VIRGINIA RESEARCH INVESTMENT COMMITTEE (VRIC) MEETING
OCTOBER 12, 2016

DRAFT MINUTES

Mr. Blake (chair) called the meeting to order at 12:40 p.m. in the SCHEV Boardroom, 9th Floor, James Monroe Building, Richmond, Virginia.

Committee members present: Peter Blake, Ric Brown, James Dyke, Karen Jackson, Robert Vaughn, John O. "Dubby" Wynne

Committee members absent: Betsey Daley, Heywood Fralin, Charles W. "Wick" Moorman

WELCOME AND INTRODUCTIONS

Mr. Blake introduced himself as the director of the State Council of Higher Education for Virginia (SCHEV), whom the Committee's enabling statute designates as the VRIC chair. He noted that the meeting agenda and all materials and handouts are located on the Committee webpage of the SCHEV website (www.schev.edu/VRIC). Mr. Blake invited Committee members to introduce themselves. He then introduced members who were not present, as well as staff to the Committee from his agency, Dr. Alan Edwards and Ms. Lynn Seuffert.

He then invited all attendees in the audience to introduce themselves.

DISCUSSION OF ENABLING LEGISLATION AND BUDGET ALLOCATIONS

Mr. Blake asked Mr. Brown and Mr. Vaughn to provide executive-branch and legislative-branch perspective on the Committee's enabling legislation. Secretary Brown stated that the Governor had an interest in diversifying the economy. He said the Governor envisioned new processes and products to create high-paying jobs. The executive branch especially valued peer review of projects in the form of VRIC and also saw collaboration as an important aspect of the legislation.

Mr. Vaughn provided the legislative perspective of the House Appropriations Committee (HAC). He said the HAC had been concerned with protecting the investments already made in research. The members wanted a rigorous process and tie-in back to GO Virginia (Growth and Opportunity for Virginia). Mr. Vaughn conveyed the perspective of HAC chair Del. Chris Jones that collaboration is key to the initiative and mentioned the potential for Virginia's two National Cancer Institute (NCI) designated cancer centers to collaborate.

He described the Center for Innovative Technology's (CIT's) Research and Technology Strategic Roadmap as "silos of opportunity" and emphasized again the importance of tying projects funded by the Virginia Research Investment Fund (VRIF) back to the Roadmap. He also mentioned his personal interest in the potential of VRIC to prioritize a research agenda for the state, rather than issuing generic solicitations for research.

Mr. Blake invited Mr. Jason Powell and Ms. April Kees to provide perspectives from the Senate Finance Committee (SFC) on behalf of Ms. Daley. Mr. Powell said that the SFC discussed the need to "string" together the Virginia Biosciences Health Research Corporation (VBHRC, aka the Catalyst), the Commonwealth Health Research Board (CHRB), and the Commonwealth Research Commercialization Fund (CRCF) administered by CIT on behalf of the Innovation and Entrepreneurship Investment Authority (IEIA). Mr. Powell mentioned budget requests received by the General Assembly for research projects, but noted that the Senate doesn't have scientific expertise to vet those proposals. Thus, the SFC sought a more rigorous review process in the

form of the VRIC. They also recognized that it costs money to effectuate that process, which is why they added the proceeds of the sale of CIT property to the corpus of funding available.

In follow-on discussion, Secretary Jackson said that she was pleased that the VRIF is not just incremental investments, but an opportunity to craft the future of technology. The future of the Commonwealth is banking on these investments, she said.

Mr. Wynne, who had been elected chairman of the GO Virginia board earlier that morning, provided the GO Virginia perspective by emphasizing collaboration. He said that there is not enough funding to go around; entities have to collaborate. He reiterated GO Virginia's sole purpose: to create high-paying jobs by working through the regions.

He mentioned the need to prioritize and leverage these dollars against existing university resources, locality resources, etc. He mentioned past successes of incentivizing change through new money to pull people together.

Mr. Wynne reviewed GO Virginia's goals and potential project categories, highlighting the "start-up, then scale up" aspect. He would like proposed projects to leverage $3 or $4 for every $1 invested. He believes regional economic development entities aspire to bring bioscience and related projects to their regions.

Mr. Dyke reviewed the history of CIT and his role as Secretary of Education under Governor Wilder in transferring it out of the Education secretariat and into the Economic Development secretariat in order to fund research with commercial potential. He said he is excited about VRIF. He sees lots of potential, with several areas ripe for development.

Mr. Blake then stepped through the legislation, highlighting criteria for award. He mentioned that the budget language amplifies the legislation. He stated that $4 million per year is tied to the sale of the CIT building, in addition to general fund and bond appropriations.

In response, Mr. Dyke questioned whether impediments exist to faculty commercializing research and asked whether opportunities exist for VRIC to make it easier. Mr. Blake responded that this issue would need deeper discussion in the future.

A concern was raised about the use of bond funds when private entities are partnering with public institutions. Mr. Vaughn mentioned the roles of taxable vs. tax-exempt debt.

Mr. Vaughn stated that Del. Jones needs to have confidence in the process in order to sustain this effort and continue budget appropriations.

DISCUSSION OF DRAFT BYLAWS

(This discussion was initially moved at the chair's discretion to the end of the agenda; ultimately and in the interest of time, it was tabled without discussion until the next meeting.)

DISCUSSION OF RESEARCH UNIVERSITIES' PRIORITIES

Mr. Blake introduced Dr. Deborah Crawford, Vice President for Research at George Mason University (GMU). She explained that the chief research officers of the seven research universities had spent the prior four months deliberating over the GO Virginia and VRIC legislation. All seven institutions are members of the Virginia Research Alliance, formed in 2015.

Dr. Crawford introduced a presentation that prioritized two main research areas: Cyber security ("Internet of Things") and bioscience (neuroscience, which also includes big data and data analytics).

Dr. Theresa Mayer, Vice President for Research and Innovation at Virginia Tech, presented the cyber section, and Dr. Phil Parrish, Interim Vice President for Research at the University of Virginia, presented the neuroscience section.

General discussion occurred throughout and following the presentation.

Mr. Vaughn questioned whether investing in more faculty makes institutions compete against each other. He wants to see universities share faculty instead of competing for faculty. Dr. Mayer responded that a base foundation should exist across institutions, but with sector-specific expertise at each university.

Dr. Crawford stated her belief that Virginia should compete with other states, not institution against institution within the state. She cited as an example the Cyber Range, which shares faculty expertise across the Commonwealth.

Mr. Wynne requested that institutions create faculty slots for the future, rather than where the state of the research has been, and suggested looking ahead 20 to 30 years.

Sec. Brown stated that the legislation allows faculty recruitment. Institutions should figure out the current resources and where the gaps are, then use this funding to fill those expertise gaps.

Mr. Vaughn reminded everyone of the strategies in institutions' six-year operating plans to re-deploy assets to areas with greater interest and stop offering programs that are waning.

Sec. Jackson suggested that new faculty recruits were not the traditional professors of yesteryear – but instead, they are multi-disciplinary.

Dr. Parrish mentioned institutions' interest in hiring in clusters.

DISCUSSION WITH POTENTIAL REVIEW ENTITIES

Mr. Blake introduced Mr. Mike Grisham, President and CEO of the VBHRC; Mr. Ed Albrigo, President and CEO of CIT; Mr. Andrew Densmore, Executive Director of the Virginia Academy of Science, Engineering and Medicine (VASEM) and Dr. Patricia Dove, VASEM President; and Ms. Anne Pace, Administrator of the CHRB.

Mr. Blake asked, "What value can these organizations bring to VRIC? How can we all collaborate?"

Mr. Grisham said that he has seen culture change in Virginia higher education over the past five years; when he was in Silicon Valley, the word was that Virginia universities were fiercely independent.

He talked about VBHRC, also known as the Catalyst. The mission, goals, governance, and metrics were created before his arrival; his expertise is operations. The Catalyst creates competitive critical mass through collaboration. It focuses on economic development through translational research and aggregating capital from multiple sources.

The creation of VBHRC's governance structure and grant award process took 18 months. It strives to be open and transparent, with clear, measureable objectives and accountability.

Mr. Grisham echoed earlier comments from Mr. Wynne when he said that the VBHRC focuses on "where the puck is going." It picks research areas in which Virginia can be better than other regions of the country and where Virginia can be a leader. Universities contribute their own money for the Catalyst. The College of William and Mary has just asked to join, for a total of seven partner institutions.

Mr. Wynne asked whether and how these entities can collaborate? Mr. Grisham responded that he is willing to do whatever VRIC requests. Mr. Vaughn reminded everyone that the legislation calls for applicants to declare other state funding they are receiving.

Mr. Albrigo distributed a handout detailing the characteristics of the subject-matter experts employed by CIT to review proposals for CRCF funds.

He said that the R&T Strategic Roadmap identifies opportunities; it does not identify priorities. CIT supports young, early stage companies. He suggested that VRIC can set priorities and re-visit how the sectors in the Roadmap are prioritized, not only by-region but also multi-region priorities.

He suggested the possibility that a pipeline could be created whereby an individual project could progress through multiple or all of the state-funded research funds and competitions.

He concluded by stating CIT's goal to take the lessons learned from start-ups of cyber companies and get that information back to universities.

Dr. Dove then offered an overview of VASEM, which started in 2013 and includes members of the three national academies who live and work in Virginia. VASEM is a non-partisan resource for the Commonwealth. Members' expertise has been nationally recognized. She said she looks forward to working with VRIC.

DISCUSSION OF INOVA BUDGET ITEM

Mr. Blake asked for feedback on Budget Item 478.20 regarding public university partnerships with INOVA on genomics and bioinformatics and the Committee's role in reviewing applications for funds appropriated for such purposes. He stated that, beyond the criteria in the budget item, VRIC was not ready to provide guidance to the universities or INOVA at the meeting. Mr. Vaughn suggested that INOVA present its plan at the next VRIC meeting.

DISCUSSION OF PRIORITIES FOR NEXT STEPS

Mr. Blake invited each VRIC member to provide closing remarks.

Mr. Wynne said he is keenly interested in coordination and was encouraged by what he heard from the institutions.

Mr. Dyke stated that this meeting was a good first step. He echoed the need for concrete coordination of steps and asked for follow-up from universities on obstacles. He asked institutions to consider the pipeline of talent to high-demand jobs, including any opportunity for coordination with K-12 and community colleges.

Mr. Vaughn again raised his concern that the state's two NCI-designated cancer centers are competing and asked: What are the synergies in research and therapies?

Sec. Jackson said that she is excited that institutions chose cyber as a priority, especially the linkage between cyber and bioscience. She reminded attendees that Virginia is already building an ecosystem in cyber, like Mr. Dyke suggested, but needs key investments to take it to the next level.

Sec. Brown thanked all the entities who are participating. He expressed appreciation that common goals had been highlighted. He said this meeting opened up avenues to work together. Virginia is doing what we need to diversify its economy.

ADJOURNMENT

On motion by Mr. Wynne and second by Mr. Blake, the meeting adjourned at 2:40 p.m.

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Peter Blake
Chair, Virginia Research Investment Committee

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Lynn Seuffert
SC HEV Associate for Research Investment

Optimizing Virginia's Competitive Advantage in the Global Knowledge Economy

Deborah Crawford, Morris Foster, Francis Macrina, Dennis Manos, Theresa Mayer, Jerry Nadler, & Phil Parrish

Presentation to the Virginia Research Investment Committee

October 12, 2016

It is essential that we as a nation reaffirm, revitalize, and ***strengthen substantially the unique partnership*** *that has long existed* ***among the nation's research universities, the federal government, the states, and philanthropy*** *by enhancing their roles and linkages and also* ***providing incentives for stronger partnership with business and industry. In doing so, we will encourage the ideas and innovations that will lead to more high-end jobs, increasing middle-class incomes, and the security, health, and prosperity we expect.***

National Research Council, *Research Universities and the Future of America (2012)*

Virginia's Challenge

- We urgently need additional significant private sector economic drivers.
  - Our economic growth rate is in decline
  - We are over reliant on dwindling defense funding – we must diversify
  - Low growth of high-paying jobs in growing industries
  - We are losing young talent to other states
  - Opportunities are passing by
- Our investments in universities are not yielding sufficient economic development
- Our economic development efforts are fragmented, localized and not aligned

From The VA Bioscience Economy Initiative, The_Virginia_bioscience_econ.pdf

Virginia Research Alliance

A Powerful Partnership for Innovation

- University partners include EVMS, GMU, ODU, UVA, VCU, VT, & W&M
- Commitment to:
  - Recruit and reward/retain world-class, innovation-focused academic scientists and engineers
  - Build and operate shared research and innovation tools, instruments and infrastructure for use by both academic and private sector innovators
  - Develop and sustain strong university-industry partnerships
  - Effectively translate research outcomes into products and services by creating alignment among federal, state and private sector initiatives

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Virginia Research Alliance

Core Strategies

- Catalyze long-term state-wide growth of high tech, high wage, private industry
- Shared strategic commitment to collaboration, alignment & economic impact
- Focus on formation of innovation clusters/districts on statewide and regional scales
- Build on existing strengths in universities and in private sector
- Leverage state $’s (GO Virginia, VRIF) with private and federal $’s
- Measure ROI and report annually

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Virginia Research Alliance

Operationalized

- VPRs empowered by SCHEV, VRIC, and University Presidents
- Multiple meetings over Spring-Summer-Fall 2016
- High priority opportunities for collaborative impact identified
  - *IoT Economy – A Cyber Emphasis*
  - *Biosciences Economy – A Neuro Emphasis*

University of Virginia 1819

George Mason University 1957 Freedom and Learning

William & Mary Chartered 1693

Virginia Commonwealth University MCV RPI 1838

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The Case for Cyber

The Commonwealth is:

- a national leader in the $75B cybersecurity industry
- well positioned to capitalize on explosive growth in cyber-physical system (IoT) security that diversifies portfolio across multiple industry sectors
- at risk of losing competitive advantage as new opportunities emerge without investments in growth of a vibrant technology entrepreneurial ecosystem

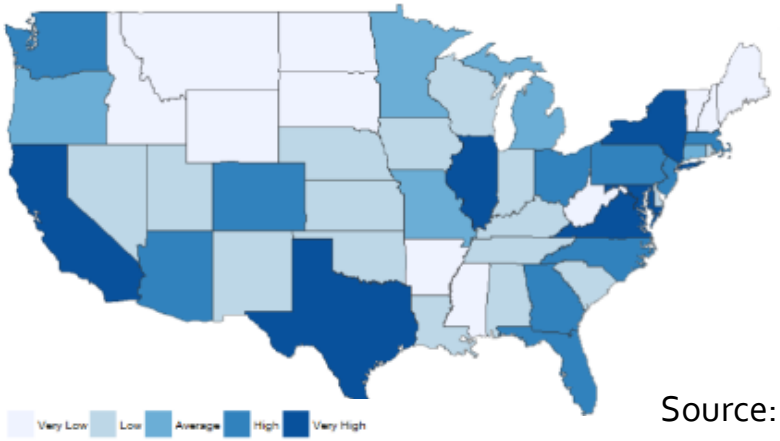
VRIF support of Virginia's universities strengthens the ecosystem for the Commonwealth to lead the nation in cybersecurity industries by:

- creating a network of leading talent across Virginia
- providing network of open access state-of-the-art facilities
- enhancing competitiveness for investment in cybersecurity research and commercialization

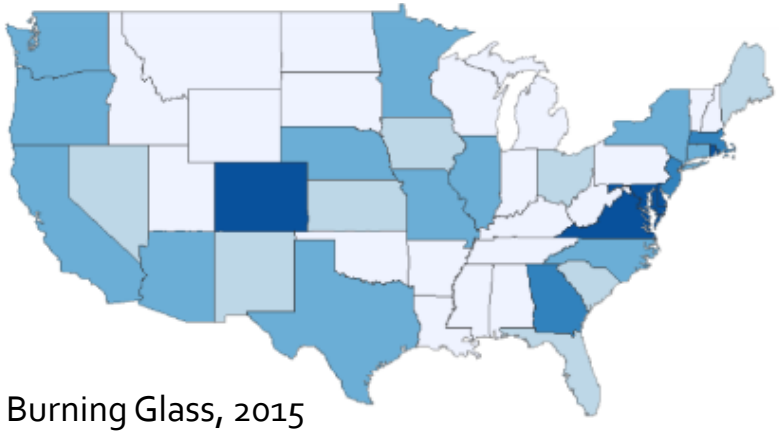
Cybersecurity: Opportunities & Threats for Virginia

	State	Total Postings	Location Quotient**	% Growth (2010-2014)
1	California	28,744	1.02	75%
2	Virginia	20,276	3.09	38%
3	Texas	18,525	0.92	113%
4	New York	14,089	0.97	104%
5	Illinois	11,428	1.16	163%
6	Maryland	11,406	2.40	39%
7	Florida	9,847	0.67	135%
8	Georgia	8,757	1.22	121%
9	New Jersey	8,268	1.21	80%
10	Massachusetts	7,911	1.45	92%
11	Colorado	7,688	1.77	111%
12	North Carolina	7,503	1.06	127%
13	Ohio	6,281	0.72	141%
14	Pennsylvania	5,745	0.59	69%
15	Arizona	5,502	1.18	87%

Cyber Postings



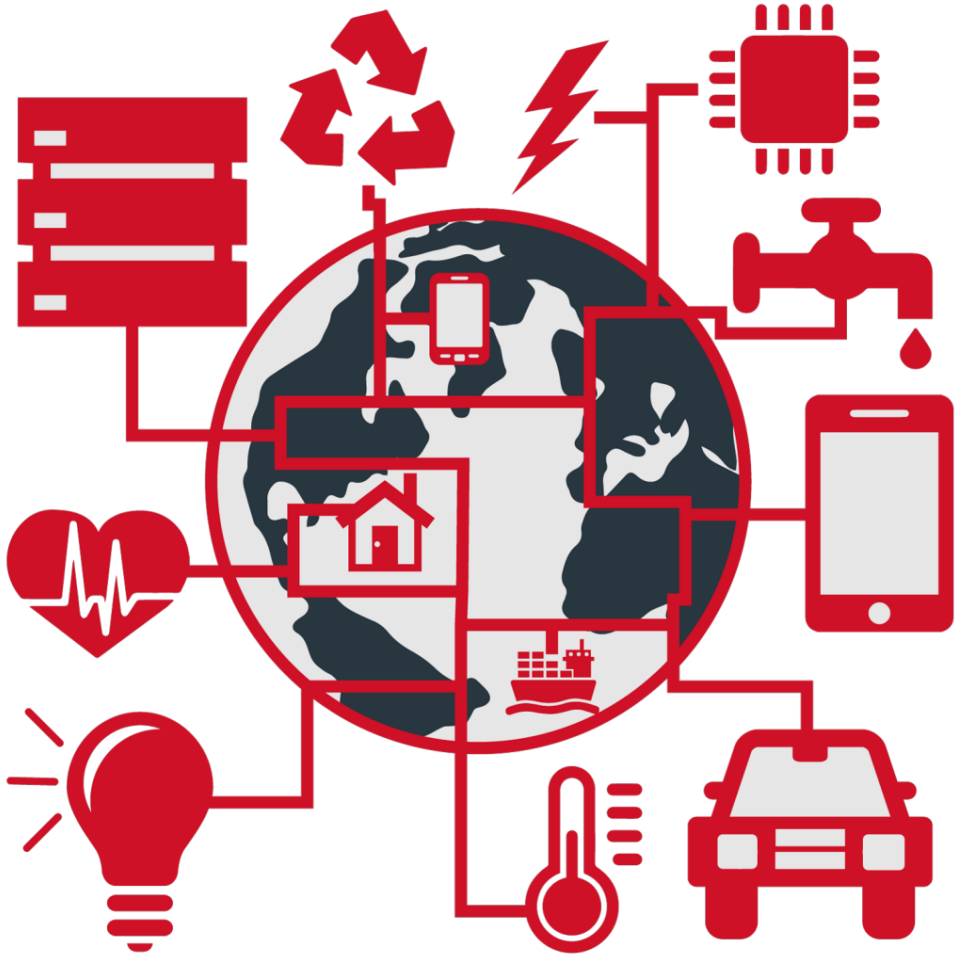
Location Quotient



Source: Burning Glass, 2015

- Virginia ranks 2nd in job postings and 1st in concentrated demand, yet high projected growth of 38% is lower than competitors
- Virginia ranks 2nd in number of cybersecurity companies (150) on Cybersecurity 500 list
- Universities are critical to this ecosystem

Cyber-physical system security is pervasive across multiple industrial sectors



- More than 30B connected devices by 2020
- Spending on IoT security to reach $120B by 2020 with overall cyber spending to be $500B-$1T from 2017-2021

Source: BI Intelligence, Gartner

Non-traditional wireless systems represent fastest growing segment of connected devices

High-Paying Cybersecurity Jobs

>17,000 vacant cyber jobs in Virginia

Growing needs for higher-level **Security+X** skills:

- Data science
- Wireless
- Advanced Manufacturing
- Autonomous vehicles
- Energy Systems
- Health and Medical Devices
- Financial / Insurance / etc.

Virginia universities play a critical role in creating a talent pipeline

Virginia's Current University Capabilities

Number of faculty actively engaged in research and instruction

> 150

Annual extramural expenditures in research and instruction

> $70 M

*Estimated (minimum amounts)

Centers and Institutes with >$5M Ann.

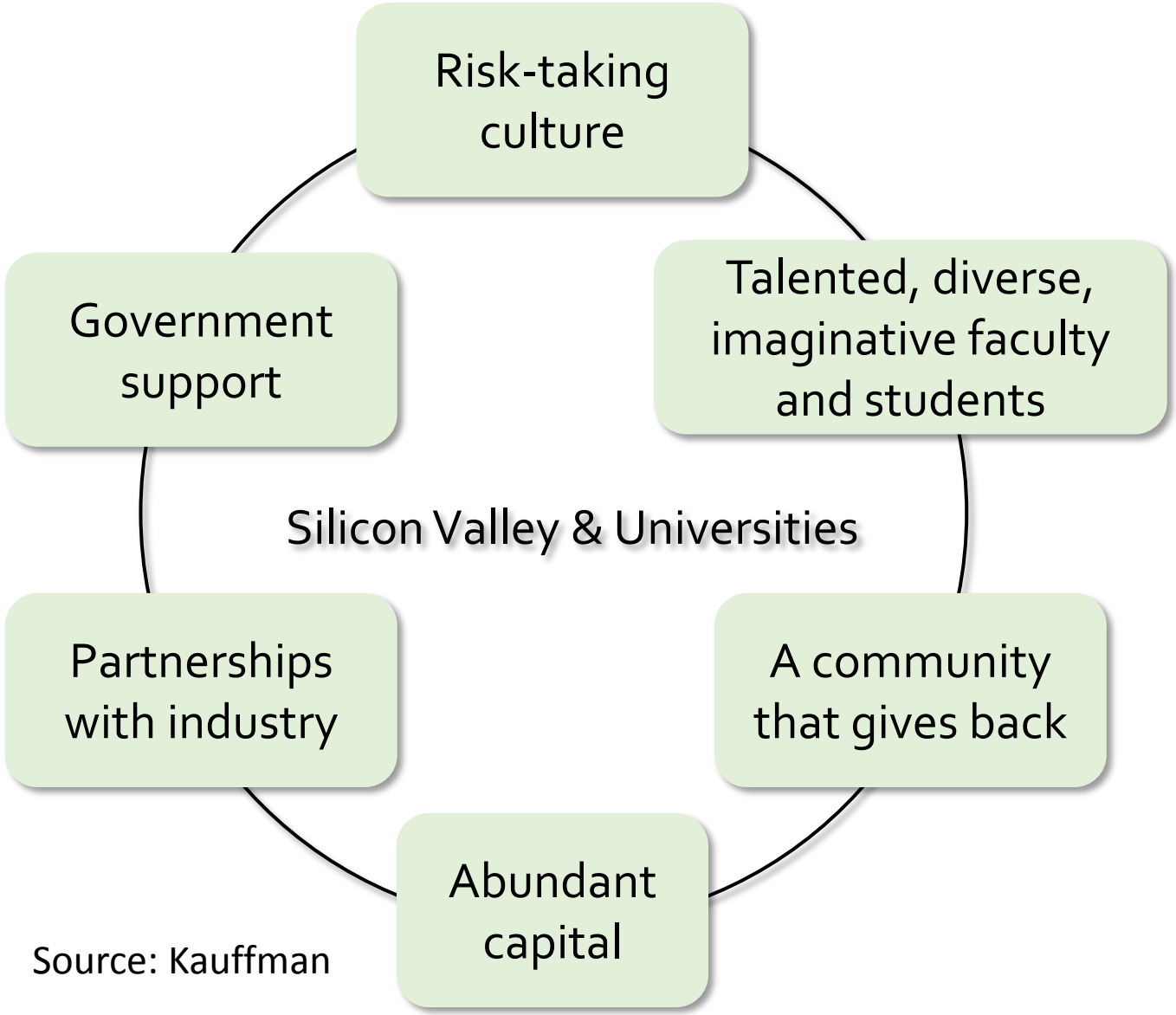
- Applied Research Institute
- Applied Research Corporation
- Center for Secure Information Systems
- Data Science Institute
- Hume Center for National Security

Select sector-specific with >$2M Ann.

- ASSIST Center
- Biocomplexity Institute
- Center for Air Transportation Systems
- Mid-Atlantic Aviation Partnership
- Transportation Institute

Virginia Cyber Range

Technology Entrepreneurial Ecosystem



Source: Kauffman

The DC region ranks among the top ten cities in the US where startups received the most venture funding, and Virginia leads the DC region

Virginia is uniquely positioned near the Federal government and its various agencies

Source: Tech.co

Network of universities with leading expertise are central to vibrant ecosystem

Select Security and Related Sector Industry Partners*

Supported > $15M in cybersecurity and sector programs over last 3 years

- Allied Minds Federal Innovations
- Millennium Space Systems
- Centripetal Network Inc.
- Shared Spectrum Company
- Aerospace Corp
- Ventura Solutions
- MacAulay-Brown Inc
- Harris Corp
- CACI International
- L3 Advanced Programs Inc
- Lockheed Martin
- General Electric
- United Technologies
- Siemens
- Boeing
- Torc Robotics
- HRL
- Dominion Power
- Volvo
- General Motors
- HRL
- ABB
- Raytheon
- Orbital Tech
- NEC
- Battele
- Torc Robotics
- Google
- Oceus
- Motorola
- CAER
- Vencore
- MS Technologies

*confidential list - many publicity restricted

Select Cybersecurity and IoT Start-ups

VA University-based start-ups raised >$100M in venture funding in 5 yrs

Scit Lab, 2007, Federal funding

PFP Cybersecurity, 2010, $0.3M raised, CIT gap funds, Blue Venture

Invincea, 2011, $21.1M raised, New Atlantic Ventures, Aeris, Dell

Optio Labs, 2012, $11.6M raised, Allied Minds

Federated Wireless, 2012, $34.0M raised, Allied Minds, Woodford, P3 Capital

DataFission, 2013, commercial sales

PsiKick, 2014, >$20M raised, Osage Partners, New Enterprise, U Michigan

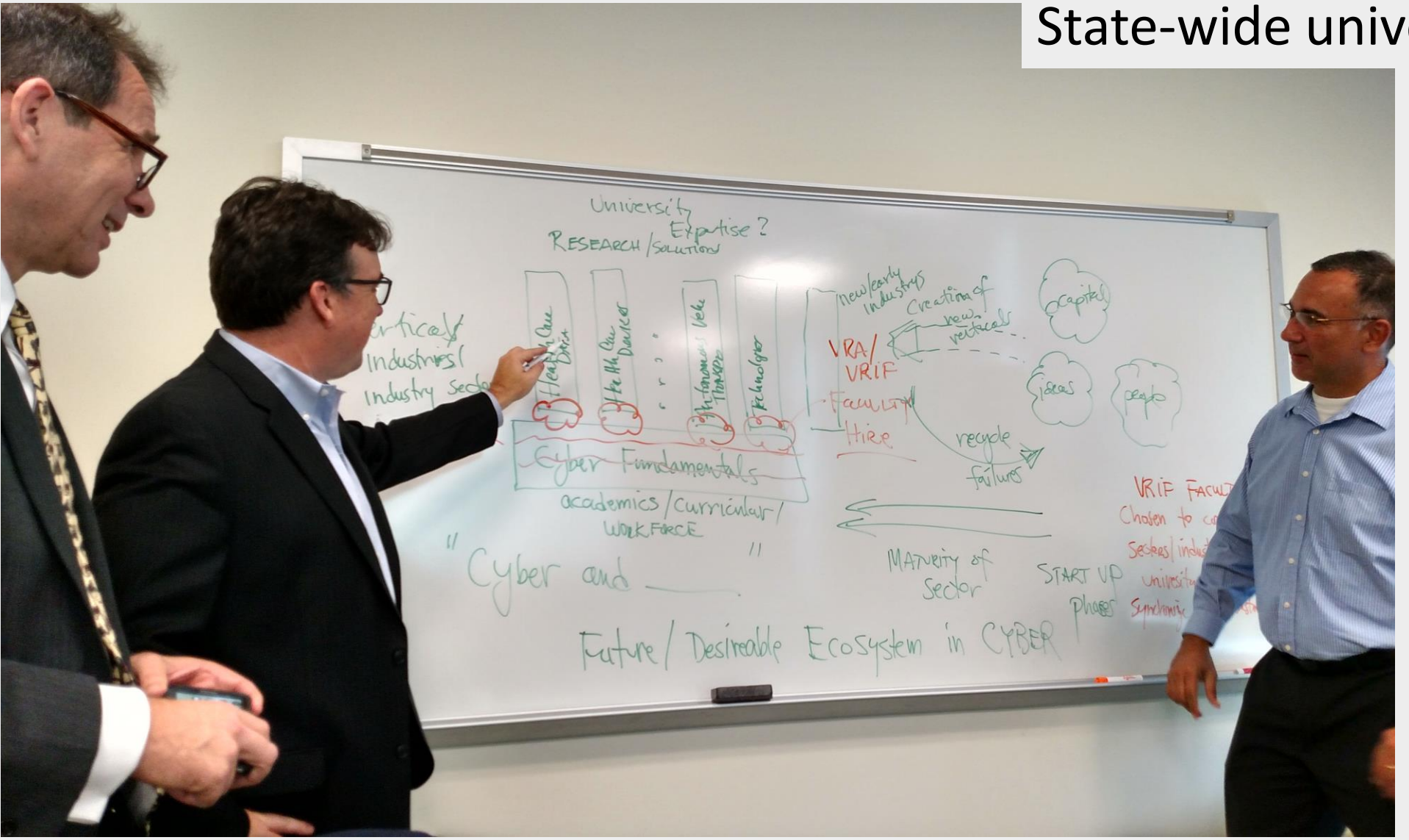
HawkEye 360, 2015, $18.3M raised, Allied Minds, In-Q-Tel, Raytheon, Razors Edge

Counter Drone Research Corp, 2016, CRCF awardee

Cyvision Technologies, sales to US government

Cyberrock Inc., CRCF awardee, Federal funding

VRIF Support to Enhance Cybersecurity Ecosystem



State-wide university network of:

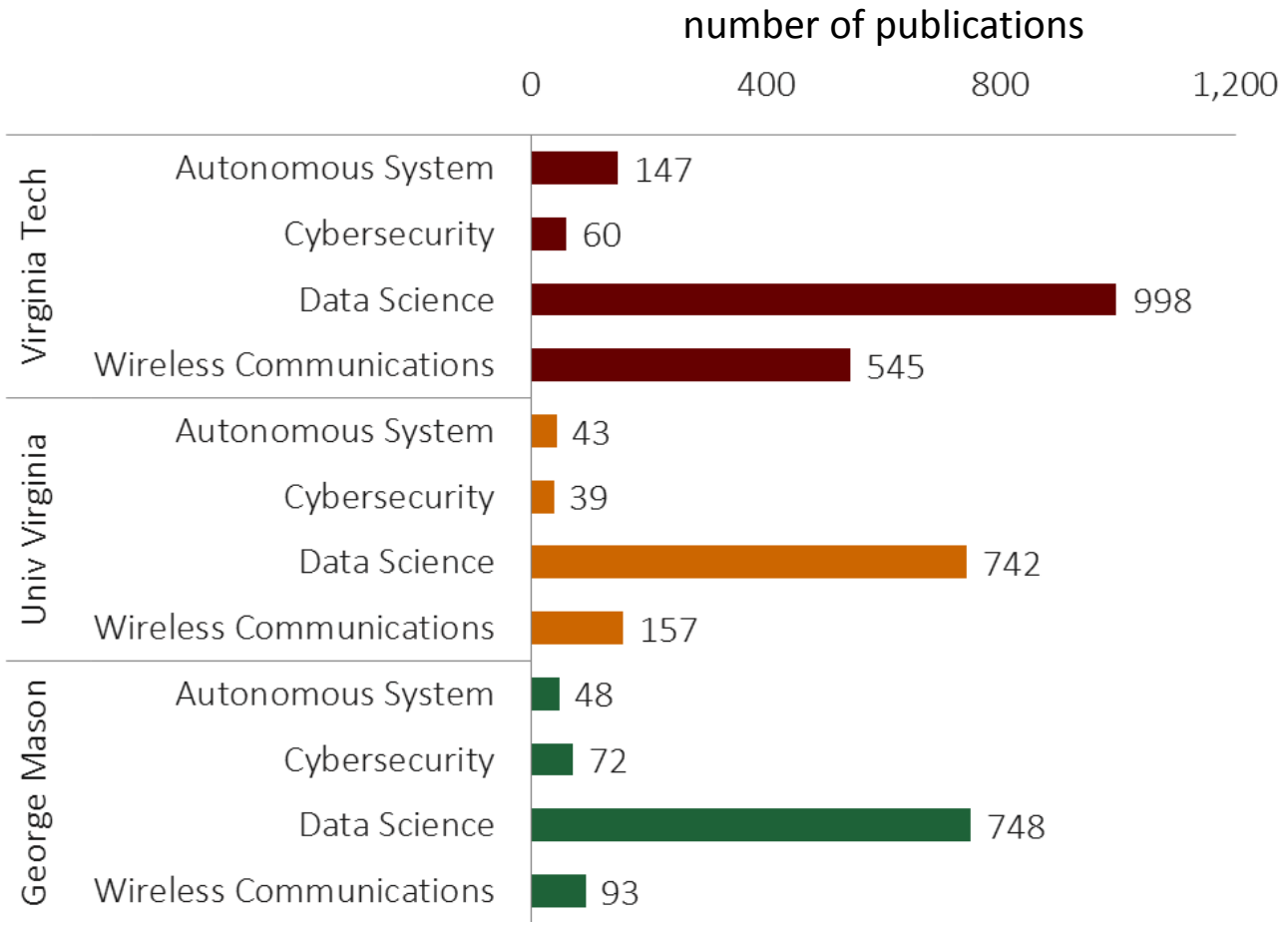
Security+X talent aligned with university strengths and translation goals

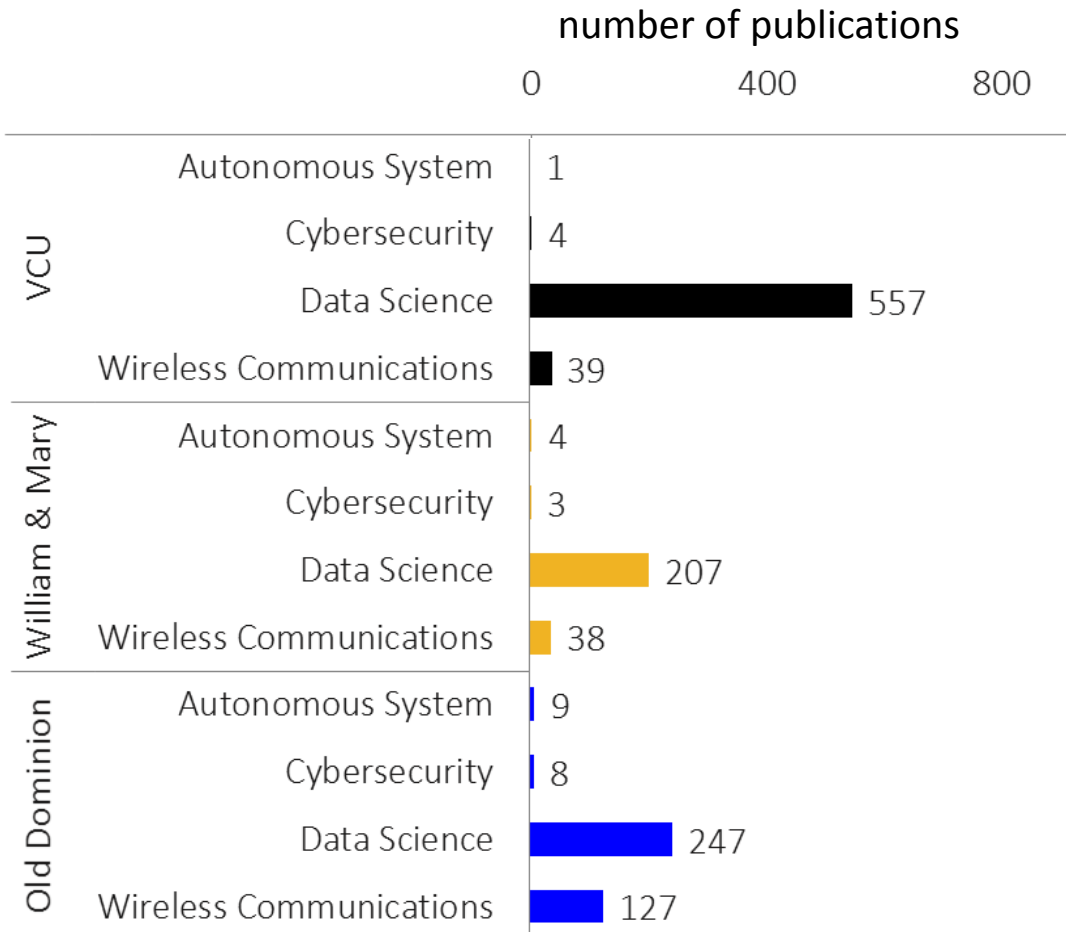
state-of-the-art open access cyber facilities

industry, govt, venture partners

curriculum and training materials

Cybersecurity and Sector Specific Publications

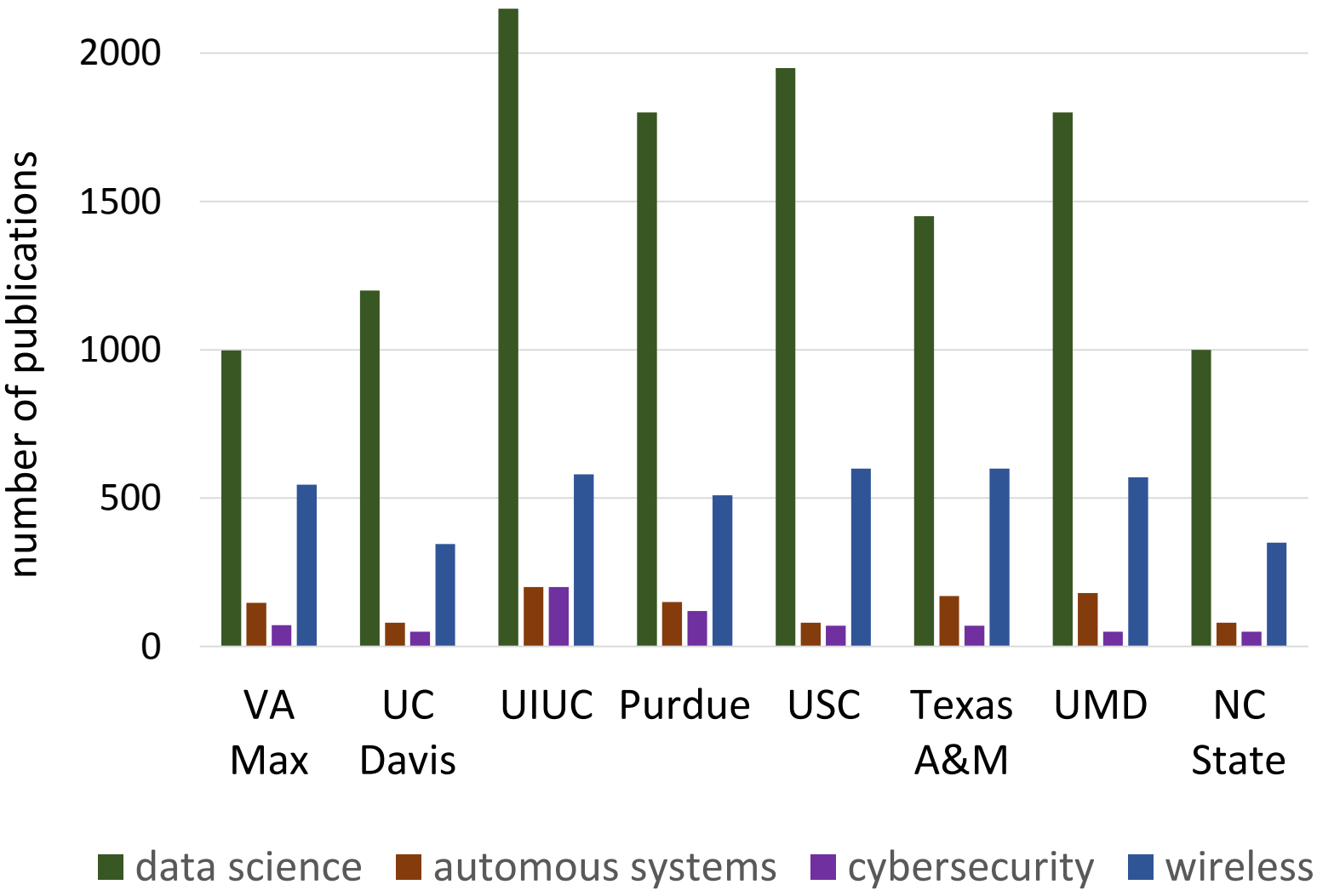




Publications can be accurately benchmarked and provide a measure of expertise and reputation

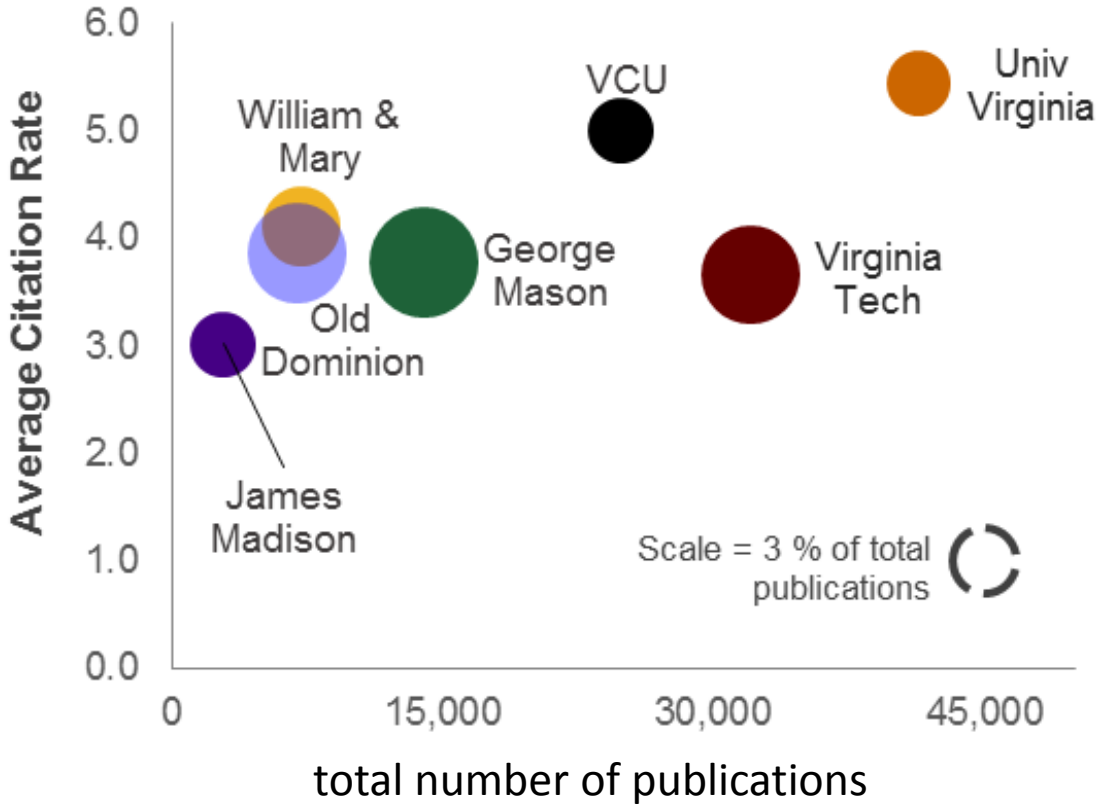
Source: Web of Science Core Collection (2006 – 2015)

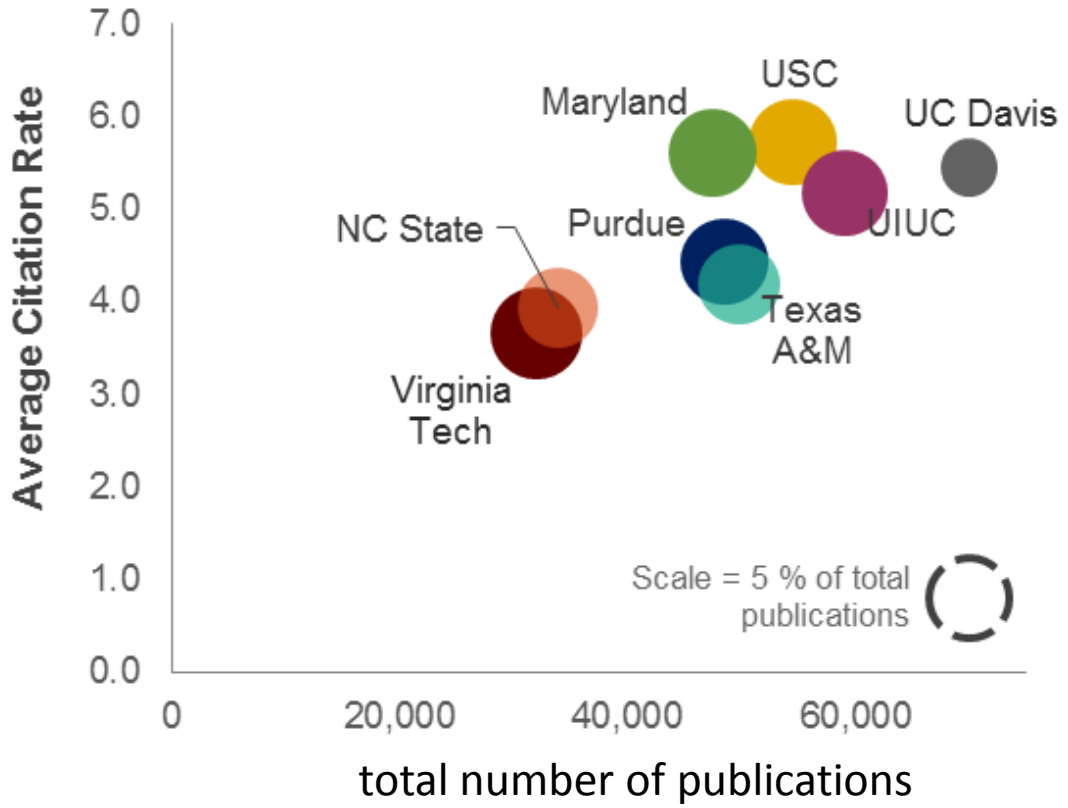
Comparison to SCHEV Peers: Cybersecurity



Strategic investments in talent and infrastructure would enhance competitiveness of Virginia universities in cybersecurity-related efforts when compared to top-ranked peer institutions

Comparison to SCHEV Peers: All Publications





Size of the bubbles indicates that emphasis of cybersecurity-related research as compared to the total is high compared to peers

Source: Web of Science Core Collection (2006 – 2015)

The Case for Neuro

University of Virginia

George Mason University

William & Mary
Chartered 1693

Virginia Commonwealth University
MCV
RPI
1838

Virginia Tech
1872

Eastern Virginia Medical School
1973

Old Dominion University
1930

Economic Motivation for Commonwealth

- Neurological diseases and conditions estimated ***$1 Trillion per year societal cost***, and burgeoning
- ***$5 Billion Federal BRAIN initiative*** across NIH, DoD, VA, NSF
- ***Treatment and Neurotechnologies market* – $12.3 Billion* per year by 2020 and rapidly increasing**
  - Neuroprosthetics
  - Neuromodulation
  - Neurorehabilitation
  - Neurosensing – diagnosis, control and medication delivery

- - ***Jobs comparables*** - analogous to Biomedical Engineering (BME) in 2005-2010
    - Intersection of Medicine, Engineering, Basic Sciences
    - **BME Jobs now growing at 23%** (US Bureau of Labor Statistics)
    - Average starting salary with Bachelor of Science degree: $86,220 per year
  - ***Enhanced workforce productivity***
  - ***Reduced Medicaid cost burden***

* *The Market for Neurotechnology, 2016-2020,* Neurotech Reports, February 2016

Opportunity: Strength through Collaboration

- ***157 Faculty across Commonwealth with funded research in Neuro***
- ***$96M per year in directly funded research (NIH, foundations, industry)***

<u>Major research strengths and capabilities across a broad spectrum</u>

- Neurodegenerative diseases
  -e.g., Alzheimer's, Parkinson's, muscular dystrophy
- Traumatic Brain Injury
- Central Nervous System Injury
- Learning and Cognition
- Autism
- Epilepsy
- Addiction
- Imaging
- Genomics
- Big data

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Current Industry & Nonacademic Partners

- ***Health Systems***
  - INOVA
  - Carilion
  - Kings Daughters Childrens Hospital
  - UVA Health
  - Veterans Administration
- ***Neurodegeneration***
  - Michael J Fox Foundation
  - Janelia Farms
- ***Injury & Trauma***
  - NFL
  - NCAA
- ***Pharma***
  - Astra Zeneca
  - Medimmune
  - Boehringer Ingelheim
- ***Big Data***
  - Booz Allen Hamilton
  - Mitre
  - IBM Watson
  - Parabon
- ***Neurotechnologies***
  - Imaging
    - Philips
    - Siemens
    - PETNET
    - Johnson & Johnson
    - Focused Ultrasound Foundation
    - DuPont

Neuro: Intellectual Property & Startups

- UVA Licensing & Ventures Group (2012-16)
  - 56 invention disclosures in neuro
  - 40 licensing deals
  - 3 startups
- VCU Innovation Gateway (2012-2016)
  - 63 invention disclosures in neuro
  - 11 licensing deals
  - 4 start-ups
- VT, GMU, W&M, ODU, EVMS (2012-2016, data still being gathered)
  - >10 invention disclosures in neuro
  - >10 issued patents
  - > 3 start-ups
- SBIR/STTR opportunities
- INOVA Venture Fund
- VBHRC, CIT

Peer Comparisons

Research and translation leaders

- MIT
  - McGovern Institute for Brain Research, estab. Feb' 2000 ($350M philanthropic gift)

    - 250+ researchers and support staff: 1 Nobel Prize, 1 National Medal of Science, 5 National Academy of Science, 3 National Academy of Medicine, 1 HHMI Investigator
  - 85,000 nsf, including Dept. of Brain and Cognitive Sciences, Picopower Inst. for Learning and Memory, Martinos Imaging Center, OpenMind Computer Cluster, other cores
- CalBRAIN (California Blueprint for Research to Advance Innovations)
  - Estab. 2014; collaboration across University of California System
    - Seed support – focus upon new technologies for monitoring widescale brain activity
      - $2M in seed funds awarded thus far
    - Support for Federal funding opportunities
- Regional: Major centers at U Maryland and North Carolina with faculty from Medicine, Engineering and Sciences (similar to new BRAIN Institute at UVA)

Areas Meriting VRIF Support in Neuro

1. Commonwealth Professors: Key Faculty hires and retentions (highest priority)
2. Establish Commonwealth Core Network of critical instrumentation at common rates for all sites (VCores)
3. Procurement of critical instrumentation not currently available from throughout the VCore Network
4. Translational Neurotechnology program initiative
   - Modeled after highly collaborative and successful i6 Grant from Department of Commerce

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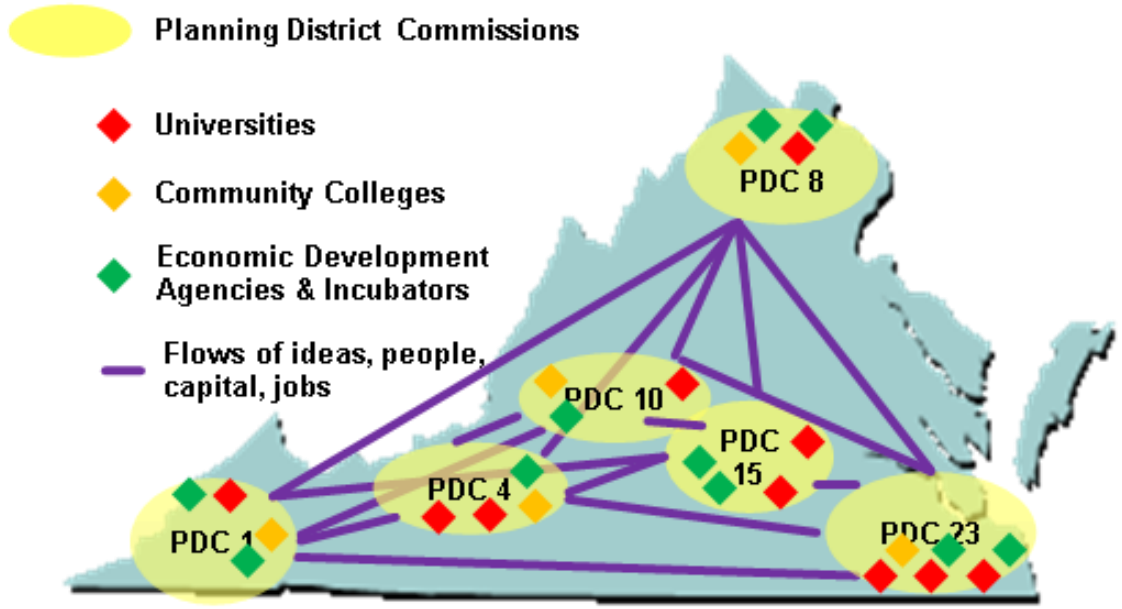
Virginia Innovation Partnership

Department of Commerce i6 Challenge 2012

Linking talent, ideas and capital across the Commonwealth

10 universities **5 community colleges** **15 corporate partners** **10 incubators**

- **Diverse review group**
- **Annual venture capital summit**
- **Mentoring network**



Virginia Innovation Partnership TIES
Talent, Innovation, Entrepreneurship Statewide

Challenges:

Motivating proposals from all regions
Sharing ideas freely across the network
Maintaining engagement of teams

Match Funding: Other university $, corporate, and non-profit organizations

Virginia Innovation Partnership (VIP) 2012-2014 Program Summary

- 147 Total Submissions Received
- 12 Number of Academic Institutions
- 36 Projects funded

  Total funding awards - year 1 ($838,000) - year 2 ($800,000)
- 13 New ventures launched
  - Eastern Virginia Medical School (1)
  - George Washington - Science and Technology Campus (1)
  - Old Dominion University (1)
  - University of Virginia (4)
  - Virginia Commonwealth University (4)
  - Virginia Tech (1)
  - William and Mary (1)
- $4.3M+ Follow-on funding received from state/federal agencies, industry and private investors to advance the projects

Virginia Research Alliance

A Powerful Partnership for Innovation

University of Virginia

George Mason University

William & Mary
Chartered 1693

Virginia Commonwealth University

Virginia Tech

Eastern Virginia Medical School

Old Dominion University

CIT has identified nearly 200 subject matter experts (SMEs) to support the Commonwealth Research Commercialization Fund (CRCF) proposal review process. Industry expertise includes such priority technology sectors as Advanced Manufacturing, Cyber Security, Communications, Energy, Information Technology – including Data Analytics, Life Sciences, and Unmanned Systems. Within Life Sciences, areas of specialization include bioinformatics, ophthalmology, biotechnology, drug development, medical devices, neuroscience, diabetes, and infectious disease. Reviewers represent industry, academia, government, nonprofits, and private investment, along with a few individuals retired from these areas.

Technology Sectors		
Advanced Manufacturing / Advanced Materials	32	16%
Aerospace* (some overlap with Unmanned systems)	9	5%
Cyber Security	8	4%
Energy	31	16%
Life Sciences	54	28%
IT, including Data Analytics	23	12%
Transportation	8	4%
Unmanned Systems	9	5%
Demographics		
Academia	80	41%
Industry	87	44%
Venture capital	5	3%
Government	21	11%