

U.S. Senate Committee on Commerce, Science, and Transportation
Nominations Hearing on July 20, 2022
Questions for the Record – Minority

Arati Prabhakar, of California, to be Director of the Office of Science and Technology Policy

Ranking Member Roger Wicker

Question 1: Emerging Technologies

The Office of Science and Technology Policy (OSTP) is a leader in the cross-government effort to engage with emerging technologies. Next year, Congress will have to reauthorize the National Quantum Initiative. Congress has expressed to the Department of Energy and to the National Institute of Standards and Technology (NIST) a desire to have the quantum efforts be focused on a wide variety of technologies. In light of this, Congress was careful to ensure that engagement with the quantum industry be inclusive of the wide variety of quantum technologies, ensuring not to overestimate the winners and losers in this emerging field.

- *Dr. Prabhakar, please tell us about your position on engagement with the quantum and artificial intelligence industry. Will you ensure that OSTP and government efforts to engage with industries of the future, such as quantum and artificial intelligence, be technology-neutral and inclusive of the wide variety of emerging technologies?*

Response: A robust U.S. R&D ecosystem is vital for advanced technologies of all types. Creating this environment requires active partnerships with a range of stakeholders across the federal government and with universities and industry. If confirmed, I will work to ensure that as OSTP promotes technologies that are essential for our national and economic security, including quantum and artificial intelligence, its efforts embrace a wide variety of technical approaches and actors.

Question 2: Update on Research Security Under the NSPM-33

In the final days of office, the Trump Administration issued a Presidential Research Security Directive 33 (NSPM-33) to strengthen protections of United States Government-supported Research and Development (R&D) against foreign government interference and exploitation. In January, the OSTP and the National Science and Technology Council (NSTC) Subcommittee on Research Security issued guidance to Federal departments and agencies regarding the implementation of NSPM-33.

- *Dr. Prabhakar, can you provide an update on where the implementation of NSPM-33 stands today? As director of OSTP, how will you ensure the integrity of federally sponsored research, and will you promise to uphold research security?*

Response: I understand that OSTP issued implementation guidance for NSPM-33 in January 2022 and that it continues to coordinate the protection of federally funded R&D from foreign interference while maintaining openness in basic research. The reality of today's geopolitics means that this work is critical to the nation's safety, security, and prosperity. It can and must be done in ways that respect individual

researchers, including those who came to our shores from other nations and are now part of the American science and technology community. If confirmed, I will work to protect the security of the American research enterprise while upholding our core values of integrity, equity, and the elimination of prejudice and discrimination.

Question 3: Research Security and Intellectual Property

Continuing on the topic of Research Security, China is fast becoming a science and technology powerhouse. We know that Beijing will cross any line to dominate critical technology sectors such as artificial intelligence, quantum, and robotics. Chinese intellectual property theft is estimated to cost the United States as much as \$600 billion per year. Through talent recruitment programs like the Thousand Talents Program, China pays scientists at American universities to bring our knowledge and innovation back to China—including valuable, federally funded research. According to FBI Director Christopher Wray, “the greatest long-term threat to our nation’s information and intellectual property, and to our economic vitality, is the counterintelligence and economic espionage threat from China.”

- *Dr. Prabhakar, can you please outline what steps the Federal government can take alongside universities and industry to protect our valuable research from foreign espionage and to maintain a competitive advantage over countries like China?*

Response: To maintain our competitive advantage, the federal government, alongside universities and industry, can take several steps to protect our research enterprise from espionage by countries of concern, including China. For instance, I understand that OSTP and federal agencies' ongoing implementation of NSPM-33 is advancing clear, transparent, standardized approaches to research disclosures. If confirmed, I look forward to promoting research security and sustaining the competitiveness of America’s research enterprise.

Senator Ted Cruz

Question 1: General

President Biden has asked OSTP to focus on five big areas—learning public health lessons from the coronavirus pandemic; harnessing science and technology to tackle climate change; ensuring the U.S. can compete technologically, especially with China; guaranteeing that the fruits of science and technology are shared with all Americans; and ensuring the long-term health of American science and technology.

- *Of these, which do you believe is the most important and why?*

Response: These five areas are good examples of the many factors that will shape how the lives of many millions of Americans unfold. Good health, safety from conflict and weather extremes, the opportunity for a good job and a rising standard of living, equitable treatment for each American—all of these together lay the foundation that allows each of us the freedom to pursue our own American dream.

Question 2: Energy and Environment

If you are confirmed, what kind of recommendations would you propose to the President with regards to energy subsidies and tax credits?

- *Do you think energy subsidies are useful?*
- *If so, do you believe energy subsidies have the potential to distort the energy market in ways that can be detrimental to ensuring we have a stable and reliable power grid?*

If you are confirmed, what kind of role would OSTP play in determining climate policy?

Do you believe mandates or technological innovation is the most effective method for reducing emissions?

If confirmed, you will oversee the national approach to science and technology. Although you won't be their formal boss, what you focus on and what messages you push will have significant impacts on the grant-making agencies like NIH, NSF, and DOE Office of Science. As we discussed during your confirmation hearing, I have become increasingly concerned with how political agendas, especially relating to climate change, shape what grants are awarded, which in turn shapes what proposals are submitted, and creates a kind of feedback loop that runs a real risk of only funding science which validates the political narrative, and never that which challenges orthodoxy. This is the opposite of how science should operate. What will you do if confirmed to ensure there is robust funding for research into both sides of a scientific debate?

Following questions from Sen. Sullivan at your hearing, you confirmed that natural gas has been “critical” in the U.S. reducing emissions more than any other country in the world over the last 15 years. In Fall 2020, you published an article in the journal *Issues in Science and Technology* in which you said, “To avoid the most calamitous consequences of a changing climate, we will need to eliminate or offset essentially all greenhouse gas emissions by 2050”.

- *Therefore, wouldn't you agree we should focus on boosting natural gas production, which you've said is critical to emission reductions?*
- *If confirmed, will you advise President Biden to increase natural gas production?*

Response: In response to your questions “Do you think energy subsidies are useful?” and “Do you believe mandates or technological innovation is the most effective method for reducing emissions?”: These mechanisms are often complementary. Ultimately, the adoption and mass scale up of technological innovations is what it will take to reduce emissions. To start that process, a number of different policy measures are needed.

In response to your question “If you are confirmed, what kind of role would OSTP play in determining climate policy?”: OSTP’s mission is to maximize the benefits of science and technology to advance health, prosperity, security, environmental quality, and justice for all Americans. This includes informing policies for mitigation and adaptation that reflect a rigorous understanding of climate variability and change. OSTP also advances actionable information so that all Americans can prepare for, and enhance their resilience to, extreme weather and climate change.

In response to your question “What will you do if confirmed to ensure there is robust funding for research into both sides of a scientific debate?”: If confirmed, I will support the ongoing work led by OSTP to promote and protect scientific integrity, through for example the OSTP-led Scientific Integrity Task Force.

In response to your question “Therefore, wouldn’t you agree we should focus on boosting natural gas production, which you’ve said is critical to emission reductions?”: Natural gas is a critical part of the U.S. energy system today and the U.S. is also the world’s largest exporter of liquified natural gas. Demand for gas in the U.S. and worldwide is shifting in response to changing national and global energy and environmental policies, as well as the cost-competitiveness of alternative technologies. It is also clear that in the next few decades, emissions from burning natural gas and from uncontrolled methane releases must drop to near zero if we are to avoid even more extreme consequences from a changing climate. Consequently, it is difficult to anticipate gas demand. It’s up to private sector actors to make investment decisions based on their risk tolerance and their assessment of this evolving energy landscape.

In response to your question “If confirmed, will you advise President Biden to increase natural gas production?”: Along with other members of the Cabinet, I would advise President Biden to assess what is in the best interest of the security, economic, environment, and equity goals of the United States and act accordingly.

Question 3: 5G

- *What is your stance on the nationalization of 5G and future generations of broadband cellular networks?*
- *Last year, OSTP announced \$40 million in new funding to support research into next-generation telecommunication networks and systems. Do you know what specific technology is being worked on and how it can support our goal of expanding 5G?*

Response: I do not support the creation of a nationalized 5G network.

I understand that last year’s funding announcement highlighted a \$40 million investment in the Resilient and Intelligent Next-Generation Systems (RINGS) program. This is a National Science Foundation effort to advance research on future versions of the cellular, Wi-Fi, and satellite networks. My understanding is that this research aims to lay the groundwork for companies to provide faster service, greater resilience, and broader access in the U.S. and around the world.

Question 4: Artificial Intelligence

What do you think are the greatest promises and greatest challenges related to artificial intelligence (AI) and machine learning?

In its 2021 report, the National Security Commission on Artificial Intelligence called AI the “quintessential ‘dual use’ technology—it can be used for civilian and military purposes.” We have laws and regulatory regimes in place to prevent the spread of other dual use technologies—like those used in rocket technology. Those have been applied to the spread of advanced digital technologies, including for hardware like gaming consoles that has extensive computing power.

- *Is it possible to have similar controls for AI?*
- *If so, what would that look like?*

Response: AI is already unleashing economic growth and transforming military power—both for the U.S. and our competitors. However, the use of AI is posing risks to Americans’ privacy, civil rights, and civil liberties, making it vital to design, build, and implement AI responsibly. AI is powered by data, computing power, and algorithms—each of which can be protected using a variety of controls. If confirmed, I will continue OSTP’s work to promote responsible AI development and protect America’s AI advantage by exploring all policy responses.

Question 5: Civil Military Fusion/China

One of the hallmarks of the Western approach to science and research is that, generally speaking, there is minimal fusion between civilian scientific research and military scientific research. This is in contrast to say China, where it is near impossible to separate scientific research and development done for civilian purposes and what is done for military purposes. How will you approach maintaining our leadership in science and technology, while preserving this important bifurcation?

Because of the whole of government and in many cases whole of state approach China takes to technological dominance, one area where there has been increasing, bipartisan concern is espionage and the theft of American science and technology in academia. The open and collaborative nature of academia creates an environment which is ripe for exploitation by nefarious actors. I’ve legislated on this subject—specifically regarding the threat posed by Confucius Institutes and more broadly academic espionage.

- *If confirmed, what will your approach be to these challenges?*
- *And how, with what seems to be a renewed embrace of China, will you balance the need for security with the desire for collaboration?*

China’s dominance in the exploration and production of rare earth minerals has become an issue of increasing bipartisan concern. Last year I introduced the Onshoring Rare Earths Act, or ORE Act, to end U.S. dependence on China for rare earth elements and other critical minerals. Specifically, the bill provides tax incentives for the rare earths industry, including expanding and making permanent full-expensing provisions in the Tax Cuts and Jobs Act; requires the DOD to source rare earth minerals and critical elements from the U.S., and; establishes grants for pilot programs to develop these materials in the U.S. The rare earth industry is completely supportive of the bill.

- *Do you agree that it is critical to onshore the critical minerals supply chain?*

- *What is the best way to engage with you and the Administration to either directly move my legislation forward or secure those provisions through other vehicles?*

Response: In response to your question “How will you approach maintaining our leadership in science and technology, while preserving this important bifurcation?”: America’s innovation ecosystem is second to none. To preserve American competitiveness in science and technology, if confirmed, I will promote our innovation ecosystem’s unique strengths by promoting technology development that supports a diverse set of civilian and military missions that range from boosting American health outcomes to enhancing our national security.

In response to your questions “If confirmed, what will your approach be to these challenges?” and “And how, with what seems to be a renewed embrace of China, will you balance the need for security with the desire for collaboration?”: I understand that OSTP issued implementation guidance for NSPM-33 in January 2022 and that it continues to coordinate the protection of federally funded R&D from foreign interference while maintaining openness in basic research. Certain governments, including China, engage in espionage and theft. This reality of today’s geopolitics means that OSTP’s work is critical to the nation’s safety, security, and prosperity. It can and must be done in ways that respect individual researchers, including those who came to our shores from other nations and are now part of the American science and technology community. If confirmed, I will work to protect the security of the American research enterprise while upholding our core values of integrity, equity, and the elimination of prejudice and discrimination.

In response to your question: “Do you agree that it is critical to onshore the critical minerals supply chain?” Yes. It is also in the interest of the U.S. to work with our allies and partners to expand the number of countries that produce and process these materials.

In response to your question: “What is the best way to engage with you and the Administration to either directly move my legislation forward or secure those provisions through other vehicles?” If confirmed, I would be happy to work with you to identify the most promising actions to increase the security of supply chains for critical energy materials and technologies.

Question 6: Space

Do you support extending the operation and utilization of the International Space Station beyond 2024 to 2030?

What should our priorities be for our national space program?

Although it has come a long way, commercial space is still an emerging industry.

- *How do you think government should address creating safety standards for commercial space companies?*
- *Do you favor a more collaborative, industry driven approach?*

- *Or more of a top down, bureaucratic approach?*

How can we leverage the scientific enterprise of America and our allies to make sure that we fully utilize the International Space Station (ISS) to create new industries?

- *How should we approach replacing the ISS once it has reached the end of its useful life?*
- *Do you believe another government asset is the best approach?*
- *A commercially-developed space station? Or some hybrid of the two?*

What are your thoughts on the National Space Council?

- *Do you envision it playing a role under the Biden administration?*

Under Vice President Pence, the National Space Council made policy implementation its focus, and agencies were surprisingly responsive to direction. The Biden administration's space policy predominately has a theme of continuity, keeping in place many priorities of the Trump administration.

- *How will you make sure that the interagency process delivers on the goals that the President and Congress set for the nation?*

Response: In December 2021, NASA announced the Administration's commitment to extend International Space Station (ISS) operations until 2030, working with our international partners. For more than 20 years, the ISS has been a unique capability that has enabled research not possible on Earth. Without this extension, China would be the only nation with a permanent human presence in space. Now, NASA is funding public-private partnerships for commercial space stations to transition to after ISS.

I support the continuing work of the National Space Council under the leadership of Vice President Harris. Space operations are integral to American commercial and military interests, and shifting geopolitics makes space more important than ever. If confirmed, I look forward to partnering with other Space Council members and Congress to ensure strong U.S. leadership, capable of meeting the opportunities and the challenges in this critical domain.

Questions 7: Gain of Function Research

In 2014, OSTP directed a "pause" and risk assessment of GOF that referenced 'incidents' related to biosafety and biosecurity. The "pause" applied to GOF research related to "research projects that may be reasonably anticipated to confer attributes to influenza, MERS, or SARS viruses such that the virus would have enhanced pathogenicity and/or transmissibility in mammals via the respiratory route." Though there was a pause in federal GOF research due to perceived risk, HHS issued the 'Framework for Guiding Funding Decisions about Proposed Research Involving Enhanced Potential Pandemic Pathogens' in December 2017 and as a result, NIH lifted the pause of GOF research.

The National Institute of Allergy and Infectious Diseases (NIAID) also provided a nearly \$600,000 grant to EconoHealth to study bat coronavirus emergence at the Wuhan Institute of Virology. Subsequently, that grant was reauthorized for \$3.7 million over five years in 2019.

- *Do you support an independent investigation of OSTP's role in gain of function research?*

Response: This is an area of research that can be dangerous, but—when carefully conducted with appropriate guardrails—can be critically important to understand how a life-threatening virus might mutate. When we do research that has safety implications like this, it must be deeply thought through, and we have mechanisms to do that. For example, I understand that OSTP, in partnership with the National Security Council, is participating in a federal government-wide review of policies related to risks from biological events, as directed by Executive Order 13987, including research related to high-risk pathogens.

Question 8: Blockchain

The “Chips Plus” bill currently being considered in Congress includes a provision directing OSTP to “establish or designate a blockchain and cryptocurrencies advisory specialist position within the office to coordinate Federal activities and advise the President on matters of research and development relating to blockchain, cryptocurrencies, and distributed ledger technologies.

- *Do you support creating a blockchain specialist position at OSTP? Please explain.*

Response: The President recently signed an Executive Order focused on harnessing the benefits and mitigating the risks from digital assets. I support OSTP having the expertise needed to implement the Executive Order and any laws Congress may pass directing OSTP to take further action on digital assets.

Senator Deb Fischer

Question 1: *Currently, efforts to develop autonomy tend to be siloed among services. What role can OSTP play to break down the barriers between agencies and the private sector to accelerate the development of autonomy?*

Response: OSTP often helps break down barriers and silos across government and across sectors. OSTP houses the National AI Initiative Office and the National Quantum Coordination Office, which both coordinate activities across the federal government and work closely with the private sector. I look forward to supporting these critical functions, if confirmed.

Question 2: *Testing and evaluation is critical to building public trust in AI and autonomous systems. Do you see any gaps in U.S. infrastructure to test and evaluate AI and autonomous systems? If so, how would you lead OSTP to fill those gaps?*

Response: I certainly agree that testing and evaluation are important components in building trust in AI and autonomous systems. I understand that OSTP co-chairs the Congressionally mandated National AI Research Resource Task Force, which is considering whether a National AI Research Resource could increase access to the ability to develop, test, and evaluate AI systems in the context of research. If confirmed, I would support this work to identify and propose solutions to rectify gaps in testing and evaluation of AI and autonomous systems, as well as to support an AI Bill of Rights to ensure we protect people from the harms to privacy, civil rights, and civil liberties.

Question 3: *If you're confirmed as the president's science and technology advisor, there inevitably would be a stronger policy component to your job. How would you use your technical science background to inform sound and unbiased policy decisions?*

Response: My experiences at NIST, where the watchword was "careful," and DARPA, where great leaps were made by taking risks—and my experience in the private sector—provide me with several very different vantage points that would inform the science and technology policy efforts of OSTP. What was common in all these roles was the realization that achieving impact required much more than science and technology itself. Exploring widely with enthusiasts and skeptics, rigorously examining evidence, weighing ethical and societal considerations, setting clear goals, bringing actors with sometimes divergent incentives together, assessing progress, and persuading users to adopt successful results—all of these were essential. If confirmed, I would expect to adopt and adapt many of these practices in leading OSTP, with the aim of achieving policies that enable science and technology to benefit all Americans.

Senator Todd Young

Question: American leadership in science and technology – especially the emerging technologies that will dominate the 21st Century – is vital to both the future of the American economy and to our competitiveness with China. This is a national security issue and we must invest in research & development in key technology areas. For years now, I’ve been working on comprehensive innovation legislation to do just that. It has gone through many name iterations and a gauntlet of procedural hurdles but the important thing is that we are making real progress to secure many of these provisions along with funding to support the American semiconductor manufacturing base. These provisions include standing up a strong tech directorate at the National Science Foundation and establishing regional technology hubs around the country – all while leveraging significant private sector dollars.

- *Can you discuss the importance of passing innovation legislation that invests in R&D to help America win the technological arms race against China?*

Response: I very much agree with your view, and the President’s view, that it is critical for Congress to pass this bipartisan innovation legislation. It can play a very significant role in strengthening our economic and national security, advancing U.S. science and technology, and creating good-paying jobs for U.S. workers in communities across the country. Geopolitical competition in both military and economic spheres means we can no longer take American leadership for granted—because leadership translates directly to the safety and prosperity of all Americans. That is what is at stake.

Senator Mike Lee

Question 1: In 42 USC 6614 the OSTP is to broadly “serve as the source of scientific and technological analysis and judgement for the President with respect to major policies, plans, and programs of the Federal government.” And further, the Director is required to “develop, review, revise, and recommend criteria for determining scientific and technological activities warranting Federal support.” Given this importance and the fact that President Biden has elevated the Director of the OSTP to a Cabinet level position within the White House, I have a series of questions regarding the ethics of certain scientific research:

- *Do you support Hyde Amendment protections in our appropriations legislation? If not, should federal taxpayer money be used to pay for abortions?*
- *Do you support the use of aborted fetal tissue for research purposes?*
- *Do you support the use of embryonic stem cell research?*
- *Do you support the use of live embryos in federally funded research?*
- *Do you support the creation of three-parent embryos?*
- *Do you support the use of germline genetic engineering to create genetically modified embryos?*
- *Do you support the creation of human-animal hybrid embryos?*
- *Do you support allowing an embryo to gestate in an artificial womb environment for research purposes for less than 14 days? Do you support allowing such an embryo to gestate in an artificial womb environment for longer than 14 days?*

Response: Publicly funded research bears an important responsibility to consider ethical issues, and where appropriate, to create mechanisms, such as Institutional Review Boards, to allow careful consideration of the benefits and risks of such research. The scenarios presented require individual consideration, based on differences in ethical consideration, current legal status, and the state of research.

- **Hyde Amendment:** President Biden has been clear that he opposes the Hyde Amendment, but recognizes it is current law. I agree with the President’s view.
- **Research use of abortive fetal tissue:** This is a specific research approach, for which there are limited or no alternatives, that can help find therapies for otherwise incurable diseases and conditions. I support the Biden Administration’s decision to lift an earlier ban on this research because of its potential to unlock solutions for cancers, Alzheimer’s, Parkinson’s, and other diseases and conditions that afflict so many Americans.
- **Embryonic stem cell research:** I support the Administration's reaffirmation of the long-standing support of responsible, scientifically worthy, human embryonic stem cell research allowable under the law, subject to the NIH Guidelines on Human Stem Cell Research.
- **Live embryos for research:** I understand that Congress has banned federal research funding on this.
- **Three parent embryos:** This type of research, aimed at not passing on genetic defects from parents with fertility issues, raises a host of ethical questions. I understand that Congress has imposed a regulatory ban on this. This Congressional action provides an opportunity for public deliberation on balancing the potential for this technique with the serious ethical issues that have been raised.
- **Germline engineering of gene edited embryos:** While this has been proposed as an approach for treating extremely serious genetic conditions, there are significant safety and ethical issues raised by this application of gene editing technology, and I do not support it. In addition, Congressional prohibitions prevent funding of this research or regulatory approval of its clinical use.
- **Human-animal hybrid embryos:** I understand that federal law prohibits federal funding to insert animal cells into human embryos.

- **Embryo in artificial womb environment (14 days):** I understand that federal law prohibits federal funding for research involving human embryos at any stage.

Question 2: Last year, the Biden Administration lifted restrictions on the use of fetal tissue for medical research. These new rules would allow scientists to use tissue derived from abortions for medical research. Recently, a series of FOIA requests showed how the Food and Drug Administration paid an estimated \$2,000 per individual baby and sometimes up to \$12,000 per box of harvested organs. Some documents have even showed that the FDA bought body parts from babies that were 24 weeks old as well as the skulls of second trimester babies.

- *With the Biden Administration's lifting restrictions on use of fetal tissue, do you support the trafficking of aborted human body parts?*
- *If confirmed to be OSTP Director, a role that involves the coordination and establishment of research and development goals across federal agencies, will you oppose this type of scientific research being conducted at the FDA or at any federal agency?*

Response: I believe you are referring to a specific research approach, for which there are limited or no alternatives, that can help find therapies for otherwise incurable diseases and conditions. The Biden Administration lifted the ban on this type of research because of its potential to unlock solutions for cancers, Alzheimer's, Parkinson's, and other serious diseases and conditions that afflict so many Americans. Federal agencies are working with Congress, researchers, and communities to ensure that this research proceeds under appropriately strict guidelines. If confirmed, I commit to working with Congress, researchers, federal agencies, and others to ensure that any such research is conducted under the highest ethical standards.

Question 3: The Senate is considering the CHIPS Act of 2022 which places a great deal of responsibility on the OSTP Director and National Science Foundation for implementation of government R&D efforts to counter China's threat to the U.S. homeland. I'm concerned that in this conversation, we are only trying to respond to the CCP threat with more government spending.

- *Should our biggest response to increased Chinese investment in R&D be to just "outspend" China? Will "outspending" China through the federal government actually counter the CCP threat?*
- *Are there regulatory changes that we need to make in order to better mobilize the United States to meet the challenges posed by the Chinese government? How about regulatory changes? Tax code changes? Workforce changes? And will U.S. spending be less effective without making these regulatory changes?*
- *How much money should the Federal Government spend on Research and Development? \$100 billion? \$250 billion? More or less than those numbers? And is there a point when government spending becomes counterproductive?*
- *Competition increases innovation. How do we avoid a situation where the federal government is picking winners and losers? And because federal investment isn't subject to market forces, could federal investment drive private R&D dollars toward inefficient purposes?*
- *Are there any R&D programs that the United States is currently funding that we should eliminate? Is there any room for stopping waste in the R&D space? And would you agree that we should be eliminating duplicative research and finding ways to conduct oversight of our R&D programs before we authorize more spending?*

Response: Geopolitical competition in both military and economic spheres means we can no longer take American leadership for granted—because leadership translates directly to the safety and prosperity of all Americans. That is what is at stake.

I agree with you that our competitiveness challenges demand that we make good use of all the tools we have as a nation. One important step is the bipartisan innovation legislation currently being considered by Congress. I agree with the President’s view that it is critical for Congress to pass this legislation. Its focus is not simply more of the same, but rather some important new approaches to improve regional innovation, make it possible to have core semiconductor production in the U.S., and bolster technology research. I understand the legislation also includes workforce policies, tax-code changes, and other policies. Given China’s R&D spending, which is growing rapidly and is strategically focused, these advances are important and necessary for the U.S. to maintain technological leadership.

Federal spending on R&D is the sum of R&D allocated by many different parts of government to pursue the science, technology, and innovation they need to achieve their missions. As one example, I participated directly in this during my years at DARPA, which the Defense Department has funded for over 60 years for its role in breakthrough technologies for national security. In my experience leading both DARPA and NIST, I found that these agencies along with the others across the federal R&D enterprise received very substantial scrutiny and review by their bosses within the executive branch and their overseers and appropriators in Congress. This oversight is an important part of why our federal R&D agencies are effective in achieving their important missions.

Question 4: *What is the appropriate role of the federal government for the categories of “basic research”, “applied research”, or “development”? And what should be left to the private sector?*

Response: I have had the opportunity to work in both the public and private sector parts of our innovation system. Federal support is essential for basic and applied research that creates a broad foundation that all industries can build upon and that allows us to make progress on critical national challenges. In addition, federal funds support the development of products required for government mission, such as weapons systems for our military and satellites for weather and space exploration. The strong American private sector spends substantially more on R&D than the federal government. It focuses its funding almost exclusively on the development and improvement of specific commercial products and services—in many cases, building upon prior federally sponsored R&D. Our success as a country depends on all of these players making their different and complementary contributions.

Question 5: Access to additional spectrum is critical for future technological innovation. Unfortunately, the federal government sits on a lot of valuable spectrum bands, particularly mid-band spectrum which is the best suited for 5G wireless networks.

- *Do you have any plans to issue a national spectrum strategy?*
- *Do you think federal agencies currently use their spectrum efficiently?*
- *Should government agencies be immune from oversight of their use of the electromagnetic spectrum?*
- *I think Congress and Executive Branch agencies need the best available data to identify inefficiencies in both the commercial and government contexts. Will you support my legislation, the Government Spectrum Valuation Act (S. 553), which would require NTIA to calculate the value or the “opportunity costs” associated with federal spectrum so that we can make more informed decisions?*

Response: Wireless spectrum is a scarce national resource that supports a wide range of national interests: 5G and other connectivity innovations, public safety, national defense, and many more. That resource must be used efficiently and strategically to support all of these important priorities. If I am confirmed, I commit to work with you as we work across agencies to help balance these important considerations.

Question 6: *Will you oppose efforts to authorize or promote a nationalized 5G network?*

Response: I do not support the creation of a nationalized 5G network.

Question 7: The OSTP under the Trump Administration was influential in the formation of the UAS Integration Pilot Program (IPP). The IPP is now completed and the FAA recently transitioned into their next program called BEYOND. A big question in drone policy is the scope of federal preemption. A September 2020 GAO report noted that both DOT and DOJ will soon be issuing a joint opinion on the scope of FAA preemption in the context of low altitude drone operations. The FAA has taken the position that they control the airspace from the ground up. To my knowledge that opinion has not been issued to date.

- *Do you think the federal government has the ability to regulate the airspace a couple of feet above your lawn? What about inches above the blades of grass? Is this a problematic position to take?*
- *Do you think full and safe drone integration is possible without the ability of state/local police to take real-time action to safeguard the public?*

Response: I appreciate the importance of innovation for a prosperous future on the ground and in the skies. I recognize that we as a country have a multitude of interests to balance including individual property rights, public safety, integration into existing aviation plans, and privacy and civil liberties. Getting the right mix of individual liberty, federal authority, and state, local, territorial, and Tribal authority will be important.

Question 8: *Is the internet a public utility? And should it be regulated as such?*

Response: Every American needs internet access to share in the benefits of online education, healthcare, work, civic engagement, and social connections. If confirmed, I pledge to work with Congress to identify governance approaches that promote affordable, reliable access to high-speed internet with appropriate consumer protections and protections for a healthily functioning democracy.