

**Testimony Regarding the FY 2012 Budget Request
Submitted March 3, 2011 to the
Subcommittee on Commerce, Justice, Science, and Related Agencies
U.S. House Committee on Appropriations by
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This testimony is submitted for the record on behalf of the University of Virginia, a non-profit public institution of higher education located in Charlottesville, VA. Founded by Thomas Jefferson in 1819, the University sustains the ideal of developing, through education, leaders who are well-prepared to help shape the future of the nation. In fiscal year 2010 the University received research awards totaling over \$375.34 million from all sources (federal and state agencies, industry and private foundations). Of this amount, \$276.47 million, or 73 percent, came from federal grants and contracts.

As the Vice President of Research and on behalf of the University of Virginia (UVa), I urge the Committee to support the President's proposed increases for the federal science agencies in the fiscal year (FY) 2012 budget, including: \$7.767 billion for the National Science Foundation (NSF); \$1.001 billion for the National Institute of Standards and Technology (NIST); \$325 million for the Department of Commerce's Economic Development Administration (EDA); and the funding proposed for Science, Aeronautics, and Space Technology within NASA. These increases, many of them authorized in the America COMPETES Reauthorization Act of 2010, will help universities make new discoveries at the frontiers of knowledge, conduct critical research, design and engineer new technologies and systems that help to solve national challenges, and power our innovation-based economy.

Innovation as an Economic Driver

Fiscally responsible increases for the federal science agencies will spur innovation and drive the economy. According to the Science Coalition, more than half of our economic growth in the United States since World War II can be traced to science-driven technological innovation. The platform for this innovation has been scientific and engineering research conducted at universities and supported by the federal government through agencies such as the National Science Foundation, the Department of Commerce, and NASA.

Innovation is invisible until it bursts into view! We have trouble imagining change. Our nation's research scientists and engineers must continue to feed the bubbling swamp of innovation, out of which must rise the new small ventures and the next giant redwoods of the American economy! The private sector is waiting at the edge of this risky swamp to take promising ideas forward to product development and launch. This ecosystem is the envy of the rest of the planet and we should re-invest in the very qualities that make it unique and able to produce U.S. innovation advantage over the long-term. This is the pioneering U.S. spirit for exploring frontiers.

UVa is devoting significant institutional resources to the process of bringing discoveries to the marketplace. An independent audit has shown that our proof of concept funds have led to a 5:1 return on investment after five years and a 42:1 return on investment for the top ten percent of

portfolio projects. For example, UVa has entered into a strategic research collaboration with AstraZeneca to enhance development of new treatments primarily for coronary artery disease (CAD) with a secondary focus on peripheral vascular disease (PAD). This partnership with industry helps us to bring innovative research, funded by federal research grants, to the marketplace quickly and efficiently.

Another example is Directed Vapor Technologies International, Inc. (DVTI). Formed in 2000 to capitalize on patents associated with the creation of a new coating method, Directed Vapor Deposition (DVD), a novel physical vapor deposition tool invented at the UVa School of Engineering and Applied Science Materials Laboratory. The new method allows coatings to be applied faster, with a greater variety of materials, with greater control and at lower cost than other methods and is used on products such as turbine engines, batteries, and liquid crystal displays. This new small business operates a 6,000 sq. ft. manufacturing facility in Albemarle County, VA and maintains its relationship with the University and the region by hiring interns, recent graduates and alumni. Development of the technologies behind DVTI was supported by grants from the National Science Foundation and the Department of Defense.

National Science Foundation

The University of Virginia supports the President's budget request of \$7.767 billion for the National Science Foundation (NSF) in FY 2012. This would represent an increase of \$894 million or 13.0 percent above the FY 2010 enacted level, keeping NSF on the path for doubling as authorized by the America COMPETES Reauthorization Act of 2010. NSF is a significant source of funding for University of Virginia research in engineering and biological, physical, computational, social, and environmental sciences. NSF also funds efforts at UVa to improve education in the STEM (science, technology, engineering, and mathematics) disciplines, which is critical for the future of our country and the Commonwealth.

In the last fiscal year, researchers at UVa received over \$29 million in competitive NSF grants that support research in all areas of science and engineering. NSF funding has allowed faculty and students at UVa to conduct ground-breaking research to improve our nation's wireless networks, study the chemistry of the universe, develop cutting-edge heating and cooling technologies, understand how environmental change impacts the Virginia coastal ecosystem, and revolutionize tissue regeneration of nerves and ligaments, among many other initiatives. Funding has also supported critical efforts to increase the number of women and minority students in STEM fields, enhance teacher training, develop improved curricula for elementary school students in math and engineering, and extend pathways for community college students to earn four-year degrees in fields such as engineering. NSF is also at the forefront of efforts to ensure that basic research is transformed into products and knowledge that improve everyday life and power our innovation economy. UVa has also utilized NSF funding to power improved networks between the university and industry in fields such as bioengineering to enhance innovation.

According to the Taskforce for American Innovation (TFAI), the 5.2 percent overall cut to NSF contained in the recently passed Continuing Resolution Appropriations Act of 2011 (H.R.1) would mean that 10,000 fewer university researchers would receive support for critical research and education projects. The 16.4 percent cut to vital STEM education programs embedded in the

5.2 percent overall NSF cut would in reality amount to a 28.1 percent reduction during the last seven months of the fiscal year. At a time when our nation desperately needs to enhance its technological workforce, the reduction is dangerously counterproductive, and I urge Congress to keep NSF on the doubling path proposed by President Obama and authorized by America COMPETES.

Specifically within NSF, we support the proposed increases to Research and Related Activities, which funds ground-breaking research across the NSF directorates, and Education and Human Resources, which funds critical education efforts.

National Institute of Standards and Technology (NIST)

*UVa supports funding for the National Institute of Standards and Technology (NIST), located within the Department of Commerce, at the level of \$1.001 billion as included in the FY 2012 budget request, \$144.4 million or 16.9 percent above the FY 2010 enacted level. This increase for NIST programs reflects the Administration's continued emphasis on innovation, manufacturing, and economic competitiveness. **The increase would fund key extramural NIST programs such the Technology Innovation Program (TIP), which funds high-risk, high-reward collaborative research at universities and private partners that address national needs, and the Hollings Manufacturing Extension Partnership (MEP) which helps manufacturers streamline manufacturing techniques and increase efficiency and profits through training resources as well as specific project assistance.** Universities, including UVa, continue to work to strengthen manufacturing within the U.S. through research and development.*

For instance, within the Commonwealth of Virginia, UVa is partnering with Virginia Tech (VT) and the John Tyler Community College to create the Commonwealth Center for Advanced Manufacturing (CCAM) at a new Rolls Royce manufacturing site in an impoverished section of Prince George County. Along with private partners such as the Rolls-Royce North America, Siemens, and Northrup Grumman Shipbuilding this research facility will spur .

innovations and improvements that can be applied directly to real manufacturing processes and technologies. The facility, ready to be constructed in the Commonwealth at the Crosspointe site, will bring industry and high-tech jobs to the region by providing member companies with applied research to reduce costs, speed time to market and maintain a global competitive advantage.

Although CCAM has not yet received funding from NIST, the facility plans to apply for future competitions which are dependent on appropriations funding. I urge you to fund NIST at the President's budget request so these programs can hold future competitions.

I would also note that funding for the NIST Extramural Construction Grant program is not included in the President's request. This program, which provides extramural funding for construction of research facilities at universities and research organizations, has been supported by Congress in the past and we urge you to restore funding for this important NIST activity. As public universities such as UVa face funding shortfalls for facilities in state budgets, they are increasingly turning to the federal government for support to improve and build facilities

that help create new high-technology jobs, and this is one of the few programs which will fund that type of activity.

Economic Development Administration (EDA)

I urge the Committee to support the President's FY 2012 budget request for the Economic Development Administration (EDA) at \$325 million.

EDA's mission is to lead the federal economic development agenda by promoting innovation and competitiveness, preparing American regions for growth and success in the worldwide economy. No other federal agency provides funding for local, state, and regional partners to create sustainable economic drivers, such as research parks. Currently, UVa has a pending application with EDA for support of the CCAM project. This federal support would help to supplement and leverage already awarded state and institutional funds.

UVa supports the requested amount of \$40 million for a new Regional Innovation Program, as authorized in the America COMPETES Act. This program would help build regional innovation clusters based on the strength of local communities and regions through competitive awards for activities relating to the formation and development of regional innovation clusters, including research parks. I urge you to support the FY 2012 budget request for EDA, including the new Regional Innovation Program.

National Aeronautics and Space Administration (NASA)

UVa supports the increases proposed in the budget request for NASA science, aeronautics, and space technology. Specifically, UVa supports funding of \$5.017 billion for Science, an increase of \$548 million or 12.2 percent over FY 2010. Funding for NASA Science is critical to the exploration of our planet and universe that powers inspiration for future generations, the development of cutting-edge technologies, and knowledge to protect our country from hazards such as national disasters. ***UVa also supports funding of the Space Technology program at \$1.024 billion.*** This program, first proposed in the FY 2011 request and authorized in the NASA Authorization Act of 2010, would catalyze partnerships between NASA, universities, and industry to develop advanced technologies to power future exploration in areas such as communications, sensors, robotics, materials, and propulsion. In addition, ***UVa supports funding for NASA Aeronautics at \$569 million,*** an increase of \$68 million, or 13.6 percent above the FY 2010 level. Aeronautics research funding supports efforts to develop new materials, alternative fuels, and the Next Generation Air Transportation System.

As a member of the National Institute of Aerospace (NIA), a non-profit research and graduate education institute, UVa and other consortium members work with the NASA Langley Research Center to conduct leading-edge aerospace and atmospheric research, develop new technologies for the nation and help inspire the next generation of scientists and engineers.

Investing in U.S. "Innovation Security" – All Agencies

UVa recommends that Congress and the Administration consider the creation of a new program at each of the federal science agencies equal to one percent (1%) of their current

extramural funding to support proof-of-concept research and development at universities, or \$300 million per year. More specifically, our recommendation is that \$2 million of this proof-of-concept funding be provided to each of the 50 top research universities (provided they demonstrate a minimum level of competence and impact in performing translational or proof-of-concept research) \$1 million per year at the next 150 universities interested in proof-of-concept research; and \$500,000 per year at another 100 universities demonstrating potential to develop successful and high impact programs in translational and proof-of-concept research and development.

It is important to note that the initiatives we are suggesting should not be for later stage product development or for more applied pre-commercial research; rather, it should be for true proof-of-concept research or prototype development best conducted in the settings where discoveries and innovations perceived to have commercial application are first developed. Such funding should be allocated after rigorous evaluation by carefully assembled panels of local experts in translational and proof-of-concept research – this is key to scaling success to the national level. Among the criteria for awards under this initiative should be the demonstrated willingness and capability of a university in engaging project management boards comprised of industry, start-up, venture capital, technical, financial, and business/market experts. Additionally, successful applicants for this funding should be required to prove their willingness and agility in managing translational projects stressing market-relevant milestones, in conducting rigorous oversight and management of such projects, and in their willingness to withdraw funding from projects failing to reach essential milestones so that funding can be re-allocated to projects with more potential.

We attribute UVa's success in proof-of-concept research to the now nationally well-known Coulter process, involving a very diverse review board, in-person final review sessions, milestone-driven projects, quarterly reporting that is simple yet effective in re-directing projects, the "will to kill" projects or re-direct funds if insurmountable obstacles occur, and excellent networking to the venture capital and private sector. The Coulter program projects have generated a 5-1 overall return on investment (ROI) in new follow-on funding, and 42-1 ROI for the top 10 percent of portfolio projects. The key differentiators of this process as we employ it at UVa versus most prior proof-of-concept funding mechanisms is the in person diligence on the involved people and ideas, dedicated project manager, the diverse composition of the board, the urgency of quarterly reviews and re-direction of projects, and will to re-direct funds as results emerge.

Conclusion

I would like to thank the Committee, specifically Chairman Wolf, for your support of the federal science agencies in these tough budgetary times. While we understand that funding is greatly constrained, I hope that you will choose to support these strategic increases for the federal science agencies that will foster American competitiveness and ensure our future economic vitality.

I thank you for your consideration of these important issues.