Testimony before the

Committee on Science, Space, & Technology

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by

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Good morning, Chairwoman Johnson, Ranking Member Lucas and committee members. Thank you for this opportunity to address how the NSF for the Future Act can help America be more technologically competitive, and more specifically, benefit from the talents and resources of highly specialized institutions such as mine. After almost four decades in higher education, I am a firm believer that universities that align their mission with the industries they serve are valuable pipelines to a globally competitive, more diverse workforce and a continuing source of innovation and research partners who share a responsibility for security. With additional support from NSF, universities can more effectively support our nation's technological superiority and prepare a future workforce capable of competing for generations to come.

I will focus on opportunities for NSF through the lens of four questions. How can we work together to:

1. Develop a workforce that maintains our nation's competitive edge in key technologies?
2. Diversify the workforce to attract the best and brightest from populations traditionally underrepresented?
3. Optimize a return on research investment, and

4. Protect intellectual property?

Building a globally competitive workforce in technologically focused industries starts years before those individuals enroll at our universities. It starts with an early introduction to Science, Technology, Engineering and Mathematics (STEM) – specifically, lessons and experiences that spark creativity and inspire young minds to learn more. And, lessons and experiences that are available to all Americans regardless of their zip code. Our nation's many STEM-focused universities, both public and private, already deliver a significant amount of these enrichment opportunities, often with support from NSF. With support from the State of Florida, Embry-Riddle supports America's global leadership in the aerospace sector by delivering pre-college science, technology and math education focused on aerospace applications. This program annually touches approximately seven thousand Florida high school students who, upon graduation from high school, pursue college STEM majors at a statistically higher rate than their classmates.

Similar to many STEM universities, we also host summer programs and online programs geared to K-12 students. They master and apply STEM skills ranging from robotics to coding to additive manufacturing, and more. Additional NSF support could help other schools launch or expand very "real world," very "hands-on" outreach experiences to spark science and math-based skills early. It will also permit the agency to identify successful programs with proven track records and expand them nationally.

We work on a daily basis with our nation's aerospace industry and can attest to the industry's extraordinary effort to build a more diverse workforce. Many collaborate with us through industry-sponsored scholarships, mentorships, internship programs and career acceleration programs. We target recruiting to under-represented groups and first-generation college students. Once these students are on campus, we support their success by involving them in career development and research programs. Data also shows that students involved in undergraduate research have higher retention rates. As required by our commitment to diversity, we use our resources and apply to federally available programs to contribute to involvement of underrepresented groups. Expanded undergraduate research through NSF is a very low-cost investment in retention. This experience – in our classrooms and labs and through internships -- pays off by inspiring the next generation of graduate students and tech entrepreneurs. So smaller schools would welcome funding and opportunities relevant to their areas of specialization.

But, how can working with a smaller, specialized institution rival the "buying power" of working with a brand name, powerhouse comprehensive university? You can think of this as another dimension of diversity. Economically, there is inherent value in building capacity in small-to-medium universities throughout the country and capitalizing on the progress they are already making in tackling the research priorities identified by industry. These initiatives tend to be highly focused problem-solving for outcomes that are specific and quantifiable.

Unlike comprehensive research universities that are active in many different areas of discovery, it is not uncommon for smaller institutions to have a few very qualified researchers in critical areas. Support for these core competency areas, especially when they are in line with national priorities and partnered with larger research institutions, will provide a greater diversity of individuals attacking some of our greatest scientific and engineering challenges.

Let me give you a practical example. Numerous investigators at large, comprehensive research universities focus on the challenges of cyber security as it applies to protecting the transmission of endless amounts of sensitive information, such as financial data. At Embry-Riddle, we have world-class faculty collaborating with other institutions and manufacturers to advance cyber security specific to airports, aircraft, spacecraft and unmanned autonomous systems. This is a challenge in what you might describe as basic computational science research. However, keeping "flying" devices, pilots, passengers and cargo protected has a direct impact on our economy and national security. While we know a lot about aerospace systems, we're not large enough to have expertise in all areas. By partnering with the University of Florida, we are combining the talents of our respective institutions and creating a center of excellence in aerospace resiliency. With new funding sources, we have the potential to apply lessons learned to other critical areas.

Finally, how can we protect our competitive edge? Research security is an ongoing challenge that demands multi-faceted approaches for identifying and alleviating national security and economic risks.

In closing, I want to emphasize that smaller, specialized schools such as ours are adding value … Our enrollment would not be at an all-time high if industry did not look to us for the next generation of scientists, engineers, innovators and policymakers. Through expanded partnership with NSF, I believe we could deliver a return on investment that would benefit the country.

P. Barry Butler, Ph.D.
President, Embry-Riddle Aeronautical University

In 2017, P. Barry Butler became the sixth president of Embry-Riddle Aeronautical University, the world's leading institution of higher education focusing on aviation and aerospace.

Embry-Riddle Aeronautical University offers more than 100 bachelor's, master's, and Ph.D. degree programs in its colleges of Arts & Sciences, Aviation, Business, Engineering, and Business Security & Intelligence. Embry-Riddle educates more than 34,000 students annually at residential campuses in Daytona Beach, Florida, and Prescott, Arizona, through the Worldwide Campus at more than 135 locations in the United States, Europe, Asia, and the Middle East, and through online programs.

Under his presidency, Embry-Riddle continues to expand discovery-driven degree programs and its research park is home to new aerospace patents, technology transfer and startups. Butler has encouraged collaboration with industry, resulting in expedited hiring initiatives with leading aviation and aerospace industries. He is expanding the university's interest in aviation cybersecurity, aviation data analytics and autonomous vehicles. The university also created new partnerships to prime the aviation/aerospace pipeline.

As a strong advocate for science, technology, engineering and mathematics (STEM) education, Butler supports a dual-enrollment program with the Gaetz Aerospace Institute. The institute offers more than 40 university courses to students in 84 Florida high schools. At the Arizona Campus, the STEM Education Center serves as a hub of enrichment for students, faculty, researchers and the community.

Previously, Butler was Executive Vice President and Provost of the University of Iowa. He was responsible for more than 100 academic programs in 11 colleges. For ten years, he served as Dean of the College of Engineering.

Butler is on the board of the Hoover Presidential Foundation and The Wings Club. He is a member of The Civic League of the Halifax Area. He is a private and glider pilot.

He earned three degrees from the University of Illinois at Urbana-Champaign: a bachelor's and master's in Aeronautical and Astronautical Engineering, and a Ph.D. in Mechanical Engineering.