



WEST VIRGINIA BLUEPRINT FOR  
TECHNOLOGY-BASED ECONOMIC DEVELOPMENT

BIOMETRICS

March 2009



A report from: **TechConnectWV**  
West Virginia Coalition for Technology Based Economic Development

With consultation and assistance from:  
**Battelle Technology Partnership Practice**

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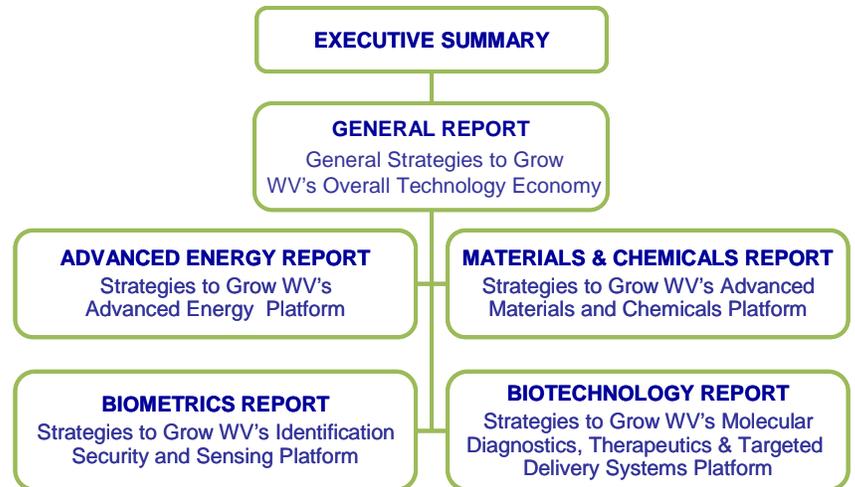
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## HOW THIS REPORT IS ORGANIZED

This report represents Phase II of West Virginia's Technology-Based Economic Development (WV's TBED) Blueprint. In 2007, Battelle Technology Partnership Practice produced the Phase I report entitled *Gap Analysis and Identification of Strategic Technology Platforms*.

The Phase II study is organized into six distinct reports:

- Executive Summary** — Provides a synopsis of introductory and background material, general strategies and actions for growing West Virginia's technology economy, and specific strategies and actions for growing West Virginia's Advanced Energy and "Biometrics" (Identification, Security, and Sensing Technology) sectors
- General Report** — Includes the Executive Summary, but also provides detailed introductory and background material and detailed information on the general strategies and actions for growing West Virginia's technology economy
- Advanced Energy Report** — Provides detailed information on the specific strategies and actions for growing West Virginia's Advanced Energy sector
- "Biometrics" Report** — Provides detailed information on the specific strategies and actions for growing West Virginia's Identification, Security, and Sensing Technology sector
- Advanced Materials and Chemicals Report** — Provides detailed information on the specific strategies and actions for growing West Virginia's Advanced Materials and Chemicals sector
- "Biotechnology" Report** — Provides detailed information on the specific strategies and actions for growing West Virginia's Molecular Diagnostics, Therapeutics, and Targeted Delivery Systems sector



The general strategies and actions represent broad recommendations for West Virginia's overall technology economy. They are common activities and tasks that will boost TBED in West Virginia independent of and across all technology areas.

Conversely, the specific sector strategies and actions are recommendations explicitly targeted to four, pre-identified technology strength areas in West Virginia. They represent those activities and tasks that will enhance those particular technology platforms.

Thus, the general strategies and actions are common to all four technology sectors and to other technology areas as well.

While many of the specific sector strategies and actions are unique to particular technology areas, there are common or similar recommendations and thus overlap among the

technology platforms. Likewise, there are some common recommendations and overlap between the general and specific sector strategies and actions as well.

As of March 2009, the first four of the six reports have been completed. However, TechConnectWV plans to develop strategies and actions for the other two technology platforms — (1) Advanced Materials and Chemicals and (2) Molecular Diagnostics, Therapeutics, and Targeted Delivery Systems — over the coming months.

*This report is the **BIOMETRICS REPORT** only.*

This report and all other reports can be found at:  
[www.TechConnectWV.com](http://www.TechConnectWV.com)

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## MEASURES OF SUCCESS

The ultimate measures of success — or outcomes — of the recommended strategies and actions will reflect the work of many groups, organizations, companies and individuals. No one person or organization will be solely responsible for the overall results — increased investment in technology-based research, development, and commercialization and increased numbers of jobs and new companies in the technology sector in West Virginia. However, **to promote accountability, lead organizations have been recommended** for all actions identified in the strategy.

Likewise, these **outcomes will not come from one particular strategy or action**. Instead, the various strategies and actions will work together to produce the overall results — an overall boost in TBED in the state.

Still, **some actions will impact some outcomes more directly than others**. Thus, those measures of success that will likely be most influenced by a particular action item are also listed as outcomes of that particular action. Consequently, each outcome is listed multiple times under both the general strategy below and the platform strategies that follow.

**Specific measures of success** are listed below for the overall Blueprint (and again, are also listed under specific actions where appropriate).

- Continue to **grow the West Virginia academic R&D base** at a pace that significantly exceeds that of the nation with a target of \$360 million by 2015
  - *Between 2006 and 2007, R&D at West Virginia's universities and colleges increased by 11.1% while total U.S. academic R&D increased by 3.5%*
  - *Between 2002 and 2007, R&D at West Virginia's universities and colleges increased an average of 10.9% per year while total U.S. academic R&D increased an average of 6.3% per year*
  - *The \$360 million target represents an increase of just over 10% per year, roughly equivalent to the 10.9% average from 2002 to 2007*
  - *Recent West Virginia academic R&D:*
    - 2002: \$100,830,000
    - 2003: \$125,417,000
    - 2004: \$134,961,000
    - 2005: \$146,489,000
    - 2006: \$150,420,000
    - 2007: \$167,208,000
  - *The past growth in West Virginia R&D occurred at a time of increasing federal R&D budgets, including the doubling of NIH funding; future funding will be highly dependent on the growth of future federal R&D funding*
- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)
  - *Because no current baseline data exist, there is a need to track over time and form more specific goals as data are gathered*

- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
  - *In 2007, 3.3% of total R&D expenditures at West Virginia colleges and universities came from industry, compared with 5.4% in the United States*
  - *From 2002 to 2007, an average of 3.4% of total R&D expenditures at West Virginia colleges and universities came from industry, compared with 5.3% in the United States.*
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
  - *Because no current baseline data exist, there is a need to track over time and form more specific goals as data are gathered*
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach national average by 2020
  - *In 2005, 8.1% of West Virginia's total employment was in the high-tech sector, compared with the national average of 10.9%*
  - *It may be helpful to consider other measures, such as employment in platform areas or particular industry sectors related to the platforms*
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020
  - *Current national average is one spin-off company created for every \$88 million of academic R&D*
  - *The measure would correspond to about two new start-ups created per year at current academic R&D funding levels*
  - *The measure would correspond to about four new start-ups created per year if academic funding reaches \$360 million in 2015*

## Technology Platform Strategies and Actions for Boosting Technology-Based Economic Development In West Virginia

### **Identification, Security, and Sensing Technology**

*This platform is often referred to as **Biometrics** throughout this report to shorten the title, realizing that the term “biometrics” often has different connotations, including the collection, analysis, and management of data in biology, and does not necessarily capture the entire essence of the Identification, Security, and Sensing Technology platform.*

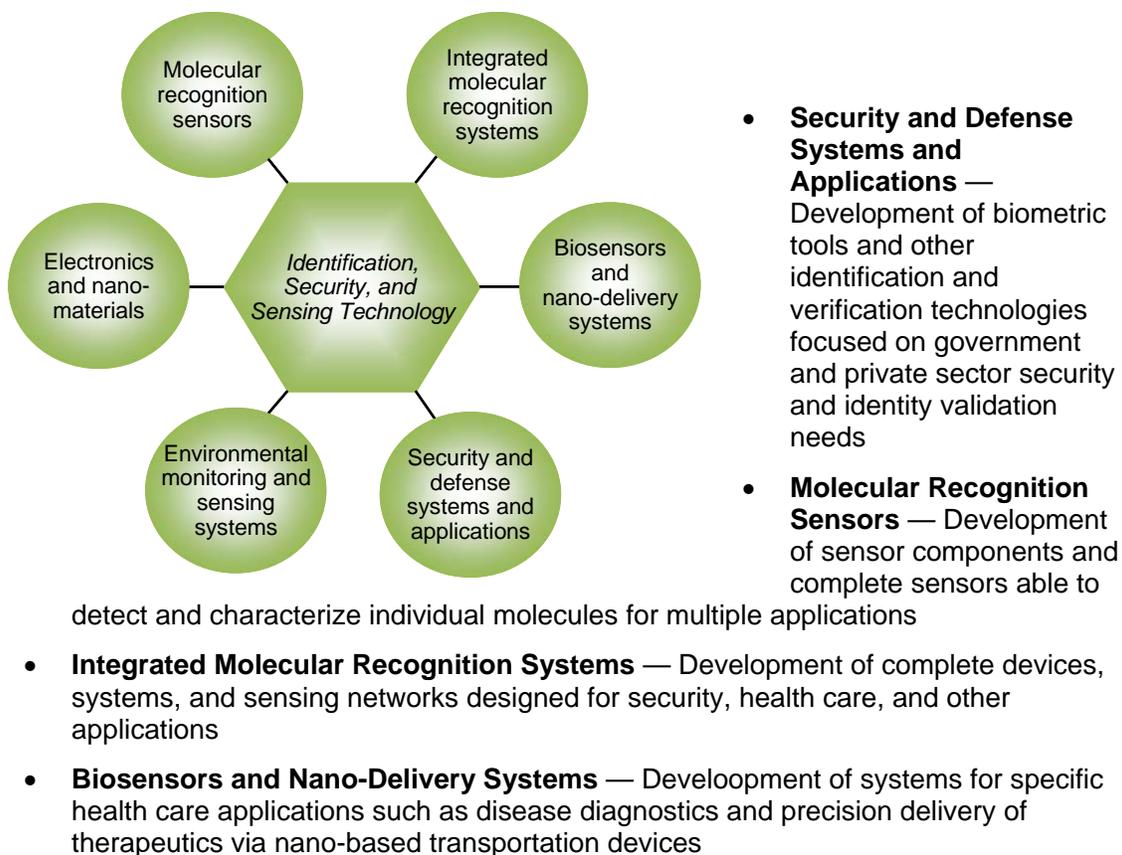
The Identification, Security, and Sensing (IS&S) Technology platform focuses primarily on opportunities and applications in biometrics and associated sensing technologies for security and identity verification purposes.

However, as Battelle noted in the 2007 Phase I report:

*The application of potential technologies from this platform **extends beyond the identification of individual humans**. The advanced sensing technologies and molecular recognition technologies likely to be developed within West Virginia will have **wide-ranging applications in areas as diverse as medical diagnostics and environmental monitoring**.*

Figure B-1 and the following descriptions illustrate the areas of research and development (R&D) -driven technology development opportunities envisioned under the platform in the Phase I study.

**Figure B-1. Opportunities of Identification, Security, and Sensing Technology Platform**



- **Environmental Monitoring and Sensing Systems** — Leveraging molecular recognition, sensing, and nano technologies to develop systems for monitoring change in the environment and the introduction of pollutants and contaminants into ecosystems
- **Electronics and Nanomaterials** — Development of nanomaterials and other materials required for IS&S technology development.

In the foreseeable future, most of the opportunities will be in the near-horizon applications of Security and Defense Systems and Applications. Much can be done in this area with electronic pattern recognition and encryption technologies such as facial recognition, fingerprints, handprints, vascular patterns, and retinal scans. More “traditional” electronics and software-driven pattern recognition and associated technologies still have significant expansion opportunities.

Over the longer-term, however, the platform should develop and broaden into the other areas listed above. Likewise, over time the application technologies from this platform may extend beyond identity verification of individual humans. The advanced sensing and molecular recognition technologies likely to be developed within West Virginia will have wide-ranging applications in areas as diverse as medical diagnostics and environmental monitoring.

However, in the **near to mid term, biometrics will be the main platform focus**, especially electronic pattern recognition technology, software, and systems.

IS&S technology was **selected as one of two platforms** to initially develop strategies and actions for several reasons:

- **No place in the world** has developed a well-established leadership position as the main geographic hub for this sector, and West Virginia has the opportunity to achieve a leading position in a unique suite of high technologies
- There is a **definite near-term market need** for advanced technology solutions for identity management and validation and security technologies, both from public and private sectors of the global economy
- West Virginia is home to several **key federal government agencies**, driving early demand for advanced IS&S technologies
- Regional economic developers, industry, and other key stakeholders have **already begun the process** of convening and working to realize technology-based economic development (TBED) out of this platform.

### ***West Virginia’s Growing Strength in IS&S Technology and Biometrics***

Battelle’s examination suggests that **no other state is better positioned than West Virginia** to capitalize on the ever-expanding need for advanced security technologies both nationally and globally. The state is demonstrating particular strength in the design of integrated biometric solutions (systems) for client applications and software for identification and security use.

For that reason, the I-79 Development Council, a regional economic development organization in north-central West Virginia, created the **West Virginia Biometrics Initiative** to grow the biometrics and identity management economy in that region.

The state, especially in north-central West Virginia, has developed a cluster of early

#### **The Federal Bureau of Investigation’s Criminal Justice Information Services**

- Hosts the National Crime Information Center
- Hosts the Uniform Crime Report data center
- Hosts the Integrated Automated Fingerprint Identification System

adopters of biometrics, identification, and security technologies and a number of service companies and organizations working with these early adopters.

The **The Federal Bureau of Investigation's (FBI's)** Criminal Justice Information Services Division in West Virginia is **the place in the nation** that law enforcement agencies turn to for identification services. The FBI's technology is largely limited to fingerprint recognition at present; but, iris scans and facial recognition will come into play in the future. The Division has 2,200 to 2,300 employees and several hundred contractors on-site.

The newly formed **FBI Biometric Center of Excellence (BCOE)**, also located in West Virginia, will enable the FBI to provide enhanced services to fight crime and terrorism with cutting-edge biometrics technology. The BCOE is the FBI's focal point to foster collaboration and advance the adoption of solutions across the law enforcement and national security communities. In fact, the FBI is creating a Biometric Technology Center in central West Virginia, a state-of-the-art R&D and training facility that will provide a central location for biometric services for federal government, academia, industry, and foreign partners.

Also located in West Virginia, the **Biometrics Fusion Center** is the biometrics testing and evaluation facility for the U.S. Department of Defense (DoD). It assists the development, adoption, and institutionalization of biometric technologies for DoD and provides biometric support for warfighters and specialized systems. It also enables collaboration in biometrics between DoD and academic institutions.

**The U.S. Department of Defense's Biometrics Fusion Center**

- Houses **DoD's biometric operations** in technology evaluation and testing
- Houses **DoD's biometrics knowledge base** and information repository
- Provides **advice and support** for DoD agencies and units

The **National Biometric Security Project**, created to increase national security and civil identity protection, consists of three organizations, including **Biometric Services International (BSI)** in West Virginia.

**Biometric Services International**

- **Develops standards** for biometric technology and applications
- **Provides research, testing and certification** to biometrics industry
- **Provides training and education services** to biometrics industry
- **Provides highly technical consulting** to biometrics users

BSI provides unbiased service and support to the biometrics industry. A nonprofit, its members sit on the biometrics standards boards and vote on standards. It is the only lab in the world exclusively dedicated to biometrics that is ISO 17025:2005 accredited.

West Virginia University is home to the **Center for Identification Technology Research (CITeR)**, the first National Science

Foundation (NSF) Industry/University Cooperative Research Center (I/UCRC) focusing on biometric identification technology.

Its mission is to advance identification technology in the areas of biometric systems and credibility assessment.

CITeR is an **internationally recognized, multiuniversity center** with two sites. West Virginia University (WVU) is the Center's founding and lead site, and the University of Arizona is the Center's second site. Each CITeR site maintains and develops collaborative partnerships with other academic

**Center for Identification Technology Research (CITeR)**

- **Provides cross-cutting research** of new enabling technologies
- **Provides interdisciplinary training** of scientists and engineers in biometrics
- **Facilitates the transfer of new biometrics technology** to the private and government sectors
- **Partners with more than 20 industry, government, and nonprofit organizations** as affiliates who jointly select, fund and advise in matters of research and intellectual property with WVU

institutions as required for execution of research of interest to Center affiliates.

CITeR operates under the I/UCRC model of cooperative engagement in which participating universities, and industry and government affiliates share responsibility for generation, selection, funding, and monitoring of the Center's research portfolio. Intellectual property is owned by the universities executing the research, however access to this IP is shared among Center affiliates with opportunity for royalty free licensing.

**West Virginia is a leader in forensics** as well. However, biometrics — at the center of the IS&S Technology platform — and forensics represent quite different market segments. Forensics deals with legal issues and crime solving (and certainly fingerprint and DNA analyses are used there); but, the primary applications of biometrics and associated technologies are security and identity verification (the primary focus of the recommended platform). Still, **forensics represents a related area** and one of strength in West Virginia.

The **Marshall University Forensic Science Center** conducts research in DNA analysis, forensic chemistry, computer forensics, and microbial forensics. The Center was created in 1994 and offers a master's degree in forensic sciences. Significantly, several start-up companies have been created around technology and processes developed at the Marshall Center.

Another state program, the **WVU Forensic Science Initiative**, provides research and resources to the nation's forensic science laboratories. Considered the largest and broadest academic research effort in forensic sciences in the nation, the Initiative partners with the FBI, ATF (Bureau of Alcohol, Tobacco, Firearms and Explosives), West Virginia State Police Laboratory, American Society of Crime Lab Directors, International Association for Identification, American Board of Criminalistics, and other forensic agencies to improve the science behind modern crime investigations.

The **WVNano Initiative**, also located at WVU, participates in this platform area as well, including security and biometrics as part of its activities. In that role, WVNano will advance molecular recognition technology for security, health, environment, and energy applications with a major focus on discoveries in materials, devices, and biomolecular systems. WVNano is a statewide initiative supported through an NSF EPSCoR (Experimental Program to Stimulate Competitive Research) Research Infrastructure Improvement grant to the State of West Virginia.

**West Virginia also is home to many biometrics and related information technology firms**, including the following:

- Augusta Systems, Inc.
- Azimuth Inc.
- Biometric Services International, LLC
- Computer Sciences Corporation
- Global Science and Technology, Inc.
- Information Research Corporation
- Innovative Management & Technology Services, LLC
- Lockheed Martin's Biometric Experimentation and Advanced Concepts Center (BEACON)
- MPL Corporation
- Northrop Grumman Corporation
- Plethora Technology
- SecurLinx Corporation
- Tygart Technology, Inc.
- vIdentity Systems Inc.

## ***The IS&S Technology and Biometrics Market — Important Now but Ever Growing***

Obviously, West Virginia has a significant presence in the IS&S technology area. And considerably, the need for accurate identification of individuals has never been greater than it is today. National security concerns, in combination with the rapid growth of “identity theft” as a 21st century crime, are placing a strong requirement on the development of technologies that use biometrics, advanced sensors, and other technologies to certify the true identity of an individual.

The need for such advanced technology is critically important for many applications, including banking and finance, health care and health insurance, government-issued identification such as driver’s licenses and visas, and secure access to sensitive facilities and government installations.

The **market for such technologies will likely grow at a significant pace**, although it is still relatively small (especially in comparison, for example, to the massive energy sector). “Biometrics” represented a **\$2.7 billion global market in 2007**; but, it is projected by BCC Research to grow to \$7.1 billion by 2012.

In fact, there is already a **significant current and potential customer base in West Virginia** for biometric applications. For example, the FBI CJIS Division holds the national repository for criminal fingerprints, a database of 55 million records. It has also seen a significant growth in commercial background checks for potential teachers, government workers, and others. The Division also maintains the biometrics terrorist watch list.

In the end, this is an emerging technology sector that **offers West Virginia the very real opportunity to become a major hub for a relatively new and growing industry**, as no other location in the world is currently dominant in this small sector.

## ***Important Issues and Opportunities for West Virginia’s Biometrics Platform***

During one-on-one **interviews and focus group sessions** with key leaders in this platform, several issues and opportunities were raised that should be noted and may need to be addressed, including the following:

- **West Virginia research universities may not be deep enough in this area**, especially in research capabilities and faculty, to drive technology development (faculty and resources are too few and the best faculty are spread too thin)
- **Industry is too often brought to the table through CITEr**, which takes work out of West Virginia (some CITEr consortium universities are out of state)
- **Industry often does not want to work through CITEr** since intellectual property generated within CITEr is not protected and instead remains in the public domain
- **Most pure biometrics companies are quite small** and have limited internal R&D capabilities
- Small companies present an opportunity for contract research with universities, but **need streamlined intellectual property agreements** to work
- Most of **West Virginia’s biometrics companies are service oriented** and not in the business of producing or manufacturing technology
- The state’s large **biometrics base has not attracted biometrics product manufacturers** or even R&D centers for tangible products

- **Small West Virginia biometrics companies may be purchased and moved** out of state by firms such as L1 which are acquiring small companies
- **Capital is not readily available** for start-up companies
- **Incubator space is needed** to house and nurture new start-up biometrics companies in the I-79 corridor.

Although there was concern about industrial involvement with **CITeR**, the Center has a membership of 21 companies, federal agencies, and nonprofits who cooperatively manage projects and their IP. CITeR represents an **internationally recognized, NSF center** that draws or can draw talented researchers and other professionals to the state. In general, such NSF Industry/University Cooperative Research Centers (I/UCRCs) provide a **solid foundation for both fundamental research and technology development with commercial potential**.

**Three strategies and eight actions**, summarized in Figure B-2 and Table and detailed below, are proposed to grow West Virginia’s biometrics economy. Actions marked critical are those that have the greatest priority, although some may take several years to accomplish. Immediate actions are those that should be undertaken in the first year of implementation. Short-term actions should be undertaken in 1 to 3 years, and mid-term actions should be undertaken in 3 to 5 years.

**Figure B-2. Overview of Biometrics Strategies and Actions**

<b>Bring key stakeholders together to guide biometrics sector development</b>	<b>Build a stronger biometrics base</b>	<b>Aggressively promote West Virginia as the international hub for biometrics—identification, security and sensing technology</b>
<ul style="list-style-type: none"> <li>▪ Fund the West Virginia Biometrics initiative to form the platform steering committee comprising representatives from industry, government, nonprofit, and R&amp;D institutions</li> <li>▪ Continue to identify and promote opportunities and high-value projects with alignment to existing capabilities in identification, security and sensing technology areas</li> <li>▪ Continue to develop and implement plans, projects or activities focused on high-priority theme areas</li> </ul>	<ul style="list-style-type: none"> <li>▪ Integrate biometric applications and technologies within state controlled facilities to spur development of West Virginia biometrics companies and industry</li> <li>▪ Encourage intellectual property development and technology transfer at West Virginia universities and invest in biometrics products from West Virginia R&amp;D institutions</li> <li>▪ Provide funds to small West Virginia biometrics companies to support joint R&amp;D projects with area universities and user organizations specific to commercial product development</li> <li>▪ Recruit a product-based company in the biometrics space</li> </ul>	<ul style="list-style-type: none"> <li>▪ Provide funding through the West Virginia Department of Commerce to support and expand the West Virginia Biometrics Initiative’s sector-promotion activities</li> </ul>

Table B-1: Proposed Biometrics Strategies and Actions

 <b>BIOMETRICS STRATEGY ONE</b>		Bring key stakeholders together to guide biometrics sector development			
ACTION	PRIORITY	TIME FRAME	LEAD ORGANIZATION	RESOURCES	
<b>Action B1.1:</b> Fund the WV Biometrics Initiative to form the platform steering committee comprising representatives from industry, government, nonprofit, and R&D institutions	Critical	Immediate	WV Biometrics Initiative and WVDO	\$250,000 annually (see Action 8 in General Strategies)	
<b>Action B1.2:</b> Continue to identify and promote opportunities and high-value projects with alignment to existing capabilities in identification, security, and sensing technology areas	High	Immediate	WV Biometrics Initiative	WV Biometrics Initiative and key stakeholders	
<b>Action B1.3:</b> Continue to develop and implement plans, projects, or activities focused on high-priority theme areas	High	Short- to Mid-Term	WV Biometrics Initiative	WV Biometrics Initiative and key stakeholders	
 <b>BIOMETRICS STRATEGY TWO</b>		Bring key stakeholders together to guide biometrics sector development			
ACTION	PRIORITY	TIME FRAME	LEAD ORGANIZATION	RESOURCES	
<b>Action B2.1:</b> Integrate biometric applications and technologies within state-controlled facilities to spur development of WV biometrics companies and industry	High	Mid-Term	WV Biometrics Initiative, WVDO	Could be significant, requiring state policy supports and financial incentives; but, with value established, could far outweigh expenditures	
<b>Action B2.2:</b> Encourage intellectual property development and technology transfer at WV universities and invest in technology commercialization of biometrics products from WV R&D institutions	High	Immediate	WV Biometrics Initiative Plus lead organizations noted in related actions in General Strategy section	WV Biometrics Initiative and key stakeholders (plus resources from related actions in General Strategy section) <i>This is not an independent action but instead links to several general recommendations under Strategies One and Two</i>	
<b>Action B2.3:</b> Provide funds to small WV biometrics companies to support joint R&D projects with area universities and user organizations specific to commercial product development	High	Short- to Mid-Term	WV Biometrics Initiative Plus lead organizations noted in related actions in General Strategy section	WV Biometrics Initiative and key stakeholders (plus resources from related actions in General Strategy section) <i>This is not an independent action but instead links to several general recommendations under Strategies One and Two</i>	
<b>Action 2.4:</b> Recruit a product-based company in the biometrics space	High	Mid-Term	WV Dept of of Commerce, WVDO, WV Biometrics Initiative	Significant — will likely require location incentives from the State of West Virginia and local government	

 <b>BIOMETRICS STRATEGY THREE</b>	<b>Aggressively promote WV as the international hub for biometrics, identity, security and sensing technologies</b>			
	ACTION	PRIORITY	TIME FRAME	LEAD ORGANIZATION
<b>Action B3.1:</b> Provide funding through the WV Department of Commerce to support and expand the WV Biometrics Initiative's sector-promotion activities	High	Immediate	WVDO and WV Biometrics Initiative	\$250,000+

**BIOMETRICS STRATEGY ONE** Bring key stakeholders together to guide biometrics sector development

**Rationale:** West Virginia contains multiple companies, R&D organizations, and major technology-user organizations engaged in various aspects of biometrics research, consulting, and services. The West Virginia Biometrics Initiative has a good start on bringing organizations and key leaders together and generally driving the biometrics and identity management sector in north-central West Virginia. However, the Initiative to date has restricted staffing and curbed activities because of limited financial resources. This organization is poised to deliver greater leadership and facilitation to the IS&S Technology platform in West Virginia.

In fact, the West Virginia Biometrics Initiative has developed a preliminary **Biometrics and Identity Management Strategic Plan** (January 2008). It is recommended that this plan form the basis for further development and discussion among key stakeholder groups, including commercial biometrics companies and user organizations.

The plan **should be used in conjunction with this Blueprint** to identify and promote opportunities and projects and implement plans and activities to enhance IS&S technology as a key platform area for the State of West Virginia.

Expanding West Virginia's R&D base by itself brings positive economic benefits by attracting external research funds; but, ultimately, **generating larger-scale economic impacts needs to be the main focus** through the following:

- Value-added **product development** from R&D-based innovations
- **Technology transfer** and commercialization of biometrics intellectual property
- **Attraction** of existing IS&S technology companies

**West Virginia Biometrics Initiative  
Preliminary Biometrics and Identity Management Strategic Plan**

**Vision:** North-Central West Virginia (NCWV) will host a vibrant, thriving biometrics and identity management industry cluster that will be recognized worldwide as a leader in biometrics and identity management

- Goal 1: **Increase recognition** of NCWV as a viable location for biometrics and identity management activity
- Goal 2: **Build NCWV's capacity** in biometrics and identity management
- Goal 3: **Enhance professional development** opportunities for NCWV biometrics and identity management workers
- Goal 4: **Promote entrepreneurship** in NCWV
- Goal 5: **Expand access to capital** for NCWV biometrics and identity management companies
- Goal 6: **Assist in ongoing and proposed TBED** efforts
- Goal 7: **Inform decision makers** of West Virginia tax, regulatory, and economic development policies that are viewed as anticompetitive
- Goal 8: **Surface nonbiometric information technology-related economic development opportunities** to decision makers

***Action B1.1: Fund the West Virginia Biometrics Initiative to form the platform steering committee comprising representatives from industry, government, nonprofit, and R&D institutions***

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*This action is also described in the General Report (see Action Eight).*

Battelle's experience with many TBED projects across the United States shows that a **formal organization needs to be formed that comprises leaders from key stakeholder groups within the platform area**. Working together, these leaders evaluate and prioritize platform development initiatives and present a united front in promoting priority projects and securing funds from key external sources.

**The existing West Virginia Biometrics Initiative should form the central organization** around which the platform is built. Since the biometrics industry is in its infancy, compared with many other technology areas, West Virginia has a window of opportunity to establish the state as the leading center for biometrics. But, all involved must act soon.

This action **will require providing funds** to the organization to allow it to more appropriately staff its functions and carry out its activities. Continued volunteer and part-time activities and lack of adequate funding for the state's leading biometrics organization will not suffice if the state hopes to become a national and global leader in biometrics.

This action will **require expansion of the West Virginia Biometrics Initiative advisory group to become a more robust Biometrics Platform Steering Committee**. Membership should include representatives from the biometrics industry; universities; biometrics-user, independent research, and economic development organizations; and state and local government. In fact, **this has already begun with the formation of the Biometrics Working Group**.

**West Virginia Biometrics Initiative**

- Vision is to **focus on existing West Virginia biometrics industry** capacity to:
  - Develop new knowledge
  - Develop new products
  - Develop new services
- Goal to have local industries and partners **collaborate in every major federal** biometrics Request for Proposal
- Goal to have the organizational capability to **interact with out-of-state biometrics players**
- Goal to **draw human and capital resources** into the region
- Goal to **serve as the catalyst** to enhance the biometrics industry in West Virginia by:
  - Developing regional basic knowledge infrastructure
  - Building regional capability
  - Creating a regional biometrics marketing and branding strategy

## Biometrics Working Group

### Ralph Bean, J.D.

Member  
Steptoe & Johnson PLLC

### Brian Bell

Vice President and General  
Manager  
Global Science and Technology

### Thomas Bush

Assistant Director  
Criminal Justice Information  
Services, FBI

### Valerie Evanoff

Chief Executive Officer  
Biometric Services International,  
LLC

### Patrick Farrell

Deputy Program Manager  
Biometrics Task Force Services  
Computer Science Corporation

### Terry Fenger, Ph.D.

Director, Forensics Science Center  
Marshall University

### Craig Hartzell

President  
Azimuth Inc.

### Barry Hodge

President and CEO  
SecurLinx Corporation

### Todd Hooker

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Business and Industrial  
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### Steve Hooks

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### Larry Hornak, Ph.D.

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West Virginia University

### Mike Kirkpatrick

Executive Director  
West Virginia Biometrics Initiative

### Jason Lis

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### John Maher, Ph.D.

Vice President for Research  
Marshall University

### Bob McLaughlin

President  
I-79 Development Council

### Chirag Patel

President & CEO  
Innovation Management &  
Technology

### Curt Peterson, Ph.D.

VP for Research and Economic  
Development  
West Virginia University

### Charles Schliebs, J.D.

Co-Founder and Managing Director  
iNetworks

### Steve Spence

Director, International Division  
West Virginia Development Office

### Linda Wellings

President  
MPL Corporation

### Bob Wentz

President  
Information Research Corporation

### LaRue Williams

Associate Director, Biometric  
Knowledge Center  
NSF Center for Identification  
Technology  
Research, West Virginia University

### Michael Yura, Ph.D.

President  
Yura Consulting LLC

Over a relatively short period, the West Virginia Biometrics Initiative has engaged in both promotional and awareness and recruitment and expansion activities. It has also promoted commercialization activities. The organization has been successful in recruiting consulting organizations such as Booz Allen and Accenture. So far, however, it has not recruited a manufacturing company, although the lack of financial incentives has been a limiting factor.

The West Virginia Biometrics Initiative also hosts a quarterly forum, bringing together companies and other stakeholders, and has sponsored an event on Capitol Hill supported and attended by Governor Joe Manchin and Senator Jay Rockefeller. Several West Virginia companies had booths at the event, and many “beltway” company representatives attended. It also publishes and distributes a weekly e-mail update with recipients around the world, and the organization’s Web site receives 300 to 400 hits per month.

However, the West Virginia Biometrics Initiative can and should do much more to promote the IS&S technology industry in West Virginia, and **with increased support** should be able to better serve and help grow this important sector to **grow West Virginia’s biometrics economy**.

**Resources Required:** \$250,000 per year to support additional staff and organization resources and activities (see Action Eight in the General Report)

**Priority:** Critical

**Time Frame:** Immediate

**Recommended Lead Organizations:** West Virginia Development Office (WVDO) to provide funding; West Virginia Biometrics Initiative to continue and expand platform committee activities

**Intended Outcomes:**

- Continue to **grow the West Virginia academic R&D base** at a pace that significantly exceeds that of the nation, with a target of \$360 million by 2015
- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)
- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

***Action B1.2: Continue to identify and promote opportunities and high-value projects with alignment to existing capabilities in IS&S technology areas***

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The **West Virginia Biometrics Initiative already engages** in these activities. This action, especially combined with Action B1.1 to provide more resources, will help the organization expand and enhance its identification and promotion of opportunities.

West Virginia is well placed to pursue multiple IS&S-related projects. In fact, one of the main goals should be to get independent companies and organizations to join together in contract proposals and applications when appropriate. West Virginia industry **experts suggest millions, if not billions, of dollars have been left on the table** because the right entities — especially small companies, but also organizations — did not come together to jointly pursue contract opportunities. Instead, small West Virginia companies often compete for the same contracts with none winning; those same small companies could come together, form much stronger proposals and teams, and have a much better chance to win those contracts.

As an aside, but an important one, larger or more mature firms should be encouraged to mentor newer or smaller firms, with the overall goal of an improved biometrics economy in the state and the concept that “a rising tide lifts all boats.”

Opportunities should be **prioritized based on economic impact**, with an emphasis on those that will generate larger-scale benefits in West Virginia, especially those that will create expanded job opportunities in value-added biometrics products. Although defense and federal opportunities are vital and should continue to be a key focus, other areas like health care, banking, and finance will become more important in the future and should also be considered for new activities and projects.

The **IS&S Technology platform will likely benefit from federal priorities** under the new federal administration as well. West Virginia is well positioned to play a distinctive leadership role in stated new administration priorities such as homeland security,

information security and privacy, and the use of technology in government while ensuring security of networks.<sup>1</sup>

Moreover, identification and validation technologies are only just starting to break through into more widespread adoption in corporate environments (such as the banking, credit card, health care, and insurance industries). Again, the opportunity presents itself for West Virginia to establish an early leadership position in products and services for these markets.

**Resources Required:** Staff time from West Virginia Biometrics Initiative and key stakeholders

**Priority:** High

**Time Frame:** Immediate

**Recommended Lead Organization:** West Virginia Biometrics Initiative

**Intended Outcomes:**

- Continue to **grow the West Virginia academic R&D base** at a pace that significantly exceeds that of the nation, with a target of \$360 million by 2015
- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)
- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

### ***Action B1.3: Continue to develop and implement plans, projects, or activities focused on high-priority theme areas***

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As with Action B1.2, the **West Virginia Biometrics Initiative already engages** in these activities. This action, especially combined with Action B1.1 to provide more resources, will help the organization expand and enhance its development and implementation of plans, projects, and activities.

Within the IS&S Technology platform, there are likely to be **multiple technology development and commercialization opportunities**, some pushed by the technology and others pulled by market need. Some, if not many, of these opportunities will require collaboration among different companies and organizations. The West Virginia Biometrics Initiative will help facilitate this collaboration and lead the development and implementation of various plans, projects, or other activities that arise.

However, opportunities and needs in one area may be very different than those in another. For example, electronics and computer science–based pattern recognition technologies may have very different researchers, sponsoring agencies, and industry partners than molecular biomarker technologies.

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<sup>1</sup> As President Elect, Barack Obama's policy platforms in this regard are online at [www.barackobama.com/issues/technology/](http://www.barackobama.com/issues/technology/).

Thus, the **highest-priority project areas may need to have their own subcommittees** or other organizational structures to guide their development. Initially, given the emerging status of biometrics as a relatively new industry, there may be only a couple of these subcommittees; but, over time, this number would be expected to increase.

Development of **specific plans will occur as needed** based on the opportunities and players involved. Those involved in specific projects may include some of the main Biometrics Platform Steering Committee members from West Virginia Biometrics Initiative, but also other researchers, stakeholders, and industry representatives specific to that opportunity.

#### Potential Subcommittees for IS&S Technology Platform

- **Marketing integrated service solutions** for biometrics-user organizations, including expanding biometric applications in the private sector
- Development of biometrics **product manufacturing** in West Virginia
- **Promotion and awareness building** for West Virginia as the international hub for biometrics
- **Long-term projects** in emerging opportunity areas such as molecular recognition technologies

**Resources Required:** Staff time from West Virginia Biometrics Initiative and key stakeholders

**Priority:** High

**Time Frame:** Short- to mid-term

**Recommended Lead Organization:** West Virginia Biometrics Initiative

**Intended Outcomes:**

- Continue to **grow the West Virginia academic R&D base** at a pace that significantly exceeds that of the nation, with a target of \$360 million by 2015
- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)
- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

BIOMETRICS  
STRATEGY  
TWO

Build a stronger commercial biometrics base

**Rationale:** West Virginia, along the I-79 Corridor in north-central West Virginia, has already developed a **small but significant base of commercial biometrics support companies** — firms providing integration, support services, and software development for the major biometrics-user organizations in the state (primarily the FBI and DoD). Although this has been an important initial step in the development of the biometrics industry in the state, it has **not yet resulted in the generation of a manufacturing base** built on local innovations in identification, security, and sensing R&D.

Certainly, the biometrics service sector can be an important contributor to West Virginia's economy and may expand to be a major knowledge- and service-exporting sector for the state. However, **high employment and business multiplier effects are typical of manufacturing and production work.**

Thus, the state would benefit significantly if it could start to produce IS&S hardware, software, intellectual property, or other products for export.

#### Pathways for Developing a Stronger Commercial Base in Biometrics

- **Recruit** existing product-based companies to locate in West Virginia
- **Diversify** current service providers into product-based businesses
- **Create** new companies based on innovations from universities, nonprofits, federal organizations, and companies

#### ***Action B2.1: Integrate biometric applications and technologies within state-controlled facilities to spur development of West Virginia biometrics companies and industry***

The goal of this action is to **create demand for biometric applications and technologies** to spur further demand and economic development in this sector.

The State of West Virginia issues multiple identification cards to employees and to the West Virginia public (such as driver's licenses). West Virginia's state colleges and universities also have student and employee ID programs. Many buildings already use security systems. Ideally the **State of West Virginia should be an early adopter of biometrics**, identification, and security technologies developed within the IS&S Technology platform in the state, thereby providing companies with a significant customer and a demonstration site to help them market their West Virginia-produced products — and thus create economic demand for this platform.

However, **the State of West Virginia would not be required to immediately spend a lot of money**, but instead should integrate biometric applications and technologies as new opportunities become available — and **only when the technologies add value and/or save money in the long term** (i.e., show a true return on investment). These opportunities could arise from upgrades of existing state facilities, including schools, government agencies, universities, and other facilities, but also for construction of new facilities.

Importantly, many (if not most) biometric applications and technologies provide not only increased safety and security but also real savings in the form of, for example, enhanced efficiency; increased productivity; and reduced risk, errors, and theft. In the end, state players in the IS&S technology area need a sincere willingness from state decision makers to have their biometric applications and technologies fairly evaluated on the value they would provide as facilities are upgraded or new facilities are built.

The state may also consider providing incentives to private institutions in West Virginia to adopt West Virginia-produced biometric solutions. Major client groups such as hospitals and health care facilities, private colleges, and businesses require IS&S technology solutions and may be encouraged to choose West Virginia-based vendors if a state incentive supports such a choice.

**Resources Required:** Could be significant, requiring state policy supports and financial incentives; but, with value established, could far outweigh expenditures

**Priority:** High

**Time Frame:** Mid-term

**Recommended Lead Organization(s):** West Virginia Biometrics Initiative and WVDO

**Intended Outcomes:**

- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

***Action B2.2: Encourage intellectual property development and technology transfer at West Virginia universities and invest in technology commercialization of biometrics products from West Virginia R&D institutions***

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*This action is not independent but instead links to the General Report recommendations under Strategies One and Two, especially the following:*

- Action Three: Encourage the state's universities to continue to increase support for technology transfer and commercialization
- Action Four: Create a university-industry matching grant program
- Action Five: Publicize and celebrate TBED successes
- Action Six: Continue to provide support for the West Virginia Research Trust Fund, which supports faculty recruitment and development of research infrastructure
- Action Seven: Establish an Innovation Institute Program focused on the technology platforms that would fund people, equipment, and facilities and create proof-of-concept funds to support cluster development projects

The actions in Strategies One and Two are **designed to create a climate and investment infrastructure — a culture — that promotes commercialization** of university- and laboratory-derived technology innovations.

Given the presence of major biometrics research projects at WVU and within the NSF-funded CITeR, biometrics innovation will likely continue in West Virginia. Thus, it is imperative that economic development programs and structures be properly aligned to support and facilitate commercialization of these technologies within West Virginia.

Although this action is covered in the General Report, it is included here to **reinforce the importance and to emphasize the role the West Virginia Biometrics Initiative** may play in supporting and tracking these activities and actions.

**Resources Required:** Staff time from West Virginia Biometrics Initiative and key stakeholders (plus resources from related actions in General Report)

**Priority:** High

**Time Frame:** Immediate

**Recommended Lead Organizations:** West Virginia Biometrics Initiative plus lead organizations noted in related actions in General Report

**Intended Outcomes:**

- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)
- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020

- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

***Action B2.3: Provide funds to small West Virginia biometrics companies to support joint R&D projects with area universities and user organizations specific to commercial product development***

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As with Action B2.2, this action is not independent but instead also links to many of the General Report recommendations, including the following:

- Action Two: Support and expand a statewide network providing comprehensive commercialization services and support to technology entrepreneurs and early-stage start-up companies
- Action Three: Encourage the state's universities to continue to increase support for technology transfer and commercialization
- Action Four: Create a university-industry matching grant program
- Action Seven: Establish an Innovation Institute Program focused on the technology platforms that would fund people, equipment, and facilities and create proof-of-concept funds to support cluster development projects
- Action Nine: Provide funds to match SBIR and STTR Phase I awards received by West Virginia companies
- Action Ten: Increase funding for INNOVA's seed and early-stage investment fund
- Action Eleven: Use tax credits to make capital available to early-stage technology companies
- Action Twelve: Attract venture fund investments in West Virginia technology companies
- Action Fourteen: Maintain the state's refundable R&D tax credit and Economic Opportunity Tax Credit for specified taxpayers

As noted previously, **no other state is better positioned than West Virginia** to capitalize on the ever-expanding need for advanced security technologies. The state, especially in north-central West Virginia, has developed a cluster of early adopters of biometrics, identification, and security technologies and a number of service companies and organizations. The area also includes a strong research base at WVU.

However, much of the **research and technology development requires cultivation and funding** to move the innovations into commercial reality. Appropriate assistance and support to develop new products and processes and generate marketable intellectual property will lead to the creation of jobs and start-up companies.

Assistance from programs like INNOVA's commercialization network will be vital for cultivating biometrics commercialization. These efforts will help entrepreneurs, start-up firms, and small companies move technology into the marketplace.

Adequate funding is also vital for growing West Virginia's biometrics economy. Financial support — whether through the university-industry matching grants program, the proposed Institutes program, the recommended seed and early-stage capital program, or others —

should be directed to support companies in joint R&D projects with academic researchers and for proof-of-concept and early-stage technology development.

Although this action is covered in the General Report, it is included here to **reinforce the importance and to emphasize the role the West Virginia Biometrics Initiative** may play in supporting and tracking these activities and actions.

**Resources Required:** Staff time from West Virginia Biometrics Initiative and key stakeholders (plus resources from related actions in General Report)

**Priority:** High

**Time Frame:** Short- to mid-term

**Recommended Lead Organizations:** West Virginia Biometrics Initiative plus lead organizations noted in related actions in General Report

**Intended Outcomes:**

- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

#### ***Action B2.4: Recruit a product-based company in the biometrics space***

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**Most advanced technology hubs** can trace their cluster of businesses and economic activity in the sector back to a major “parent” company that spins off people, technologies, and companies that further seed the sector in the immediate region. This company may have resulted from local university research; but, the research alone is not enough to spur cluster growth. One or two fast-growing companies typically form the center of a growing universe of smaller spin-out companies.

**West Virginia needs that initial product-based company**, and the most rapid route to fulfilling this need is to recruit an existing manufacturer or other company with a tangible product. For the IS&S technology area, the company could be a manufacturer of hardware, but might instead be a producer of software, internet technology, or other intellectual property. In the end, the industry needs companies providing more than just (or mostly) consulting and services.

Relocating a company is expensive; but, the presence of the FBI and DoD centers will be a major attraction. It is very likely, however, that state incentives will be required to make such a move happen, perhaps requiring a major investment of state funds. While the State of West Virginia does not currently favor the use of location incentives, Battelle believes that an exception should be made in this area. West Virginia has an opportunity to achieve a strong leadership position in growing a high-technology cluster, and recruitment of a manufacturer is a key step in securing this position.

**The key recommendation, therefore, is that the state incentivizes attraction of a manufacturer in biometrics** to build early production expertise for the sector in the state.

The West Virginia Department of Commerce, WVDO, and the WVVI should **collaborate in the recruitment and attraction strategy and associated recruitment activities** as a high-priority project.

**Resources Required:** Significant — will likely require location incentives package from the State of West Virginia and local government

**Priority:** High

**Time Frame:** Mid-term

**Recommended Lead Organizations:** West Virginia Department of Commerce, WVDO, and West Virginia Biometrics Initiative

**Intended Outcomes:**

- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020

BIOMETRICS  
STRATEGY  
**THREE**

Aggressively promote West Virginia as the international hub for biometrics — identification, security, and sensing technology

**Rationale:** Because there is **no current dominant hub for biometrics** globally and biometrics is an emerging industry, there is a small but significant window of opportunity for **West Virginia to aggressively position itself as a leading location** for this important technology sector. The West Virginia Biometrics Initiative is already undertaking some out-of-state promotional work (with events and newsletters, for example); but, the Initiative needs more resources to accomplish marketing and promotional activities.

***Action B3.1: Provide funding through the West Virginia Department of Commerce to support and expand the West Virginia Biometrics Initiative's sector promotion activities***

The logical support mechanism is the West Virginia Department of Commerce providing funding for the **West Virginia Office of Development to work jointly with the West Virginia Biometrics Initiative** in developing a marketing and outreach plan and funding its implementation. Funding will be needed for marketing and promotional activities, including production of promotional materials, advertising in biometrics trade journals, and travel for trade shows and one-on-one meetings with prospective companies.

**Resources Required:** \$250,000+

**Priority:** High

**Time Frame:** Immediate

**Recommended Lead Organization:** WVDO and West Virginia Biometrics Initiative

**Intended Outcomes:**

- Continue to **grow the West Virginia academic R&D base** at a pace that significantly exceeds that of the nation, with a target of \$360 million by 2015
- **Increase R&D funding in platform areas** in all sectors (academia, nonprofits, and industry)

- **Increase industry-supported R&D** at West Virginia's universities and colleges to match the national average by 2020
- **Increase the number of technology-based companies** in West Virginia at a rate higher than the national average
- **Increase employment** in private-sector, technology-based companies in West Virginia to reach the national average by 2020
- **Increase the number of spin-off companies** developed from technology created at West Virginia's universities to achieve the national average by 2020



## CONCLUSION

**The State of West Virginia** — including governmental agencies, economic development groups, universities, nonprofit organizations, and business and industry — **must act boldly and quickly** to grow its research, technology transfer, and commercialization activities. TBED is an economic imperative, with multiple studies showing that a state's economic success can be largely attributed to the growth of high-technology businesses.

Innovation and technology lead not only to more jobs but also to higher-paying jobs, fueling economic growth and increasing the standard of living across entire states and regions where TBED is prevalent. Thus, **TBED is a critical component of West Virginia's economic future.**

Unfortunately, TBED is not widespread in West Virginia compared with other states. Its innovation economy is young and must be cultivated. West Virginia is behind its neighbors, behind its peers, and **behind most of the nation** in building a technology economy.

However, **West Virginia does have significant strengths** with strong foundations in several technologies, including in Identification, Security, and Sensing Technology (Biometrics).

This Blueprint lays out **recommended strategies and actions for the Biometrics Platform** — which can be used exactly as proposed or as guidelines for further refinement and development — **to boost West Virginia's biometrics technology economy.**

Successful implementation of the Blueprint will require:

- **Significant investments** in West Virginia's technology infrastructure
- **Strong leadership** from the recommended lead organizations — and other groups within the state
- **Long-term commitment** from all stakeholders, including West Virginia's citizens
- **Strong resolve** to make critical and sometimes difficult decisions
- **Genuine will to compete.**

No single organization will be able to carry out this Blueprint or boost West Virginia's innovation economy alone. But, with the right investment, true collaboration among all stakeholders in the state's public and private sectors, **West Virginia can and will become a leader** in this vital economic sector.

"We have a local saying that biotechnology in North Carolina has been a 30-year overnight success."

Barry Teater, North Carolina Biotechnology Center, in *Research Ripple: States attracted to job multiplier effect of biotech firms*, The Council of State Governments, May 2006.

This report and all other related reports — as well as  
other information about West Virginia's  
technology economy — can be found at...

**[www.TechConnectWV.com](http://www.TechConnectWV.com)**



*This report is the **BIOMETRICS REPORT** only.*

The full reports can be found at:

[www.TechConnectWV.com](http://www.TechConnectWV.com)

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