



## COMMONWEALTH of VIRGINIA

STATE COUNCIL OF HIGHER EDUCATION FOR VIRGINIA

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November 1, 2020

The Honorable Ralph S. Northam  
Governor, Commonwealth of Virginia  
Patrick Henry Building, Third Floor  
Richmond, VA 23218

The Honorable Janet D. Howell  
Chair, Senate Finance and Appropriations Committee  
P.O. Box 2608  
Reston, VA 20195-0608

The Honorable Luke E. Torian  
Chair, House Appropriations Committee  
4222 Fortuna Plaza, Suite 659  
Dumfries, VA 22025

Dear Governor Northam, Senator Howell and Delegate Torian,

As Chair of the Virginia Research Investment Committee (VRIC or the Committee), and on behalf of its members, I hereby submit the last annual report of the Committee's work, per Va. Code § 23.1-3132.E. Between its creation on July 1, 2016, and its end on June 30, 2020, the Committee has made substantial contributions to Virginia's innovation ecosystem. We are confident that the new Virginia Innovation Partnership Authority (VIPA) will continue and expand on our successes.

This report is divided into two sections. The first describes the work of the Committee since the last annual report in November 2019. The second summarizes accomplishments over the life of the Committee and the Virginia Research Investment Fund (VRIF).

### **Annual Report**

The Committee met twice, in December 2019 and in June 2020. A meeting that had been planned for April was canceled due to the pandemic.

The December meeting included one action item. The Committee discussed the requests for funding by the four regional nodes of the Commonwealth Cyber Initiative (CCI), which had been submitted according to guidance approved by VRIC at the August 2019 meeting.

The following amounts were approved for each node:

Central Virginia Regional Node  
Fiscal Agent: Virginia Commonwealth University  
General fund: \$2.5 million  
Bond fund: \$500,000

Coastal Virginia Center for Cyber Innovation (Regional Node)  
Fiscal Agent: Old Dominion University  
General fund: \$2.5 million  
Bond fund: \$500,000

Northern Virginia Regional Node  
Fiscal Agent: George Mason University  
General fund: \$2.5 million  
Bond fund: \$500,000

Southwest Virginia Regional Node  
Fiscal Agent: Virginia Tech  
General fund: \$2.5 million  
Bond fund: \$500,000

The December meeting also included discussion of an inventory of the Commonwealth's research and development (R&D) endeavors. The Research and Technology Strategic Roadmap, which had been previously approved by VRIC and then reviewed by the Governor's office for the statutorily required 30 days, was now final. The statute authorizing the development of the Roadmap also mentioned the inventory. The Roadmap development process had generated ideas for the inventory and members discussed options and provided guidance to staff.

Finally, the December meeting included a discussion of legislation that would be introduced to create the new Virginia Innovation Partnership Authority (VIPA). The Committee passed a resolution endorsing the concept of VIPA.

The June 2020 meeting of the Committee was its final meeting. At that meeting, members voted to approve the "Report on Establishing a Research and Development Inventory" presented by staff. The report included four recommendations for a future inventory. Following the meeting, the report was transmitted to the Governor, Chairs of the Senate Finance and House Appropriations committees, the Joint Commission on Technology and Science, the Center for Innovative Technology and the Virginia Innovation Partnership Authority as per statute.

Also at the June meeting, the Committee discussed the single application that was received in response to the Committee's Round 4 Call for Proposals. An external review panel had unanimously recommended that the proposal be funded. The Committee voted to approve the award of funding, pending future endorsement by the VIPA board.

Through this final VRIF grant competition, the Committee had sought proposals to establish a disciplined process for streamlining the commercialization of products from university research. The Committee sought a process that would authorize awardees to re-grant or make mini-grants to teams of researchers in specified domain areas for proof of concept (POC) experiments and the provision of mentoring and other support to those teams before, during and after the POC grants. Successful applicants would provide direct assistance to university-based innovators and entrepreneurs to support POC and commercialization of technology by offering a range of services that drive innovation-based, high-growth entrepreneurship and startup acceleration.

Eleven public institutions partnered with one private institution and submitted a single application proposing to provide supportive services and mini-grants for POC research projects to researchers working in five strategic opportunity areas.

The proposal was well received by the panel of external experts. Given that the June meeting would be the final meeting of the Committee, members decided to award the funds requested by the applicants, with the stipulation that the VIPA board would have to endorse the project as well.

The application, along with the recommendations of the external panel of experts, has been sent to the new VIPA board via the Secretary of Commerce and Trade, who serves as co-chair of VIPA.

Lastly, between July 1, 2020, and Sept. 30, 2020, VRIC staff collaborated with staff at the Center for Innovative Technology (CIT) to transition active and ongoing work. Staff coordinated the transition of the administration of all active grant projects, provided background on the pending grant application, and described the history of CCI, with the understanding that the statutes governing VIPA allow that body to create a different CCI process than the one used by VRIC.

### **Accomplishments of the Committee**

Over the past four years, the Committee (1) commissioned a study that led to the recommendations that resulted in the creation of VIPA, (2) oversaw the process to implement the General Assembly's vision for the Commonwealth Cyber Initiative, (3) coordinated with the State Council of Higher Education for Virginia (SCHEV) on development of the Commonwealth Research and Technology Strategic Roadmap (the Roadmap), (4) awarded over \$2.5 million to public institutions of higher education for research leading to the commercialization of new products and the creation of new jobs and (5) awarded \$3 million to fund two new statewide centers of excellence in autonomous systems and small satellite data.

#### **1. Study to Assess the Commonwealth's Research Assets**

Item 255A.2. of Chapter 836 of the 2017 Acts of Assembly authorized SCHEV to assist VRIC by contracting for an assessment of the research assets in the Commonwealth's universities, companies and federal facilities. In August 2017, after following Virginia procurement processes, SCHEV negotiated a contract with TEconomy Partners, LLC, to conduct the study, recommend priority focus

areas in research and development that will lead to commercialization and job creation and offer evidence-based options for action to pursue these priority areas. In January 2018, the consultant delivered to VRIC a final report and three detailed sub-analyses.

Given the depth of the consultant's analyses and the insights elicited from the underlying data, VRIC members suggested that SCHEV assemble a group of stakeholders to provide additional guidance on prioritizing next steps and developing an implementation plan for the study recommendations. TEconomy Partners conducted additional analyses and provided technical support. The 14-member group worked from March through October 2018 to identify strategies through which to achieve transformational change for Virginia's innovation ecosystem.

In October 2018, the Committee received the stakeholder group's guidance, which recommended activities under four interconnected sub-goals: (1) generate more new high-growth potential commercialization ideas; (2) focus on strategic domain areas; (3) launch and scale-up high-growth, product-oriented startups; and (4) coordinate a statewide network of innovation services. The guidance describes Virginia's competitive advantages and innovation assets in five strategic innovation domain areas: (i) cybersecurity technologies; (ii) big data (leveraging fiber and data center assets); (iii) unmanned autonomous systems applications (leveraging test and demonstration facilities); (iv) space and satellite development and applications; and (v) life sciences.

During the 2019 General Assembly Session, senate and house bills based on that guidance were introduced to transform Virginia's innovation ecosystem. While those bills did not become law, they led to revised bills submitted during the 2020 General Assembly Session which were successful in creating the new Virginia Innovation Partnership Authority (VIPA).

## 2. Commonwealth Cyber Initiative: Blueprint, Hub and Regional Nodes

Item 252 B. of Chapter 2 of the 2018 Special Session I created the Commonwealth Cyber Initiative (CCI) and tasked VRIC with oversight of the implementation. The budget language required that Virginia Tech submit a blueprint to VRIC "for the development and operation of the Commonwealth Cyber Initiative" and further directed VRIC to "establish a process for public institutions of higher education in Virginia to seek certification as a Spokes site based on a plan for institutional investment, industry partnership, enrollment growth, and research focus areas. The Hub and certified Spokes sites will have the ability to seek matching funds for faculty recruitment and support for renovations and equipment."

On December 1, 2018, Virginia Tech submitted to VRIC the Blueprint for CCI on behalf of the CCI Leadership Council. Also in December, the Committee approved the release of \$1 million of the \$5 million in bond funds appropriated to support the CCI "Hub" in Northern Virginia. Subsequently, a VRIC work group developed instructions describing the criteria, process and documentation required for regional nodes (referred to as Spokes in the budget) to request certification. Those Instructions for Application for Certification of CCI Regional Nodes were approved by the Committee in March 2019.

Also in March, the Committee voted to approve the release of \$10 million in general funds to Virginia Tech for the CCI Hub on July 1, 2019, contingent upon the university and the CCI Leadership Council providing to the Committee's satisfaction at its next meeting additional information.

In June 2019, and following receipt of the requested follow-up information, VRIC members expressed satisfaction with the details provided by Virginia Tech and the CCI Leadership Council. Also at that June meeting, the Committee reviewed requests for, and acted in accordance with the budget language to certify, four CCI Regional Nodes:

- i. Southwest Virginia Regional Node (Founding partners: Virginia Tech; Radford; UVa-Wise);
- ii. Northern Virginia Regional Node (Founding partners: George Mason; James Madison; Mary Washington; Germanna Community College; Lord Fairfax CC; and Northern Virginia CC);
- iii. Coastal Virginia Regional Node (Founding partners: Old Dominion; Christopher Newport; William and Mary; Norfolk State; Paul D. Camp Community College; Thomas Nelson CC; and Tidewater CC); and
- iv. Central Virginia Regional Node (Founding partners: Virginia Commonwealth; Longwood; University of Virginia; Virginia State; Reynolds Community College; and John Tyler CC).

In August 2019, VRIC provided formal guidance to the four Nodes on requesting funding via the Committee. All four nodes submitted requests for funding and, at the December 2019 meeting, the Committee approved the release of \$2.5 million in general funds and \$500,000 in bond funds to each node.

### 3. Commonwealth Research and Technology Strategic Roadmap

Chapters 796 and 816 of the 2019 Acts of Assembly enacted Va. Code § 23.1-3134, which directed the Committee to “approve a Commonwealth Research and Technology Strategic Roadmap, a comprehensive research and technology strategic roadmap for the Commonwealth to identify research areas worthy of economic development and institutional focus.” The statute directed SCHEV to “develop the Roadmap and submit it to the Committee for review and approval. In developing the Roadmap, the Council shall select and oversee a panel of independent experts.” Throughout 2019, the Committee coordinated with the Council on development of the Roadmap.

The Roadmap is Virginia's articulation of the research areas/domains/foci in which it has determined that state investment will yield the greatest impacts on economic development, workforce development and the public good generally. As required by statute, SCHEV assembled a panel of independent external experts, who assisted with review of quantitative data and qualitative input from a wide variety of stakeholders in both the public and private sectors. VRIC set an ambitious target of Roadmap completion in October 2019 to inform the upcoming legislative session. After receiving updates at meetings in March, June and August, the Committee approved the Roadmap at a meeting on October 8, and it was forwarded to Governor Northam for final approval.

The Roadmap identifies six areas of research focus that exhibit the most worth and promise for the Commonwealth:

- i. Life and health sciences;
- ii. Autonomous systems;
- iii. Space and satellites;
- iv. Agricultural and environmental sciences;
- v. Cybersecurity; and
- vi. Data science and analytics.

The document also details a variety of collaborative options for pursuing implementation of the focus areas, as well as recommendations for aligning research and development and economic growth and for measuring the outcomes of these efforts.

#### 4. Virginia Research Investment Fund (VRIF): Grants for Research and Commercialization

In accordance with § 23.1-3133, SCHEV and VRIC collaborated to issue a Call for Proposals for the first grant competition in May 2017. Public universities submitted 10 applications, totaling almost \$11.5 million in requests, which SCHEV staff forwarded to a panel of scientific experts, industry leaders and venture capitalists as provided for in statute. In December 2017 and January 2018, the Committee approved three proposals for VRIF grants to fund applied-research projects with strong potential for commercialization, company formation and/or job creation. The trio of grant awards totaled just over \$2.5 million, with an additional \$3.8 million in matching funds committed by the universities and their private-sector partners.

- An artificial pancreas that uses smart phones, insulin pumps and the online cloud to reduce blood-sugar variation in people with diabetes (University of Virginia): \$255,855 (\$291,952 in matching funds).
- Two product lines based on patented algorithms that use machine learning to improve the safety and security of wireless communications from cyberattacks (Virginia Tech): \$1,181,030 (\$2,362,74 in matching funds).
- A medical device that will use low-energy electric fields to treat brain tumors (Virginia Tech): \$1,111,758 (\$1,236,872 in matching funds).

One grantee has completed their work successfully and administration of the other two grants has transitioned to VIPA, with oversight to be provided by staff at the Center for Innovative Technology (CIT).

The completed project, UVA's hypoglycemia safety project, was a clinical trial to evaluate the impact on cognitive function of the artificial pancreas, in particular its dedicated safety system that automatically adjusts insulin levels to achieve better blood sugar control. The researchers enrolled 18 older adults (age 65+), along with 16 young children (ages 6-10) and 16 parents of the enrolled children. The researchers developed an innovative program specifically for this project using a

scientific method called “Ecological Momentary Assessment” (EMA), which refers to data collection in real time during a person’s daily schedule. Study participants completed brief cognitive assessments two to four times each day on a randomized schedule. An additional aim of this project was to explore the possible effects of this artificial pancreas technology on sleep quality and quantity. Researchers obtained sleep data using a commercially available wrist-worn device that is comparable to a watch, called an Actigraph.

Some data is still being analyzed and other available study results are currently being prepared for peer review. The results so far show the use of the automated insulin delivery device (AID) achieved greater time in target range, lower time spent in low blood sugar range (hypoglycemia) and less time spent in high blood sugar range (hyperglycemia) when compared to the control situation (sensor-augmented pump therapy) for both groups. In addition to this positive impact on glycemic outcomes, the data also show that parents of young children with Type 1 diabetes had improved sleep quality with fewer nighttime awakenings during the AID use period. Researchers also found that diabetes-specific psycho-behavioral outcomes in parents such as the fear of hypoglycemia, diabetes-related emotional distress, and depression were improved with the use of AID.

Collectively to date, the three projects have:

- Generated \$200,000 in licensing revenue
- Sold products that generated \$80,000
- Won follow-on funding:
  - NIH SBIR Phase I grant for \$244,000
  - Private funding at \$8.5 million
- Been awarded four patents
- Filed over 40 patent applications that are pending
- Created over 20 new jobs (not including jobs at institutions where the researchers work)
- Received recognition: One company was named to the AI 100, CB Insights' annual ranking of the 100 most promising AI startups in the world, which includes AI startups from 13 countries who are pushing the boundaries of AI research and commercial adoption across 15 industries and a broad range of cross-industry applications.

##### 5. Virginia Research Investment Fund (VRIF): Centers of Excellence

The second VRIF grant competition, in 2018-2019, was designed to support collaboration between public universities that would enhance the capacities of their translational research centers in targeted growth-opportunity areas. Through this capacity-building initiative, we sought to strengthen existing university-industry partnerships and to position successful grantees to be more competitive for future opportunities for funding from federal, state, non-profit and private entities. We received seven concept papers and invited full proposals in response to five. After review by a panel of experts, the Committee approved two proposals, one in August 2019 and one in October 2019, that totaled \$3 million from the VRIF, with an additional \$4 million in matching funds committed by the universities and their private-sector partners.

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- Launch of the Virginia SmallSat Data Consortium, a collaborative research center co-led by Old Dominion University and Virginia Tech, in partnership with the Virginia Commercial Space Flight Authority and NASA Langley Research Center: Up to \$1,500,000 over two years, with the partners providing \$1,800,000 in matching funds.
- Launch of the Commonwealth Center of Innovation for Autonomous Systems (C2IAS), a collaborative research center led by Virginia Tech with Old Dominion University as its partner, and in the first year involving private collaborators: Atlas-NA; Burton-LeRoy; Cambrian Design and Development; Procomm Aviation; Sanchez Engineering Services; SimIS; Textron; and UAVPro: Up to \$1,499,991 over three years, with the partners providing over \$2,200,000 in matching funds.

While the new centers are still getting underway, one has already secured a launch slot at NASA's Wallops Flight Facility as part of the matching funds.

### **Conclusion**

In addition, we are pleased to report that the Committee's prudence and fiscal conservatism has resulted in funds remaining in the non-reverting Virginia Research Investment Fund, which will be available for use by VIPA. After subtracting commitments to current grantees, general funds remaining total \$22 million, with an additional \$26 million in bonding authority.

Finally, I also am pleased to report that SCHEV staff who have supported VRIC are continuing to advance the Commonwealth in their work. As VRIC winds down, staff have taken the lead on the workforce and education alignment project and the Innovative Internship Fund and Program. They participated in proposals leading to two successful grant awards: one to SCHEV and one to Hampton University on behalf of the Virginia Workforce Board and they continue to make substantial contributions, including to the revision of *The Virginia Plan for Higher Education*.

On behalf of the members of the Virginia Research Investment Committee, I thank you for your vision in creating VRIF and VRIC as vehicles to spur academic research in the Commonwealth. Through our work, I believe we have spurred so much more – a transformation of Virginia's innovation ecosystem that will serve Virginia into the future.

Sincerely,



Peter Blake

Chair, Virginia Research Investment Committee

cc: Members, Virginia Research Investment Committee