# Education, Economic Development, and 21st Century Jobs: The Case for Planned Growth of Biosciences in Washington County

A COMMUNITY DISCUSSION PAPER PREPARED BY HAGERSTOWN COMMUNITY COLLEGE

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## Introduction

The purpose of this paper is to stimulate ideas, discussion, and action that will unite and strengthen local economic development, education, and workforce plans to reshape the local landscape for 21st century jobs. It presents a case for the planned growth of bioscience business development in Washington County that has the potential to contribute to the transformation of the county's economy. Within the past few years, a number of bioscience-related initiatives have been developed in the county. For example, Hagerstown Community College (HCC), with county and state support, has constructed wet labs for bioscience start-up businesses, and has developed a biotechnology degree program. The Economic Development Commission (EDC) has made the attraction of bioscience businesses to the county a priority. These and other efforts will continue and at the same time could become part of a more comprehensive effort by the community as a whole, the magnitude of which is a central question posed by this paper. It is hoped that the information contained in this paper and community discussions will help answer that question. The five sections of the paper:

1. Describe Washington County's economy in transition; introduce the field of life sciences and its role as an engine of growth in the U.S. and Maryland; examine why bioscience makes sense for the future economy of Washington County and describe its current status; and discuss the importance of a shared vision and targeted plan for the future of bioscience in the county;
2. Detail the needs of life science businesses and describe existing resources in Washington County to meet those needs;
3. Explore strategies and potential pathways for bioscience business development;
4. Examine potential challenges and strategies to address them; and
5. Present a summary, recommendations, and conclusions.

An Executive Summary of the paper may be found in **Appendix 1**.

## Section I. Washington County's Economy

Long known as a transportation, agricultural, and industrial hub, Washington County has responded to declines in its traditional economic base by beginning to build a more diverse economy. As a result, the county has experienced growth in such primarily service-based businesses as transportation, the financial sector, health care, and leisure and hospitality. While providing employment for thousands of workers, jobs in these sectors are typically less well paid than manufacturing jobs, which have experienced a 19.5% decrease in the county between 2001 and 2007.[1] To continue its evolution to an economy that provides greater access to high skill, high wage employment, the county must attract businesses from sectors that are experiencing growth now and are expected to continue expanding throughout the 21st century. These businesses would form the nucleus of a sector that offers high wages to highly skilled workers, and, through a ripple effect, contributes to widespread economic well being.

The terms biotechnology, bioscience, and life sciences are used interchangeably and represent a multi-sectored industry. These sectors include: Research Testing and Medical Labs; Agricultural Feedstock and Chemicals; Drugs and Pharmaceuticals; and Medical Devices. Defining the bioscience industry presents a challenge because bioscience has many diverse applications ranging from developing diagnostic tests that spot cancers to designing bugs that will clean Brownfield contaminants. The U.S. Office of Technology Assessment defines bioscience as "any modern technology that uses living organisms (or parts of organisms) to produce or modify products, to improve plants or animals, or to develop microorganisms for specific uses." Examples of fields within life sciences include: Agrotechnology; Biodynamics; Bio-Engineering; Bioinformatics (the management and analysis of data as applied to biological research); Biotechnology; Ecology and Environmental Sciences; Genetics and Genomics; Nanotechnology; and many others.[2] The bioscience field, one of the most rapidly changing areas of science, offers a wide variety of high skill, high wage employment options, including laboratory technicians, research associates, manufacturing and production technicians, as well as senior scientists. Positions can relate to medical and pharmaceutical research, microbiology, forensics, and product development, and are typically better paid than jobs in manufacturing. For example, former textile workers now working as research technicians in North Carolina have increased their earning capacity after community college biotechnology training.[3]

In its study, "Technology, Talent and Capital: State Bioscience Initiatives 2008, The Battelle Memorial Institute describes the biosciences as, "much more than other sectors… dynamic and evolving with the latest research and scientific discoveries with tremendous widespread impact on food, medicine, and alternative fuels. The common link among this diverse set of companies is an application of knowledge as to how living organisms function."[4] Battelle reports that bioscience employment approached 1.3

million people in 2006, representing at 5.7% increase over five years. The total number of bioscience establishments reached 42,910 in 2006, a 15.7% increase in five years.[5]

Maryland is a national leader in the bioscience industry, with more than 400 bioscience companies in the state, and Frederick and Montgomery Counties have led the way, with a combined 40% of Maryland's bioscience workforce. Maryland has invested more than $450 million in bioscience infrastructure, and Governor Martin O'Malley recently announced his plan to seek an additional $1.1 billion in state funds for the bioscience industry over the next ten years. There are growing indications, however, that the regional industry is experiencing barriers to continued growth. This is especially the case in Montgomery County, where lack of available development land, as well as high operating costs, are leading established and start-up organizations to consider moves to nearby areas with lower costs and more available land.[6] This development is also occurring in other states**.** In Massachusetts, for example, several biotechnology firms in the Cambridge area, facing increasingly scarce and expensive laboratory space, are re-locating to suburban areas.[7]

An additional factor expected to have a significant impact on Maryland's bioscience sector is the Base Realignment and Closure (BRAC) Act of 2005. Fort Detrick, one of five BRAC-affected areas in the state, is a mixed asset U.S. Army installation that performs five strategic missions: National Biomedical Research and Development; Joint Medical Materiel Management; Global Telecommunications; Military Medical Intelligence; and Detection of Crop Pathogens. As a result of BRAC, several billion dollars will be spent on new construction and revisions to Ft. Detrick's infrastructure, concentrated in the National Interagency Bio-defense Campus (NIBC) and the National Interagency Council for Biomedical Research (NICBR).

Among the changes planned for Ft. Detrick include: relocation of the Naval Research Biomedical Research Center to the U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID); and additions in personnel to the National Institute of Allergies and Infectious Diseases (NIAID) and the National Bio-defense and Countermeasures Centers (NBACC). By 2010, total employment growth at Ft. Detrick is expected to exceed 1,400 jobs.[8] Ft. Detrick expansion is expected to have a fallout effect throughout the region. With access to space and other services becoming more difficult to find, federal agencies, as well as emerging bioscience businesses that serve government agencies, will be searching for nearby facilities that offer the services they need to perform their missions.

Taken together, these developments point to the potential for bioscience business development in Washington County that would enable the county to capitalize on its existing assets. The Washington County Economic Development Commission has responded to this confluence of events and circumstances by making the attraction of bioscience firms to the county a priority. Growth projections for the industry are strong, and Maryland has made and will continue to make substantial investments in bioscience.

Washington County's available, relatively low-cost land, as well as its comparative lower property taxes and operating costs, make the area potentially attractive for start-up and expanding companies. The county's proximity to the Baltimore-Washington metropolitan area makes it an attractive site for a variety of businesses, and its transportation network incorporates air, rail, and interstate connections. Its educational facilities include Hagerstown Community College, with a 62-year history of contributing to the economic and workforce development of the county; an expanding K-12 system; and the Hagerstown campus of the University System of Maryland that provides upper division higher education. With BRAC-related expansion of Ft. Detrick, Washington County can offer facilities to federal agencies and bioscience businesses that work with and for the government. For example, Corporate Office Properties Trust (COPT), the developer for Fort Ritchie, expects to lease one million square feet of office space, and bring 4,500 jobs to the county, in part by offering a secure setting to meet anti-terrorist protection requirements.[9]

In the past few years, the state, county, bioscience employers, and Hagerstown Community College have made significant investments in bioscience, and Washington County has begun to position itself to take advantage of potential bioscience opportunities. HCC convened a panel of regional bioscience professionals in 2006 to advise the college on future industry trends and workforce requirements. These professionals, including representatives from such bioscience research and manufacturing agencies and firms as Ft. Detrick, MedImmune, Inc., and the U.S. Department of Agriculture, reaffirmed the growing need for trained bioscience technicians and predicted the need will continue to expand. These and other bioscience employers then worked directly with HCC faculty to develop curriculum for new Biotechnology Associate of Applied Science (AAS) and Certificate programs. These employers and others serve as members of the college's Biotechnology Advisory Committee, and provide guidance and support to the program.

HCC's biotechnology program was approved by the Maryland Higher Education Commission (MHEC) in Spring 2007. The college hired a lead faculty member for the program, and students began coursework in the Fall 2007 semester. The first students will complete internships and graduate during the 2008-2009 academic year. Students are working in new state-of-the-art biotechnology and microbiology laboratories, both of which are features of the $21 million renovation of the college's Career Programs Building. HCC is developing joint program pathways with Washington County public schools, as well as program articulation agreements with several four-year colleges. To expand the impact of the program, HCC is pursuing grant opportunities through, for example, the Workforce One Maryland BRAC initiative, as well as the National Science Foundation. Within the next few years, HCC will be constructing a new 65,000 square foot Science Building that includes fourteen leading edge laboratories and "smart" classrooms for the preparation of technicians and future scientists.

Additional investment in the future of bioscience in Washington County is represented by the construction of a 4,000 square-foot addition to the Technical Innovation Center (TIC), HCC's business incubator. The $1.3 million addition, jointly funded by a state and local partnership composed of the Maryland Department of Business and Economic Development (DBED), the Maryland Technology Development Corporation (TEDCO), and the Washington County Board of County Commissioners, contains eleven private wet laboratories and one common laboratory. The wet lab addition opened in February 2008, and as of July 2008, four start-up bioscience businesses, occupying four laboratories, have leased wet lab space. It is projected that by February 2009, all the labs will be leased.

Three of the four firms leasing wet laboratory space have missions to develop products and services that support R&D activities at the National Cancer Institute (NCI), National Institutes of Health (NIH), and other large government-supported laboratories. Ambay Immune Sensors is developing very early stage diagnostic techniques to identify biological markers for breast cancer patients. Protein RST, LLC manufactures standard and custom proteins for private and publicly funded laboratories engaged in a variety of research areas. The firm is also engaged in research to engineer more efficient enzymes that accelerate the production of ethanol from cellulosic material and thus reduce the cost of the ethanol. ToxPath, LLC prepares tissue samples for further study by others. Finally, Nanolytics is engaged in the development of medical devices to harvest pathogens in sufficient quantities from paraenteral dialysis patients so that clinicians can identify the pathogenic source of the infection in its earliest stage.

Washington County Public Schools (WCPS) has also begun preparing for a future that incorporates bioscience. It now offers a biomedical program, part of the national initiative Project Lead the Way. The program will be linked with HCC's biotechnology program, through a pathway that will create a seamless transition for students from high school through the associate degree and beyond. WCPS has initiated planning and implementation of STEM (Science, Technology, Engineering, and Math) projects at the elementary, middle, and high school levels. HCC, the University System of Maryland-Hagerstown, and the school system are part of a Western Maryland STEM task force which is planning regional initiatives to strengthen education in science, technology, engineering, and math.

To develop and take full advantage of bioscience opportunities, and to leverage and incorporate current and future investment, it is essential to develop a vision for the future of bioscience in Washington County that is shared by the community. The inter-related elements of economic development, education, and workforce creation must be united to present a comprehensive, targeted, and achievable plan to leverage Washington County's assets to attract, strengthen, and expand bioscience businesses. These businesses would offer high wage jobs to well educated and trained workers, and would contribute to the economic prosperity and well being of the county in the 21st century.

## Section II. Bringing Life Science Businesses to Washington County: What Life Science Business Needs and What Currently Exists

Virtually every state in the nation is vying to create a life science sector in its portfolio of industries, and for good reason: life sciences is a regenerative industry that is challenged to create new and better products constantly; that is environmentally clean; and creates high paying knowledge jobs as well as quality career paths for individuals of diverse academic backgrounds. The competition for life science firms is fierce and states are investing billions of dollars to create the necessary infrastructure to attract and retain businesses in this industry. Each sector of the bioscience industry has sector-specific needs. Common to all, however, is their need to access managerial and technical intellectual capital, financial capital, avenues for collaboration, and cost effective physical facilities.

A review of the literature on local strategies to promote the creation of a life science cluster in the region found that most publicly-funded research on life science economic development best practices was conducted by fewer than five firms. In almost every case, each report identified the same key community assets as indicators of potential success. The Battelle Memorial Institute reports that those assets include: strong research capability; extensive collaboration across bioscience sectors; available capital and funding support; a workforce pool; access to specialized facilities and equipment; policies that encourage and support bioscience development; and patience and a long term perspective. This last asset is especially important, since bioscience development cannot be accomplished in a year or two, or around a single project.[10] Almost every study conducted by Battelle and others in their role as economic development consultants to various states relies on this traditional paradigm to measure a jurisdiction's capacity to support life science.

As do all industries, bioscience businesses have specific needs in a number of areas, including location, support services, and education and training. Those needs and the current ability of Washington County to meet those needs are discussed below.

### *Location Needs*

The suitability of physical facilities in an area will depend heavily on which sector within the industry the life science firm is focused, as well as in what stage of development the firm is currently situated. In all cases, transportation of people and supplies is critical, so quality mass transit and the ability to move small quantities of perishable materials without delay, are important. The demand for collaboration among life science firms requires relatively easy access to transportation links such as airports and highways permitting short commutes. Freight rail services are not a determining factor for most life science firms, but regional commuter rail service is viewed as an asset.

All technology firms require passenger airport facilities, and bioscience is no exception. Although Washington County Regional Airport no longer provides scheduled passenger service, the area is served by four major international airports within 90 minutes of Hagerstown: Thurgood Marshall International in Baltimore (BWI), Dulles (IAD), and Reagan International (DCA) in the Washington, D.C. area, and Harrisburg International (MTD) in Harrisburg, Pennsylvania.[11]

Water and sewer requirements differ among sectors as well. Medium to large scale pharmaceutical production facilities will require substantial amounts of water for processing and post production pretreatment facilities for its waste stream. Conversely, the impact on public water and sewer infrastructure by R&D firms is negligible, even less than most office complexes as there are fewer people per square foot in laboratory settings.

A fundamental requirement for attracting life science firms to a community is the ability of the firm to obtain zoning approvals from local government prior to commencing operations. A certificate of zoning compliance is required by the Clerk of the Court prior to the issuance of any required local business license. The city of Hagerstown provides several zoning options for life science firms under the Professional and Technical Services category. In fact, the city specifically identified areas for drug and pharmaceutical production facilities as well as areas for laboratories conducting chemical, physical, and biological activities.[12]

Washington County's current zoning ordinance does not specifically identify any type of laboratory operations as a permitted use anywhere in the zoning ordinance or as a special exception. They do, however, permit the raising of animals for experimental purposes under the Rural Business designation.[13] The Technical Innovation Center at HCC is currently zoned under the Rural Business Designation. If zoning approvals are obtained, the county may elect to "fast track" the permitting process. Recent high profile expansion attempts, however, have met with some public opposition which can delay large scale projects. Creating a general permitted use classification for life science firms and other related endeavors in one or more zoning designations may ameliorate future issues with respect to attraction and future expansions. For example, HCC is proposing a new zoning district designation that would support the college's interrelated higher education and economic development initiatives. More comprehensive rezoning in the Robinwood area, encompassing land occupied by the Washington County Health System, Hagerstown Community College, and the Mt. Aetna Farms property, could create a bioscience/biomedical corridor. Such a designation would provide for an environment that attracts and sustains higher education functions and related health and technology research and business support activities, such as business incubators and accelerators, as well as applied technical and medical research.

As noted in **Section** I, Washington County has adequate buildings and land for life science development. The development of the county's comprehensive development

plan coupled with private and public investments at Forts Ritchie and Detrick laid the groundwork for future technology drivers.

***Support Service Needs***

As discussed in **Section I,** in collaboration with the Washington County Economic Development Commission, Hagerstown Community College has begun to build a foundation for development of a bioscience cluster within Washington County. The recently opened biotechnology addition to HCC's 30,000 square foot Technical Innovation Center business incubator has already attracted new life science firms to Washington County. These firms originated in jurisdictions outside Washington County, thus demonstrating the potential of Washington County to attract life science businesses. Furthermore, the college has new and well developed curriculum that provides an entry-level career path for lab technicians. Workplace learning opportunities within the incubator will accelerate students' ability to apply laboratory practices and protocols.

When bioscience businesses move beyond early-stage development and outgrow their incubator space, they look for step-up, or accelerator facilities. An accelerator is part of a continuum of the bioscience industry that would add to the attractiveness of the county as a bioscience hub. With the success of HCC's wet lab addition, it is anticipated that within a few years the wet lab tenants, as well as new start-up businesses, will be ready to move to a bioscience accelerator. As discussed in **Section I**, the county has an advantage of relatively low-cost available land. One such parcel, convenient to HCC's existing wet lab facility and offering easy access to area interstates, is the 200+ acre Mt. Aetna Farms site, currently owned by PNC Bank as a result of foreclosure. Rezoning of this land to accommodate a bioscience accelerator could be a valuable step in realizing a comprehensive strategy for the county's bioscience future.

In addition to the new Bio Safety Level 2 (BSL2) rated lab facilities that are certified suitable for work involving agents of moderate potential hazard to personnel and the environment, open manufacturing space, and office suites, the incubator at HCC provides general management, product development, and marketing assistance to early stage technology oriented firms. The center serves as a support service for firms seeking federally guaranteed debt financing or grants through Small Business Innovation Research (SBIR) and the Small Business Technology Transfer (STTR) programs. Through these two competitive programs, the Small Business Administration (SBA) ensures that the nation's small, high-tech, innovative businesses are a significant part of the federal government's research and development efforts. Eleven federal departments participate in the SBIR program; five departments participate in the STTR program awarding $2 billion to small high-tech businesses. Moreover, the incubator acts as a conduit for TEDCO funding programs and services. The Technical Innovation Center serves as the base of operations for the Washington County office of the Small Business Development Center (SBDC). Both the incubator and the SBDC provide periodic training programs for the general business community.

Access to capital continues to be a top priority for nearly every life science firm. With respect to the ability to access capital, the incubator has an equal potential to secure State sponsored equity capital through DBED and TEDCO. Private institutional equity investment remains elusive as it does for firms in most areas. In 2000, the Technical Innovation Center, through a grant from the Maryland Technology Development Corporation ( TEDCO), commissioned a study to determine the potential of developing a private angel investment fund. Based on interviews with more than 100 high net worth investors, Charles Stein of Strategic Development Services concluded that Hagerstown/Washington County had the capacity to create a $3-5 million investment pool. Coinciding with the recent construction and leasing of HCC's wet labs, venture capital development groups have made overtures to the college that could be pursued. Moreover, for many years the Hagerstown/Washington County Industrial Foundation, Inc. (CHIEF) has taken a leadership role in encouraging and supporting economic development ventures.

The lack of legal firms with Intellectual Property (IP) protection practices in the immediate area presents few challenges to the incubator as it is able to secure such services from firms in Frederick and the Baltimore–Washington metropolitan areas. Adequate financial advisory services exist locally, and through TEDCO funding programs and reduced fee agreements with diversified accounting firms, the incubator adds value to the emerging firm by providing access to high quality CPA and legal services usually at substantially reduced cost to the firm.

Recruiting managerial talent is not expected to be a problem given Hagerstown's relatively short distance to Frederick and Fort Detrick. Additionally, the Washington County Health System (WCHS) is at present an untapped resource to obtain skills associated with the life science industry. WCHS' new campus is within a ten-minute walk to the incubator at HCC. Such industry-related activities at WCHS as clinical trials in conjunction with the expansion of the bio-defense campus at Fort Detrick and the redevelopment of Fort Ritchie by COPT, will act as anchors for life science development.

The ability to develop networks between and among clinicians, researchers and others is an important issue within the scientific community. In a recent entrepreneurial summit hosted by the Hagerstown Community College's Technical Innovation Center, twenty two business support organizations convened to discuss collaborative opportunities and methods to improve the delivery of services to the business community. It was generally agreed that a "Business Resource Alliance" was needed to effectively communicate the availability of resources and to create a systematic approach to delivery of services. Follow-up work with the group is slated for September 2008.

### *Education and Training Needs*

Education is a critical requirement for 21st century jobs and must incorporate strong science and mathematics instruction at all levels. Both individual and national competitiveness and prosperity will depend more than ever on the strength of the entire

educational continuum. Moreover, because life science is considered to be a regenerative industry, continual training will be needed to ensure that a firm's workforce can quickly adapt to an ever changing environment.

Washington County Public Schools has made substantial progress in recent years. For example, WCPS students in grades six and seven ranked third in the state in math performance on the Maryland School Assessments (MSA) in 2007, and the school system maintained its first place ranking in the state on the Algebra High School Assessment.[14] To expand on K-12 progress, it will be important for elementary schools to build a foundation for instruction and learning in math and the sciences. This includes methods to involve young children in enjoyable discovery learning opportunities that will help build keen analytical skills. As part of its overall plan for strengthening STEM (Science, Technology, Engineering, and Math),Washington County Public Schools has established a vertically aligned math, science, and technology magnet program at Williamsport Elementary School, a math and science magnet program at Springfield Middle School, and, opening in the 2008-2009 academic year, a STEM magnet at Williamsport High School.

A task for middle and high schools will be to continue to encourage further study in math, science, and technology. Schools can begin to provide opportunities for career exploration that engage students, and that reinforce the importance to their futures of a rigorous course of study to prepare them for postsecondary education. As recently as 2007, however, just 53.7% of all WCPS graduates that year planned to attend either a two-or four-year college. Additionally, 53.5% of the graduating class completed University System of Maryland requirements for admission, and 25.2% completed rigorous high school program indicators.[15]

As previously noted, preparation of biotechnology students at the post secondary level has begun, and HCC's biotechnology curriculum will address the needs of employers for lab technicians and will align with programs at several baccalaureate institutions. Between 2001-2008, the number of HCC students majoring in science disciplines has significantly increased by, for example, 42% in Biology and 62% in Chemistry. During the same time period, enrollment in advanced Mathematics (courses above the 101 level) increased by 19%. To put in place a sustainable pipeline to biotechnology careers, however, even more students must be attracted to postsecondary math and science education and training.[16]

For many students entering HCC, achieving success in college-level work is a challenge. For example, the Maryland Higher Education Commission (MHEC) reported in 2006 that when assessed with the Compass placement exam used by HCC, 54% of incoming freshmen who had not completed the most rigorous high school program needed math remediation, and 53% required English remediation. Moreover, 40% of students who had completed a more rigorous "core" program required remediation.[17] Students who do not test directly into college-level work must first take developmental

coursework, and deficiencies in math, for example, can keep them from pursuing the major of their choice.

HCC and WCPS have begun to address this issue by offering Compass testing for juniors at county high schools, giving students an opportunity to assess their academic strengths and needs and to remediate them before high school graduation. In addition, HCC's ESSENCE program, which offers area high school students a 50% tuition discount, provides an opportunity for students who are ready to get a head start in college. The program, which includes public and private high school students as well as persons who are home schooled, has grown to approximately 700 students per year. Most ESSENCE students, however, do not enroll in college-level math and science coursework.

While several upper division colleges and universities exist in the Baltimore-Washington metropolitan area, and in this region, Washington County has lacked a similar institution. The USM-H center was developed to offer programming for bachelor's and master's degrees, but without the ability to offer programs or courses requiring a laboratory component in science. This limits educational offerings for individuals seeking to advance in the life science industry. With the only higher education science laboratories in Washington County, HCC's current science facilities have little to no reserve capacity to assist with this problem since they are now scheduled seven days per week to support credit science courses. As discussed in **Section I**, however, the college plans to construct a new Science Building which can be designed to accommodate the community's need for higher education laboratory space. One potential approach would be for HCC and USM-H to enter a facility-sharing agreement in which upper division students in one of the USM-H-sponsored programs could use science laboratories in HCC's new Science Building.

HCC's new conferencing facility scheduled to open in late 2008 can serve as a venue for continuing education opportunities. Both the Tech Council of MD and the Fort Detrick Alliance are evaluating ways in which their respective organizations can further integrate Washington County into the industry's activities. Tech Council/TEDCO joint programs could be offered in this new center and provide participants with a glimpse of all that Washington County has to offer to life science firms.

With the collaboration of education, economic development, and workforce interests, a shared vision can be created for Washington County's future as an attractive and successful site for bioscience business development. In order to match bioscience business needs with existing county resources, and to develop new capabilities, a comprehensive plan must be developed that incorporates strategies, key players, and timelines for achieving that vision. Preliminary planning includes an examination of bioscience development pathways, a review of Washington County's strengths, and a discussion of potential pathways most suited to the county's future economic development, all of which are presented in **Section III.**

**Section III. Strategies and Potential Pathways**

States and regions which have taken advantage of bioscience opportunities have pursued one or more of three primary bioscience development pathways: large-scale manufacturing; academic bioscience research and development; and integration into an existing supply chain.

Large-scale manufacturing, in, for example, drugs and pharmaceuticals, is "more highly concentrated among fewer states than the other bioscience sub-sectors," with California and New Jersey leading the way with a combined 25+% share of national pharmaceutical employment. Together, the ten states with the largest number of jobs in this sub-sector account for 73% of national employment.[18] Such large-scale manufacturing operations are heavily dependent on substantial capital investment, local incentives, and make significant demands on infrastructure, for example water and sewer capacity.

Academic and healthcare institutions are significant drivers of bioscience development in most areas of the country, and bioscience research and development expenditures accounted for more than $29 billion in FY 2006. Leading fields include medical sciences, biological sciences, agricultural sciences, and bio/biomedical engineering, and states with large academic infrastructures, for example California, New York, Texas, Pennsylvania, and Maryland, lead in total academic bioscience R&D funding. Although other federal agencies fund bioscience-related research and development, the National Institutes of Health (NIH) is "considered to be the 'gold standard' of biomedical research funding." While NIH funding is a "significant component of academic medical sciences research…NIH also funds research and educational initiatives within non-university affiliated medical research institutions, hospitals, and other healthcare-related organizations."[19]

The research, testing, and medical laboratories sub-sector is an example of supply chain integration, and it includes a range of activities, from "highly research-oriented companies working to develop and commercialize new drug discovery/delivery systems, and gene and cell therapies, to more service-oriented firms engaged in medical and other life sciences testing services." Compared with other bioscience sub-sectors, the research, testing, and medical laboratories sub-sector "is unique in that its firms do not engage in manufacturing specific products. R&D and lab services companies in the biosciences play a critical role in breakthrough research and the development of new products, in addition to administering biomedical diagnostic and lab services."[20]

Examples of products in this sub-sector include preclinical drug development, nanoscale drug delivery systems, research models and laboratory support services, diagnostics development and testing, and bioinformatics. Leading states include California, Pennsylvania, Massachusetts, and New Jersey, and the Washington-

Arlington-Alexandria, DC-VA-MD-WV metropolitan area has the fifth largest employment level in this sub-sector.[21] Partially accounting for this region's prominence is the proximity to federal laboratories, for example those at Fort Detrick. This sub-sector generally makes fewer demands on local infrastructure capacity.

Development strategies within these pathways have included attempts to attract existing companies and/or encourage start-up businesses. According to Perry Wong, reporting on findings of the Milken Institute, building a bioscience cluster, rather than focusing narrowly on biotechnology, is important to create bioscience impact on a region's economy. Wong further argues that the best way to build a cluster is to promote the growth of start-up businesses, which, as their numbers and influence grow, will give a region bargaining power to attract additional businesses. Dr. Baiju Shah, president of BioEnterprise in Cleveland Ohio, agrees. In his view, it is important to create, accelerate, and retain start-ups. According to Shah, what is needed is a pipeline for products and start-ups that does not have to be dependent on university-based research.[22]

In beginning to build a bioscience cluster, it is helpful to examine existing area businesses that may be considered to be engaged in life science or complementary to life science business development. Hagerstown and the surrounding area contain many life science and potentially complementary businesses producing, for example: non-toxic cleaners and other alternatives to hazardous cleaning products (P&D Creative Co., Inc); portable near infrared analyzers (Zeltex, Inc.); aviation electronics and sensors (Sierra Nevada Corporation); and thermal films (GBC Films Group). There are also several firms that produce analytical laboratory instruments, and many testing laboratories. A sample list of life science and potentially complementary businesses in the Hagerstown, Washington County, and surrounding area may be found in **Appendix 2**.

Essential to a community's selection of bioscience strategies and pathways is an analysis of current and potential regional competition, to evaluate the relative competitiveness of Washington County to attract commercial biotechnology firms of any type.

Events since 2001 have resulted in Frederick, Maryland's Fort Detrick becoming a much larger driver of Frederick's economic development. As discussed earlier, the federal government will be spending over five billion dollars to create the National Interagency Biodefense Campus at Fort Detrick. In addition to current military operations and the research conducted by the National Cancer Institute at the installation, expansion will take place through the construction of new facilities for USAMRIID as well as facilities for the USDA, and the Department of Homeland Security. Despite some local opposition to the buildup at Fort Detrick, construction is underway.

Frederick County is expected to be Washington County's primary competitor in attractiveness for life science firms. Its primary strengths lie in the developments at Fort Detrick; a substantial number of PhD's residing in the county; and the perception of

relative closeness to the National Institutes of Health (NIH). Much like Montgomery County, Frederick has also cultivated a vibrant community that is welcoming to a diversity of demographic groups. The Frederick County business community is also supportive of technology business incubation. Frederick opened a second biotech incubator at Monocacy within eighteen months of its success at Hood College. Frederick's Office of Economic Development provides financial support to their incubators. In addition, the business community has formed a Frederick chapter of the Tech Council of Maryland and an entrepreneurial development group. Commuters have a variety of choices as a developed interstate route and mass transit is readily available to and from the core biotechnology commercial areas by car, bus, and light rail. There are two private colleges and universities in the area and Frederick Community College. Hopkins University, Shady Grove facility has entered into a partnership with Fort Detrick to provide graduate training for staff interested in pursuing a degree in Biodefense. The Shady Grove campus can provide post graduate training in other life science programs as well. As the largest county in the state, Frederick does have ample available land for commercial development. According to information gained from the Frederick's Office of Public Works, infrastructure to support commercial development will take priority over residential development.

Despite its strengths, there are some significant weaknesses that could be exploited. Frederick's growth plan limits residential construction dramatically and thus will cause a continued escalation of home prices that will cause outlying areas to be considered by the workforce. Second, not all Frederick's residents and elected officials are celebrating the Fort Detrick expansion. Several lawsuits have been filed to stall the project and recently several county commissioners attempted to eliminate the Office of Economic Development as unnecessary budget expenditure in light of the desire to curtail growth. These commissioners were in the minority, but the actions reflect a growing concern over the congestion that has occurred over the last few years.

Montgomery County is the epicenter of Maryland's life science industry. However, life science is dwarfed by the number of personnel engaged in development and delivery of information technology (IT) products and services. Both of these industries flourish in Montgomery County due to its geographic proximity to Washington DC, the National Institutes of Health (NIH), the National Science Foundation (NSF), and the National Institute for Science and Technology (NIST). The Montgomery County Economic Development Commission provides significant resources for the growth and development of any size firm in these two industries. Montgomery County fully funds operations of five technology incubators, with plans to open additional facilities, and the City of Rockville recently opened its own incubator. Montgomery County is a true life science cluster because it is home to a wide array of complementary businesses. With its combined strength in IT and biotechnology coupled with numerous firms developing myriad electronic sensors and other hardware, it can be expected that the county will remain the market leader and that growth of these firms will require more support from

other firms in the supply chain. It is anticipated that opportunities for smaller specialized firms will continue to grow.

As mentioned earlier, the high location rents charged for the privilege of living or working in Montgomery County have forced some firms and their workers to seek lower cost areas. This is especially true for emerging firms with unproven technologies or limited market share. Initially these firms have sought economic refuge in Frederick County or Howard County. These alternative areas are becoming saturated, and as noted earlier, county planners in those jurisdictions are severely restricting residential building due to the high costs of public infrastructure for such development. Nonetheless, these counties remain committed to commercial growth.

Potential competition considered from areas west and north of Washington County in Allegany County, Maryland and Franklin County, Pennsylvania, is expected to be limited. Of the two areas, only Allegany County has some plan to try to attract a life science firm. Much like Washington County, Allegany's focus is on attracting a large scale biomanufacturing firm that would employ substantial numbers of workers. Grant funds from the Appalachian Regional Commission and the Department of Commerce have been used to develop infrastructure projects such as improvements to water and sewer capacity and the creation of a technology "Science Park" at Frostburg University (FSU). Frostburg University also recently opened a new state of the art science building. On a limited basis, Frostburg also operates a small business incubator for biotechnology firms.

Because Franklin County, Pennsylvania has no demonstrable or articulated plan to attract life science related firms, no business incubation facilities for any type firm, a general emphasis on targeting heavy manufacturing oriented firms, and no typical drivers of life science such as a university or federal lab, it can be concluded that the county represents no immediate direct competition to Washington County's efforts to attract firms in this industry.

An expanded analysis of regional competition may be found in **Appendix 3**.

In considering potential options for bioscience economic development, what are Washington County's most significant strengths, and what exists in the state and regional environment upon which the county can draw?

***The State and Regional Environment***

1. Maryland's commitment to bioscience development has made the state a national leader, and Governor O'Malley recently announced an additional $1 billion investment in bioscience initiatives.

2. An example of Maryland's interest in regional bioscience development is the investment by DBED and TEDCO in Hagerstown Community College's wet lab addition to HCC's business incubator.
3. The Johns Hopkins University is a top-tier bioscience R&D and clinical institution.
4. The role of Fort Detrick in biodefense, cancer research, and other fields related to bioscience, is expanding.
5. Fort Ritchie is in an advantageous position to attract bioscience companies, particularly those which provide services to Fort Detrick.

***Washington County***

1. There is a growing consensus among county leaders to develop a strategy for moving forward with bioscience/ biotechnology initiatives.
2. There is a historical willingness to invest in Washington County's bioscience future. For example, the County Commissioners participated in the joint funding of HCC's business incubator, and, more recently, in 2006 the County Commissioners were unanimous in their decision to invest in the wet lab addition.
3. There are available and currently financially attractive land options for bioscience development.
4. The county's proximity to major interstate highways, and its rail and air service capabilities, give the county access to metropolitan areas, and contribute to making it the "Crossroads of Commerce" for the region.[23]
5. The wet lab addition to HCC's business incubator has already attracted bioscience start-up firms, and venture capital investment groups have made preliminary overtures to the college.
6. HCC's Biotechnology academic program will produce its first graduates during the 2008-2009 academic year, and articulation agreements with four-year institutions are being developed. The program's advisory committee, which includes five individuals from Ft. Detrick, provides key support for the program.
7. There are many existing businesses locally that may have potential to complement bioscience business development.
8. K-12 education continues to improve its position relative to the rest of the state, and its graduates are increasingly choosing to attend college.
9. Washington County Health System's construction of a new hospital will provide a setting for clinical research.
10. The county's library system, museum, as well as many other local cultural assets such as the Maryland Symphony Orchestra, parks, and historical sites, contribute to an attractive quality of life.

In summary, Washington County's strengths include its clearly articulated goal to attract life science firms by the Hagerstown Washington County Economic Development

Commission, Hagerstown Community College's commitment to biotechnology education, and commercial opportunities for emerging life science firms within the business incubator. In conjunction with the ongoing westward expansion of the life science cluster from Montgomery County, the county's proximity to the expanding Fort Detrick, the construction of a new major hospital with a history of conducting clinical trials, and the development of Fort Ritchie by Corporate Offices Properties Trust (COPT), can provide the necessary fuel for the development and growth of life science firms in Washington County. The county has proved its capacity to attract biotechnology related firms from as far away as Howard County with the opening of the BSL2 laboratories at the business incubator at HCC. Additionally, Washington County has an expanding diverse economic base with several life science firms such as Crist Instruments, Cumberland Valley Analytical Services, and GESAC Inc. already in operation. The county is also home to a variety of complementary firms engaged in electronics, precision instruments avionics, and sensor technologies.

## Section IV. Understanding and Addressing the Challenges

Previous sections of this paper have described Washington County's economy in transition, introduced the field of biosciences, and discussed the county's positioning, strengths, and potential pathways related to bioscience economic development. Arising from this discussion are issues that present challenges that must be understood and addressed as a vital part of overall planning for bioscience development. This section describes and suggests possible strategies to address those challenges.

1. In order to engage in a concerted effort to build a bioscience presence, there is a need to align government, business, education, and the community as a whole behind a vision for the economic future of the county, as well as specific strategies to develop bioscience initiatives. Without such alignment, and a clear plan, fragmentation of energy and resources is likely to occur, leading to a lack of progress and a consequent falling away of interest. This can be addressed through careful planning and by making sure that all the appropriate individuals and organizations have opportunities to be engaged in the effort.

2. There are concerns regarding infrastructure capacity, for example adequate water and sewer capability, to meet the needs of businesses that might wish to locate or re-locate in the county. These concerns can be addressed through the selection and shaping of the bioscience sector, sub-sector, and pathway to be pursued. There are substantial bioscience development options that do not place heavy demands on water and sewer services.

3. Much of the nation's and region's bioscience business development has depended on close proximity to an R&D academic institution, where research

and its applications can be harnessed through technology transfer to economic advantage. This proximity is something that Washington County does not have and might be considered a challenge. As with infrastructure capacity, the lack of a nearby academic R&D institution, however, is a factor that varies in importance based on the sector, sub-sector, and pathway of biosciences that is pursued.

4. Securing external financial support both from government entities, for example the Maryland Department of Business and Economic Development (DBED) and TEDCO, as well as private investment, is essential to bioscience development. As noted earlier, competing with well-financed regional competition will be a challenge for Washington County. With their investment in HCC's wet lab addition, DBED and TECCO have demonstrated their belief in the future of bioscience development in the county. With continued forward progress in developing and implementing a comprehensive bioscience development plan, those two agencies and others may be expected to add to their investment. Governor O'Malley's Maryland BIO 2020 initiative will also help attract additional investment to the region. Moreover, BRAC-related expansion at Ft. Detrick and Ft. Ritchie, continued development of businesses that complement biosciences, the assistance of CHIEF, and private investment funds coming into the county to fund other business development, are likely to generate opportunities to pursue additional funding.

5. The development of the University System of Maryland-Hagerstown campus has been a positive addition to the county's higher education capability. There still does not exist, however, any baccalaureate institution within the county that contains science laboratories. This is a potentially significant barrier to bioscience business development, since upper division science students would not be able to earn degrees in the county and thus serve as part of a workforce continuum that would be attractive to new or relocating bioscience firms. HCC's current science labs are overextended and cannot accommodate baccalaureate students. With the construction of a new, expanded Science Building that would have ample laboratory space, however, HCC and USM-H could enter into a facility-sharing partnership to address this challenge.

6. Economies of the 21st century will demand that virtually all workers have the education and training needed to participate in a high skill/high wage environment, and communities across the nation are developing strategies to unite economic development, education, and high skill/high wage occupations. As discussed earlier, there is a need to attract greater numbers of students who want to pursue careers in math and science. Few ESSENCE students elect to take math and science courses at HCC, and while enrollment

in HCC's math and science majors has increased, greater numbers will both signal the county's readiness for bioscience development and help create a local cadre of highly skilled workers. HCC and WCPS have begun to address this challenge by, for example, collaborating on an annual biotechnology career day, developing a coherent high school to college biotechnology pathway, and instituting Compass placement testing in county high schools. Additional partnership efforts, as well as a community education campaign, are needed to continue to build community understanding of the necessity for continued education, and for large numbers of students well prepared to continue their math and science education.

7. An organized high technology group to provide opportunities for social networking, collaboration, and advanced learning opportunities is needed by the scientific and technical communities. The Economic Development Commission and HCC could assist in bringing together a core group of individuals to develop such a networking group. Additionally, services to the business community, including those which are potentially complementary to bioscience development, need to be improved. Services could include information related to financial and business planning; marketing; human resources; and continuing education. Support structures to enhance entrepreneurial activity, managerial competence, personal confidence, and an ability to demonstrate resiliency in changing market conditions, need to be strengthened. A "Business Resource Alliance," mentioned earlier in this paper, could be a vehicle to systematically communicate available resources and deliver services.

8. There are gaps in transportation services, especially in passenger service. For example, according to the MTA schedule, commuter bus service is available to Frederick & Rockville/Gaithersburg Metro stations daily. Mass transit, however, is limited to eastbound in the morning and westbound in the evening. Thus, Washington County can export its workforce to Frederick and Montgomery Counties but must rely on private transportation to facilitate the importation of life science professionals to work in the county. This issue was brought to the attention of Senator Barbara Mikulski's office at HCC's June, 2008 Biotechnology Advisory Committee meeting.

Although much work needs to be done to address all these challenges, progress has been made. Hagerstown's renaissance is taking shape within the Arts and Entertainment District; the public schools are increasing their STEM-related activities and making steady progress in SAT scores and other measures; HCC continues to take a leadership position in meeting the education and economic development needs of the county. Finally, private investment capital continues to flow into Washington County

and is a clear demonstration that the private sector is aware of the changes happening in Hagerstown and Washington County.

## Section V. Summary, Recommendations, and Conclusions

This paper has presented a case for Washington County embracing a unique and timely set of opportunities that have the potential to make bioscience a significant part of the local economy. These opportunities, including Maryland's bioscience development, Ft. Detrick expansion, Ft. Ritchie development potential, the establishment of complementary businesses, and HCC's wet labs, bioscience start-ups, and biotechnology program, have been discussed throughout the paper. Needs of prospective bioscience businesses have been described. Strategies, potential pathways for development, and the county's strengths have been analyzed, and likely competition has been noted. A number of challenges have been described, along with possible strategies to address them.

For consideration in the decision-making process, a number of issues and recommendations are presented below. These issues/recommendations are designed to address the strengths and challenges discussed in this paper, to build on the foundation already established, and to assist in a course of action that will enable Washington County to seize existing opportunities and create new possibilities for bioscience business development. To provide structure and context for consideration, the issues and recommendations are organized by community group: Government; Business; Education and Health Care; and the Community-at-Large.

### *Issues/Recommendations*

**Government:** Elected officials and government agencies are influential in making and supporting economic development decisions that have significant impacts on their communities. Using their understanding of national, state, and regional economic trends, they can help to create a unifying vision for the future development of the area. Their expertise is especially needed to address such issues as infrastructure, transportation, zoning, and promotion of bioscience both within and outside the county.

**Recommendations for governmental entities include:**

1. Take full advantage of opportunities presented by Fort Detrick Base Realignment and Closure (BRAC)-related expansion. Governmental officials, especially the delegation to the General Assembly, could promote the ability of Washington County to contribute to BRAC initiatives.
2. Engage in discussions with Corporate Office Properties Trust (COPT) to help shape the development of Fort Ritchie, especially as it applies to bioscience enterprises.
3. Promote and market Washington County as part of a regional bioscience identity, and as a pre-eminent bioscience development target.

4. While continuing to attempt to attract existing bioscience manufacturing firms, place the major focus on start-up bioscience businesses, especially those that are research-oriented.
5. Examine and evaluate potential land that would be appropriate for bioscience development, perhaps in cooperation with the Hagerstown-Washington County Industrial Foundation, Inc. (CHIEF).
6. Continue to work on transportation improvements, including passenger rail service.
7. Continue to seek funding to make the construction of the Eastern Blvd. extension to Washington County Hospital and HCC the county's number one transportation priority.
8. In shaping bioscience development, preserve water and sewer capacity by selecting bioscience opportunities that make the fewest demands on these services.
9. Give thoughtful consideration to rezoning proposals that could create a bioscience/biomedical corridor in the Robinwood area that would include the Washington County Health System, Hagerstown Community College, and the Mt. Aetna Farms property.

**Business:** Start-up bioscience and related enterprises have established a foothold in Hagerstown, Washington County, and the immediate surrounding area. Leaders of these and other businesses can provide expertise in the further development and strengthening of bioscience business capacity.

**Recommendations for the business community include:**

10. Establish a high technology networking group to provide opportunities for social networking, collaboration, and advanced learning opportunities. The Economic Development Commission and HCC could assist with this effort.
11. Work with such organizations as the Hagerstown-Washington County Chamber of Commerce to develop a Business Resource Alliance that would provide services that could include information related to financial and business planning, marketing, human resources, and continuing education.
12. Continue discussions between COPT and local officials to develop bioscience enterprises at Ft. Ritchie.
13. Engage businesses that are complementary to bioscience in discussions and development of an expanded bioscience business community. Such groups as CHIEF, the Hagerstown-Washington County Chamber of Commerce, and the Economic Development Commission can assist in this process.

**Education and Health Care:** The public education system, which includes Washington County Public Schools, Hagerstown Community College, and the University System of Maryland at Hagerstown, are positioned to work in partnership with each other

and other community interests to serve bioscience development within the county. Issues for education include: participating in a community education campaign; finding ways to increase the math and science interests and skills of local students; working to provide financial assistance to for higher education; and developing clear pathways among educational levels.

The health care community provides vital services to Hagerstown and Washington County. The Washington County Health System (WCHS) can become part of a nucleus of bioscience/biomedical development, by, for example, conducting clinical trials and other research. With construction of a new hospital underway in the Robinwood corridor within a ten-minute walk of HCC's wet lab incubator, WCHS and HCC could develop partnerships that would strengthen bioscience/biomedical development.

**Recommendations for the education and health care communities include:**

14. Undertake, with support from such groups as the EDC, media, and others, a community education campaign that emphasizes the need for education for high skills/high wage jobs for the 21st century.
15. Develop a bioscience educational and career pathway that incorporates secondary, postsecondary, and business/industry components so that students can make seamless transitions among educational levels.
16. Provide proactive and continuing academic and career counseling, with opportunities for contact with bioscience professionals.
17. Examine the feasibility of constructing a magnet math/science high school for students who have potential for high achievement in those disciplines.
18. Develop a partnership between WCPS and HCC to identify promising math/science candidates for early college experiences.
19. Develop HCC summer institutes, funded by businesses and/or community development groups, in which high school students earn credit, tuition-free, for college-level coursework in math and science in exchange for a commitment to major in a Science, Technology, Engineering, or Math (STEM) field.
20. Seek funding, in cooperation with community and business groups, for equipment for HCC's new science labs, and establish a partnership in which HCC would rent lab space in its new Science Building to USM-H.
21. Formalize opportunities to provide HCC wet lab space for WCHS physicians who wish to conduct medical/bioscience research.
22. Develop opportunities for WCHS physicians conducting research to teach in HCC's credit biotechnology and other science programs.

**The Community-at-Large:** A major issue for the entire community involves a complete discussion of the economic future of Hagerstown and Washington County,

whether bioscience development is a viable choice for the county, and if so, to what scale?

**Recommendations for the community-at-large include:**

23. Convene forums, perhaps facilitated by the Greater Hagerstown Committee (GHC), to determine the viability and potential scale of bioscience development.
24. Establish a leadership group to construct a unified vision and comprehensive plan to develop bioscience initiatives.
25. As part of comprehensive planning, further evaluate potential competition for bioscience business development.
26. Working with the education, governmental, and business community, coordinate media coverage to promote a community education campaign, and to help inform the public of bioscience economic development efforts.
27. Promote the involvement of area bioscience professionals in community activities to demonstrate the county's desirability as a place to live and locate businesses.

### *Conclusions*

This paper began by posing a central question: To what magnitude might bioscience development contribute to the transformation of Washington County's economy? It is hoped that this paper has contributed to answering that question. Whatever the outcome of community discussion and decisions on this issue, however, many current bioscience initiatives and efforts will persist and grow. HCC will continue to serve start-up bioscience businesses through its wet labs, and some of these may be able to expand their operations in the county. HCC will also continue to build its biotechnology program, whose graduates will have ample employment opportunities in the region. The college and Washington County Public Schools will maintain and expand their partnership to involve more students in math and science education.

Community, regional, and national prosperity and well being in the 21st century are expected to expand in great measure through the application of new technologies. Success in these ventures will depend increasingly on individual and collective high levels of knowledge and skills, frequently renewed through lifelong learning. Communities that recognize and understand this new reality, and act with unified vision and purpose to embrace it, as well as with patience and a long term perspective, will be able to create and take advantage of opportunities for economic, educational, and cultural advancement.

The degree to which current bioscience initiatives interface with the county's economic development decisions will determine the magnitude and impact of bioscience

development on the economic transformation of Washington County. This paper concludes that the timing and positioning are ideal for Washington County to continue its strategically important economic transformation by establishing and putting into action a comprehensive plan for bioscience development.

## Endnotes

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**EDUCATION, ECONOMIC DEVELOPMENT, AND 21ST CENTURY JOBS:**

**The Case for Planned Growth of Biosciences in Washington County**

# APPENDIX 1

# EXECUTIVE SUMMARY

## Introduction

The purpose of this paper is to stimulate ideas, discussion, and action that will unite and strengthen local economic development, education, and workforce plans to reshape the local landscape for 21st century jobs. It presents a case for the planned growth of bioscience business development in Washington County that has the potential to contribute to a transformation of the county's economy. Within the past few years, a number of bioscience-related initiatives have been developed in the county. For example, Hagerstown Community College (HCC), with county and state support, has constructed wet labs for bioscience start-up businesses, and has developed a biotechnology degree program. The Economic Development Commission (EDC) has made the attraction of bioscience businesses to the county a priority. These and other efforts could become part of a more comprehensive effort by the community as a whole, the magnitude of which is a central question posed by this paper. It is hoped that the information contained in this paper and community discussions will help answer that question. The five sections of the paper:

1. Describe Washington County's economy in transition; introduce the field of life sciences and its role as an engine of growth in the U.S. and Maryland; examine why bioscience makes sense for the future economy of Washington County and describe its current status; and discuss the importance of a shared vision and targeted plan for the future of bioscience in the county;
2. Detail the needs of life science businesses and describe existing resources in Washington County to meet those needs;
3. Explore strategies and potential pathways for bioscience business development;
4. Examine potential challenges and strategies to address them; and
5. Present a summary, recommendations, and conclusions.

## Washington County Strengths in Considering Bioscience Development

Washington County's strengths include its clearly articulated goal to attract life science firms by the Hagerstown Washington County Economic Development

Commission, Hagerstown Community College's commitment to biotechnology education, and commercial opportunities for emerging life science firms within the business incubator. In conjunction with the ongoing westward expansion of the life science cluster from Montgomery County, the county's proximity to the expanding Fort Detrick, the construction of a new major hospital with a history of conducting clinical trials, and the development of Fort Ritchie by Corporate Offices Properties Trust (COPT), can provide the necessary fuel for the development and growth of life science firms in Washington County. The county has proved its capacity to attract biotechnology related firms from as far away as Howard County with the opening of the BSL2 laboratories at the business incubator at HCC. Additionally, Washington County has an expanding diverse economic base with several life science firms such as Crist Instruments, Cumberland Valley Analytical Services, and GESAC Inc. already in operation. The county is also home to a variety of complementary firms engaged in electronics; precision instruments avionics, and, sensor technologies.

**Understanding and Addressing Challenges to Bioscience Development**

1. In order to engage in a concerted effort to build a bioscience presence, there is a need to align government, business, education, and the community as a whole behind a vision for the economic future of the county, as well as specific strategies to develop bioscience initiatives.
2. There are concerns regarding infrastructure capacity, for example adequate water and sewer capability, to meet the needs of businesses that might wish to locate or re-locate in the county.
3. Much of the nation's and region's bioscience business development has depended on close proximity to an R&D academic institution, where research and its applications can be harnessed through technology transfer to economic advantage. This proximity is something that Washington County does not have and might be considered a challenge.
4. Securing external financial support both from government entities, for example the Maryland Department of Business and Economic Development (DBED) and TEDCO, as well as private investment, is essential to bioscience development. As noted earlier, competing with well-financed regional competition will be a challenge for Washington County.
5. The development of the University System of Maryland-Hagerstown campus has been a positive addition to the county's higher education capability. There still does not exist, however, any baccalaureate institution within the county that contains science laboratories.
6. There is a need to attract greater numbers of students who want to pursue careers in math and science.
7. An organized high technology group to provide opportunities for social networking, collaboration, and advanced learning opportunities is needed by the

scientific and technical communities. Additionally, services to the business community, including those which are potentially complementary to bioscience development, need to be improved.

8. There are gaps in transportation services, especially in passenger service.

**Summary, Recommendations, and Conclusions:**

This paper has presented a case for Washington County embracing a unique and timely set of opportunities that have the potential to make bioscience a significant part of the local economy. These opportunities, including Maryland's bioscience development, Ft. Detrick expansion, Ft. Ritchie development potential, the establishment of complementary businesses, and HCC's wet labs, bioscience start-ups, and biotechnology program, have been discussed throughout the paper. Needs of prospective bioscience businesses have been described. Strategies, potential pathways for development, and the county's strengths have been analyzed, and likely competition has been noted. A number of challenges have been described, along with possible strategies to address them.

For consideration in the decision-making process, a number of issues and recommendations are presented below. These issues/recommendations are designed to address the strengths and challenges discussed in this paper, to build on the foundation already established, and to assist in a course of action that will enable Washington County to seize existing opportunities and create new possibilities for bioscience business development. To provide structure and context for consideration, the issues and recommendations are organized by community group: Government; Business; Education and Health Care; and the Community-at-Large.

***Issues/Recommendations***

**Government:** Elected officials and government agencies are influential in making and supporting economic development decisions that have significant impacts on their communities. Using their understanding of national, state, and regional economic trends, they can help to create a unifying vision for the future development of the area. Their expertise is especially needed to address such issues as infrastructure, transportation, zoning, and promotion of bioscience both within and outside the county.

**Recommendations for governmental entities include:**

1. Take full advantage of opportunities presented by Fort Detrick Base Realignment and Closure (BRAC)-related expansion. Governmental officials, especially the delegation to the General Assembly, could promote the ability of Washington County to contribute to BRAC initiatives.

2. Engage in discussions with Corporate Office Properties Trust (COPT) to help shape the development of Fort Ritchie, especially as it applies to bioscience enterprises.
3. Promote and market Washington County as part of a regional bioscience identity, and as a pre-eminent bioscience development target.
4. While continuing to attempt to attract existing bioscience manufacturing firms, place the major focus on start-up bioscience businesses, especially those that are research-oriented.
5. Examine and evaluate potential land that would be appropriate for bioscience development, perhaps in cooperation with the Hagerstown-Washington County Industrial Foundation, Inc. (CHIEF).
6. Continue to work on transportation improvements, including passenger rail service.
7. Continue to seek funding to make the construction of the Eastern Blvd. extension to Washington County Hospital and HCC the county's number one transportation priority.
8. In shaping bioscience development, preserve water and sewer capacity by selecting bioscience opportunities that make the fewest demands on these services.
9. Give thoughtful consideration to rezoning proposals that could create a bioscience/biomedical corridor in the Robinwood area that would include the Washington County Health System, Hagerstown Community College, and the Mt. Aetna Farms property.

**Business:** Start-up bioscience and related enterprises have established a foothold in Hagerstown, Washington County, and the immediate surrounding area. Leaders of these and other businesses can provide expertise in the further development and strengthening of bioscience business capacity.

**Recommendations for the business community include:**

10. Establish a high technology networking group to provide opportunities for social networking, collaboration, and advanced learning opportunities. The Economic Development Commission and HCC could assist with this effort.
11. Work with such organizations as the Hagerstown-Washington County Chamber of Commerce to develop a Business Resource Alliance that would provide services that could include information related to financial and business planning, marketing, human resources, and continuing education.
12. Continue discussions between COPT and local officials to develop bioscience enterprises at Ft. Ritchie.
13. Engage businesses that are complementary to bioscience in discussions and development of an expanded bioscience business community. Such groups as

CHIEF, the Hagerstown-Washington County Chamber of Commerce, and the Economic Development Commission can assist in this process.

**Education and Health Care:** The public education system, which includes Washington County Public Schools, Hagerstown Community College, and the University System of Maryland at Hagerstown, are positioned to work in partnership with each other and other community interests to serve bioscience development within the county. Issues for education include: participating in a community education campaign; finding ways to increase the math and science interests and skills of local students; working to provide financial assistance to for higher education; and developing clear pathways among educational levels.

The health care community provides vital services to Hagerstown and Washington County. The Washington County Health System (WCHS) can become part of a nucleus of bioscience/biomedical development, by, for example, conducting clinical trials and other research. With construction of a new hospital underway in the Robinwood corridor within a ten-minute walk of HCC's wet lab incubator, WCHS and HCC could develop partnerships that would strengthen bioscience/biomedical development.

**Recommendations for the education and health care communities include:**

14. Undertake, with support from such groups as the EDC, media, and others, a community education campaign that emphasizes the need for education for high skills/high wage jobs for the 21st century.
15. Develop a bioscience educational and career pathway that incorporates secondary, postsecondary, and business/industry components so that students can make seamless transitions among educational levels.
16. Provide proactive and continuing academic and career counseling, with opportunities for contact with bioscience professionals.
17. Examine the feasibility of constructing a magnet math/science high school for students who have potential for high achievement in those disciplines.
18. Develop a partnership between WCPS and HCC to identify promising math/science candidates for early college experiences.
19. Develop HCC summer institutes, funded by businesses and/or community development groups, in which high school students earn credit, tuition-free, for college-level coursework in math and science in exchange for a commitment to major in a Science, Technology, Engineering, or Math (STEM) field.
20. Seek funding, in cooperation with community and business groups, for equipment for HCC's new science labs, and establish a partnership in which HCC would rent lab space in its new Science Building to USM-H.

21. Formalize opportunities to provide HCC wet lab space for WCHS physicians who wish to conduct medical/bioscience research.
22. Develop opportunities for WCHS physicians conducting research to teach in HCC's credit biotechnology and other science programs.

**The Community-at-Large:** A major issue for the entire community involves a complete discussion of the economic future of Hagerstown and Washington County, whether bioscience development is a viable choice for the county, and if so, to what scale?

**Recommendations for the community-at-large include:**

23. Convene forums, perhaps facilitated by the Greater Hagerstown Committee (GHC), to determine the viability and potential scale of bioscience development.
24. Establish a leadership group to construct a unified vision and comprehensive plan to develop bioscience initiatives.
25. As part of comprehensive planning, further evaluate potential competition for bioscience business development.
26. Working with the education, governmental, and business community, coordinate media coverage to promote a community education campaign, and to help inform the public of bioscience economic development efforts.
27. Promote the involvement of area bioscience professionals in community activities to demonstrate the county's desirability as a place to live and locate businesses.

## *Conclusions*

This paper began by posing a central question: To what magnitude might bioscience development contribute to the transformation of Washington County's economy? It is hoped that this paper has contributed to answering that question. Whatever the outcome of community discussion and decisions on this issue, however, many current bioscience initiatives and efforts will persist and grow. HCC will continue to serve start-up bioscience businesses through its wet labs, and some of these may be able to expand their operations in the county. HCC will also continue to build its biotechnology program, whose graduates will have ample employment opportunities in the region. The college and Washington County Public Schools will maintain and expand their partnership to involve more students in math and science education.

Community, regional, and national prosperity and well being in the 21st century are expected to expand in great measure through the application of new technologies. Success in these ventures will depend increasingly on individual and collective high

levels of knowledge and skills, frequently renewed through lifelong learning. Communities that recognize and understand this new reality, and act with unified vision and purpose to embrace it, as well as with patience and a long term perspective, will be able to create and take advantage of opportunities for economic, educational, and cultural advancement.

The degree to which current bioscience initiatives interface with the county's economic development decisions will determine the magnitude and impact of bioscience development on the economic transformation of Washington County. This paper concludes that the timing and positioning are ideal for Washington County to continue its strategically important economic transformation by establishing and putting into action a comprehensive plan for bioscience development.

**EDUCATION, ECONOMIC DEVELOPMENT,
AND 21ST CENTURY JOBS:**

**The Case for Planned Growth of Biosciences in Washington County**

# APPENDIX 2

# SAMPLE OF LIFE SCIENCE AND POTENTIALLY COMPLEMENTARY BUSINESSES

## 1. Hagerstown City and Immediate Surroundings Within 5 Miles

a. Life Science Firms

Agricultural Chemicals
SYNAGRO Hagerstown Pelletizer Plant

Industrial organic chemicals
P&G Creative

Analytical laboratory instruments
Zeltex, Inc.
Frazier Precision Instrument Company, Inc.
Instrument Distributors International
Crist Instruments

Optical instruments and lenses
DVF Corporation
Healthguard Instruments Incorporated

Medical instruments and supplies
Action Products

Hospitals
WCHS

Medical and dental laboratories
Alpha Syromil Dental Lab
Hagerstown Medical Lab
LabCorp

Commercial physical and biological research
Protein RST, LLC
Ambay Immune Sensors, LLC
Nanolytics, LLC

Testing laboratories
Toxpath Specialists
Express Analytical Svcs.
Cumberland Valley Analytical Svcs.
Mid-East Milk Lab Svcs.
Medical Services, Inc.

b. Potentially Complementary Life Science Firms

Clarke Michael, Inc. – Environmental consulting
Reisner Products, Inc. – Electronics manufacturing
Central Precision, Inc. – Prototype machining
Electromet Corporation – Mass production machining
Lake Precision Machine – Protope machining
EPS/CCA, Inc. – Paints and coatings
GBC Films Group – Thermal films
Rust-Oleum Corporation – paints and coatings
Sierra Nevada Corporation – Aviation electronics and sensors
AC&T Company – Haz Mat
West Manufacturing – DOD contractor

**2. Life Science Firms in Washington County Except Metro Area 5-20 Miles**

Medical and dental laboratories
Kershner Dental Lab, Sharpsburg
Sites Dental lab

Commercial physical and biological research
GESAC, Inc.

**3. Life Sciences Firms in the Washington County Regional Area 21-35 Miles**

Drugs
Srisai Biopharmaceutical Solutions, Inc.
Clinical Research Management
Pelican Life Sciences Corp.
Medimmune, Inc.

Agricultural chemicals
- Horsts Farms Seeds & Chemicals

Analytical laboratory instruments
- Metrigenix
- Pegasus Scientific, Inc.
- Super Array Bioscience
- Finnigan Corporation

Optical instruments and lenses
- Atlas Instrument Company

Medical instruments and supplies
- Atlantic Medical Supply
- Medical Gas Systems Specialist Incorporated
- Medical Thermal Imaging
- Sheepman Supply

Hospitals
- Frederick Memorial Hospital, MD
- Chambersburg Hospital, PA
- VA Center, Martinsburg, WV
- Waynesboro Hospital, PA

Medical and dental laboratories
- Carmco Inc., Chambersburg
- Lincoln Dental Lab, Chambersburg
- Quest Diagnostics, Chambersburg 3 loc.
- Summit Health-Lab Svcs., Chambersburg
- Frederick Prosthetics Dental Laboratory
- Tuscarora Dental Laboratory

Commercial physical and biological research
- Imquest Biosciences, Inc.
- Mid West Research Institute
- Bio-Molecular Technology, Inc.
- Jefferson Laboratories
- Polestar Laboratory, Inc.
- Pathology Associates International

Noncommercial physical research
- Fort Detrick USAMRIID et al

Testing Laboratories

Franklin Analytical Svcs, Chambersburg
Analytical Lab Svcs, Chambersburg
Professional Testing and Inspection Svcs, Chambersburg
Reliance Laboratories Inc, Martinsburg WV
Maryland Spectral Services, Inc.
Accugen Laboratories, Inc.

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# APPENDIX 3

# REGIONAL COMPETITION ANALYSIS

This analysis evaluates the relative competitiveness of Washington County to attract commercial biotechnology firms of any type. The primary emphasis is on counties directly adjacent to Washington County and other counties that are included in the Washington DC Metropolitan Statistical Area (MSA). The Baltimore MSA is relevant insofar as the massive investment biotechnology facilities taking place in proximity to Johns Hopkins University. This billion dollar project is driven by the research conducted by Johns Hopkins Medical Center. Historically, commercialization of Hopkins derived research has been significantly retarded and observers of the industry suggest that if Hopkins initiated a program to actually commercialize its discoveries it would elevate Maryland's ranking in terms of life science capacity. The lack of commercialization of Hopkins work is not lost on the Maryland Technology Development Corporation (TEDCO). TEDCO has been working diligently to create programs that would facilitate the technology transfer from the universities' and federal laboratories located in Maryland.

Two additional drivers of biotechnology in the Baltimore region are the University of Maryland at Baltimore (UMAB) drug development facilities in West Baltimore and the University of Maryland Biotechnology Institute UMBI, located on Pratt Street. Based on the UMBI 2007 Annual report, the institute in Baltimore and their CARB Center at Shady Grove are more focused on scientific discovery and post graduate study and not the actual commercialization of biotechnology products. Nonetheless, these drivers of biotechnology in Baltimore City are laying the groundwork for a true life science cluster to emerge in the Baltimore area. However, unlike Montgomery County in Maryland and Fairfax and Loudoun Counties in Virginia, the concentration of activity resides only in the university or Hopkins hospital initiatives. A number of incubating life science firms are located in the Emerging Technology Center (ETC) and the TechCenter at UMBC but only the TechCenter has BSL2 wet lab facilities. The ETC, funded by the city of Baltimore, has a working relationship with Hopkins to provide business incubation services to assist in the commercialization process.

Howard County, which is part of the Baltimore MSA may also be less relevant because of the county's nearly zero growth plans for new residential developments. This will preclude any large scale employer from relocating to Howard County unless it can draw employees from Baltimore City, Baltimore County, Carroll County, and to a lesser

degree Frederick County. Howard County does not currently have any incubation laboratory facilities for life science firms.

Frederick County has for many years been the bedroom community for the Montgomery County workforce. Until recently, the difference in housing affordability between the two counties resulted in substantial numbers of workers relocating to Frederick County and commute between twenty five and thirty five miles one way to work in Montgomery County. Today, an affordability differential still exists but the gap between the two has narrowed substantially. Many entry level workers can no longer afford to live in the Montgomery County and have migrated to West Virginia and other lower cost areas that will permit a relatively easy commute. The suburban areas north and east of Frederick, Maryland, as well as Shepherdstown and Martinsburg, West Virginia, are particularly attractive due to daily MARC train service to the DC Metro area coupled with either amenities that appeal to a sophisticated population demographic as in Frederick Maryland and or a very low cost of home ownership.

Events since 2001 have resulted in Frederick, Maryland's Fort Detrick becoming a much larger driver of Frederick's economic development. The federal government will be spending over five billion dollars to create the National Interagency Biodefense Campus at Fort Detrick. In addition to current military operations and the research conducted by the National Cancer Institute at the installation, expansion will take place through the construction of new facilities for the U.S. Army's Military Research Institute for Infectious Diseases (USAMRIID) as well as facilities for the U.S. Department of Agriculture, and the Department of Homeland Security. Despite some local opposition to the buildup at Fort Detrick, construction is underway.

Frederick County's primary strengths are the developments at Fort Detrick; a substantial number of PhD's residing in the county; and the perception of relative closeness to epicenter of all life science, the National Institutes of Health (NIH). Much like Montgomery County, Frederick has also cultivated a vibrant community that is welcoming to a diversity of demographic groups. The Frederick County business community is also supportive of technology business incubation. Frederick opened a second biotech incubator at Monocacy eighteen months after its success at Hood College. Frederick's Office of Economic Development provides financial support to their incubators. In addition, the business community has formed a Frederick chapter of the Tech Council of Maryland and an entrepreneurial development group. Commuters have a variety of choices as a developed interstate route and mass transit is readily available to deliver to and from the core biotechnology commercial areas by car, bus and light rail. There are two private colleges and universities in the area and Frederick Community College. The Hopkins University, Shady Grove facility has entered into a partnership with Fort Detrick to provide graduate training for staff interested in pursuing a degree in Biodefense. The Shady Grove campus can provide post graduate training in other life

science programs as well. As the largest county in the state, Frederick does have ample available land for commercial development. According to information gained from the Frederick's Office of Public Works, infrastructure to support commercial development will take priority over residential development.

Frederick is expected to be Washington County's primary competitor in attractiveness for life science firms. Despite its strengths, however, there are some significant weaknesses that could be exploited. Frederick's growth plan limits residential construction dramatically and thus will cause a continued escalation of home prices that will cause outlying areas to be considered by the workforce. Second, not all of Frederick's residents and elected officials are celebrating the Fort Detrick expansion. Several lawsuits have been filed to stall the project and recently several county commissioners attempted to eliminate the Office of Economic Development as unnecessary budget expenditure in light of the desire to curtail growth. These commissioners were in the minority but the actions reflect a growing concern over the congestion that has occurred over the last few years.

Montgomery County is the epicenter of Maryland's life science industry. However, life science is dwarfed by the number of personnel engaged in development and delivery of information technology (IT) products and services. Both of these industries flourish in Montgomery County due to its geographic proximity to Washington DC, the National Institutes of Health (NIH) the National Science Foundation (NSF), and the National Institute for Science and Technology (NIST). The Montgomery County Economic Development Commission provides significant resources for the growth and development of any size firm in these two industries. Montgomery County fully funds operations of five technology incubators, with plans to open additional facilities, and the City of Rockville recently opened its own incubator. Montgomery County is a true life science cluster because it is home to a wide array of complementary businesses. With its combined strength in IT and biotechnology coupled with numerous firms developing myriad electronic sensors and other hardware, it can be expected that the county will remain the market leader and that growth of these firms will require more support from other firms in the supply chain. It is anticipated that opportunities for smaller specialized firms will continue to grow.

Replete with all the amenities of modern urban living, and some of the best public education facilities in the country, Montgomery County is able to attract firms of the highest caliber. However, the high location rents charged for the privilege of living or working in the county have forced some firms and their workers to seek lower cost areas. This is especially true for emerging firms with unproven technologies or limited market share. Initially these firms have sought economic refuge in Frederick County or Howard County. These alternative areas are becoming saturated, and as noted earlier, county planners in those jurisdictions are severely restricting residential building due to the high

costs of public infrastructure for such development. Nonetheless, these counties remain committed to commercial growth.

Northern Virginia, comprising Arlington, Fairfax and Loudoun Counties is Virginia's equivalent to Maryland's Montgomery County in terms of cost, amenities, and economic opportunities. Combined, nearly one in four residents has a master's degree or higher and the number of those with at least a high school diploma is over 90%. Geographic proximity to the nation's capital and low tax rates have spawned unrelenting growth. Loudoun County continues to develop infrastructure for both residential and commercial growth as it pushes westward along I66. Fairfax is home to Northern Virginia's INNOVA medical center and many international firms locate in this area for its proximity to DC and the availability of international passenger air service at Reagan National and Dulles International airports. Light rail and several major thoroughfares attempt to link the commercial centers with outlying suburban residential areas. Daily traffic congestion is the norm. It can be reasonably anticipated that corridor growth will continue westward toward Winchester in Frederick County,Virginia.

Potential competition considered from areas west and north of Washington County in Allegany County, Maryland and Franklin County Pennsylvania is limited. Of the two areas, only Allegany County has some plan to try to attract a life science firm. Much like Washington County, Allegany's focus is on attracting a large scale biomanufacturing firm that would employ substantial numbers of workers. Grant funds from the Appalachian Regional Commission and the Department of Commerce have been used to develop infrastructure projects such as improvements to water and sewer capacity and the creation of a technology "Science Park" at Frostburg University (FSU). Frostburg University also recently opened a new state of the art science building. On a limited basis, Frostburg also operates a small business incubator for biotechnology firms. The incubator has had only marginal success. Allegany's strengths lie with its ability to attract federal dollars for infrastructure development, its strong ties with the Tri-County Council for Western Maryland, ongoing state efforts to create an economic renaissance, and Frostburg University. Unlike other University System of Maryland schools, however, FSU is primarily a teaching institution with no known technology transfer department. Population migration out of Allegany County by young people has continued unabated for many years. Furthermore, Allegany County's proximity to life science activities in the Washington DC MSA is further away than it is to the life science cluster in Pittsburgh, Pennsylvania. Despite having the lowest costs of commercial development and housing in any of the reviewed areas, it is not expected that biotechnology firms will leapfrog Washington County to obtain moderately lower costs in Allegany County.

Because Franklin County, Pennsylvania has no demonstrable or articulated plan to attract life science related firms, no business incubation facilities for any type firm, a general emphasis on targeting heavy manufacturing oriented firms, and no typical drivers

of life science such as a university or federal lab, it can only be concluded that the county poses no direct competition to Washington County's efforts to attract firms in this industry.