

Marshall University iCenter
launches inaugural gBETA
accelerator cohort to fuel statewide
innovation

West Virginia State University to offer
bachelor's degree in cybersecurity

Fairmont State University selected
to host 2026 ASCE Civil Engineering
Student Championships

NEURON

Volume 21 Issue 1

Science, Technology & Research in West Virginia

RESEARCH CHALLENGE GRANTS

Playing the Long Game

*Funding scientific research is an investment in the future, one
that elevates local communities and boosts potential outcomes*

NEURON

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ABOUT

STaR Division: Science, Technology & Research at the West Virginia Higher Education Policy Commission provides strategic leadership for the development of competitive academic research opportunities in science, technology, engineering and mathematics (STEM).

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FROM THE SENIOR DIRECTOR

The Strategic Importance of Research Investment in West Virginia

It is my privilege to highlight the pivotal role research investment plays in shaping our state's future.

Since its founding, the Research Challenge Fund (RCF) has stood as a cornerstone for innovation and scientific advancement within our state. Competitive Research Challenge Grants (RCG) have empowered our colleges, universities, and research institutions to pursue bold projects addressing pressing needs—spanning health sciences, energy, advanced manufacturing, and technology. Through these grants, West Virginia has cultivated a thriving ecosystem of discovery and progress.

None of this would be possible without the support of the West Virginia State Legislature. Sincere appreciation is extended to the state's lawmakers for their continued commitment to research and ongoing support of the RCF. Their vision and leadership have been instrumental in enabling these remarkable achievements.

With the foundational backing of the RCF, our scholars are positioned to secure substantial follow-on funding from federal agencies and private industry, amplifying the impact of every state dollar. This not only draws new resources into West Virginia

but also enhances our state's reputation as a center for innovation and scientific excellence.

Further, the outcomes of these investments are visible in the growing number of scholarly publications, innovative patents, and discoveries emerging from West Virginia's research community. These

successes contribute to the broader academic and economic landscape and spark the creation of new technologies, businesses, and solutions with benefits that extend throughout the state.

Perhaps most importantly, investing in research directly supports workforce development—a critical priority for our state's sustained success. RCGs attract and retain talented faculty, students, and research professionals, preparing them for high-skill careers that will drive West Virginia's economy forward. The experience gained through this work equips graduates with the knowledge and expertise demanded by employers now and in the future.

Sincerely,

Dr. Janet Rorrer

Senior Director of Science & Research,
WV Higher Education Policy Commission



Rorrer

News briefings

Fairmont State University selected to host 2026 ASCE Civil Engineering Student Championships

The American Society of Civil Engineers (ASCE) has selected Fairmont State University to host the 2026 Civil Engineering Student Championships, marking the first time this prestigious international competition will be held in West Virginia. The multi-day championship is expected to draw hundreds of students, faculty, judges, and spectators to campus, offering a unique opportunity for engagement and visibility.

“Hosting the ASCE Civil Engineering Student Championships is a tremendous honor and a testament to Fairmont State’s strong academic program, dedicated faculty, and talented students,” said President Dr. Mike Davis. “It also highlights our vibrant campus and top-notch facilities. This global event will put our University and West Virginia on the map in a powerful way—highlighting our commitment to innovation, hands-on learning, and shaping the next generation of engineers.”

The 2026 competition will welcome student teams from around the globe to compete in cornerstone events such as the Concrete Canoe, Surveying, and Sustainable Solutions competitions.

West Virginia State University to offer bachelor’s degree in cybersecurity

West Virginia State University has received final approval to offer a four-year bachelor’s degree in cybersecurity, expanding its academic offerings in one of the nation’s fastest-growing fields.

Previously, cybersecurity has been offered as a minor within the computer science department.

“Today marks a historic milestone for West Virginia State University as we have secured all approvals to launch a four-year degree in the vital and rapidly expanding field of cybersecurity,” said WVSU President Ericke S. Cage. “The demand for highly skilled cybersecurity professionals has never been greater, and this program positions our students to not only meet that demand but to lead in protecting the digital infrastructure that drives our economy and safeguards our future.”

The cybersecurity program at WVSU has been in a period of tremendous growth in recent years.

Last spring, the university opened the WVSU Cybersecurity Clinic, which was made possible in part with \$1 million in grant funding and wraparound support from Google’s Cybersecurity Clinics Fund. The clinic, the first of its kind in West Virginia, trained 18 students and provided free cybersecurity assessments to 27 organizations.

The WVSU Cybersecurity Clinic followed the establishment of the WVSU Cybersecurity Innovation

Center (CIC) in 2023. The center was made possible in part by a \$764,792 grant from the Kanawha County Commission. The United States Department of Education also contributed \$2.5 million to the establishment of the center to work in collaboration with Marshall University on cybersecurity for critical infrastructure.

“The Cybersecurity Innovation Center at WVSU also provides free cybersecurity evaluations for small businesses, non-profit organizations, and critical infrastructure,” said Dr. Ali Al-Sinayyid, director of the WVSU Cybersecurity Innovation Center. “In the spring of 2025 alone, the CIC delivered these services to 27 local organizations across West Virginia, providing our students with valuable real world experience, while also supporting the needs of the local business community.”

The CIC features a state-of-the-art learning laboratory, providing an immersive and hands-on experience for students in defending critical public infrastructure. Students in the cybersecurity program gain valuable practical skills that prepare them to address real-world challenges in the field of cybersecurity.

In addition to its general cybersecurity program, WVSU is the only university in West Virginia to offer an Agricultural Cybersecurity option, joining a select group of institutions nationwide that prepare a workforce to protect this critical sector of the economy.

News briefings

Marshall University iCenter launches inaugural gBETA accelerator cohort to fuel statewide innovation

The Marshall University Center for Innovation and Entrepreneurship (iCenter) is proud to announce the launch of its first gBETA accelerator cohort, in partnership with nationally recognized venture capital firm gener8tor. Five dynamic startups were chosen for the inaugural cohort: FarmerzTool Technology, get2there, Monarch Learning Labs, Quest R&D and Stitch AI. The group has been selected to participate in the program, representing key industries including agriculture, digital infrastructure, medtech, advanced manufacturing, and artificial intelligence.

Hosted at Marshall’s iCenter, the gBETA accelerator is a no-cost, seven-week program designed to help early-stage startups refine their business models, gain customer traction and prepare for future investment. Participants benefit from one-on-one coaching and direct access to gener8tor’s national network of experienced mentors, investors, and corporate partners.

“At Marshall, we believe in the power of people with big ideas and we’re proud to be a launchpad for entrepreneurs who are shaping the future of our state’s economy,” said Tricia Ball, executive director of the iCenter. “This cohort represents the purpose-driven founders

and innovative ideas we aim to cultivate in West Virginia, and gener8tor has been an incredible partner, providing them with the relationships and resources they need to accelerate their success.”

Selected from a competitive applicant pool across West Virginia, the cohort reflects the growing strength of local innovation and its potential to scale nationally.

“Our mission at gener8tor is to be the best partner for a community to invest in its best and brightest,” said Eddie Olson, senior managing director at gener8tor. “Through this partnership with Marshall University, we’re doing just that—supporting founders whose ingenuity, drive, and entrepreneurial spirit shine in West Virginia and other overlooked regions across the country.

This future-focused program is made possible by the generous support of Huntington Bank, a steadfast supporter of small businesses and regional growth.

“At Huntington, we know that small businesses are drivers of innovation, job creation and opportunities in every community throughout West Virginia,” said Chad Prather, regional president for Huntington Bank in West Virginia. “We’re proud to support this program because it aligns with our purpose: making people’s lives better, helping businesses thrive, and strengthening the communities we serve.”

The Summer 2025 cohort

concluded with a public showcase event on Thursday, August 7 at the Brad D. Smith Center for Business and Innovation, where each startup pitched their company to investors, business leaders, and community stakeholders.

WVU researchers train AI to diagnose heart failure in rural patients using low-tech electrocardiograms

Concerned about the ability of artificial intelligence models trained on data from urban demographics to make the right medical diagnoses for rural populations, West Virginia University computer scientists have developed several AI models that can identify signs of heart failure in patients from Appalachia.

Prashna Gyawali, assistant professor in the Lane Department of Computer Science and Electrical Engineering, said heart failure is one of the most pressing national and global health issues, and one that hits rural regions of the U.S. especially hard.

The researchers found deep-learning models did best at correctly predicting a patient’s ejection fraction based on data from 12-lead electrocardiograms, with the results suggesting that a larger dataset for training would yield even better results.

Research Challenge Fund

Established by the State Legislature in 2004 to support research and development projects at institutions of higher education in West Virginia



STaR sponsors Undergraduate Research Day at the Capitol

Undergraduate Research Day at the Capitol (URDC) took place on Tuesday, March 25 at the West Virginia State Capitol Complex in Charleston. URDC happens annually during the legislative session to provide further opportunities for lawmakers to have direct conversations with student researchers about how their funding is used and why it is important. This year's event featured 120 presentations from seven institutions with approximately 160 presenters in attendance. Topics included, but were not limited to: agriculture, biology, chemistry, computer science, engineering, mathematics, neuroscience, physics, and more. The luncheon keynote was given by Seth Cressy, global analytical quality manager at Chemours.



Opportunity Grants help fill funding gaps for statewide STEM projects

The Opportunity Grants & Sponsorships Program, funded by the Research Challenge Fund, supported multiple local organizations and schools this year.

Two new and notable events were support for the Spruce Knob STEM and Kite Festival and a sponsorship to WV Alliance for STEM & the Arts to host statewide screenings of Small Town Universe, a film highlighting the Green Bank Telescope. Other projects included: BridgeValley Vex Robotics Program and the 2025 Marshall University Research & Creativity Symposium.

The current round of Opportunity Grants and Sponsorships opened on July 1 with funding available until June 30, 2026 or otherwise exhausted. For more information on applying, please visit wvresearch.org.



Undergraduate research continued statewide this summer

Summer Undergraduate Research Experiences (SURE) were held on campuses statewide from June to August.

Students gained experiential learning through academic research. Participating institutions included: Fairmont State University, Marshall University, Shepherd University, West Liberty University, West Virginia State University, West Virginia University, West Virginia University Institute of Technology, and West Virginia Wesleyan College. Students interested in summer 2026 SURE programs should see their institution's faculty representative.

NSF EPSCoR

**National Science Foundation
Established Program to Stimulate
Competitive Research**

A program that enhances research competitiveness of targeted jurisdictions (states, territories, and a commonwealth) by strengthening STEM capacity and capability through a portfolio of investments from talent development to local infrastructure



Grant No. OIA-2242771



New hire and staff promotion at Higher Education Policy Commission's STaR

Dr. Quinn A. Clark is the new Associate Director of Science, Technology, and Research at the WV Higher Education Policy Commission. Previously, Quinn was a Program Director at the National Science Foundation's Office of International Science and Engineering where he worked on the agency's India and Singapore portfolios. He was also the MA Director at Columbia University's South Asia Institute. Quinn received his PhD at Columbia University, MA at the University of Washington-Seattle, and his undergraduate training at Butler University. He also served as a Peace Corps volunteer in Mali and a Fulbright Fellow in India.

Dr. Janet Rorrer was recently promoted to Senior Director of Science, Technology and Research (STaR) at the West Virginia Higher Education Policy Commission. She had served as Associate Director since 2023. Rorrer joined STaR with over 25 years of higher education experience.



Marshall University hires Kathman

Dr. Nick Kathman uses insects to study how circuits in the brain allow animals to navigate the complex environments they live in. He earned his bachelor's degree in zoology from Miami University and completed his Ph.D. in neuroscience at Case Western Reserve University, where he first began studying the navigation circuits of the insect brain. In his new program at Marshall University, Dr. Kathman will integrate the circuit dissection tools used in the fruit fly with freely-moving recording techniques in the cockroach to study these newly discovered circuits during free-walking and uncover the complex decision making used during truly natural behavior.



All Hands Meeting took place in July

The WV Network for Functional Neuroscience and Transcriptomics (WV-NFNT) held its annual All Hands Meeting Friday, July 18 at West Virginia University. Approximately 70 participants attended, including project leadership and students. A poster presentation was available in the Health Sciences Center lobby. This meeting allowed for in-person networking and collaboration between project participants.

Industry Advisory Board meets for the first time

The Industry Advisory Board (IAB) met for the first time on April 16, 2025. This meeting with WV-NFNT leadership focused on introducing students to careers in industry and preparing them for success. Internship opportunities and the sharing of them will be a focus in the coming months with assistance from Dr. Qing Wang at Shepherd University. IAB members include: Michael Seminerio, AbbVie (Drug Development); Bryan Labombard, CODENINJAS (Software coding and robotics for kids); John Efromson, Ramona Optics (Live imaging, machine learning, and parallel microscopy); Victoria Brun, Frederick National Laboratory for Cancer Research (Writer and Project Manager); Maggie Scully, Frederick National Laboratory for Cancer Research (Partnership and Development Office).



The Bug Chicks delight enthusiasts in Charleston

The Bug Chicks - Kristie Reddick & Jessica Honaker - presented to a crowd of approximately 100 guests at the Charleston Coliseum & Convention Center Little Theater on Wednesday, April 30 at 6 p.m. Their interactive talk explored the world of insects and spiders, even featuring live arthropods. Honaker and Reddick are entomologists and award-winning educators who specialize in connecting STEM and social-emotional learning, using bugs as a tool to help people foster empathy for themselves, others and the natural world. The STEM Speaker Series has been offering free scientific presentations to the public since 2014.

NSF INCLUDES

A comprehensive national initiative to enhance U.S. leadership in science, technology, engineering and mathematics (STEM) discoveries and innovations focused on NSF's commitment to broadening participation



Grant No. HRD-1834586

First2 Network welcomes new chapter

As the First2 Network looks to the future, the Network is thrilled to announce that High Rocks has received a no cost extension from the National Science Foundation. These funds are allocated to support institutional teams to continue performing inquiry based work as well as initiating new system change questions.

Funding will be focused on supporting student leadership and engagement in activities and programs, as well as sustainability and dissemination of materials, such as multi-institutional publications. Nine institutions across two states are currently engaged with First2 with multiple pathways to continue to collaborate with the network.

Several First2 Network members, including the West Virginia Higher Education Policy Commission (the Commission), will be ending their time with the network as their grant cycles have concluded. In addition to the Commission, three more institutions will be ending their grant funding cycles: Fairmont State University, Green Bank Observatory, and West Virginia University. First2 has been honored to engage and support West Virginia and continues to look forward to opportunities with institutions, industry, and other partners throughout the state.



Above (left to right): First2 Network Student Leaders from Marshall University Erica Edinger, Neha Chandrasekar, and Nevaeh Ellington

Successful co-conference brings higher education students and faculty together with workforce development leaders

The First2 Network and the Appalachian Regional Commission-funded WV Jobs Network held a dynamic and collaborative spring co-conference: "Aligning Colleges, Communities, and Employers to Transform Education and Workforce Development" on May 15–17. This gathering brought together students, job seekers, faculty, administrators, workforce trainees, employers, and industry leaders to spark learning, collaboration, and systems change.

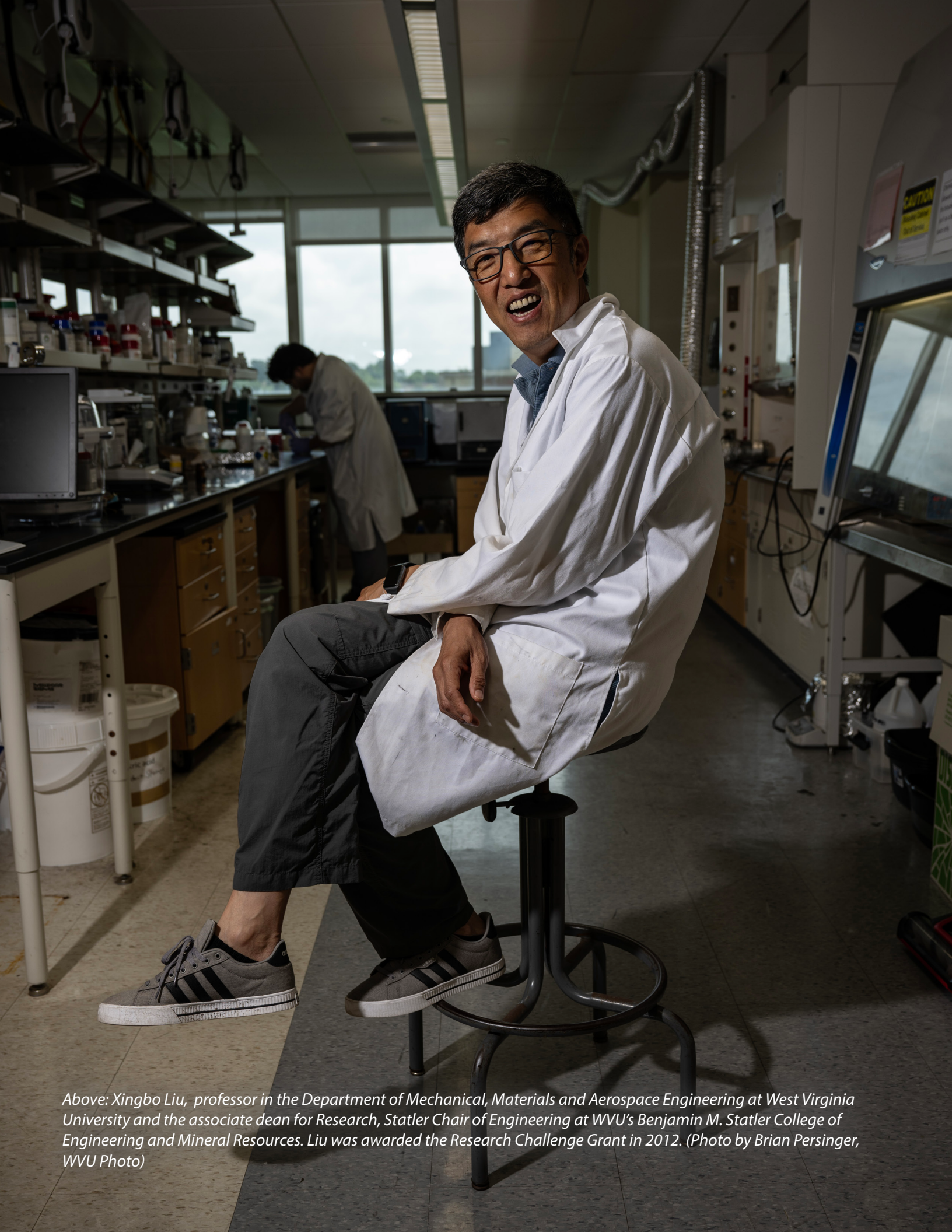
The First2 Network Spring Conference focused on opportunities in West Virginia and exploration and support of the skills needed to be successful in moving forward. It is also a key event that allows higher learning institutions to come together and discuss successes and struggles in pedagogical work. For the last two years, this effort was a collaborative effort with the WV Jobs Network. This has allowed for an opportunity to enhance the skills and support the pathways that connect education and training. This also works to connect the pathways to employers and careers, particularly in the state of West Virginia, and provides real time workforce status updates. It brings together a wide range of individuals passionate about West Virginia and Appalachia discussing and learning about improving STEM education, opportunities, and jobs.

Presenters and participants engaged with new research, shared real-world stories, and collaborated on

strategies to build sustainable networks of support. From interactive data walks, hands-on workshops, institutional sharing, and inspiring panels including varied and authentic voices, the co-conference facilitated a variety of spaces for cross-sector brainstorming, networking, and collaboration.

A few major themes within the workshops arose. Sense of belonging was a core theme to improve recruitment, retention, and learning/performance. For example, there were large innovative projects such as WVU's "You Belong in STEM" video initiative. In discussing experiences of first-generation individuals, the theme of 'grit, gumption, and grace' and the idea of the different types of resiliency that individuals experience and accumulate. Whether discussing barriers to undergraduate research, analyzing statewide education data, or exploring new approaches to employer-educator alignment, the sessions created a rich opportunity for continued learning, partnership, and impact across West Virginia and beyond.

As First2 Network looks out towards its future, the goal is to focus efforts on the student population. Several campuses have submitted research project proposals, and the Network continues to pursue funding to support faculty and students. The future for First2 always looks bright as it is student centered and student driven.



Above: Xingbo Liu, professor in the Department of Mechanical, Materials and Aerospace Engineering at West Virginia University and the associate dean for Research, Statler Chair of Engineering at WVU's Benjamin M. Statler College of Engineering and Mineral Resources. Liu was awarded the Research Challenge Grant in 2012. (Photo by Brian Persinger, WVU Photo)

Playing the Long Game

Funding scientific research is an investment in the future, one that elevates local communities and boosts potential outcomes

By Angela Sundstrom

Research funding is a hot topic these days. Much has been said about the recent reductions and freezes and the effects on scientists. With federal funding questionable for the foreseeable future, researchers will be looking for new sources to continue their work. The responsibility for filling that hole will likely fall to industry and non-profits, but the most unlikely source—state governments—could be a wildcard.

State research funding varies wildly nationwide. New York, California, Texas and others with significant populations have more tax dollars to draw from while smaller states, like West Virginia, must make tough decisions with far less money to go around. There is room for creativity, though. In North Carolina, the General Assembly created a research funding agency called the North Carolina Collaboratory that partners with academic institutions and government entities to transform research into practical information and technologies for use by government to boost local communities. In short, using state tax dollars to solve problems through research. So far, this has happened to the tune of nearly \$225 million working to solve everyday problems affecting North Carolina residents from opioid addiction to flooding. West Virginia does not currently have a similar state-funded project. What the state does have, and has had for years, is the Research Challenge Fund.

RCG History

West Virginia currently has a limited number of sources for funding basic research at higher education institutions but limited does not mean zero. One of the longest running programs offering opportunities to researchers statewide is the Research Challenge Fund (RCF).

The RCF was created in the early 2000s to help colleges and universities fill gaps missed by federal funding. This includes purchasing necessary scientific equipment, recruiting more PhD students, and funding summer undergraduate student research.

The most prestigious grant available through the RCF is the Research Challenge Grant (RCG).

"The purpose of the RCG is to provide support for lasting improvements in institutional research capacity, to build toward economic development, and to increase West Virginia's ability to compete for federal funding," said **Dr. Janet Rorrer**, senior director of science and research at the West Virginia Higher Education Policy Commission. "RCG proposals must describe the strategy and implementation mechanisms to develop and sustain the scientific focus of the proposal and create potential for economic development. Most importantly, the strategy must identify implementation mechanisms that have a high probability of realizing stated goals and objectives."

Since the program's 2002 inception until the conclusion of the most recent grant cycle in 2023, approximately \$24 million in state funding has been awarded to researchers studying a variety of subjects. The follow-on funding, or money earned from new sources like federal grants or venture capital after an initial investment by the state, is considerably higher at approximately \$154.1 million.

Success Stories

When agencies award researchers, especially at the state level, the hope is that those individuals and teams will put down roots. Researchers are problem solvers and every state has problems to solve. With the RCGs, many previous awardees are still working in West Virginia, primarily at Marshall University and West Virginia University.

Dr. Xingbo Liu is one such awardee. Liu was awarded the RCG in 2012 with funding concluding in 2017. He is currently a professor in the Department of Mechanical, Materials and Aerospace Engineering at West Virginia University as well as the associate dean for Research, Statler Chair of Engineering at WVU's Benjamin M. Statler College of Engineering and Mineral Resources. However, at the time he received his RCG, he was a newly minted associate professor

Michael Norton
Marshall University

2002: Awarded RCG for DNA Sensor Infrastructure Development

Today: Norton was a Chemistry Professor at Marshall University in the College of Science for decades. He founded Vandalia Research during his RCG, a biotechnology custom manufacturing organization specializing in the large scale production of DNA sequences. Vandalia Research was acquired by Applied DNA Sciences for \$1.5 million in 2015. Near the end of his RCG cycle, Norton began discussions on Parabon NanoLabs, a company he co-founded with the mission to create breakthrough products using DNA. Several patents have been awarded to Parabon NanoLabs over the years. Norton officially retired from Marshall in 2025.

Eric Blough & Philippe Georgel
Marshall University

2007: Awarded RCG for Development of a Cell Differentiation and Development Center focused on the epigenetic mechanisms underlying cell differentiation and development and the diseases that result from failure of these mechanisms, especially cancer and cardiovascular disease.

Today: Blough currently serves as dean for the Marshall University School of Pharmacy. Blough and his colleagues have received approximately \$13 million in research awards since 1998 and published over 300 scientific manuscripts, technical reports and abstracts – all while maintaining a strong focus on student development and mentoring in his teaching. In 2017 and 2018, he was a finalist for the WV Professor of the Year Award. Georgel, a professor of biological sciences, has been with Marshall University since 2002 and currently serves as senior director of the Office of Student Research. Georgel and his collaborators have secured nearly \$4 million in research and infrastructure funding and, since 1992, have published over 100 manuscripts, book chapters, and abstracts.

Duncan Lorimer & Maura McLaughlin
West Virginia University

2007: Awarded RCG for Creation of a world-class Center for Astrophysics at West Virginia University in partnership with the National Radio Astronomy Observatory in Green Bank.

Today: McLaughlin is the Chair and Eberly Family Distinguished Professor of Physics and Astronomy at West Virginia University. Her focuses include the Pulsar Search Collaboratory at the Green Bank Telescope and The North American Nanohertz Observatory for Gravitational Waves (NANOGrav). Lorimer is the Eberly Distinguished Chair for Academic Excellence and Professor of Physics and Astronomy at West Virginia University, with research interest in fast radio bursts (FRBs). FRBs were discovered by an undergraduate student working with McLaughlin and Lorimer during their RCG award. Lorimer has held multiple administration positions, including associate Dean for Research of WVU Eberly College of Arts and Sciences from 2019-2024. Both McLaughlin and Lorimer have numerous professional awards and distinctions, including co-recipients of The Shaw Prize in Astronomy in 2023 for their roles in the discovery of FRBs.

Xingbo Liu
West Virginia University

2012: Awarded RCG for WVU Center for Electrochemical Energy Storage to conduct fundamental and applied research leading to devices for storing electricity in amounts ranging from kilowatts for smaller-scale applications to megawatts serving power generation stations.

Today: Liu's work focuses on high-temperature materials, including solid oxide electrochemical cells, high-temperature alloys and protective coatings. He was recognized by the U.S. Department of Energy with the Hydrogen Production Technology Award in 2023 for his contributions to developing durable and efficient solid oxide electrolysis cells. Liu has served as a professor since 2014, and was appointed Statler Endowed Chair of Engineering in 2018. He is also a fellow of ASM International, American Ceramic Society, and The Electrochemical Society.

Heath Damron
West Virginia University

2017: Awarded RCG for the Foundation of the Vaccine Development Center (VDC) at WVU.

Today: Damron still leads the Vaccine Development Center at WVU while serving as associate professor and director of the MD-PhD Program, Research & Graduate Education.

Jianli (John) Hu
West Virginia University

2017: Awarded RCG for Advancement of Science and Engineering for Localized Gas Utilization at WVU.

Today: Hu is the Statler Chair in Engineering for Natural Gas Utilization and director of the Center for Innovation in Gas Utilization and Research (CIGRU).

\$154.1 million

approximate follow-on funding amount of RCG projects since 2002

looking to build his research portfolio. “The RCG was the biggest award I got at that time,” Liu said. “I was only an associate professor for several months. It was exciting! It certainly helped me in my career development. Also, it helped WVU develop in this research area.”

Liu earned his bachelor’s, masters, and doctorate degrees in materials science from the University of Science & Technology in Beijing, China. He followed his mentor to the United States in 2000, taking a job at West Virginia University where he started as a postdoctoral researcher in the Statler College before joining as a faculty member two years later. Liu has been building a name for himself in Morgantown ever since.

An expert on materials science, most of Liu’s research focuses on material energy application. The NSF describes materials science and engineering as exploring the basic structure, properties and behavior of materials—down

to the molecular, atomic and even subatomic levels—to create goods that benefit society. Researchers in this field study a broad array of materials, ranging from the familiar, like silicon, glass, concrete, metals and plastics, to the exotic, like biomaterials and wholly new ‘designer materials’ that are configured one atomic layer at a time.

Liu’s RCG proposal suggested the creation of the WVU Center for Electrochemical Energy Storage to research a rechargeable battery for utility scale storage and related electrochemical technologies. Though the Center did not formally continue, the work proposed has blossomed. Liu and his team earned millions in follow on funding, particularly from the U.S. Department of Energy (DOE). They also broadened their research into a robust program on lithium-sulfur battery technology for consumer electronics and transportation as well as solid oxide fuel cell technology for electricity generation. Just this year, they designed and successfully tested a fuel cell that can switch

between storing or making electricity and also generate hydrogen from water. The results appear in a Nature Energy paper led by Hanchen Tian, a WVU doctoral student and postdoctoral researcher at the time of the study, and Wei Li, then a WVU research assistant professor. This technology received the DOE Hydrogen Production technology Award in 2023. The team has also filed two patent applications and received another \$4.5 million from the DOE in 2024 to further develop the technology.

Liu is quick to emphasize he did not do all this alone. “The Research Challenge Grant supports research, but beyond that, it is supporting a group of faculty to work together, to grow, not only in that research area, but also related areas.”

“States like California, we don’t have everything they do—but we can compete.”

- Xingbo Liu

Liu highlights the importances of partnerships in his work, both past and present. He believes such relationships are the key to progress, whether in research or otherwise. Many that he initially collaborated with on the RCG still work together in WVU’s Advanced Energy Materials Research Group.

“We don’t have to do everything by ourselves,” Liu said. “Almost 100 percent of my projects have partnerships. That kind of thing not only helps us grow research, but also our students because when they do their research, they are not just in my lab. They are working with partners, sometimes during summer internships. They go there and that opens their eyes and prepares them for their future. This partnership is not just research dollars, but research dollars for good use.”

Liu became a full professor at WVU in 2014 and was appointed Statler Endowed Chair of Engineering in 2018. He served as the associate chair for research in his department from 2012 to 2019. He is also a fellow of ASM International, the American Ceramic Society and The Electrochemical Society. In 2025, Liu and his colleagues received the R&D 100 award, known as the “Oscars of Innovation,” for the development of SAM-J, which will enable industries from energy to aerospace to use 3D printing to weld together metals to ensure the joints can withstand extreme stress. Patents have been received in the United States and the European Union with others pending

in China, Japan, and South Korea. The technology has been licensed to GE Vernova.

Worthwhile Investments

It can be difficult to quantify the benefits of research funding. Many projects are abstract to the everyday person with it taking years to produce significant results. But just because something seems a distant problem does not mean it is not worth investigating now.

Early career researchers often struggle to gain their footing, especially when it comes to funding projects. “When you are junior faculty, you are competing with people like me now, 20 years later, right?” Liu said. “They have the names and more established credentials. It’s hard for junior faculty because you are just getting started.”

Investing in researchers means investing in both local education and the state economy. Students benefit from research. It supplements their classroom studies and often introduces them to new interests and opportunities.

“The future of research, of educational research, is not the classroom,” Liu said. “It’s experiential learning. I always tell my own people here: research and education. It’s not research versus education.”

Research also leads to new discoveries in industry. Liu and his team partner with companies such as Hope Gas in Morgantown and Special Metals in Huntington, among many others. Most of these jobs require an educated workforce, from associate to doctoral degrees.

Liu hopes that everyone can see the value of investing in state-funded programs like the Research Challenge Grant, especially in small states like West Virginia.

“I certainly hope state government can realize the return on investment,” Liu said. “They have all kinds of priorities, but, to us, things like the Research Challenge Grant are extremely important for growth in research enterprise and to improve people’s lives. The Research Challenge Grant can improve our human resources, develop new technologies, and create new opportunities. That cannot be easily quantified. States like California, we don’t have everything they do—but we can compete.”

Current Research Challenge Grant Awardees
The three current RCG projects funded from 2023-2028



Cosmin Dumitrescu

Professor - Department of Mechanical, Materials and Aerospace Engineering, West Virginia University

Synergistic Conversion of Captured CO2 and Green H2 to Value-Added Products for a Decarbonized Economy



Aldo Romero

Eberly Distinguished Professor of Physics and Astronomy, West Virginia University

Data-Driven Autonomous Experiments for Energy Sciences: from First Principles to Machine Learning



Oishi Sanyal

Assistant Professor - Department of Chemical and Biomedical Engineering, West Virginia University

Metal-embedded carbon-based catalytic membranes for co-production of ammonia and ethylene

Commentary

Eric Blough



Blough

In 2007, I was a young faculty member at Marshall University with big ideas and an even bigger vision: to build a center that could bring together scientists from across disciplines to tackle important questions in biology and medicine. That year, I received a \$2.35 million Research Challenge Grant from the West Virginia Higher Education Policy Commission—a grant that would prove to be the turning point in my career. With that funding, my colleagues and I created the Cell Differentiation and Development Center, an interdisciplinary hub designed to spark collaboration, innovation and scientific growth in our state. The grant allowed us to acquire essential shared facilities and core instrumentation, resources that were critical to launching projects that otherwise would have been out of reach.

Just as importantly, the Center became a place where aspiring scientists could learn, grow and contribute. Through WV-EPSCoR, NASA and INBRE fellowships, my

team and I were able to mentor numerous graduate and undergraduate researchers. Many of these students went on to build their own careers in science, creating a strong pipeline of talent trained right here in West Virginia.

The initial investment from the Research Challenge Grant generated incredible momentum. It helped us secure major follow-on funding, including a \$750,000 NASA EPSCoR project to study countermeasures for muscle atrophy and, later, a multi-million-dollar award from the Department of Energy to establish the Center for Diagnostic Nanosystems at Marshall.

“Looking back, I see clearly how this program strengthens West Virginia’s research ecosystem.”

- Eric Blough

Over time, what began as a single project evolved into a wide-ranging research portfolio spanning nanomedicine, cardiovascular aging, metabolic disease and spaceflight biology. Our work attracted industry partnerships with companies like McNeil, Novartis and Boehringer Ingelheim, resulted in more than 120 peer-reviewed publications, and led to patents—such as using cerium oxide nanoparticles to treat sepsis and zinc oxide nanoparticles to treat muscle atrophy.

The impact went beyond the lab bench. My research journey eventually led me into leadership roles, including my current position as dean of Marshall’s School of Pharmacy. None of this would have been possible without the early, transformative support of the Research Challenge Grant.

Looking back, I see clearly how this program strengthens West Virginia’s research ecosystem. It gives early-career investigators the means to pursue bold, interdisciplinary ideas, builds a critical mass around shared resources and lays the groundwork for future federal and industry support.

In 2007, I was given an extraordinary opportunity. Today, the labs, students and discoveries that grew from that seed continue to thrive, driving new innovations and inspiring the next generation of scientists. That is the lasting power of the Research Challenge Grant.

***Dr. Eric Blough** is currently dean of the Marshall University School of Pharmacy. He was a Research Challenge Grant awardee in 2007.*



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