs.opm.gov/>.

¹³ Code.org (last accessed Jan. 11, 2021), <https://code.org/promote>. See also Oren Etzioni, *What Trump's Executive Order on AI Is Missing: America Needs a Special Visa Program Aimed at Attracting More AI Experts and Specialists*, *Wired* (Feb. 13, 2019), <https://www.wired.com/story/what-trumps-executive-order-on-ai-is-missing/>.

¹⁴ The USDSA should also have the authority to accept gifts, particularly to help fund its establishment.

¹⁵ The Council on Foreign Relations report, *Innovation and National Security: Keeping Our Edge*, recommends creating a digital military service academy. James Manyika & William McRaven, *Innovation and National Security: Keeping Our Edge*, Council on Foreign Relations (September 2019), <https://www.cfr.org/report/keeping-our-edge/>. Our recommendation is for a civilian digital service academy that would not produce any uniformed military personnel.

¹⁶ The five academies include the United States Military Academy, the United States Naval Academy, the United States Coast Guard Academy, the United States Merchant Marine Academy, and the United States Air Force Academy.

¹⁷ Joseph Moreno & Robert Scales, *The Military Academies Strike Back*, The Chronicle of Higher Education (Nov. 12, 2012), <https://www.chronicle.com/article/the-military-academies-strike-back/>. As an example, 5 Secretaries of the Navy, 29 Chiefs of Naval Operations, and nine Commandants of the Marine Corps graduated from the United States Naval Academy.

¹⁸ Each military service academy has a maximum and minimum number of positions available for every available career field, causing some graduates to receive career fields other than their first choice. Similarly, USDSA graduating classes would have a minimum and maximum number of civilian graduates that join each military department or government agency.

¹⁹ The military service academies are accredited by different regional accreditation organizations recognized by the U.S. Secretary of Education and Council for Higher Education. Their engineering programs are generally accredited by the Accreditation Board for Engineering and Technology, Inc.

²⁰ State approval and accreditation are not the same, but both are required.

²¹ Recruitment will rely on private-sector champions to recruit high-profile adjunct faculty that can serve as beacons that will attract additional faculty and high-quality students.

²² The Computing Accreditation Commission on Colleges of Accreditation Board for Engineering and Technology is a nonprofit, ISO 9001 certified organization that accredits college and university programs in applied and natural science, computing, engineering, and engineering technology.

²³ For comparison, since 2001, C:SFS has had 3,600 graduates, or about 189 graduates per year, according to program officials NSCAI spoke with on March 9, 2020.

²⁴ This analysis is based on the NSCAI staff conducting more than 100 interviews with government officials between May 2019 and May 2020. This feedback has emerged as a common theme in nearly all of NSCAI's workforce discussions. See e.g., NSCAI interviews with government officials (June 7, 2019); NSCAI interviews with government officials (May 17, 2019).

²⁵ NSCAI staff interview with a private-sector company (Sept. 9, 2019); NSCAI staff interview with a private-sector company (Sept. 19, 2019); NSCAI staff interview with a private-sector company (April 24, 2020).

²⁶ NSCAI staff interviews with government and private-sector senior leaders (May 6, 2020).

²⁷ *Workforce Now: Responding to the Digital Readiness Crisis in Today's Military*, Defense Innovation Board at 1-7 (2019), https://media.defense.gov/2019/Oct/31/2002204196/-1/-1/0/WORKFORCE_NOW.PDF.

²⁸ NSCAI staff has interviewed several ORSA personnel performing AI-related tasks. All agreed when asked that a separate career field for artificial intelligence or data science is needed. Existing initiatives make some progress, but do not adequately address the lack of career fields for digital talent.

²⁹ The NSCAI staff conducted more than 100 interviews with government officials between May 2019 and May 2020. This feedback has emerged as a common theme in nearly all of NSCAI's workforce discussions. See e.g., NSCAI interviews with government officials (June 7, 2019); NSCAI interviews with government officials (May 17, 2019).

³⁰ NSCAI's *First Quarter Recommendations* included an addition to the Armed Services Vocational Aptitude Battery to test for computational thinking that would help identify aptitude and a test for coding language proficiency that would help identify skill. *First Quarter Recommendations*, NSCAI at 33-35 (March 2020), <https://www.nscail.gov/previous-reports/>. Both tests will be helpful, but will not meet their full utility without digital career fields. In conversations with NSCAI, numerous government officials continuously identified a lack of digital career fields as a key impediment to talent management. See e.g., NSCAI interviews with government officials (June 7, 2019); NSCAI interviews with government officials (May 17, 2019).

³¹ *2020 Interim Report and Third Quarter Recommendations*, NSCAI at 37-38 (October 2020), <https://www.nscail.gov/previous-reports/>.

³² See Chapter 2 of this report for a detailed description of how DoD would implement this plan.