VICEROY Program Introduction

Washington State University CySER Summer Symposium Kickoff

Chester "CJ" Maciag
Director Cyber-Spectrum Academic Outreach
Integrated Sensing and Cyber
OUSD(R&E), OASD(CT), D(AT)

Chester "CJ" Maciag – Dept of Defense

- Director of Cyber Science & Technology Research and Academic Outreach

  - Coordinates on a wide variety of technology development, assessment, and protection issues affecting the $4B DoD cyber portfolio.

  - Additionally, he leads three impactful academic enhancement programs in cyber and spectrum disciplines designed to close DoD talent gaps and innovative S&T capability needs.

- Before coming to OUSD(R&E), Mr. Maciag served 30 years at the Air Force Research Laboratory in Rome NY as a civilian computer engineer, fulfilling numerous roles as a bench scientist, program manager, portfolio manager, branch chief, and principal cyber strategist.

- Concurrently, he also served in the academic community as an Adjunct Professor of Cybersecurity where he was recognized in 2018 with the SANS Difference Makers in Cybersecurity award for his contributions to cybersecurity education.

- He is a current member of the Military Cyber Professionals Association and the Association of Old Crows.

Where I started and how I got here today...
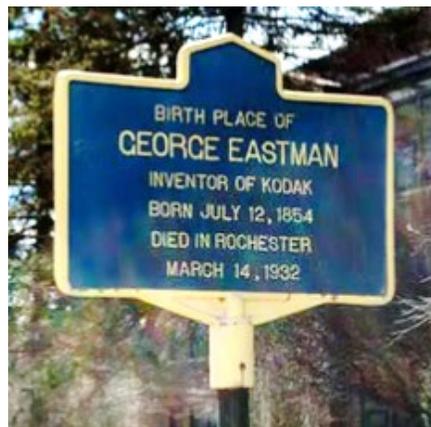
50 Year NY Native – Mohawk Valley Resident

Education
- BS-EE Rochester Institute of Technology
- MS-FCM Utica University
- Air War College

30 years at AFRL and 5 Years at Pentagon
- Scientist, Program Manager, Supervisor, Portfolio Lead
- 12 papers on communications and network security
- Influenced digital forensics standards through DFRWS
- Cyber Defense and Cyber Effects Operations Research
- Branch Chief of 140 people / Portfolio over $60 million
- Managed DoD Cyber Portfolio of $4 billion

Utica University Adjunct Professor for 21 Years
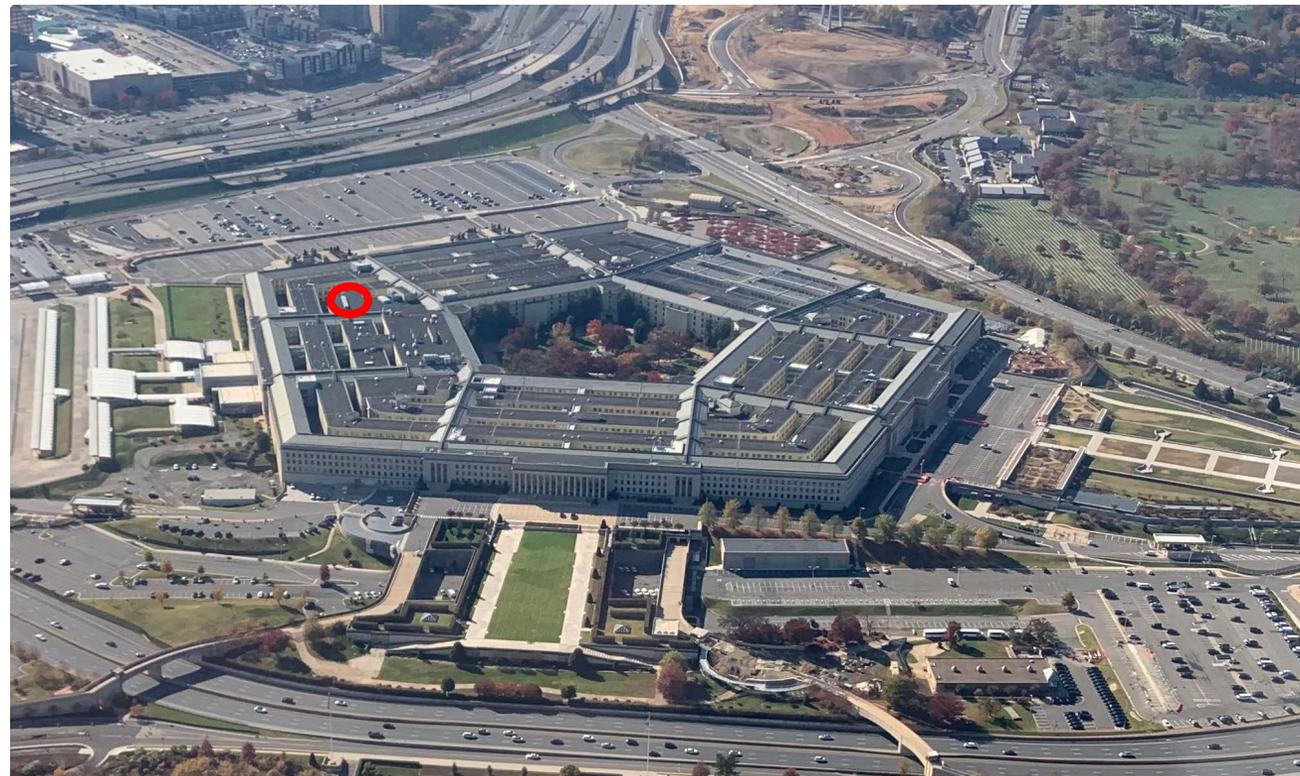- Cyber and Network Security, Open Source Cyber Intelligence

USD(R&E) Mission – DoD's Chief Technology Officer

Ensure Technological Superiority for the U.S. Military

Drive the critical technological vision for the DoD

Accelerate the transition of key capabilities

Maximize our technological advantage for the future fight

14 Critical Technology Areas

Integrated Sensing and Cyber
(Critical Technology Area)

Computers / Cyber

Communications

Spectrum Management

Spectrum Operations

Advanced Sensing

"To maintain the United States military's technological advantage, the Department will champion research, science, technology, engineering and innovation."
– Under Secretary Honorable Heidi Shyu, February 2022

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Our Leaders' Perspective on Cybersecurity and Operations

"The Federal Government must improve its efforts to identify, deter, protect against, detect, and respond to malicious cyber campaigns and their actors through bold changes and <u>significant investments in cybersecurity</u>"

- President Joseph Biden, on National Security Memorandum – 8, 19 Jan 2022

"…the <u>most important person on the mission is</u> no longer the operator kicking down the door, but <u>the cyber operator</u> who the team has to… work their cyber tools into the [all domain] fight."[2]

- General Richard D. Clarke, Former Commander of U.S. Special Ops Command

"Our cyberspace forces require a <u>comprehensive, integrated cyberspace architecture</u> to achieve and sustain the insight, agility, and lethality necessary for <u>maintaining competitive advantage against near-peer adversaries</u>."[1]

- General Paul M. Nakasone, Former Director of NSA & Commander U.S. CYBERCOM

> Cyber is increasingly critical for strategic all-phase, all-domain, **joint** operations. Need **resilient**, **agile**, **precise** capabilities, integrated architecture, and **enabled workforce**.

1 Paul M. Nakasone, "Statement of Commander, United States Cyber Command," Hearing to Review Testimony on US Special Operations Command And US Cyber Command in review of the Defense Authorization Request for Fiscal Year 2020 and the FYDP, Senate Committee on Armed Services, 14 February 2019.
2 Richard D. Clarke quoted by Jared Keller, "SOCOM chief: Door-kickers are out, cyber operators are in," Task and Purpose, May 12 2019. https://taskandpurpose.com/news/special- operations-forces-cyber-warfare

DoD's Three Primary Cyber Missions

Defend DoD networks, systems, and information

Defend the U.S. homeland and U.S. national interests

Provide cyber support to military operations

Commander USCYBERCOM — Dual-Hatted — Director NSA

CNMF
Cyber National Mission Force

JFHQ-DODIN
Joint Force Headquarters-DOD Information Networks

AFCYBER
Air Forces Cyber

ARCYBER
Army Cyber Command

FLTCYBER
Fleet Cyber Command

MARFORCYBER
Marine Corps Forces Cyberspace Command

133 Cyber Mission Force Teams are assigned to these Commands

Mission Teams
Deliver effects through cyberspace

Support Teams
Develop tools and Provide analysis

Protection Teams
Defend Defense Department Infrastructure

Selected Cyber Attacks in the News

Potential cybersecurity threats that affect will increasingly impact the public if not addressed

Russia: cyber + kinetic
- Disable government, private websites during Russo-Georgian War

Stuxnet: digital weapon
- Compromised PLCs of Iranian nuclear centrifuges
- Destroyed > 1000 centrifuges (20% of inventory)

Jeep hack: remote control
- Hackers demonstrate control of a running Jeep from miles away

Solar Winds: supply chain hack
- Trojanized IT management software compromised multiple gov't agencies

| 2008 | 2010 | 2012 | . . . | 2015 | 2017 | 2020 |

China: stealing data
- Exfil technical program data from defense contractors

China: critical infrastructure
- Target oil, natural gas pipelines in US

Russia: cyber + kinetic
- Cyber attack during Ukraine war
- Power outage for 230K people

Maersk: collateral damage
- Russian Cyber attack against Ukraine affects Maersk
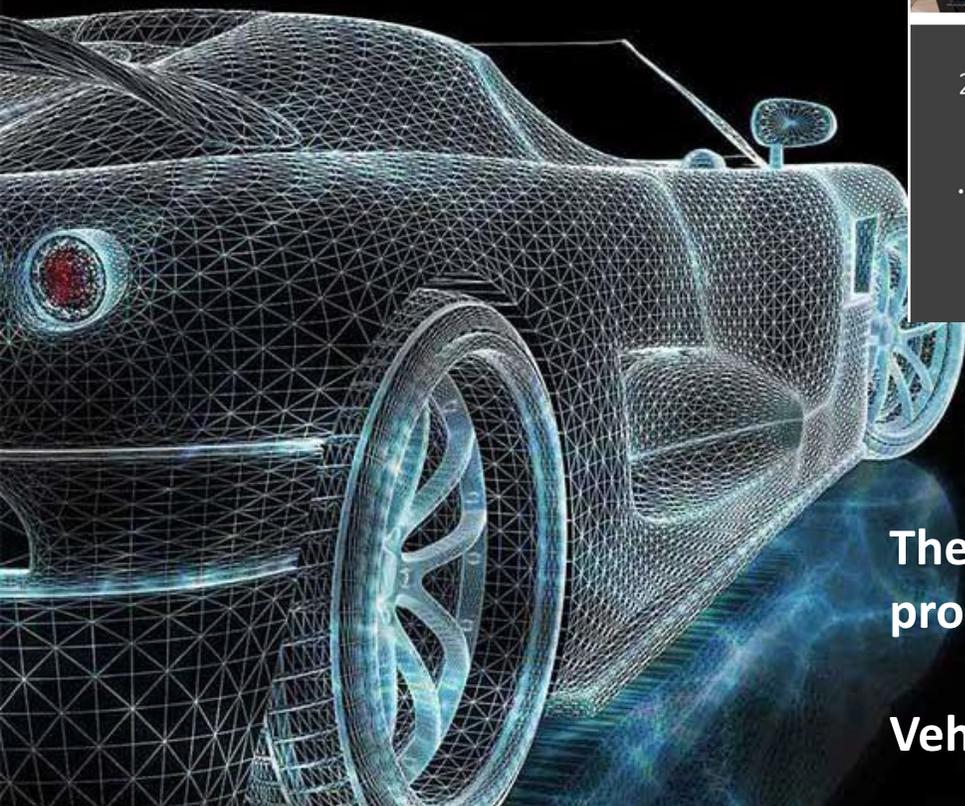- Global operations halted for weeks
- ~$10B in damages to multiple firms

Then: Hacking of platforms and stealing of data → Now: Holding critical infrastructures and supply chain at risk

Our vehicles are rolling data centers
Military vehicles too! They are built from commercial standards…

Student Cyber Truck Challenge
Pen-test competition to remove flaws

2017 Lincoln MKZ
Approximately 100 processors onboard

The typical Ford F150 has over 100 million lines of code and processes over a gigabyte of data per second

Vehicle infrastructure and Smart Cities are the next big security challenges

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VICEROY Cyber and Spectrum Experiential Learning

Opportunity

Retain our talented students and fuel a STEM career passion by exposing them to interesting applied national security problems

Eliminate logistic and financial barriers impeding pursuit of a DoD career in cyber and spectrum research or operations

Vision

To be recognized by DoD as the leading mission-focused experiential cyber-spectrum operations education and internship pipeline producing job-ready leaders in military, civilian, and industrial base sectors.

Mission

Establish academic cyber institutes at institutions of higher learning, to develop foundational expertise in critical cyber operational skills for future military and civilian leaders of the Armed Forces and the Department of Defense, including such leaders of the reserve components.

Approach

Augment traditional college curricula by providing hands-on, experiential learning and internship opportunities uniquely tailored to match the critical cyber-spectrum workforce demands of the Armed Services, Department of Defense, and our Defense Industrial Base partners.
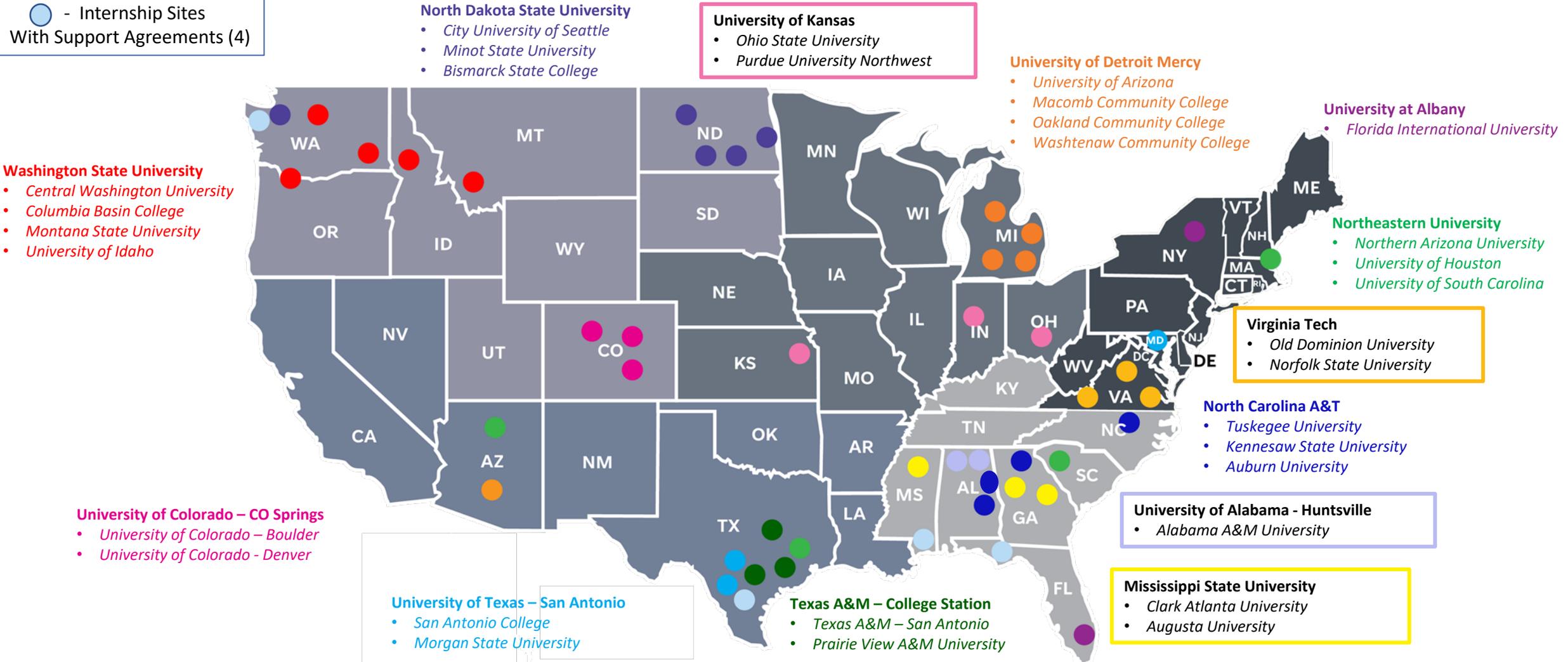
Congressional Requirements

- Develop Early Cyber Interest
- Practical Instruction/ Experience
- More Cyber Instructors
- Strategic Foreign Languages
- Mathematical Cryptography Foundations
- Data Science

VICEROY Regional Consortiums and Major Internship Sites
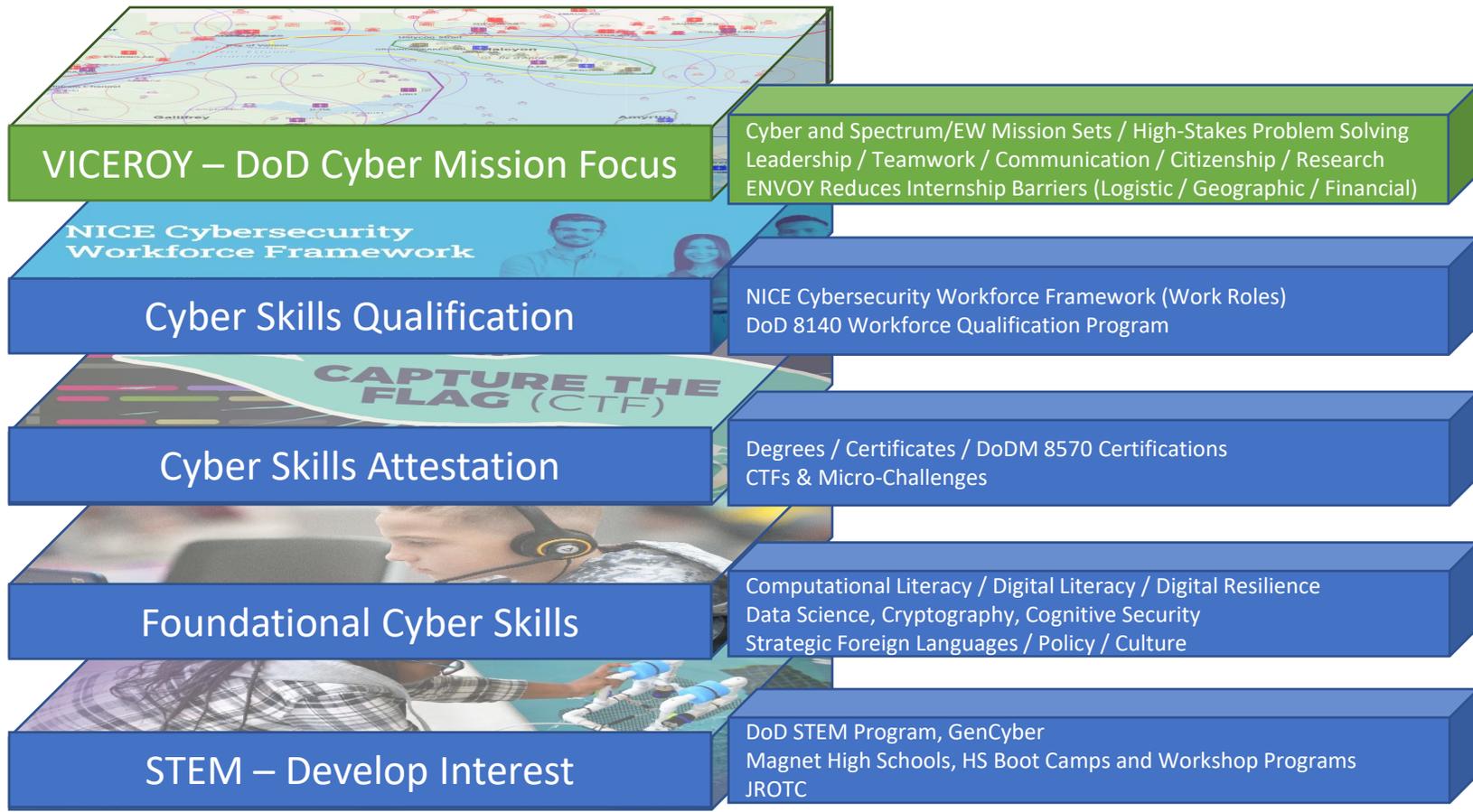
- Internship Sites With Support Agreements (4)

North Dakota State University
- City University of Seattle
- Minot State University
- Bismarck State College

University of Kansas
- Ohio State University
- Purdue University Northwest

University of Detroit Mercy
- University of Arizona
- Macomb Community College
- Oakland Community College
- Washtenaw Community College

University at Albany
- Florida International University

Washington State University
- Central Washington University
- Columbia Basin College
- Montana State University
- University of Idaho

Northeastern University
- Northern Arizona University
- University of Houston
- University of South Carolina

Virginia Tech
- Old Dominion University
- Norfolk State University

North Carolina A&T
- Tuskegee University
- Kennesaw State University
- Auburn University

University of Colorado – CO Springs
- University of Colorado – Boulder
- University of Colorado - Denver

University of Alabama - Huntsville
- Alabama A&M University

University of Texas – San Antonio
- San Antonio College
- Morgan State University

Texas A&M – College Station
- Texas A&M – San Antonio
- Prairie View A&M University

Mississippi State University
- Clark Atlanta University
- Augusta University

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How is VICEROY Different?

Mission-focused cyber-spectrum education emphasizing leadership and communication

Existing Scholarship Programs
ROTC, CySP, SMART, DCTC, etc.

VICEROY – DoD Cyber Mission Focus

Cyber and Spectrum/EW Mission Sets / High-Stakes Problem Solving
Leadership / Teamwork / Communication / Citizenship / Research
ENVOY Reduces Internship Barriers (Logistic / Geographic / Financial)

Cyber Skills Qualification

NICE Cybersecurity Workforce Framework (Work Roles)
DoD 8140 Workforce Qualification Program

Cyber Skills Attestation

Degrees / Certificates / DoDM 8570 Certifications
CTFs & Micro-Challenges

Foundational Cyber Skills

Computational Literacy / Digital Literacy / Digital Resilience
Data Science, Cryptography, Cognitive Security
Strategic Foreign Languages / Policy / Culture

STEM – Develop Interest

DoD STEM Program, GenCyber
Magnet High Schools, HS Boot Camps and Workshop Programs
JROTC

VICEROY Institutes

- DoD and National Security Problem Sets
- Mission-focused Education and Experiential Learning
- Cyber and Spectrum Curriculum
- Strategic Foreign Languages, Data Science/Crypto
- Degrees, Certificates, and Industry Certifications
- Competitions and Skills Assessment

MAVEN- Summer Internship Program
(8 or 10 week formats available)

- Intro to DoD/Service-Specific Missions & Culture
- Emphasis on Cyber and EMS | Hands-on Exercises
- Blue Book® Mission Vulnerability Assessments
- IEEE Conference-style Paper
- Leadership, Citizenship, Teamwork

ENVOY- Summer Internship Program
(Duration variable to suit needs)

- Vetted Students Matched to Operational Skillset Needs
- Students Cleared to Interim-Secret Where Required
- Immersion in DoD/Service-Specific Missions & Culture
- Supports Projects that "Move the Mission Needle"
- Total Student Compensation on Par with Industry
- Affordable Housing and Transportation Services
- Lightning-Fast Student Onboarding Process
- "Bridge Program" Permanent Employment Retention

VICEROY leverages and aligns foundation of existing cyber programs and scholarships for mission success

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2024 VICEROY MAVEN Summer Internship

- Pedigree and Focus

  - Leverages 20+ years of experience from running the Advanced Course in Engineering Cyber Security Bootcamp (ACE)

  - Mission: Shepherding next generation of cyber leaders through diverse technical acumen, high-stakes problem solving, effective leadership/followership, and respect for national imperatives and capabilities

- When: Summer 8-week program, with 10-week option available

  - 60 first-year interns / 6 MAVEN Mentors (average intern GPA 3.65)

- Topics

  - Leadership, community service, writing, public speaking, research, career day, capstone, bluing trips, and graduation dinner components

  - Air Force / Space Force mission and electromagnetic spectrum (EMS) emphasis

  - Blue Book® cyber vulnerability assessment of a mission system

  - Hands-on cyber and EMS exercises; IEEE conference-style paper

- FY24 – Rolling out MAVEN to ARL and NIWC-PAC in FY24

VICEROY MAVEN
PLAYBOOK

A Guide to Hosting Your Own MAVEN Program

MAVEN Curriculum Elements

Category	Description
1. Service and DoD Careers	DoD stories of service, career fair
2. Domains/Missions	Immerse in mission-mindset through mission and mission system lectures, Blue Books®, and capstone event
3. Mission Systems	Satellites, UAS, Cyber-enabled Munitions, SCADA, mIoT
4. Core Cyber	OS and Network Fundamentals, CIAAAA, OCO, DCO, AI/ML and cyber
5. Core EMS	Signal generation, transmit/receive, offensive and defensive techniques
6. Leadership and Teamwork	Writing, public speaking, Blue Book®, and research teams
7. Assessment	Writing and speaking rubrics, peer assessment, pre- and post-test

MAVEN Internship Capstone

- **Mission Relevance:** Based closely on USAF and USSF Unit Cyber Warfare Training (UCWT) culminating operational capstone challenge (CONCORD DAWN)

- **CONCORD DAWN Capstone:**
  - Transmit the coordinates of a High Value Target (HVT) to a UAV to enable target strike
  - Place a spectrum "cone of silence" around the HVT and its UAV to prevent defensive actions
  - Mission-focused timed event with multiple levels of increasing difficulty

- **Other VICEROY-Wide Activities:**
  - National VICEROY 44-school competition in Fall 2023
  - Alternate capstones focused on ground, surface, undersea, and space domains of Service partners
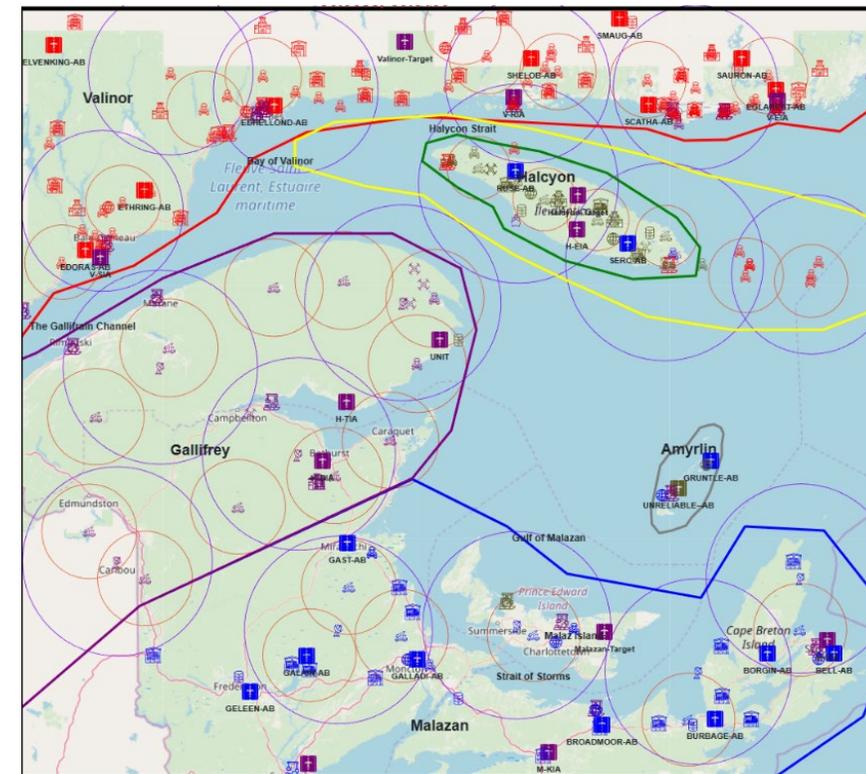
Partnership with AFRL/RI's *Blue Edge* competition development team

National Competition

Purpose

- Generate early-semester excitement in cyber/spectrum high-stakes problem solving
- Elevate student awareness and pursuit of VICEROY
- Create sense of community and pride among VICEROY post-secondary institutions

When

- National Cyber Security Week – Start getting a team ready!

Format

- Online virtual competition
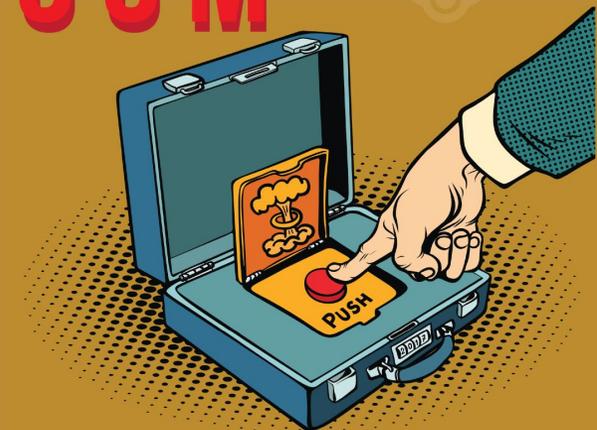- Run by AFRL and GI Blue Edge Team

Teams

- At least one VICEROY student per team; Up to two teams per school

Results

- 2023 Winners – University of Alabama-Huntsville "Fear the Beards"

VICEROY / MAVEN Impact on ROTC

- 54 participating ROTC units nationwide with outreach to over 75 total

- Attracts and retains cyber-spectrum cadets via scholarships and stipends helped talented students stay in ROTC during freshman and sophomore years

- Projects and competitions drive interdisciplinary solutions that expose other career fields to cyber and spectrum challenges and opportunities

- Cultivates cyber-spectrum leadership and excellence

  - Two ROTC contract students were approved for deferred Unit Cyber Warfare Training (UCWT) to attend MAVEN.

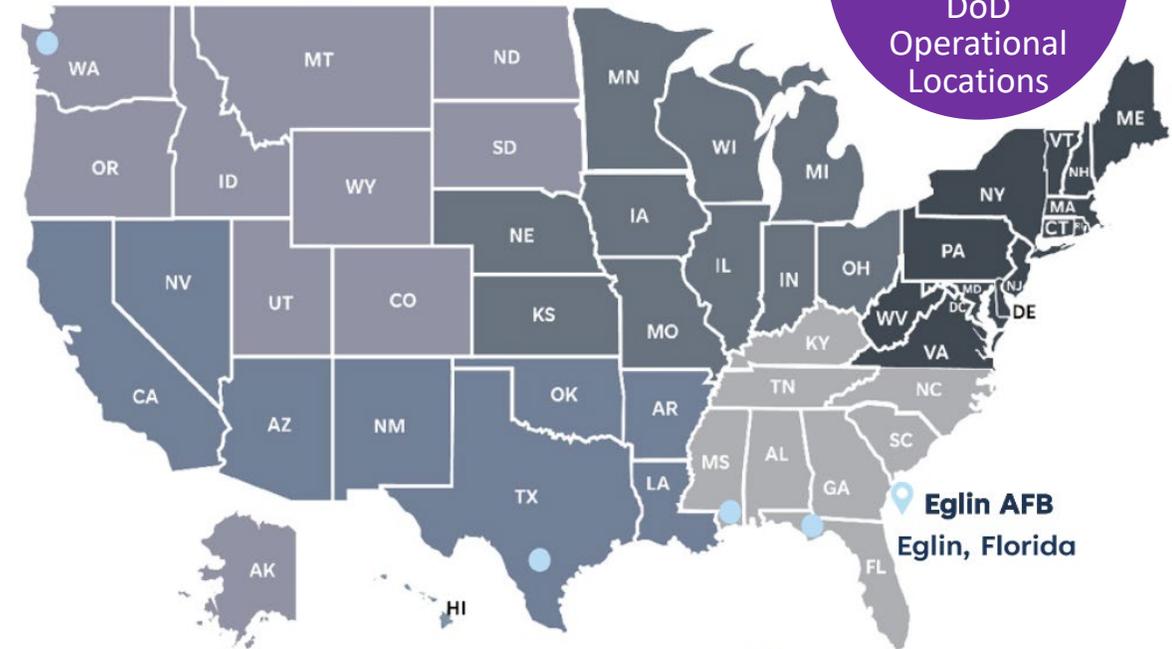 - Upon graduating MAVEN, they were leading their UCWT class cyber exercises

Northwest

AROTC
Mountain Ranger Battalion
Cougar Battalion
Bobcat Battalion
Chrisman Battalion
Wildcat Battalion
Bison Battalion
Buffalo Battalion

NROTC   AFROTC
NROTC Battalion   Det 905
Navy Battalion   Det 450
                  Det 895
                  Det 610
                  Det 105

Midwest

AFROTC   AROTC
Det 390   Jayhawk Battalion
Det 280   Buckeye Battalion
Det 645
          NROTC
          Jayhawk Battalion
          Buckeye Battalion

Northeast

AROTC
Liberty Battalion
Bear Battalion
Spartan Battalion
Monarch Batalion
New River Battalion

AFROTC   NROTC
DET 550   VT
DET 355
Det 875

Southwest

AFROTC   AROTC
Det 842   Roadrunner battalion
Det 027   Lumberjack Battalion
Det 003   Wildcat Battalion
Det 805   Houston Battalion
Det 020   Warrior Training Battalion

NROTC
Arizona Battalion
Midshipmen Battalion
Panther Battalion

Southeast

AFROTC   AROTC
Det 605   Jaguar Battalion
Det 165   Bulldog Battalion
Det 155   Southern Strike Battalion
Det 015   Aggie Battalion
Det 775   Golden Tiger Battalion
Det 425   Gamecock Battalion

NROTC
Gamecock Battalion
Tuskegee Battalion

VICEROY and MAVEN transforms students with foundational skills into a Combat Capability

34 Second Year Internships at DoD Operational Locations

MOA — U.S. AIR FORCE

MOA — JOINT BASE SAN ANTONIO

MOA — U.S. AIR FORCE

EPA — NAVSEA NAVAL SEA SYSTEMS COMMAND / Naval Sea Logistics Center

Eglin AFB — Eglin, Florida

Keesler AFB — Keesler, Mississippi

Naval Sea Systems Command — Keyport, Washington

Joint Base San Antonio — San Antonio, Texas

Eglin, Florida

"The 96th Test Wing executes developmental test and evaluation enabling the warfighter to put weapons on target in all battlespace media while also providing support for all other Team Eglin missions as the installation host wing. Eglin deploys combat ready forces while delivering full spectrum support to the DoD's second largest test and training complex. Today, Eglin tests and evaluates non-nuclear munitions, electronic combat systems and navigation/guidance systems."

Click to learn more.

San Antonio, Texas

"The Air Force is the lead agency for Joint Base San Antonio, comprising three primary locations at JBSA-Fort Sam Houston, JBSA-Lackland and JBSA-Randolph plus 8 other operating locations and more than 200 mission partners. JBSA services more DOD students than any other installation, more active runways than any other installation, houses the DOD's largest hospital and only level one trauma center, supports more than 250,000 personnel."

Click to learn more.

Keesler, Mississippi

"Keesler trains more than 28,000 students annually with an average daily student load of more than 2,700. The 81st TRW is a lead Joint Training Installation, instructing not only Air Force, but Army, Navy, Marine Corps, Coast Guard and civilian federal agency personnel. Keesler's mission is enduring. We provide a wide array of capabilities in over 160 career field specialty training courses from 8 operating locations in the continental United States. Our mission is not only to technically train warfighters, but to develop and inspire them."

Click to learn more.

Keyport, Washington

"Keyport provides technical leadership, engineering expertise, and unique facility complexes that serve to ensure sustainment of undersea warfare (USW) superiority for the United States. As one of two divisions of the Naval Undersea Warfare Center, Keyport's mission is focused on developing and applying advanced technical capabilities to test, evaluate, field, and maintain undersea warfare systems and related defense assets. These advanced technical capabilities directly support the full spectrum of Navy undersea programs."

Click to learn more.

Housing
- Housing for First Year Interns is provided nearby Griffiss Institute
- Housing for Follow-up DoD Host Site Interns is provided nearby each DoD host site

Pay
- Graduate Assistants are paid $29/hr
- Follow-up DoD Host Site Interns are paid $24/hr
- First Year Interns are paid $22/hr

Travel
- Interns that live greater than 50 miles from their placement site will receive travel reimbursement up to $1500 for airfare or mileage
- Daily transportation is provided to/from Griffiss Institute for interns in Rome, NY

Quality of Life
- All travel and housing is facilitated by Griffiss Institute
- Interns can meet one another digitally before start dates to build rapport
- We ensure interns have a quality environment where they can thrive

How VICEROY is Lighting Student Passions

Turner Woodward
1st Year VICEROY, Intern - 2023

University of Detroit Mercy
Computer Engineering

"I'm a student at the University of Detroit Mercy pursuing a degree in Computer Engineering with a minor in Computer Science. I am an ambitious life-long learner, and I spend most of my free time programming, gardening, or making CAD models to 3D print.

The MAVEN program has challenged me to constantly improve my skills and build me into a CYBER professional, and I truly believe I would not be who I am today if not for the support from my fellow MAVENs. I feel this internship has been a transformative experience and my first steps to a long career in the DoD, and I am very thankful for the opportunity to visit the Pentagon."

Guinevere Fish
1st Year VICEROY, Intern - 2023

Washington State University
Computer Science

"My name is Guinevere Fish. I am studying computer science and will be a junior at Washington State University in the fall. I am involved in the cybersecurity club at WSU, the CyberCougs.

The opportunity to participate in this internship has not only given me skills that I can bring back to utilize in the club at school but has also given me a look into what working in cybersecurity in the government might look like."

Yasmin Chambers
1st Year VICEROY, Intern - 2023

Mississippi State University
Computer Engineering

"Hi, my name is Yasmin Chambers. I am a rising senior at Mississippi State University, majoring in computer engineering with a minor in mathematics. I am in the U.S. Army Reserves, and recently contracted into the AROTC program at MSU. I enjoy fitness, nature, reading, and hackathons!

The VICEROY program has given me the necessary tools to create my own solutions and further elevate the technologies that are present. I have gained diversified insight and seen the wide scope of cybersecurity and electromagnetic spectrum systems. I plan to use this knowledge to strengthen the military's cyber intelligence and use new technology to advance our armed forces' defense. I look forward to networking and experiencing the Pentagon."

NATO Youth Summit June 2023

- *"**You are convening at a time [of] tremendous change and grave threats** to that order as demonstrated by Russia's brutal war of aggression in Ukraine, and Ukraine's valiant defense of the freedoms that many of us take for granted."*

- Tomorrow's leaders will carry the torch in addressing the pacing challenge posed by the People's Republic of China, **while at the same time confronting the rise of disinformation and the implications of disruptive technologies**.

- *"The world desperately and urgently needs creative solutions to complex problems like this, and **your role in devising and implementing these creative solutions begins with your decision to engage and serve**"*

- *"**Young leaders like you are integral to our collective effort to safeguard the rules-based international order**, which really undergirds our safety, our prosperity and our way of life. **We need people who are not only looking out for themselves but are invested in making the world a better place.**"*

Emphasis to quote added by CJ Maciag for readability

VICEROY MAVEN Flag Bearers at the 2023 Honor America Days at Ft. Stanwix, Rome NY

Thank You!

VICEROY Landing Page: https://adobe.ly/3pwEGaV

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