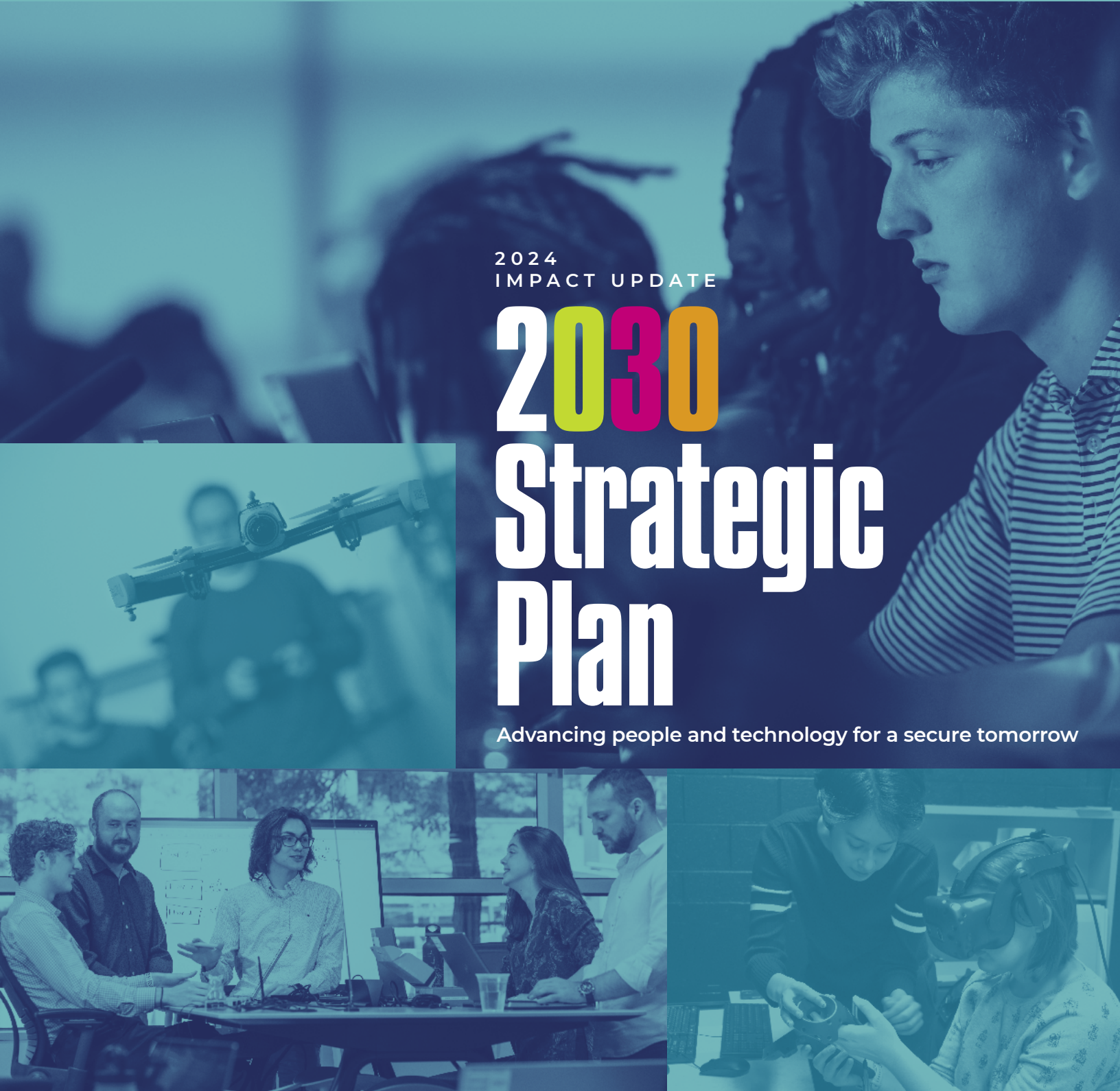# Commonwealth Cyber Initiative

2024
IMPACT UPDATE

2030
Strategic Plan

Advancing people and technology for a secure tomorrow

In our first four years of operations, the **Commonwealth Cyber Initiative** (CCI) has far outpaced even our boldest expectations. We are having a demonstrable and meaningful impact on the commonwealth economy while establishing Virginia as a global leader in cybersecurity.

CCI has brought in $192 million in federal and private sector funding, contributed to the creation of 2,517 jobs, helped generate $196 million in labor income, and added $367 million to Virginia's Gross Domestic Product.

Our statewide scale and interlocking mission lines of research, workforce development, and innovation focused on cybersecurity make CCI unique in the nation.

1 WORKFORCE DEVELOPMENT: Our workforce development programs give college students crucial experiential learning opportunities and contribute to their retention in the cybersecurity field. These programs have had high levels of participation by students from groups who are traditionally underrepresented in cybersecurity. **In fiscal year 2023, we supported a record 330 interns. Our workforce programs also resulted in 45 direct full-time job placements. We've formed 652 external partnerships since we started operations.**

2 INNOVATION: In innovation, our two-pronged strategy has gained traction. We promote the transition of research into the commercial space through spin-outs, intellectual property licensing, and preparing our researchers to become entrepreneurs. We also support the success of the Virginia cybersecurity startup ecosystem by placing interns, contributing expertise, and providing incubator and accelerator services.

3 RESEARCH: Our strategy of uniting Virginia's researchers across disciplines, geography, and institutions is yielding significant results. Researchers use CCI-funded seed grants as a springboard to multimillion-dollar externally funded projects.

We've quickened our pace in all three mission lines. To navigate our next phase of growth, we have developed the CCI 2030 Strategic Plan, which focuses on each mission line and details our role, goals, and other key objectives. The plan was developed with input from CCI's Leadership Council, Inclusion and Diversity Committee, Technical Advisory Board, and research community.

We're excited about the future of CCI and Virginia's global role in cybersecurity.

Luiz DaSilva

CCI Executive Director
Bradley Professor of Cybersecurity
Bradley Department of Electrical and
Computer Engineering, Virginia Tech

Map labels:
Shenandoah University
Laurel Ridge Community College
CCI Hub
Virginia Tech, Arlington
Northern Virginia Node
Lead: George Mason University
George Washington University
Marymount University
Northern Virginia Community College
James Madison University
Blue Ridge Community College
University of Virginia
Germanna Community College
University of Mary Washington
Piedmont Virginia Community College
Virginia Military Institute
Central Virginia Node
Lead: Virginia Commonwealth University
Reynolds Community College
Virginia Union University
University of Richmond
Eastern Shore Community College
Southwest Virginia Node
Lead: Virginia Tech
Roanoke College
Liberty University
John Tyler Community College
New River Community College
Radford University
Virginia Western Community College
Longwood University
Virginia State University
William & Mary
Southwest Community College
New College Institute
Christopher Newport University
Virginia Peninsula Community College
University of Virginia, Wise
Wytheville Community College
Paul D. Camp Community College
Hampton University
Mountain Empire Community College
Patrick & Henry Community College
Coastal Virginia Node
Lead: Old Dominion University
ECPI
Regent University
Virginia Highlands Community College
Danville Community College
The Institute for Advanced Learning and Research
Norfolk State University
Tidewater Community College

our network: CCI Is an unprecedented consortium of more than 40 institutions of higher education in Virginia, encompassing more than 375 researchers focused on the intersection of cybersecurity, autonomous systems, and intelligence.

The **ARLINGTON-BASED CCI HUB** coordinates programs and strategy for the entire network while providing cutting-edge facilities that provide a platform for innovative research. Four regional nodes —in **NORTHERN VIRGINIA, CENTRAL VIRGINIA, COASTAL VIRGINIA, and SOUTHWEST VIRGINIA**— include regional industry, government, universities, and community colleges.

our vision: To establish Virginia as a global center of excellence in cybersecurity research and serve as a catalyst for the commonwealth's economic diversification and long-term leadership in this sector.

our mission: To serve as an engine for research, workforce development, and innovation at the intersection of cybersecurity, autonomous systems, and intelligence.

Enabling Legislation, 2018 Special Session 1, Budget Bill HB5002 Chapter 2, Item 252, Paragraph B.1

"The Commonwealth Cyber Initiative shall be established to serve as an engine for research, innovation, and commercialization of cybersecurity technologies, and address the Commonwealth's need for growth of advanced and professional degrees within the cyber workforce."

WORKFORCE DEVELOPMENT

1 We're committed to building the cybersecurity workforce that Virginia and the nation needs to safeguard our critical infrastructure, personal information, and communities.

CCI provides hundreds of Virginia students with experiential learning opportunities to meet the rising demand for cybersecurity professionals. Increasing the diversity of the cyber workforce is one of our top goals.

We help support hundreds of paid internships in the private and public sectors for students from high school through graduate school. **Our highly sought internship programs often boast majority participation from traditionally underrepresented groups.**

CCI is building a unique experiential learning portfolio, from capture-the-flag events to opportunities for students to work at state agencies in such areas as **election security** and **cyber forensics**. These programs are paired with professional development activities and clearance-readiness instruction. CCI experiential learning programs increase retention and equip students to compete for top cybersecurity jobs.

CCI activities supported 863 jobs across Virginia in FY23 and added $97 million to the state's GDP.

Supporting Tomorrow's Cybersecurity Experts
Source: RTI Economic Impact Report

573 Interns + experiential learning participants

317 Research scientists + graduate assistants

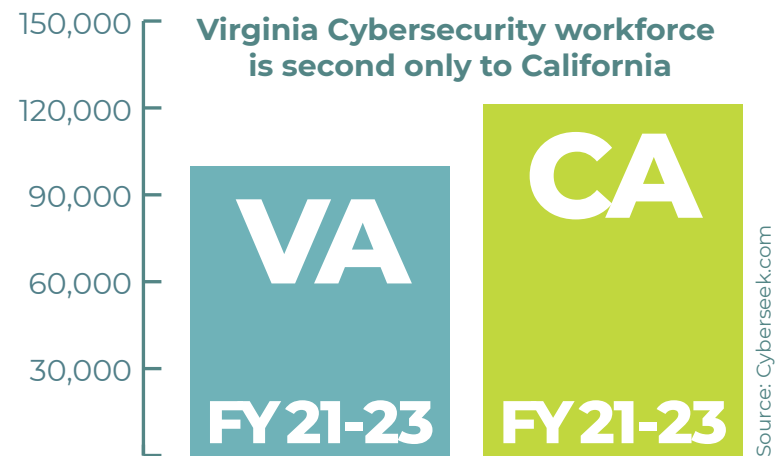**801** Undergraduates supported

TAYLOR

STRATEGIC PLAN

our role: CCI is a connector between Virginia students and employers and a creator of experiential learning opportunities for cybersecurity careers.

our goals:
- To close the cybersecurity workforce gap in Virginia, becoming a recognized resource for talent statewide
- To reduce equity gaps of underrepresented groups in the cybersecurity workforce.

Virginia Cybersecurity workforce is second only to California

150,000
120,000
90,000
60,000
30,000

VA
FY 21-23

CA
FY 21-23

Source: Cyberseek.com

1:1

Source: RTI 2023 Report

Every job directly created by
CCI SPENDING supports
another job in the economy.

2

INNOVATION

We enrich a strong innovation ecosystem in Virginia by preparing students for entrepreneurship and investing in faculty and startups to translate university research into commercial products and services.

We work with Virginia cyber startups by providing paid internships, supporting translational research grants, and pairing them with faculty inventors.

Our students participate in innovation boot camps and entrepreneurial skills workshops, and receive funding and mentorship to bring their ideas to market.

STRATEGIC PLAN

our role: CCI is a broker and a resource for the cybersecurity innovation ecosystem in Virginia.

our goals:

- Identify and foster commercialization of research from academic labs across the commonwealth.

- Support regional industry, in particular, startups, by providing intellectual capacity through partnerships with a diverse collection of CCI faculty and students.

- Empower the next generation of innovators by providing CCI students with equitable access to the tools of entrepreneurship.

- Align innovation initiatives with socioeconomic mobility and other strategic priorities of the commonwealth.

CCI Supports Innovation in Virginia
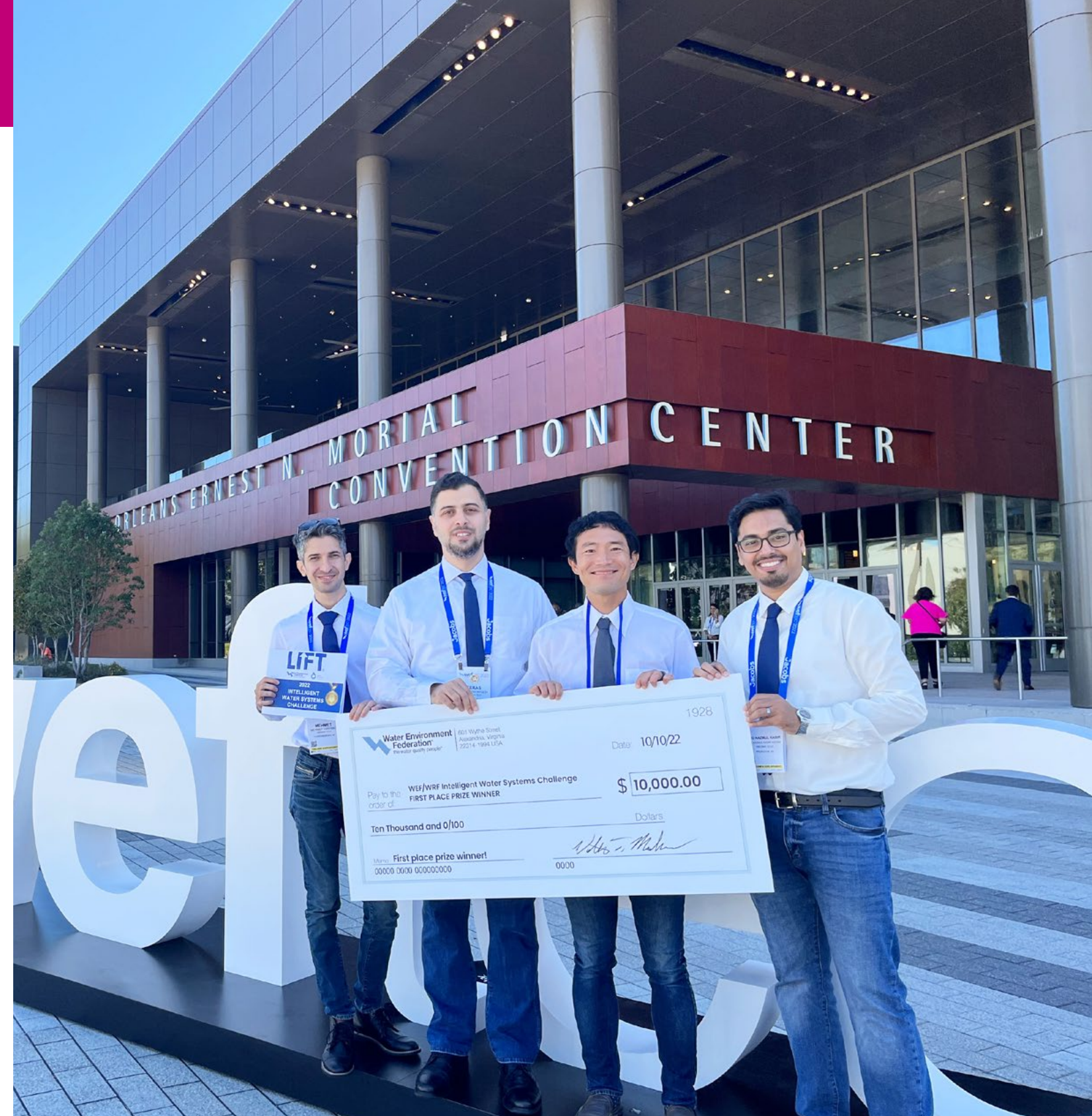
In the past three fiscal years, CCI has:

- Directly supported **18 new startups**.

- Attracted **$3.8 million in external funding** for entrepreneurship programs.

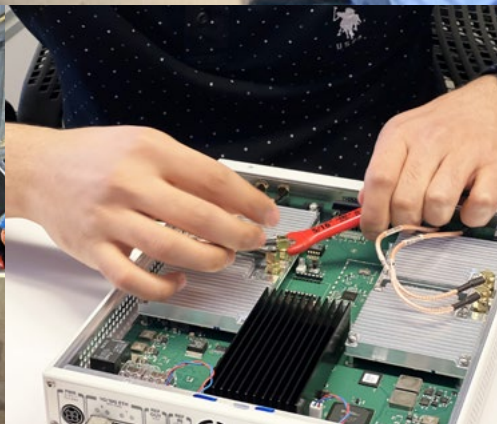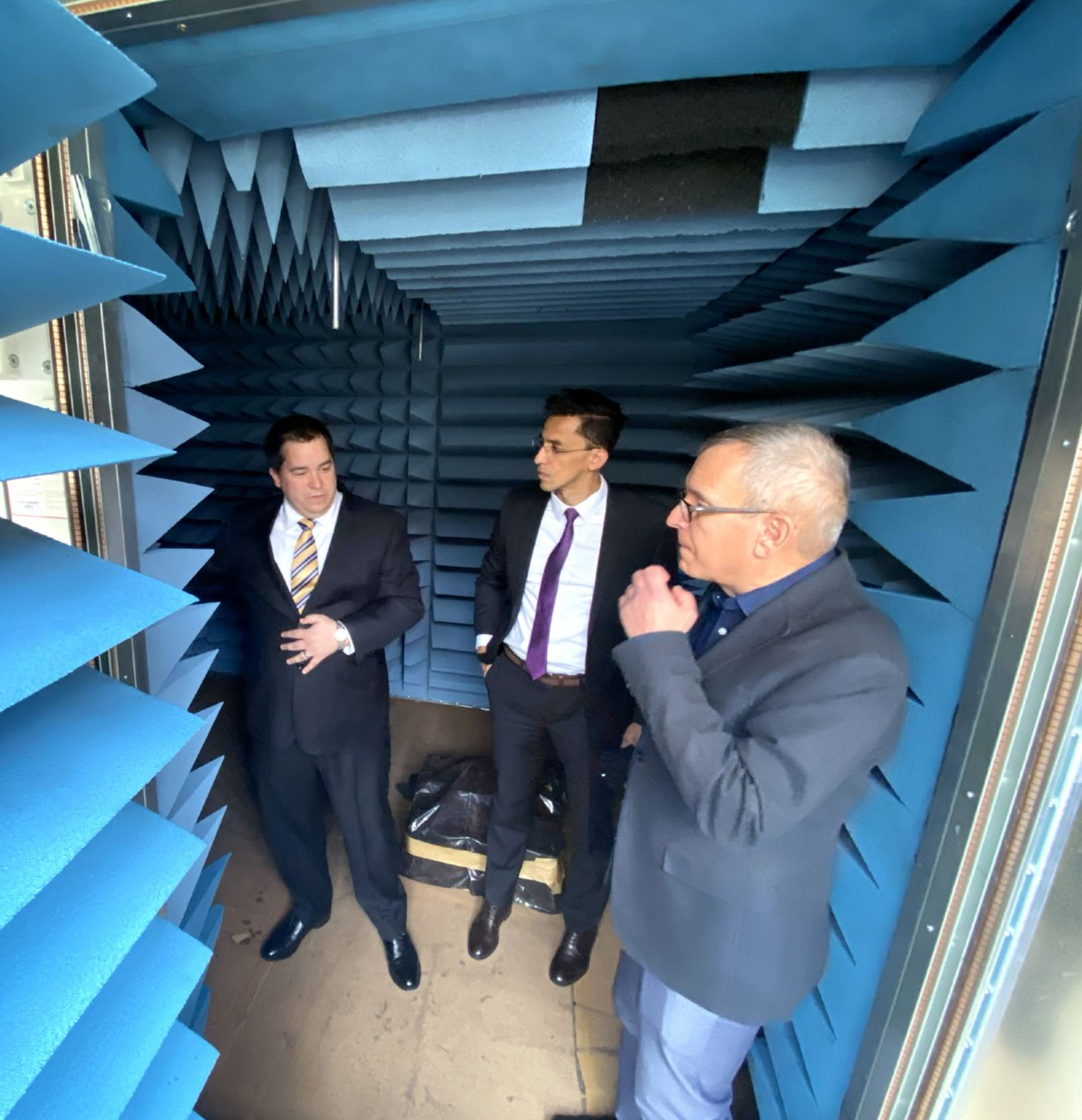- **Formed 524 external partnerships** with industry leaders and startups.

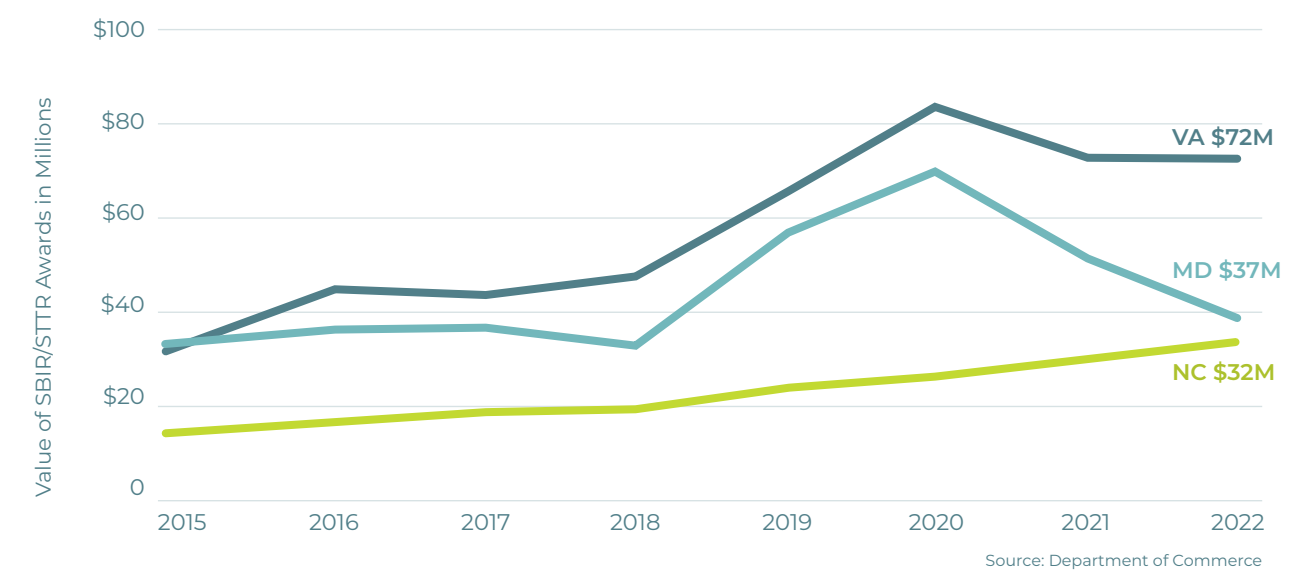 Source: RTI Economic Impact Report

CCI INNOVATION FLOWCHART

	Ideation	Formation/ Feasibility	Validation/ Launch	Growth	Maturity/ Exit
MATURITY	Ideation	Formation/ Feasibility	Validation/ Launch	Growth	Maturity/ Exit
START UP STAGE	PRE-SEED Concepts/ Ideas	SEED MVP, Prototypes	SERIES A Production-Market Fit	SERIES B+ Working at Scale	PUBLIC/EXIT Diverse Revenue Streams
FUNDING LEVEL	$50K	$10K-$3M	$2-15M	$30M	$50M+
VA FUNDING SOURCES	• **CCI Programs** • VA Venture Partners • SBIR/STTR	• **CCI Programs** • VA Venture Partners • SBIR/STTR • CCF • VA Founders Fund	• **CCI Programs** • VA Venture Partners	• Private Sector Funding (VCs) • VA Venture Partners	• Private Sector Funding (VCs)

Commonwealth Commercialization Fund (CCF), Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), and Venture Capital (VCs)
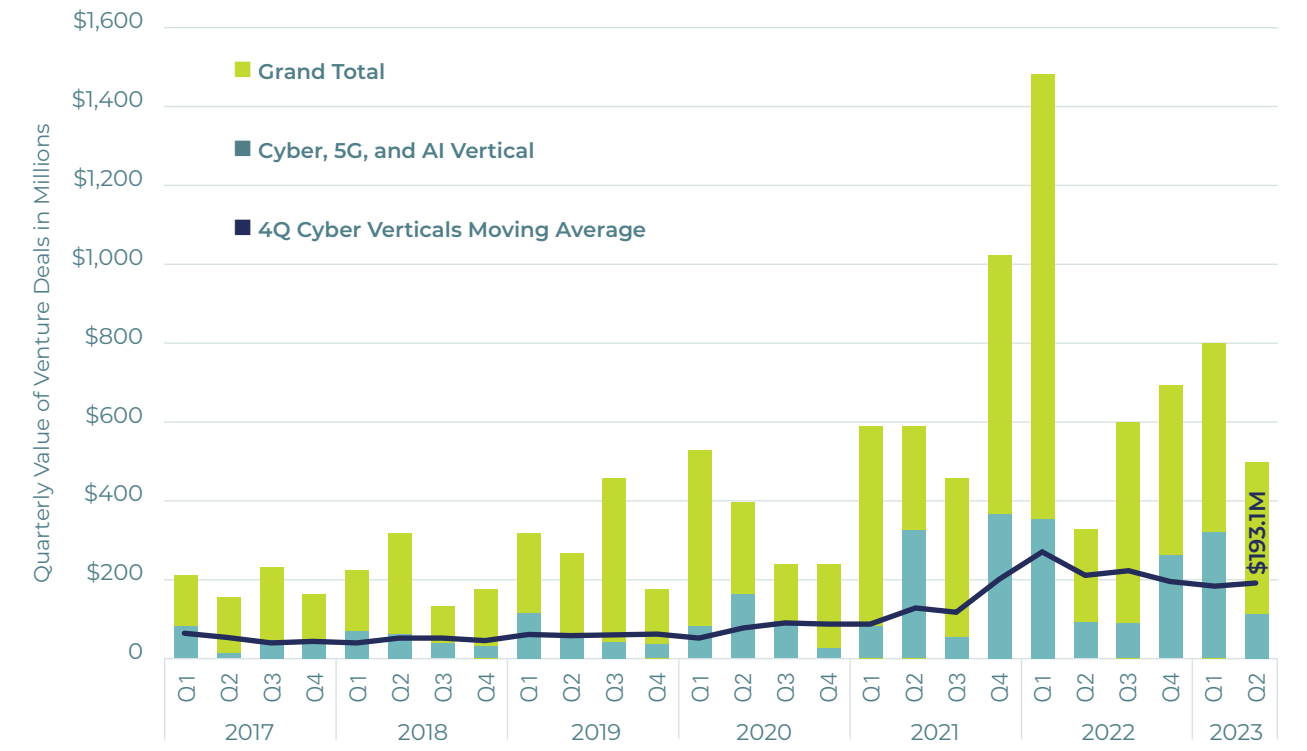
AWARDS IN CYBER, G5, AI/ML, SOFTWARE, & AUTONOMY

Value of SBIR/STTR Awards in Millions

VA $72M
MD $37M
NC $32M

Source: Department of Commerce

VIRGINIA VENTURE & STARTUP ACTIVITY

Quarterly Value of Venture Deals in Millions

- Grand Total
- Cyber, 5G, and AI Vertical
- 4Q Cyber Verticals Moving Average

$193.1M

TRANSDISCIPLINARY CYBERSECURITY SPURS INNOVATION

By incorporating a transdisciplinary approach, we're discovering new ways of looking at cybersecurity challenges. A prime example is our **CyberArts Program**, which views cybersecurity through an artistic lens and has yielded unexpected results.
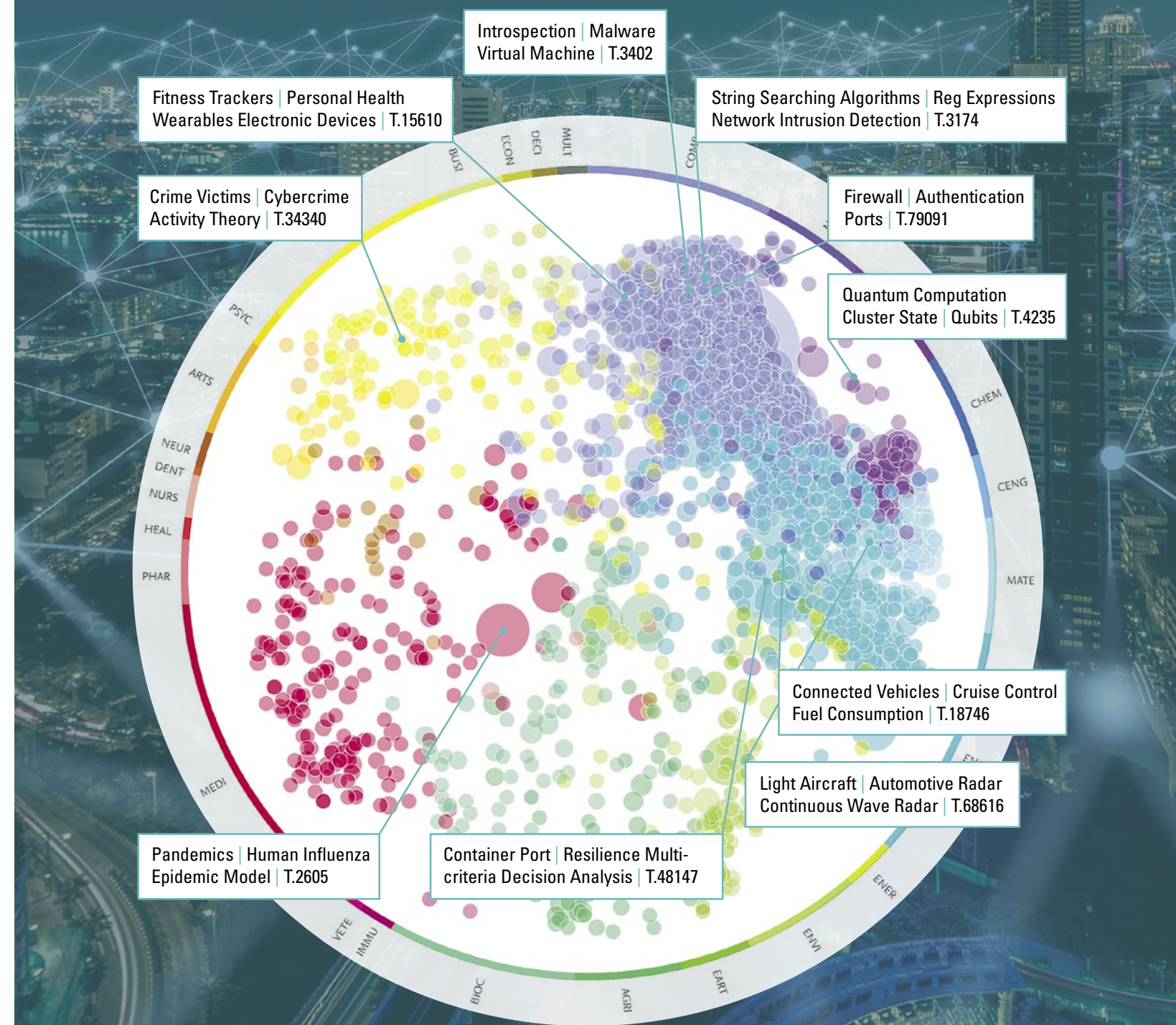
We're educating people about scams through interactive performance, addressing privacy concerns, showing how artificial intelligence can leave us vulnerable, and more.

At least two projects have marketplace opportunities, and there are more to come.

- The sound of cyberattacks can be heard through a loudspeaker array called a **tesseract** developed by Virginia Tech researchers.

- Old Dominion University researchers created a cybersecurity-themed board game called **Net-Tech Warriors** that's taken off with middle school and high school students and their teachers. Teachers like the collaborative approach provided by a board game that also gives students a view into what working in cybersecurity could be like. ●

Cybersecurity is a Transdisciplinary Domain at CCI

Introspection | Malware Virtual Machine | T.3402

Fitness Trackers | Personal Health Wearables Electronic Devices | T.15610

String Searching Algorithms | Reg Expressions Network Intrusion Detection | T.3174

Crime Victims | Cybercrime Activity Theory | T.34340

Firewall | Authentication Ports | T.79091

Quantum Computation Cluster State | Qubits | T.4235

Connected Vehicles | Cruise Control Fuel Consumption | T.18746

Light Aircraft | Automotive Radar Continuous Wave Radar | T.68616

Pandemics | Human Influenza Epidemic Model | T.2605

Container Port | Resilience Multi-criteria Decision Analysis | T.48147

Source: SciVal April 4, 2023
T= Topic Codes

RESEARCH

3 CCI has the breadth of expertise and the scale to lead large research projects. Multi-university teams use CCI's unique research infrastructure to deliver on multi-million-dollar research projects funded by federal agencies and industry.

We have two research themes:

- **Securing the Next Generation of Networks:** We help safeguard secure communications networks within critical infrastructure.

- **Securing Human-Machine Interactions:** Developments in artificial intelligence, cyber physical systems, and communications are creating a world in which humans and autonomous machines increasingly interact.

Our xG Testbed is the largest, most advanced of its kind in the country. It offers unparalleled opportunities to CCI researchers and our industry and government partners to test secure 5G and next-generation mobile networks, as well as AI assurance.

The CCI xG Testbed is an **Open Testing and Integration Center** (OTIC), an essential component in boosting advancements and competition in wireless mobile networks based on open radio access networks (O-RAN). The CCI center, approved by the **O-RAN Alliance**, is one of 17 globally and seven in North America.

Our shared research infrastructure also includes testbeds that are focused on smart cities, medical devices, cyber manufacturing, and more.
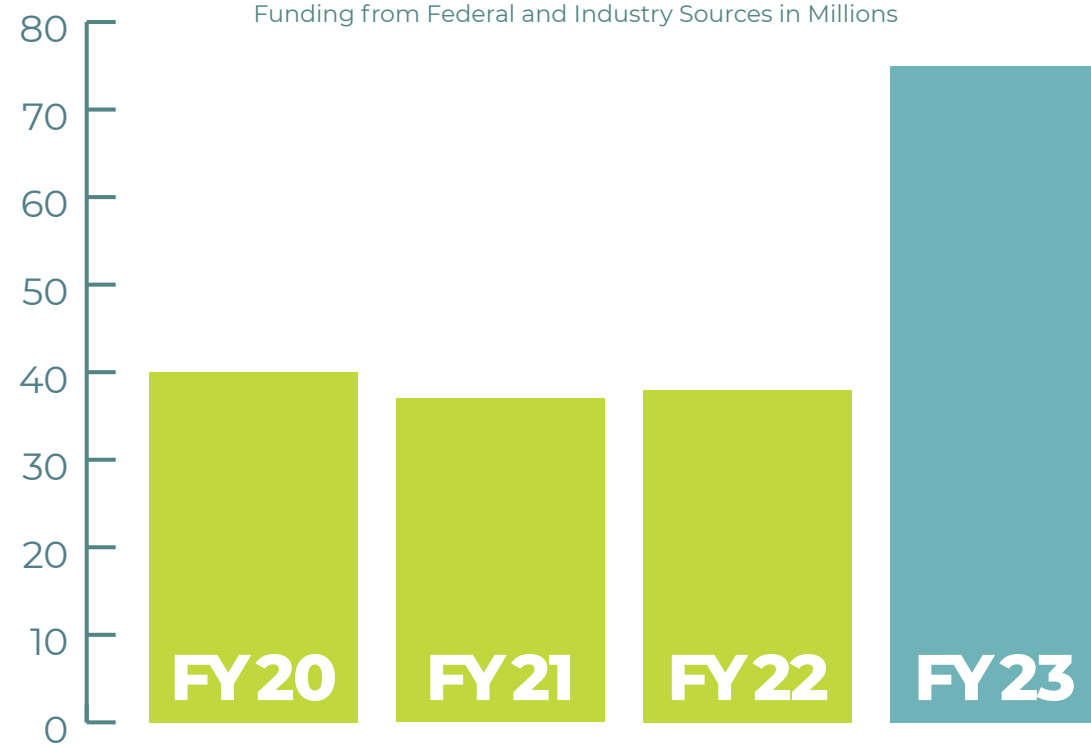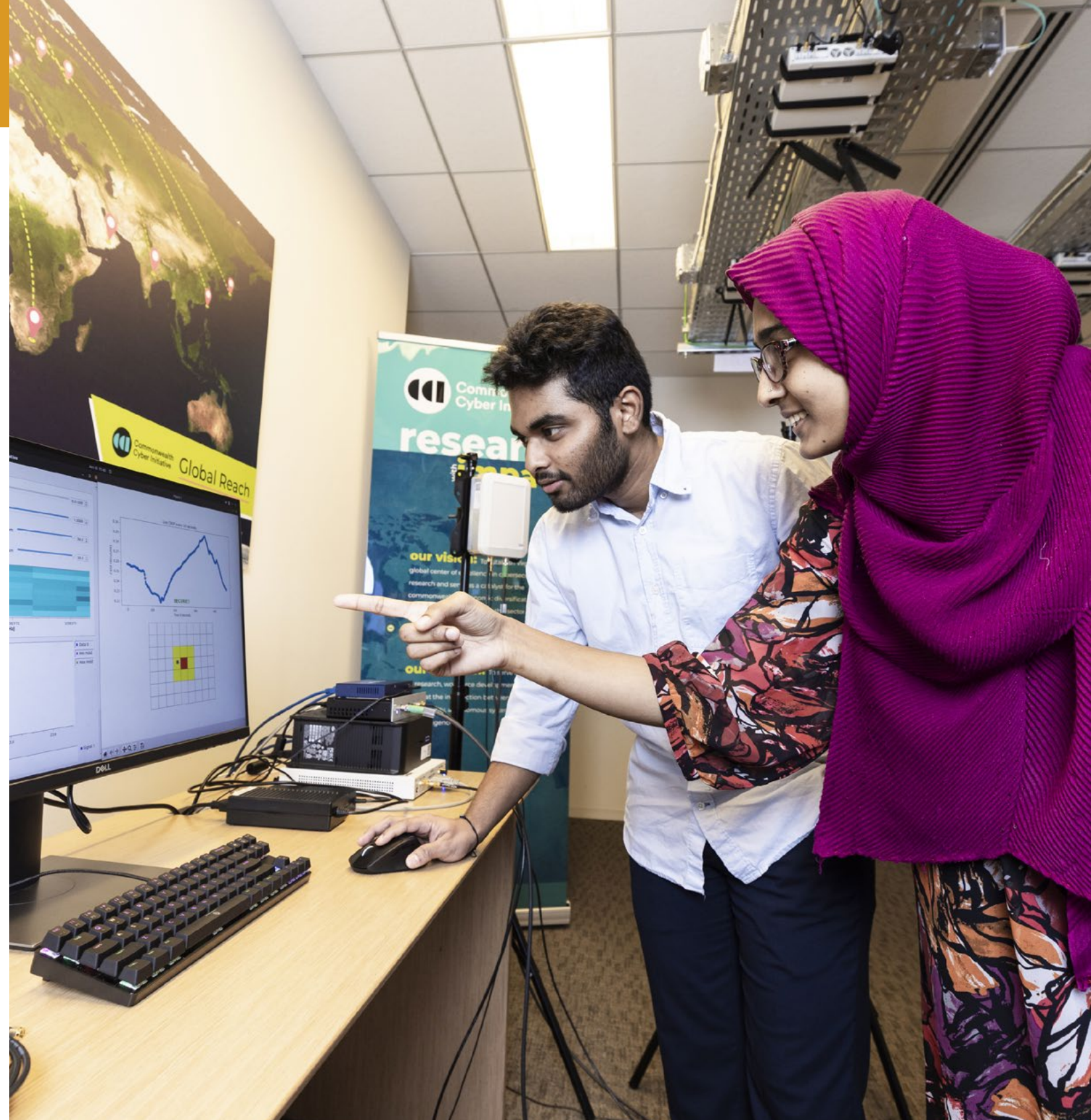
In Fiscal Year 2023, CCI researchers brought in a **record $75 million in research funding** from federal sources and the private sector.

NEW CCI RESEARCH CONTRACTS
Funding from Federal and Industry Sources in Millions

In the last year, CCI obtained **$7.51 in research funding** from sources outside Virginia for every **$1 spent by CCI in research activities.**
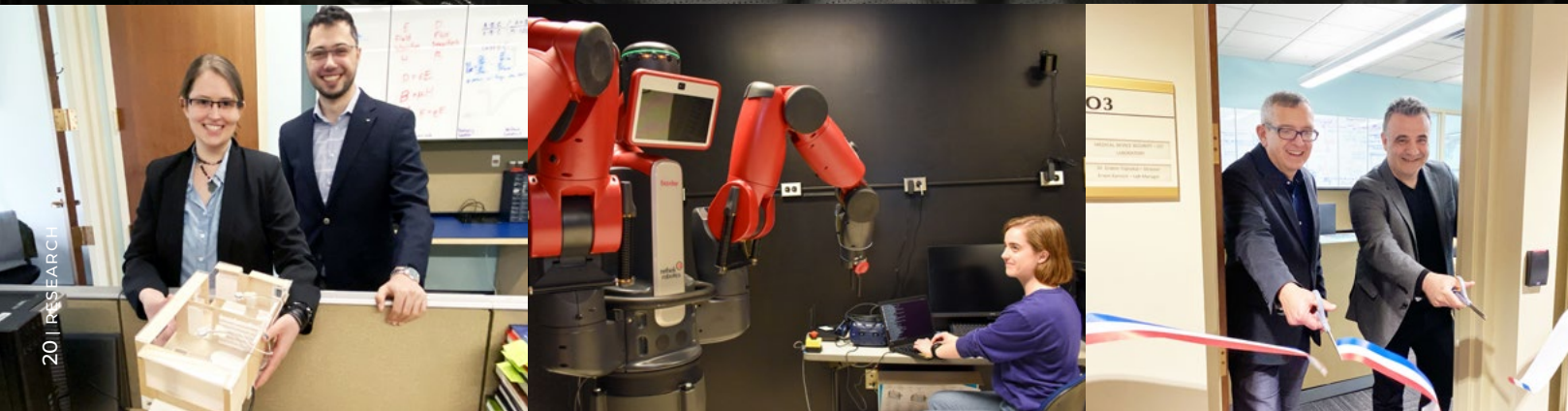
STRATEGIC PLAN

our role: **CCI is a leader of cybersecurity research** with impact, through collaborative multi-institution research teams with a depth and breadth of cybersecurity expertise.

our goals:
- Produce impactful research through teams that bring diversity of thought and experience.

- Strengthen a culture of collaboration across institutions of higher education and disciplines.

- Invest in inclusivity through a robust research infrastructure that can be shared across CCI institutions to enhance researchers' competitiveness.

- Bring top cybersecurity research talent to Virginia, and develop future senior researchers.

- Fuel significant research efforts by increasing the CCI network's competitiveness for large-scale grants.

Commonwealth
Cyber Initiative

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