



Science & Technology Highlights

*in the First Year of the
Trump Administration*

“We’re on the verge of new technological revolutions that could improve, virtually, every aspect of our lives, create vast new wealth for American workers and families, and open up bold, new frontiers in science, medicine, and communication.”

– President Donald J. Trump

Foreword

Since President Trump’s inauguration, the Office of Science and Technology Policy (OSTP) has built a robust team of over 50 staff members, including a corps of scientists and engineers, policymakers, and academics to advise the President on science and technology (S&T), support the President’s agenda, and ensure that S&T efforts across the Executive Branch are effectively coordinated. OSTP policy advisors are providing expert advice and developing policies on a wide range of topics, including advanced manufacturing, artificial intelligence, autonomous systems, biotechnology, cybersecurity, digital economy, disaster preparedness, healthcare, infectious diseases, information technology, medicine, nanotechnology, nuclear energy, ocean science, quantum information sciences, space and aeronautics, and telecommunications, among others.

The Trump Administration is committed to advancing technological development and conducting research and development (R&D) to ensure national security, grow the economy, create well-paying jobs, and improve the lives of Americans across this great nation. Over the past year, OSTP has led coordinated Administration efforts to promote emerging technologies, empower Americans to innovate, and defend American technologies abroad.

President Trump demonstrated his commitment to the importance of Federal scientific exploration by requesting \$151.2 billion for Federal R&D investment in the FY 2018 budget – a 2% increase over FY 2017.¹ Furthermore, the President’s FY 2018 Budget Request would result in the highest percent of the budget for the conduct of R&D since the FY 2014 Budget Request.² In August, OSTP and OMB released the annual Administration R&D budget priorities for FY 2019, advising agencies to prioritize basic and early-stage applied research, the foundation for the development of transformative commercial products and services.

In March, President Trump established the White House Office of American Innovation (OAI) to develop policies and plans that improve government services and launch initiatives focused on innovation. Three months later, OSTP and OAI co-hosted the Administration’s Technology Week, bringing top tech executives to the White House for discussions with the President and senior Administration leadership. As part of Technology Week, OSTP hosted the American Leadership in Emerging Technology Summit to work with industry leaders to identify barriers to developing technologies in the United States.

OSTP led the international delegation at the G7 Information and Communications Technology Ministerial in Italy, and has been instrumental in Administration efforts to promote the free flow of data, prevent requirements for data localization, and maintain open markets while standing firm against unfair trade practices. The Trump Administration also signed the first bilateral S&T agreement with the United Kingdom, creating a pathway for collaboration on scientific initiatives that will benefit the nation and the entire world.

OSTP led a robust agenda of interagency coordination activities, convening senior leadership from across the Federal Government to discuss department and agency S&T priorities and set a path for future collaboration through OSTP’s leadership of the National Science and Technology Council (NSTC). In recognition of the cross-cutting nature of policies related to tech transfer, infrastructure utilization, open data, and workforce development, OSTP created a new NSTC Committee on the S&T Enterprise, to be co-chaired by the Directors of the National Science Foundation, the National Institute of Standards and Technology, and the Undersecretary of Energy for Science.

This document provides a selection of the tremendous S&T achievements by the Trump Administration to date.

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Artificial Intelligence & Autonomy

*“[T]he next generation of technological breakthroughs that will transform our lives and transform our country, and make us number one in this field.”*³

Removing regulatory barriers to commercializing autonomous systems. At the American Leadership in Emerging Technologies summit, the White House convened leaders from the commercial drone industry to discuss regulatory barriers to advancements in the use of drones for applications including package delivery, emergency management, and critical infrastructure inspection.

Integrating drones into the National Airspace System. On October 25, President Trump directed the Secretary of Transportation to establish an Unmanned Aircraft Systems (UAS) Integration Pilot Program.⁴ The pilot program will spur state, local, and tribal jurisdictions to work with the Federal Aviation Administration (FAA) to gain regulatory approval for innovative commercial UAS operations in their jurisdictions. The program will be coordinated with ongoing testing conducted at FAA UAS test sites and Federal efforts to develop a UAS traffic management system, and brings the nation one step closer to fully integrating drones into our national airspace system and realizing the significant job opportunities and economic benefits associated with this emerging technology.

Enabling the safe deployment of automated vehicles onto American roads. On September 12, the U.S. Department of Transportation released *Automated Driving Systems: A Vision for Safety 2.0*, an update to the 2016 Federal Automated Vehicles Policy and an important step in the development and deployment of automated driving systems (ADS) in the United States.⁵ The new policy will ensure innovation in automated vehicle technologies, increase the safety of American roadways, and provide for a consistent ADS regulatory framework. Three months later, the Secretary of Transportation announced the publication of several requests for information seeking public input from across the transportation industry on ADS.⁶ The

Trump Administration will use the public input to further integrate automated driving systems into the national highway system and remove regulatory barriers to innovation in automated safety technologies.

Using machine learning to improve patient health outcomes. In April, The Department of Energy (DOE) teamed up with the Department of Veterans Affairs (VA) to launch the Million Veteran Program (MVP) Computational Health Analytics for Medical Precision to Improve Outcomes Now (CHAMPION).⁷ The MVP CHAMPION program pairs VA data on millions of veterans and health data from other Federal agencies with high performance computing infrastructure at DOE National Laboratories to apply AI techniques to analyze large quantities of data. This VA-led effort will initially focus on patient specific analysis for suicide prevention, discerning lethal from non-lethal prostate cancer, and enhancing prediction and diagnosis of cardio-vascular disease.⁸

Biomedical Innovation

*“To speed access to breakthrough cures and affordable generic drugs, last year the FDA approved more new and generic drugs and medical devices than ever before in our history.”*⁹

Approving novel, innovative medical drugs and treatments. Last year, the U.S. Food and Drug Administration (FDA) approved more new drugs than any year before in history. That includes 1,027 generic drugs, 56 novel drugs and biologics, and 95 novel devices.¹⁰ Over the past year, the FDA also approved the first drug with a digital ingestion tracking system, the first two biosimilars for cancer treatment, and in August, the first three gene therapies in the United States.^{11, 12, 13, 14, 15}

Streamlining biomedical grant processes and research sharing. The Department of Health and Human Services (HHS) streamlined the grant review process at the National Institute of Allergy and Infectious Diseases by developing an electronic tool to eliminate manual processes and reduce the time required to review grants. In May, the National Institutes of Health

(NIH) altered a longtime policy to allow researchers to share “preprints,” or draft research that has not undergone peer review, in order to speed up the process of scientific dialogue and discovery.¹⁶

Streamlining digital health product oversight. In July, the FDA announced a Digital Health Innovation Action Plan to promote and oversee innovation within digital medical devices.¹⁷ The plan provides clear guidance on medical software provisions in the 21st Century Cures legislation and launches an innovative pilot precertification program to develop a new approach to digital health technology oversight.

Improving the usability of health information technology (IT). HHS announced two departmental priorities for health IT: improving the usability of health IT while reducing its burden on providers and making sure that health information is interoperable. In addition to improving health IT, the Administration has worked hard to make healthcare data publicly available for the health services research community. In September, the Agency for Healthcare Research and Quality released the nation’s first publicly available database that provides a snapshot of the over 600 health systems across the nation.¹⁸

Connectivity

“Americans need access to reliable, affordable broadband internet service to succeed in today’s information-driven, global economy.”¹⁹

Promoting agriculture and rural prosperity through internet access. On April 25, President Trump signed an Executive Order establishing an interagency Task Force on Agriculture and Rural Prosperity.²⁰ In response to the Executive Order, the task force delivered a report to the President with recommendations for improving life in rural America.²¹ The recommendations centered around five areas, notably, the importance of access to robust high-speed broadband internet. The Administration and key Agencies continue to implement the recommendations from that report.

Highlighting the importance of 5G and IoT. On June 22, at the American Leadership in Emerging Technologies summit at the White House, President Trump hosted a roundtable with industry leaders to discuss opportunities and challenges facing innovative new

technologies, including 5G and the Internet of Things.

Streamlining and reducing the costs of broadband deployment. On January 8, 2018, President Trump took two executive actions to facilitate broadband deployment across the country. The President signed an Executive Order streamlining and expediting requests to locate broadband facilities on Federal lands in rural America.²² The Executive Order will improve the processing by the General Services Administration of applications for siting telecommunications infrastructure on Federal lands, and will promote and speed deployment. President Trump also issued a Presidential Memorandum to the Secretary of the Interior, directing the Department of the Interior (DOI) to support rural broadband deployment by increasing access to tower facilities and other assets owned by DOI.²³ Making this infrastructure available to broadband providers could help lower the cost of broadband deployment and encourage investment in hard to serve areas of the country.

Dynamically managing the RF spectrum. In December, the preliminary round of the DARPA Spectrum Collaboration Challenges (SC2) was held, a first-of-its-kind collaborative machine-learning competition to autonomously manage the increasingly congested radiofrequency spectrum.²⁴ In support of SC2, DARPA built a server testbed that allows for the emulation of tens of thousands possible interactions between hundreds of wireless communication devices in real-time. Over three years, teams from academia and industry will compete in this challenge, and will have access to the DARPA server to test designs.

Cybersecurity & Government IT Services

“Our goal is to lead a sweeping transformation of the Federal Government’s technology that will deliver dramatically better services for citizens and stronger protection from cyberattacks.”²⁵

Establishing executive leadership on modernizing government IT services. On April 28, President Trump signed Executive Order 13794—Establishment of the American Technology Council.²⁶ This cabinet-level

council was formed to transform and modernize Federal IT and digital services by advising the President on and coordinating national strategy for Federal use and provision of IT services. The American Technology Council delivered the Federal IT Modernization Report on December 13.²⁷ This report was developed using an open and collaborative process with significant industry input, and resulted in a plan with 50 actions to dramatically accelerate IT Modernization plans across the Federal Government. The majority of these tasks will be completed within the first six months of 2018.

Driving implementation of government IT modernization. The Administration worked with Congress to pass the 2018 National Defense Authorization Act, which included a section on modernizing government technology.²⁸ The legislation created a central pool of funding for Federal agencies to use in modernizing IT systems, and granted the authority to 24 CFO Act Agencies to create their own working capital funds to better allocate funding towards modernization projects. In addition, the Office of American Innovation devised and implemented a strategy to stand up centers of excellence at the General Services Administration to provide much needed expertise to enable Agencies to modernize their IT in the most efficient and secure manner.

Strengthening cybersecurity of Federal networks and critical infrastructure. On May 11, President Trump signed Executive Order 13800—Strengthening the Cybersecurity of Federal Networks and Critical Infrastructure.²⁹ This order emphasized accountability of Agency heads for their cybersecurity posture and charged components of the government to assess and develop plans to address significant cybersecurity issues. A month later, President Trump hosted CEOs of leading technology companies for a half-day meeting to discuss in-depth topics including commercial cloud and cybersecurity. These discussions helped to inform the Administration’s plans for modernizing Federal IT.

Updated framework for critical infrastructure cybersecurity. On December 5, the National Institute for Standards and Technology released the second draft of the proposed update to the Framework for Improving Critical Infrastructure Cybersecurity.³⁰ The revised draft incorporated feedback from a public review process, and clarifies and refines the framework to simplify its use for industry, Federal, and other organizations.

Digital Economy

“It is the policy of the executive branch to promote an open, interoperable, reliable, and secure internet that fosters efficiency, innovation, communication, and economic prosperity”³¹

Facilitating the development of the digital economy. At the American Leadership in Emerging Technologies summit, the White House convened business leaders to discuss regulatory barriers to advancements in communications technology. President Trump heard from industry leaders about the importance of the Internet of Things and 5G communications for our nation’s economic growth. On November 11, President Trump participated in the Asia-Pacific Economic Cooperation Economic Leaders’ Meeting and pledged to consider actions to facilitate the development of the Internet and digital economy, including e-commerce and digital trade.³²

Preventing international restrictions on digital trade and cross-border data flows. On July 17, the Office of the U.S. Trade Representative (USTR) announced negotiating objectives for the North American Free Trade Agreement to advance digital trade. USTR objectives include advancing data flows, preventing forced data localization and government-mandated disclosure of computer source code or algorithms, and ensuring non-discriminatory treatment of digital products.³³ On September 26, Deputy Assistant to the President Michael Kratsios served as the U.S. Head of Delegation to the G7 ICT Ministerial as part of the G7 Innovation Week. OSTP worked with other countries to prevent regulatory barriers to the digital economy, promote the flow of information, and oppose data localization requirements.^{34, 35}

Promoting the free flow of information. On September 15, the White House voiced its commitment to the EU-U.S. Privacy Shield before the first joint review of the initiative.³⁶ Programs like the Privacy Shield and the Asia-Pacific Economic Cooperation Cross-Border Privacy Rules system enable the free flow of information, which sustains the nearly \$1 trillion in goods and services trade across the Atlantic, and even more around the globe. These positions are cemented in the Administration’s National Security Strategy that commits to advocating for open, interoperable communications, with minimal barriers to the global exchange

of information and services, and continued promotion of the free flow of data.³⁷

Energy Dominance

*“The truth is that we have near-limitless supplies of energy in our country. Powered by new innovation and technology, we are now on the cusp of a true energy revolution.”*³⁸

Reviving and expanding the domestic nuclear energy sector. During the Unleashing American Energy event in June, President Trump called for a “complete review of U.S. nuclear energy policy” in order to “revive and expand our nuclear energy sector.”³⁹ The White House is leading the nuclear policy review, which includes a focus on restoring U.S. nuclear R&D capabilities and enabling innovation in the development and deployment of new reactors.

Reducing barriers to accelerate American energy innovation. On November 13, the Secretary of Energy announced the authorization for National Laboratory contractors to use Agreements for Commercializing Technology (ACT).⁴⁰ Building on the successful completion of a six-year pilot, the authorization adds a new and powerful technology transfer tool to help unleash American energy innovation by removing barriers for businesses and other entities interested in working with DOE’s National Laboratories.

Resuming operations of domestic nuclear test facilities. For the first time in 23 years, the U.S. Department of Energy has resumed operations at the Transient Reactor Test Facility (TREAT).⁴¹ TREAT is a crucial part of the nation’s nuclear R&D infrastructure, and provides the capability to test nuclear reactor fuels and materials under extreme conditions. Such testing can help to improve safety and performance of the current and future nuclear reactor fleet.

Homeland Defense & National Security

*“Our government's first duty is to its people, to our citizens — to serve their needs, to ensure their safety, to preserve their rights, and to defend their values.”*⁴²

Prioritizing U.S. leadership in emerging technologies for national security. On December 18, President Trump signed a new National Security Strategy that calls on America to lead in research, technology, invention, and innovation.⁴³ The strategy prioritizes “emerging technologies critical to economic growth and security,” including autonomous technologies, gene editing, nanotechnology, advanced computing, and artificial intelligence. The strategy also commits to encouraging scientists and nurturing an innovation economy that improves Science, Technology, Engineering, and Mathematics (STEM) education and invests in R&D.

Developing a technologically advanced nuclear deterrent. On January 27, President Trump signed National Security Presidential Memorandum (NSPM)-1 on Rebuilding the U.S. Armed Forces.⁴⁴ NSPM-1 directed the Secretary of Defense to conduct a new Nuclear Posture Review (NPR) to ensure that the United States nuclear deterrent is modern, flexible, resilient, and able to deter technologically advanced threats. The 2018 NPR, released on February 2, 2018, highlights the critical role of scientists and engineers to maintain a modern nuclear weapons infrastructure and calls for rapid implementation of expanding opportunities for young scientists and engineers to advance warhead design, development, and production skills.⁴⁵ The NPR also asserts that the United States will “remain at the forefront of science and technology” to reduce the likelihood of technological surprise.

Funding research and development to strengthen national missile-defense capabilities. NSPM-1 also directed the Secretary of Defense to conduct a new Ballistic Missile Defense Review to identify ways of strengthening missile-defense capabilities, rebalancing homeland and theater defense priorities, and highlighting priority funding areas. In November, President Trump requested that Congress provide an additional \$4 billion “to support urgent missile defeat and defense enhancements to counter the threat from North

Korea.”⁴⁶ On December 22, the President signed H.R. 1370, which provided the requested funding enhancement, including over \$2 billion for associated research, development, test, and evaluation (RDT&E).⁴⁷

Opioid Epidemic Response

*“In this enormous struggle against drug addiction, an opioid epidemic...our greatest hope is the same as it has always been. Through every trial America has encountered throughout our history, the spirit of our people and the strength of our character, we win.”*⁴⁸

Improving the Federal response to drug addiction and the opioid crisis. On March 29, President Trump established the President’s Commission on Combating Drug Addiction and the Opioid Crisis.⁴⁹ The Commission was tasked with studying the scope and effectiveness of the Federal response to drug addiction and the opioid crisis and released their report on November 1, making 56 recommendations to the President for improving that response.⁵⁰ On October 26, the Administration declared a nationwide public health emergency to address the opioid crisis.⁵¹ In December, the Trump Administration responded to the final recommendations of the Commission with commitments to action across nine overarching goals.⁵²

Taking action to combat the opioid crisis. In April, the Department of Health and Human Services (HHS) outlined a five-point strategy to combatting the opioid crisis, including providing support for cutting edge research on pain and addiction.⁵³ In August, the Centers for Disease Control (CDC) released the first annual report covering the latest data available on rates of opioid prescription, substance use disorder, and overdose deaths.⁵⁴ In November, FDA issued a final guidance on developing generic abuse-deterrent opioids to encourage industry to move away from opioid formulations that can more easily be manipulated or abused.⁵⁵ In December, HHS held a national opioids code-a-thon, bringing together 50 teams of computer scientists to derive insights and solutions for the epidemic from HHS data sets.⁵⁶ In conjunction with the opioid code-a-thon, HHS hosted an opioid symposium that brought together those on the front lines of the opioid epidemic to promote innovative ways that

technology and data can be used to address the national crisis.⁵⁷

Coordinating opioid-related health R&D. On December 11, OSTP convened an interagency Fast-Track Action Committee (FTAC) under the NSTC to coordinate health research and development in support of the Trump Administration’s opioid response. The Opioid FTAC directly addresses the R&D coordination recommendations of the President’s Commission on Combating Drug Addiction and the Opioid Crisis, and will deliver a roadmap for opioid-related health R&D.⁵⁸

Scientific Discovery

*“Americans fill the world with art and music. They push the bounds of science and discovery... And it is the people who are making America great again.”*⁵⁹

Supporting Nobel Prize-worthy research. In 2017, eight National Science Foundation (NSF)-sponsored scientists were awarded Nobel Prizes in physics, chemistry, medicine, and economics.⁶⁰ With the support of NSF funding, the 2017 Nobel laureates made tremendous advancements in the fields of circadian biology, behavioral economics, gravitational waves, and cryo-electron microscopy. In addition to those high profile projects, research funded by NSF in 2017 also included exploring the potential use of CRISPR-Cas9 for treatment of genetic disorders and development of targeted cancer therapies; the application of atomic spin magnetometers for medical diagnostic applications; the improvement of weather warning systems for disaster response; and the deployment of agricultural monitoring instrumentation to inform crop management.^{61, 62, 63, 64}

Conducting Grade-A Research at National Laboratories. In 2017, national user facilities at DOE and NIST supported tens of thousands of researchers from academia, industry, and government laboratories to conduct transformative scientific research. For the first time since FY 2013, the 10 Office of Science National Laboratories all scored A- or higher on their laboratory performance report cards for the quality and productivity of their R&D.⁶⁵ In September, the \$338 million 12GeV Upgrade Project of the Continuous Electron Beam Accelerator Facility at the DOE Jefferson Lab was completed, enabling much more precise study of

the fundamental physics of subatomic particles.⁶⁶ Additional research highlights from national scientific user facilities included the development of more effective Zika vaccines, the realization of new classes of materials for use in supercomputers, and the demonstration of high-flow membranes for energy-efficient water purification.^{67, 68, 69}

Building new research facilities for international experiments. In July, construction began on the Long Baseline Neutrino Facility (LBNF) in South Dakota, the future site of the Deep Underground Neutrino Experiment (DUNE).⁷⁰ The DUNE experiment will require LBNF researchers to work with scientists at DOE’s Fermi National Accelerator Lab to generate a neutrino beam in Illinois and detect neutrino interactions at the detector in South Dakota. LBNF/DUNE will be built and operated by 1,000 scientists and engineers from 30 countries – the largest experiment ever constructed in the United States to study neutrinos.

Space Exploration

“We’re a nation of pioneers, and the next great American frontier is space.”⁷¹

Reviving the National Space Council. On June 30, President Trump signed an Executive Order to revive the National Space Council.⁷² The council operated previously from 1989-1993, and an earlier version operated from 1958-1973. The council serves as a central hub guiding space policy within the Administration, and can help the nation achieve the many ambitious milestones we strive for today. The revival of the council is another demonstration of the Trump Administration’s recognition of the importance of space exploration to our economy, our nation, and the planet as a whole.

Enabling human expansion across the solar system. On December 11, President Trump signed Space Policy Directive – 1, the policy calls for the NASA administrator to “lead an innovative and sustainable program of exploration with commercial and international partners to enable human expansion across the solar system and to bring back to Earth new knowledge and opportunities.”⁷³ The effort will more effectively organize government, private industry, and international efforts toward returning humans to the Moon, and will lay the founda-

tion that will eventually enable human exploration of Mars.

Authorizing a focused plan for human exploration and commercialization of space. On March 21, President Trump signed the NASA Transition Authorization Act of 2017, the first comprehensive NASA authorization passed by Congress in more than six years.⁷⁴ The bill demonstrates strong bipartisan support for our nation’s space program and helps ensure that NASA remains at the forefront of exploration and discovery.

STEM Education

“Skills in STEM—including, in particular, computer science...open the door to jobs, strengthening the backbone of American ingenuity, driving solutions to complex problems across industries, and improving lives around the world.”⁷⁵

Prioritizing STEM and computer science education. On September 25, President Trump signed a Presidential Memorandum directing the Secretary of Education to prioritize high-quality STEM and computer science education when awarding competitive grant funding.⁷⁶ The memorandum also establishes a goal of devoting at least \$200 million annually in grant funds for this purpose, which was matched by a private industry commitment of \$300 million.⁷⁷

Inspiring the nation’s youth to pursue STEM careers. On February 28, President Trump signed the Inspiring the Next Space Pioneers, Innovators, Researchers, and Explorers (INSPIRE) Women Act into law.⁷⁸ The INSPIRE Women Act called on the NASA Administrator to encourage women and girls to pursue STEM education and careers in aerospace by supporting related NASA initiatives. On July 26, President Trump donated his second-quarter salary to the Department of Education to host a STEM-focused camp for students.⁷⁹ The Trump Administration has also continued senior level attendance at STEM gatherings across the country, including the National Science Bowl, the U.S.A. Mathematical Olympiad, and the FIRST Global Challenge.

Training Americans for the jobs of the future. On June

15, President Trump signed an Executive Order designed to expand apprenticeships and improve job-training programs for the American people.⁸⁰ The Executive Order allows industry to develop industry-recognized apprenticeship guidelines, directs the U.S. Department of Labor to use available funding to promote

apprenticeships, and establishes the Task Force on Apprenticeship Expansion. These actions will help Americans develop the right technical skills for the jobs of tomorrow through innovative apprenticeship and job training programs.

Conclusion

These highlights represent only a fraction of the tremendous scientific and technological work conducted across the Federal Government. Every day, Federal scientists and policymakers advance the frontiers of human knowledge and inform national policy to deliver the benefits of these advances to the American people. OSTP looks forward to continuing to advocate for American scientists and technologists in the year ahead, and working together to ensure that the United States continues to lead the world in technological innovation and scientific discovery.

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