



# VISION2025

THE WEST VIRGINIA SCIENCE AND TECHNOLOGY STRATEGIC PLAN

By 2025, Science, Technology, and Engineering are  
West Virginia's Leading Economic Growth Drivers  
Attracting Investments, Creating Jobs, and  
Improving Our Quality of Life

## Foreword

In 2005, West Virginia science and education leaders developed a strategic plan entitled: "Vision 2015; The West Virginia Science and Technology Strategic Plan." This document was endorsed by the State's research officials, the Governor and, ultimately, was recognized in state code (18-18B et. seq.) by the legislature.

Upon completion of the fifth year of implementation, the West Virginia Science and Research Council commissioned a review of the plan, its outcomes and progress indicators. With the assistance of diverse group of stakeholders, Vision 2015 was updated in 2012. Stakeholders were brought together in the Fall of 2014 to begin to develop Vision 2025, the successor to Vision 2015.

*Vision 2025* was completed in the summer of 2015 and endorsed by the West Virginia Science and Research Council on June 23, 2015.

A strategic plan for West Virginia's research enterprise is hereby presented. A framework of actions and initiatives will position West Virginia to achieve measurable growth in economic development as stated in the vision: "By 2025, Science, Technology, and Engineering are WV's Leading Economic Growth Drivers Attracting Investments, Creating Jobs, and Improving Our Quality of Life." West Virginia is at a crossroads and must embrace this plan as it continues to transform from traditional extractive industrial base to a more high tech, knowledge-based economy. Highly credible national organizations including the American Academy for the Advancement of Science (AAAS) and the National Association of Manufacturers (NAM) have recently presented alarming data noting declining trends in the numbers of college graduates in engineering and science - at a time when the nation is experiencing greater demand for such training. Thus, West Virginia is not alone. Rather, West Virginia joins the national effort on this issue recognizing that each surrounding state (Ohio, Virginia, Kentucky, Maryland and Pennsylvania) has initiated similar strategic plans - and funding mechanisms - for research growth. Microsoft founder, Bill Gates, a famed college drop-out, has joined the chorus of national leaders and scholars who recognize that the "new economy" will continue to grow and move forward when government and industry engage research centers and universities. These centers can no longer be viewed as simple post-secondary academic institutions, but rather the nucleus of economic strength, entrepreneurship and innovation.



Chair, S&T Council

# VISION2025 THE WEST VIRGINIA SCIENCE AND TECHNOLOGY STRATEGIC PLAN

**VISION** By 2025, Science, Technology, and Engineering are WV's Leading Economic Growth Drivers Attracting Investments, Creating Jobs, and Improving Our Quality of Life

Financial Development	Physical Development	People Development	Cultural Development	Innovation Economy Development
<p>1. Obtain \$6 MM commitment for state-based funding for HEPC Division of Science and Research and match 3-1 with external funding by July 1, 2017 and grow 10% per year thereafter (Jan Taylor)</p> <p>3. Dedicate \$10 MM in annual funding with private 1-to-1 match for a Science and Technology Future Fund starting July 1, 2017 (Jan Taylor)</p> <p>3. Obtain \$1 MM funding for start-up and venture businesses with private 1-to-1 match by July 1, 2017 and grow ' 10% per year (Rusty Kruzeloek)</p>	<p>1. Determine statewide needs for science and technology facilities to enable research and business growth goals at university and technology parks by July 1, 2016 (John Maher)</p> <p>2. Upgrade and increase science and technology facilities to enable research and business acceleration needs for Vision 2025 at university and technology parks by July 1, 2025 (John Maher)</p> <p>3. Ensure continual upgrades and expansions of broadband to meet FCC and E-rate standards starting July 1, 2017 (Jack Smith)</p>	<p>1. Create and implement a STEM and entrepreneurial-based education and workforce development plan by December 31, 2016 (Chuck Somerville)</p> <p>2. STEM faculty at all WV colleges and universities will have opportunities to be rewarded for entrepreneurial activities and innovation in promotion and tenure considerations by January 1, 2017 (Chuck Somerville)</p>	<p>1. Increase WV public's understanding of the value of STEM and research by 5% annually starting January 1, 2016 (Amanda Ramey)</p> <p>2. Increase external understanding and awareness of West Virginia's STEM strengths and attract new STEM-based businesses by increasing external communication, public relations, and marketing activities starting January 1, 2016 (Amanda Ramey)</p>	<p>1. Grow number of technology-based business by 2% annually starting July 1, 2016 (Fred King)</p> <p>2. Increase research and development public and private expenditures in WV by 6% annually starting January 1, 2016 (Fred King)</p>

**KEY OBJECTIVE** Financial Development

**SMART GOAL** Obtain \$6 MM in state-based funding for HEPC Division of Science and Research and match 3-1 with external funding by July 1, 2017 and grow 5% per year thereafter

**ACCOUNTABILITY** Paul Hill (Jan Taylor)

**RATIONALE OR BRIEF BACKGROUND**

With the reduction in science and technology funding and increased competition at the national level, state-based S&T funding is even more important for increasing WV's competitiveness and developing tech-based economic development. A state investment at this level would result in a 3-1 return on investment based on historical returns received from previous state investments in research at West Virginia institutions of higher education.

**MEASUREMENT** Amount of funding received by State by July 1, 2017 and continued increases with 5% growth rate

**IMPLEMENTATION PLANS**

1. Develop any needed statistics, comparisons, and other data along with talking points for legislative and other meetings by August 31, 2015
2. Chancellor and Division of Science and Research staff meet with key legislative leaders during interims in 2015 and during the early days of the 2016 regular session to build support for increased funding
2. Chancellor and staff build support with Governor and key staff through meetings and other means beginning in early 2016 and ramping up in late 2016
4. Work with identified legislative champions to write legislation in 2017
5. Recruit university lobbyists and other supporters and stakeholders to support and promote the legislation in 2017

DATE May 11, 2015

REVISED



**KEY OBJECTIVE** Financial Development

**SMART GOAL** Dedicate \$10 MM in annual funding with private 1-to-1 match for a Science and Technology Future Fund starting July 1, 2017

**ACCOUNTABILITY** Paul Hill (Jan Taylor)

### **RATIONALE OR BRIEF BACKGROUND**

STEM-related innovation will lead WV's future job growth only if research and technology are adequately funded. The Research Trust Fund and Eminent Scholars Fund which built endowments at West Virginia University and Marshall University were wildly successful. Endowed chairs, professorships and research professorships have allowed recruitment of excellent faculty. A similarly designed Fund for supporting Science and Technology research should find similar success, bring in additional donors who would find the dollar for dollar match attractive, and help boost STEM job growth in the State.

**MEASUREMENT** New Science and Technology Future Fund started with \$10 MM of funding by July 1, 2017 with commitment of annual funding of at least the same amount

### **IMPLEMENTATION PLANS**

1. Develop any needed statistics, comparisons, and other data along with talking points for legislative and other meetings by August 31, 2015
2. Chancellor and Division of Science and Research staff meet with key legislative leaders during interims in 2015 and during the early days of the 2016 regular session to build support for increased funding
3. Chancellor and staff build support with Governor and key staff through meetings and other means beginning in early 2016 and ramping up in late 2016
4. Work with identified legislative champions to write legislation in 2017
5. Recruit university lobbyists and other supporters and stakeholders to support and promote the legislation in 2017

DATE May 11, 2015

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**KEY OBJECTIVE** Financial Development

**SMART GOAL** Obtain \$1MM funding for start-up and venture businesses with private 1-to-1 match by July 1, 2017 and grow 10% per year

**ACCOUNTABILITY** Rusty Kruzelock, WV Regional Technology Park

### **RATIONALE OR BRIEF BACKGROUND**

Technology innovation and entrepreneurship are key elements of WV's future economic growth, and access to capital is vital to the start and growth of West Virginia start-up and venture businesses. Historically, state programs to encourage new venture formation include business tax credits, angel investment tax credits, small business innovation research (SBIR) matching programs, state venture capital funds, seed capital funds, and more. Currently, the State has little funding to help West Virginia start-ups, but such funding is needed for future economic growth and STEM job creation.

**MEASUREMENT** \$1MM in funding for start-up and venture businesses with private 1-to-1 match by July 1, 2017 with annual 10% increase

### **IMPLEMENTATION PLANS**

1. Develop any needed statistics, comparisons, and other data along with talking points for legislative and other meetings by August 31, 2015
2. WVRTP Executive Director, HEPC Chancellor, and Division of Science and Research staff meet with key legislative leaders during interims in 2015 and early in the 2016 regular session to build support for increased funding
3. WVRTP Executive Director, HEPC Chancellor and staff build support with Governor and key staff through meetings and other means beginning in early 2016 and ramping up in late 2016
4. WVRTP Executive Director develops fund details required for legislation, including management, investment, policy and other guidelines by July 31, 2016
5. Work with identified legislative champions to write legislation in 2017
6. Recruit university lobbyists and other supporters and stakeholders to support and promote the legislation in 2017

DATE May 6, 2015

REVISED





**KEY OBJECTIVE** Physical Development

**SMART GOAL** Determine statewide needs for science and technology facilities to enable research and business growth goals at Universities and technology parks by July 1, 2016

**ACCOUNTABILITY** John Maher

#### **RATIONALE OR BRIEF BACKGROUND**

To achieve our vision and expand and diversify the state's economy through innovation, science, and technology, we must ensure that we have adequate infrastructure in place. Understanding what new facilities will be required and how they may be provided by reallocation, renovation and new construction is key to insuring that capacity is provided to accommodate growth.

**MEASUREMENT** Statewide needs for science and technology facilities at Universities and technology parks determined by July 1, 2016

#### **IMPLEMENTATION PLANS**

1. Quantify goals for growth from Innovation Economy Development and, if needed, other data and information by August 31, 2015
2. Project space demand resulting from projected growth by December 1, 2015
3. Survey major stakeholders for plans to satisfy projected growth through re-prioritization of existing facilities, renovation of existing facilities and new construction by March 15, 2016
4. Obtain science and technology space plan from each institution and technology park by March 15, 2016
5. Develop final report detailing statewide needs for science and technology facilities at Universities and technology parks by July 1, 2016

DATE June 7, 2015

REVISED

**KEY OBJECTIVE** Physical Development

**SMART GOAL** Upgrade and increase science and technology facilities to enable research and business acceleration needs for Vision 2025 at Universities and technology parks by July 1, 2024

**ACCOUNTABILITY** John Maher

**RATIONALE OR BRIEF BACKGROUND**

To achieve our vision by 2025 and expand and diversify the state's economy through innovation, science, and technology, we must ensure that we have adequate infrastructure in place. Expanding the research and technology business enterprise in WV will, in some cases, tax the capacity of existing facilities, and upgrades and increases in capacity will almost certainly be needed. Assigning accountability for delivering new capacity is critical to growth.

**MEASUREMENT** Completion of facilities enumerated in Physical Development Goal 1

**IMPLEMENTATION PLANS**

1. Deliver facilities needs assessment from Physical Development Goal 1 to appropriate University and technology park leaders by July 15, 2016
2. Develop space policies at each University and technology park to insure appropriate use of existing research/acceleration space by October 1, 2016 and modify space plan as appropriate (Jan Taylor)
3. List additional facilities required for growth on institutions' and technology parks' capital priorities (Jan Taylor)
4. Obtain additional bonding/funding commitment necessary for facility upgrades and additions (Paul Hill)
5. Execute construction of facility upgrades and additions (Paul Hill)

DATE June 7, 2015

REVISED





**KEY OBJECTIVE** Physical Development

**SMART GOAL** Ensure continual upgrades and expansions of broadband infrastructure to meet prevailing FCC and E-rate standards and follow the recommendations of the WV Strategic Broadband Plan for statewide administration, promotion, and development, starting July 1, 2017

**ACCOUNTABILITY** Chair of the WV Broadband Enhancement Council

### **RATIONALE OR BRIEF BACKGROUND**

Adequate broadband is needed to support the State's science and technology growth. In fact, Tom Wheeler, Chair of the FCC, has said, "Broadband is the indispensable infrastructure of our 21st century economy." Closer to home, Senator Capito, in her recently announced Capito Connect Plan, states, "A recent study by the FCC indicates that 56% of WV residents do not have access to broadband services that meet its benchmarks. In rural areas of the state, this number is an even higher 74%. WV cannot attract and retain businesses if we are not connected."

**MEASUREMENT** Broadband infrastructure upgrades and expansions made to meet standards starting July 1, 2017

### **IMPLEMENTATION PLANS**

1. Work with the Capito Connect campaign leaders to develop data and talking points for legislative and other meetings by August 31, 2015
2. Chair of WV Broadband Enhancement Council and other key staff or stakeholders meet with key legislative leaders during interims in 2015 and during the early days of the 2016 regular session to build support
3. Chair, staff, and stakeholders build support with Governor and key staff through meetings and other means beginning in early 2016 and ramping up in late 2016
4. Work with identified legislative champions to write legislation in 2017 to fund operations of the WV Broadband Enhancement Council and projects it oversees to implement the recommendations of the WV Broadband Strategic Plan developed by the WV Broadband Deployment Council
5. Recruit appropriate lobbyists and other supporters and stakeholders to support and promote the legislation in 2017

DATE June 5, 2015

REVISED

**KEY OBJECTIVE** People Development

**SMART GOAL** Create and implement a STEM and entrepreneurial-based education and workforce development plan by December 31, 2016

**ACCOUNTABILITY** Paul Hill (Chuck Somerville)

**RATIONALE OR BRIEF BACKGROUND**

A highly educated, technically skilled, and entrepreneurial workforce is a foundational element needed to transform the West Virginia economy toward a more prosperous and sustainable future. STEM-based businesses started in West Virginia will diversify and strengthen the State's economy, attract additional population, and grow the tax base to further the development of entrepreneurial opportunities and increase educational attainment in the state. STEM-based education, employment, and entrepreneurial opportunities are critical for diversifying and boosting the State's economy.

**MEASUREMENT** STEM and entrepreneurial-based education and workforce development plan developed by December 31, 2016

**IMPLEMENTATION PLANS** (person responsible for each task will be appointed by Chancellor Hill)

1. Summer 2015 - Define elements of STEM and high-tech businesses and compile baseline data on types and numbers for the State, including projected future needs
2. Early Fall 2015 - Convene meeting of Provosts at all WV CTC's, Colleges and Universities to determine existing tech training and education programs, identify gaps, and make planning assignments to maximize complementarity and minimize overlap at institutions within the state
3. Mid Fall 2015 - Convene meeting of Deans of Business Colleges and Chambers in WV to review existing training and educational programs and propose entrepreneurial support programs (programs, certificates, incubators, etc.)
4. Spring 2016 - Compile reports from two Fall meetings; identify strong themes and needs; select top existing programs for enhancement and top proposed programs for development; provide faculty/admin support to develop curriculum documents
5. Summer and Fall 2016 - Compile curriculum development documents; write up theme/framework, and identify how existing and new programs fit the theme; write up timeline for establishment of new programs; establish assessment plan

DATE May 11, 2015

REVISED



**KEY OBJECTIVE** People Development

**SMART GOAL** STEM faculty at all WV colleges and universities have opportunities to be rewarded for entrepreneurial activities and innovation in promotion and tenure considerations by 1 January 2017

**ACCOUNTABILITY** Paul Hill (Chuck Somerville)

### **RATIONALE OR BRIEF BACKGROUND**

Technology-based innovation and entrepreneurship are critical elements for WV's future economic and workforce development. In most regions, much of that innovation and entrepreneurial activity starts at colleges and universities. STEM faculty in WV, however, have little incentive to devote time to intellectual property (IP) development, commercialization, or technology transfer, because these activities are not traditionally considered in promotion and tenure decisions. Counting IP development toward faculty merit, promotion, and tenure decisions will ensure that more faculty are encouraged to be entrepreneurial, and will help move West Virginia toward a more diverse, sustainable, and STEM-based innovation economy.

**MEASUREMENT** All colleges and universities in WV have promotion and tenure guidelines in place that account for and reward entrepreneurial and innovation activities and accomplishments

### **IMPLEMENTATION PLANS**

1. Summer 2015 – Gather promotion and tenure policies from all WV colleges and universities. Gather implementation guidelines from all WV STEM colleges or departments. Gather P&T guidelines from several peer and aspirational colleges and universities in states with vibrant STEM-based economic activity.
2. Fall 2015 – Appoint a committee of academic and research administrators to review existing policies and guidelines. This committee will be responsible for identifying the clearest and most progressive policies and guidelines. The committee will meet to recommend language to be included in all WV policies
3. Spring 2016 – HEPC personnel will make presentations to Boards of Governors and Faculty Senates to present proposed changes to policy and seek comment.
4. Fall 2016 – All Boards of Governors of West Virginia colleges and universities will be asked to consider, amend and adopt policies that they deem to be appropriate for their institution

DATE May 12, 2015

REVISED

**KEY OBJECTIVE** Cultural Development

**SMART GOAL** Increase West Virginia public's understanding of the value of STEM and research by 5% annually starting January 1, 2016

**ACCOUNTABILITY** Amanda Ramey

**RATIONALE OR BRIEF BACKGROUND**

To achieve our vision for research and innovation in West Virginia, including obtaining and maintaining adequate funding for STEM-based economic development, all citizens within our state need to be informed and educated about the importance of not only Science, Technology, Engineering and Math but also research and innovation in creating high-skilled, well-paying jobs.

**MEASUREMENT** 2016 baseline to be determined via survey  
Baseline numbers to increase by 5% via subsequent surveys

**IMPLEMENTATION PLANS**

1. Select survey method and/or survey firm by September 30, 2015
2. Develop final survey questions by November 30, 2015
3. Conduct a random baseline survey of the WV population in January 2016
4. Analyze data and, if appropriate, use to inform other activities, including legislative and public relations activities
5. Conduct follow-up, random survey of WV population in January of each year
6. Analyze data each year and make plans to increase understanding and awareness, also using data to inform other activities

DATE May 2015

REVISED



**KEY OBJECTIVE** Cultural Development

**SMART GOAL** Increase external understanding and awareness of West Virginia's STEM strengths and attract new STEM-based businesses by increasing external communication, public relations, and marketing activities starting January 1, 2016

**ACCOUNTABILITY** Amanda Ramey

**RATIONALE OR BRIEF BACKGROUND**

To achieve our vision for research, innovation, and STEM-based economic development in West Virginia, external audiences (those living outside of West Virginia) must see the state as a viable place to locate and thrive in their STEM-based businesses. Although many factors go into that, we can influence business attraction by increasing external awareness of WV's innovation and STEM strengths. Although the ideal goal would be to increase external understanding and measure that with a national survey, we are using a "process" rather than "outcome" goal to avoid having to do a national survey.

**MEASUREMENT** Measure baseline external communication, marketing, and PR activities that target WV's STEM, research, and innovation strengths by December 1, 2015 and by December 1 each year thereafter

**IMPLEMENTATION PLANS**

1. Measure baseline external communication, marketing, and PR activities that target WV's STEM, research, and innovation strengths by August 31, 2015
2. Evaluate each activity, and make decision to retain or discard each activity as appropriate by October 31, 2015
3. Develop external communication strategy, including existing (retained) activities and incorporating new activities, increasing overall activities by December 31, 2015
4. Begin implementing new communication strategy and activities, starting in January 2016

DATE May 2015

REVISED

**KEY OBJECTIVE** Innovation Economy Development

**SMART GOAL** Grow number of technology based businesses by 2% annually starting July 2016

**ACCOUNTABILITY** Fred King

**RATIONALE OR BRIEF BACKGROUND**

To achieve our Vision, we must increase the number of technology-based start-ups in WV. Growing the number of tech-based businesses creates more opportunity to not only “keep the talent here” but also grow this critical sector of the economy. In 2013, WV was at the national average of 0.28% of adults per month starting businesses. Regionally, only KY was higher, MD was equal, OH, PA, and VA were lower according to the Kauffman Index of Entrepreneurial Activity. A 2% growth would move us from the average to a high rate of entrepreneurial activity.

**MEASUREMENT** Establish number of technology-based businesses in WV by December 31, 2015  
Measure number of tech-based businesses each year thereafter

**IMPLEMENTATION PLANS**

1. Examine best practices from states, such as Utah, that have succeeded in growing the innovation economy and implement appropriate practices in coming years (Alternative plan here ... Use TechConnectWV Blueprint to establish best practices and implement appropriate goals for growing WV’s innovation economy)
2. Foster entrepreneurial and commercialization activities, including SBIR/STTR activity, at Universities and colleges, making this a metric for their evaluation by HEPC
3. Seek investment in SBIR/STTR matching funds and other entrepreneurial and commercialization funds from State of WV
4. Collaborate with TechConnectWV, CAZ, and other groups to attract SBIR/STTR firms and other start-ups from surrounding region
5. Develop tracks in STEM BS/BA programs with entrepreneurship capstones
6. Encourage development of 4+1 STEM BS/MBA programs

DATE May 15, 2015

REVISED





**KEY OBJECTIVE** Innovation Economy Development

**SMART GOAL** Increase research and development public and private expenditures in WV by 6% annually starting January 1, 2016

**ACCOUNTABILITY** Fred King

### **RATIONALE OR BRIEF BACKGROUND**

A key metric for a robust innovation economy is the research and development expenditures in a state, and we must increase those expenditures in WV to realize our Vision. In 2013, WV was at the 20th percentile for total R&D expenditures and the growth rate was 2%. While 7 other states were equal or below the 20th percentile, of those only DE had a higher growth rate (5%). Aiming for a tripling of the growth rate by 2025 would exceed all states at that level but RI.

**MEASUREMENT** Establish baseline annual total public and private R&D Expenditures by December 31, 2015. Measure annual total public and private R&D expenditures each year thereafter and establish annual growth rate

### **IMPLEMENTATION PLANS**

1. Determine the 3-year average R&D Expenditures for 2011-2014, breaking down contributions between public and private sources, by December 31, 2015
2. Develop a strategy to grow public and private R&D investment in WV by July 31, 2016
3. Implement strategy by the end of 2016
4. Measure annual total public and private R&D expenditures each year thereafter, establish annual growth rate, and make adjustments to strategy and plans to increase the rate as needed

DATE May 15, 2015

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