

MEMORANDUM

TO: Legislative Oversight Commission on Education Accountability (LOCEA)

FROM: Dr. Juliana Serafin, Senior Director Division of Science and Research, HEPC

DATE: July 1, 2022

RE: Vision 2025: Science & Technology Strategic Plan Annual Report

West Virginia Code §18B-18B-2 requires the West Virginia Science and Research Council (SRC) report to the Legislative Oversight Commission on Education Accountability annually on progress in implementing its state science & technology strategic plan, as well as any updates to the plan. In last year's report LOCEA was provided with a completely revised strategic plan, **Vision 2025: West Virginia Science and Technology Plan**, which was created with input from more than 60 stakeholders from industry, higher education, and state government.

The strategic plan was developed with an eye toward attracting future federal research funding and new high-tech industries to West Virginia. Through the plan, over the next five years, we have an incredible opportunity to attract more external investments that will allow new sectors to take root right here at home.

The plan prioritizes four science and technology platforms for the state, based on our research strengths and workforce needs: **Life Sciences, Computer and Data Science, Advanced Manufacturing and Advanced Energy**. Life Science and Computer/Data Science were chosen for the state's RII Track-1 EPSCoR Research Infrastructure Improvement proposal, a \$20 million federal National Science Foundation grant which will be submitted in August 2022.

The new plan has specific goals in five focus areas: **STEM Talent Pipeline, Research Enterprise, Innovation & Entrepreneurship, High-Tech Companies and Stakeholder Alignment**. The plan sets Vision, Goals, Actions and Metrics for each focus area. It also analyzes trends that affect technology and workforce in the state and includes a SWOT analysis for the four science and technology platforms

Focus Area One: STEM Talent Pipeline

Vision: The vision is for West Virginia students to become interested in high-tech career pathways and actively pursue STEM degrees. Ultimately, companies will locate in West Virginia because of the availability of STEM talent in the state.

The goals are to increase two- and four-year STEM degree enrollment and conferral, and to increase research opportunities and internships for students with the support of federal grants and the state-funded Research Challenge Fund.

Actions include expanding K-12 STEM opportunities, partnering with organizations in the state to help prepare and retain STEM students, and partnering with companies and federal labs to increase the number of available internships.

FY 22 Results and Recommendations for Focus Area One:

Although physical sciences and engineering degree enrollment continue to decline with the overall decline in the number of students enrolled in public college institutions, the biological and biomedical science enrollment is not seeing the same declines and is much more stable.

<https://www.wvhepc.edu/resources/data-and-publication-center/data-center-enrollment/>

We expect STEM enrollment and retention to be positively impacted when a new NSF EPSCoR RII Track-1 grant is obtained. The 2021 proposal was declined, but a new proposal is being submitted in August 2022, and will focus on neuroscience, which will leverage existing trends in biological/biomedical sciences.

Focus Area Two: Research Enterprise

Vision: The vision for the research enterprise is that West Virginia will be recognized for its academic research in the four target platforms (Life Sciences, Computer and Data Science, Advanced Manufacturing and Advanced Energy), and that industry will seek technical expertise and collaborations with academic researchers.

Goals are to increase the number of STEM doctoral degrees conferred at West Virginia's universities, and to increase research expenditures in the four target platforms. Actions include increasing funding for the Research Challenge Fund, securing federal research capacity-building grants, increasing federal grants and contracts in the four target platforms, and identifying critical lab and facility needs and assessing funding mechanisms to fulfill those needs.

FY 22 Results and Recommendations for Focus Area Two:

The largest impact on the research enterprise in WV can be made by increasing the amount of state funds for the Research Challenge Grants which are funded through the Research Challenge Fund. These grants are extraordinarily successful in obtaining follow-on funds for research from federal agencies. The attachment at the end of this report explains more about these grants and funding. The creation of a specific Research Challenge Grant for collaboration with primarily undergraduate serving institutions would be especially helpful in bringing research funding expertise from the larger institutions to smaller ones in WV.

The Research Challenge Fund continues to fund STEM doctoral students at WVU and Marshall through the STEM Fellows program. This award was renewed in 2021 and will be in place from 2022 to 2026.

We expect that a new NSF EPSCoR RII Track-1 grant will significantly assist research growth at the higher education institutions in the state. The 2021 proposal was not funded, but a new proposal is being submitted in August 2022, and will focus on neuroscience. The grant is for \$20 million over 5 years.

Focus Area Three: Innovation and Entrepreneurship

Vision: The vision for Focus Area Three is that successful startups in West Virginia will attract more Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) funding

and venture capital to increase operations.

Goals include increasing industry-university research and development activity, including patents and invention disclosures, and SBIR/STTR awards. Actions include piloting an R&D voucher program, supporting the FAST program (Federal and State Technology Partnership Program to help West Virginia companies apply for SBIR/STTR funding and providing the SBIR/STTR match) and increasing the Entrepreneurship and Innovation Investment Fund. This Department of Economic Development-managed Fund supports entrepreneurship, creation of business startups, improvements in workforce participation, and attracting individuals to relocate to West Virginia.

FY 22 Results and Recommendations for Focus Area Three:

In 2021, the following SBIR/STTR awards were made with assistance from TechConnect WV's FAST project and the state Entrepreneurship and Innovation Investment Fund (EIIF):

- 5 WV companies received Phase 0 matching awards,
- 5 received Phase I matching awards, and
- 4 received Phase II matching awards from the fund.

The number of companies participating could be increased by adding more state match funding in the EIIF and the creation of a R&D Voucher program.

Focus Area Four: High-Tech Companies

Vision: The vision is to make West Virginia home to high-tech companies and industries and to grow business R&D and innovation activities.

Goals include attracting R&D-oriented federal operations; ensuring that infrastructure, facilities, and specialized equipment are available to high-tech companies; and working with the West Virginia Department of Economic Development (DED) on recruitment of high-tech companies. Actions include supporting programs to move federal anchors to the state, leveraging R&D vouchers, and collaborating for high-tech company recruitment.

FY 22 Results and Recommendations for Focus Area Four:

The WV Regional Technology Park (WVRTP), the I-17 High Technology Park, and the Department of Economic Development continue to actively participate in *Opportunity Move*, the collaborative effort to relocate federal agencies to West Virginia. The group meets monthly, has engaged consultants, and has created many points of contact in the past year.

NOAA's Science on a Sphere project at the WV Regional Technology Park will open in the fall of 2022, bringing innovative STEM-based education tools to middle and high school students as well as the community. While this is anticipated to help with the STEM Talent Pipeline, it will also serve as a centerpiece of the Tech Park and hopefully attract other companies. The WVRTP has planned and will host a "red carpet" tour of the park for high tech company executives in the fall.

Focus Area Five: Stakeholders

Vision: The vision is that industry-academic-government stakeholders agree on the importance of science and technology in the state economy and collaborate on plan goals and actions.

Goals include establishing strong communications between stakeholders and working together to overcome challenges. Actions include conducting meetings for industry, academics, legislators, and executive branch stakeholders that identify two to three collaborative projects each year and reporting on the outcomes of the plan.

FY 22 Results and Recommendations for Focus Area Five:

New federal funding opportunities, including the Building a Better America guide to the Bipartisan Infrastructure Law and the creation of the NSF's Regional Innovations Engine program (NSF's Engines) have brought the state's key stakeholders in research and economic development together over the past year for multiple meetings to discuss funding opportunities. Concept papers for the NSF Engines program were submitted on June 30, 2022.

Conclusion

The revised **Vision 2025** presents an opportunity for significant development of science and technology in West Virginia. The Division of Science & Research announced the plan in July 2021 and is developing additional outreach methods and communications including in-person, social media, and public events.

A full copy of **Vision 2025** may be accessed here: <https://westvirginiaresearch.org/vision-2025-west-virginia-science-technology-plan>

(Attachment follows)

RESEARCH CHALLENGE GRANTS

How state funding encourages **job creation** and **private investment**

Research Challenge Grants offer return on investment

\$11.6 million

Localized Gas Utilization

External follow-on funding after initial award of \$1.3 million over five years

Jianli (John) Hu, Ph.D.

Research Challenge Grant recipient,
Localized Gas Utilization

"The RCG integrates **collaborations** wherein science & engineering faculty can engage with law, finance and geology to come up with **innovative solutions** to energy and environmental issues in West Virginia. The project has generated specific impacts on the advancement and realization of smart goals in The West Virginia Science and Technology Strategic Plan. The research activities result in a continuing stream of intellectual properties, federal grants and industrial investment to sustain the scientific advancements in energy research. With the help of the RCG, an interdisciplinary team has trained 25 PhD/MS students, 10 BS students and 4 postdocs."



\$24.3 million

Center for Cognitive Computing

External follow-on funding after initial award of \$1.3 million over five years

"The RCG grant has allowed me to extend WVU research activities on several critical national security topics as well as collaborating with state commercial and industrial companies. I have been able to advance **state-of-the-art machine learning** on biometrics and face recognition for national security. Due to this RCG, my research group **secured two large grants** and received two consecutive year supplemental grants. The RCG grant has also helped me collaborate on several projects with small businesses."



Nasser Nasrabadi, Ph.D.

Research Challenge Grant recipient,
Center for Cognitive Computing

"The Vaccine Development Center (VDC) has acquired \$26 million in extramural support from private and federal sources of funding. The VDC has **supported seven faculty-lead projects** over the past four years which has allowed labs to become more competitive for extramural support. Furthermore, the projects have resulted in **publications in high-tier journals**, illuminating research that is occurring in West Virginia. The VDC **partnerships have enabled three potentially lifesaving vaccines** to be moved into human clinical trials."

Heath Damron, Ph.D.

Research Challenge Grant recipient,
Vaccine Development Center



Research Challenge Grants (RCGs) are awarded every five years. RCGs support the creation of university-based research centers that can foster economic development and workforce advancement in alignment with the goals listed in the state Science & Technology Plan (S&T Plan). All three current projects were awarded \$1.3 million over five years. They have made excellent use of state funding by leveraging the initial investment into further funding from federal sources, supporting scores of graduate students and postdoctoral fellows, and producing hundreds of publications on important research. Increased funding of the Research Challenge Fund would be used for additional RCGs that have been very successful at garnering follow-on funding.

GROW

Grow research programs at institutions to help secure federal funding that will spur economic development

DEVELOP

Develop STEM talent pipeline to increase the STEM-ready workforce in West Virginia

RETAIN

Keep expertise in the state with competitive programs that provide quality experiences to attract and retain students

How further investment in the Research Challenge Fund would *positively impact* West Virginia

SUMMER UNDERGRADUATE RESEARCH EXPERIENCES

The Summer Undergraduate Research Experiences (SURE) program provides stipends to **fully or partially support research for 100 undergraduate students annually**. Marshall University, Shepherd University, West Liberty University, West Virginia University, West Virginia State University, and West Virginia Wesleyan College host these students. The sum of six awards is \$300,000 per year, for three years from 2020-2022.

INSTRUMENTATION & INNOVATION GRANTS

Instrumentation Grants provide \$20,000 to purchase **modern instruments for advanced undergraduate laboratories**. Innovation Grants provide one-time awards of about \$40,000 each for **equipment, supplies and minor renovations of laboratory spaces for undergraduate education and research**.

An external, expert peer review service is provided for STEM faculty. This allows them to develop competitive proposals for funding from federal agencies. Last year, 32 faculty proposals were reviewed, 1 large scale proposal to the National Science Foundation (NSF) was reviewed multiple times, and 50 proposals were reviewed for 9 competitions for about \$150,000. Administration and cost share to NSF EPSCoR RII grant was also provided at \$255,000.

STEM FELLOWS

STEM Fellows offers **funding for doctoral (Ph.D.) students studying science, technology, engineering and mathematics (STEM)** at Marshall University (MU) and West Virginia University (WVU). This grant provides **significant support** to both schools for their research programs and **helps maintain their respective research classifications**. The total for five years will be \$800,000 to MU and \$1,675,000 to WVU.

OPPORTUNITY FUND

The Opportunity Fund provides **small, one-time awards** less than \$5,000 each to assist faculty and STEM programs with expenses related to development of proposals for federal funding, and for summer student programs. Total funding per year is \$40,000.

Learn more at wvresearch.org or call us at **304.558.4128**



Science,
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