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Testimony

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Chairwoman Clarke, Ranking Member Garbarino, and Members of the Cybersecurity, Infrastructure Protection, & Innovation Subcommittee, I want to thank you for providing me with the opportunity to testify today. My name is Professor Tony Coulson and I serve as the Executive Director of the Cybersecurity Center at California State University, San Bernardino (CSUSB).

CSUSB is one of 23 campuses that make up the great California State University system – the largest four-year public university system in the world. Under the leadership of President Tomás Morales, CSUSB is a nationally recognized university, serving more than 20,000 students, most of whom come from the Riverside and San Bernardino counties, an area in inland Southern California known as the Inland Empire. As a Hispanic Serving Institution (HSI), we are recognized for our transformative influence in our community. More than 80 percent of CSUSB’s students are the first in their families to earn four-year college degrees, and two-thirds of our students come from economically disadvantaged circumstances. We are proud that CSUSB, with campuses San Bernardino and Palm Desert, is ranked No. 7 among top colleges and universities educating economically disadvantaged students and graduating them into well-paying jobs. CSUSB is recognized globally for our Jack H. Brown College of Business and Public Administration and nationally for our leadership in developing the country’s cybersecurity workforce.

I am here today to specifically talk about ways how to bridge the nation’s cybersecurity workforce gap, how CSUSB’s Cybersecurity Center is currently leading nationwide initiatives in this effort, and how existing U.S. government programs are working with universities like mine to achieve this goal. More than 12 years ago, CSUSB created its Cybersecurity Center (“Center”), focused on one mission – creating a cybersecurity talent pool and a corresponding job base within the Inland Empire region of California. This has always been a clear need as the Inland Empire has been an economically depressed region for the last two decades, experiencing economic challenges like so many of our communities across the nation, but with one of the lowest degree attainment rates in the state of California combined with low high school graduation rates.

To address these issues, CSUSB created a Cybersecurity Center with four undergraduate programs in a variety of disciplines including criminal justice, business and public administration, computer science, and information science. This led us to develop five master’s degree programs along the same disciplines (business, computer science, information systems, and public administration) but with one broader goal, to integrate the NSA Centers of Academic Excellence in Cybersecurity with the Intelligence Community CAE program – creating a critical new program to produce intelligence analysts with cyber skills. This new master’s program in national cyber security Studies became a model curriculum adopted by universities around the United States. From 12 years ago with 10 students, CSUSB now has over 600 students enrolled in these degree programs. While CSUSB has always been innovative in its approach, providing an environment that built curriculum based on government and industry workforce needs, it was the students that provided the energy and truly showed their capabilities.

CSUSB is on the front line training the next generation of cyber warriors. We are proud to say that CSUSB’s student outcomes are so strong that one program director at the U.S. Department of Homeland Security (DHS) once said that CSUSB students “are everywhere” and have commended the skill sets that CSUSB students have when they graduate.

The nation has had a dearth of well-trained cybersecurity workers for many years; however, the problem is greatly exacerbated by the integration of technology into every sector of our economy, leading to an inevitable growth of cybersecurity attacks. These attacks have illustrated the need to expeditiously fill the estimated 500,000-person deficit in the nation’s cybersecurity workforce. As part of my testimony today, I want to stress the importance of partnerships across academia, with the government, as well as with industry. The 2020

Cyberspace Solarium Commission [report](#) states that “...sometimes success in building a robust federal workforce depends on elements outside of the federal government. In those cases, the U.S. government can and should play a supporting role by providing its partners in workforce development the tools needed to accelerate the increase in cyber personnel.”

A 2021 [report](#) on “The Hewlett Foundation’s Cyber Talent Pipeline: An Evolution Based on Equitable Evaluation Framework Principles” states “We identified 5 Minority-Serving Institutions to be in our evaluation sample; each has committed Cyber faculty, existing innovative partnerships and the opportunity to further develop interdisciplinary education programs... Cal State San Bernardino leads a national collaboration of more than 300 universities and colleges dedicated to cyber and piloting innovations, many of which are community colleges.” The report also states that “the assumption that elite universities are best placed to enable multidisciplinary cyber education is not borne out by our evidence.”

Just as President John F. Kennedy called for a greater goal for the U.S. to land a man on the moon, so must we as a nation think about the global cyber race. In his speech before a Joint Session to Congress on May 25, 1961, he needs that President Kennedy highlighted still resonate today: “I believe we possess all the resources and talents necessary. But the facts of the matter are that we have never made the national decisions or marshaled the national resources required for such leadership. We have never specified long-range goals on an urgent time schedule, or managed our resources and our time so as to insure their fulfillment.”

I am happy to be here today to discuss this important challenge, describe what CSUSB is doing to help address the problem, discuss key federal partnerships we have and the outcomes they are producing, and to share best practices for how we can address this problem head-on together.

I. CSUSB and the National Centers of Academic Excellence in Cybersecurity (NCAE-C)

The National Centers of Academic Excellence in Cybersecurity (NCAE-C) program was created in 1999, beginning with just seven schools, and through its successful partnerships, the program has grown to 335 schools across 48 states.¹ The NCAE-C program is the nation’s premier cyber workforce development initiative that leverages the unique capabilities of the National Security Agency (NSA) and the member schools to meet the nation’s needs for a specialized education program and unique curricula. NCAE-C is the first, and only of its kind, to have clearly defined academic standards, curricula, and designations for cyber education, holding the member colleges and universities to rigorous educational standards.

CSUSB’s Cybersecurity Center is part of the NCAE-C system and leads the Centers of Academic Excellence in Cybersecurity Community. Six years ago, there were 100 institutions in the program, now there are 335 NSA-Designated Centers of Academic Excellence in Cybersecurity, educating approximately 100,000 students in cyber-related disciplines.

The CAE Community in Cybersecurity program allows for innovation with our government partners at NSA, the Program Office, as well as DHS, the Cybersecurity and Infrastructure Security Agency (CISA), the Federal Bureau of Investigation (FBI), the National Initiative for Cybersecurity Education (NICE), and the National Science Foundation (NSF).

These partnerships are important as each agency plays a unique role in the CAE program. To help increase a talent pipeline for students into the federal government, DHS serves as a strategic partner in promoting

¹ See Attachment A: List of schools in the NCAE-C program.

cybersecurity education and workforce development, as well as strengthening partnerships between institutions and federal, state, local and tribal governments.

II. CSUSB and CyberCorps®: Scholarship for Service

A strong example of the benefit of partnerships is NSF's CyberCorps®: Scholarship for Service program. This program has sponsored thousands of cybersecurity students leading them into government cyber careers. This unique partnership with DHS, NSF, OMB, and the NSA CAE Program has produced thousands of quality cybersecurity graduates as well as building capacity for stronger cyber research and programs at colleges and universities. DHS and NSF further expanded the CyberCorps® program by creating the Community College Cybersecurity Pilot scholarship program focused on veterans and persons with existing bachelor's degrees.

III. CSUSB Focus on K-12 Programs

CSUSB has a long-standing commitment to focusing not just on college age students, but also on going deeper into the educational pipeline to start teaching cybersecurity skills to younger students. A great example of this is CSUSB's involvement in the GenCyber program – a partnership between the NSF and the NSA. The GenCyber program provides K-12 students the opportunity to go to “cybersecurity summer camp” for free and for teachers to participate in training camps to provide cyber literacy in the classroom. CSUSB's early work in this program involved partnerships with the Girl Scouts of San Geronimo Council as well as Title I middle schools, to reach underserved communities and promote diversity in cybersecurity talent. This successful series of camps serving over 1,200 girls eventually led to a national Girl Scout badge in cybersecurity.

Through recent grant programs, the greater CAE Community schools are working together to create K-12 learning pathways to provide cyber literacy programs and prepare students for cyber careers. Cybersecurity teachers in schools around the country are learning new skills to teach cybersecurity and in doing so utilizing freely available CAE materials and those developed by our partners. The new Regions Investing in the Next Generation (RING) program from Illinois' Moraine Valley Community College and Alabama's University of Alabama Huntsville focuses on teaching cybersecurity skills in rural areas and home schools and provide resources for diverse communities including the economically disadvantaged, the deaf and hard of hearing, and the neurodiverse. Additionally, New York's Mohawk Valley Community College and Florida's University of West Florida have just launched the national Enigma cybersecurity competition. This national competition starts with 165 12-person teams (1,980 high school students) to attack and defend in unique cyber scenarios as well as interact with potential employers. The CAE Community now has year-round extracurricular and in-school activities focused on cyber in K-12.

IV. Creating Cutting Edge Programs: INSURE (Information Security Research Education)

Federal grants have also funded future-oriented programs, meaning that CAE Community schools and government partners are not just focusing on the cybersecurity skills of today but also are looking at the cybersecurity skills that are needed five years from now and beyond.

Recognizing a shortage of domestic research talent, CSUSB, working with the NSF, NSA, and CAE Community partners, has advanced a cutting-edge research program. Housed at CSUSB, this program, called the Information Security Research Education (INSURE) program, works with technical directors from industry, the U.S. Department of Energy (DOE), national labs, DHS, and the NSA, to partner with student teams around the country on real cybersecurity problems. The CAE Community is listening to industry and government needs, adapting its

curriculum, and focusing on research in artificial intelligence (AI), autonomous vehicles (AV), advanced networks, and critical infrastructure protection.

V. CSUSB Partnering with Community Colleges and the National Science Foundation Advanced Technology Education (ATE)

CSUSB's collaboration and partnership mission is further evident with the cooperation of the NSA and the NSF's Advanced Technology Education (ATE) program. The National Cybersecurity Training and Education Center, based at Whatcom Community College in Washington state, focuses on opportunities and the development of cybersecurity workforce capabilities at community colleges nationwide, and working with the CAE Community, established a National Cybersecurity Virtual Career Fair to match students from CAE colleges and universities with employers across the nation. In 2020, this career fair saw more than 1,400 well-qualified CAE students and 38 employers participate. This year, the CAE Community is seeking to double that number. Future collaborations include national apprenticeship initiatives partnering with CAE designated schools.

VI. CSUSB Partnership with the NICE Challenge Project

Another strong example of how CSUSB's successful cybersecurity collaboration is the CAE Community's national cyber range, the NICE Challenge Project. The program is funded through grants from NSF, DHS, NSA, and the NICE program with a mission to create a range where cybersecurity participants can test their cyber workforce readiness, measured against the NIST Cybersecurity Workforce Framework (800-181) and NSA Knowledge Unit Standards. This system, free for use in higher education, currently serves thousands of students at 500 schools across the nation. This program is exploring an expansion for helping veterans, and high schools, and working with CISA on federal workforce training. With further funding from DHS, CISA, and NSA, this cyber range could be easily scaled to serve the nation's high schools, providing progress towards workforce readiness. Working with CISA, CSUSB also sees opportunities for using the NICE Challenge as a means to train, develop and validate the federal workforce.

VII. Looking Ahead

The nation is grappling with a critical problem to address the cyber workforce challenge. Colleges and universities across the country are doing tremendous work to address the problem and CSUSB is doing its part each day to help bridge the workforce gap. As Congress grapples with solutions to these challenges, it must avoid creating new programs in the Federal government, but rather provide steady-state funding to ones that are in existence and have a long history of success. The CAE Community has existed for 22 years and has amazing return on investment using federal funds. Other programs such as those I have described at NSF and NIST, working with the DHS and other agencies, are successful programs making great strides to address the problem.

What makes the CAE Community program unique is its willingness to collaborate with a wide range of entities, from both industry and government, as a critical resource. DHS has a unique vantage point based on its mission to safeguard the nation's homeland, and DHS should promote sustained funding and leverage the capabilities of the CAE Community in its efforts to address cybersecurity workforce challenges.

The colleges and universities that make up the CAE in Cybersecurity Community have boundless energy, but what is needed from Congress is a concerted focus and dedicated funding for all of these programs along with the need to avoid creating overlapping and duplicative programs across all other agencies. The model created in the CAE community, working with DHS, FBI, NSF and NIST have a long history of success. The program is also created and run by those who understand cybersecurity and the educational needs of our community. We need

to sustain and encourage the non-profit, collaborative approaches that work and dedicated funding is critical to helping to achieve these goals.

We also need to ensure the workforce of the future is diverse in nature as well. The CAE Community schools are engaged in many initiatives building out diverse workforce, including wounded warriors, neurodiverse, women, and minority serving institutions. The recently launched Cyber Education Diversity Initiative (CEDI) is housed at Fordham University in New York state. This program is focused on building the capacity of Minority-Serving Institutions (MSIs) to become CAE designated as well as inviting students from MSIs to join competitions, hosting workshops for faculty, and allowing for students to transfer from MSIs to colleges with a cybersecurity degree program.

NATO Secretary General Jens Stoltenberg, speaking at the Cyber Defence Pledge Conference in London in 2019, stated: *"It takes just a 'click' to send a cyber virus spreading across the globe. But it takes a global effort to stop it from inflicting chaos."* He went on to say *"But cyber goes beyond technology. The people behind the technology are just as important. We need to build a strong and diverse workforce of future cyber defenders."*

The efforts by CSUSB and the Centers of Academic Excellence in Cybersecurity Community have generated undeniable results but tackling a 500,000-person workforce shortage is a problem that will require "all hands-on deck." Where there are programs that already exist with long standing demonstrable results, Congress should support those with dedicated funding. Thank you for your time and I look forward to any questions.

NSA Designated Centers of Academic Excellence in Cyber Institutions

Athens State University	AL
Auburn University	AL
Calhoun Community College	AL
Jacksonville State University	AL
Snead State Community College	AL
The University of Alabama	AL
The University of Alabama at Birmingham	AL
The University of Alabama in Huntsville	AL
Tuskegee University	AL
University of South Alabama	AL
University of Arkansas	AR
University of Arkansas at Little Rock	AR
Arizona State University	AZ
Embry-Riddle Aeronautical University, Prescott Campus	AZ
Estrella Mountain Community College	AZ
Glendale Community College	AZ
Grand Canyon University	AZ
The University of Arizona	AZ
University of Advancing Technology	AZ
California State Polytechnic University, Pomona	CA
California State University San Marcos	CA
California State University, Sacramento	CA
California State University, San Bernardino	CA
City College of San Francisco	CA
Coastline Community College	CA
Cypress College	CA
Long Beach City College	CA
National University	CA
Naval Postgraduate School	CA
Ohlone College	CA
Sierra College	CA
University of California, Davis	CA
University of California, Irvine	CA
Arapahoe Community College	CO
Colorado School of Mines	CO
Colorado State University-Pueblo	CO
Colorado Technical University	CO
Pikes Peak Community College	CO
Pueblo Community College	CO
Red Rocks Community College	CO
Regis University	CO
United States Air Force Academy	CO
University of Colorado, Colorado Springs	CO
University of Denver	CO
University of Connecticut	CT

University of New Haven	CT
Georgetown University	DC
The George Washington University	DC
University of Delaware	DE
Wilmington University	DE
Daytona State College	FL
Embry-Riddle Aeronautical University - Daytona Beach Campus	FL
Florida A&M University	FL
Florida Atlantic University	FL
Florida Institute of Technology	FL
Florida International University	FL
Florida State College at Jacksonville	FL
Florida State University	FL
Indian River State College	FL
Nova Southeastern University	FL
Saint Leo University	FL
St. Petersburg College	FL
University of Central Florida	FL
University of Florida	FL
University of North Florida	FL
University of South Florida	FL
University of West Florida	FL
Valencia College	FL
Augusta Technical College	GA
Augusta University	GA
Columbus State University	GA
Georgia Institute of Technology	GA
Georgia Southern University - Armstrong Campus	GA
Georgia State University	GA
Kennesaw State University	GA
Middle Georgia State University	GA
Middle Georgia State University - MSIT	GA
University of Georgia	GA
University of North Georgia	GA
Honolulu Community College	HI
Leeward Community College	HI
University of Hawaii – West Oahu	HI
University of Hawaii at Manoa	HI
University of Hawaii Maui College	HI
Iowa State University	IA
Idaho State University	ID
North Idaho College	ID
University of Idaho	ID
College of DuPage	IL
DePaul University	IL

Illinois Institute of Technology	IL
Illinois State University	IL
John A Logan College	IL
Lewis University	IL
Lincoln Land Community College	IL
Loyola University Chicago	IL
Moraine Valley Community College	IL
Rock Valley College	IL
Roosevelt University	IL
University of Illinois at Springfield	IL
University of Illinois, Urbana-Champaign	IL
Indiana University	IN
Ivy Tech Community College	IN
Purdue University	IN
Purdue University Northwest	IN
Butler Community College	KS
Fort Hays State University	KS
Johnson County Community College	KS
Kansas State University	KS
University of Kansas	KS
Wichita State University	KS
Bluegrass Community and Technical College	KY
Murray State University	KY
Northern Kentucky University	KY
Owensboro Community and Technical College	KY
University of Louisville - Graduate Certificate of Cybersecurity	KY
University of Louisville, Kentucky	KY
University of the Cumberlands	KY
Bossier Parish Community College	LA
Louisiana Tech University	LA
University of New Orleans	LA
Boston University	MA
Northeastern University	MA
University of Massachusetts Lowell	MA
Worcester Polytechnic Institute	MA
Anne Arundel Community College	MD
Bowie State University	MD
Capitol Technology University	MD
Cecil College	MD
College of Southern Maryland	MD
Hagerstown Community College	MD
Harford Community College	MD
Howard Community College	MD
Morgan State University	MD
Prince George's Community College	MD

The Community College of Baltimore County	MD
The Johns Hopkins University	MD
Towson University	MD
United States Naval Academy	MD
University of Maryland	MD
University of Maryland Global Campus	MD
University of Maryland, Baltimore County	MD
Southern Maine Community College	ME
University of Maine at Augusta	ME
Baker College	MI
Davenport University	MI
Delta College	MI
Eastern Michigan University	MI
Ferris State University	MI
Grand Rapids Community College	MI
Henry Ford College	MI
Lansing Community College	MI
Macomb Community College	MI
Oakland University	MI
University of Detroit, Mercy	MI
Walsh College	MI
Washtenaw Community College	MI
Capella University	MN
Century College	MN
Lake Superior College	MN
Metropolitan State University	MN
St. Cloud State University	MN
Walden University	MN
Metropolitan Community College - Kansas City	MO
Missouri University of Science and Technology	MO
Southeast Missouri State University	MO
St. Louis Community College	MO
University of Missouri - Columbia	MO
University of Missouri-St. Louis	MO
Webster University	MO
Mississippi State University	MS
Great Falls College Montana State University	MT
Missoula College	MT
Alamance Community College	NC
East Carolina University	NC
Fayetteville Technical Community College	NC
Forsyth Technical Community College	NC
Montreat College	NC
North Carolina A&T State University	NC
North Carolina State University	NC

Pitt Community College	NC
Sampson Community College	NC
University of North Carolina, Charlotte	NC
University of North Carolina, Wilmington	NC
Wake Technical Community College	NC
Bismarck State College	ND
North Dakota State University	ND
Bellevue University	NE
Metropolitan Community College	NE
Northeast Community College	NE
University of Nebraska, Omaha	NE
Dartmouth College	NH
University of New Hampshire	NH
Brookdale Community Collge	NJ
County College of Morris	NJ
Fairleigh Dickinson University	NJ
New Jersey City University	NJ
New Jersey Institute of Technology	NJ
Rutgers, The State University of New Jersey	NJ
Stevens Institute of Technology	NJ
Central New Mexico Community College	NM
Eastern New Mexico University - Ruidoso Branch Community College	NM
New Mexico Tech	NM
University of New Mexico	NM
College of Southern Nevada	NV
University of Nevada, Las Vegas	NV
University of Nevada, Reno	NV
Binghamton University (SUNY at Binghamton)	NY
Excelsior College	NY
Fordham University	NY
Mercy College	NY
Mohawk Valley Community College	NY
New York Institute of Technology	NY
New York University	NY
Pace University	NY
Rochester Institute of Technology	NY
Rockland Community College	NY
Syracuse University	NY
University at Albany, the State University of New York	NY
University at Buffalo, the State University of New York	NY
Utica College	NY
Utica College - MS Cybersecurity	NY
Westchester Community College	NY
Air Force Institute of Technology	OH

Cedarville University	OH
Clark State Community College	OH
Columbus State Community College	OH
Franklin University	OH
Sinclair Community College	OH
Terra State Community College	OH
The Ohio State University	OH
University of Cincinnati	OH
Wright State University	OH
Oklahoma City Community College	OK
Oklahoma State University	OK
Rose State College	OK
University of Tulsa	OK
Chemeketa Community College	OR
Mt. Hood Community College	OR
Portland Community College	OR
Portland State University	OR
Bloomsburg University of Pennsylvania	PA
Carnegie Mellon University	PA
Drexel University	PA
East Stroudsburg University	PA
Indiana University of Pennsylvania	PA
Lehigh Carbon Community College	PA
Pennsylvania Highlands Community College	PA
Pennsylvania State University	PA
Pittsburgh Technical College	PA
Robert Morris University	PA
Saint Vincent College	PA
University of Pittsburgh	PA
Valley Forge Military College	PA
West Chester University of Pennsylvania	PA
Polytechnic University of Puerto Rico	PR
Community College of Rhode Island	RI
New England Institute of Technology	RI
University of Rhode Island	RI
Clemson University	SC
South Carolina State University	SC
The Citadel	SC
Trident Technical College	SC
University of South Carolina	SC
Dakota State University	SD
Jackson State Community College	TN
LeMoyne–Owen College	TN
Roane State Community College	TN
Tennessee Tech University	TN

The University of Tennessee at Chattanooga	TN
University of Memphis	TN
El Paso Community College	TX
Hill College	TX
Houston Community College	TX
Laredo College	TX
McLennan Community College	TX
Our Lady of the Lake University	TX
Sam Houston State University	TX
San Antonio College	TX
South Texas College	TX
Southern Methodist University	TX
St. Philip's College	TX
Texas A&M University	TX
Texas A&M University-Corpus Christi	TX
Texas A&M University-San Antonio	TX
Texas State Technical College in Harlingen	TX
The University of Texas at Austin	TX
The University of Texas at San Antonio	TX
University of Dallas	TX
University of Houston	TX
University of North Texas	TX
University of Texas at Dallas	TX
University of Texas at El Paso	TX
Brigham Young University	UT
Southern Utah University	UT
Danville Community College	VA
ECPI University	VA
George Mason University	VA
Germanna Community College	VA
Hampton University	VA
James Madison University	VA
Liberty University	VA
Lord Fairfax Community College	VA
Marymount University	VA
Mountain Empire Community College	VA
Norfolk State University	VA
Northern Virginia Community College	VA
Old Dominion University	VA
Radford University	VA
Regent University	VA
Southwest Virginia Community College	VA
Thomas Nelson Community College	VA
Tidewater Community College	VA
University of Virginia	VA

Virginia Commonwealth University	VA
Virginia Polytechnic Institute and State University	VA
Virginia Western Community College	VA
Champlain College	VT
Norwich University	VT
City University of Seattle	WA
Columbia Basin College	WA
Edmonds Community College	WA
Green River College	WA
Highline College	WA
Spokane Falls Community College	WA
University of Washington	WA
Whatcom Community College	WA
Madison College	WI
Marquette University	WI
University of Wisconsin-Stout	WI
Waukesha County Technical College	WI
American Public University System	WV
Blue Ridge Community and Technical College	WV
West Virginia University	WV