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Throughout his campaign, President Donald Trump was largely silent about his views on science, technology and innovation.

This uncertainty has left the science and technology community scrambling to scrutinize tweets, pore over published plans and read between the lines of

campaign promises. Trump “landing teams” have spread out across Federal agencies, asking questions, surveying the landscape and making employees nervous. Typical for changes in Administration, advisory white papers and reams of recommendations on science and technology are swirling around town.



Uncertainty Reigns - But Opportunities Abound First, the uncertainties:

In addition to concerns about the new administration's rejection of climate change science, the science and technology community is concerned that the Trump Administration will embrace the *Heritage Foundation's Blueprint for a New Administration*, which calls for **eliminating Federal spending on research, development and demonstration of new technologies** in the energy sector, the Department of Energy (DOE) offices that oversee these programs, NIST's Manufacturing Extension Partnership and the “Manufacturing USA” innovation network.

Then there's the issue of **who will lead the science and technology agencies**. As if demonstrating the uncertainty, the homepage of the White House Office of Science and Technology Policy website was replaced with a picture of an empty lectern following the departure of John Holdren, President Obama's Science Advisor.



Two names have surfaced to stand at that lectern in the new Administration, both of whom have met with Trump recently: Yale Computer Science Professor and parallel processing pioneer David Gelernter, and Princeton Physicist William Happer, who excelled at previous posts including director of DOE's Office of Energy Research. Secretary of Energy-designate Rick Perry—who as a Presidential candidate promised to shut down DOE—said at his confirmation hearings that he changed his mind, and sang the praises of our “crown jewel” national labs, exascale computing and nano-photonics.

Another major area of uncertainty is **how President Trump will work with conservatives on Capitol Hill on science and technology policy, and R&D investment**. Historically, conservatives have promoted technology policies in line with free market principles, and generally have opposed an expanded role of government in developing technologies with commercial potential as “industrial policy” by which government rather than the marketplace “picks winners and losers.” However, President Trump is a disruptor and lacks ties to the policies that have governed the Federal role in science and technology. Perhaps the President will take a fresh approach to promoting American innovation, which could shake up the current order in a positive way.



The Opportunities - Trends to Watch

During the ongoing transition to the new Administration, Federal agencies continue their work in science and technology, and it is important to recognize that there are opportunities even in this period of uncertainty, if you know where to look.

- President Trump's focus on infrastructure creates a potential opportunity for a wide range of technology related projects. However, it will be critical to ensure that building state-of-the-art infrastructure does not give way to fixing potholes. Technologies related to clean water, fresh water and broadband technologies are areas to watch.
- The goal of building a stronger military may drive new investment in **defense science and technology**.
- In today's constrained budget environment, President Trump may seek to prioritize Federal investments in **research**. He has expressed general support for the Federal role in long-term research and development, particularly in academia.
- In his confirmation hearing, Secretary of Commerce designate Wilbur Ross recognized the importance of **semiconductors**, saying they are "building blocks." Secretary-designate Ross also expressed interest in learning more about "**Manufacturing USA**," saying he had heard only "good reports" about the program, and that this program appears to be in line with the new president's goal of increasing U.S. manufacturing.
- President Trump has expressed a positive view of a Federal role in **space exploration**.
- The President seeks to make the United States **energy independent** as soon as possible, and indicates that energy independence includes developing every energy source.
- **Corporate tax and regulatory reform** could be tremendously beneficial for entrepreneurs, high-tech start-ups, small businesses and U.S. manufacturers.
- The principles of "**Buy American, Hire American**" may impact Federal procurement, although some "Buy American" policies may be scrutinized for violation of WTO and other international agreements.



Despite the current uncertainty about the direction of Federal science and technology policy in the new Administration, one thing is quite clear: President Trump is focused on creating jobs and growing the economy. Science and technology have delivered 50 percent of U.S. long-term economic growth over several decades and, therefore, should be a cornerstone of the Trump Administration's economic agenda.

Meanwhile, senior career executives who are program managers will continue to exert influence over program and funding directions.

As the Trump agenda develops and unfolds, **the winners will be** those companies and organizations that engage in the policy making process in the coming weeks and months – that is, those who shift into action as soon as possible to help shape those policies.

TechVision21's team members have been through many Presidential transitions, and have deep and broad experience in helping clients identify and seize opportunities like these. It is **crucial to advocate for your interests now**, while the direction of science and technology in the new Trump Administration is evolving, as subcabinet appointees take their places, and as the new Administration and Congress work together on budget initiatives.

Despite Transition, Funding Opportunities Remain Numerous

Despite the ongoing transition to a new Administration and running on a continuing budget resolution through April, Federal agencies continue to work to implement their strategic and R&D plans. Therefore millions in funding opportunities to advance their science and technology agenda continue as well.

Key to pursuing Federal funding proactively is to carefully plan, including the following steps:

- Review Federal agency budgets, program plans and potential opportunities, and consider what they indicate about the agencies' agenda, trends and priorities;
- Develop strategic Federal funding plans;
- Monitor for funding opportunities that support business and organizational goals;
- Build relationships with Federal decision-makers and program managers;
- Consider where your technology might fit, including as a partner with an entity that provides another piece of a project;
- Take early action to develop preliminary proposal concepts and identify potential partners;
- Pursue funding opportunities with high quality proposals; and
- Provide input to Federal Requests for Information to shape future opportunities.



To maximize funding opportunities, it is crucial to have a clear strategy and execute it well, including helping Federal agencies understand specifically how they can achieve their goals with your technology or solution. To do so successfully, you need to prepare, understand their agenda and priorities, and establish and maintain key relationships, especially with career officials who have seen administrations come and go. Partnering with a firm such as TechVision21 that brings decades of experience in this arena and deep relationships across agencies, with a specialization in technology, can save you time and expenses, and increase your success rate.



Department of Energy

Technologist in Residence (DE-TIR-000099): Competitive selection of pairs comprised of a senior technical staff member from a National Lab, and a senior technical staff member from a clean energy manufacturing company or consortium who work together for 18-24 months to: identify the participating company's (or companies') technical priorities and challenges, and resources and capabilities in DOE's National Labs that may address them; propose collaborative R&D efforts; and develop an agreement and begin developing scopes of work for the proposed collaborative R&D. The proposed R&D will take place outside of the program. **Applications due May 3, 2017.**

SENSOR (DE-FOA-0001737): ARPA-E's SENSOR program aims to reduce the energy used for heating and cooling residential buildings via sensor systems that sense human presence, and to reduce energy use in commercial buildings by enabling ventilation control based on sensor systems that count humans in a pre-determined zone. There are four areas of focus: human presence sensors for residential use; people counting sensors for commercial use; low-cost, stable and easily deployable CO2 sensors to enable adoption of ventilation setbacks; and testing and validation of these sensors in both laboratory controlled quasi-real world environments and actual field deployment tests. **Maximum award \$10 million. SENSOR has an SBIR set aside (DE-FOA-0001738), with a maximum award of \$3.225 million. Concept papers due March 17, 2017.**

Innovative Development in Energy-related Applied Science (IDEAS) (DE-FOA-0001428): Continuing opportunity for support of early-stage applied research on new concepts with the potential for transformational changes in energy technology. Awards may take the form of analyses, exploratory research that provides ARPA-E with information useful for developing focused technology programs, and proof-of-concept research.

Applications must propose concepts not covered by open ARPA-E focused FOAs and that do not represent incremental improvements over existing technology. Funds single phase efforts of 12 months or less. Proposals must address one or more of six forms of energy: mechanical, thermal, chemical, electrical, radiant or nuclear. **Maximum award \$500K.**

Department of Defense

Defense Production Act Title III Advanced Drop-in Biofuels Production Project, Biofuels 2: DOD is soliciting proposals to increase domestic advanced biofuels production capacity by establishing complete domestic value chains capable of producing drop-in replacement biofuels. This includes feedstock production and logistics, conversion facilities, fuel blending (if required), transportation and logistics. The proposed Integrated Biofuel Production Enterprise must establish a capability to produce at least 10 million gallons of neat biofuel per year. Proposals may take the form of brownfield expansion/modification of existing pilot-scale facilities, commercial-scale facilities or new greenfield construction. **One award is expected, with a maximum grant of \$55 million, with a 50:50 cost share.**



Tech Transfer (T2) and Education Outreach (STEM) Partnership Intermediary Agreement (FOA-RVKV-2017-0001): The Air Force Research Laboratory Directed Energy Directorate and Space Vehicles Directorate seek proposals for multiple funding opportunities in support of the directorates' Office of Research and Technology Applications. These opportunities are for Partnership Intermediary Agreements (PIAs) to support efforts in two topic areas: technology transfer and STEM education outreach. **Maximum grant for a baseline PIA is estimated at \$6 million. Applications are due March 9, 2017, and proposers are to first contact the Agreements Point of Contact to determine eligibility and applicability.**



Commerce Department

FY 2017 Economic Development Assistance Public Works and Economic Adjustment Assistance Programs: Priorities include collaborative regional innovation projects to stimulate industry clusters, advanced and sustainable manufacturing projects to encourage job growth and business expansion, IT infrastructure, skills development, access to capital for small- and medium-sized enterprises, science and research parks, technology transfer/commercialization efforts and projects to promote job creation through green economy development. **Maximum award \$3 million. Rolling submissions.**

National Institute of Standards and Technology Public Safety Innovation Accelerator Program: Seeks applications to accelerate R&D, production and testing in six technology areas: mission critical voice, location based services, public safety analytics, public safety communications demand model, research and prototyping platforms, and resilient systems. **Maximum award \$1 million per year with project performance of up to two years. Applications due February 28, 2017.**

Future Funding Opportunities

The Department of Energy and USDA published notice of their intent to release the following funding opportunity in the near future:

FY 2017 Biomass Research and Development Initiative (DE-FOA-0001711): DOE and USDA intend to issue a Request for Applications for biomass R&D grants. Three areas of interest include: development and optimization of feedstock and feedstock logistics for producing raw materials for conversion to biofuels and bio-based products; development of technologies for use of cellulosic biomass in the production of biofuels, bioenergy and bio-based products; and system evaluation methods to optimize system performance and quantify a project's impact on sustainability.

Advanced Power Electronics Design for Solar Applications (DE-FOA-0001741): DOE intends to issue a funding opportunity in two topic areas: R&D of solar PV inverter/converter designs that reduce solar PV lifetime costs toward SunShot’s 2030 cost goals; and R&D of modular, multi-purpose power electronics that achieve lower lifetime costs by enabling value-added grid and/or customer-owned solar energy solutions.

Digital Transportation: ARPA-E intends to issue a funding opportunity focused on developing communication technologies that are preferable to physical travel. The FOA will target research in: (1) real-time capture, digitization and reconstruction of detailed communicative information of a fidelity commensurate with travel-replacement; (2) complementary technologies for travel reduction, including server-side communication environments, novel display modalities, and stationary capture and digitization tools; and (3) third party testing and validation. ARPA-E seeks multi-disciplinary project teams, and is offering a teaming partner list to facilitate formation of new project teams.

Figure 1

Areas of Focus, Are Any of These of Interest?	
Critical Materials	Waste Heat Recovery System
Direct Thermal Energy Conversion Materials, Devices	Combined Heat and Power
Systems	Sustainable Manufacturing
Wide Bandgap Semiconductors	Clean Water Technologies
Materials for Harsh Service Conditions	Energy Efficient Advanced Computing
Advanced Materials Manufacturing	Advanced Manufacturing to Enable Modern Electric Power Systems
Additive Manufacturing	Advanced Manufacturing for Clean electric Power Generation
Composite Materials	Advanced Materials/Manufacturing Processes for Clean Fuels
Roll-to-Roll Processing	Advanced Manufacturing to Increase Building Energy Efficiency
Process Intensification	Advanced Manufacturing for Clean Transportation Systems
Process Heating	
Smart Manufacturing	



Agencies Seek Input for Program Planning and Funding Opportunities

Opportunities exist today to provide input to selected Federal agencies, based on Requests for Information they have issued, including those below. This is your chance to help shape future funding opportunities that can support your business or technology objectives, and it is an effective mechanism in helping to achieve your Federal funding objectives, based on our firsthand experience with TechVision21 clients.

Public Feedback and Comments Sought: Advanced Manufacturing Office Multi-year Program Plan: The Office of Energy Efficiency and Renewable Energy’s Advanced Manufacturing Office (AMO) seeks public feedback on a draft Multi-Year Program Plan intended to guide AMO. The document includes a new mission statement and goals, and identifies the technology outreach and crosscutting activities AMO plans to focus on over the next five years (See Figure 1). The plan establishes targets and metrics for RD&D. See: <https://energy.gov/eere/amo/downloads/advanced-manufacturing-office-amo-multi-year-program-plan-fiscal-years-2017> **Comments are due by March 15, 2017 and should be sent to AMO_MYPPinfo@ee.doe.gov**

Request for Information: Grid Engineering for Accelerated Renewable Energy Deployment 2 (GEARED 2) (DE-FOA-0001744): DOE is exploring next steps in its efforts to train power systems engineering students and professionals. Interested in information related to the types of energy technologies that would receive the greatest benefit from expanding a program such as GEARED (i.e., distributed or utility-scale solar power generation, wind power, microgrid-enabling technologies, etc.); level of diversity in the power systems engineering workforce; populations that would benefit the most, and provide the most value, to the power systems industry after receiving education; and the best designs for programs such as GEARED. **Responses due February 28, 2017.**

Manufacturing USA: New Manufacturing Innovation Institutes

During December and January, the Departments of Energy and Defense, and the National Institute of Standards and Technology (NIST) announced winners for **five new Manufacturing Innovation Institutes**, growing the Manufacturing USA network to 14 institutes with a Federal funding commitment of more than \$1 billion:

- DOD awarded \$80 million to the Advanced Regenerative Manufacturing Institute to lead the **Advanced Tissue Biofabrication Manufacturing USA Institute (ATB)**, headquartered in Manchester, New Hampshire. Contributing a \$214 million cost share, an 87-member coalition will develop techniques for repairing and replacing cells, tissues and organs; and advance technologies such high-throughput culture technologies, 3D biofabrication and bioreactors.

- DOD awarded \$80 million to American Robotics, Inc. to establish the **Advanced Robotics Manufacturing Innovation Hub (ARM)** in Pittsburgh, Pennsylvania. Contributing a \$173 million cost share, a 227-partner consortium will integrate knowledge across disciplines into an innovation ecosystem for advancing robotics, including sensor technologies, software and artificial intelligence, materials science, and human and machine behavior modeling.

- DOE awarded \$70 million to the American Institute of Chemical Engineers to establish the **Rapid Advancement in Process Intensification Deployment Institute (RAPID)**, headquartered in New York City. Contributing a \$70 million cost share, a 130-partner coalition will focus on boosting energy productivity and energy efficiency in industries such oil and gas, pulp and paper, and chemicals through modular chemical process intensification such as combining multiple, complex processes such as mixing, reaction and separation into single steps.

- DOE awarded \$70 million to the Sustainable Manufacturing Innovation Alliance to establish the **Reducing Embodied-energy and Decreasing Emissions Institute (REMADE)**, headquartered in Rochester, New York. Contributing a \$70 million cost share, more than 100 partners will focus on driving down the cost of technologies needed to reuse, recycle and remanufacture materials.

- NIST awarded \$70 million to establish the National Institute for Innovation in Manufacturing **Biopharmaceuticals (NIIMBL)**, led by the University of Delaware. Contributing a \$129 million cost share, 150 participants will focus on advancing manufacturing platforms and capabilities to help ensure that manufacturers can respond quickly to pandemics and other biological threats.

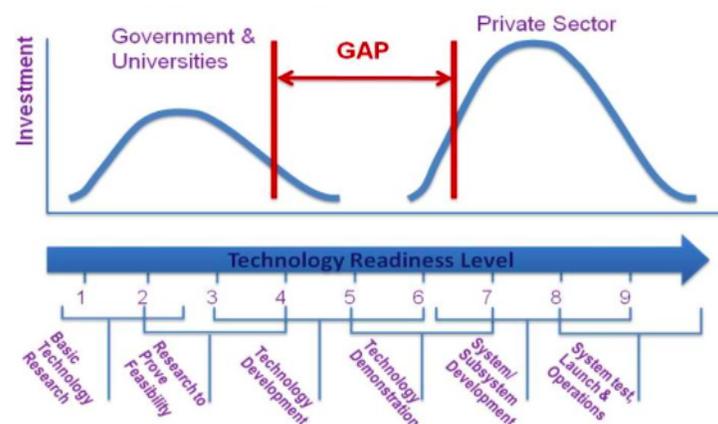


The Manufacturing USA program could help fulfill the Trump Administration's stated commitment to **increasing manufacturing** in the United States.

The Institutes provide a lifeline for new technologies that can be manufactured in the United States at their most vulnerable stages, known as the **"Valley of Death,"** the gap between early stage research, and manufacturing scale-up and commercial deployment. Small companies, start-ups and university researchers often have promising innovations, but lack the resources to demonstrate, test and pilot produce their inventions, a necessary step to validate product performance and cost before attracting commercial financing and scaling manufacturing. As a result, these promising technologies can fall into the "Valley of Death," slowing or halting their commercialization, and raising their vulnerability to foreign acquisition.

The Manufacturing Innovation Institutes take aim at this gap, providing a promising model for bringing new technologies to a higher level of readiness that can attract private investment and move them toward commercialization. The Institutes could also fuel start-ups, and serve as anchors for new research hubs and industry clusters that create new manufacturing and jobs in the United States.

The shared manufacturing facilities these institutes house are one of their most attractive features, for example, providing small and start-up businesses with manufacturing capabilities they need to validate new innovations and for low rate initial production.



Potential New Institutes

Several topics for new institutes have been under consideration. Topics in this mix that are a high priority are: **cyber security for manufacturing**, and virtual assessment and certification of products and manufacturing processes. Using 3-D models, virtual prototyping and virtual testing, this type of product and process testing, certification and qualification could save significant funds in innovation and stimulate more innovation, as the cost to test and validate drops. Other topics under consideration include: assistive and soft robotics, bioprinting, advanced machine tools and control systems, materials for harsh service conditions, high-value roll-to-roll manufacturing and an open topic competition.

Two other topics we suggest adding to the list are: **detecting nanotechnology defects**, and **advanced sensors**. Cost-effective nano-defect detection is needed for widespread nanotechnology-based manufacturing and materials. Sensors will be widely deployed across the IoT, in natural and built environments, in numerous new products and systems, in defense and medical applications, and nearly every area of relevance to society, generating new markets and underpinning new innovations, businesses, industries, jobs and productivity growth. Sensors were among the top technologies identified by respondents to the 2013 NIST Request for Information to inform Manufacturing USA, which sought input on technologies with broad impact.

Should the Trump Administration extend the Manufacturing USA network, and you consider competing for one of these high dollar manufacturing institute grants, we recommend—based on our decades of experience with creating industrial consortia, and assisting proposers for manufacturing innovation institutes—that you **take early action** to develop preliminary concepts and identify potential partners.



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