PHED Committee #1
November 26, 2012

MEMORANDUM

November 20, 2012

TO: Planning, Housing, and Economic Development Committee

FROM: Jacob Sesker, Senior Legislative Analyst JS

SUBJECT: Business Innovation Network—Report Update

Introduction

DED Director Steve Silverman will present an implementation strategy for enhancing the Montgomery County Business Innovation Network (BIN). He will be joined by Mike Knapp (Orion Ventures, LLC), who authored the Program and Policy Review (July 2012) and the Report Update (October 2012). This briefing provides the Committee with an opportunity to engage DED in a discussion regarding its efforts to re-position the incubators to achieve greater economic development impact. This is a briefing only—no action is required at this time.

This packet contains the following attachments:

- Business Innovation Network Report Update: © 1-18
- Biotechnology Industry Profile: © 19-26

Not attached to this memorandum is the Program and Policy Review report that was presented to the Committee in July. That report can be found at:

http://www6.montgomerycountymd.gov/content/council/pdf/agenda/cm/2012/120723/MC_Business_Innovation_Network.pdf

Background

A review of the existing BIN program, along with policy alternatives, was presented to the Committee on July 23rd. The Committee requested follow-up from DED and its consultant, Orion Ventures, with respect to how changes to the existing program will be implemented. DED will continue its implementation planning over the remainder of the fiscal year. The DED/Orion Report Update is attached at © 1-18.

Initially, those efforts will include identifying and analyzing target industries, providing fiscal analysis of baseline and alternative scenarios, identifying specific steps necessary to begin restructuring

current programs, and reaching out to potential partners in order to assess the potential of strategic partnerships to improve outcomes and/or reduce costs. Subsequently, DED intends to transition the current program during the spring of 2013—the transition will require coordinating program requirements and budget, communicating the transition plan to each BIN tenant, and beginning to address facility-specific issues within each incubator. DED intends to begin the implementation phase in FY14.

As a reminder, the Program and Policy Review report observed that the objective of the original incubator (the Montgomery County Technology Enterprise Center) was to provide "low-cost rental space and support services for knowledge-based, technology-intensive start-up or early-stage information technology firms." The current incubators (all opening in 1999 or later) opened during a period of economic growth and tight real estate markets. As such, an emphasis on meeting the real estate needs of BIN tenants was appropriate. The Program and Policy Review suggested that the BIN should move away from an emphasis on maintaining high occupancy rates in its facilities to a program that is more focused on achieving positive economic impacts. In order to do so, the Program and Policy Review Report recommended several potential changes. The Report Update represents a further refinement of those recommendations.

Highlights—Report Update

In its Report Update, DED has endeavored to refine the mission, vision, and policy objectives of the BIN program in order to ensure that the incubators are aligned with strategic objectives, structured in a way that is financially sustainable, and programmed in a manner that provides maximum benefit. See © 3-5.

On © 5, the Report Update proposes the following policy objectives for the BIN: (1) Grow technology companies; (2) Develop economic clusters in target industries; (3) Increase Montgomery County jobs that align with Montgomery County demographics; (4) Leverage key regional research and business assets; (5) Increase investment in local start-up companies; and (6) Support a pipeline of new companies.

The Report Update proposes that each incubator should be aligned with a specific industry. See © 6. DED is currently analyzing key industries in order to better understand how those industries align with the policy objectives identified. The "straw man" proposal at this stage is to focus BIN programs on the life sciences industry, health IT (information technology), cyber-security, an accelerator program with focus on software development, and a general or transitional incubator to facilitate transition for current BIN tenants that do not fit within one of the other identified areas of focus.

The Report Update indentifies potential partnerships that would improve outcomes (e.g., accelerating commercialization/tech transfer) and/or potentially reduce costs. Potential partners include academic institutions, non-profits, industry partners, federal institutions, and municipalities. See © 7.

Operation of the incubators over the past two decades has responded to changing objectives, and while the incubators have succeeded by many measures, key elements of the operational programming have been ad hoc. The Report Update recommends creating an admissions process that is based on review and approval by a committee with industry and/or investment representation. In addition, each BIN tenant would have a project plan with specific milestones, semi-annual reviews, a projected graduation timeframe, and an assigned staff member. Programming for each incubator would be

developed with guidance from an industry specific advisory committee. Outcome measures for each tenant and graduate of the program will be tracked for 5 years. See © 8.

On © 9-10, the Report Update suggests potential outcome measures. Examples include outcomes that may be objective indicators that the program is succeeding (e.g., to have a certain percentage of BIN-supported companies receive private investment, or to achieve a target graduation rate or average time to graduation based on industry sector) and output measures that will help to monitor the BIN's efforts to achieve program objectives (e.g., growing the percentage of companies each year that are in the facility's strategic industry sector, or defining and achieving financial viability for the incubator).

On © 11-14, the Report Update addresses organizational structure, facilities, programs, and marketing/branding.

- The organizational structure would include shared staff (e.g., Executive Director, Education/Programming Manager, Communications/Events Coordinator, Mentorship Managers) and facility-specific staff (e.g., Center Directors, Facility/Tenant Service Managers). Total net new positions (whether County or contractor) required at stabilization would be 4.5 (+1 Executive Director, +1 Center Director, +0.5 Education/Programming Manager, +1 Communications/Events Coordinator, +2 Mentorship Managers, -1 Facility/Tenant Service Manager).[1]
- Advisory committees for each target industry would advise on the admission of BIN tenants and programming/educational elements for that facility.
- The BIN would transition from 5 to 4 incubators, and assess the space needs of each incubator in order to determine whether the individual facility needs to be larger, smaller, or configured differently.
- Reducing long-term debt will improve financial sustainability of the incubator program.
- Each incubator would have industry-specific programming.
- The BIN itself would be rebranded, and each individual incubator would also be branded.

On © 15-18, the Report Update addresses the mechanics of the transition from the status quo. The first phase of transition (roughly November 2012 through February 2013) will include analysis of key/target industries, fiscal analysis of the current program and proposed alternative, developing specific steps necessary to restructure current programs, and outreach to potential partners and an assessment of their interest. The second phase of transition (roughly March 2013 through June 2013) will include budget coordination as well as communicating the new BIN plan to BIN participants and providing a transition plan for each company.

Staff observations

Staff supports the proposed changes to the BIN and the proposed transition plan. Staff adds the following observations:

- Emphasizing clusters in target industries makes sense. Clusters generate economies of scale, including both "localization economies" (benefits derived from locating in proximity to suppliers

[1] The short-term priorities would be to fill the positions of Executive Director, Center Director, and one of the two Mentorship Manager positions, and to expand the scope of our contract for education/programming from part-time to full-time.

or in proximity to other firms that draw upon the same labor pool), and "urbanization economies" (production costs are lower in larger markets where firms have better access to specialized services or to knowledge transfer between related industries). Cluster development is also consistent with "cumulative causation theory" (successful areas accumulate competitive advantages, and those competitive advantages lead to the accumulation of more competitive advantages).

- Creating industry specific incubators will allow for targeted programming and networking and generally improve the efficiency and effectiveness of the incubator program. Advisory committees with industry representation will improve admissions and help to set industry-appropriate milestones and graduation timelines. In addition, industry focus will both simplify and enhance efforts to brand the County, the incubator network, and each individual incubator.

- From a budgetary standpoint, implementing the recommendations in FY14 and FY15 might require additional personnel before savings can be achieved from phasing out a facility and/or re-structuring debt. During the transition, it may be necessary for existing resources to fulfill the role of Communications/Events Coordinator or to leverage possible volunteer resources to fulfill some of the responsibilities of a Mentorship Manager.

- Three individuals currently manage 5 facilities. DED proposes a future BIN that has both an Executive Director and a Center Director for each incubator. While Staff agrees that the proposed future level of staffing is necessary in order to implement the package of programmatic changes recommended, available resources will dictate the pace of the transition. It simply may not be possible to add both positions in the short term.

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Business Innovation Network Report Update Presented to PHED Committee

October 29, 2012

OrionVentures, LLC

Business Innovation Network
Montgomery County Department of Economic Development

Where Are We?

- Presented the BIN Report in July (Phase I)
- Current report provides a strategic direction and framework for a revised BIN (Phase II)
- Final phase of the study includes a cohesive proposal for consideration during the budget process
- Implementation

MC BIN Proposal

❖ **Mission**

- To harness business, government and academic resources in order to provide strategic counsel, operational guidance, and infrastructure support to early stage science and technology companies with high growth potential that will ultimately increase the tax base in Montgomery County.

MC BIN Proposal

❖ **Vision**

- MCBIN is based on the belief that we can build upon our existing strengths to become a worldwide hub for innovation and commercialization by cultivating an entrepreneurial community whose companies are the leaders in several targeted areas of science and technology.

MC BIN Proposal

- **Policy Objectives**
  - Grow technology companies
  - Develop economic clusters in target industries
  - Increase Montgomery County jobs that align with County demographics
  - Leverage key regional research and business assets
  - Increase investment in local start-up companies
  - Support a pipeline of new companies

MC BIN Proposal

- **Areas of Focus**
  - **Life Sciences** (See hand out)
  - **Health IT**
  - **CyberSecurity**
  - **Accelerator** – a high intensity, short-term program to identify and move primarily software development ideas into the marketplace as quickly as possible.
  - **General/Transition Facility** – as each facility becomes more specific in its focus it will be necessary to provide transition space for a period of time for those firms in the BIN that may not fit a particular focus.

MC BIN Proposal

- **Innovation Center Partnerships** - Establish partnerships with each incubator based on its specific industry focus
  - **Academic institutions** - USG/JHU/MC/others
  - **Non-profit associations** - Tech Council/BHI/MD Biotech Center/TEDCO
  - **Industry partners** – Westat/IBM/MedImmune/Microsoft
  - **Federal institutions** – NIH/FDA/NIST/Ft. Detrick/DoD
  - **Local jurisdictions** – e.g. Gaithersburg (CyberSecurity), Poolesville (Agriculture)

MC BIN Proposal

- **Operating Principles**
  - BIN admission is based on review and approval by an industry advisory/investment committee
  - Each BIN company has:
    - A project plan with specified milestones
    - Reviews every 6 months
    - A projected graduation time frame
    - A staff member assigned to assist in meeting its milestones
  - Each incubator has an industry specific advisory committee to guide programming and provide support for BIN companies
  - BIN staff track outcome measures of tenant companies and graduates for at least 5 years after graduation

MC BIN Proposal

- **Proposed Outcomes** (for discussion and refinement)
  - To grow the % of companies each year in the facility's strategic industry sector
  - To have a % of BIN supported companies receive private investment
  - To create new jobs in the county
  - To spin out or move into the incubator, new companies each year from the accelerator program, helping to build a pipeline of new companies
  - To retain a % of BIN graduates in Montgomery County after 5 years

MC BIN Proposal

- **Proposed Outcomes** (continued)
  - To achieve a % company graduation rate and an average time to graduation depending on industry sector
  - To generate a % of BIN companies from active partnerships with academic and federal research institutions
  - To define and achieve financial viability for the BIN

MC BIN Proposal

- **Organizational Structure** – Ensure that each incubator has sufficient resources to achieve its potential
  - **Executive Director** – oversees whole program
  - **4 Center Directors** w/industry specific expertise
  - **1 Education/Programming Manager**
  - **1 Communications/Events Coordinator** – coordinates programs, outreach, press and media opportunities for the incubator and companies (could be handled within DED)
  - **2 Mentorship Managers** – coordinates with industry, advisory committees and mentors (could be partly managed by volunteers)
  - **4 Facility/Tenant Service Managers** (may be outsourced and will vary depending upon # of facilities)
  - **BIN Center Advisory Committees** (one committee for each industry)
  - **Mentors** (likely volunteers from the business community)

MC BIN Proposal

- **Facilities**
  - **4 BIN Facilities** (county-owned/county leased/private partners)/space for Accelerator/collaboration with NCCoE
  - Identify space needs/goal of each incubator facility to determine appropriate size for incubator activities and then develop additional strategy if space is too large/small
  - Develop physical facility plan for industry focus for each incubator including any facility renovations that may be necessary
  - This section will also need to connect with next study phase to address long-term debt associated with BIN

MC BIN Proposal

- **Programs** (these will vary based upon the industry focus of each incubator, but should include industry-related programs in the following areas. May be delivered in part/whole through outside institutions.)
  - Funding/Financing
  - Mentoring
  - Industry/Technology Specific
  - Management
  - Marketing
  - Business Development

MC BIN Proposal

- **Marketing and Branding**
  - Rebranding of the BIN, building upon its past success – refining for the future, i.e., it was the first, and the largest and has seen much success, now it is being refined to make it even stronger for the County
  - Branding for each individual incubator

MC BIN Proposal

❖ **Migration and Transition**

- Review timing and relationships of current BIN tenants
- Develop strategy for realignment of firms to appropriate incubators, if necessary
- Develop clear communication for new objectives of BIN and present to tenant company CEOs

MC BIN Proposal

- **Budget Requirements/Constraints**
  - Address long term debt structure of BIN in order to establish financial viability
  - Develop cost model for each incubator
  - Determine reallocation of existing budget resources and additional resources required
  - Develop funding requirements for new programs
  - Coordinate with OMB/CC for budget requests and support

MC BIN Proposal

- **Timing**
  - Planning Phase (November '12 – February '13)
    - Identify and justify key industries
    - Provide a fiscal analysis of the current program and the proposed alternative(s)
    - Outline new programs and activities, and develop specific steps necessary to begin restructuring the existing programs
    - Analyze and undertake initial outreach to potential partners in order to assess the level of interest

MC BIN Proposal

- **Timing** (cont.)
  - Transition Phase (March '13 – June '13)
    - Coordinate with CE and CC to ensure budget requirements are met during budget deliberations
    - Communicate new BIN plan to BIN participants and provide transition plan for each company
    - Begin to address specific facility issues within each incubator
  - Implementation Phase (starting July '13)
  - Expansion Phase

Biotechnology Industry Profile

Industry Description

Biotechnology is defined as the manipulation through genetic engineering of living organisms or their components to produce useful, usually commercial, products. Biotechnology also includes any of various applications of biological science used in such manipulation.

Biotechnology harnesses cellular and biomolecular processes to develop technologies and products. Modern biotechnology provides breakthrough products and technologies to combat diseases, reduce our environmental footprint, feed the hungry, use less and cleaner energy, and have safer, cleaner and more efficient industrial manufacturing processes.

Biotechnology industry in Montgomery County is represented by federal institutions, such as National Institutes of Health and Food and Drug Administration, by over 300 private companies, and by higher education institutions.

Criteria for a Focus Industry

- Size of the industry sector
  - 13,358 private sector jobs
  - Biotech jobs constitute over 2% of the county's total jobs. The % of biotech jobs in the nation is only 0.7%.

- Job growth
  - In the county, the industry has demonstrated 17% growth in the past 10 years, mirroring national growth. It is projected to grow by 5.6% in the next 5 years. Nationally, the projected growth rate is 9%.

- The relative concentration of biotech jobs in the county compared to the nation
  - Biotech industry's share of the local employment is almost 3 times larger than nationally.

- Average wages
  - According to US Census (2010) per capita income in the county is $47,310 and median household income is $93,373.
  - In the biotech sector the average per employee earnings in 2012 are $122,158.

- County assets
  - NIH, FDA, other federal and university labs.

- Workforce Requirements and Availability
  - Top 6 occupations for the industry and their educational requirements are:

Occupation	Employed in Industry Group (2012)	Employed in Industry Group (2017)	Change	% Change	% of the Total Jobs in Industry Group (2012)	Median Hourly Earnings	Education Level
Medical Scientists, Except Epidemiologists	983	1,083	100	10%	7.4%	$52.84	Doctoral degree
Chemists	741	744	3	0%	5.5%	$59.40	Bachelor's degree
Biological Technicians	568	569	1	0%	4.3%	$24.50	Bachelor's degree
Microbiologists	388	417	29	7%	2.9%	$51.49	Doctoral degree
Natural Sciences Managers	325	329	4	1%	2.4%	$62.02	Bachelor's or higher degree, plus work experience
Biochemists and Biophysicists	280	317	37	13%	2.1%	$49.23	Doctoral degree

- Workforce resources include postdoc fellows at federal and university laboratories and graduates of multiple academic programs:

CIP	Program	# of institutions in state providing training	State Completions (2010)
26.0101	Biology/Biological Sciences, General	20	1,441
40.0501	Chemistry, General	18	289
26.1201	Biotechnology	3	266
14.0501	Bioengineering and Biomedical Engineering	2	169
26.0202	Biochemistry	6	119
26.0210	Biochemistry and Molecular Biology	2	78
26.9999	Biological and Biomedical Sciences, Other	2	55
30.0101	Biological and Physical Sciences	4	52
41.0101	Biology Technician/Biotechnology Laboratory Technician	3	48
26.0203	Biophysics	1	35
26.1102	Biostatistics	1	21
26.0299	Biochemistry, Biophysics and Molecular Biology, Other	1	14
15.0401	Biomedical Technology/Technician	1	13
26.0102	Biomedical Sciences, General	1	9
40.0599	Chemistry, Other	3	9
26.1103	Bioinformatics	1	3

Industry Sectors and NAICS Codes

The following NAICS represent the Biotechnology/Life Sciences sector. Tables below show the details of the sector dynamics.

NAICS Code	Description	2002 Jobs	2012 Jobs	Job Change	% Change
541711	Research and Development in Biotechnology	5,567	5,137	(430)	-8%
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	3,386	3,112	(274)	-8%
325414	Biological Product (except Diagnostic) Manufacturing	587	2,246	1,659	283%
621511	Medical Laboratories	600	1,116	516	86%
325413	In-Vitro Diagnostic Substance Manufacturing	240	665	425	177%
541380	Testing Laboratories	881	584	(297)	-34%
325412	Pharmaceutical Preparation Manufacturing	44	415	371	843%
334516	Analytical Laboratory Instrument Manufacturing	79	83	4	5%
	Total	**11,385**	**13,358**	**1,974**	**17%**

Economic Base Analysis

Economic base analysis and shift-share analysis are additional tools to understand changes taking place in an industry sector.

Economic base analysis allows economic development specialists to understand a local economy better. It assumes that the local economy can be divided into two main sectors: basic and non-basic. The basic sector is made up of those local businesses that produce goods and services sold to consumers outside the county. Their sales are dependent almost entirely on export markets. The non-basic sector, on the other hand, is composed of those firms that produce goods and services that are sold and consumed locally. Almost all local businesses such as hairdressers, restaurants, dentists, etc. can be considered non-basic because they depend almost entirely on local market sales. Economic base analysis is based on the presumption that basic industries form the economic base of a locality by bringing in new money from outside, and all other industries benefit by servicing these sectors.

Location Quotient (LQ) is a standard indicator used to estimate the economic base of a locality. LQs measure the relative concentration of a given industry in the county compared to a larger area, such as the whole nation. An LQ greater than one indicates that this is a basic industry, i.e. it satisfies all local consumption and the excess of production can be exported. An LQ of less than one indicates that the industry cannot satisfy local consumption.

NAICS Code	Description	2012 Avg Earnings	2011 Establishments	2002 LQ	2012 LQ
541711	Research and Development in Biotechnology	$111,367	181	12.27	9.07
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	$100,451	133	2.53	1.74
621511	Medical Laboratories	$77,922	93	1.22	1.68
541380	Testing Laboratories	$85,830	26	1.62	0.97
334516	Analytical Laboratory Instrument Manufacturing	$34,759	9	0.62	0.69
325412	Pharmaceutical Preparation Manufacturing	$131,918	7	0.05	0.55
325413	In-Vitro Diagnostic Substance Manufacturing	$112,859	6	4.79	8.63
325414	Biological Product (except Diagnostic) Manufacturing	$212,526	3	6.25	22.00
	Total	**$122,158**	**458**	**2.89**	**2.85**

The table above shows the LQs, as well as average earnings and number of establishments, for sectors included in the biotechnology industry. All five largest sectors have LQs higher than 1, indicating that Montgomery County has a significantly higher concentration of jobs in these sectors compared with national averages. The LQ for Pharmaceutical Preparation Manufacturing sector, while smaller than 1, has grown 10-fold over the last 10 years reflecting the 800% growth in the number of jobs in this sector. The table above demonstrates that biotechnology is one of the most robust and important sectors of the local economy.

Shift-Share Analysis

Shift-share analysis may be used to examine the changes in employment and to gain information about the characteristics of growth and competitiveness of local industries.

Shift-share analysis attributes employment change over a time period to three contributing factors:

1. National growth effect represents the share of local employment growth/decline that can be attributed to growth of the national economy.
2. Industrial mix effect represents the effects that specific industry trends at the national level have had on the change in employment in the county.
3. Competitive effect shows how industrial groups in the county performed relative to those groups at national averages. It is assumed that for the same industry groups the locality may not follow the national trends due to local comparative advantage or disadvantage, e.g. labor resources, natural resources, taxes, etc.

NAICS Code	Description	Ind Mix Effect	Nat'l Growth Effect	Expected Change	Competitive Effect
325414	Biological Product (except Diagnostic) Manufacturing	(10)	54	44	1,616
325412	Pharmaceutical Preparation Manufacturing	(9)	4	(5)	375
621511	Medical Laboratories	142	55	197	318
325413	In-Vitro Diagnostic Substance Manufacturing	102	22	124	300
334516	Analytical Laboratory Instrument Manufacturing	(12)	7	(5)	9
541380	Testing Laboratories	(1)	80	79	(377)
541712	Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology)	778	309	1,087	(1,361)
541711	Research and Development in Biotechnology	799	508	1,307	(1,737)
	Total	**1,791**	**1,039**	**2,830**	**(857)**

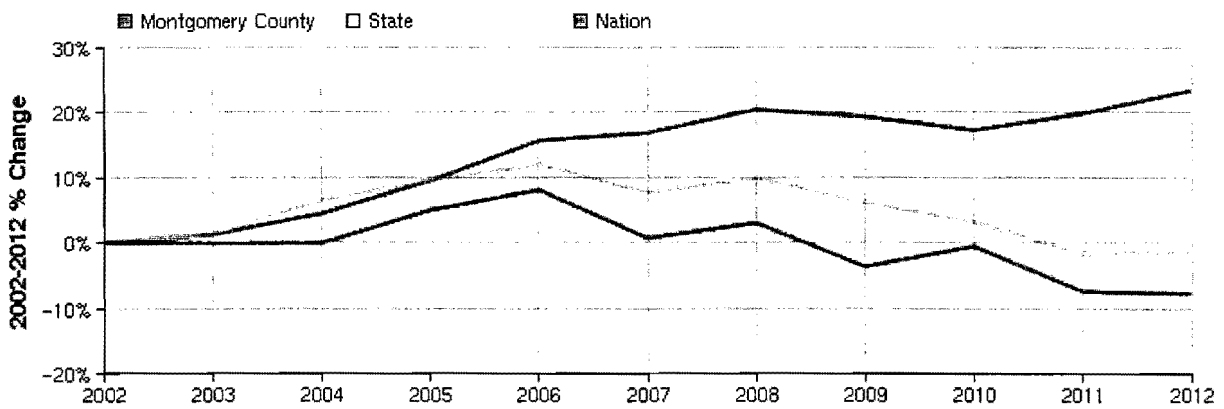
This table shows that over the last 10 years the growth in the first four sectors was mainly due to advantageous local conditions. However, growth in the two largest sectors, Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) and Research and Development in Biotechnology can be attributed to the growth in the national economy and the growth of the sector at the national level, but not to any specific local advantages.

Industry Dynamics

Biotechnology industry has been steadily growing in the county and is projected to continue the upward trend.

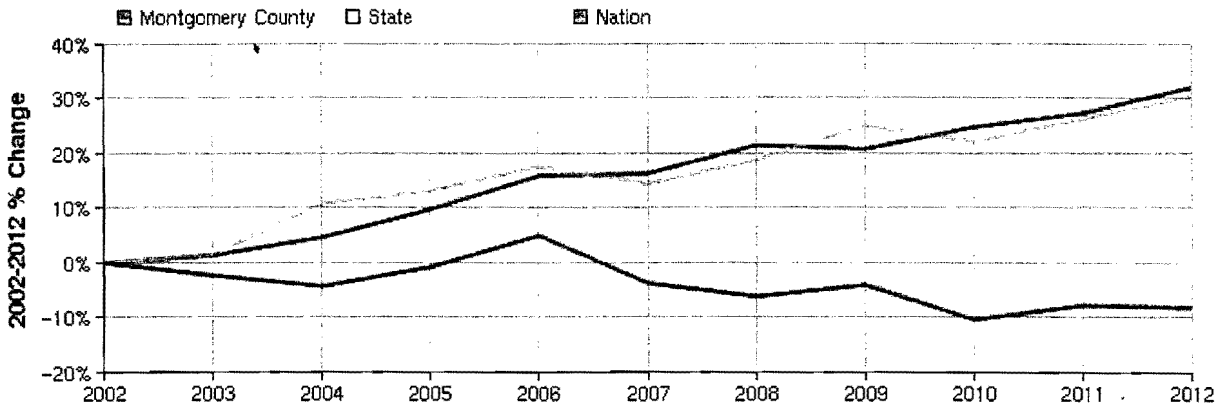
Sectors within Industry

Research and Development in Biotechnology (541711) – This is the largest sector in the cluster with over 5,000 private sector jobs and 180 private companies. High Location Quotient – the county share of employment in the sector is 9 times larger than the national average. LQ of 9.07 indicates that the sector is basic, i.e. it is export-oriented and brings money into the county. The sector had been growing between 2002 and 2006, however, since 2006 the sector has lost about 800 jobs. LQ has been decreasing and the downward trend is projected to continue. The sector is projected to remain stable in the next five years. The Competitive Effect is negative, which indicates that the downward trends are in contrast with the national trends both in the economy as a whole in the that particular sector and should be attributed to local conditions. The industry sector trends in the county mirror those on the state level.

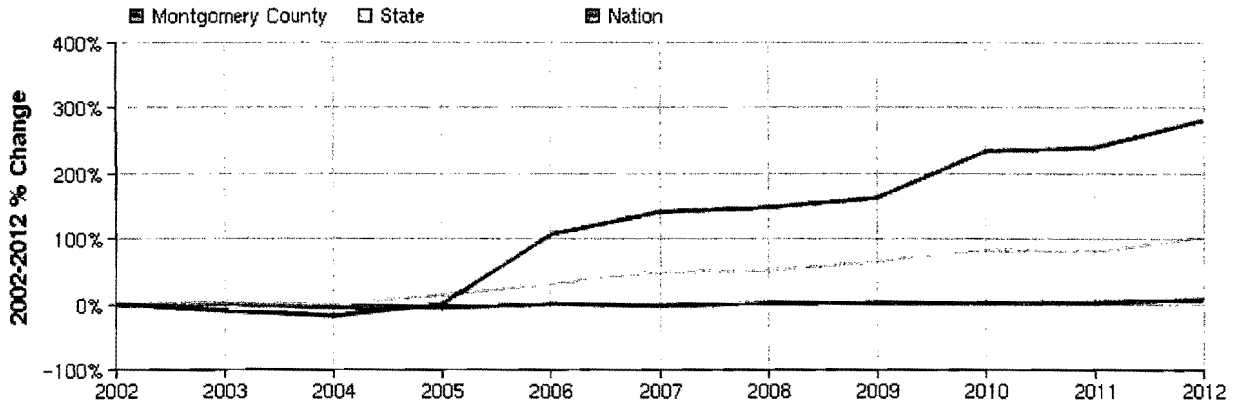


Despite job losses, Research and Development in Biotechnology remains one of the most important basic sectors in the county economy. This sector's importance becomes even more significant if we take into account thousands of biotechnology related jobs at the NIH, FDA, WRAIR and other federal government labs.

Research and Development in the Physical, Engineering, and Life Sciences (except Biotechnology) (541712) – With over 3,000 private sector jobs and close to 100 businesses, this is the second largest sector in the cluster. The sector has lost about 200 jobs between 2002 and 2011, but is projected to remain stable in the next five years. The LQ=1.74, but has been decreasing and is projected to continue the slight downward trend. Competitive Effect is negative (see comments above for the *Research and Development in Biotechnology* sector).



Biological Product (except Diagnostic) Manufacturing (325414) – There are only two companies in the county that report under this NAICS code. While the sector has grown significantly, has an LQ of above 20, is projected to grow, and has a large positive Competitive Effect, most of the changes may be attributed to the success of a single company.



Medical Laboratories (621511) is a growing sector that has almost doubled in size between 2002 and 2012 and is now 4th largest sector in the biotech industry. LQ is just above 1, but is projected to grow in the next 5 years.

In-Vitro Diagnostic Substance Manufacturing (325413)– relatively small sector that has more than doubled in size between 2002 and 2011. The Location Quotient has increased from 4.79 in 2002 to 8.63 in 2011 and is projected to slightly increase by 2016. Competitive effect is positive. There are only 5 businesses that report under this NAICS.

Testing Laboratories (541380) – relatively small and contracting sector, consists of about 25 businesses with about 1/3 of them biotech related (largest employer under this code is BioReliance). LQ=0.69 and will remain stable. Competitive Effect is negative.

Pharmaceutical Preparation Manufacturing (325412) – small, but growing sector. LQ<1, i.e. the clientele of the companies in this sector is predominantly local and the sector doesn't bring any money from outside into the local economy.

Analytical Laboratory Instrument Manufacturing (334516) – with fewer than 100 jobs this is the smallest sector. It is projected that the sector will remain at about the same level of employment.

ESTABLISHMENTS

Total number of establishments in the biotech sector in the county has increased from 328 in 2002 to 458 in 2011. Although the overall number of firms has increased, a closer look at the firms within each sector reveals a significant amount of fluctuation. For some of the years, Montgomery County was adding as many establishments as it was losing. While most of the smaller sectors have been steadily adding businesses, the number of businesses in the two largest sectors - *Research and Development in Biotechnology* and *Research and Development in the Physical, Engineering, and Life Sciences* – has been fluctuating significantly. The period between 2006 and 2007 was a very challenging one, when the net loss of businesses climbed to 16. Both sectors have recovered well and many new small businesses have been created since then.

Data Sources and Calculations

Economic Modeling Specialists, Inc. EMSI Complete Employment 2012.2 release.

State Data Sources
This report uses state data from the following agencies: Maryland Department of Labor, Licensing and Regulation, Office of Labor Market Analysis and Information.

Staffing Patterns Data
The staffing patterns data in this report is compiled from several sources using a specialized process. Sources include Occupational Employment Statistics, and the National Occupation Matrix. EMSI uses ratios from the national matrix and inputs regional jobs by industry, converting these to jobs by occupation. The ratios derived from this are adjusted to equal actual regional data, resulting in a unique regional staffing pattern.

Completers Data
The completers data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.

Institution Data
The institution data in this report is taken directly from the national IPEDS database published by the U.S. Department of Education's National Center for Education Statistics.