



VIEWS & VISIONS

A publication of Bowles Rice McDavid Graff & Love LLP

Spring 2007



**Research.
Development.
Prosperity!**

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Research. Development.
Prosperity!

Spring 2007

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Research and Development Creating Future Prosperity

F. Thomas Graff, Jr.
Bowles Rice McDavid Graff & Love LLP



FROM OUR
MANAGING
PARTNER

Our firm mission statement affirms that Bowles Rice is a professional service organization, contributing to the success of our clients and the vitality of our communities through advocacy, counsel, leadership and service. That commitment is especially true in the research and development world of technology. This issue of "Views & Visions" further confirms that Bowles Rice has made substantial commitments in the field of technology and is ready, willing and able to participate with entrepreneurs and business, education and government leaders in the work of advancing research and development of technology in our communities to create a new economy.

For the last five years, I have been the Chairman of the Chemical Alliance Zone (CAZ). This job has given me the opportunity and pleasure of meeting and working with not only the plant managers for the chemical plants in Kanawha, Cabell, Putnam and Wayne Counties, but with individuals from business, education and government who have a vested interest in advancing the business of technology in our area. Through those relationships, I have witnessed firsthand the work of many of the contributors to this issue of "Views & Visions," and I am personally very proud to share some of their exceptional work with our readers.

Building research capability in terms of assembling talent and acquiring facilities, and the development of successful research centers take years and requires great care and expertise in the planning process. In our region, many of the basics are in place in the research corporations of our universities,

in the missions of organizations like MATRIC, INNOVA, WVEPSCoR and Battelle, and in the minds of our entrepreneurs, engineers, scientists and chemists; not to mention, the generosity of Dow and other multinational companies doing business in West Virginia and Kentucky.

Admittedly, some of the basics are works in progress or have not yet begun, but from all I have learned, there are major technological research and development initiatives underway and off to a very good start

For CAZ and others, the South Charleston Technology Park is a facility that can house and nurture adventures into the new economy. With the help of Dow, the Park offers a prime opportunity for our universities and businesses to collaborate with government and the CAZs of the world to support and encourage research and development on a major scale.

Collectively, the articles in this issue of "Views & Visions" paint a bright future for West Virginia and Kentucky in technology and related areas. Additionally, there is solid evidence that we have many forces at work at the same time which are moving in the same direction with common objectives. Too often in the past, our efforts have failed or been ineffective because they lacked coordination and cohesion. This time, the rising storms of technology activity appear to be building on each other. I can assure you that Bowles Rice is committed to support these activities to keep the research and development ball rolling for our future prosperity! ♡

Sincerely,

A handwritten signature in dark ink that reads "Tom".



West Virginia Competes in the 21st Century

Gayle C. Manchin, First Lady
State of West Virginia

Gayle Conelly Manchin has been a teacher in Marion County schools and a professor at Fairmont State College while also being active in United Way and community service groups in the Fairmont area.

The Manchins moved to Charleston in 2001 and Gayle began playing an active role in community service organizations throughout the area. In addition to her being First Lady, Gayle is a national board member of The Center for Study of Economic Diversity, Inc. in Texas, and serves by appointment to the National Education Commission of the States.

Mrs. Manchin serves as a Commissioner on the West Virginia Commission for National and Community Service, Chair of the Governor's Healthy Lifestyles Coalition, Vice Chair of the Governor's Cabinet on Children and Families, and a Co-Chair on the Governor's 21st Century Jobs Cabinet. She is a partner on the West Virginia Partnership to Promote Community Well Being Commission, serves as the Nominating Chair on the executive board of The Education Alliance and is a member of the Vandalia Rotary Club of Charleston.

In West Virginia, the Governor has made a commitment to ensure business, education, and labor leaders a permanent seat at the table for all discussion and decisions around how we improve our economic climate, enhance the educational opportunities, and build a system that does not leave any segment of our population behind as we move the state forward in the 21st century.

An overall goal of the Global Vision for the 21st century plan is to promote that educational achievement and economic development have a lasting impact on earnings and quality of life. While there are many issues, the bottom line is that West Virginia must develop its talent and prepare its citizenry and workforce for the 21st century global economy if we are to prevail.

Technology and globalization are changing the skills needed by workers and the products demanded by markets. It also means that West Virginia is competing not only with neighboring states and nationally, but also internationally. Success requires a seamless system that integrates education policy with workforce and economic development, and business strategies. The 21st Century Jobs Cabinet is a broadly representative group of decision-makers that the Governor has charged to create the blueprint and is co-chaired by Ralph Baxter, CEO of Orrick, Herrington, & Sutcliffe, LLP, and myself, an educator and strong advocate for children and families.

As John Chambers, President and CEO of Cisco Systems and Honorary Chair of our initial forum so succinctly stated, "Jobs will

go wherever the best workforce is ... [and that increasingly hinges on] ability."

Primarily, we know that our citizens must be challenged to reach their full potential through education and training programs built on academic rigor, relevance, responsibility, and relationships, which is the very premise of 21st century learning skills. This can only be accomplished through cutting edge technology, which will include a statewide portal, expanded broadband access, and proven best classroom practices in a seamless approach from early childhood through adult programs at every level.

From our dialogue, an action plan is being developed around specific areas of:

Curriculum Transformation, which dramatically focuses on how we teach and what schools look like in this millennium.

Communication, which will require West Virginians not just to teach new thinking skills but to do new thinking.

Teacher Excellence, which means that to attain (and retain) the skills that will help them change results in the classroom and contribute to needed system reforms, teachers must have meaningful professional development that includes time for collaboration and sharing of best practices during the regular school day.

Strategic Partnerships, which must bring stakeholders together and promote collaboration to solve the issues that will determine West Virginia's long-term economic prospects.

Leadership, which promotes a voluntary plan of bringing business principles and leadership skills to schools, colleges and universities, but especially to public schools—which provide the building blocks for future life and work success—using the powerful team of a principal paired with a corporate CEO and master educator.

Even with universal popular support for the systems transformation called for in this initiative, committed leadership will be required to make changes. At every level from local district and program administrators, to legislators, and to state agency officials, decision-makers must be willing to eliminate ineffectual practices and embrace innovative ideas that will produce better results.

These issues, combined with the 21st Century Jobs Cabinet – “P20” are creating

the opportunities for West Virginians to set a new standard and raise the bar on our expectations for ourselves about who we are as a state and the future we are promoting for all of our citizenry. It is this diverse collection of philosophy, education, experience and leadership that is different from the cabinets of yesterday; it is different because it is not separate meetings with independent goals; it is different because there is a governor in West Virginia today that says anything is possible if we share information and agree to respectfully disagree as we look for the common ground of understanding and solutions; it is different because the stakes are higher but the rewards are also greater; it is different because we are creating the legacy for our children and grandchildren. ♡

The First Lady's Message

I am most honored to serve as the 34th First Lady of West Virginia. Like many of you, I continue in my effort to balance several roles in my life – wife, mother, grandmother, educator, volunteer, and friend.

As the Governor's wife, one of my top priorities is to serve with dignity and pride as the hostess of our beautiful new home, the Governor's Mansion, and to preserve its historical integrity for posterity.

As First Lady, I will be tireless in my efforts to support my husband's endeavors and to level the playing field for every child in West Virginia through a life-long seamless education. I will also work to raise awareness of many issues that affect our children and families in their communities.

However, I cannot do this job alone; I ask for your support, your ideas, and your enthusiasm. You have been such an inspiration to both Joe and me throughout our work across West Virginia, and I ask for your continued commitment. Together, we can create a more connected and empowered West Virginia of which we will all be proud.





Building an Economic Engine

Dr. Stephen J. Kopp, President
Marshall University

Dr. Stephen Kopp became the 36th President of Marshall University in July 2005.

His academic career has included leadership positions with Midwestern University, Central Michigan University and Ohio University. As an administrator, he was the founding dean of both the College of Allied Health Professions at Midwestern University, and The Herbert H. and Grace A. Dow College of Health Professions at Central Michigan University, and recently served as the provost of Ohio University.

In addition to serving as Marshall's President, Dr. Kopp also serves on the boards of the Huntington Chamber of Commerce, the Huntington Area Development Council, the Huntington Museum of Art, the Marshall Artists Series, Advantage Valley, the West Virginia Roundtable, and the Mid-Atlantic Technology, Research and Innovation Center (MATRIC).

In his spare time, he enjoys Marshall Athletics, reading, golf and spending time with his wife of 35 years, Jane. He and Jane have two adult children and two grandchildren.

When most of us think of Higher Education, we tend to think of youthful days framed by learning that challenged us, experiences that shaped us, people who made a difference in our lives and the majestic halls of our alma mater that became a home away from home. These experiences were made possible largely through public, and to lesser extent, private investments in our future and that of our state and nation which allowed us to live, learn and grow into productive members of society.

other sectors, like healthcare, demand larger and larger portions of state tax revenues in the coming years.

Futuristic thinking and planning are essential to making the transitions required for sustainable growth, development and fulfillment of our public charter. In contemplating how we rise above these challenges, I am convinced that strategies must be developed and investments must be made in initiatives that produce self-generating and self-sustaining revenue



As a public institution of higher learning, Marshall University continues to receive annual appropriations from the state; however, like most public universities today, that component of the overall funds required to operate the University has declined dramatically. Twenty years ago, close to eighty percent of our total operating funds were provided by the state. Today, that percentage is less than 29%, and this downward trend is likely to continue as

growth and lessen the financial burden on taxpayers, our students and their families. Only through greater self-reliance can we become the dynamic "economic engine" that generates the public value our stakeholders expect. How do we fulfill this daunting mission? The answer is as simple as it is complex.

Innovation-based research is a potent catalyst for powering this university-based

economic engine. The new Robert C. Byrd Biotechnology Science Center at Marshall University creates an unprecedented opportunity to retain research scientists from West Virginia and attract proven scientists and inventors from elsewhere. This magnificent state-of-the-art facility is a testament to the leadership and vision of our senior senator, Robert C. Byrd.

Senator Byrd understands that modern physical resources and capabilities are essential for West Virginians to compete in the rapidly evolving, technology-based global economy of the 21st century. This structure provides the physical resources required for advancing cutting-edge research that will germinate new intellectual breakthroughs which can be commercialized. These technology-transfer ventures offer long-term revenue potential that can foster

with benchmarks and accountability. At Marshall, we have developed a program that will not only succeed, but operate as a self-sustaining and self-generating enterprise. The Marshall Institute for Interdisciplinary Research (MIIR) is the product of my 20 years of personal research experience combined with proven strategies that have fostered successful entrepreneurial research elsewhere. This program requires a one-time investment from our state (i.e., use of funds to earn interest) and private benefactor contributions to create a critical mass of nine endowed research scientist positions.

MIIR will not expend any of the state's or private benefactor's investment – not one dollar. By working only with the interest generated from the initial



greater institutional self-sufficiency as state resources are needed elsewhere.

At this time it is important to mention that university-based research takes both monetary investment and sustained commitment. The competition is intense and more than one institution has tried (with limited success) to fill what can become an unending financial burden by failing to have a plan for sustainability

\$36 million investment (\$26 million from the state and \$10 million from private donors), the investment principal is maintained without risk, yielding only benefits in the form of new high-paying jobs, increased state tax revenues and new commercial enterprise.

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(OPPOSITE PAGE)

Senator Robert C. Byrd has championed West Virginia's efforts to compete in the global economy.

(THIS PAGE)

The new Robert C. Byrd Biotechnology Science Center at Marshall University is key to both retaining research scientists from West Virginia and attracting proven scientists from outside the state.



Major Universities Are Primary Engines of the Modern Economy

David C. Hardesty, Jr., President
West Virginia University

David Hardesty is president of West Virginia University, a public, comprehensive, multi-campus, land-grant university. The main campus is located in Morgantown, West Virginia, and regional campuses and other offices are located throughout the Mountain State.

Since becoming president of WVU in 1995, President Hardesty has fostered a more student-centered culture at WVU. A host of new programs, including the Mountaineer Parents Club, Resident Faculty Leaders in the residence halls, a new math learning institute, a new student recreation center, investments in student-oriented technology, and enhanced advising efforts have resulted in enrollment growth in a state with declining high school enrollments.

The Hardesty presidency has also been marked by significant growth in research and sponsored program activities, supported by new research centers, a new university library, efforts to advance technology transfer, a science building, and investments in research infrastructure and laboratories.

President Hardesty came to the University from the practice of law, where he specialized primarily in state and local taxation and corporate law. Earlier in his career, he served in the governor's Cabinet as State Tax Commissioner of West Virginia.

It's intuitive, but research now clearly validates the basic point that local economies with colleges or universities tend to grow faster than those lacking these institutions. Moreover, metropolitan areas and cities with higher levels of colleges/universities per capita tend to grow faster than those with lower levels. These correlations remain significant and positive even after controlling for a wide range of other influences on local growth.

Anyone living in or visiting Monongalia County recently sees the validity of this research in living color. Vibrancy abounds—from the cultural offerings to campus speakers to business growth. The area's economic indicators are growing at faster rates than the state averages.

What makes this story particularly compelling is that, in part, growth in north central West Virginia has occurred during a time when the state's economy suffered a recession. As a result, over the past decade, WVU has experienced significant base budget cuts and has reallocated millions of dollars into paying higher insurance costs. While less than one-third of the University's budget is comprised of state funds, such cuts can erode the foundation upon which we operate.

Therefore, our challenge was to grow atop a shrinking base so that the growth could be used to replenish lost state resources and then to make investments for the quality of our programs and services. The great news is that Governor Manchin has proposed an increase in base funding for

higher education this year which will give institutions even greater ability to invest in growth that will benefit all of West Virginia.

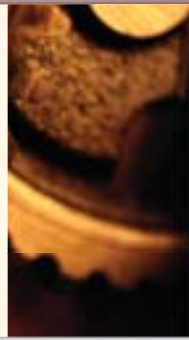
By most accounts we have exceeded even our own goals over the past decade. Enrollment has grown by more than 25%, research funding doubled, private donations doubled, the number of Extension clients doubled, and so on.

While these numbers bode well for our institution, what do they mean for our home state?

A few of our economists recently suggested several ways that higher education benefits communities. I am sure there are more, but this list is a start

Direct Expenditures

All institutions, regardless of size, spend dollars in their communities, bring in dollars to be spent and provide salaries that allow employees to spend. The size and complexity of an institution determines the magnitude of its economic engine. WVU has multiple campuses and a network of hospitals, clinics, farms, extension offices and other assets that create direct spending throughout West Virginia. The aggregate budget of the WVU enterprise is about \$2 billion, and our economic impact, according to our economists, would be roughly double that. Given WVU's economic leveraging, we also estimate that every \$1 the state invests in WVU translates into at least \$10 in the economy.



Enriching the Labor Pool

Higher education institutions populate the labor pool that attracts and retains business investments and professional services in our communities. We have all heard of companies such as Toyota heralding the applicant pool that fills up for each opening at their West Virginia operation. After more than a decade of talking to college and graduate school graduates and working with faculty and staff on our campuses, I am convinced that we have a virtually unlimited supply of skilled and educated workers for companies that will locate in West Virginia and pay nationally competitive salaries.

Synergy and Knowledge Spillover

Higher education institutions help create pools of activity that create a synergy between businesses, professional services and community amenities. Business owners are attracted to areas where there is a supply of quality health care, diversity, cultural activities, recreation and other kinds of enrichment that enhance the quality of life. College and university communities are often the nucleus of these variables that attract one business and then another, which in turn make a community that much more appealing for additional businesses. We saw similar clustering around rivers in the early settlement of the country, and in much the same way, colleges and universities help create thriving communities wherever they are.

Economic Diversification

The experts in a college or university help communities and states diversify their economies. Technology transfer refers to direct commercialization or application of knowledge from a university into the private sector. WVU research spawned Protea, a biosciences company now growing in West Virginia. The growth of the aquaculture industry is another good example. Knowledge has become the essential DNA for the 21st century economy and, as such, colleges and universities are even more important in helping communities and states compete in the global marketplace.

Developing “Generation Next”

The time is approaching when baby boomers will be retiring in great waves. Colleges and universities are critical to restocking our boardrooms, classrooms and other leadership posts. At the same time, colleges and universities face similar challenges in competing for talented faculty and staff as baby boomers retire from campuses across the country.

Promotion of Entrepreneurial Spirit

If we honor the traditional teachings of higher education, graduates of our colleges and universities will be able to think critically, analyze problems, envision and create new technologies and effectively lead others. These are all building blocks to an entrepreneurial culture that helps

With baby boomers on the verge of retirement, colleges and universities are key to building the boardroom leaders of tomorrow.

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Lexington: A Vision for Change

Mayor James H. Newberry, Jr.
Lexington, Kentucky

Jim Newberry was elected Mayor of Lexington in November 2006 by the largest margin since the city and county governments merged in 1974.

Mayor Newberry received both his undergraduate and law school education at the University of Kentucky. Upon graduation, he practiced business and banking law in Lexington and then served as Vice-President and General Counsel of Airdrie Stud in Midway.

From 1987 through 1989, he served as an Executive Officer in the Office of Lieutenant Governor Brereton Jones, focusing on agriculture, economic development and health care issues. Later, he served as Acting Secretary of Kentucky's Natural Resources and Environmental Protection Cabinet.

In 1990, he co-founded Newberry, Hargrove & Rambicure, where he practiced law until 1998, when he joined Wyatt, Tarrant & Combs.

He has served as chair of the Deacons at Calvary Baptist Church and serves on numerous boards around the community, including service as Vice-President of Health Kentucky and Vice-President of the Bluegrass Community Foundation.

As chief executive of the Lexington-Fayette Urban County Government, Mayor Newberry supervises and administers all departments of the government. The following contains excerpts from a conversation about his vision and goals for the future of Lexington.

Recently, members of the Urban County Council and my administration met in a day-long retreat and identified a half dozen items that we want to address during the course of 2007. Several of these issues are of concern to the entire Bluegrass region, and I have also started meeting with the mayors of our neighboring counties to discuss common concerns.

The Environment

The administration and the Council share a keen sense of responsibility for the environment. Environmental stewardship, which is clearly a regional concern, takes many forms. It involves using our land wisely, keeping our city clean and improving the water quality in our streams.

Unfortunately, the Urban County Government has been one of the area's biggest polluters of our streams because we have been operating sanitary and storm sewers that have failed to comply with the Clean Water Act. This information should come as no surprise. For years, neighborhood associations and homeowners have complained about an assortment of problems with both our sanitary and storm sewer systems. Despite attempts to

address some of these issues in recent years, any honest observer would have to admit that those efforts have been too little, too late.

Lexington, like Winchester and a number of cities across the country, now faces an enforcement effort from the U.S. Environmental Protection Agency for violations of the Clean Water Act related to sewers and other issues concerning water quality. Nationwide, the resulting fines and remedial obligations have totaled hundreds of millions of dollars.

Right now we do not know the size of the fine the EPA will level against Lexington, nor do we know what remedial steps we will be required to undertake. But we do know that those obligations are coming soon. Negotiations in the case are ongoing, and there is a confidentiality agreement that prohibits us from sharing much information.

In the coming months there will be an opportunity for the public to review and comment on any consent decree which may be negotiated. However, it is abundantly clear from the results of enforcement actions in other cities that the costs will be significant, and in most of those cities, significant increases in sewer user fees have been necessary to fund the remedial measures. Lexington should expect no less.

The pending EPA enforcement action provides us with an opportunity to begin the process of improving our water quality, but we should not stop there. I will soon propose to the Council that Urban County Government create a new Department of

Environmental Quality to oversee our solid waste functions, our sanitary and storm water sewer systems and our air quality.

The Department of Environmental Quality will help to ensure that our rights of way stay clean and that our gateways look attractive to both Lexingtonians and to those who come to visit. Most of all, the creation of such a department will emphasize our need to improve our environment for our children and for generations yet to come.

Vision for the Future

The Council and I have recognized the need to establish a vision for our community's future. As I said in my inaugural address, we must dream a dream that will endure, a shared vision for the future of our community.

That vision will consist of many elements. We will need to develop a visual image of the way Lexington will look in the future so that we can address our physical needs. We will also need to address our economic, cultural and human needs if we really want our community to prosper.

In the very near future, we will present a process by which the shared vision of the Council and our administration can be enhanced with broad-based involvement of our citizens.

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Lexington officials are working together to implement a shared vision for the city's future.





West Virginia's Golden Age

Thomas A. Heywood
Bowles Rice McDavid Graff & Love LLP

Tom Heywood is Assistant Managing Partner of Bowles Rice, and a former Chief of Staff to the Honorable Gaston Caperton, Governor of the State of West Virginia. He has significant experience in health care, corporate, finance and commercial law, and is recognized as one of the "Best Lawyers in America."

Tom is active in the community, and in various West Virginia business and trade associations. He serves on the boards of many charitable organizations, including Vision Shared, Imagine West Virginia, the West Virginia Venture Connection, the West Virginia Entrepreneurs Forum, Discover the Real West Virginia Foundation, Thomas Memorial Hospital, West Virginia University Hospitals, the Clay Center and the Kanawha County Library Foundation.

As a native West Virginian, I am excited to live in a time when West Virginia is entering its Golden Age.

Backdrop to the Future

Three mutually reinforcing trends and developments form the backdrop to West Virginia's coming Golden Age: (1) world demographics; (2) the global knowledge economy; and (3) the commencement of the permanent age of homeland security.

The world's population is currently 6.3 billion. Demographic projections show the planet's population rising to an estimated 9 billion people by 2040. We will be adding more people to the planet over the next 35 years than have lived on earth throughout most of human history.

The consequences of this demographic reality are manifold, and difficult to overstate. Less densely populated regions are rapidly becoming very attractive places to live. Resources are becoming increasingly valuable and scarce. In the years ahead, West Virginia's abundant natural resources, including not only her mineral and timber assets, but also her water resources and aesthetic beauty, will become an extremely attractive asset on our increasingly crowded planet.

It is commonplace to observe that we have permanently entered the global knowledge economy. Today, many talents and skills can be effectively deployed from anywhere in the world, and people no longer need to reside in major industrial and commercial centers

to succeed and prosper. Advantage, West Virginia.

In the years ahead, West Virginia and other attractive places to live will capture their fair share of talent, wealth and skills. We see evidence of this reality every day, from professionals who are relocating from major urban centers to West Virginia for quality of life reasons (such as Gardiner Smith, who has written an article in this edition of Views & Visions), to major companies who are making similar decisions (such as Chesapeake Energy, whose attraction to West Virginia is also described in this edition).

Finally, for better or for worse, we have permanently entered the age of homeland security. We live in a very connected world – a true global village – and we can never go back. West Virginia's topography, which has long been an impediment to our economic success, has now become a huge asset. Our mid-Atlantic location, protected from but proximate to East Coast population centers, has also risen in value many times over as a result of the tragic events of September 11, 2001.

The Coming Era of Abundance and Prosperity

Evidence that West Virginia is entering a new era of abundance and prosperity abounds. Our location and security have resulted in West Virginia enjoying the sixth highest incidence of second-home ownership in the United States, a distinction we have never before enjoyed. Multi-million dollar homes are going up around the state, as



people recognize what West Virginia has to offer for the next 200 years and longer.

Homeland security means abundant opportunity for West Virginia. Many federal agencies have established operations in West Virginia, and enormous capital investment is being made in West Virginia in the interests of homeland security. West Virginia will benefit richly from this investment for decades to come.

West Virginians are adopting new modes of behavior. Historically, we have been reluctant to collaborate, proud of our independence and too often hostage to

Thanks to Senator Robert C. Byrd, the FBI's Fingerprint Identification Center in North Central West Virginia is now a reality. The Center, which represents the largest public investment in the 1990s, and gives West Virginia the "crown jewel" of technology of the 21st Century and beyond, is in its infancy in generating jobs and attracting intellectual capital to North Central West Virginia.

West Virginia's colleges and universities have become crucibles of cutting edge research and development. MATRIC is bringing together some of the world's top minds to unlock and harness the chemistry of energy,

Historically, we have been reluctant to collaborate, proud of our independence and too often hostage to a scarcity mentality. However, numerous initiatives throughout West Virginia reflect a new spirit of interdependence.

a scarcity mentality. However, numerous initiatives throughout West Virginia reflect a new spirit of interdependence.

Vision Shared, Imagine West Virginia, the Discover the Real West Virginia Foundation, Advantage Valley, the Gateway New Economy Council, the West Virginia Venture Connection, the Chemical Alliance Zone, the Polymer Alliance Zone and MATRIC are but a few of the many exciting, new initiatives that are creating opportunity and prosperity across the state.

and much more. These and many other investments and initiatives across West Virginia, several of which are described in this edition of Views & Visions, will create enormous wealth, prosperity and opportunity for West Virginians for the next 50 years and beyond.

As new investments are made, our traditional assets and values will continue to serve us well. Our energy resources position us to become a world energy leader, not only in the

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Linking West Virginia's Centers of Research and Development Excellence

Betsy Ennis Dullin, Esq., P.E.
Bowles Rice McDavid Graff & Love LLP

Betsy Dulin is a partner in the Charleston office of Bowles Rice. She is a former Dean and Professor of Engineering with the college of Information Technology and Engineering at Marshall University. She is also a former engineering faculty member for West Virginia University Institute of Technology and West Virginia Graduate College.

Betsy is on the Board of Directors for both the National Institute for Chemical Studies and the Chemical Alliance Zone. She is also a member of the board of West Virginia American Water Company, a member of the National Advisory Committee, Exploring for Engineering and Technology Committee member, the Council on Research Commercialization and Technical Advisor of the Mid-Atlantic Technology, Research and Innovation Center.

In recent years, Betsy has had leadership roles as a member of the West Virginia Environmental Quality Board, Co-Chair of the Governor's Task Force on Mountaintop Mining and member of the Legislative Joint Committee on Mountaintop Mining.

In West Virginia's Kanawha River Valley, it is not uncommon to hear people reminiscing about a time when thousands of science and engineering researchers lived and worked in the area in connection with the chemical industry. These early "knowledge workers" enriched the valley in various and many ways as they raised families, volunteered their time and talents in the community, and generally went about the business of building national and global reputations in their areas of expertise.

As we all know, the economy changed along with the times, and the Kanawha Valley's chemical industry was no longer the same. However, an amazing thing happened. The talented researchers and innovators who moved to West Virginia to build their careers while enjoying a good lifestyle decided to stay. They had discovered something that provides a key ingredient to our state's research and development resurgence today – West Virginia is a unique and wonderful place to live.

This is something that has been identified countless times as a primary factor in attracting knowledge workers and all the creativity and innovation that comes along with them. Fortunately, this fact was not lost on the state's leadership, as it plotted a course that would link our centers of intellectual capital and provide the means for West Virginia's participation in the New Economy.

Due to the foresight of the state's business, government and education leaders, West Virginia has spent the last decade quietly

but intentionally redefining itself in the area of scientific research and development. One by one, new centers of R&D excellence are emerging around the state. Many of these centers are associated with the state's institutions of higher education.

As you can read in this volume, West Virginia University and Marshall University have made significant investments in research in the past decade, and have seen corresponding advances in the growth of research funding and centers in key economic growth sectors.

West Virginia's other academic institutions, too numerous to mention here, also are increasing their emphasis on research. While there is no doubt that the increased research activity provides a richer and deeper learning experience for our students attending these institutions, it also provides the foundation for technology transfer and commercialization.

This ability to "grow our own" technology and corresponding business environment is a powerful and needed ingredient as West Virginia heads further into this new century.

Seeking to capitalize on the growing research culture, as well as the fact that many of the previously mentioned industry-trained research scientists continue to reside here, several non-profit organizations have emerged from the state's growing research culture.

The Mid-Atlantic Technology, Research, and Innovation Center (MATRIC) was

created to build on existing research talent and creativity in the state and region, and has had success in merging this talent with new R&D opportunities and emerging technologies.

The Chemical Alliance Zone and Polymer Alliance Zone, both developed within the last eight years, are working both to attract existing industries and to build new businesses in the chemical industry and related fields. Taking advantage of the reputation of the scientists and institutions in the state, both of these organizations have shown a real commitment to building a network of industry contacts on a global scale. They also have been leaders in adapting to the rapidly changing field of competition, and have acted quickly and effectively to capitalize on and enhance the growing focus on technology transfer.

Along with the growth of R&D centers, state leaders also have recognized the importance of ensuring that the requisite educational building blocks are in place

All of these initiatives are unique partnerships among the K-12, higher education, and business communities, charged with working together to incite the interest of our state's young people in STEM careers and to ensure that they have the adequate educational background and qualifications to succeed.

All of this R&D activity points to a new "golden age" in West Virginia's technological history, so long as we can effectively link and leverage our resources. As participants and partners in many of the groups and endeavors described above, we at Bowles Rice can say unequivocally that some very dedicated and passionate individuals are working on just that

Universities are collaborating to take advantage of funding opportunities, and non-profit groups and research centers are striving every day toward enhanced collaboration with one another and their educational counterparts.

Due to the foresight of the state's business, government and education leaders, West Virginia has spent the last decade quietly but intentionally redefining itself in the area of scientific research and development.

to fuel and sustain the growth. In response to this concern, several collaborative initiatives are underway to "build the pipeline" for our future scientists and engineers.

In the past year alone, the state has seen the creation of the West Virginia Science, Technology, Engineering and Math (STEM) Academy and the Consortium on Undergraduate Research and Engineering. In addition, West Virginia became a national leader as the second state to join the Partnership for 21st Century Skills and is an active participant in Project Lead the Way.

All are working toward creating an environment in the state that encourages innovation and invention, and that provides a pathway for our talented young people who wish to remain here, and for those who would otherwise seek to join us here as we continue to expand our R&D capital. ▽



Growing a Research University

Howard Aulick, Vice President for Research
Marshall University

Howard Aulick is the Vice President for Research at Marshall University.

Dr. Aulick received his PhD degree in physiology at Indiana University in 1974 and spent the next 33 years in research and research administration.

His current responsibilities include serving as executive director of the Marshall University Research Corporation and the director of the Marshall University Technology Transfer Office. He was one of the original members of the West Virginia Science and Technology Advisory Council and a long-standing member of the WW EPSCoR Advisory Council.

When I joined Marshall University's School of Medicine twenty-three years ago, my primary interest was research. What I found, at that time, was a medical school and university with only limited experience and aptitude for research.

The University has changed dramatically in the last 23 years. Many things contributed to this transition, but I will mention only a few of the more pivotal events, because I considered them essential elements for any school aspiring to become a research university.

First, there must be some evidence that your faculty can be nationally competitive researchers. For Marshall, we began to approach a nationally competitive stance for the institution when basic scientists in the medical school received a multi-million dollar award from National Science Foundation Office of Experimental Program to Stimulate Competitive Research in 1989.

The resources provided by this award enabled us to enter the biotechnology research arena in a major way. They brought talented researchers, sophisticated tools and new ideas which ultimately led to Marshall's first independent Ph.D. program, a major emphasis in the cell and molecular basis of disease and the nationally recognized Forensic Science Program.

Almost overnight perceptions changed – Marshall faculty and senior officials realized they could build a research university. When I was hired in 1984, the principal criterion for selection was your teaching credentials. Today, search

committees across campus are placing more and more emphasis on the candidates' research background, and an increasing number of campus units include research expectations in their employment contracts.

Growing a research university requires considerable resources and a well-thought out strategic plan. In our case, a taskforce was created in 1996 to draw up this plan. The principal recommendation of this group was to merge our two primary research communities (basic scientists in the College of Science and School of Medicine) in a state-of-the-art research facility.

Competitive research today requires an interdisciplinary approach and this was impossible for us at that time because these two groups were separated by over eight miles. Thanks to the support of Senator Byrd, the impressive new Robert C. Byrd Biotechnology Science Center is now fully operational. The fact that this new research building is the largest capital project in the history of the University makes it clear what we intend to do at Marshall. Additional evidence of developing infrastructure includes the new Joan C. Edwards Cancer Center (with an entire floor dedicated for translational research) at the School of Medicine, and a major addition to the Forensic Science Center.

Currently on the drawing board is a new engineering building. All these new buildings would not be coming on line without public, private and institutional commitments to enhancing the educational and service missions of the University through research.

Marshall's rapid research growth has necessitated continued development and expansion of a Research Corporation both to help investigators acquire grants in the very competitive national arena and to manage these awards in an era of ever-increasing fiscal and compliance complexities.

Since 1989, Marshall University Research Corporation has grown from two generalists to 22 pre- and post-award specialists who last year processed 289 grant and contact applications and managed 600 projects totaling over \$44 million. Now we are in the process of "decentralization" – moving grant administrators into research buildings where they can be more readily available to the investigators.

The final, and to some extent the most important driver, in Marshall's transition is an increasing public awareness of the role of a research university in technology-based economic development. Academic research is no longer considered an esoteric endeavor of "pointy-headed professors" isolated in their ivory towers, but the basic foundation of the new knowledge-based economy.

In an effort to prepare this foundation, West Virginia has created and Governor Manchin has endorsed the WV Vision 2015 Strategic Plan. In my opinion,

legislative implementation of Vision 2015 will do more for West Virginia's long-term economic development than everything I have seen in my 23 years in the state.

Marshall's research has already begun to impact the regional economy. In the last three years, our Technology Transfer Office has filed 13 patent applications and negotiated five license agreements. As a result, Marshall researchers have contributed to the creation of three new high tech businesses in the Huntington and Charleston areas and improved lighting products of a Lewisburg company.

Marshall's transition to a research university is guaranteed, because it was well thought out, enjoys growing federal, state and private support, and offers an exceptional opportunity to contribute to the development of a high tech business corridor connecting Huntington and Charleston. ▽

Completion of The Joan C. Edwards Cancer Center was a milestone in Marshall's transition to becoming a research university.





West Virginia: Mountains of Opportunity in a Flat World

Scott Rotruck, Director of Corporate Development
Chesapeake Appalachia LLC

Scott Rotruck is the Director of Corporate Development for Chesapeake Energy Corporation. He is the past Chairman, President and CEO of the Morgantown Area Chamber of Commerce and currently serves as the Treasurer of the West Virginia Chamber of Commerce.

Scott spent 15 years in the energy sector with Maryland Coal, Anker Energy and CONSOL Energy, Inc. He spent 10 years in the railroad industry with CSX Corporation and Norfolk Southern Corporation. He also served as the Economic Development Director and Senior Adviser to President Hardesty at West Virginia University, and currently serves as chair of WVU Extension Service Visiting Committee. He taught Entrepreneurship at the WVU College of Business and Economics and is a FastTrac Facilitator for the Kauffman Foundation's Entrepreneurial Training Programs.

Active in many statewide initiatives, Scott currently serves as chair of the West Virginia Tourism Commission, Vision Shared Inc., and the West Virginia Council for Community and Economic Development. He was chair of the Interstate Commission on the Potomac River Basin in 2000 and chair of the West Virginia Jobs Investment Trust, the state's venture capital fund from 2003-2005.

Thomas Friedman, Foreign Correspondent for the New York Times, wrote *The World is Flat* in 2005, setting forth his proposed architecture of how the modern world economy works. A central theme of the book is that the world is technologically flat, where anything that is digitizable can be done virtually anywhere.

I offer the corollary that in a flat world, place becomes paramount and high knowledge and high-wage jobs will locate where talent wants to live. If West Virginia can continue improving its business climate, we can leverage our incredible physical assets, way of life and market proximity, to truly be mountains of opportunity in a flat world. This aspiration will require a nearly flawless organization and leveraging of West Virginia's unique assets.

I am more optimistic than ever about West Virginia's opportunities in the flat world, not because we have no serious economic challenges, but because we recently demonstrated that we can indeed overcome enormous obstacles to improve economic and community development for all West Virginians. The privatization of workers' compensation is an example of a truly paradigmatic change achieved under Governor Manchin's leadership and his winning argument that all West Virginians would be better for the enactment. It will continue to take a broad coalition of business, labor, education, government, non-profits and others collaborating to make additional fundamental changes in West Virginia.

Making West Virginia a magnet for attracting and retaining talent calls for collaboration on an unprecedented scale. West Virginia: A Vision Shared continues to serve as the vehicle for pursuing these broad mutual interests under its "Declaration of Interdependence."

A Vision Shared has been the state's lead community and economic development organization and action plan since December 14, 2000, when it was jointly announced by Governor Cecil Underwood and Governor-Elect Bob Wise. The West Virginia Council for Community and Economic Development (WVCCED) commissioned Market Street Services to help create the grassroots development plan that has been implemented through three administrations with the generous support of the Benedum Foundation. The continuity of this action plan is evidenced by former WVCCED member Joe Manchin's participation in its drafting and today First Lady Gayle Manchin's co-chairing of a key Vision Shared Committee. The plan's vision statement is enshrined in the state code as a touchstone and appears below.

A Vision Shared relentlessly pursues the vision statement through 27 active, dynamic and changing committees with 788 volunteers working across four broad subject areas: intellectual infrastructure; new economy and new solutions; building bridges and empowering citizens; and results-based government. The A Vision Shared action plan, co-chaired by Mike Basile and Kenny Perdue, now has a 501(c)(3) non-profit parent called Vision Shared



Inc. tasked with the requisite administrative responsibilities, as well as an affiliated think tank called Imagine West Virginia.

A Vision Shared was an early supporter of workers' compensation reform and we salute all those who made it a reality. The change was a vast improvement to the perceived business climate, but much more remains to be done in order for West Virginia to attract technology-based economic development that has so many enticing areas to consider as a home. According to many experts, some key

Russ Lorince and Benedum Foundation Program Officer Mary Hunt-Lieving, is securing 501 (c) (3) status and will be a major factor in supporting commercialization of intellectual property created on our university campuses, increasing deal flow generally and rallying the effort to increase early stage capital formation.

Thanks again to all the many volunteers who continue to commit their time, talent and resources to the aspiration to make West Virginia the best place in this flat world to live, learn, work, play and retire.



West Virginia's strong commitment to future generations has created a vibrant and diverse economy, balancing quality jobs and the state's irreplaceable natural beauty. West Virginia has a highly skilled and educated work force, is a leader in innovation and offers an excellent quality of life for all residents.

factors for creating and sustaining an environment conducive to growing high knowledge and high wage opportunities, include a skilled and educated workforce, research capacity, capital availability and an excellent quality of life, all ensconced in a supportive business climate.

One of A Vision Shared's strongest new initiatives, the Technology Based Economic Working Group, better known as TBED, focuses on several key areas, including growing, attracting and retaining the talent which fuels technology-based economic development. TBED, chaired by WVU Economic Development Director

As A Vision Shared co-chairs, Mike Basile and Kenny Perdue have so often exhorted and demonstrated, A Vision Shared is a marathon, not a sprint

To volunteer, please call Holly Clark at 304-293-5551, extension 40, or email her at info@visionshared.com. You may also visit www.visionshared.com and join in the quest. ▽



Research Means Business at the University of Kentucky

Deborah Weis, Director of Research Communications & Odyssey Magazine
University of Kentucky

Deborah Weis will join the new University of Kentucky's Office for Commercialization and Economic Development as director of marketing and communications. Currently she is the director of UK Research Communications and Odyssey magazine, a position she has held since coming to the University in 1997.

As editor-in-chief of *Odyssey Magazine*, which covers the latest research advances, innovative scholarship and outstanding people that are part of UK's \$300-million-a-year research enterprise, Deborah will publish the 25th anniversary issue this fall. Prior to coming to UK, Deborah worked as publications director for the Kentucky Tourism Cabinet and published the first Kentucky Vacation Guide. Deborah is a graduate of the University of Kentucky with a B.A. in Journalism.

These days, business is the operative word at the University of Kentucky. Just last year, UK President Lee T. Todd Jr. presented a Top 20 Business Plan, the first of its kind for public universities in the United States, to the Governor and the Kentucky General Assembly. As a result, they invested an additional \$18 million in UK.

Now, President Todd, a former UK engineering professor, entrepreneur and businessman, has implemented another top priority by creating the UK Office for Commercialization & Economic Development. He chose angel investor, entrepreneur, state government cabinet secretary and vice chancellor for academic affairs at UK, Len Heller to lead the new office which will serve as a catalyst for economic growth throughout the Commonwealth.

As economic development vice president, Heller will coordinate UK's role in an innovative new partnership with the Lexington-Fayette Urban County Government and Commerce Lexington to provide one-stop services for new businesses, company recruitment and business development.

The new UK economic development office includes intellectual property and technology transfer management, and business development, including the Von Allmen Center for Entrepreneurship, the Lexington Innovation and Commercialization Center, and the Kentucky Small Business Development Center statewide network. Also included are UK's on-campus incubators, the Advanced Science and Technology Commercialization Center (ASTeCC) and the Agricultural Technologies



The University of Kentucky's Painting Technology Consortium, led by Dr. Kozo Saito, includes partners such as Toyota and Honda.

Commercialization Center (AgTeCC), with 12 faculty startups, 18 faculty research groups and a waiting list for lab space. Since opening in 1994, ASTeCC has graduated thirty companies, some of which are now located at Coldstream Research Campus.

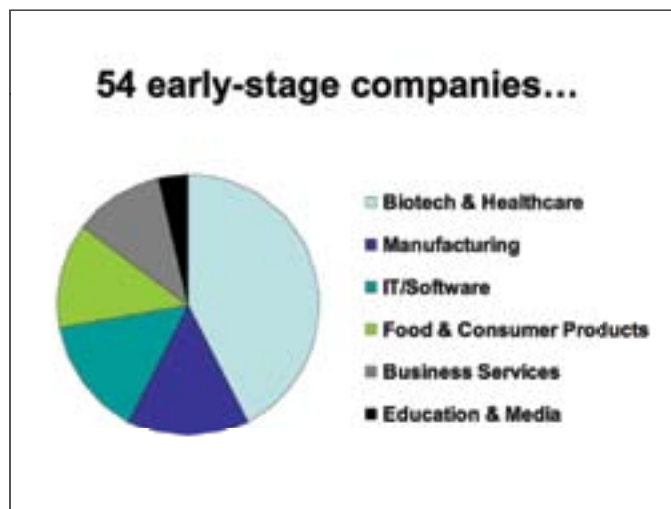
Developing the university owned-and-operated research park is another priority for Heller. More than 700 people currently work at Coldstream in high-tech and biotech companies, university centers and startups. Some of the businesses include IBM and Embassy Suites Hotel.

Coldstream Laboratories will begin sterile drug manufacturing for clinical trials and some niche commercial products at Coldstream after completing validation this summer, and the company's pharmaceutical development division, the Center for Pharmaceutical Science and Technology, will offer clients full-service R&D support.

Exstream Software, a privately held company headquartered in Lexington since 1998, will move 150 Lexington-based employees to Coldstream this fall. The American Board of Family Medicine and ASI Guardian will be the first tenants to move into the \$50 million Lexhold Center later in 2007.

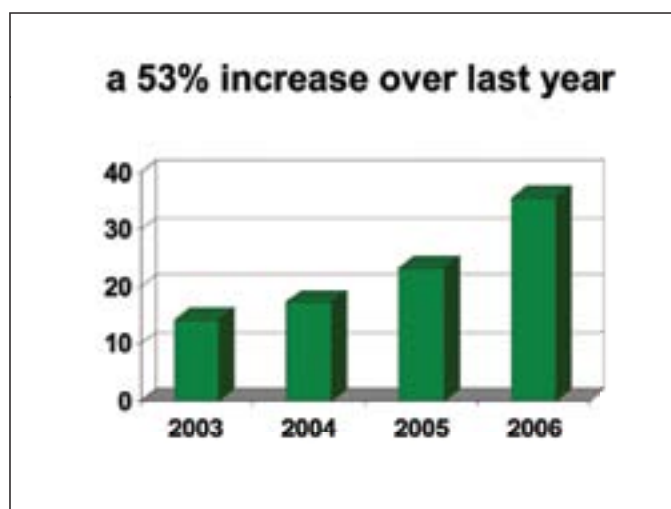
Heller will also serve as CEO/President of Kentucky Technology, Inc. (KTI), a for-profit corporation wholly owned by the University of Kentucky Research Foundation. KTI is charged with generating revenue from leasing incubator space, royalty fees from licenses and equity investments, and re-investing in the commercial development of university-based technologies and technology-based businesses. Through KTI, UK is one of the investors in the Bluegrass Angel Venture Fund, an early-stage seed fund. The Bluegrass Angels, an organization of 50 successful local businessmen and

Funding of new companies in Lexington-Fayette County



received over \$35 million in funding in 2006...

Founders/Family/Friends	\$ 5,905,000
Kentucky State Funds	1,520,000
Federal Grants	7,830,000
Angel Investors	3,295,000
Venture Capital	13,605,000
Strategic Partners	2,965,000
Other	325,000
	\$ 35,445,000



(continued on p. 51)

Source: Lexington Venture Club



Health Research at WVU Expanding Rapidly

Robert M. D'Alessandri, M.D., Vice President for Health Sciences
West Virginia University

Robert M. D'Alessandri, M.D., is Vice President for Health Sciences at West Virginia University and President of the Blanchette Rockefeller Neurosciences Institute. A specialist in infectious diseases and general medicine, he is a fellow of the American College of Physicians and a diplomate of the American Board of Internal Medicine. He joined the WVU faculty in 1977, and served as Dean of the School of Medicine from 1989 to 2004.

He is a frequent national speaker on the subjects of health policy, work force issues, rural health, Alzheimer's disease research, and the future of health care.

He hosts "Doctors on Call," a live public television broadcast that addresses a different health topic each week, answering questions phoned in by viewers throughout West Virginia and in parts of Pennsylvania, Ohio, Maryland and Virginia.

In the 1990s, together with U.S. Senator Jay Rockefeller, he developed the concept of an independent national research center with the mission of developing new means of diagnosing and treating Alzheimer's disease. His tireless work toward this goal energized University leaders, private-sector researchers and donors, and political officials, and led to the creation of the Blanchette Rockefeller Neurosciences Institute.

Much of the economic growth in the Morgantown area is tied to health care, health professions education and health research. And, although health care and education have been at the center of the region's economy for several decades, the research enterprise is taking on new importance and creating new opportunities.

WVU adopted a strategic plan for health research in 2001. It's paying off already, and WVU is far more competitive than ever before in the national biomedical research community.

Our plan is based on creating and supporting centers of strength that cross organizational boundaries. We have focused on six interdisciplinary research centers, each closely tied to one of the state's key health concerns:

- neurosciences
- cancer
- cardiovascular sciences
- respiratory biology and lung diseases
- immunopathology and microbial pathogenesis
- diabetes and obesity

For the past three years, WVU's Robert C. Byrd Health Sciences Center has targeted these specific thematic areas of research, providing start-up funding to promising young scholars and providing experienced researchers, both current faculty and new, nationally recognized recruits with laboratories and support for their efforts.

We identified researchers already on faculty who were recognized as leaders in

their fields, and named several as directors of our newly-formed research centers. Other research leaders were recruited from around the country, including some who brought full research teams – and continuing funding from the National Institutes of Health (NIH) and other sources – with them to Morgantown.

The University has supported this endeavor by providing assistance in building core facilities and research resources that can be shared across many projects, by strengthening the assistance available



to faculty in the grant application process, and by the addition of dozens of new labs and equipment. We've been greatly assisted in this process by Senator Robert Byrd and Senator Jay Rockefeller, each of whom has taken a keen interest in strengthening WVU's research infrastructure. The West Virginia Economic Development Authority, the West Virginia Infrastructure and Jobs



Development Council and the West Virginia Housing Development Fund have also invested heavily in research infrastructure.

One of the key measures of the research strength of any U.S. health center is the level of support its scientists win from the NIH. There is stiff competition for research dollars at this level, and the NIH carefully screens grant applicants both for scientific merit, and for the applicability of the proposed research to the nation's health goals. Only one in seven submitted proposals is funded by NIH.

Competitively-funded research at the Health Sciences Center of West Virginia University is on the rise. In the School of Medicine, the total jumped an unprecedented 45% in one year, from \$13.6 million in FY 2005 to \$19.7 million in FY 2006. Across the health sciences, NIH grants exceeded \$20.7 million in 2006 – a 118% increase from the \$9.5 million recorded in 2001, the base year for WVU's Strategic Research Plan for health sciences.

Not all health research at WVU is NIH funded; in fact, externally-sponsored research and contracts at the Health Sciences Center totaled \$55 million in 2006. But NIH funding is widely accepted as a key metric of research competitiveness. As we complete new research infrastructure – particularly the Biosciences Research Building – a rising NIH ranking will be an important asset in recruiting talented and productive researchers to Morgantown.

Nationwide, growth in overall NIH funding has stagnated over the past two years. WVU's ability to attract substantially increased grant support in this climate is striking, and it adds to the evidence that the strategic plan is having the desired effect. We are more competitive – and growing stronger each year both in real terms and in relation to other academic medical centers.

For example, the work of scientists associated with the interdisciplinary neuroscience group has pushed WVU's Department of Otolaryngology into the top 10 among all ENT departments in the country in sponsored research. WVU also recently received word that it has won an \$11 million renewal award for the Center of Biomedical Research Excellence (COBRE) in Signal Transduction and Cancer. That award will provide start-up funds for a promising cancer-related research faculty over the next several years.

WVU's goal is to develop a critical mass of research in each of the six research areas so that the University will be nationally competitive for health research funding over the long term.

In 2006, we began advertising nationally to fill 42 new tenure-track research faculty positions at the Health Sciences Center. As these positions are filled, there will be a ripple effect in the local economy: each researcher will require a laboratory staff, including graduate assistants and junior faculty. An average \$285,000 research

(continued on p. 53)

(OPPOSITE PAGE)

George Spirou, Ph.D., director of the Center for Neuroscience at the WVU School of Medicine, and Brian Hoffpauir, Ph.D., postdoctoral research associate, study the relationship between the senses and the brain.

(ABOVE)

Architect's rendering of the Biomedical Sciences Research Facility, now under construction at the WVU Robert C. Byrd Health Sciences Center in Morgantown.



Warming Your House, Not the Globe

John D. Weete

Vice President for Research & Economics, West Virginia University
President, WVU Research Corporation

Dr. Weete came to West Virginia University in September, 1998. He administers the WVU Research Office and works collaboratively with other vice presidents, deans and directors in providing institution-wide leadership for the University's comprehensive research programs, including university-wide centers and institutes that report to the Research Office.

He was Professor, Associate Dean for Research and Director of the Leach Science Center in the College of Sciences & Mathematics before coming to WVU. He has also been an Invited or Visiting Professor at the University of Paul Sabatier in France, University of Zurich and University of Ottawa. He is past chair of the Biotechnology Division of the American Oil Chemists' Society and has served on the editorial boards of several international journals. He is a member of the Board of Directors of the Institute for Scientific Research and Research Partnership to Secure Energy for America (RPSEA), and the Advisory Council of the Counter Drug Technology Consortium of the National Guard Bureau in Washington D.C.

Dr. Weete's primary research interest is in the biochemistry and biotechnology of lipids in eukaryotic microbes. In 1980, he authored *Lipid Biochemistry of Fungi and Other Organisms*, and has 170 other publications. He holds four U.S. and several international patents.

The future prosperity of our nation depends not only on reliable and affordable energy, but also on the secure and efficient delivery of fuel sources and power distribution. The 21st Century has brought new challenges with respect to energy utilization and consumption. Some of these include terrorist threats; natural disasters; shrinking reserves of oil and natural gas; global climate change; environmental pressures; geopolitical unrest; the deployment of more expensive and advanced energy technologies; and the need to make costly upgrades to our energy generation and distribution infrastructures.

West Virginia is an 'energy state'. Our fossil energy sources, particularly coal, have been one of the traditional key components of the West Virginia economy for many years. The high price of natural gas helped the state's economy to grow by increasing the demand for less expensive coal for power generation to displace the load carried by natural gas turbines. At the current production level, West Virginia has sufficient recoverable coal to provide electricity generation for 100 years. Although our national strategy is to reduce the dependence on fossil fuels, the current demand for coal is expected to continue in the foreseeable future. There are no economical alternatives to replace a fuel source (coal) that generates over 52% of our electricity.

In keeping with the University's long history of energy and environmental research at the state, regional, and national levels, West Virginia University is taking proactive steps to expand its programs.

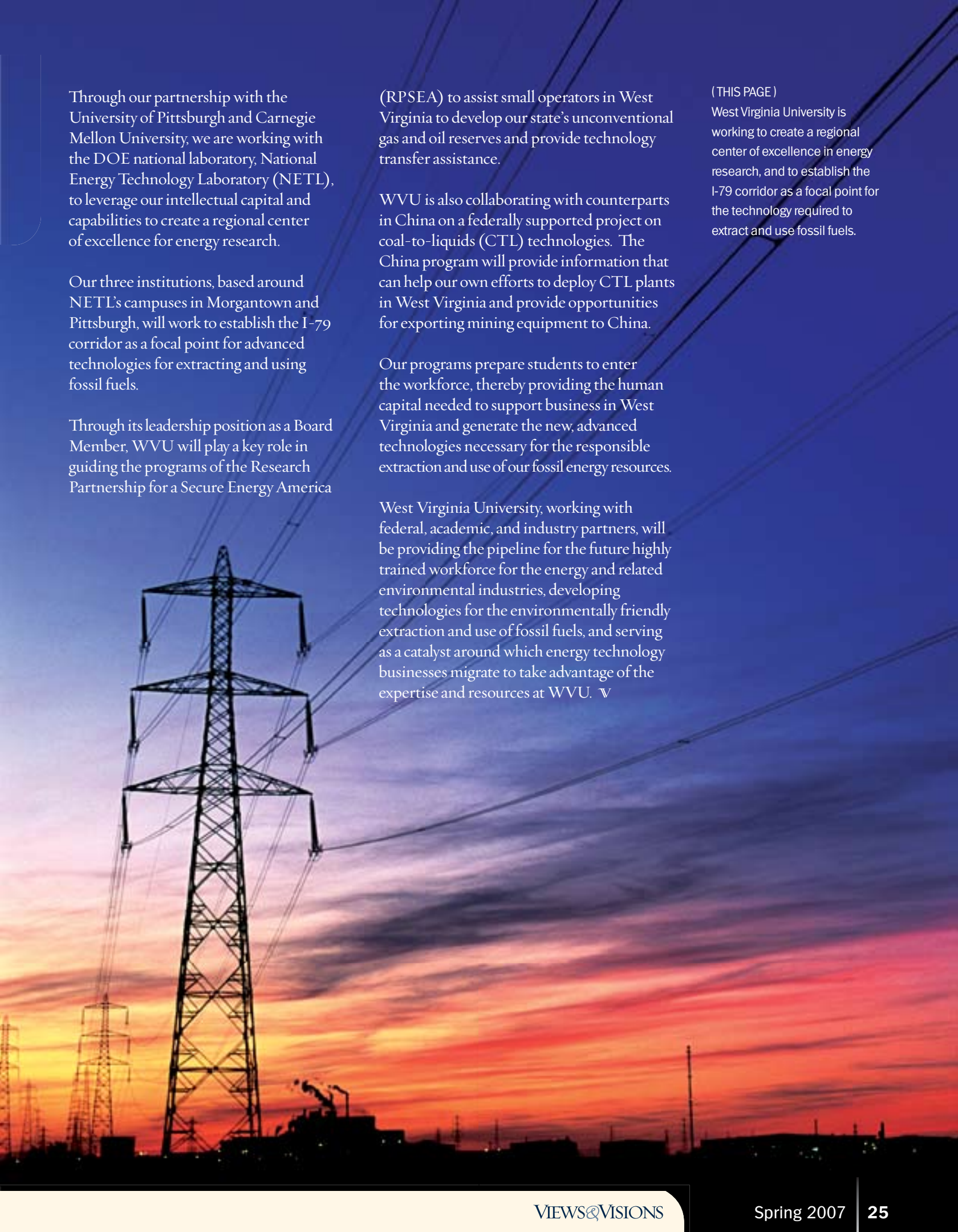
WVU has recently unveiled a new energy program: "Revitalizing the Energy and Environmental Research and Education Agenda at West Virginia University."

This strategic initiative addresses energy and related environmental issues of state, national, and global importance. The overall aim of this initiative is to address the national propriety of having a diverse supply and delivery of reliable, affordable and environmentally-sound energy. Some of the broad program areas include:

- Exploration and extraction of fossil fuels—coal, gas and oil
- Fuel utilization and conversion—combustion and gasification, sequestration, power generation and distribution, system efficiency and reliability
- Non-conventional transportation fuels and other products from fossil and renewable sources—chemicals and materials from coal, biofuels, bioproducts
- Energy efficiency and sustainability, economics, and policy

We will include sub-programs in environment, security, safety, education and training, and technology transfer in each of the above areas.

Another aim of our energy initiative is to serve as a magnet for energy and environmental businesses to locate near the University because of the students and highly trained graduates as well as facilities.



Through our partnership with the University of Pittsburgh and Carnegie Mellon University, we are working with the DOE national laboratory, National Energy Technology Laboratory (NETL), to leverage our intellectual capital and capabilities to create a regional center of excellence for energy research.

Our three institutions, based around NETL's campuses in Morgantown and Pittsburgh, will work to establish the I-79 corridor as a focal point for advanced technologies for extracting and using fossil fuels.

Through its leadership position as a Board Member, WVU will play a key role in guiding the programs of the Research Partnership for a Secure Energy America

(RPSEA) to assist small operators in West Virginia to develop our state's unconventional gas and oil reserves and provide technology transfer assistance.

WVU is also collaborating with counterparts in China on a federally supported project on coal-to-liquids (CTL) technologies. The China program will provide information that can help our own efforts to deploy CTL plants in West Virginia and provide opportunities for exporting mining equipment to China.

Our programs prepare students to enter the workforce, thereby providing the human capital needed to support business in West Virginia and generate the new, advanced technologies necessary for the responsible extraction and use of our fossil energy resources.

West Virginia University, working with federal, academic, and industry partners, will be providing the pipeline for the future highly trained workforce for the energy and related environmental industries, developing technologies for the environmentally friendly extraction and use of fossil fuels, and serving as a catalyst around which energy technology businesses migrate to take advantage of the expertise and resources at WVU. ♾

(THIS PAGE)

West Virginia University is working to create a regional center of excellence in energy research, and to establish the I-79 corridor as a focal point for the technology required to extract and use fossil fuels.



How the Chemical Industry is Adapting in the New Economy

John M. Maher, Executive Director
Chemical Alliance Zone

John Maher has served as Executive Director of the Chemical Alliance Zone since 2003. He worked for 21 years in Research and Development at Union Carbide and Dow Chemical, and has served in a broad range of technical and managerial assignments in areas as diverse as catalysis, plant technology support, capital project execution and new business development.

John received his A.B. at Cornell University and his Ph.D. in Organic/Organometallic Chemistry from Harvard University.

He is also President and Managing Partner of Rampant Technology Partners, LLC, a locally-based chemistry and materials consulting and research firm. He lives in Charleston with his wife Regan.



The Chemical Alliance Zone was formed by Executive Order of Governor Underwood in 1999. The order states, “The goal of the Chemical Alliance Zone shall be to retain and expand existing chemical plants and to attract new chemical-related businesses to the state... Individual businesses within the Chemical Alliance Zone and the college and university systems of West Virginia will be encouraged to partner with state and community governments to stimulate broad-based economic development within the Chemical Alliance Zone and throughout West Virginia.”

It is a significant mission. The chemical businesses in West Virginia span the range from research to logistics and distribution to manufacturing, networked with their allied suppliers and customers. The focus of The Chemical Alliance Zone has been on three major initiatives:

- **We reach out to chemical businesses around the world to locate in our area.** We market the significant advantages of the region afforded by available land within existing facilities, shared infrastructure, favorable electrical costs and extensive transportation access. This effort, like all the others described

here, is effective only through the close and trusted collaboration with individual companies, state and local economic development agencies and universities.

- **We work to maintain the readiness of our workforce as the needs of the chemical enterprises evolve, and new sector opportunities appear.**
- **We promote the development of capabilities and opportunities in the high growth sectors of the economy that transect the chemical enterprise by promoting networking, collaboration and investment in our strengths.**

How is it going and how are the stakeholders and partners in the Chemical Alliance Zone implementing the mission? Let's take a brief look.

Recruitment

As we begin 2007, US-based chemical industry has weathered several years of high energy prices and increasing globalization. The competitive environment has been fierce. Yet, through hard work and determined collaboration, some tremendously good news has emerged over the last year and a half:

- Governor Manchin and Bayer announced that the Esseco Group from Italy will be building their first overseas facility in West Virginia, at the Bayer CropScience Institute site.

- The DuPont Belle site has increased production volumes of some of its key products and foresees a hiring trend of 25-30 employees a year for the next five to six years.
- The Dow Chemical Company recently announced that it will invest \$30 million in its cellulose derivatives business at the Institute site.

The significance of these achievements is obvious to industry participants, but deserve emphasis. Our area facilities are competitive enough that they are attracting business and investment from within their own corporations and from outside investors who could put their facilities almost anywhere. That does not mean that remaining competitive in the future will be easy, but it does mean we have what it takes to succeed.

Workforce Development

The Workforce Development sub-committee has been one of the most active in our organization. The associate degree program in Chemical Operations Technology has been a central focus of this group, and they have taken great strides recently in its implementation. The Advantage Valley Community College Network has implemented a locally taught Applied Technology Program, which is being taught at the South Charleston Technology Park for Dow employees. Currently, 22 students are in their fourth semester. The Workforce Development sub-committee is looking to expand this offering to other companies and open enrollment as implementation advances.

For the future, the Workforce Development sub-committee is developing strategic workforce training curriculum solutions to make the associate degree programs even more integrated, flexible and relevant. Leveraging general education curricula across multiple industry programs is being

looked at as a tool to allow students to specialize more rapidly in response to hiring trends.

Promoting Technology-Based Economic Development

We usually think of our chemical industry as a manufacturing enterprise, but area plants are the manufacturing end of a technology-driven enterprise, which extends to service providers and suppliers. In fact, through survey and asset inventorying activity, we've identified a surprising reservoir of research and development activity conducted in West Virginia in the chemical industry spanning small medium and large enterprises.

This aspect of the chemical industry points out an important opportunity. Technology innovations emerging from universities or industry can lead to significant business activity, either in new enterprises or in project activity within existing enterprises, to develop and commercialize the innovations. This type of activity requires researchers, technicians, engineers, and, as products move to commercialization, operators and support for demonstration-scale manufacture. In what developing sectors can we provide the most significant innovations and the most fertile environment for commercialization? The answers will be dictated by our ability to collaborate quickly and effectively across educational, industrial and government partners to seize these opportunities as they develop.

To fully develop our assets and target economically meaningful initiatives, the Chemical Alliance Zone has formed a Center for Economic Development and Technology Advancement. The Center is working in close partnership with West Virginia University and Marshall University, the state's two Ph.D. granting universities on several exciting initiatives. The Center is sponsoring a study of

(continued on p. 57)



A Conversation with Pearse Lyons

Pearse Lyons, President
Alltech

Dr. Pearse Lyons is founder, president and sole owner of Alltech, a company that employs over 1,700 people in 85 countries around the world.

Dr. Lyons received his Bachelor of Science degree and Master's of Science degree from University College Dublin, Ireland. After receiving his Ph.D. from the University of Birmingham in the United Kingdom, he worked for some of the largest brewers and distillers in Ireland, the UK and USA.

In 1980, he founded Alltech, initially supplying yeast and enzyme products to the alcohol industry. Dr. Lyons soon realized that the principles of yeast technology could also be applied to the animal feed industry. Alltech is now one of the global leaders in the animal health industry, with annual sales exceeding \$300 million USD and growth of 20% per annum.

In 2004, Dr. Lyons had conferred upon him Honorary Doctorates from University College Dublin and the Herriot-Watt University in Scotland. In 2005 he was named one of the top 15 Irish-American life scientists by *Irish-American Magazine*.

Please tell our readers about Alltech: its beginnings, its present, and its future.

Alltech. The name in and of itself has a story since the initials A. L. L. are my daughter's initials, Aoife Louise Lyons. The rest of the name stands for technology. Alltechnology, abbreviated into Alltech, had its beginnings in the early '80s when, like now, oil prices were high and the country had requirements for renewable fuel.

The production of ethanol as a fuel, then and now, was seen as one of the possible solutions. As I have a background in fermentation, having worked as both a brewer and a distiller, it was in this renewable energy problem of the early '80s that the company got its start.

Yeast. The core competency of the company became the vehicle through which the technological company was to move forward. In the mid '80s other applications for this yeast technology were seen, namely in improving animal health and performance through nutrition. By maximizing animal performance, whether for horses, dairy cows, pigs or chickens, Alltech's technology ensures the sustainability of the American farmer and now of the global farmer.

The ethanol industry is no longer an area in which the company works although its four textbooks are still the mainstay for technology in that area. Rather, the company focuses on animal health through nutrition with some 80 plus offices around the world.

Would you describe central Kentucky as a region on the move?

Kentucky has always been Alltech's home, although less than 1% of its sales are in the Commonwealth. The ease of operating in Kentucky and the attractiveness to overseas visitors has made it an ideal home. The company slogan is "Marketing Through Education." Kentucky's strong educational background and Alltech's strong relationship with the University of Kentucky have enabled it to showcase Kentucky's agricultural background, from horses, to dairy, to beef and at the same time, Alltech's technological prowess.

Along with the University of Kentucky, Alltech launched a bioscience center concept – an intermediate between industry and academia – [where young people earn a masters or a PhD on a topic of interest to the company while obtaining a degree from the University]. Another example is the joint running of the UK's poultry research unit at Clodstream Farm.

Furthermore, UK has cooperated with the company as Alltech moves forward to build the world's first center for Nutrigenomics, the science where the impact of the nutrients on genes are evaluated. This center, to be built on the Alltech Campus, will offer a contrast of a very high-tech facility and the rolling Bluegrass of the state.

In selling Kentucky, Alltech encourages its clients to come here where they are impressed by the corporate headquarters and the research facility and at the same time feel at home with the southern hospitality of Alltech's old colonial home or its new meeting hall built in a baronial style at the Alltech Kentucky Ale Brewery.

Alltech has repeatedly shown itself to be a fantastic corporate citizen. Your \$10,000,000 sponsorship of the 2010 Alltech FEI World Equestrian Games is the latest example of support for central Kentucky. What do you believe the Games mean for your state?

The World Equestrian Games will be the largest equestrian sporting event in North America and indeed the fifth largest sporting event ever held in the United States. It offers a world class competition to a global audience of millions. It is the zenith of equine performance and it offers Alltech an opportunity to demonstrate its passion for Kentucky, the excellence of its products and to work with animals at the heights of their performance.

The games are a window to the world and offer the state an opportunity to show itself at its best and for the company to establish itself as the company whose products drive animal performance. The logo "Alltech Inside" will hopefully become synonymous with the Games.

What do we need to do in the next five years to maximize the economic and cultural growth in central Kentucky and to insure that we can continue to be recognized as a "region on the move"?

In the next five years, Alltech and Kentucky need to maximize the opportunity that the games offer. Companies will perhaps look to Alltech as a model of what can be achieved in the Bluegrass State, and by the time of the Games we hope to have reached \$1 billion in sales.

If this is achieved, it will be a testament to how a private company with no outside investment can be successful in Kentucky. That success can be traced back to the encouragement and accessibility of local government, the ease of doing business here, and the quality and openness of our education system. ♡



“ **The World Equestrian Games will be the largest equestrian sporting event in North America and indeed the fifth largest sporting event ever held in the United States.** ”

—Pearse Lyons



How MATRIC is Kickstarting the Region's Research & Development Activities

Keith A. Pauley, President and Chief Executive Officer
MATRIC

Keith A. Pauley was appointed president and CEO of MATRIC in April 2004. He brought more than 16 years of technical experience in the development of high technology systems for various governmental and commercial customers.

Mr. Pauley has provided management and technical leadership for NASA, the U.S. Department of Energy, and the U.S. Department of Defense, as well as General Motors, Boeing, and Lockheed-Martin. He supported nuclear research for the Pacific Northwest National Laboratory for nine years and managed the \$500 million technology development program for the space shuttle and space station at the Johnson Space Center for seven years.

Pauley holds a BS and an MS in nuclear engineering from Oregon State University.



“For the first time in generations, the nation’s children could face poorer prospects than their parents and grandparents did. We owe our current prosperity, security, and good health to the investment of past generations, and we are obliged to renew those commitments in education, research and innovation policies...”

—*Rising Above the Gathering Storm*,
National Academies Press, 2006.

This assessment of our nation can not be any truer than in the state of West Virginia. For example, of the first 500 commodity chemicals produced, 286 were first discovered and brought to commercial scale production in the Kanawha Valley, which earned hundreds of billions of dollars worldwide. The Union Carbide Corporation alone created over 30,000 patents worth over \$18 billion dollars at the Union Carbide Technology Center, now called the South Charleston Technology Park.

With this heritage behind us, the Mid-Atlantic Technology Research and Innovation Center (MATRIC) is making a down payment on the future prosperity of the children of West Virginia through mentoring and research and innovation from their laboratory facilities at Dow Chemical’s South Charleston Technology Park.

MATRIC has a dual mission that focuses both on business return to assure long-term economic viability and the social concerns of the Mountain State and the nation. These concerns are like the double lens of a pair of binoculars that bring distant objects into clear and precise focus through what we do and how we do it.

Stewards of the Future

MATRIC has offices and laboratories in the South Charleston Technology Park, a location well suited for research and development activities.

In the first three years of MATRIC’s operation, over 50 projects have been completed for 29 different federal and state agencies, commercial companies and private foundations. From 2005 to 2006, MATRIC’s contract revenue increased five fold and in 2007, is projected to double that impressive performance metric.

Furthermore, commercialization of developed intellectual property has allowed MATRIC to create four new companies that will manufacture new polymers, natural gas purification systems, biodiesel fuels, ethanol and other biomass products.

MATRIC’s impact on the future of West Virginia’s economy is three-fold:

- 1) The long-term growth of the core MATRIC research organization which will in itself employ many highly-paid scientists and engineers;

- 2) The active partnering with local industry to revitalize their products and services through effective and efficient research and development, which will create new jobs in growing private sector companies; and
- 3) The goal of creating three to five new companies each year that are associated with MATRIC-developed technologies in order to provide these new products and services to the marketplace.

Following are some examples of MATRIC's wide variety of research topics including biodiesel process development, land restoration, software assurance for spacecraft and mine safety technology.

soy and other oils to produce high quality biodiesel fuels.

As part of the agreement with BEST Energies, LLC, MATRIC has the right to develop up to 20 million gallons per year of production capacity using this novel process design. Currently, several sites are being considered throughout the state and region for the construction of one or more facilities of this type.

Appalachian Land Restoration Center

MATRIC has recently developed an embedded research center that will create science and technology to restore economic value to mine-scarred lands throughout

In the first three years of MATRIC's operation, over 50 projects have been completed for 29 different federal and state agencies, commercial companies and private foundations.

Biodiesel

MATRIC has created a partnership with BEST Energies, LLC in Madison, Wisconsin to develop a new and innovative continuous process to manufacture biodiesel transportation fuels. The process has the potential to nearly double the production capacity of traditional batch processes, which are the most common throughout the biodiesel industry.

This new approach was conceived and developed in MATRIC Biomass Chemistry Laboratory which has tested a wide variety of vegetable oil feedstocks and catalysts over the last year. The optimal laboratory process was used to generate a detailed plant scale engineering design by MATRIC, which is now under construction in Cashton, Wisconsin. The 8 million gallon per year Cashton Plant will use

West Virginia. Specifically, the Appalachian Land Restoration Center will conduct research activities on soil, water and plant species to develop valuable agricultural and forestation uses; alternate land uses; and K-12 education in natural resources, biology and overall ecology.

The Center will focus on science and technology and will present data, information and new technology so that landowners, mining companies, state and federal regulators, as well as state and federal policymakers can extract the maximum value for their land use in the overall recovery of mined lands.

With over 190,000 acres of surface-mined lands in the state, the important mission of the Center will be to give landowners the

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Biotechnology Opportunities for West Virginia and the Region

Gardiner F. H. Smith
Bowles Rice McDavid Graff & Love LLP

Gardiner Smith is special counsel in the Charleston office of Bowles Rice and practices in the areas of intellectual property, biotechnology and licensing.

He is a graduate of North Carolina Central University School of Law and received his bachelor of arts from the University of North Carolina, Chapel Hill. Mr. Smith joined Bowles Rice from Aspreva Pharmaceuticals, where he was the Senior Vice-President of Business Development and Licensing.

Gardiner served as in-house intellectual property attorney at GlaxoSmithKline, a research-based pharmaceutical company. His role with GSK focused on compound licensing in oncology, research and development alliances and acquisitions. He was also a patent attorney and a scientist at Glaxo Research Institute.

Additionally, Gardiner served in senior transactional roles at Human Genome Sciences and Memory Pharmaceuticals, two publicly traded biotechnology companies.

A number of organizations in West Virginia have articulated plans to substantially increase biotechnology related activities in the state. Groups like EPSCoR and MATRIC have strong leadership, dedicated resources and facilities committed to the recruitment of scientists and attraction of capital investment for biotech research, development and commercialization.

The West Virginia executive and legislative branches continue to provide support for these activities through a variety of grants, credits and initiatives. Bringing more biotechnology to West Virginia will increase high-paying jobs, generate infrastructure and result in healthcare, energy and environmental improvements for our citizens, as well as for people across the country, and throughout the world. This potential is accompanied by its own set of challenges, and we need to stay keenly focused on building on our successes to date in biotechnology to realize a variety of tangible benefits over the next decade.

Academic centers of excellence like WVU, Marshall, the Charleston College of Pharmacy, and the Rockefeller Neuroscience Center are heavily involved in cutting edge research in the life sciences, including use of molecular biology, genetics, bioinformatics and characterization of therapeutic compounds. West Virginia teaching and research institutions provide a highly qualified workforce in the medical and biochemical fields, with capacity to operate across a spectrum of applications.

Already we've seen businesses established in our state to make practical use of biotechnology, such as in forensic pathology

through the use of DNA testing. In addition to diagnostics and therapeutics, potential applications include examples in the crop sciences, with hardier plants and greater yields, energy, with the conversion of biomass to fuel, and in preservation of our environment through the use of microbes to transform industrial waste to safe by-products. Another area of biotechnology is in the bio-defense arena, where we want to be prepared to combat harmful pathogens.

The growth of biotechnology has a regional component. Urban centers like Boston, Washington, D.C., San Francisco and San Diego are home to major medical research institutions, which coupled with state and federal funding over time have generated biotechnology intellectual property, garnered venture capital and seeded start-up companies seeking to exploit novel diagnostic techniques, medicines and medical devices.

These elements and this pattern of growth for biotechnology started over 40 years ago when molecular biology and medicinal chemistry emerged as funded scientific disciplines, and infrastructure such as highway systems enabled the dissemination of activities to surrounding areas.

In fact, this is a paradigm which many cities, states and countries are trying vigorously to replicate, ranging beyond the U.S. and major European locations to places like Singapore and Ukraine. Given this high level of competition, West Virginia can look to a number of advantages we possess.

The proximity of West Virginia to major centers of biotechnology gives us the opportunity to provide convenient, new

facilities at lower cost, with a high quality of life for those working in the scientific and commercial aspects of the sector.

An example of how this can lead to success is seen in the University of Alabama at Birmingham Health System. Over the last twenty years UAB made a concerted effort to attract leading researchers, offering more research space and higher quality of life at lower cost of living than other centers.

This resulted in the recruitment of scientists from institutions in cities like St. Louis. Not only has UAB become a top-flight research center in the health sciences, but numerous biotechnology companies have been formed, adding consequent benefits for the surrounding area.

West Virginia can similarly attract scientists from cities like Pittsburgh, Cleveland and Cincinnati, joining the biotechnology leadership we have at our academic centers. Our closeness to Washington, D.C. is another strong advantage, with all of its resources in the field of biotechnology. We benefit from being a few hours' drive and less than an hour flight from the federal government, and political leaders from our state have excellent relationships with their colleagues in Washington.

The National Institutes of Health, with a 2007 budget of around \$28 billion for research in health related fields, spends large amounts of money through grants to biotechnology researchers around the country, including those in West Virginia. The U.S. Homeland Security department has many initiatives in the biotechnology field for defense against pathogenic microorganisms. Biotechnology and Pharmaceutical companies could participate in consortiums with governmental and academic programs to accelerate scientific breakthroughs in these areas.

From the material handling, distribution and intellectual property perspectives, West Virginia is a secure and accessible location.

With air and ground transportation systems in place, and high speed information technology available throughout, our ability to participate in cutting edge biotechnology research and development is fully enabled.

West Virginia has the vision, accessibility and integrity to play a key role in biotechnology research and product development. We have the people in place on the scientific, political, legal, financial and business fronts who can drive growth in this sector. The benefits of these efforts will be seen in healthcare, energy and agriculture, and in the growth of our economy generally. ▽

With ample research space and close proximity to Washington, D.C., West Virginia is poised to compete in the field of biotechnology.





Gateway New Economy Council Has Big Plans for the Region

Howard Mills, President and Jeff Curtis, Executive Director
Gateway New Economy Council

Mr. Mills (Founding Member) is a retired executive with extensive national and international business experience. As Chairman of Maplehurst Companies headquartered in Indianapolis, IN, he led the growth of a processing and distribution company serving grocery and food service markets.

The firm pioneered processing and distribution of fresh and frozen dairy products and frozen bakery products for in-store bakeries. He then led the company to its acquisition in 1992 by George Weston, Ltd, of Toronto, Canada. (Weston's brands include Girl Scout cookies, Arnold, Boboli, Entenmann's and Thomas' English Muffins.) Mr. Mills' business experience led to his involvement with startup companies in educational music publishing, gas/convenience stores, retail record stores, and fresh specialty products distribution.

His civic commitment includes election to the Town Council of the Corporation of Shepherdstown and Treasurer for the town's historic Station at Shepherdstown. Currently, he is a Vice Chair of the Board of Trustees of Earlham College, from which he graduated.

The Gateway New Economy Council (GNEC) would like to thank the Bowles Rice law firm for this opportunity to inform readers of "Views & Visions" about the background, activities and strategic focus of the organization. The Bowles Rice firm, through its Martinsburg office, and especially Phil Hill, has been a supporter and contributor to GNEC almost from its origins.

Several years ago, inspired by the West Virginia Vision Shared Document on New Economy Development, a group of interested persons began meeting in the Eastern Panhandle to discuss several of the ideas offered in the document. The group was aware of the tremendous strides that had been made in Northern Virginia, Maryland, and the Washington, D.C. areas in developing technology jobs and were concerned over the limited amount of progress in the Eastern Panhandle. The group was also aware that virtually all the regions that were benefiting from these "new economy" jobs were being supported by colleges and universities that were often at the center of the process.

During 2003, the group decided to formally organize. With the assistance of Phil Hill, by-laws and Articles of Incorporation as a nonprofit organization were drafted. The name, Gateway New Economy Council, was chosen with a reference to the Vision Shared document, and the group considered that the region could become a gateway to the rest of the state for technology jobs and companies. The organization then created a Board of Directors and set about to build membership, visibility and programs. The first major event of GNEC was a New Economy Forum in May of 2004.

The event, "Technology and Education Gateway to the 21st Century," was attended by over 200 people from around the region with West Virginia Senator Jay Rockefeller as the keynote speaker.

At the Forum, several panelists talked about Regional Economic Development and the need for the Region to be able to differentiate itself from other areas and regions. This event was followed by several other community learning events including partnering with Senator Rockefeller to conduct the "Gateway Region High-Tech Seminar" in late 2004, and in 2006 a forum entitled, "Marketing the Gateway Region - Defining our Message."

As the membership and interest in the programs of GNEC grew, it became obvious that if the organization was to continue being an effective force in the region, it would be necessary to secure some paid staff. In mid-2005, the Benedum Foundation provided a grant that allowed the organization to carry out a strategic planning process, to hire a part time executive director for the purpose of building funding capacity for sustainability, to implement a research project on the elements that differentiate the region and to begin discussions concerning the possibility of regional alignments that could carry out a true regional marketing effort directed at new economy firms and jobs.

The Strategic Intent of GNEC is to "enhance the ability of the Eastern Panhandle to create and sustain meaningful employment opportunities in the New Economy of the Twenty-first Century." This will be achieved by: serving as a catalyst to foster regional cooperation and synergy



in the Eastern Panhandle; providing meaningful and synergistic networks of relationships and community learning experiences; and articulating and communicating a compelling vision of the Region's differentiation.

GNEC is developing close partnerships with the economic development authorities in the region and is assisting these organizations with programs and information they find useful. During 2007 GNEC will be carrying out a research project to identify the small technology firms and the technology workers in the region.

The Mission Statement of GNEC reads, "The GNEC is a group of volunteers in the Gateway Region of West Virginia dedicated to serving as a catalyst to foster an environment where the region will have the opportunity to participate fully in, and

How do we help? Perhaps as important as anything we have accomplished is the groundwork of communications now so expected by our constituents. To illustrate this point: while this article is being written, the office has received a phone call from a GNEC member who was regretful that he does not have the ability to receive electronically-generated (email) notification about upcoming events. Information will be delivered to him via the postal service. The Council has permeated the region of members, associates and partners as effectively and professionally allowed within the means available to it: we have implemented a network wherein Berkeley, Morgan and Jefferson county officials are beginning to share ideas, challenges and a more unified appreciation of regional partnering. This has been a crucial and powerful accomplishment.

Mr. Curtis graduated from The Ohio State University and completed course work toward his MBA at Southern Methodist University and Colorado College. Jeff was the President/CEO of a progressive Chamber of Commerce in Rockwall, Texas adjacent to Dallas.

During his leadership there, the Chamber was recognized as one of the fastest growing in Texas, and Rockwall County as the fastest growing county in the U.S. two years in a row. He then was recruited as Vice-president of the Knoxville, Tennessee Area Partnership and recently led the downtown revitalization program for Martinsburg, West Virginia.

Mr. Curtis is an accomplished writer having won the international poetry competition in 2001 and has two books published.

“ The Strategic Intent of GNEC is to “enhance the ability of the Eastern Panhandle to create and sustain meaningful employment opportunities in the New Economy of the Twenty-first Century.” ”

benefit from, the 'New Economy' of the twenty-first century." That role as catalyst affecting environmental change is a daunting one with political and territorial issues. A constant awareness of our intent to serve as an extension of the efforts of the economic development authorities has advantageously allowed us a position of trust and confidence with those agencies already so involved in economic development and business recruitment.

This year the Council will enhance its level of catalytic effect by delivering several public forums focused on regional economic growth, extending its communications outreach and maintaining a highly visible, thoroughly professional posture as one of the dependable leaders of the Eastern Panhandle. ▽



Collaboration – The Key to Success

Julia A. Chincheck

Bowles Rice McDavid Graff & Love LLP

Julia A. Chincheck is a partner in the Charleston office and heads the firm's Commercial and Financial Services Group. She concentrates her practice on banking law, with additional emphasis on complex commercial transactions and business work-outs for banking and other commercial lenders, bankruptcy and commercial litigation.

Julia is a frequent lecturer on commercial and bankruptcy law. During the 2000 legislative session, Julia assisted clients, including the West Virginia Bankers Association, in reviewing and drafting local changes to revised Article 9 of the Uniform Commercial Code. She is a contributing author to the American Bankruptcy Institute's "Health Care Insolvency Manual," on the issues of bankruptcy and health care laws.

Julia is listed in Best Lawyers in America in Bankruptcy and Creditor-Debtor Rights Law. She is a member of the American Bar Association and serves on its Business Law Section. She is also a member of the Commercial Law League, the American Bankruptcy Institute, the West Virginia State Bar, the West Virginia Bar Association and the Kanawha County Bar.

If you have seen the movie "We Are Marshall," you have undoubtedly felt the difficulties faced when building a cohesive program from the ground up. Yet that is exactly what West Virginia has been doing with its research and development centers around the state. Through the efforts of many, technology and science centers are in place and growing throughout the eastern, central and southern regions of West Virginia. Yet much work remains to be done.

An important ingredient to the future success of our region is collaboration. We all benefit from numerous collaborative endeavors in our region, many of which are described in this edition of *Views & Visions*.

Increasingly, in West Virginia, Kentucky and across the region, businesses, entrepreneurs, the public sector, the private sector, service providers and many others are learning that success is dependent on collaboration with others, especially given global competition in the research and development arena.

Individually and collectively we know that the cavalry is not coming over the hill, and that if we are to succeed in the years ahead, we must do so through our own initiative, ingenuity and development. And we must do so working closely with others who share our hopes, dreams and visions.

Bowles Rice proudly joins with our clients, federal, state and local governments, and other service providers to help build the prosperity that is promised by enhanced

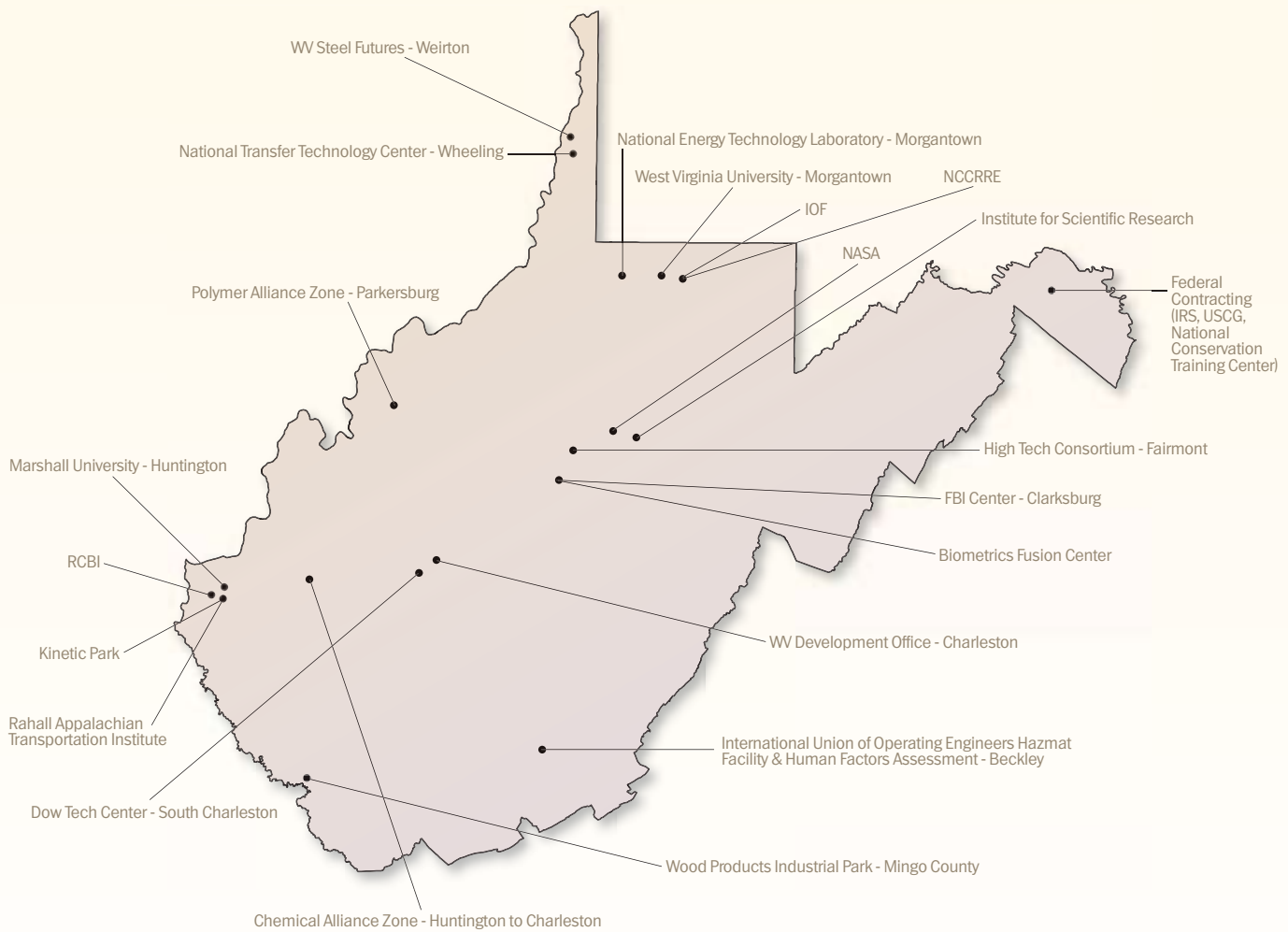
research and development in our region. The aspects of our practice that come to bear on these collaborative efforts with others include commercial transactions, economic development, finance, government relations, small business development, intellectual property, tax and education, just to name a few.

We have seen how interdisciplinary teams – including clients, government organizations, and other service providers and professionals – are essential to success. We regularly work in collaborative arrangements with teams, both large and small, to help advance the growth or research and development in our region.

Bowles Rice, like many others in our region today, actively participate in our communities to help create success. Our mission statement says it all "we contribute to the success of our clients and the vitality of our communities through advocacy, counsel, leadership and service." We take our mission seriously, each and every day.

We thank every organization – public or private, large or small – that is working diligently across our region to create a bright future, and that is committed to doing so in a collaborative fashion. We pledge our continued commitment to working with you, and look forward to realizing prosperity for all that increased research and development will bring. ▽

West Virginia Research & Development Assets and Resources



Graphic compliments of Mountaineer Capital, LP, a venture capital company headquartered in Charleston, West Virginia



Advancing the Technology Economy in the Mountain State

Greg Clutter, Director
INNOVA Commercialization Group

Greg Clutter is the Director of the INNOVA Commercialization Group, an initiative of the West Virginia High Technology Consortium Foundation. INNOVA is a business support services and seed and early-stage investment capital program dedicated to creating successful entrepreneurs and new ventures in West Virginia.

Greg is responsible for overseeing all aspects of INNOVA including providing commercialization services and assistance to companies and entrepreneurs, management of INNOVA's seed stage investment fund and delivery of entrepreneurial training offerings throughout West Virginia.

Prior to joining INNOVA, Greg led the commercial marketing efforts for Nortel's Carrier VoIP product line. He held product marketing, customer service, manufacturing and international operations positions while at Nortel.

Greg is a Certified Public Accountant and graduate of West Virginia University's College of Business and Economics.



Most new technology enterprises require tremendous knowledge and funding to grow into successful ventures. Management and financial capital are critical for these companies, but both are difficult to find for such early-stage efforts. Many endeavors exhaust personal knowledge and financial resources well before they are able to attract outside talent and funding. Without additional assistance and investment, these companies will most likely fail.

Ironically, technology-based enterprises now drive economic growth in the United States. Therefore, the success of new product and technology ventures within a region is essential to that region's economy.

The INNOVA Commercialization Group (INNOVA®), an initiative of the West Virginia High Technology Consortium Foundation (WVHTC Foundation), is a business support and seed stage investment capital program created to provide new ventures with these critical missing elements.

This program provides a well designed portfolio of resources to help qualifying West Virginia product companies succeed. These resources include commercialization assistance services, seed-stage investment capital and entrepreneurial education programs.

Nurturing and Developing the Technology-Based Economy

The global economy has undergone significant transformation in recent years. According to the Milken Institute and the State Science and Technology Institute (SSTI), the economy of the past was grown using physical assets, materials and manufacturing infrastructure. Today, regions that experience prosperity are those that best utilize technology and intangible assets.

This economy is driven by technology that creates new industries and increases productivity. Technology-based economic development (TBED) is an approach to economic development that creates an environment where such companies thrive.^{1,2}

According to SSTI, all successful technology-based economies have certain elements. These elements include intellectual and communications infrastructure, risk capital, methods to rapidly transfer knowledge, a skilled workforce, an entrepreneurial culture and a high quality of life.²

Groups of cooperating organizations in West Virginia are increasingly recognizing that nurturing these elements is at the heart of the technology economy. These groups are actively pursuing efforts which emphasize TBED. One of the lead organizations in this effort and in TBED in West Virginia for many years is the WVHTC Foundation and its INNOVA Commercialization Group (INNOVA®).

Nurturing the Technology Economy in West Virginia: INNOVA

The WVHTC Foundation founded INNOVA when it recognized that elements critical to West Virginia's technology economy were missing. Modeled on successful TBED best practices, INNOVA's services include business support services, investment capital and entrepreneurial education efforts.

Commercialization, Start-up and Business Support Services

INNOVA can provide many support services to its companies. The INNOVA team includes finance professionals along with marketing and operations experts. Therefore, much of the assistance to companies is delivered directly by the INNOVA team. In addition, INNOVA provides technical assistance to qualifying clients that allows companies to receive services from third party providers at reduced costs.

Seed and Early-Stage Investment Capital

Risk capital is a critical element to a technology-based economy. Nationally, there is a "gap" in funding after the founders' financial resources are exhausted, but before companies are mature enough for more formal sources of capital. To combat this phenomenon, INNOVA manages a seed stage investment fund which seeks out young, West Virginia product companies into which INNOVA places investments. INNOVA support services and investments are utilized to prepare these companies for more formal and larger rounds of investment

Entrepreneurial Education, Training and Networking

INNOVA sponsors and delivers multiple entrepreneurial education programs and



training and networking events in West Virginia to help nurture the entrepreneurial culture. At the forefront of these efforts is FastTrac[®], a suite of entrepreneurial education programs developed by the Ewing Marion Kauffman Foundation. INNOVA offers these programs throughout West Virginia and has graduated hundreds of entrepreneurs from FastTrac[®] programs.

Additionally, INNOVA is the host of the annual West Virginia Venture Capital Expo. VC Expo events have brought together many entrepreneurs and venture capitalists, angel investors and state and local economic development agencies. The event's mission is to provide venture capital industry education and information to attendees, and to provide entrepreneurs with the educational opportunities to help them start and grow their businesses.

With its complete set of resources, INNOVA offers a unique toolkit for seed and early-stage companies. INNOVA is strongly dedicated to economic diversification and wealth creation in West Virginia. Support and investment in seed stage companies are critical to the technology economy of the Mountain State. Long term success requires ongoing private and public cooperation. Efforts in support of TBED are not only critical for the success of fledgling technology companies, but for the entire economy of West Virginia. ▽

The WVHTC Foundation is a 501(c)(3) non-profit organization based in Fairmont, W.Va., functioning as an engine of economic change for growing a statewide and regional high tech business sector. The WVHTC Foundation has established a multi-faceted approach to maximize economic development, including infrastructure development, research and development, commercialization and affiliate services.

References

1. Largely based upon and taken from: "State Technology and Science Index: Enduring Lessons for the Intangible Economy," Milken Institute, DeVol, Koep with Ki, March 2004
2. Largely based upon and taken from: "A Resource Guide for TBED," SSTI, August 2006



What is a Cardinal Company?

John S. Hale, Executive Director
West Virginia Venture Connection
and West Virginia Entrepreneurs Forum

John Hale is the Executive Director of the West Virginia Venture Connection and the West Virginia Entrepreneurs Forum.

Also in private consulting, John leads MINDWEST Strategic Communications. He directed national award-winning Internet initiatives for the White House youth media campaign, innovated Web online learning for an international NYSE-traded healthcare management corporation and pioneered interactive communications in the telecommunications subsidiary of Time Inc.

John graduated from the United States Air Force Academy and received master's degrees in communications and business from the University of Colorado and University of Denver.



Just two decades ago Ireland was described as “a tired, lagging economy, suffering from double-digit unemployment, stagnating incomes and a brain drain of its best and brightest” By any measure, it was in the backwaters of European economies.

Today it stands in the forefront of economic growth. Over the past decade, Ireland's real domestic product per head has doubled, and its national unemployment rate has declined from 16 percent to less than 5 percent. This has made the Irish Republic one of the ten richest countries in the world.

What does Ireland's economic turnaround tell us about the future of our state of West Virginia? After all, some see West Virginia in the same doldrums as Ireland was 20 years ago. While the *Forbes Magazine* ranking of best states in the nation for business puts next-door Virginia as #1 and Maryland as #11, West Virginia's ranking at #49 surpasses only Katrina-devastated Louisiana. West Virginia, says *Forbes*, ranks #50 in “growth prospects.” Of course, West Virginia has a thin population, remote areas and mountainous geography difficult to develop. But so does Colorado ... which ranks #5.

We need to ask why Ireland, once considered a “third world” economy, has catapulted itself into what some call the “Irish

Miracle.” First, of course, Ireland did not rely on leprechauns, traditional thinking and sentimental boosterism. The truth was plain. Incomes were low. Education lagged. Profits and growth were uninspiring, and overall business output could not compete with an aggressive global economy. It was not enough for Ireland to be an island unto itself. Irish business and civic leaders were smarter than that. Instead, they took a hard look and took action.

First, they stopped relying on government. Ireland embraced economic freedom, which means that investment and entrepreneurialism were put in the hands of people who could invest their money and reap honest rewards the way they saw fit. Business owners could operate with a minimum of necessary regulation. Today, Ireland ranks #6 in the world among economies that allow enterprising private citizens to create and run business. The United States is #4.

Second, Ireland stopped caring if your birth certificate had a shamrock. Today we are in a global economy, and not even the largest country can go it alone. Under intelligent leadership, the Irish recruited leading high-tech companies such as IBM, Lotus, Intel, Microsoft, Dell, Gateway and Oracle. Financial and tax-related incentives, plus a talent pool from Ireland's world-class universities, changed the face of Ireland in the global market. At the same time, this

brought an experienced cadre of experienced business leaders to join Ireland's own ranks.

Third, Ireland invested and convinced private investors that it was a good bet. Enterprise Ireland supported entrepreneurship and venture capital to foster high-tech industry. Ireland created incentives to invest not only at the lower-end "seed" stage, but also at the venture capital "growth" stage where real profits and jobs take off. Now Irish companies such as Baltimore Technologies are global competitors with deep pools of private investment. Today, Ireland is the second largest exporter of packaged software in the world.

Here is where leading business states like Virginia and Colorado come in. They are doing the same thing! Where are we?

rolled up its sleeves and tackled the topic of a "Manhattan Project" for breakthrough business creation.

Of course, our state does not have a Manhattan, so we chose our state bird, the cardinal. And we asked, "How can we foster a Cardinal Project?" What will it take for West Virginia to create a Cardinal Company followed by an increasing number of Cardinal Companies able to win global market share and change the future for our children and grandchildren? If two kids had created Google here, would the world be beating a path to our door?

There are no easy answers. One of our Roundtable panelists noted that in the annual tally of economic freedom, West Virginia ranks lower than some former Soviet republics. Others cautioned against

We must lay out the welcome mat to attract new ventures from entrepreneurs, whether they're in the state or not. If a smart entrepreneur in Oregon has a good idea, why shouldn't he or she consider bringing it to West Virginia?

—Senator Jay Rockefeller

About a year ago, the West Virginia Venture Connection, a private nonprofit organization formed with the vision of Senator Rockefeller, assembled a roundtable of leaders from private, nonprofit and public organizations. WVVC was joined by the Discover the REAL West Virginia Foundation, which has played a pivotal role in attracting companies like Toyota, Sino-Swearingen and other companies to our state. The premise of this meeting was to ask what it would take for West Virginia to boost the funding, start-up, rapid expansion and ongoing operations of a nationally prominent venture.

West Virginia will not achieve competitive advantage relative to Virginia, Maryland or Colorado simply by building overdue infrastructure. So the WVVC Roundtable

favoring a few prima donna companies. Yet we face the reality that venture capital investors look for superstars who can warrant high-risk investment. Later, one of our WVVC board members, an experienced venture capital executive whose company manages over \$100 million, advised that \$25 million is the national average venture capital investment that is needed to mature a start-up company. He urged that West Virginia be open to importing management teams with a proven track record of managing venture capital. Everybody speaks growth rhetoric, but actual growth brings in competition for the old guard, for whom the status quo is just fine.

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Technology-Based Economic Development: The Brightest Star in West Virginia's Future

Paul L. Hill, Ph.D., Director
West Virginia Experimental Program
to Stimulate Competitive Research (WVEPSCoR)

Dr. Paul Hill is the director of the West Virginia Experimental Program to Stimulate Competitive Research (WVEPSCoR). He has more than 20 years of experience in research, management, communication, public policy and administration. Prior to joining WVEPSCoR in 2001, he was chairman and CEO of the United States Chemical Safety Board.

Dr. Hill has authored, co-authored and edited numerous technical papers, research reports, articles and other publications. A native West Virginian, he holds degrees from Marshall University (B.S. and M.S.) and the University of Louisville (Ph.D.) in biology and chemistry.

As I write this article, West Virginia University (WVU) and the Datacaster Corporation, which has offices in Morgantown and Martinsburg, have just announced the formation of a partnership to market the Reality Computing™ platform developed at WVU's GeoVirtual Lab. This exciting initiative came about because entrepreneur David Levine, Datacaster's chief executive officer, had experience building high-tech businesses and saw an opportunity to commercialize a patented product being developed by researchers in the university's laboratories.

Business projections look bright for Datacaster, which will produce highly interactive, three-dimensional maps on hand-held devices for both the business and consumer markets. Startup companies like Levine's traditionally bring with them the types of high-tech, good-paying jobs needed in West Virginia. Research-driven economic development initiatives similar to this one between WVU and Datacaster are precisely the type of public-private partnership we should all be encouraging if we really want to charge up our state's economic future.

Yes, West Virginia all too frequently ranks close to the bottom in major economic indicators. But we can change those discouraging trends. To do so, we need to keep our eyes on the big picture. Change will not happen overnight and it will require a significant investment in money and effort. But in the end, the benefits for all West Virginians will be substantial.

Studies show that regions of the country with more science, technology, engineering and mathematics professionals in the

population have better wages, higher levels of job creation, healthier citizens and so on. These populations also tend to create new intellectual property and commercial ventures readily. Good examples include regions like North Carolina's Research Triangle and California's Silicon Valley.

Closer to home, and on a much smaller scale, is the Mid-Atlantic Technology Research and Innovation Center (MATRIC), which opened two years ago in South Charleston. Salaries for the center's 40-plus employees average \$76,000/year. Just think what more jobs like that would mean for our state's future.

If we are to realize our vision of a new, prosperous and diverse economy in West Virginia, we must continue to grow the research enterprise—to lay the groundwork for more technology-based economic development initiatives like the one announced by WVU and Datacaster.

As a roadmap for that journey, WVEPSCoR (West Virginia Experimental Program to Stimulate Competitive Research) has developed Vision 2015: The West Virginia Science and Technology Strategic Plan.

The plan is based on the premise that to succeed, West Virginia must continue to diversify and transform its traditional extractive and industrial base to a more high-tech, knowledge-based economy. Endorsed by Governor Joe Manchin III and other state leaders, Vision 2015 calls for the state to grow the research enterprise by investing \$250 million over 10 years to recruit scientists and engineers, construct state-of-the-art science and engineering facilities, increase the production of West



Virginia scientists and engineers with advanced degrees, and develop new technology-based businesses like Datacaster. We project this \$250 million investment would result in a cumulative economic impact through 2015 of \$3.3 billion and 33,000 new jobs.

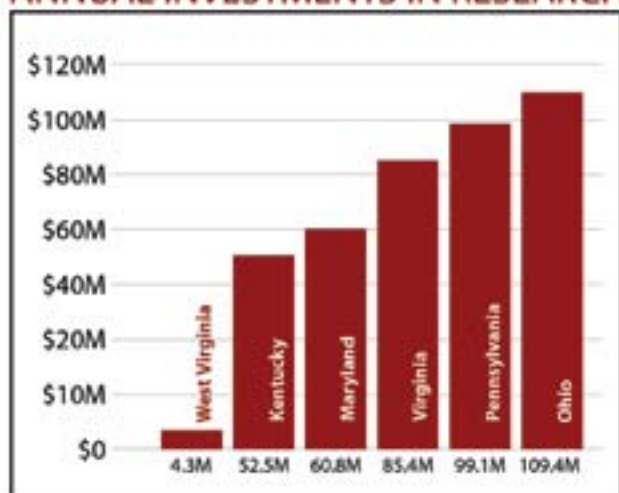
West Virginia is not alone in engaging this strategy. As manufacturing and traditional jobs continue to move offshore, states across the country are driving economic diversification through investments in cutting-edge research.

Furthermore, although West Virginia invests approximately \$4.3 million annually in academic research through the Research Challenge Fund (RCF), the surrounding states of Pennsylvania (\$99.1 million), Kentucky (\$52.5 million), Ohio (\$109.4 million), Maryland (\$60.8 million) and Virginia (\$85.4 million) invest significantly more. West Virginia must keep pace.

The Datacaster announcement is evidence that West Virginia's fledgling research grant program is starting to achieve some of its goals. In fact, this business venture is the fifth startup company to result from the RCF program. These state grants also have generated \$18.2 million in the form of corporate and federal grants and more than \$2.3 million in venture capital. But much remains to be done to make our state competitive in the new world economy.

Vision 2015 has established a clear pathway for building intellectual capital and stimulating unprecedented growth. WVEPSCoR looks forward to continuing to take the lead as a catalyst for improvements within our state and as a contributor to West Virginia's increased competitiveness in the global economy. ▽

ANNUAL INVESTMENTS IN RESEARCH



About WVEPSCoR

The National Science Foundation established the Experimental Program to Stimulate Competitive Research (EPSCoR) in 1979. West Virginia is one of 27 states and territories that participate in the program. By stimulating competitive research and promoting broad excellence in education, the program helps improve access to high-quality education and front-line research, expand economic opportunity, create jobs and improve quality of life for residents. For more information, visit WVEPSCoR's website at www.wvepscor.org.



Two Decades of Infrastructure Initiatives Established Economic Opportunities for the Future

Robert S. Kiss

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Robert S. Kiss is a partner in the Charleston Office of Bowles Rice practicing in the areas of tax, estate planning and commercial law. He earned his Bachelor of Arts degree in Economics from Ohio State University in 1979 and his law degree in 1982.

Bob was a member of the House of Delegates from 1989 to 2006 and held the position of Speaker of the West Virginia House from 1997 until 2006.

Pursuant to his legislative duties, Bob has been extensively involved in over a decade of major economic and fiscal legislation, including the West Virginia School Building Authority, water and sewer infrastructure development, state tax policy, state health care plans including PEIA and Medicaid, state retirement systems, the state's Workers' Compensation system, and the state's Tax Increment Financing legislation (TIF).

For nearly a generation West Virginia state government has quietly developed comprehensive funded initiatives, which will provide on an ongoing basis, the basic infrastructure needs for West Virginia's economy to succeed in the 21st century.

In 1988, Governor Caperton and the legislative leadership began to establish both a long-term economic vision for the state of West Virginia and long-term plans to deal with its infrastructure deficiencies.

At that time two prominent areas were identified which were acting as a continual drag on the ability of West Virginia's economy to develop at a pace more in line with that of the other states.

Those two identified areas were the failure of the state of West Virginia to identify and responsibly amortize its long-term debt, and the failure to establish long-term adequately funded programs to develop the core infrastructure of the state.

The infrastructure needs in question included continued road development which has historically been a challenge in West Virginia given our geography, but perhaps more importantly, water and sewage facility construction, and modern school facility construction, which was needed to replace inadequate and antiquated facilities.

Now a generation removed from the seeds of 1988, West Virginia has seen the passage of two relevant constitutional amendments by the citizens of the state, the dedication of over \$100 million dollars on an annual basis, the passage of substantial new structural legislation and the leveraging

of available resources against matching federal programs. The result by any measure, including dollars adjusted for inflation, has seen more investment in West Virginia's core infrastructure than at any other comparable period of time in the state's history. Furthermore, all of this was accomplished without any substantial increase in state bureaucracy, new state employees or tax increases for the general fund.

Actually one of these initiatives, the West Virginia School Building Authority, was already in existence in 1988, but one of the first steps taken by the Caperton administration and by the legislative leadership was to implement the program as envisioned, and more importantly to provide a long-term stable funding mechanism to allow for the issuance and amortization of bonds to permanently address the immediate several billion dollar need, and the anticipated long-term school construction needs throughout the state.

In a uniquely diverse West Virginia way, substantial additional dollars were needed for school construction because of economic expansion and population pattern changes which were occurring in the eastern panhandle even in the late 1980's. Dollars were also needed for new facilities in counties such as McDowell, which were experiencing substantial student population loss, but which still needed substantial investment in new facilities because of the age of its facilities and demographic population distribution changes within those counties.

In the early 1990's, the School Building Authority legislation was substantially

re-written to allow for an equitable centralized distribution of state level resources to construct new facilities, taking into consideration the state's competing needs. Given the substantial need for new school construction throughout the state and its importance to both the economic future and educational future of the state, the necessity of this program and its adequate funding was even more important given the fact that traditional school construction in West Virginia was almost predominantly undertaken at the local level, and only if local resources were available.

The results of this traditional funding mechanism, requiring the issuance of a local bond and the passage of a local levy, discriminated against smaller counties which had a diminished property tax base, and was further hampered by the continual inability of many counties to pass school construction levies at an adequate level to build the required facilities without some assistance from the state.

An additional challenge facing the Caperton administration and the West Virginia legislative leadership at that time was the fact that school facilities had been neglected for so long that an initial immediate substantial investment was required which would then later have to be followed by a stabilized long-term program. The major obstacle to resolving this challenge was the funding issue, which was further exacerbated by the fact that West Virginia's economy of the early 1990's could not support tax increases.

The West Virginia legislature at that time had an opportunity to dedicate a substantial new revenue source from video lottery gaming facilities at the race tracks. The availability of those revenues was perfectly suited to the purpose of funding the issuance of bonds to jump start the state's initial substantial construction needs. After the payment of the bonds, this dedicated revenue flow would allow for the construction of a few additional facilities per year throughout the state on an ongoing basis.

The result of these actions and initiatives in the late 1980's and early 1990's has seen, without any general revenue tax increase and by leveraging other local or federal revenues, a school construction program over the ten years in excess of one and a half billion dollars. Furthermore, the program has gone a long way to resolve a core policy challenge in that local property tax levies were inadequate for the purposes of maintaining and expanding necessary quality educational facilities for West Virginia's economic and educational future.

The next major infrastructure challenge addressed by the Caperton administration and the West Virginia Legislature was the establishment and adequate funding of the state's first comprehensive water and sewer infrastructure development program.

In the early 1990's, West Virginia was one of the few states with no comprehensive water and sewer infrastructure development program. West Virginia's water and sewer infrastructure needs faced a projected shortfall of several billion dollars.

The legislature identified this as not only an economic development challenge, but a growing environmental and health challenge given the lack of adequate sewer facilities and clean water delivery systems in many parts of the state. Towards the end of the second Caperton administration in 1994, the West Virginia Legislature and the Caperton administration proposed and pursued a comprehensive plan to deal with the many challenges facing the state in regards to its water and sewer development.

The first step taken in 1994 included the presentation and passage by the West Virginia Legislature and the citizens of the state of a constitutional amendment known as the Infrastructure Improvement Amendment of 1994. The Legislature also passed comprehensive legislation aimed at centralizing and rationalizing water and

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The Practice of Intellectual Property Law is Alive and Growing in West Virginia

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Anthony P. Tokarz is a partner in the Charleston office of Bowles Rice. His practice focuses on patents, trademarks, copyrights, trade secrets, environmental law and complex litigation involving scientific and technology-intensive cases.

Tony is registered to practice before the United State Patent and Trademark Office and serves as Chairperson of the Intellectual Property Committee of the West Virginia State Bar. He is admitted to practice in Kentucky, West Virginia, Virginia and before the U.S. District Court, Eastern District of Kentucky and U. S. District Court, Southern District of West Virginia. He is a member of the American Bar Association's Intellectual Property Law and Litigation Sections and the American Intellectual Property Law Association.

No longer must clients in West Virginia seek out practitioners in large out-of-state metropolitan areas to satisfy their intellectual property law needs. With the activation of the West Virginia State Bar Intellectual Property Law Committee (the "IPL Committee") Intellectual Property Law ("IPL") is alive and growing in this State. Indeed, since the IPL Committee held its first meeting at the State Bar Center in Charleston on September 10, 2003, the IPL Committee has grown to over 30 members.

The IPL Committee's areas of concentration address all aspects of IPL, including patents, trademarks, copyrights, trade secrets, unfair competition and technology law. IPL is a subject that arises in many corporate transactions, in numerous business operations and in a substantial amount of litigation.

IPL Committee members include attorneys in solo practice, in law firms, corporate-in-house, and government practitioners.

Twelve of the IPL Committee members are registered patent attorneys. These registered patent attorneys are authorized and experienced in preparing and prosecuting patent applications before the U.S. Patent and Trademark Office ("USPTO") in Washington, D.C. To become a registered patent attorney, a lawyer must have a bachelor's degree in a recognized technical subject, such as chemistry or electrical engineering, and achieve a passing score on the registration examination administered by the USPTO.

The IPL Committee addresses the issues involved in the legal protection of intellectual property.

A major objective of the IPL Committee is to create an awareness among individual inventors, creators, authors and members of the business, academic and governmental communities that there are capable IPL practitioners in West Virginia. These practitioners can provide quality IPL work at fees far less than those of IPL practitioners in Pittsburgh, Baltimore, Washington, D.C. and other more costly areas.

Other objectives of the IPL Committee are:

- To advance the quality of IPL practice in West Virginia by keeping our members informed about developments in IPL practice;
- To provide interesting and informative IPL continuing legal education programs for IPL and non-IPL attorneys; and
- To create opportunities for our members to become acquainted and to share IPL experiences.

IPL is the cornerstone of this Information and Technology Age and the IPL Committee strives to assist West Virginians in protecting and increasing the value of their intellectual property assets, and to provide a platform upon which the members can be on the leading edge of this dynamic field of law. ▽

**IPL is the
cornerstone of this
Information and
Technology Age**

What is the Relationship Between Law and Technology?

Carrie J. Daugherty
Bowles Rice McDavid Graff & Love LLP



The increasing need for an understanding of the relationship between law and technology is readily apparent both in our daily observations and personal activities. Law controls the use of technology, imposing licensing requirements for software and regulating devices used in underground mining to provide safe and healthy working environments.

Law regulates the ownership and content of television commercials, the graphics included on the packaging of our favorite cereals and cans of soda, and the slogans and jingles we have grown to associate with popular products. Law regulates the pharmaceutical industry and the availability of generic drugs, and law controls the entrance of competing technologies into the marketplace via patent infringement rules and regulations. Law is an intricate mix of art and science, and Bowles Rice has the technical capabilities to overcome scientific legal challenges and develop successful solutions.

Successful outcomes are a product of strong foundations, and Bowles Rice has a strong, multi-disciplinary foundation in science and technology. Our legal team is comprised of individuals with education and professional backgrounds in the fields of chemical, civil, electrical, environmental, mechanical, and mining engineering, as well as accounting, biology, chemistry, economics, finance, geology, and statistics.

Our team includes certified public accountants, former members of the military, pilots, college professors and multi-lingual individuals. Bowles Rice

is a team of highly skilled individuals, combined to provide a detailed, analytical approach to legal analysis and problem solving. The specialized legal knowledge available at Bowles Rice is evidenced by the selection of 24 attorneys as the "Best Lawyers in America" in a variety of scientific and technical areas of the law, including information technology, intellectual property, tax, natural resources, health care and banking.

Individually, the fields of law and technology are growing rapidly and becoming increasingly unpredictable. However, a constant thread amidst the web of unpredictability is the exponentially increasing relationship between legal and technical issues.

Numerous innovations and their related technologies are developed each day, and with each new technology comes legal issues of first impression. Bowles Rice has the knowledge, experience, and enthusiasm to successfully overcome the challenges associated with the interplay of law and technology. √

Carrie J. Daugherty is an associate in the Morgantown office of Bowles Rice and practices in the areas of real estate, energy and intellectual property law.

Carrie earned her law degree from the West Virginia University College of Law where she was the recipient of the Robert G. Kelly Memorial Scholarship. She received her B.S. in Mining Engineering, summa cum laude, from West Virginia University, and was a member of the Society of Mining Engineers and Tau Beta Pi Engineering Honor Society. Carrie was also the recipient of the Raymond Salvati Scholarship, the Sims Memorial Scholarship and the Beckley Area Foundation Scholarship.



**What does this can of soda have to do with the practice of law?
A lot, actually.**

Building an Economic Engine

(continued from p. 7)



These nine research scientists will concentrate their efforts in areas that will produce patentable intellectual property with commercialization potential. They will involve undergraduate and graduate students in their research with the goal of preparing the next generation of entrepreneurial researchers who will contribute to the economic growth of West Virginia within MIIR and elsewhere.

The charter for MIIR establishes a research enterprise predicated on an earning and entrepreneurial culture. It stipulates that appointments of research scientists will be exclusively within the Institute (a subsidiary 501.c.3. of MU) with no appointments in traditional academic departments. The research scientists will be hired on performance-based contracts in lieu of tenure eligibility, and contract renewals/extensions will be merit and performance based.

All of the endowed research scientists will be required to generate 50% of their compensation from externally funded grants/contracts within five years and each year thereafter. Their performance will be evaluated principally on the genesis of commercially viable intellectual property (IP). The recaptured interest earnings used to support these positions at the outset will be reinvested in new research scientist positions. At the beginning of the sixth year of operation, MIIR will expand the number of research scientists from nine to thirteen through this mechanism and continue to self-generate new positions every five years thereafter.

It is important to note that the benefits generated by MIIR accelerate over time. An independent economic impact study performed by the Center for Business and Economic Research indicates that 1,100 new jobs will be created by MIIR and state tax revenues will increase by more than \$25 million during the first decade, returning the state's original investment in full.

During the second decade, job growth escalates to 3,365 new jobs and new tax revenues climb to \$138 million. These projections are conservative and do not include any revenues generated either from the sales of products created from the Institute or the development from the much needed job growth in our surrounding communities.

MIIR will retain and employ significant numbers of college-educated West Virginians (undergraduate through doctoral degrees) in high-paying positions with benefits. In so doing, this institute will create educational and occupational ladders in entrepreneurial research and business innovation for talented West Virginians that further the economic development of the state. Presently many of these educated and talented West Virginians are leaving the state because such opportunities are limited to non-existent in West Virginia and abundant elsewhere. Our ability to retain and expand the educated workforce of West Virginia is of paramount importance in attracting new business investment in the state.

It is my hope that Governor Joe Manchin, the members of the West Virginia Legislature and other state leaders will embrace this plan as a strong, accountable method for creating responsible economic growth and career opportunities within the state for highly talented West Virginians. At Marshall University we stand ready to implement this plan as soon as the public and private investment funds are available. The reaction thus far by business leaders, public servants and the media has been overwhelmingly positive. It is a plan that

can be championed by both investors and inventors alike.

We in public higher education have been challenged by Governor Manchin to become more self-sufficient. By developing a highly competitive research institute that delivers these kinds of self-sustaining and self-generating economic benefits, Marshall University will answer this challenge with confidence, conviction, and a powerful plan for research-based economic development that will create new opportunities for our children and grandchildren and fulfill the promise of a better future.

To learn more about the Marshall Interdisciplinary Institute for Research (MIIR), please visit www.Marshall.edu/miir. ▾

Major Universities Are Primary Engines of the Modern Economy

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communities thrive and greatly contribute to the synergy mentioned earlier.

Strategic Development and Intellectual Leadership

Not only do colleges and universities produce graduates with strategic thinking skills, these institutions have a wealth of intellect among their faculty, staff and students. Look around any college town and one will see faculty, staff, students and administrators of the local institution serving as volunteers, leaders and contributors to the local community. In Morgantown, it was a retired WVU administrator who was instrumental in the visioning exercise that led much of the community's approach to economic

development. Extension agents are also part of the strategic planning fabric of local communities around West Virginia.

These are only some of the ways that higher education propels economic development. WVU has been doing this for 140 years. When Doherty and Summers wrote a history of WVU in 1982, they titled it *West Virginia University: Symbol of Unity in a Sectionalized State*. From its disadvantaged location, with limited resources, WVU has been among the most influential engines of progress in our state since its founding. In today's knowledge economy, WVU's role is arguably more central than it has ever been. The leaders at WVU feel the pressure, as we should, to do all that we can to make this turn-of-the-century optimism last for generations to come.

With new academic programs, enrollment growth, a more robust research and service agenda, new campuses, the addition of a new health care system, and Eastern Panhandle and Clarksburg hospitals to our family of organizations, a stronger more national athletic department, new technologies, larger dependence on private funds and tuition dollars and the changing nature of global competition in the education market, WVU has emerged as a true economic engine for West Virginia. ▾

References

Beeson, Patricia E., David N. DeJong, Werner Troesken, "Population Growth in U.S. Counties, 1840-1990." *Regional Science and Urban Economics*. 2001.

Glaeser, Edward L., Albert Saiz, "The Rise of the Skilled City," Project Muse, Brookings-Wharton Papers on Urban Affairs. 2004.

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Lexington: A Vision for Change

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Economic Development

We need to put greater focus on our economic development efforts to ensure that Lexington and the Bluegrass region have the sort of economy that can sustain itself in the 21st century. Our world economy has changed dramatically over the course of the last 15 years, and so, too, must Lexington's economy change.

Our workforce must develop the skills necessary to compete in the new economy, so we will support worker training programs for individuals who need to enhance their skills.

Our horse, health care and high-tech industries hold great promise for our future. These are our prime source of high-paying, home-grown jobs and we must do everything we can to nurture these industries.

We must make science, technology, engineering and math areas of increased emphasis at every educational level. This year I will propose a scholarship program to the Council that will encourage Lexington high school students to pursue science, technology, engineering and math education in our local post-secondary institutions.

We will work hand-in-hand with the University of Kentucky in the school's quest for top 20 research status as we strengthen the tie between university research and economic development.

Innovative Planning

We must utilize the best thinking in urban planning, and we must address our infrastructure needs on an ongoing basis rather than be confronted with massive infrastructure needs all at one time. The decisions we make in planning clearly have an impact on our neighboring counties.

The Council and I want to take a comprehensive look at the process by which we develop our community in an effort to ensure that our planning efforts and our implementation efforts are more closely linked. We also want to create an atmosphere that permits greater creativity by our builders so that we can more effectively utilize our unique land resources.

Better Communication

The Council and the administration recognize the need for more effective communication, both internally and externally. Internally, we have already undertaken several initiatives to improve communication with the Council; I intend for these initiatives to be the rule, not the exception. The time of bickering and infighting is over. Externally, I will work with the Council to improve communications with the community by making the best use of the many options technology offers, including e-mail, electronic newsletters, and the expanded use of our website.

We also want to improve the communications we offer through Cable Channel 3 by adding several new programs, and I will encourage Council participation in that effort. We also hope to hold Council meetings outside the confines of city hall so that it will be easier for members of the community to attend.

More Efficient, More Cost-Effective Government

There are a number of steps we can take to make Urban County Government more efficient and more cost effective. Those steps include the expansion of the internal

audit office so that more management and financial audits can be performed.

We plan to identify and analyze critical measurements to evaluate our performance, and we hope to increase the use of LexCall so our citizens will be able to more easily access needed local government services. We believe that we need to emphasize our information technology by creating the post of a chief information officer to oversee the significant investment we have made in our computer systems.

Athens of the West

During my Inaugural Address I spoke of how Lexington was once known as the Athens of the West. Between 1780 and 1830, the early settlers of this community took Lexington from being merely a blockhouse and four cabins to being one of America's pre-eminent cities.

Lexington's educational institutions, its arts and culture, its fertile land and its industrious people created an atmosphere that enabled Lexington to grow and prosper. Because of their hard work in the early 19th century, our forefathers earned a special place in our city's history.

Today we have the same opportunity to claim a special place in Lexington's history if, like our forefathers, we work hard and seize the potential that exists in our city and our region. I am confident that Lexington is uniting and will move forward to become one of America's pre-eminent cities, just as it was in 1830. If we do that, our own special place in Lexington's history will be secure. W

Research Means Business at the University of Kentucky

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The University of Kentucky owns and operates the Coldstream Research Campus, located only minutes from campus.

businesswomen who are accredited investors, was formed several years ago and has already invested in six new businesses, some of which are UK startups.

But commercialization could not take place without UK's strong, dynamic, multidisciplinary research enterprise. Cross-disciplinary research at UK is sparked by the fact that it is one of the few universities in the country with a teaching and research campus and a medical center located on one central campus. An emphasis on emerging technologies is reflected in the university's patent portfolio in the areas of pharmaceuticals and therapeutics, plant biotechnology, and environmental energy and manufacturing technologies.

The UK College of Agriculture conducts cutting-edge research for expanding high-tech agriculture and houses strong translational research programs in plant and animal sciences, food, nutrition, health surveillance and biosecurity, and environmental sciences. Plant science and equine programs have attained distinguished stature and have generated multiple startups and commercialization opportunities.

UK researchers and the Kentucky Tobacco Research & Development Center located at UK are leaders in plant-made pharmaceuticals (focusing on PMP regulation), plant-based natural products and plant production systems.

In the medical field, UK is taking on Kentucky's biggest health problems: cancer and heart disease. The Markey Cancer Center is a leader in cancer research, with projects under way to create a lung cancer vaccine, find cancer-killing genes, repair cancer-caused spinal cord injury, and target hard-to-treat thyroid cancer. The Gill Heart Institute, the focal point for patient care, research, education and prevention, has four specialty programs, including management programs for atherosclerosis, heart failure and lipids, and the Cardiovascular Women's Health Clinic. And the Center for the Advancement of Women's Health includes a new statewide health registry that will aid research on diseases and conditions that affect Kentucky women.

UK has a strong research focus in neurodegenerative diseases such as Parkinson's and Alzheimer's, as well as spinal cord injury and head trauma. UK is also home to a Morris K. Udall Parkinson's Research Center, one of only 11 such centers in the United States funded by the NIH. The Sanders-Brown Center on Aging is one of the original 10 Alzheimer's research centers in the nation.

Biomedical research is advanced through interdisciplinary collaboration at UK that brings together scientists from Medicine, Engineering, Dentistry, Pharmacy, Arts & Sciences, Health Sciences, Nursing, Public Health, and others to develop and apply biomedical technologies. The Center for Oral Health Research in the College of Dentistry collaborates with 10 other UK colleges on research related to infection/immunity and chronic diseases, health services research, orofacial pain, and craniofacial bone biology.

The UK College of Pharmacy, year after year, is ranked among the top 10 in the nation. Researchers work in the areas of pharmaceuticals & drug delivery, drug discovery, medicinal chemistry, natural product chemistry, pharmacokinetics & pharmacodynamics, drug metabolism, pharmacology, molecular biology, transporters, cell biology, pharmacogenomics and analytical chemistry. Ongoing projects include treatments for nicotine addiction, neuropharmacology and toxicology, discovery of new anti-tumor agents, nanoengineering of drug delivery systems for vaccines and cancer diagnostics / therapeutics, and the evaluation of drugs for transdermal therapy. Many of UK's pharmaceutical scientists are involved in commercialization and startups.

Researchers in UK's College of Engineering take on different challenges, focusing on fundamental research and translational research in the areas of biomaterials, computational fluid dynamics, the environment, energy, transportation and mining. Research-for-development teams include centers for aluminum technology, nanoscale engineering, micro-magnetic and electronic devices, manufacturing, fossil fuel science and vibro-acoustics. The Center for Visualization & Virtual Environments develops computer-generated immersive environments for a variety of applications. The Painting Technology Consortium, a leader in coating and surface technology, includes partners such as Toyota and Honda.

For more on UK's research enterprise, including information on all UK research centers & institutes, sponsored projects database, core facilities and *Odyssey Magazine*, see www.research.uky.edu.

For more information on the Office of Commercialization & Economic Development, see www.research.uky.edu/ed, or contact EconDev@uky.edu. ▽

Health Research at WVU Expanding Rapidly

(continued from p. 23)



Daniel Flynn, Ph.D., deputy director of the Mary Babb Randolph Cancer Center at WVU, injects cells into a mass spectrometer at the cancer center as part of a research study.

grant leads to the creation of eight new jobs in and around the university.

More importantly, a concentration of research laboratories almost invariably leads to private investment in developing the concepts created in the university setting. Protea Biosciences, Inc. is a biotechnology firm that was launched in 2002 to commercialize the work of several WVU scientists. In 2006, the company introduced the Protea Explorer System. The \$30,000 device, manufactured in Morgantown, allows scientists to complete a week's worth of work in three hours. It is expected to be in heavy demand among the 12,000 pharmaceutical, biotech and academic laboratories around the world where protein research is conducted.

WVU's healthcare enterprises are also tied to its research work. Over the course of the next three years, WVU Hospitals and University Health Associates will install a \$70 million health information system. The main object of the investment is

to improve the care of patients by making all information and medical records available to caregivers wherever and whenever a patient is treated.

A side benefit will be the development of a massive health database, where medical information (stripped of patient identification) can be analyzed to detect health trends; study the effects of drugs, surgery, preventive treatments and other interventions; and analyze the factors that affect healthcare costs. The development of the integrated health database has the potential to put WVU in the forefront of several areas of population-based health research.

The Morgantown area is an ideal location for an expanding research enterprise – it has a strong existing network of research resources, both within the University and at the Federal research labs on campus and nearby; a community that values and supports research; and the support of the business community, the state government and our representatives in Washington. We expect the health research component of the local economy to continue to thrive. ▽

How MATRIC is Kickstarting the Region's Research & Development Activities

(continued from p. 31)



technical tools to create long-term economic value from post-mine lands.

The Center will be co-managed by MATRIC, West Virginia Land and Mineral Owners Council and West Virginia State University, and will include partnerships with West Virginia University,

Marshall University and other entities across the state. Open scientific-oriented access to the resources of the Appalachian Land Restoration Center will be guaranteed to all non-profit and university partners committed to advancing the technical mission of the Center.

Software Assurance

MATRIC has teamed with the L-3/Titan Corporation to support NASA in the analysis of software for the New Horizons Pluto-Kuiper Belt Mission, a mission designed to explore the mysterious worlds at the edge of our solar system.

The New Horizons spacecraft has been outfitted with a complete suite of instruments to perform scientific measurements of Pluto and its moon, Charon. As part of an extended mission, New Horizons will continue its journey into the Kuiper Belt region of our solar system in hopes of encountering trans-Neptunian objects, or minor planets.

MATRIC has provided software assurance for the fault protection autonomy system onboard the spacecraft. The autonomy system is responsible for detecting and correcting any problems with the spacecraft and its subsystems that could jeopardize the mission.

The New Horizons spacecraft was launched from Cape Canaveral, Florida in January 2006, and will take advantage of planetary positioning by using Jupiter to “slingshot” it towards Pluto. New Horizons will reach Jupiter approximately 13 months after launch, and will fly three to four times closer to the gas giant than the Cassini spacecraft.

During the brief encounter with Jupiter, New Horizons’ arsenal of scientific instruments will be exercised and tested, obtaining extraordinary scientific data on the biggest planet in our solar system. After the Jupiter fly-by, New Horizons will enter “hibernation” mode and prepare

itself for the long journey to Pluto. It is scheduled to make its first contact with Pluto in the year 2015.

MATRIC is part of the team led by Titan Corporation to perform as much as \$200 million in research services over five years across every mission within NASA, including the International Space Station, Space Shuttle and interplanetary spacecraft.

Coal Mine Safety

MATRIC is investigating a new technology concept for providing breathable air to miners who may be trapped for extended periods after a mine accident.

In emergency situations resulting from fire within a mine, oxygen in the air is consumed to feed the fire. In some cases, the oxygen remaining in the air drops to levels too low to sustain life. In addition, toxic carbon monoxide may be generated by the fire.

Currently, in these situations, miners rely on a closed breathing system that generates a one-hour supply of oxygen. Since it may take many hours for a successful rescue attempt, it is necessary to store a considerable number of these devices at locations in the mine to ensure a continuing supply of breathable air.

The concept being investigated by MATRIC follows a different approach that does not rely on consumable oxygen supplies. Instead, this technology uses the low levels of oxygen remaining in the depleted air and selectively enriches the oxygen until it reaches a breathable concentration.

At the same time, undesirable gases such as carbon monoxide would be separated or destroyed. New catalytic systems for CO destruction are the focus of a separate investigation, and they could be incorporated into the device.

MATRIC’s approach to oxygen enrichment uses novel separation techniques that have

been demonstrated in home use applications for medical patients with lung disorders. The low power requirements could be supplied by batteries or by a mechanical source.

“The goal of this work is to develop a user-friendly and economical solution,” says Dr. George Keller, who is leading this effort. “It is clear that this technology can produce breathable air and could save lives when other supplies would have been exhausted.”

Doing It Right

MATRIC is just as committed to doing research and development in the right way as we are to developing the right science and technology. The MATRIC values are the articulation of our approach.

We cherish fast-paced market-oriented innovation.

We are the best-in-class innovators because we value intense customer focus.

People are our most treasured asset.

We conduct all our business with the highest standards of ethics.

We value diversity of thought, experiences, disciplines, and cultures.

MATRIC is a fun and exciting place to work.

MATRIC is committed to our dual mission, which focuses both on the financial performance of the corporation as well as the social concerns of West Virginia and the United States. As we continue to grow, we will be even more effective in meeting these important obligations to the next generation of citizens. ▽

What is a Cardinal Company?

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At the Roundtable itself, Senator Rockefeller said, “We must lay out the welcome mat to attract new ventures from entrepreneurs, whether they’re in the state or not. If a smart entrepreneur in Oregon has a good idea, why shouldn’t he or she consider bringing it to West Virginia? We have to create the conditions where we can identify and attract those businesses.” He commended the West Virginia Venture Connection, chaired by entrepreneur and West Virginia native Eric Lewis, for playing a key role in bringing more risk capital to bear in our state.

Can we be hopeful for a “West Virginia Miracle” in business development and economic growth? Battelle Memorial Institute will soon issue a report reminding that our state has energy and chemical resources critical to our nation’s future. This spring the West Virginia Venture Connection will host its next Roundtable to introduce venture capital investors to the energy, chemical and other sector leaders in our state. Meanwhile, innovators like Grethe Lindemann of The Hopewell Fund in Wheeling are creating new funding options for smaller entrepreneurs across our state. Innovation incubators are gathering new momentum at West Virginia University and Marshall University. The final test, however, will not be in process, but in profits.

There are hopeful signs for West Virginia. At one end of our state, a company is developing alternative-energy technologies for homeland security. In central West Virginia, a company is developing Internet technology for NASA to manage the Space Station and to empower companies who want to outsource not

only to India, but to West Virginia. At the other end of our state, companies are mastering biometrics and more. They are inventing our future.

So, statistics are not destiny. Ask Ireland. Next year, ask West Virginia. W

Two Decades of Infrastructure Initiatives Established Economic Opportunities for the Future

(continued from p. 45)



sewer infrastructure investment decisions in addition to maximizing the leverage opportunities presented by various federal funding programs. The legislation further created a revolving fund to provide low interest and no interest loans and grants to subsidize the development of water and sewer facilities throughout the state.

Once again, the Caperton administration and the West Virginia Legislature were faced by the main challenge of providing a long-term stable funding source to fund over a reasonable period of time the substantial water and sewer infrastructure needs of the state. The solution was the dedication of a portion of then existing West Virginia severance taxes.

West Virginia severance taxes are imposed on the extraction of natural resources such as

coal, oil and gas, and timber. The dedication of a portion of these taxes made perfect economic sense as the depletion of the state's natural resources could be used to develop the state's infrastructure to allow for future growth and diversification of the economy.

It made further sense in the context that the extraction of natural resources, particularly coal, in many instances left raw usable land for development purposes but without water or sewer access. The legislature further benefited from a general upturn in the economy at that time which allowed for a dedication of a portion of the severance taxes without having to increase severance tax rates at that time.

In order to deal with immediate construction needs, West Virginia once again looked to the bond market to allow for the initial funding of a program to deal with core immediate needs, while at the same time the dedication of severance taxes on a long-term basis would allow for the permanent funding of necessary water and sewer infrastructure development on an annual basis.

Given the fact that the legislature was identifying and attempting to use a general revenue tax, (unlike lottery which was utilized for school construction), it was necessary to obtain from the voters of the state the approval of any bonded debt for the initial water and sewer investment program. In 1994, West Virginia approved, by a narrow margin, a \$300 million dollar bond issuance to be amortized from dedicated severance tax collections.

The 1994 legislation also created the West Virginia Infrastructure and Job Development Council, which for the first time oversaw and coordinated all investment in water and sewer throughout the state. The Council was provided with the dedicated severance tax and bond proceeds, which were used to create a revolving fund initially funded with the three hundred million dollars in bond proceeds.

Those initial proceeds in most instances were used to support low interest loans to public service entities throughout the state and the repayment of those loans over the past generation has allowed an additional revenue flow to the state of West Virginia to issue an additional series of revenue bonds for infrastructure investment.

At the time of the passage of the Infrastructure Improvement Amendment, the West Virginia Legislature was aware that the \$300 million dollar revolving fund concept would not be adequate to resolve the immense water and sewer infrastructure development needs on a long-term basis, and clearly additional funding was required.

While it took several years, the West Virginia Legislature at the turn of the century was presented with an opportunity by the regulation of illegal gray machine gambling devices which were then proliferating throughout the state's bars and clubs. At that time the Legislature dedicated in perpetuity, on an annual basis, an additional forty million dollars a year from the state's regulation of these machines.

In fact, the dedication of revenues from gaming activities over the past generation has not predominantly been utilized to fund expansion in existing governmental programs or the salaries and benefits of state employees, but instead, a major portion of those revenues have been dedicated to the development of this state's school building and water and sewer infrastructure needs establishing the groundwork for a diversified economy.

A final infrastructure initiative of the Caperton administration and the West Virginia Legislature actually saw its completion and implementation under Governor Cecil Underwood.

In 1996, the citizens of the state again approved a constitutional amendment known as the Safe Roads Amendment

of 1996, allowing the legislature to sell state bonds not to exceed \$550 million dollars. Again, the funding and amortization of these bonds were undertaken by dedicating a part of existing state and gasoline tax revenues thereby not necessitating an increase in gasoline taxes at that time. This road investment during the last ten years has become particularly important given the expanded economic opportunities in several expanding parts of the state.

Perhaps only state policy makers involved directly in these infrastructure development decisions are fully aware or appreciative of these initiatives. The substantial progress made in these areas, based upon the initial planning stages of the late 1980's and early 1990's, may very well be later recognized on a broader basis as some of the most beneficial long-term economic development initiatives undertaken in the history of the state. ▽

How the Chemical Industry is Adapting in the New Economy

(continued from p. 27)



technology transfer best practices in the universities, which we hope will identify centers of expertise and opportunities for further growth. It is also participating extensively in the Vision Shared TBED initiative, which is working with the Benedum Foundation, the architects of Vision 2015, and other key stakeholder organizations to develop an externally verified, actionable blueprint for the future, mapping key public and private sector activities to develop West Virginia's niches in high growth technology-driven

sectors. The key focus is building on West Virginia's technology strengths. Details of this important activity will be forthcoming from the Vision-Shared TBED team, and the early results are encouraging. Finally, we are developing a software platform to enable connection and collaboration, tying together relationships, capabilities and institutions.

Is there an opportunity for West Virginia to capitalize and attract further research-based endeavors? To the extent we can establish university and industry centers to serve as nuclei for attracting partners to our unique and world-leading expertise, we can. ♾

by urbanization and population growth.

As we enter West Virginia's Golden Age, challenges remain. We must abandon our scarcity mentality, and adopt a new abundance mentality more in keeping with our many blessings and rich opportunities. We must balance growth with preservation of that which makes West Virginia such an attractive place to live, work and play.

Most importantly, we must actively and thoughtfully position ourselves for future success. If we do, West Virginia's Golden Age will be upon us before we know it. ♾

West Virginia's Golden Age

(continued from p. 13)



production of energy, but also in safe and environmentally sound production techniques. Tourism will remain strong and grow. Our industrial and manufacturing base will continue to serve us well, and reap many benefits from technological change.

Our solid work ethic and creativity – demonstrated by the recognition that the Toyota plant in Buffalo regularly earns as the most productive plant operated by Toyota in North America – will become a greater asset with each passing year. And the warmth and friendliness of West Virginians will emerge as a beacon to citizens around the globe, who daily face increasing challenges and frustrations brought on

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