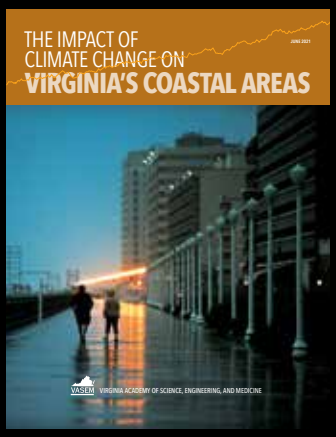
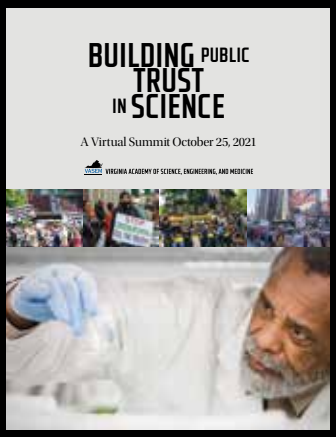
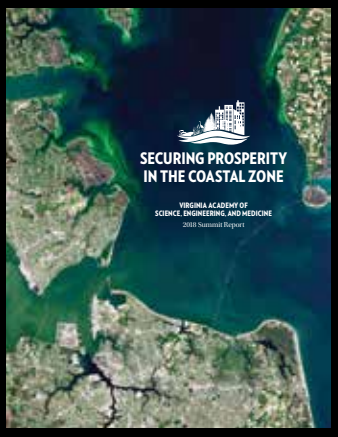
10 YEARS
VASEM
VIRGINIA ACADEMY of SCIENCE, ENGINEERING, AND MEDICINE



The Virginia Academy Celebrates Its 10th Anniversary





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From the President

Initiating any endeavor, be it a company or a new organization, can be a challenge. No matter how promising, success is never guaranteed. And if it is successful, there is no guarantee that the exact outcome will match expectations.

In 2013, Sen. Mark Warner encouraged a group of scientists, engineers, and healthcare professionals to create an organization in the image of the National Academies to provide nonpartisan, objective technical guidance to decision-makers on the most difficult, challenging issues of the day. Thus began the Virginia Academy of Science, Engineering, and Medicine (VASEM).

The many ways that we have successfully pursued this mission are detailed in this document. They include eight summits on emerging challenges and opportunities, two in-depth studies on issues of pressing concern for Virginians, a well-regarded fellowship program that introduces graduate students from technical areas to policymaking, and a report highlighting those areas in which Virginia could play a leading role in addressing national challenges.

The successes the Virginia Academy has achieved over the last decade have enlarged our aspirations. We are currently reflecting on these successes and making ambitious plans for the future. At the end of the next 10 years, we intend to be recognized across state government as the premier convener of science, engineering, and healthcare expertise in the Commonwealth and as an indispensable source of information, analysis, and insight required for more effective public policy.

James Aylor

A Decade of Service

In 2013, Sen. Mark Warner convened a small group of Virginia-based members of America's three National Academies—the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine (now the National Academy of Medicine)—along with the presidents of Virginia's premier research universities. They explored the idea of developing an independent body of experts to advise state policymakers on matters of pressing public concern, much as the National Academies advise the federal government. This discussion led directly to forming the Virginia Academy of Science, Engineering, and Medicine (VASEM).

VASEM was created to provide authoritative, nonpartisan information for Virginia's legislature and its executive branch. It was also conceived as a way to benefit the Commonwealth's universities and industry, elevate its membership, and promote economic development. The mission statement of the Virginia Academy incorporates these broader aims.

Inform

- **Provide an independent** resource of expertise in science, engineering, and medicine to Virginia.
- **Envision future trends** and provide leadership in catalyzing emerging opportunities.

Advocate

- **Promote investments** in job growth, research, and solutions to challenges in science, engineering, and technology.
- **Support emerging leaders** in science, engineering, and medicine toward their election in the national academies.

Serve

- **Foster new collaborations** between businesses and Virginia universities and colleges.
- **Grow Virginia's competitiveness** for new business investments, federal funding, and job growth.

VASEM's ability to fulfill this mission rests on the quality and breadth of its membership, and so it casts its net widely. Members of the National Academies who reside or work in Virginia are automatically named to VASEM, but VASEM members can also nominate for membership any Virginian with an outstanding record of accomplishment in science, engineering, or medicine.

A Diverse Range of Programs

Since its founding 10 years ago, VASEM has established a diverse set of programs.

In-Depth Studies
To further our core mission of advising the Commonwealth, we have established a relationship with members of the Virginia General Assembly's Joint Commission on Technology and Science (JCOTS), which authorized VASEM to produce two in-depth studies for the legislature. The first report was on prospects for the commercial space and unmanned aerial vehicle industries in Virginia, and the other was on the impact of climate change on Virginia's coastal areas. VASEM has also been asked to supply evaluators to assess programs and issues for the Virginia Research Investment Funds, the Virginia Innovation Partnership Corporation, and legislative offices.

Annual Summits
Starting in 2013, VASEM has convened eight annual summits identifying challenges the Commonwealth faces and highlighting the role Virginia's scientists, engineers, and healthcare professionals play in addressing them. Our 2017 summit on infectious diseases was remarkably prescient, featuring keynote speaker Anthony Fauci, while our climate change summit the following year attracted a standing-room-only audience.

Commonwealth of Virginia Engineering and Science (COVES) Policy Fellows Program
We launched the Commonwealth of Virginia Engineering and Science (COVES) Policy Fellows program, now in its fourth year. Thanks to our efforts, over 50 graduate students from universities across Virginia have gained hands-on experience applying their expertise to public policy issues at state agencies, legislative offices, corporations, and nonprofits. Host offices ranging from the Department of Transportation to the State Council of Higher Education for Virginia (SCHEV) have benefited from their contributions. The program has already had an impact: a significant number of our graduates have altered their career plans to focus on the public sector.

Key Strategy Report
VASEM has not limited itself to projects proposed by other sources. In 2021, we took the initiative to develop a key strategy document, identifying five promising areas, such as sustainable energy production and semiconductors, in which the Commonwealth has the fundamental resources and expertise to achieve national prominence. We are currently in the process of updating and reissuing our report.

Studies Commissioned by the General Assembly

At the request of policymakers, VASEM has conducted a series of in-depth studies on issues of paramount concern to the Commonwealth.

Aerospace in Virginia (2017)

An Opportunity for Economic Growth

AT THE REQUEST of JCOTs, the Virginia Academy undertook a study of the aerospace industry in Virginia. After holding a series of all-day sessions and interviews with a score of stakeholders, the report committee identified two growth areas—commercial space and unmanned aerial systems (UAS)—that held high promise for Virginia.

The report committee found that these areas were among the fastest-growing segments of the aerospace industry, generating thousands of well-paying jobs, both directly and indirectly, and producing substantial growth for states encouraging their development. In commercial space, companies like SpaceX, Blue Origin, Virgin Galactic, Orbital ATK, and Bigelow Aerospace were assuming many activities formerly conducted by NASA, including supplying the International Space Station.

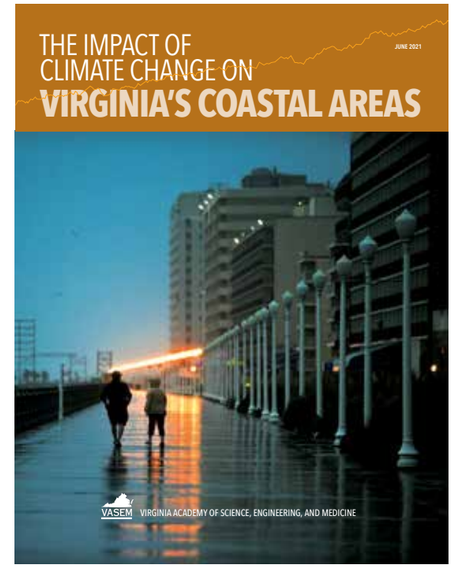
The UAS industry was at an earlier stage of its life cycle, but the report committee found that the Federal Aviation Agency (FAA) had begun to move forward with a series of regulations to accelerate the use of high-end drones for commercial activities like pipeline inspection and logistics. At the same time, the military continued to invest in drones, like the MQ-4C Triton, with ever more-advanced capabilities.

The committee members determined that Virginia had assets in both commercial space and UAS that could position it for leadership. This included one of four spaceports with FAA approval to launch into space, one of just six FAA UAS test sites, the NASA Wallops Flight Facility and the NASA Langley Research Center, the presence of every major aerospace company in the nation, proximity to the nation's capital, and several top-rated universities.

Despite these advantages, the committee found that a number of other states, particularly Florida in commercial space and North Dakota in UAS development and application, had outpaced the Commonwealth. Both states were more aggressive in pursuing these industries, demonstrated commitment at the highest levels of government, and had more flexible and compelling incentives to attract private investment. By contrast, the Virginia Economic Development Partnership had limited authority to negotiate with private companies and few incentives to offer them. In addition, it had pursued a regional economic development strategy that had proven to be unequal to the challenge of conveying the totality of Virginia's aerospace assets or of encouraging coordination among its regions.

The report included four recommendations that together provided a blueprint for further action:

- **Virginia must create** a senior, high-level aerospace economic development position with direct access to the governor and the authority to negotiate with aerospace companies considering investing in Virginia.
- **Virginia must commit** significant existing and new resources, including budget and tax incentives, to attract new aerospace investments to Virginia.
- **Virginia must support**, strengthen, and market its current aerospace assets, including its governmental, commercial, and academic assets.
- **Virginia must coordinate** its government, commercial, and academic institutions within the state to strengthen its economic development capability.



The Impact on Climate Change on Virginia's Coastal Areas (2021)

JCOTS ASKED VASEM to study the "safety, quality of life, and economic consequences of weather and climate-related events on coastal areas in Virginia." In response, VASEM convened an expert study committee, which operated virtually during the COVID pandemic.

After conducting its investigations, the committee found that climate change will have an increasingly disruptive effect on people living in Virginia's coastal areas during the 21st century—and that these disruptions will have repercussions across the Commonwealth. For Virginians living on the coast, the immediate consequences will be rising sea levels, more intense and frequent storms, and warmer and more variable local temperatures. These primary drivers translate into recurrent flooding, saltwater intrusion into drinking water, inundation of septic systems, and threats to public health, among other issues.

An important finding of the report was that the consequences of these changes will be very different for rural and urban areas. For instance, water-logged soils in flood-prone areas, an increase in soil salinity due to saltwater intrusion, more variable temperatures affecting seed germination, and an increase in agricultural pests and diseases will threaten the rural economy and culture. Significantly, rural coastal communities in Virginia lack the financial resources of urban regions to address these challenges.

In addition to detailing the current and projected effects of climate change, the committee provided an explanation of the physical forces driving climate change, offered perspectives that the Commonwealth's legislators might consider as they evaluate and act on these challenges, and offered recommendations that could help Virginia implement more productive and effective strategies to address them. These were:

- **Recommendation 1: Establish a Structure for More Effective Collaboration and Coordination.**
  The committee recommended that climate change initiatives across Virginia government should be headed by a statutorily created council modeled after the Council on Virginia's Future (2004–2017) and appropriately funded and staffed. Chaired by the governor, this organization of legislative leaders and citizen members would create a statewide strategic plan focusing all 11 secretariats and 93 agencies on a specific set of goals.
- **Recommendation 2: Address Gaps in Policy and Procedure**
  The committee recommended that Virginia establish and optimize a substantive budgetary policy and procedure for climate impact review as part of relevant state agency planning that (i) would provide equitable opportunity for all stakeholders, and (ii) would incorporate and facilitate feasible resilience strategies.
- **Recommendation 3: Create a Body to Coordinate and Support Critical Data Collection and Technology Transfer Across the Commonwealth**
  The committee recommended that the Commonwealth create, fund, and staff a Climate Change and Resilience Resource Center for Virginia. This entity would be charged with synthesizing research and development efforts for Virginia's climate response to maximize benefits for the state's citizens and promote collaboration.
- **Recommendation 4: Provide Meaningful Economic Innovation and Incentives to Build a Resilience Economy in Virginia**
  The committee recommended that the General Assembly provide incentives for businesses to develop innovative resilience-enhancing products, technologies, designs, and services, to partner with universities to capitalize on their expertise, and to foster workforce development in building and implementing resilience solutions.

Summits on Issues of Pressing Concern to the Commonwealth

VASEM regularly convenes stakeholders and experts to increase awareness of challenges facing the Commonwealth and steps being taken to address them.

Energy and Health (2013)

THE VIRGINIA ACADEMY'S inaugural summit featured presentations by some of the most eminent scientists, engineers, and physicians in the country. Sen. Mark Warner hosted the summit, and Ralph Cicerone, president of the National Academy of Sciences, introduced it. Mildred Dresselhaus, Emerita Institute Professor at MIT and winner of the prestigious Kavli Prize in Nanoscience, gave the keynote address on Materials as an Enabling Technology. The summit was attended by more than a third of VASEM's members.

During the sessions on the future of energy policy, Arun Majumdar, vice president for energy at Google, spoke on the future of sustainable energy, while Paul Alivisatos, director of the Lawrence Berkeley National Laboratory, discussed nanoscience and the future of the carbon cycle.

Francis Collins, director of the National Institutes of Health, kicked off afternoon sessions on creative solutions for biomedical science and informatics by rapidly sketching out the frontiers of biomedical research. He was followed by two distinguished academic leaders: Rita Colwell, a professor of public health at the University of Maryland, spoke on using bioinformatics to ensure safe drinking water, and William Snead, a professor of biomedical informatics and medicine at Vanderbilt University, highlighted the role of bioinformatics in closing the loop between discovery and healthcare.

Big Data (2014)

FACED WITH AN impending onslaught of data that had already reached unprecedented proportions, VASEM organized a summit on Big Data that attracted such authorities as Vint Cerf, co-inventor of the TCP/IP data packet interconnection suite that underlies Internet communication, Arati Prabhakar, director of the Defense Advanced Research Projects Agency (DARPA), and John Thompson, director of the U.S. Census Bureau.

This summit had a goal of developing the insight to better control the coming rivers of data for society's advantage.

One of the goals of this summit was to better understand the impact of this wave of data. The summit organizers imagined that ever-growing flows of data from every sector of society would bring great opportunities for scientific discovery, technological innovation, economic growth, and personal and public health. But they also acknowledged that data flows of this diversity and magnitude were new to humanity and carried with them potential downsides.

The summit featured special sessions on the projected effect of big data on technology and industry, social science and policy-making, and health and medicine—with a goal of developing the insight to better control the coming rivers of data for society's advantage. The summit concluded with a session that took a broad view, laying out the opportunities and challenges that big data posed for the citizens of the Commonwealth.

Vehicular Transportation & Unmanned Aerial Systems (2015)

THE 2015 VASEM summit was unique in covering two distinct but interrelated topics, vehicular transportation and unmanned aerial systems (UAS). During the morning transportation sessions, speakers discussed traffic congestion and zeroed in on the problem of unpredictable travel times that plague commuters in metropolitan areas. Speakers also examined the development of connected automated vehicles and the challenges to their widespread acceptance. This presentation, as well as the following one on transportation and safety, focused on the growing use of automated systems in automobiles. This section of the summit concluded with a discussion of the need to transition to sustainable fuels in order to minimize the effects of climate change and the timetable required for this transition to have meaningful effect.

The 2015 VASEM summit was unique in covering two distinct but interrelated topics.

In the UAS portion of the summit, speakers shared insights gained from creating a national UAS training and certification center at Sinclair College in Dayton, Ohio, an essential element of that state's efforts to establish itself as a hub for this emerging industry. Speakers also highlighted the vulnerability of UAS to hackers and the steps needed to protect them from cyber threats. And they reviewed the impact of federal regulations on the UAS industry and the effectiveness of incentives for UAS research and development.

Smart and Connected Health (2016)

THE IMPETUS FOR this summit was the recognition that healthcare in the United States was undergoing a profound transformation. Sweeping new healthcare legislation and the growing promise of personalized medicine paved the way for Virginia and the nation to do much more to improve quality of care and enhance the Triple Aim of better care, lower cost, and better outcomes for patients.

The summit explored a number of issues for policymakers such as the need to keep patient records secure as medical centers moved their data systems online and the challenges that Virginia entrepreneurs faced as they sought to transfer medical technology to the marketplace. The summit also highlighted the pace and range of healthcare research and development underway in Virginia. For instance, presenters spoke on their efforts to introduce 3-D printing of medical devices as needed in the International Space Station and inexpensive methods to create drugs on demand.

The use of smartphones for diagnostics and monitoring was another important focal point for the summit. Researchers gave talks on smartphone-based diagnostics for pediatric diseases and the role of smartphones in developing an artificial pancreas for diabetes patients. Automated healthcare monitoring, in some cases using smartphones, was the subject of several presentations, including one on the development of monitoring devices that produce more accurate readings because they more closely conform to the contours of the skin.

Emerging Infections and Preparedness (2017)

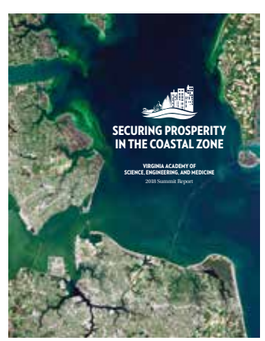
PERHAPS THE MOST prescient of VASEM's summits was our 2017 edition on Emerging Infections and Preparedness. The summit featured a number of voices who would play important roles in the public response to the COVID pandemic including Lindsey Marr, an authority on airborne pathogen transmission, Rick Bright, director of the U.S. Biomedical Advanced Research and Development Center, and Anthony Fauci, director of the National Institute of Allergy and Infectious Diseases at the U.S. National Institutes of Health.

Speakers highlighted such topics as the increasing frequency of wildlife- and vector-borne diseases as humans infringe on formerly uninhabited areas, the effects of climate change on the ranges of these vectors, and the rapid spread of disease worldwide along global transportation networks.

The Virginia Secretary of Health and Human Resources discussed the emergency response system the Commonwealth had established for containing emerging infectious disease. Highlighting an issue that would affect the U.S. response to COVID, he discussed the issue of vaccination refusal and the reemergence of diseases like measles that had been controlled when he was a medical student. While stressing that vaccination is critical for suppressing or eliminating deadly disease, he acknowledged that health officials have not been as effective as they could be in making the case to the public.

Securing Prosperity in the Coastal Zone (2018)

THE 2018 SUMMIT on Securing Prosperity in the Coastal Zone covered a broad range of interconnected issues that impact the prosperity of all Virginians. Virginia's Coastal Zone is extraordinarily important to the state's economy. The region around Hampton Roads is host to the world's largest Navy base, a bustling port, top-tier research universities, national labs, NASA facilities, and a fast-growing population and vibrant private sector. The Coastal Zone is also distinctive because it includes many of Virginia's oldest communities.



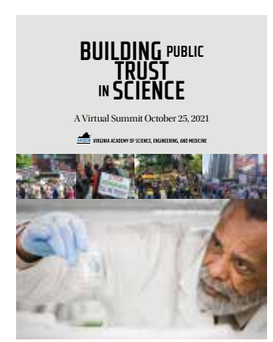
The summit presenters noted that changing climate is fueling sea-level rise, which is exacerbated by land subsidence in the Chesapeake Bay area. Climate change is also increasing the variability and intensity of weather. They forecast that the coastal zone would be subject to more routine flooding as well as more violent and damaging storms.

The projected increase in coastal population, they added, will only further intensify stresses on the region's water, power, and transportation infrastructure, much of which is aging, while putting pressure on its public health, healthcare, and education services

The summit concluded on an optimistic note, that given the magnitude of Virginia's Coastal Zone assets, sea-level rise brings with it myriad opportunities for innovation in engineering and planning as well as for constructive legislative and policymaking. The net result could be enhanced economic growth across multiple sectors and movement towards an adaptive and thus more resilient coastal community.

Building Public Trust in Science (2021)

VASEM 2021 SUMMIT was different from previous gatherings in a number of ways. Held during the COVID quarantine, it was our first virtual summit. Equally important, it was the first summit that focused on social and cultural issues rather than on scientific, technical, or medical ones. But our topic, Building Public Trust in Science, was one that VASEM felt could not be more timely and more important.



Less than a year after three lifesaving COVID vaccines were approved, polls showed that more than 20 percent of people in Virginia and the nation were refusing to get vaccinated, and a similar proportion of the population denied basic scientific principles. Given the many challenges the nation faces—from climate change to public health—it is clear that restoring that trust will be critical to the future.

The specific suggestions about restoring faith in science offered by our summit speakers were the result of hard-earned experience. Making connections with other people, they said, was paramount. Keynote speaker Sheril Kirschenbaum, for instance, highlighted the power of listening, noting that the simple act of hearing someone out creates a bond that will increase the likelihood that our audience will be more receptive to a scientific perspective. While conceding that some people will continue to question evidence-based conclusions, the summit speakers all emphasized the importance of persistence.

Securing the Future of Cyberspace (2022)

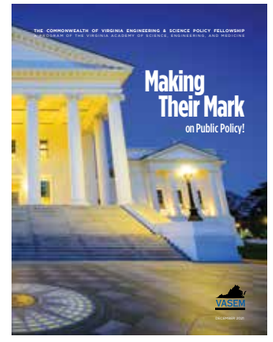
WITH BILLIONS OF interconnected devices online and billions more in the offing, the challenge of securing our home and business networks is more critical than ever. The more interconnected and extensive our computer networks become, the more vulnerable they are to cyberattack.

With this summit, the Virginia Academy teamed up with the Commonwealth Cyber Initiative to take a snapshot of measures that cybersecurity experts from academia, industry, and government are proposing to secure the future of our networks. We were honored that one of the founders of the Internet, Virginia Academy member Robert Kahn, agreed to deliver the keynote address. Kahn has developed a method called digital object architecture, which he believes can play an important role in securing the Internet.

Speakers approached the topic of cybersecurity from a range of viewpoints. They highlighted the need for all Internet users to have a fundamental idea of how the Internet functions so that they would understand the urgency of practicing basic Internet hygiene. They also put a spotlight on the Cybersecurity and Infrastructure Security Agency, which serves as both the nation's cyber defense organization and as the national coordinator for critical infrastructure resilience and security. Presenters also underscored the work the Federal Communications Commission is doing to safeguard U.S. communications networks and showcased its efforts to prohibit providers who use federal funds to offer advanced communications services from obtaining communications equipment or services from companies that pose a national security risk.

Policy Fellowship Program

Commonwealth of Virginia Engineering and Sciences (COVES)



VASEM HAS DEVELOPED this pioneering program to give graduate students from technical fields hands-on experience using their talents to shape public policy.

The challenges leaders face today—in such areas as health, climate, and security—are unprecedented in their scope, complexity, and urgency. All too often, however, decision-makers lack access to the accurate and impartial scientific and technical information needed to act decisively and wisely. The obstacle: a critical shortage of scientists and engineers with the necessary training to be effective policy advisors.

VASEM created the Commonwealth of Virginia Engineering and Science (COVES) Policy Fellowship program to help bridge that gap. Although many young scientists and engineers are eager to take a more active role in policymaking, the opportunities to gain the skills and experience to make meaningful contributions are limited during their graduate careers. Thanks to the fellowship, they now have that opportunity.

The COVES Policy Fellowship program enables young researchers to spend 12 weeks during the summer months serving as science and technology advisors in legislative offices and executive agencies as well as in prominent Virginia companies and nonprofits.

A Compelling Opportunity

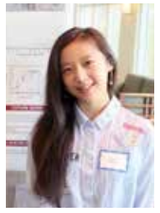
The fellowship program has been carefully designed to ensure that both fellows and host offices gain maximum benefit from the experience. It is modeled after successful programs developed by such organizations as the National Academies of Sciences, Engineering, and Medicine and the American Association for the Advancement of Science:

- **Fellows are current** graduate students from universities across the Commonwealth and are selected based on career interests, desire to learn about public policy, and scientific integrity.
- **They are matched** with offices involved in policy decisions based on mutual interests and the offices' need for assistance researching policy proposals, drafting policy documents, or organizing policy meetings and events.
- **The program begins** with a science policy bootcamp and orientation, which introduces fellows to the fundamentals of science policy and communication as well as governance and policymaking in the Commonwealth of Virginia.
- **In addition to** their work in policy offices, COVES fellows are paired with a mentor from the Virginia Academy and participate in academy briefings, committee meetings, and an annual summit.
- **Fellows receive a** summer stipend.









Sponsors and Hosts

George Mason University, Old Dominion University, Virginia Commonwealth University, Virginia State University, Virginia Tech, University of Virginia, and William & Mary currently support fellows. In addition, the Chan Zuckerberg Initiative, the MITRE Corporation, and Huntington Ingalls have supported students from Virginia's historically black colleges and universities—including Virginia State University and Norfolk State University—as well as other minority fellows.

Host offices have been so impressed by the caliber of our fellows that they have continued working with many of them after they completed the 12-week program, and several host offices have extended full-time offers to them. In collaboration with their host offices, fellows have published blog posts, science policy documents, and reports highlighting challenges facing the Commonwealth.

Changing Lives

The goal of the COVES program is to acquaint graduate students in science and technology with the process of policymaking and to enable them to explore career options in this area. In many cases, the COVES experience has confirmed their existing interest or encouraged them to shift career goals.

Of our first two cohorts, more than a third are now pursuing careers in policy. They include:

Janey Dike, doctoral student in clinical psychology at Virginia Tech and research policy intern with the Louisiana Policy Institute for Children.

Chelsea Gray, doctoral student in environmental science and policy at George Mason University.

Tara Illgner, program analyst and specialist in energy policy at Leonardo Technologies, Inc.

Nikita Lad, doctoral student in environmental science and policy at George Mason University.

The COVES Policy Fellowship program has already improved the capacity of institutions throughout Virginia to make policy. Fellows have served at the following organizations:

- Department of Behavioral Health and Developmental Services
- Department of Conservation and Recreation
- Department of Environmental Quality
- Department of Forestry
- Department of Health
- Department of Transportation
- Dominion Energy, Public Policy Department
- Joint Commission on Technology and Science
- Office of the Secretary of Education
- Office of the Secretary of Natural Resources
- Office of Delegate Rodney Willett
- Office of Delegate Sally Hudson
- Office of Senator Ghazala Hashmi
- Office of Senator Jennifer McClellan
- Senate Finance and Appropriations Committee
- State Council of Higher Education for Virginia
- The Port of Virginia
- Virginia Biotechnology Association
- Virginia Board for People with Disabilities
- Virginia Innovation Partnership Authority
- Virginia Marine Resources Commission

Identifying Key Strategies for Growth

VASEM periodically convenes experts who examine emerging trends and technologies, pinpointing opportunities for Virginia to take a leading role.

Positioning Virginia for Leadership in Areas of Critical National Challenge

CYBERSECURITY, CLIMATE CHANGE, pandemic disease, crumbling infrastructure, healthcare disparities, workforce development, supply chain vulnerability—these were just some of the complex and urgent challenges facing the United States and the Commonwealth in 2021. Seen in another light, they represented an opportunity for the state. If the Commonwealth could identify differentiating strengths to enable it to help solve one or more of these issues, it could create a path to sustained economic growth.

Accordingly, JCOTS asked VASEM to identify broad areas where Virginia has the resources, expertise, and critical infrastructure to address these challenges in uniquely powerful ways and to set aspirational goals that would help the state mobilize these resources.

In response, the Virginia Academy assembled an expert panel that examined trends in technology, cataloged the strengths that help differentiate Virginia from other states, and suggested how these resources might be focused on problems of national significance. It identified five areas for deeper study where Virginia has a critical mass of assets that could position the Commonwealth to leverage emerging technologies and assume leadership in critical sectors that are likely to define our future. These five areas are:

Reliable Sustainable Energy

The Commonwealth has the assets to create a national model of how two complementary noncarbon energy sources—offshore wind (a variable generating source) and nuclear power (a constant energy source)—could be combined with long-duration energy storage to provide reliable sustainable energy.

Supply Chain System Security

Some of the largest employers in the Commonwealth have complex supply chains that make them tempting targets of attack. To avoid economic disruption, the Commonwealth must have more resilient, diverse, and, most of all, secure supply chains. While Virginia has many of the assets needed to secure our supply chain, the experts advocated for the state to develop a mechanism to encourage cooperation and coordination among these disparate entities.

Semiconductors

Virginia has a number of distinct advantages that can place it at the forefront of efforts to secure the U.S. semiconductor supply chains and energize semiconductor research and development. These include expertise in memory and storage, a well-established infrastructure of public and private organizations supporting semiconductor innovation and economic development, world-class universities conducting semiconductor research, and proximity to the leading semiconductor manufacturers in the United States.

Healthcare Disparities

The major challenges facing the U.S. healthcare system are lack of access for underserved populations, difficulty maximizing the value of existing healthcare data to provide better care, and the inability to mount a rapid response to emerging healthcare crises. Virginia has the assets to develop the technological infrastructure crucial to addressing these issues.

Smart Cities

Smart technology can enable communities to use resources more efficiently, improve quality of life for residents, and better anticipate future needs. Virginia's smart cities infrastructure ranges from an ecosystem of public-private partnerships to a Smart Cities testbed. The expert panel found that developing a mechanism that would enable Virginia to scale and better coordinate these activities, delivering meaningful smart community services while laying the foundation for further innovation, deserves immediate study.

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