Infrastructure & Economic Stimulus Priorities

While investments in traditional infrastructure have modest stimulative effects, the Information Technology & Innovation Foundation (ITIF) concluded that investments in innovation infrastructure would generate much larger economic growth and productivity[1]. Innovation infrastructure includes scientific equipment, instrumentation, and research itself. Defense-related innovation infrastructure and research and development (R&D) is particularly important to supporting economic growth. Studies show that defense-related R&D is the most important federal policy to affect the speed and direction of innovation in the economy and ultimately leads to significant productivity gains[2].

However, the most advanced innovation infrastructure will not support economic growth and job creation if we do not have the necessary workforce to utilize that infrastructure. Consequently, we must invest in the workforce and innovation infrastructure simultaneously. With foreign competitors investing heavily in workforce, now more than ever we need do the same to ensure U.S. military preeminence.

As Congress considers infrastructure or economic stimulus legislation, below please find recommendations from CNSR to address critical infrastructure and workforce needs.

Defense University Research Instrumentation Program (DURIP)

The U.S. Department of Defense (DoD) research and technology development enterprise is a catalyst that supports U.S. leadership in innovation, national security, and economic prosperity. Programs such as the Defense University Research Instrumentation Program (DURIP) enable the U.S. Armed Services to develop future technologies that spur solutions to America's most pressing current and future security needs. Through a competitive grant process, DURIP funds the purchase of equipment and infrastructure and the development of novel state-of-the-art technology and research by academic institutions necessary for high-quality, DoD-relevant science. This instrumentation plays a vital role in allowing defense-critical research projects to acquire and develop technical resources specifically engineered to meet their requirements and is critical in accelerating the development of U.S. military capabilities. Past DURIPs have led to greater capabilities for U.S. warfighters and to new technologies, innovative companies, and job creation. Furthermore, the technologies developed and acquired through the DURIP process ensure that the next generation of scientists and engineers are trained with cutting-edge capabilities for the military and national security innovation base (NSIB) workforce. In FY 2020, DURIP received proposals requesting $295 million, but was only able to award $49 million in funding – a significant under-utilization of innovation and creativity aligned to defense needs[3].

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[1] https://itif.org/publications/2017/01/03/investing-innovation-infrastructure-restore-us-growth
[2] https://www.nber.org/papers/w26483
[3] https://www.defense.gov/Newsroom/Releases/Release/Article/2021937/dod-awards-489-million-to-universities-for-major-research-equipment/source/%E2%80%A6/

This demonstrates a sizeable need for additional infrastructure dollars to support developing new capabilities and the NSIB infrastructure needs.

Multidisciplinary University Research Initiative (MURI)
The MURI program sponsors transformational university research that has had a profound economic impact as well as produce revolutionary new military technologies. For example, a MURI focused on researching nanotechnology led to the creation of 16 companies and 1,300 derived patents[4]. Another MURI-sponsored innovative research project developed a new technique to fabricate certain types of semiconductors that ultimately supported U.S. manufacturing jobs[5]. Furthermore, dozens and dozens of technological innovations from MURI research have been transferred to industry, which strengthens the NSIB while also creating jobs as industry manufacturers new products for DoD, based on MURI research outcomes. In FY 2020, the MURI program reported more than 330 unfunded proposals – showing a significant need in additional investment[6].

Defense Established Programs to Stimulate Competitive Research (DEPSCoR)
DEPSCoR is designed to strengthen basic research infrastructure at institutions of higher education in under-utilized states and territories. DoD often relies on scientists and engineers on an as needed basis. This scientific infrastructure and capacity is vital for DoD to meet its workforce needs of the future while also helping diversify the NSIB. Nearly 70 percent of the states in the United States are eligible for DEPSCoR, meaning there are tremendous infrastructure opportunities to ensure that DoD can fully utilize talent from every state in the nation[7].

Defense Enterprise Science Initiative (DESI)
DESI supports university-industry collaboration on accelerating the impact of basic research on defense capabilities. If there was ever a research program that has the potential to create new capabilities, infrastructure, and jobs in the defense industry, it is the DESI program. Partnering academic researchers directly with industry enhances the probability that research will lead to solving a particular problem facing DoD or the NSIB. The solution, or research outcome, can result in new capabilities or infrastructure for the industrial base to manufacture. DESI is currently a pilot program administered by the DoD's Basic Research Office that has only had sufficient funding to grant five awards[8].

Scientific Infrastructure Workforce
DoD employs more than 100,000 scientists and engineers to support the United States' national defense[9]. More than 40 percent of those scientists and engineers work in one of the Department's

[4] https://www.ida.org/idamedia/Corporate/Files/Publications/IDA.../STD/D-5361.pdf
[5] Ibid
[6] https://www.defense.gov/Newsroom/Releases/Release/Article/2099273/fiscal-year-2020-university-research-funding-awards/source/GovDelivery/
[7] https://basicresearch.defense.gov/Pilots/DEPSCoR-Defense-Established-Program-to-Stimulate-Competitive-Research/
[8] https://basicresearch.defense.gov/Programs/Defense-Enterprise-Science-Initiative/
[9] https://dsb.cto.mil/reports/2010s/Defense_Research_Enterprise_Assessment.pdf

Laboratories, Warfare Centers and Engineering Centers[10]. These scientists and engineers serve as arguably the most important piece of DoD's innovation infrastructure. If we do not have the individuals to solve challenges or create new technologies, we will fall behind foreign competitors.

In addition, a recent report from the Congressional Research Service forecasts that COVID-19 will have concerning impacts to the scientific workforce, as disruptions and lost opportunities for students, post-docs, and early career faculty may discourage aspiring scientists[11]. Ensuring a strong and resilient pipeline for aspiring researchers and scientists is critical not only to support DOD's mission and modernization priorities, but to ensure that the goals of Congress' long-term investments in R&D are achieved. Bolstering funding for programs that support the Department's scientific workforce will ensure that the research enterprise will remain resilient in the aftermath of the COVID-19 pandemic and rebuild its capacity to continue to fulfill the Department's science and technology needs.

The following scientific infrastructure workforce programs support jobs while creating the scientists and engineers of the future that DoD will need to meet its mission. CNSR calls for additional investments in these programs to create jobs and enhance DoD's innovation infrastructure:

- National Defense Science and Engineering (NDSEG) Fellowship: supports those pursuing a doctoral degree in one of 15 supported STEM disciplines of interest to DoD.

- Young Investigator Programs (YIPs): each Service and DARPA award funds to academics who recently completed their PhDs with the goal of seeding those faculty to work with DoD for the rest of their careers.

- Science, Mathematics and Research for Transformation (SMART) Scholarship: supports undergraduate and graduate students pursuing technical degrees in STEM disciplines in exchange for serving in a DoD facility for a period of time.

- Vannevar Bush Faculty Fellowships: prestigious single-investigator award for research that has the potential for transformative impact. Fellows serve as experts to DoD officials.

- Laboratory University Collaboration Initiative (LUCI): supports collaborations between DoD lab scientists and DoD-funded academics with the goal of introducing academics to the DoD research environment.

- Manufacturing Engineering Education Program (MEEP): supports better positioning the current and next-generation manufacturing workforce to produce military systems and components that assure technological superiority for DoD.

[10] Ibid
[11] https://crsreports.congress.gov/product/pdf/R/R46309