Economic Development Strategy for Frederick County, Maryland

PREPARED BY





Executive Summary

Successful economic development efforts must be ***asset based*** and ***targeted*** on core driver industry clusters. *Asset-based* economic development strategies build on the core strengths of the jurisdiction; while, *targeted* economic development strategies focus on the key industry drivers in which the jurisdiction has or can establish a comparative advantage.

Frederick County, Maryland, has substantial ***economic development assets*** with which to promote economic development. The following are chief among these, with Frederick County having:

- One of the ***fastest-growing economies*** in the State of Maryland, with total private employment growing by 26 percent since 2001, adding more than 17,000 jobs, far outpacing the rates of growth of the United States and Maryland, as well as those of Baltimore and Washington DC metropolitan areas;
- A ***diversified and growing*** **economy** specialized in the professional services, finance and insurance, and construction sectors, that is experiencing growth among most major industries that is outpacing the State and the Baltimore and Washington metro area comparison regions;
- A ***rapidly growing population***, with its population growing by 6 percent since 2010, one and a half times the Maryland rate of growth, with a growing base of educated and millennial residents;
- A ***skilled and educated workforce with competitive labor costs***, with 41 percent of County residents having a bachelor's degree or above and 47 percent of workers employed in "creative class" management, business, science, and arts occupations, exceeding Maryland's rate of 39 percent of residents with a bachelor's degree or above and 45 percent of workers employed in management, business, science, and arts occupations, and competitive wages within the State and benchmark regions;
- A ***competitive business climate***, with strong infrastructure, competitive tax rates, and affordable real estate; and
- A ***high quality of life***, including a regionally competitive cost of living; nationally ranked schools; and substantial cultural, historic, and outdoor amenities.

The strength of Frederick County's economy is highlighted by its ability to bounce back from the economic shocks of the Great Recession. Despite these economic challenges, Frederick County has fared well in the economic recovery with higher employment gains and lower unemployment rates than found across both the Baltimore and Washington DC regions, and a positive in-migration of population from within the region. While still viewed by many as a bedroom county that supplies workforce to other parts of the Baltimore and Washington DC metro areas, Frederick County has, in fact, one of the lowest rates of out-commuting of its resident workforce, well below that of Baltimore, Carroll, and Howard Counties, and on par with Montgomery County. The next phase of Frederick County's development will be to focus on becoming a regional technology and innovation driver in its own right, especially in the targeted advanced industry clusters of biosciences and computing and information technology (IT).

In terms of targeted economic development policies, it is well understood that each region has specific industry clusters through which it is uniquely positioned for growth due to factors of comparative advantage. A targeted economic development strategy focuses on these core industry clusters in which the local economy has or can create a comparative advantage relative to competing jurisdictions. Frederick County has recognized this and designated four industry clusters—advanced technology, agriculture, biosciences, and manufacturing—for targeted growth. The Jacob France Institute (JFI)-TEConomy Team refined and extended the County's designated target industry cluster using a cluster identification model.

In analyzing the performance of Frederick County in the context of the regional economy, the JFI-TEConomy Team has identified ***six core industry clusters*** that represent strong targets for focused economic development efforts (Table ES-1), with a seventh industry, ***manufacturing***, where the County offers substantial development assets. The LQ column stands for Location Quotient, which compares the concentration of employment in an industry to the national average. An economy with high LQs, generally a threshold of 1.2, indicate the potential presence of a comparative advantage and the existence of a core industry cluster in that sector. The intent of redefining the designated target industry clusters for Frederick County is not to pick corporate winners and losers, but to think strategically about where the County is positioned for and has the best opportunities for economic growth and to inform the Frederick County Office of Economic Development (OED) on how to focus and deploy its resources to generate the maximum County benefit on its investment.

Table ES-1: Frederick County's Industry Clusters by Classification and Growth, 2001–2016, 2016 Employment, and LQ

Frederick County Cluster	Long-Term Performance 2001–2016	2016 Employment	% Growth 2001–2016	LQ
Biosciences	Current Strength	2,060	77%	4.23
Computing and IT	Emerging Strength	1,990	124%	0.89
Hospitality and Tourism	Emerging Opportunity	1,227	4%	0.55
Professional, Engineering, Scientific, and Technical Services	Current Strength	4,035	59%	2.12
Transportation, Distribution, and Logistics	Emerging Opportunity	4,233	6%	0.63
Value-Added Agriculture	Emerging Strength	1,348	92%	0.63

Source: JFI-TEConomy Analysis of IMPLAN Quarterly Census of Employment and Wages (QCEW) Data from the U.S. Bureau of Labor Statistics.

An underappreciated aspect of Frederick County's economic success is the growing diversity of its industry base. Over the past two decades, Frederick County has generated strong gains in IT, biosciences, and value-added agriculture industry clusters that have diversified an economy once dominated by more regionally based service industries of construction, engineering and technical services, finance and insurance, and transportation and distribution. Manufacturing also maintains a strong foothold in the County's economy and offers a unique range of job opportunities for residents, opportunities not typically found in other parts of the Baltimore and Washington DC metro areas.

While the long-term performance of its economy has been strong, the County is facing new competitive pressures. Historically, the County has competed based on its lower-cost, high-quality location offering access to a high-quality workforce within the growing and successful Washington DC metropolitan area. While Frederick County remains competitive in the region in terms of business costs, it must focus its economic development efforts on the technology- and innovation-based sectors of tomorrow to attract the high-skill jobs in knowledge-based sectors that will generate greater prosperity and higher wages and incomes. The County is well positioned to make this transition, with substantial innovation and technology drivers, including Fort Detrick; the National Cancer Institute; and a strong base of life sciences, computer/internet, and other technology-related businesses. The County is also investing in this transition: building a second location for the Frederick Innovative Technology Center, Inc.; investing in community college training programs and training centers (the Monroe Center); supporting the development of a higher education center (the Frederick Center for Research and Education in Science and Technology); and investing in quality-of-life amenities.

The Frederick County OED commissioned this strategy to identify both the County's key economic development assets and core industry clusters and prepare an economic development strategic plan to guide its efforts into the future. The JFI-TEConomy Team proposes 12 key policy actions in four strategic priority areas (Table ES-2):

- ***Workforce***—Creating the supply and pipeline of talent needed by the County's employer community;
- Improving infrastructure and placemaking, consisting of the following:
- ***Infrastructure***—Putting in place the physical infrastructure needed to support business and employment growth; and
- ***Placemaking Strategies***—Creating the sense of place and quality of life desired by residents and employers alike;
- ***Targeting Core Industry Cluster Growth***—Targeting cluster growth through specialized efforts; and
- ***Branding***—Enhancing Frederick County's recognition and stature in regional and national markets.

Looking forward to the next 10 years, these strategies will strengthen Frederick County's economic foundations building upon the County's mix of industry clusters and enable the County to sustain the diversity of its industry and employment base, while raising its performance in driving high-quality economic growth. Success measures for each element of these strategies are presented in Table ES-3.

This strategic plan is best viewed as taking the additional steps for ensuring that Frederick County's economic development measures make the County a leading place in the region and the nation to live and work. The actions set out complement and build upon the ongoing economic development efforts and initiatives that the County has put in place in recent years by unifying and focusing the County's efforts around its industry clusters and their needs as it focuses on strengthening its economic foundations.

The strategy endorses the continuation of the following ongoing activities:

- Targeted cluster development efforts of the OED for advancing business development;
- Workforce Services efforts targeted to middle- and lower-skilled occupations as well as targeted industry training and skill upgrading with the FCC; and
- Expansion of FITCI and creation of the ROOT innovation hub for the County Economic Development in the downtown City of Frederick.

The strategy endorses the cessation of the following ongoing activities:

- Unutilized tax credit programs. These should be replaced by more targeted business development assistance, such as for tenant improvements for ensuring availability of high-quality commercial real estate for the biosciences and computing and IT clusters and growth capital funding for the computing and IT cluster.

The strategy endorses the modification of the following ongoing activities:

- Broadening of CREST's focus to developing curriculum with local higher education institutions to meet industry cluster-based skill requirements and to advancing a Frederick Talent Recruitment Project for college juniors and seniors in targeted STEM fields.

Table ES-3: Suggested Performance Measures and Goals for Strategy Priorities of Frederick County

Strategic Focus	Goals	Metric/Sources
Overall Strategic Goal: Sustaining industry diversity with an increasing focus on high-quality economic growth	Goal 1: Outpace the broad Baltimore-Washington region and the State in total job growth as well as average wage growth of jobs in Frederick County.	**Metric:** Industry Employment and Wages **Source:** QCEW
	Goal 2: Encourage growth across low-, middle-, and high-skilled occupations to reflect the broad diversity of Frederick County's economic base.	**Metric:** High-/Middle-/Low-Skilled Jobs **Source:** Occupational employment survey
Strategic Priority: Generating, Retraining, and Attracting a Skilled Workforce	Goal 3: Increase share of residents working in the County across educational levels demonstrating the ability of Frederick County's economy to support its local residents.	**Metric:** County Commuting Patterns—In County Employment **Source:** U.S. Census Bureau American Community Survey (ACS)
	Goal 4: Generate a positive net in-migration of high-educated workers and their families.	**Metric:** County Migration Patterns—Migration by Education **Source:** U.S. Census Bureau ACS
	Goal 5: Generate a positive net in-migration of population between 21 and 35 years old.	**Metric:** County Migration Patterns—Migration 21–35 Age Bracket **Source:** U.S. Census Bureau ACS
	Goal 6: Increase level of recent graduates from Frederick County higher education institutions and other Maryland universities working in the County.	**Metric:** Student Employment Placements **Source:** Frederick Community College (FCC), Mount Saint Mary's University (MSM), Hood College, Frederick County Workforce Services
Strategic Priority: Improving Infrastructure and Placemaking	Goal 7: Promote employment growth in central business district (CBD) areas of Frederick County.	**Metric:** CBD Employment **Source:** City of Frederick
Strategic Priority: Targeting Development Efforts for Industry Cluster Growth	Goal 8: Outpace the broad Baltimore-Washington region and the State in job growth as well as average wage growth for the six identified industry clusters in Frederick County.	**Metric:** Industry Employment and Wages **Source:** QCEW
Strategic Priority: Branding and Proactively Marketing	Goal 9: Track number of social media hits about Frederick County's advanced industry development.	**Metric:** Tracking of news media stories, website visits, and other social media data

Table ES-2: Summary of Recommended Actions by Strategic Priorities, Time Frames, and Cost Implications

Strategic Priority	Recommended Action	Time Frame	Cost Implications
Generating, Retaining, and Attracting a Skilled Workforce	Action 1: Create a staffing capacity to support industry cluster-based skill need identification and training approaches as a cornerstone of Frederick's workforce and talent development efforts.	Immediate	Modest
	Action 2: Advance a "Work Where You Live" Project.	Longer Term	Significant
	Action 3: Undertake a Frederick Talent Recruitment Project for college juniors and seniors in targeted STEM fields.	Longer Term	Modest
Improving Infrastructure and Placemaking	Action 4: Support placemaking across the County through planning and zoning policies.	Near Term	Limited
	Action 5: Support placemaking in the City of Frederick.	Longer Term	Significant
	Action 6: Support rural/municipal placemaking and agricultural needs.	Near Term	Limited
	Action 7: Assess infrastructure/transit needs.	Longer Term	Significant
Targeting Development Efforts for Industry Cluster Growth	Action 8: Focus biosciences targeted development strategy in Frederick County on outreach marketing and engagement to leverage the assets of Fort Detrick, and particularly the Frederick National Laboratory for Cancer Research, as well as Frederick County's strategic location along the I-270 corridor.	Near Term	Modest
	Action 9: Focus Computing and IT targeted development strategy on assisting the existing base of businesses to scale up and attract more mid-career entrepreneurs to locate in Frederick County.	Longer Term	Significant
	Action 10: Pursue project-specific initiatives to support other industry clusters as they are identified.	Longer Term	Significant
Branding and Pro-actively Marketing to Raise Awareness of Frederick County as a High-Quality Community in which to Live, Work, and Locate a Business	Action 11: Advance a brand and image marketing campaign focused on telling local residents, the region, and the nation of the emergence of Frederick County as an economically diverse, growing, and high-quality place to live, work, and locate a business.	Near Term	Modest
	Action 12: Pursue targeted marketing for key audiences in biosciences and computing and IT clusters.	Longer Term	Modest

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Section 1: Introduction

Defining Economic Development

Economic development is an important public purpose that both the public and private sectors have a shared interest in fostering. As a U.S. Economic Development Administration (EDA) report, *Economic Development: A Definition and Model for Investment*, explains:

> The ultimate result of economic development is greater prosperity and higher quality of life; however, these goals can only be realized through sustained innovation, activities that lower transaction costs through responsive regulation, better infrastructure and increased education and opportunities for more fruitful exchange. Only by appreciating the role of government as a vehicle for collective action can we ensure our economic future.[1]

Government plays a central role in fostering economic development, and in the United States, State and local governments play the preeminent role in the development and implementation of economic development policies. State and local governments invest in economic development in order to enhance the well-being of their community through efforts to promote job creation, job retention, tax base enhancements, and improvements in the local quality of life.

According to the International Economic Development Council (IEDC), "…there is no single strategy, policy, or program for achieving successful economic development. Communities differ in their geographic and political strengths and weaknesses. Each community, therefore, will have a unique set of challenges for economic development."[2] While there is no single, universally defined economic development strategy, economic development programs typically engage in a common set of economic development efforts, policies, and strategies, focusing on the following:

- ***Business recruitment***—or policies to attract new businesses into the jurisdiction;
- ***Business retention and expansion***—or policies to support and retain existing businesses;
- ***Entrepreneurship***—or policies to support the formation of local businesses; and
- ***Innovation***—or policies to foster innovation and the commercialization of locally generated intellectual capital/technologies through technology-based development strategies have emerged as a central element of State and local economic development strategies.

Frederick County, through its Office of Economic Development (OED), is currently engaged in each of these four core economic development policy areas.

In implementing economic development programs and strategies, ***cluster-based*** development strategies have emerged as the central element of State and local economic development efforts. Best practice in economic development recognizes that each region has a set of target industry sectors or "***industry clusters***" in which it can differentiate itself, thereby building comparative advantage within competitive regional, national, and global markets. By focusing economic development efforts on these target industries, where a region has or can establish a local comparative advantage, State and local economic development agencies can improve the efficiency of and return on investment in their efforts. Increasingly, emphasis is being placed on technology and innovation as drivers of 21st Century economic development. As the National Governors Association set out in advising States and regions across the nation on best practices for global competitiveness:

[1] https://eda.gov/files/tools/research-reports/investment-definition-model.pdf.
[2] https://www.iedconline.org/clientuploads/Downloads/IEDC_ED_Reference_Guide.pdf.

> Each state must exploit the unique advantages it has relative to other states and build on the strengths found in its local "clusters of innovation"—distinct groups of competing and cooperating companies, suppliers, service providers and research institutions.[3]

Frederick County has recognized this and designated four industry clusters—advanced technology, agriculture, biosciences, and manufacturing, for targeted growth and commissioned this study to refine and broaden the designated target industry clusters based on the size, structure, and performance of the County's economy and competitive position with the larger regional, State, national, and international economies.

Frederick County has considerable economic development assets but is facing challenges. Frederick County has the assets needed to promote knowledge-based and innovation-driven economic development, notably with a diversified and growing economy, expanding population base, high-quality workforce, strong business climate and quality of life, and key innovation drivers found among federal laboratories housed at Fort Detrick. Still challenges remain. Post-recession employment growth in some key industries—most importantly in high-quality job industries of computing, data and internet; finance and insurance; and professional, engineering, scientific, and technical services—have lagged the United States, Maryland, and the region over the course of the national recovery. Wage growth at the County level has also lagged the United States, Maryland, and both the Baltimore and Washington DC regions.

Frederick County is the midst of an economic development transition. In the past, the County has benefited from its competitive position within the large, growing, and successful Washington DC metropolitan area economy. By capitalizing on the winning combination of high quality of life, low cost of living, low business and residential real estate costs, and access to a high-quality pool of talent, the County experienced nearly two decades of relatively strong and stable population and employment growth. Moving forward, economic development efforts can no longer rely on these same factors to support continued growth for two reasons. First, the County is in many ways a victim of its own success, with County cost advantages eroding with continued population and economic development success. Second, across the nation, cities are experiencing a re-urbanization of both population and jobs. This trend has been shaped by a change in real estate preferences that is altering where people want to live and work. Increasingly, younger workers and innovative companies have begun to favor urban areas. As a result, Frederick County will need to increasingly promote economic development that is focused on building on its own strong existing base of business drivers and innovation assets over competing as a lower-cost/high-quality location within the successful Washington DC region while continuing its success in placemaking to support development**.**

Frederick County is well positioned to make this transition. The County has a diverse and growing business base, and the JFI-TEConomy Team has identified six core industry clusters that are expected to drive future economic growth. The County possesses a host of economic development assets including a high-quality local talent pool, strong infrastructure, available/affordable real estate, and regionally competitive tax rates. Frederick County is also home to key innovation drivers including defense installations and national labs at Fort Detrick that are focused on life sciences and generating the next wave of new innovations. Plus, the County is investing in the second location of the Frederick Innovative Technology Center, Inc. (FITCI) to support the development of the new knowledge-based economy at ROOT, the County's downtown innovation hub. The Frederick County OED has invested in the development of this strategy to guide this transition.

[3] National Governors Association, "A Governor's Guide to Trade and Global Competitiveness," 2002.

Background and Report Purpose

The Frederick County OED commissioned the team of the Jacob France Institute and TEConomy Partners to prepare this Economic Development Strategy for Frederick County, Maryland. This Team combines the capacities of the Jacob France Institute, one of Maryland's oldest and most respected university-based research institutions, with TEConomy Partners, one of the nation's leading providers of technology- and cluster-based economic development planning. Throughout the preparation of this report, the JFI-TEConomy Team drew on the local knowledge and expertise of the OED staff and core County businesses. The report is organized into the following sections:

- Section 2 sets the overall socioeconomic and innovation asset context for the analysis;
- Section 3 describes the six core industry clusters driving the County economy; and
- Section 4 presents the strategies and actions for the County to take to promote economic development.

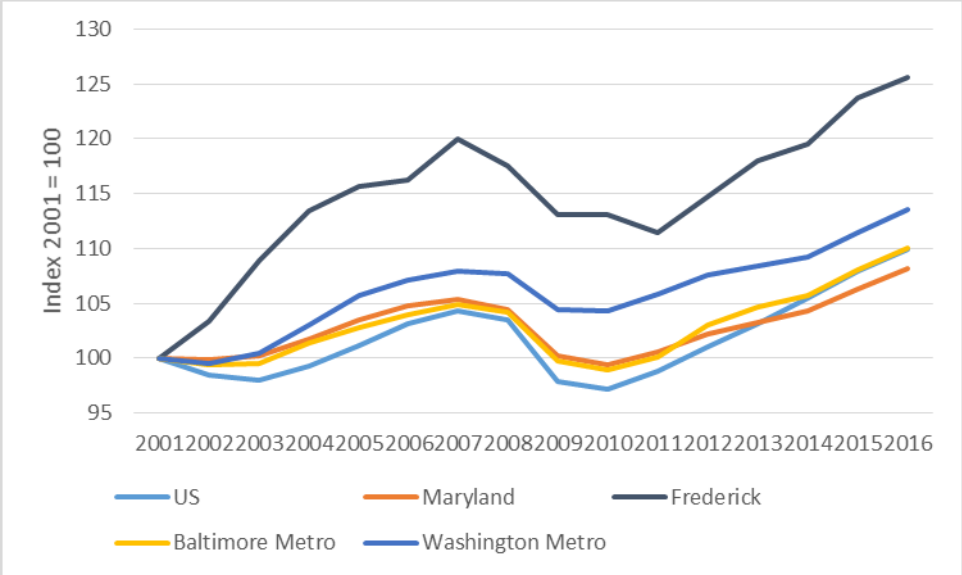
Section 2: Setting the Economic Context

This section sets the overall economic context for the Frederick County Economic Development Strategy by assessing the performance of the County relative to Maryland; to the two larger economic regions—the Washington DC metropolitan area (of which Frederick County is a part) and the neighboring Baltimore metropolitan area—whose performance impacts the County; as well as to selected peer jurisdictions. The JFI-TEConomy Team analyzed the performance of Frederick County in five areas of socioeconomic performance: (1) the overall performance of the County's economy; (2) population and demographic dynamics; (3) workforce dynamics; (4) broad business climate and quality of life issues; and (5) innovation dynamics. The Team also describes the importance of placemaking in economic development and provides an overview of County activities in this area. These areas represent the key economic strengths and assets on which the County will build its economic development strategy.

Economic Context

Frederick County has experienced strong long-term economic growth. While key industry cluster trends and performance are analyzed in more detail in Section 3, in assessing the County's current economic situation it is first important to analyze the County's overall economic performance as compared to the larger State and regional economies in which it operates. In terms of long-term private sector employment growth (since 2001), Frederick County has outperformed the nation, the State of Maryland, and both the Baltimore and Washington metropolitan areas. While the County was more significantly impacted by the Great Recession, losing more jobs than comparison regions, it has fully recovered and has far surpassed pre-recession employment levels (Figure 1).

Figure 1: Private Sector Employment Growth of Frederick County and Comparison Regions



To establish the economic context for the County's economic development strategy, it is also important to analyze the performance of the broad industry sectors[4] that make up the County's economy. The JFI-

[4] The JFI-TEConomy Team analyzed employment for the County and comparison regions in terms of broad industries at the two-digit North American Industry Classification System (NAICS) level that classifies economic activities into related groupings of industries based on similar production-oriented or supply-related relationships.

TEConomy Team analyzed the overall structure and post-recession employment growth performance of the County's economy. The composition of the County's economy was assessed using location quotients (LQs)—which compare the concentration of employment in an industry to the national average.[5] LQs are used to measure the level of specialization in a particular economy with high LQs, generally a threshold of 1.2, indicating the potential presence of a comparative advantage and the existence of a core industry cluster in that sector. At the broad industry level, the Frederick County economy is comparable to the comparison regions in terms of industry specialization with a high degree of specialization in the professional and technical services sector that drives the Maryland and the Baltimore and Washington metro area economies. The County has a high degree of specialization in the construction sector and is also specialized in the finance and insurance sector; but, unlike the State and regional economies, the County is not specialized in educational services (Table 1).

Table 1: Regional Private Sector Employment Specialization, 2016

Industry	Maryland	Frederick	Baltimore Metro	Washington Metro
Agriculture, forestry, fishing and hunting	0.23	**0.56**	0.15	0.10
Mining, quarrying, and oil and gas extraction	0.11	**0.07**	0.05	0.08
Utilities	1.00	**0.17**	1.08	0.68
Construction	1.35	**2.04**	1.23	1.14
Manufacturing	0.47	**0.60**	0.48	0.22
Retail trade	1.03	**1.17**	0.97	0.88
Transportation and warehousing	0.88	**0.45**	1.04	0.57
Wholesale trade	0.82	**0.69**	0.88	0.46
Information	0.76	**0.55**	0.62	1.29
Finance and insurance	0.91	**1.26**	0.96	0.79
Real estate and rental and leasing	1.19	**0.62**	1.14	1.22
Professional and technical services	1.57	**1.43**	1.41	2.67
Management of companies and enterprises	0.65	**0.43**	0.64	0.84
Administrative and waste services	1.06	**0.83**	1.09	1.05
Educational services	1.31	**1.12**	1.71	1.61
Health care and social assistance	1.07	**0.91**	1.17	0.81
Arts, entertainment, and recreation	1.14	**1.09**	1.24	0.99
Accommodation and food services	0.96	**1.08**	0.91	1.03
Other services, except public administration	1.16	**1.22**	1.07	1.94

= Specialized Industry in Frederick County

Source: IMPLAN Quarterly Census of Employment and Wages (QCEW) from the U.S. Bureau of Labor Statistics (BLS).

Overall, Maryland and the Baltimore and Washington metro areas have lagged the nation in terms of the overall recovery from the Great Recession, with Frederick County outpacing the State and both regions, but lagging the United States in terms of post-recession job growth (Table 2). At the industry level, Frederick

[5] According to the U.S. Bureau of Labor Statistics, Location Quotients (LQs) are ratios that allow an area's distribution of employment by industry to be compared with a reference or base area's distribution (in this analysis, they were compared with the national average). If an LQ is equal to 1, then the industry has the same share of its area employment as it does in the reference area. An LQ greater than 1 indicates an industry with a greater share of the local area employment than is the case in the reference area and an LQ lower than 1 indicated a lower share. LQs are used to measure the concentration of employment in a particular economy with high LQs (generally a threshold of 1.2 is used) indicating the potential presence of a comparative advantage and the existence of a core industry cluster in that sector.

County has generally tracked the State and comparison regions, with growth in the management of companies and enterprises (business headquarters and office-related operations), construction and wholesale sectors standing out as high-growth industries. Frederick County also experienced growth in manufacturing employment, which continued to decline at the State and regional levels despite the national recovery. However, employment in the finance and insurance and professional and technical services sectors, both of which are specialized in the County, has not yet recovered to pre-recession levels.

Table 2: Regional Private Sector Employment Growth, by Industry, 2009–2016

Industry	U.S.	Maryland	**Frederick**	Baltimore Metro	Washington Metro
Total	12%	8%	**11%**	10%	9%
Agriculture, forestry, fishing and hunting	10%	7%	**9%**	13%	(12%)
Mining, quarrying, and oil and gas extraction	(4%)	(22%)	**(26%)**	15%	(18%)
Utilities	(1%)	(3%)	**2%**	(5%)	(6%)
Construction	12%	5%	**24%**	8%	5%
Manufacturing	4%	(13%)	**3%**	(16%)	(9%)
Retail trade	9%	5%	**16%**	4%	9%
Transportation and warehousing	20%	22%	**1%**	32%	6%
Wholesale trade	5%	(2%)	**18%**	2%	(5%)
Information	(0%)	(18%)	**(23%)**	(23%)	(14%)
Finance and insurance	4%	(4%)	**(27%)**	0%	0%
Real estate and rental and leasing	8%	5%	**24%**	11%	2%
Professional and technical services	18%	10%	**(11%)**	16%	6%
Management of companies and enterprises	20%	28%	**136%**	76%	(3%)
Administrative and waste services	25%	22%	**28%**	33%	14%
Educational services	14%	8%	**2%**	6%	17%
Health care and social assistance	19%	13%	**24%**	12%	19%
Arts, entertainment, and recreation	16%	29%	**72%**	39%	18%
Accommodation and food services	20%	16%	**25%**	16%	23%
Other services, except public administration	0%	3%	**20%**	6%	10%

= Specialized Industry in Frederick County

Source: IMPLAN QCEW.

Overall, in terms of long-term and post-recession employment growth, Frederick County is outperforming both the State of Maryland and the Baltimore and Washington DC metropolitan areas. The composition of the County's economy is comparable to the State and comparison regions, with a higher concentration of construction jobs, specialization in the finance and insurance sector, and higher than national level of specialization in the professional and technical services sector. Two industries that will be described in more detail in Section 3 are also worthy of discussion here. While Frederick County and the comparison regions are not specialized in the *manufacturing* or *wholesale trade* sectors, the County has experienced stronger than regional growth in both and stronger than national growth in the expanding wholesale trade sector. Frederick County has the potential to continue to serve as a regional center for both wholesale trade/distribution and manufacturing, and both are presented as options for targeted industry development in Section 3.

Population Dynamics

Frederick County has experienced strong population growth. It is easier to promote economic development in a vibrant and growing community that is gaining population. Furthermore, in today's tight labor market, population growth is generally indicative of an expanding labor supply. Since 2010, population growth in Frederick County has exceeded growth in the State and Baltimore metro area, but lagged the Washington DC metro area (Figure 2). When compared with peer jurisdictions, Frederick County was in the middle range of counties, lagging Loudoun County, Virginia, and Howard and Montgomery Counties in Maryland (Table 3). In analyzing the growth of selected populations—millennials (25–34-year-olds) and older (65+) persons—two trends are evident; Frederick County is successful in attracting/retaining millennials (Figure 3) but is, along with the nation and region, also facing an aging population (Figure 4).

Figure 2: Frederick County and Regional Total Population Growth, 2010–2016

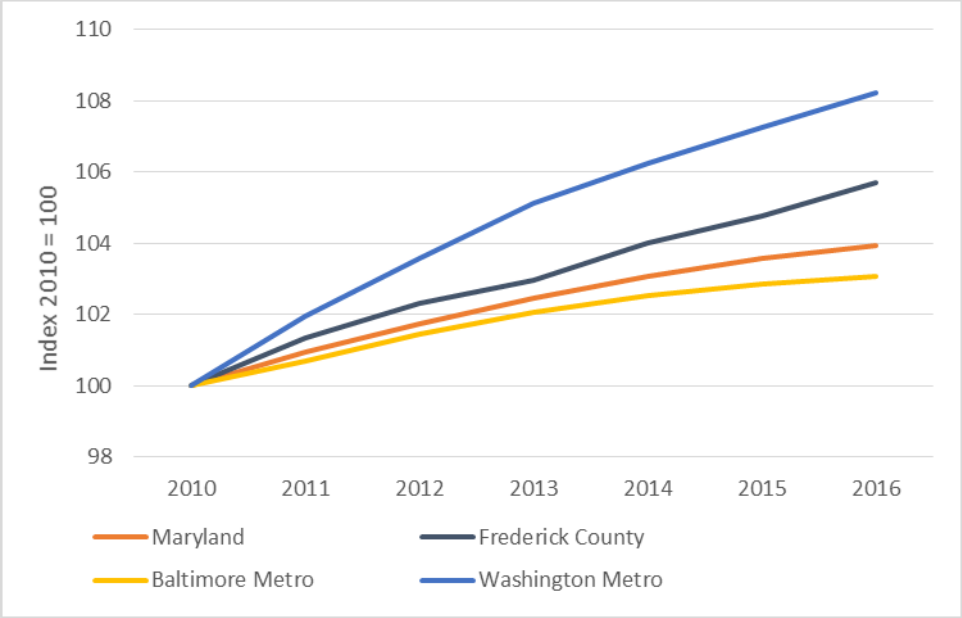


Table 3: Population Growth in Frederick County and Comparison Regions, 2010–2016

Jurisdiction	2010	2016	Change 2010–2016 #	Change 2010–2016 %
Maryland	5,788,584	6,016,447	227,863	3.9%
Baltimore-Columbia-Towson, MD Metro Area	2,715,705	2,798,886	83,181	3.1%
Washington-Arlington-Alexandria, DC-VA-MD-WV Metro Area	5,666,655	6,131,977	465,322	8.2%
Baltimore County, Maryland	806,241	831,026	24,785	3.1%
Carroll County, Maryland	167,210	167,656	446	0.3%
Frederick County, Maryland	234,202	247,591	13,389	5.7%
Harford County, Maryland	245,240	251,032	5,792	2.4%
Howard County, Maryland	288,674	317,233	28,559	9.9%
Montgomery County, Maryland	976,321	1,043,863	67,542	6.9%
Washington County, Maryland	147,735	150,292	2,557	1.7%
Loudoun County, Virginia	315,585	385,945	70,360	22.3%

Source: U.S. Census Bureau.

Figure 3: Frederick County and Regional Millennial Population Growth, 2010–2016

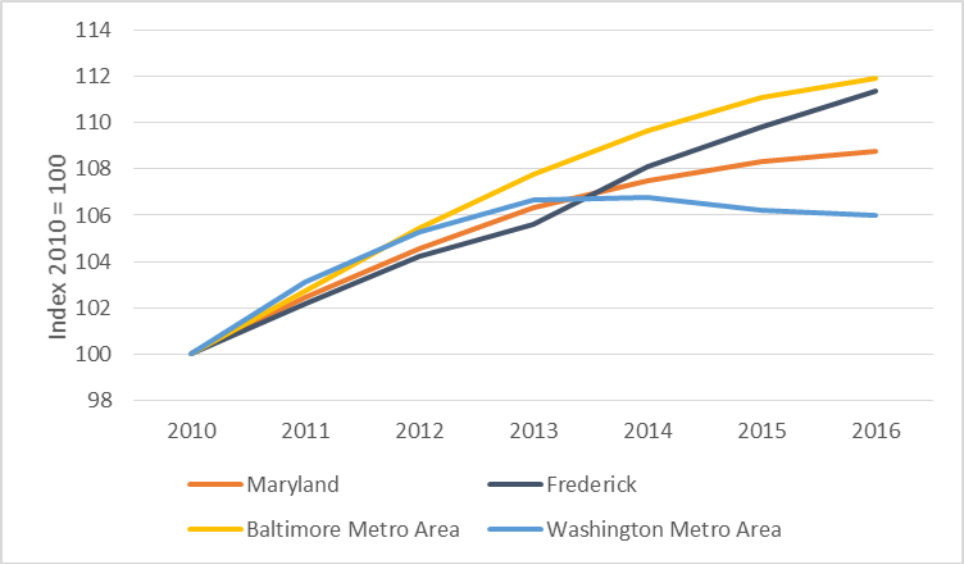
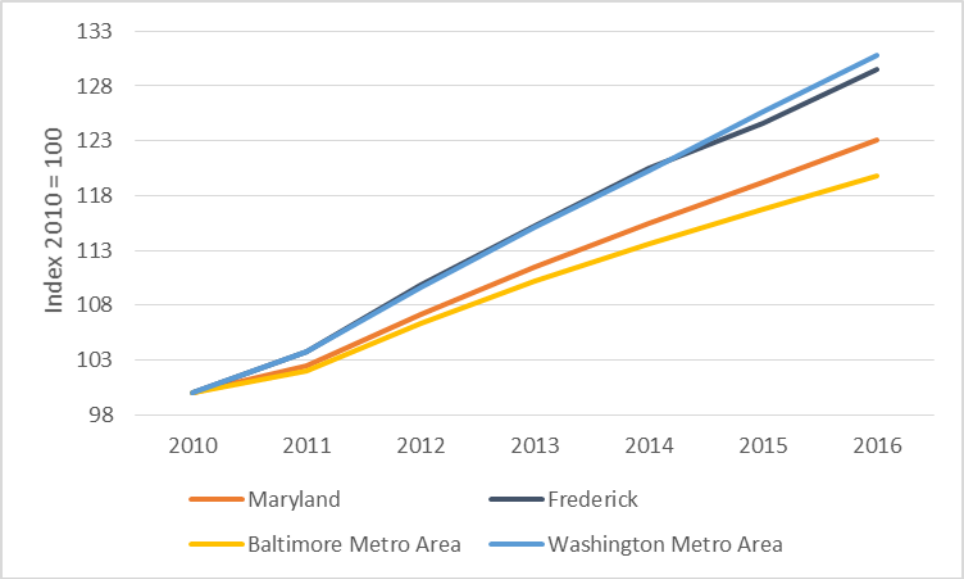


Figure 4: Frederick County and Regional Older (65+) Population Growth, 2010–2016



Frederick County is one of only three peer jurisdictions gaining population from domestic as well as international migration. Population growth has two components: natural increase (births less deaths) and net migration (in-migration less out-migration—with migration consisting of international and domestic migration). Frederick County, along with Loudoun and Howard Counties, is one of only three peer jurisdictions that benefitted from both domestic as well as international in-migration (Table 4).

Table 4: Components of Population Change in Frederick County and Comparison Regions, 2010–2016

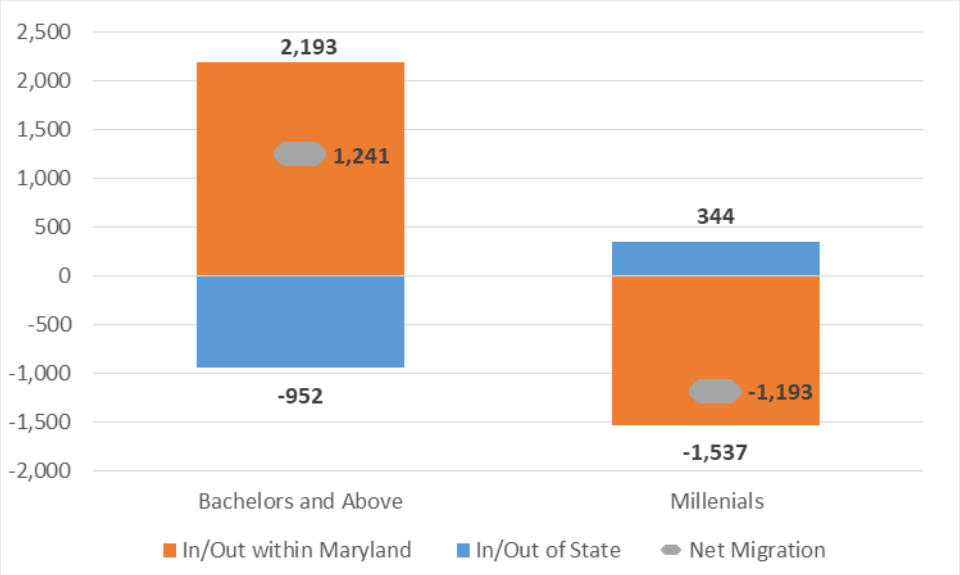
Jurisdiction	Net Change[1]	Natural Increase	Net Migration		
			Total	International	Domestic
Maryland	242,661	170,287	77,875	161,392	-83,517
Baltimore-Columbia-Towson, MD Metro Area	88,303	63,167	28,008	54,506	-26,498
Washington-Arlington-Alexandria, DC-VA-MD-WV Metro Area	495,561	297,395	199,276	245,540	-46,264
Baltimore County, Maryland	26,115	11,798	15,070	20,849	-5,779
Carroll County, Maryland	518	848	-598	480	-1,078
Frederick County, Maryland	14,209	7,115	7,118	4,788	2,330
Harford County, Maryland	6,204	4,571	1,710	2,242	-532
Howard County, Maryland	30,104	11,936	18,470	9,772	8,698
Montgomery County, Maryland	71,911	45,408	27,683	57,574	-29,891
Washington County, Maryland	2,862	1,554	1,161	1,607	-446
Loudoun County, Virginia	73,609	24,285	48,399	14,439	33,960

(1) Net change does not sum to Natural Increase plus Total Migration due to residual values.

Source: U.S. Census Bureau.

Looking at net migration[6] by source for two core target populations—people with a bachelor's degree and above and millennials—Frederick County has a net in-migration of educated workers, with net in-migration from within Maryland exceeding out-migration to other States; but, it is experiencing a net out-migration of millennials, attracting millennials from out of State, but experiencing a net out-migration within Maryland (Figure 5). While the County has experienced overall growth in its millennial population (Figure 3), this growth is a result of local population growth, with the net out-migration of millennials reinforcing the need for a continued emphasis on placemaking in the County's economic development strategy.

Figure 5: Frederick County Net Migration, Bachelor's Degree and above and Millennials, 2010–2016



[6] In- and out-of-State only—U.S. Census Bureau American Community Survey (ACS) data do not include foreign net migration data.

Based on migration data from the Internal Revenue Service (IRS), Frederick County is gaining population from in-state migration which is offsetting losses from out-migration to other States. Residents moving to the County from Montgomery County compose the largest source of in-state migrants. One key migration-related issue is that, for most of the past five years, the average income of in-migrants is below that of out-migrants (Table 5).

Table 5: Frederick County Migration Trends, by Year, 2009–2016

Item	2009–10	2010–11	2011–12	2012–13	2013–14	2014–15	2015–16
Total In-Migration (Returns)	6,038	5,842	6,188	6,513	6,625	4,694	6,842
In-State	3,304	3,003	3,262	3,356	3,392	2,524	3,839
Other State and Foreign	2,734	2,839	2,926	3,157	3,233	2,170	3,003
Average Income	$53,550	$56,024	$55,646	$60,420	$63,417	$57,445	$64,231
Total Out-Migration (Returns)	5,591	5,562	6,118	6,420	6,315	4,796	6,611
In-State	2,638	2,534	2,709	2,767	2,689	2,129	2,886
Other State and Foreign	2,953	3,028	3,409	3,653	3,626	2,667	3,725
Average Income	$50,640	$51,568	$67,704	$63,354	$65,139	$57,357	$67,375
Net In-Migration	447	280	70	93	310	(102)	231
In-State	666	469	553	589	703	395	953
Other State and Foreign	(219)	(189)	(483)	(496)	(393)	(497)	(722)
Income Difference	$2,909	$4,456	($12,058)	($2,934)	($1,722)	$88	($3,144)

Source: IRS Statistics of Income.

Workforce Dynamics

The availability and cost of labor are key factors impacting the economic development process. According to *Area Development Magazine's* 2016 "31st Annual Survey of Corporate Executives,"

> For companies considering a new location, labor is of great concern. Skilled labor availability (#2 with 89.8 percent) and labor costs (#3 with 89.6 percent) have become key site selection factors. The labor market has tightened significantly, which is causing wage rate pressures (wages are projected to increase 3 percent this year according to a 2016 Society for Human Resource Managers' survey). Many human resource managers are saying available positions for skilled workers seem to be more plentiful than qualified applicants.
>
> Because the labor market has a limited qualified labor pool, companies, economic development organizations, and community colleges are working "hand in hand" to develop a pipeline of local workers. This is especially true for manufacturing companies that have to demonstrate to high school students, parents, and guidance counselors that new manufacturing jobs have better pay and require more advanced technical training than ever.[7]

As a result, understanding Frederick County's workforce dynamics in the form of the composition and costs of the County's workforce is of critical importance to informing the County's economic development strategic plan.

[7] http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2017/highway-access-labor-skills-costs-remain-primary-concern.shtml.

Labor Force Participation and Unemployment

Frederick County has a high labor force participation rate, 70.7 percent, higher than the United States, Maryland, and Baltimore metro area rates and on par with the Washington DC metro rate (Figure 6). The County's unemployment rate has been consistently below the United States, Maryland, and both comparison regions (Figure 7). While high labor force participation and low unemployment are indicators of economic strength, they may also indicate an impending shortage of workers as the national and regional expansion continues. As a result, efforts to expand labor market supply through training, especially through the upskilling of local workers, may be needed in the County.

Figure 6: Frederick County and Regional Labor Force Participation, 2016

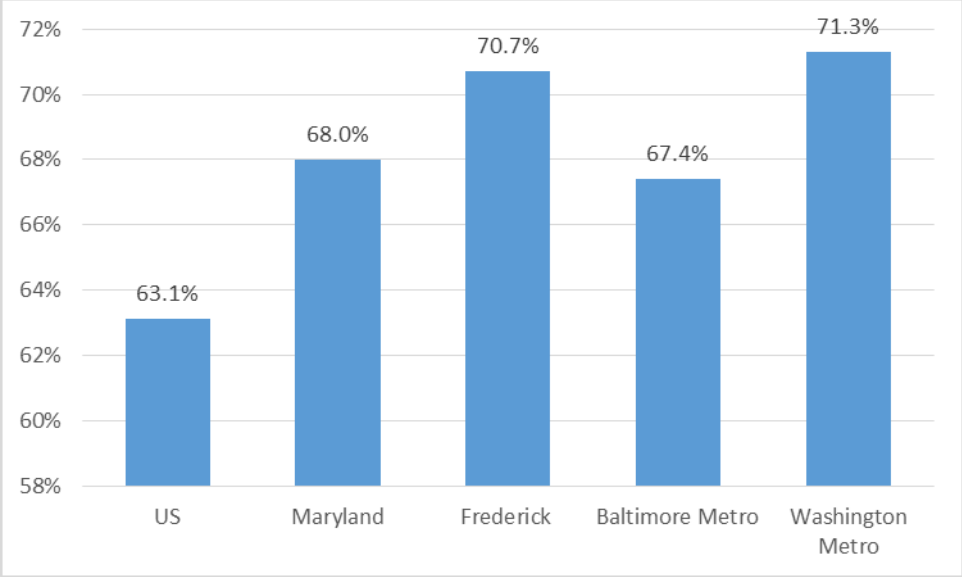
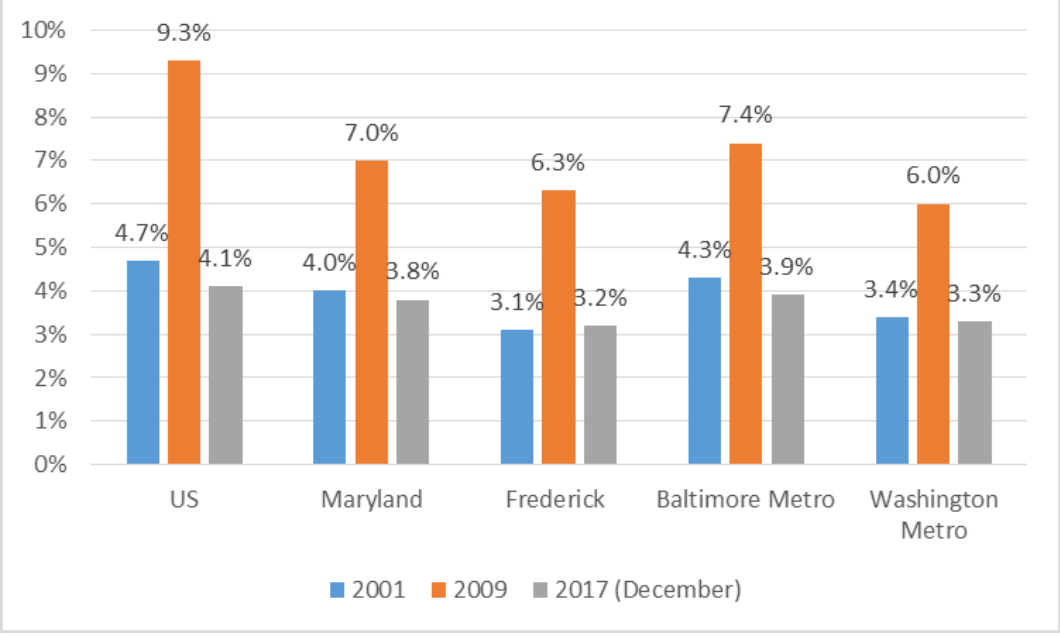


Figure 7: Frederick County and Regional Unemployment Rates, 2001, 2009, and 2017



Workforce Educational Attainment and Occupation

It is difficult to measure the quality of any region's workforce. Two indicators of workforce quality are the educational attainment and occupation of the workforce residing in County. By both measures, Frederick County offers access to a significant pool of qualified talent/workers. Forty-one percent of County resident workers have a bachelor's degree or above, well above the national rate of 31 percent, slightly above the rates of both Maryland and the Baltimore metro area, but lower than the 50 percent rate in the Washington DC metro area (Figure 8). Forty-seven percent of County resident workers are employed in the "creative class" management, business, science, and arts occupations, again well above the national rate (38 percent), slightly above Maryland and Baltimore metro rates, but below the 52 percent rate in the Washington DC metro area (Figure 9). Based on the interviews conducted, the lack of a public four-year university in the County was not found to be a barrier to attracting educated and skilled workers. Based on employer interviews, the County is able to draw from the strong State and regional higher education systems and is well served by Frederick Community College (FCC) and the two private four-year colleges, Hood College and Mount Saint Mary's University (MSM), in the County.

Figure 8: Frederick County and Regional Educational Attainment, 2016

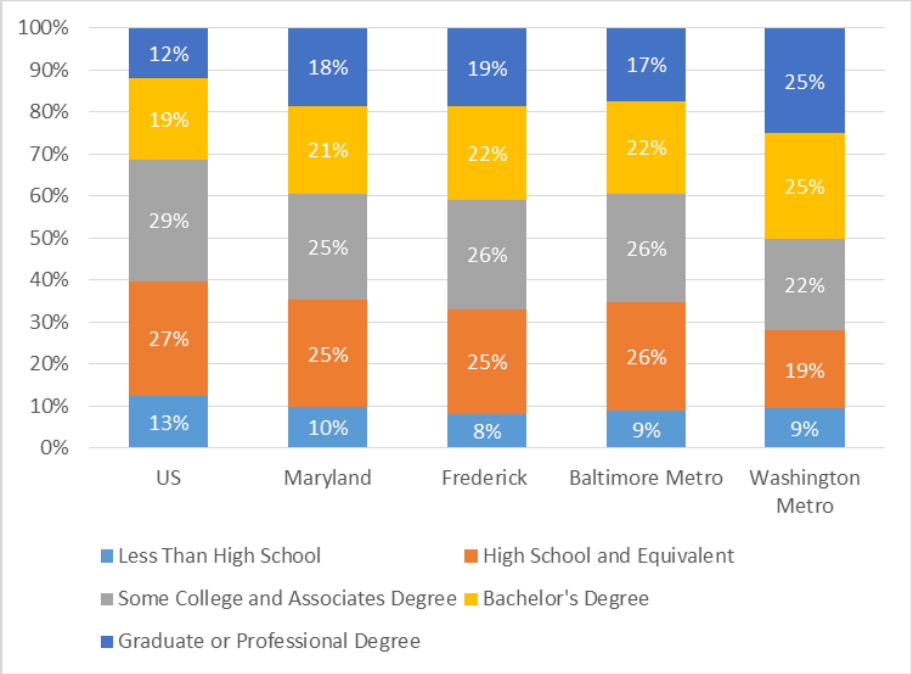
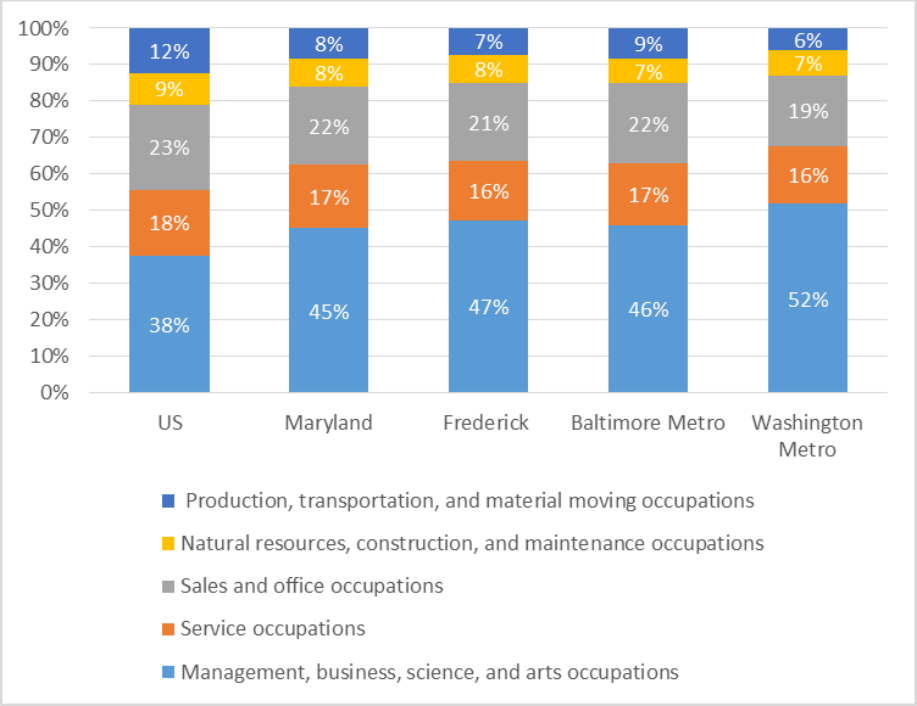


Figure 9: Frederick County and Regional Employment, by Occupation, 2016



Industry and Occupational Wages

In addition to the supply of labor, businesses also consider the cost of labor in making location decisions. As a result, it is important to analyze Frederick County's labor costs in the context of the broader region in which it competes. At the industry level (Table 6), Frederick County's wages are generally lower or competitive as compared with the United States, Maryland, and both the Baltimore and Washington DC metro areas, making the County attractive to businesses located in or considering locating in the broader region; however, lower than regional industry pay rates was identified as a barrier to attracting the required talent, especially in manufacturing. At the occupational level, patterns of occupational wages are interesting (Table 7). Despite having lower or competitive wages at the industry level; Frederick County's occupational wages for more skilled occupations are closer to or even above national, State, and Baltimore metro area wages and comparable to, and sometimes even higher than, occupational wages for the Washington DC metro area, while occupational wages for lower skilled occupations tend to be competitive or lower. This indicates that Frederick County must compete with higher wage areas nationally and even internationally in attracting and retaining higher skilled talent, despite its lower cost of living (see below). This finding indicates the continued importance of placemaking—or building/maintaining attractive and desirable quality-of-life characteristics—in the County's economic development strategy. The rates of wage growth exhibit one area of concern. According to U.S. Bureau of Economic Analysis (BEA) data, Frederick County has exceeded the national wage growth rate but lagged the State and comparison regions in the long term (2001–2015) and lagged the United States, Maryland, and comparison regions in post-recession wage growth.[8]

[8] JFI-TEConomy analysis of BEA wage data.

Table 6: Frederick County and Regional Private Sector Wages, by Industry, 2016

Industry	U.S.	Maryland	**Frederick**	Baltimore Metro	Washington Metro
Total	$53,507	$55,751	**$47,409**	$55,715	$68,902
Agriculture, forestry, fishing and hunting	$33,309	$35,006	**$34,478**	$37,224	$33,525
Mining, quarrying, and oil and gas extraction	$102,900	$67,101	**$56,365**	$70,213	$73,710
Utilities	$102,871	$119,482	**$95,998**	$133,251	$108,740
Construction	$58,643	$62,500	**$57,590**	$61,489	$64,049
Manufacturing	$64,860	$73,846	**$60,029**	$75,155	$80,690
Retail trade	$30,297	$30,780	**$31,514**	$30,401	$32,771
Transportation and warehousing	$50,443	$51,567	**$44,103**	$55,131	$53,229
Wholesale trade	$73,707	$77,476	**$59,909**	$73,663	$92,835
Information	$98,475	$87,158	**$73,192**	$80,524	$119,812
Finance and insurance	$101,180	$101,517	**$78,018**	$105,908	$119,492
Real estate and rental and leasing	$54,959	$61,754	**$60,657**	$59,369	$73,830
Professional and technical services	$90,950	$94,111	**$79,883**	$92,389	$114,932
Management of companies and enterprises	$115,102	$109,342	**$96,475**	$97,805	$148,789
Administrative and waste services	$38,001	$41,371	**$36,682**	$39,460	$48,374
Educational services	$48,762	$55,032	**$32,745**	$60,505	$52,525
Health care and social assistance	$47,955	$51,659	**$44,979**	$52,744	$54,599
Arts, entertainment, and recreation	$36,727	$32,508	**$16,960**	$39,873	$37,021
Accommodation and food services	$20,028	$20,409	**$18,326**	$19,999	$24,597
Other services, except public administration	$35,923	$40,319	**$37,003**	$38,479	$65,586

Source: IMPLAN QCEW.

Table 7: Frederick County and Regional Wages, by Occupation, 2016

Item	U.S.	Maryland	**Frederick**	Baltimore Metro	Washington Metro
Total	$49,630	$56,120	**$52,253**	$54,920	$68,880
Management Occupations	$118,020	$125,940	**$118,085**	$124,450	$143,840
Business and Financial Operations Occupations	$75,070	$80,050	**$76,583**	$76,520	$92,780
Computer and Mathematical Occupations	$87,880	$96,800	**$103,363**	$95,640	$104,750
Architecture and Engineering Occupations	$84,300	$94,330	**$104,226**	$88,810	$101,580
Life, Physical, and Social Science Occupations	$72,930	$87,780	**$90,907**	$77,340	$101,450
Community and Social Service Occupations	$47,200	$50,170	**$51,042**	$48,390	$57,810
Legal Occupations	$105,980	$88,330	**$98,175**	$82,170	$144,610
Education, Training, and Library Occupations	$54,520	$63,440	**$53,151**	$65,770	$64,560
Arts, Design, Entertainment, Sports, and Media Occupations	$58,390	$59,460	**$58,464**	$56,300	$77,930
Healthcare Practitioners and Technical Occupations	$79,160	$85,430	**$90,003**	$80,770	$90,040
Healthcare Support Occupations	$30,470	$32,710	**$33,466**	$32,860	$33,660
Protective Service Occupations	$45,810	$48,800	**$49,118**	$45,790	$56,930
Food Preparation and Serving Related Occupations	$23,850	$24,650	**$24,073**	$24,270	$26,780
Building and Grounds Cleaning and Maintenance Occupations	$28,010	$28,520	**$28,610**	$28,580	$30,110
Personal Care and Service Occupations	$26,510	$28,950	**$30,946**	$28,380	$31,080
Sales and Related Occupations	$40,560	$40,950	**$37,896**	$41,570	$44,780
Office and Administrative Support Occupations	$37,260	$39,810	**$38,825**	$39,630	$44,400
Farming, Fishing, and Forestry Occupations	$27,810	$34,670	**$35,277**	$36,900	$37,790
Construction and Extraction Occupations	$48,900	$48,520	**$44,817**	$48,500	$50,100
Installation, Maintenance, and Repair Occupations	$46,690	$50,230	**$48,516**	$49,480	$53,880
Production Occupations	$37,190	$38,980	**$41,952**	$38,680	$41,360
Transportation and Material Moving Occupations	$36,070	$38,560	**$34,655**	$39,520	$41,720

Source: BLS and Maryland Department of Labor, Licensing and Regulation (DLLR).

Commuting

While Frederick County has a large share, 60 percent, of its employed residents working in-County, 40 percent of its workforce commutes out of the County (Table 8). Based on an analysis of 2015 Longitudinal Employer-Household Dynamics (LEHD) data, Frederick County sends a large number of workers, generally to the larger Washington DC metro area to the south and the Baltimore metro area to the east, while attracting workers from western Maryland and Pennsylvania. These out-commuters are a potential source of talent to support local economic development.

Table 8: Number of In-County, Out-of-County, and Out-of-State Workers and Number and Percentage of Out-Commuters, by County, 2016

County	Total Workers	Worked In-County	Worked in Other Maryland County	Worked Out-of-State	# of Out-Commuters	% of Out-Commuters
Baltimore County	417,308	209,475	195,805	12,028	207,833	50%
Carroll County	85,994	39,293	42,345	4,356	46,701	54%
Frederick County	**131,298**	**78,736**	**39,839**	**12,723**	**52,562**	**40%**
Harford County	126,879	74,645	47,844	4,390	52,234	41%
Howard County	172,520	73,462	85,570	13,488	99,058	57%
Montgomery County	552,762	339,861	55,452	157,449	212,901	39%
Washington County	65,882	41,564	15,382	8,936	24,318	37%
Loudoun County, VA	209,293	104,695	81,363	23,235	104,598	50%

Source: U.S. Census Bureau ACS.

Using U.S. Census Bureau ACS Public Use Microdata Sample (PUMS) data, the JFI-TEConomy Team analyzed the demographic, economic, and occupational characteristics of the following: Frederick County residents who work in-County, out-commuting County residents, and in-commuters to the County from other jurisdictions. The core findings of this analysis (Tables 9a and 9b) are as follows:

- Frederick County resident out-commuters have higher educational attainment, with 51 percent having a bachelor's degree or above, than the in-County employed resident workforce (43 percent) and in-commuters (36 percent);
- Frederick County resident out-commuters have higher earnings, $74,877, than either the in-County employed resident workforce ($49,527) and in-commuters ($60,655);
- While a large number of County residents (11,932 resident workers) are employed by the federal government, more than two-thirds commute to jobs outside of the County;
- The share of resident workers employed in-County and out-commuters employed in the critical professional, scientific, and management, and administrative and waste management services are roughly comparable, indicating the strength of the County in this industry;
- The County imports between 35 and 44 percent of workers in the manufacturing, wholesale, and transportation and warehousing sectors, indicating the importance of in-commuting to these sectors; and
- Frederick County resident out-commuters are much more likely to be employed in high-wage/high-skill management, business, and financial occupations and computer, engineering and science occupations (40 percent) than are in-County employed resident workforce (23 percent). Interestingly, in-Commuters are also highly concentrated in these occupations (24 percent).

The implications of these findings are that County out-commuters are potentially a vital workforce resource to support the promotion of the key business clusters analyzed in Section 3 of this report. Marketing this workforce asset to the County's existing business base as well as to prospective companies interested in the County should

be considered as part of this strategy. Furthermore, developing **"*work where you live*"** outreach strategies as part of the County's workforce strategy is also a viable option for the County's economic development strategy. Because most County federal workers commute to jobs outside of the County, attracting federal satellite or telecommuting centers may also be a viable option for local job creation. Interestingly, despite the limited public transit options for commuting outside of the County, more out-commuters appear to use public transit (4 percent) than in-County resident workers (1 percent), supporting the need for expanded public connections, both within the County and to employment centers to the south (Table 9a). Because of the high share of in-commuters employed in the manufacturing and transportation/logistics sectors, regional workforce cooperation may be important for strategies targeting these industries (Table 9b).

Table 9a: Demographic, Socioeconomic, and Occupational Characteristics of Frederick County's Resident Workforce, Out-Commuters, and In-Commuters, 2016

Live/Work Relationship	Live/Work in Frederick	% of Total	Out-Commuters	% of Total	In-Commuters	% of Total
Total	78,994		53,613		34,670	
Demographics						
White alone	64,134	81%	44,143	82%	27,599	80%
Black or African American alone	7,522	10%	4,914	9%	2,288	7%
Hispanic	6,428	8%	2,812	5%	1,718	5%
Citizenship						
U.S. Citizen by Birth	65,535	83%	45,134	84%	28,905	83%
Naturalized Citizen	7,493	9%	5,330	10%	2,706	8%
Not a Citizen	5,966	8%	3,149	6%	3,059	9%
Average Wage and Salary Income	$49,527		$74,877		$60,655	
Educational Attainment (25+)	66,682		50,040		31,982	
Less Than High School	4,901	7%	806	2%	3,226	10%
High School Graduate	14,085	21%	9,043	18%	9,229	29%
Some College	13,810	21%	10,201	20%	4,974	16%
Associate Degree	4,977	7%	4,321	9%	3,018	9%
Bachelor's Degree	14,418	22%	14,969	30%	6,935	22%
Graduate or Professional Degree	14,491	22%	10,700	21%	4,600	14%
Class of Worker						
Private Company/Nonprofit Organization	57,278	73%	35,843	67%	28,104	81%
Local Government	6,135	8%	3,713	7%	1,765	5%
State Government	2,313	3%	2,027	4%	650	2%
Federal Government	3,929	5%	8,003	15%	1,469	4%
Self Employed	9,171	12%	4,027	8%	2,607	8%
Means of Transportation to Work						
Car, truck, or van	62,352	79%	50,692	95%	34,578	100%
Public transportation (excluding taxicab)	453	1%	2,377	4%	0	0%
Bicycle	342	0%	0	0%	0	0%
Walked	3,025	4%	233	0%	0	0%
Taxicab, motorcycle, or other means	2,801	4%	311	1%	92	0%
Worked at home	10,021	13%	0	0%	0	0%

Source: 2016 U.S. Census Bureau ACS PUMS Data.

Table 9b: Demographic, Socioeconomic, and Occupational Characteristics of Frederick County's Resident Workforce, Out-Commuters, and In-Commuters, 2016—continued

Live Work	Live/Work in Frederick	% of Total	Out-Commuters	% of Total	In-Commuters	% of Total
Industry						
Agriculture, forestry, fishing and hunting, and mining	698	1%	154	0%	299	1%
Construction	5,843	7%	4,566	9%	6,323	18%
Manufacturing	4,097	5%	3,271	6%	2,551	7%
Wholesale Trade	945	1%	1,311	2%	744	2%
Retail Trade	9,670	12%	3,101	6%	4,026	12%
Transportation and warehousing, and utilities	3,529	4%	1,801	3%	1,971	6%
Information	1,474	2%	1,586	3%	1,048	3%
Finance and insurance, and real estate and rental leasing	5,021	6%	3,441	6%	1,852	5%
Professional, scientific, and management, and administrative and waste management services	13,594	17%	9,974	19%	5,405	16%
Educational services, and health care and social assistance	17,990	23%	10,585	20%	4,998	14%
Arts, entertainment, and recreation, and accommodation, and food services	7,526	10%	2,920	5%	1,714	5%
Other services, except public administration	3,548	4%	2,821	5%	1,729	5%
Public administration	5,059	6%	8,082	15%	2,010	6%
Occupation						
Management, Business, and Financial Occupations	12,496	16%	13,871	26%	5,743	17%
Computer, Engineering and Science Occupations	5,546	7%	7,572	14%	2,656	8%
Education, Legal, Community Service, Arts, and Media Occupations	8,343	11%	5,781	11%	2,694	8%
Healthcare Practitioners and Technical Occupations	9,112	12%	6,275	12%	2,968	9%
Service Occupations	11,871	15%	3,285	6%	2,725	8%
Sales and Related Occupations	8,020	10%	3,783	7%	3,657	11%
Office and Administrative Support Occupations	9,950	13%	6,542	12%	4,078	12%
Farming, Fishing, and Forestry Occupations	782	1%	99	0%	34	0%
Construction and Extraction Occupations	3,807	5%	2,632	5%	5,377	16%
Installation, Maintenance, and Repair Occupations	1,844	2%	1,357	3%	993	3%
Production Occupations	2,280	3%	869	2%	1,246	4%
Transportation and Material Moving Occupations	4,304	5%	1,357	3%	2,311	7%
Military Specific Occupations	639	1%	190	0%	188	1%

Source: 2016 U.S. Census Bureau ACS PUMS Data.

Business Climate and Quality of Life

In addition to the general economic, population, and workforce factors considered above, Frederick County's economic development strategy will be influenced by both business climate and general quality-of-life conditions that impact the attractiveness of the County for both companies and talent/workers. Business location decisions are impacted by a variety of factors. According to *Area Development Magazine's* 2016 "31st Annual Survey of Corporate Executives," the top five factors considered by business range from highway accessibly, the #1 issue in 2016, to labor availability and costs (#2 and #3 discussed above), to occupancy costs (#4), and state and local incentives (#5). Other core factors include quality of life (#10), available buildings and land (#11 and #12), as well as factors ranging from financing to airports to port/waterway access. In addition to business climate factors, quality-of-life issues are important because, in today's tight labor market environment, the ability to attract and retain workers is becoming more critical. According to the *Area Development Magazine's* survey,

> Although "quality of life" slipped from the third spot in the 2015 Corporate Survey, this site selection factor still remains in the top 10 with a rating of 76.4 percent. Despite that drop, communities with good highway accessibility and top-notch talent will likely continue to emphasize their unique quality of life as a differentiator to both attract and retain employers and employees alike. "Quality of life" is a phrase that can refer to many different and often unique qualities of a local community. It could be a cluster of great restaurants all within walking distance, access to world-class museums and art galleries, or simply close proximity to parks, trails, streams, and other outdoor activities. Like the ability to draw in labor from greater distance, good highways and bridges allow residents access to nearby amenities and are factors that a community may use to demonstrate what makes them unique and drive future prosperity.[9]

Frederick County is well positioned in terms of business climate and quality-of-life factors. The JFI-TEConomy Team analyzed Frederick County's competitive position in a variety of business climate and quality-of-life conditions. Overall, Frederick County offers affordable office and industrial real estate costs, strong infrastructure, regionally competitive housing costs, and competitive cost of living, with strong cultural and rural amenities.

Business Climate Conditions

Frederick County is well positioned in terms of the business climate variables analyzed. In terms of transportation access (Table 10), Frederick County is well served by highways with 39.5 Interstate miles and 197.5 Interstate lane miles, in the middle range of the peer counties analyzed. Congestion on both core interstates (I-270 and I-70) is considered a barrier to development, with County resident workers having among the highest mean travel times to work, despite having a high (59.3 percent) share of workers employed in-County. Based on the business interviews conducted, access to mass transit in the County is considered a weakness. The County has only limited transit connections to employment centers to the south, where a large number of out-commuters work, with a limited in-County transit system. Only 2.7 percent of County commuters use mass transit, well below Montgomery County to the south and above only the more rural Carroll, Harford, and Washington counties. Expanding both in-County and southbound mass transit options was identified as a key development issue in the stakeholder interviews conducted.

[9] http://www.areadevelopment.com/Corporate-Consultants-Survey-Results/Q1-2017/highway-accessibility-tops-list-Charles-Ruby-Deloitte-Tax.shtml.

Table 10: Selected Transportation Statistics of Frederick County and Peer Jurisdictions

	Highway System		Commuting		
County	Interstate Miles	Interstate Lane Mileage	% Work in County of Residence	Mean Travel Time to Work (Minutes)	% Using Public Transit
Baltimore County	88.7	521.7	51.9%	28.7	4.3%
Carroll County	1.6	9.7	44.3%	35.5	1.0%
Frederick County	**39.5**	**197.5**	**59.3%**	**35.3**	**2.7%**
Harford County	18.4	116.5	57.1%	31.2	0.9%
Howard County	31.1	197.6	41.4%	30.5	3.7%
Montgomery County	41.5	318.7	60.2%	34.3	15.9%
Washington County	59.4	246.9	66.4%	29.5	0.9%
Loudoun County, VA	0.0	0.0	47.4%	34.5	4.4%

Source: Maryland Department of Transportation, Virginia Department of Transportation, U.S. Census Bureau ACS.

Office/Industrial real estate costs and availability are a competitive asset for the County. According to CoStar third quarter of 2017 data,[10] Frederick County has an existing inventory of 653 office buildings with a total of 8.5 million square feet of space. The County has over 800,000 square feet of office space available, with a vacancy rate of 9.5 percent and an average cost of $20.74 per square foot. The office vacancy rate has declined over the past several years, but the cost per square foot has declined as well. Frederick County has an existing inventory of 546 industrial buildings with a total of 19.2 million square feet of space. The County has over 1.1 million square feet of industrial space available, with a vacancy rate of 6.0 percent and an average cost of $7.78 per square foot. The industrial space vacancy rate has declined over the past several years, with the cost per square foot remaining stable. Frederick County office vacancy rate and cost per square foot are lower than both the Washington DC and Baltimore metro area averages; the County has a lower industrial space vacancy rate than both comparison regions, with industrial space cost lower than in the DC market, but higher than the Baltimore market (Figures 10a and 10b).

Figure 10a: Office and Industrial Vacancy Rate, 2017:Q3

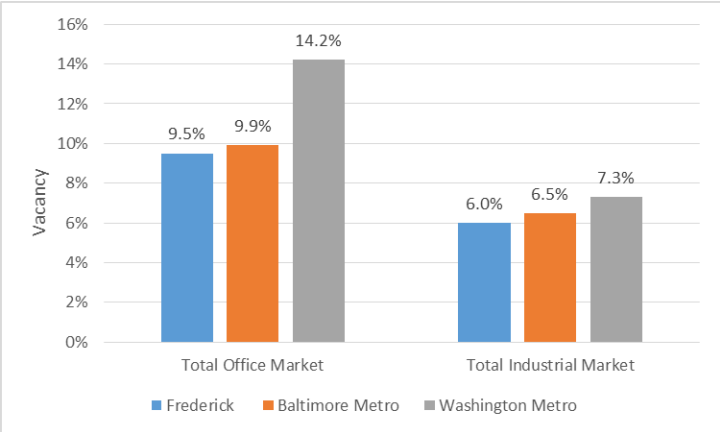
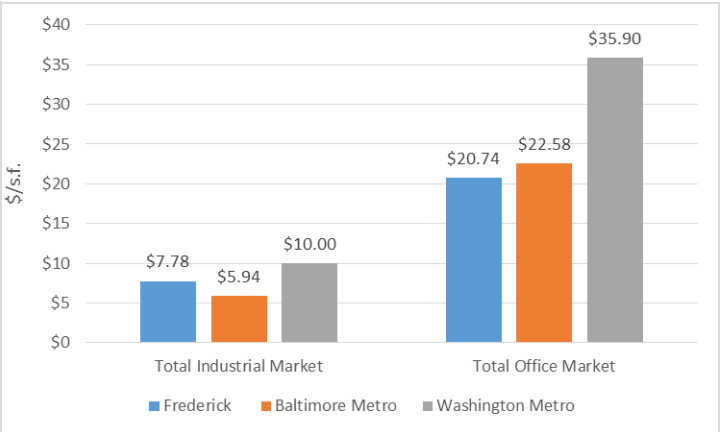


Figure 10b: Office and Industrial $/sq. ft., 2017:Q3



While real estate costs and availability in Frederick County appear to be an asset within the comparison Baltimore and Washington DC metro areas, some areas of concern were identified in the stakeholder

[10] The Maryland Department of Commerce provided the CoStar Office Statistics and CoStar Industrial Statistics reports for the Washington DC and Baltimore markets.

interviews. Industry interviews raised concerns about the quality of the space for Information Technology (IT) users. Much of the County's office inventory is in suburban office parks, while many innovation companies are seeking a live-work-play environment in or near downtown locations. Of the available buildings in or near downtown locations, a number of technology industry executives were concerned that the space did not meet the needs of advanced companies in terms of size or structure and broadband access. Furthermore, the JFI-TEConomy Team was unable to identify a strong existing inventory of the wet labs required by firms in the targeted biosciences cluster based on a quick search of available properties. Thus, while the overall availability and cost of real estate in the County appears competitive, the location and quality of that space may be out of line with the changing needs of the knowledge- and innovation-based firms increasingly targeted by the County.

Outside of office and wet-lab space, a further concern raised in the interviews was the availability of large parcels close to I-70/I-270 for transportation, distribution, and logistics firms, as well as smaller for-sale properties for the smaller manufacturing firms that have been attracted to the County.

In tax rates, Frederick County is competitive overall with peer jurisdictions (Table 11). The County's business-owned personal property (the County does not tax this—the rate below is for Frederick City) stands as the lowest among peer jurisdictions.

Table 11: Selected Taxes of Frederick County and Peer Jurisdictions

County	State Income Tax Rate[1]	Local Income Tax Rate[2]	Property Tax[3]		Sales Tax
			Real Property	Personal Property[4]	
Baltimore County	5%	2.8%	1.100	2.750	6%
Carroll County	5%	3.03%	1.668	3.615	6%
Frederick County	**5%**	**2.96%**	**1.665**	**1.550**	**6%**
Harford County	5%	3.06%	1.554	3.934	6%
Howard County	5%	3.20%	1.014	2.535	6%
Montgomery County[5]	5%	3.20%	1.015	2.613	6%
Washington County	5%	2.80%	1.736	4.653	6%
Loudoun County, VA[6]	5.75%	0.0%	1.125	4.200	6%

(1) Maryland—$100,000–$150,000 Bracket.

(2) Maryland Comptroller.

(3) Rate per $100—County plus Highest Municipal Rate.

(4) Personal Property Tax is for Frederick City. Frederick County does not tax this.

(5) Property Tax is for Rockville—Highest Rate.

(6) From Loudoun County.

Source: Maryland Comptroller, Maryland State Department of Assessments and Taxation, and Loudoun County.

Quality-of-Life Factors

Frederick County offers a host of quality-of-life amenities to support economic development and growth. Chief among these are an affordable cost of living within the Washington DC metro area (Figure 11), a competitive cost of housing when compared with most peer jurisdictions (Table 12), and a strong public education system (Table 13). Two concerns related to quality of life were identified in the stakeholder interviews conducted—public transit access (discussed above) and cost of living (with the County having a high level of cost-burdened homeowners and renters, but a level comparable to peer jurisdictions (Table 12). While these issues are outside of a traditional economic development strategy—as the County pursues a placemaking strategy—both public transit and affordable housing policies should be considered.

Figure 11: Cost of Living Index for Frederick County and Peer Jurisdictions

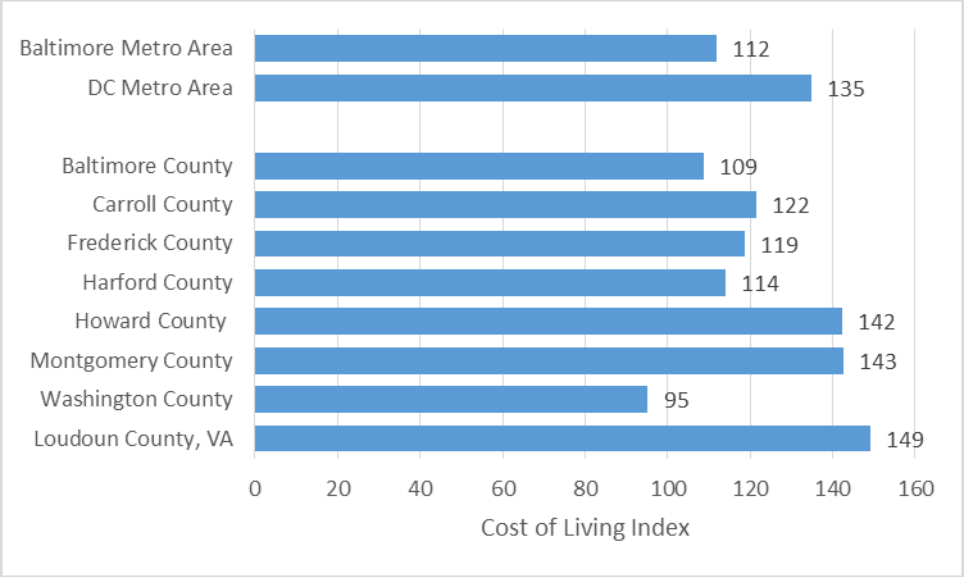


Table 12: Selected Housing Cost Measures of Frederick County and Peer Jurisdictions

County	Median Housing Price[1]	% of Cost-Burdened Mortgage Holders (2016)[2]	Median Rent (2016)[2]	% of Cost-Burdened Renters (2016)[2]
Baltimore County	$217,721	27.5%	$1,247	46.3%
Carroll County	$291,161	26.0%	$1,023	47.9%
Frederick County	**$272,302**	**24.8%**	**$1,331**	**48.5%**
Harford County	$239,110	25.1%	$1,149	51.2%
Howard County	$387,725	24.5%	$1,632	43.7%
Montgomery County	$404,536	28.3%	$1,662	50.0%
Washington County	$165,687	28.4%	$851	44.1%
Loudoun County, VA	$439,000	22.6%	$1,755	43.8%

(1) Maryland Data from Maryland Association of Realtors, Loudoun County Data from Dulles Area Association of Realtors.

(2) U.S. Census Bureau ACS.

Source: Maryland Association of Realtors, Dulles Area Association of Realtors, U.S. Census Bureau ACS.

Table 13: Selected Education Measures of Frederick County and Peer Jurisdictions

County	Cost per Pupil[1]	Education Effort[1]	SAT Composite Mean[2]	Graduation Rate[2]	% Attend a 4- or 2-Year College[2]
Maryland	$13,745	1.45	1428	94.7%	82.9%
Baltimore County	$13,130	1.49	1336	93.6%	83.9%
Carroll County	$12,947	1.49	1560	95.0%	82.0%
Frederick County	**$12,482**	**1.46**	**1558**	**95.0%**	**85.2%**
Harford County	$12,443	1.37	1520	95.0%	83.5%
Howard County	$15,058	1.91	1641	94.9%	92.6%
Montgomery County	$14,985	1.52	1629	95.0%	92.0%
Washington County	$12,413	1.29	1485	94.6%	71.2%
Loudoun County, VA[3]	$12,914	n.m.	n.a.	96%	88.8%

(1) Maryland Data from *Maryland State Department of Education (MSDE) Fact Book 2014–2015*.

(2) Maryland Data from *2017 Maryland Report Card*.

(3) Loudoun County Data from *Virginia Department of Education School Quality Report*.

Source: MSDE and Loudoun County.

Frederick County also offers many of the core amenities conducive to a high quality of life, including the following:

- ***Low Crime Index***—Crime index of 27 (out of 100) in property and violent crime—Lower than the United States, Maryland, and both adjoining metro areas (http://www.bestplaces.net);
- ***Strong Health Outcomes***—Ranked fifth in Maryland in health outcomes (http://www.countyhealthrankings.org); and
- ***Access to Outdoor and Cultural Amenities***—Including 12.4 museums per 100,000 population; 4.14 public libraries per 100,000 population; and 40 National Register of Historic Places sites per 100,000 population (91 sites—fourth largest in Maryland) (http://www.americansforthearts.org/by-program/reports-and-data/research-studies-publications/arts-index).

Innovation Dynamics

Innovation and entrepreneurial development are critically important to local economic development because they drive industrial competitiveness and offer new sources of growth through new business formation. Economists at the Federal Reserve Bank of Cleveland found that increased innovation, as evidenced by growing levels of patent activities, is one of the most significant factors in determining the level of per capita income of a State and its regions, outstripping other factors in growing per capita income such as tax burdens, public infrastructure, and the size of private financial markets.[11]

Like other regions across the nation, Frederick County benefits from the presence and technology focus of its local research institutions housed at Fort Detrick, which are critical for growing the County's technology-based industry clusters. First, the research conducted at these institutions generates new knowledge and technology forming the basis for creating new firms and introducing new products in the marketplace. Second, these organizations both attract and produce highly-trained personnel who provide the skilled

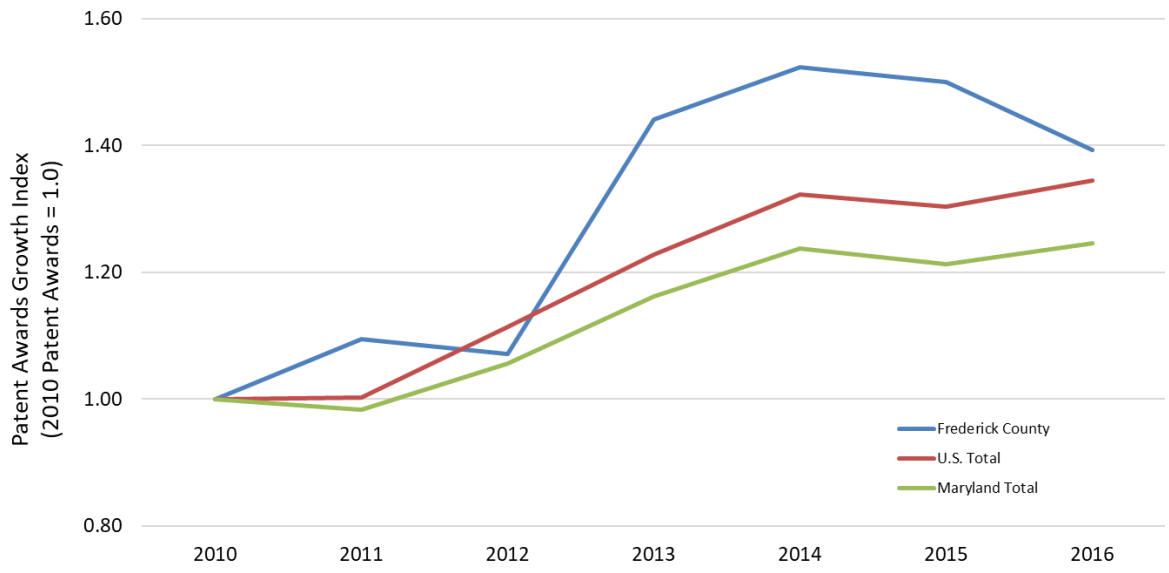
[11] Paul Bauer et al., "State Growth Empirics: The Long-Run Determinants of State Income Growth," Federal Reserve Bank of Cleveland, 2006, Working Paper #6.

workforce needed by technologically advanced companies. Third, the presence of such a workforce, in turn, attracts technology companies to locate in proximity to these centers of excellence.

While it is difficult to track the intramural research activities found at federal labs operating at Fort Detrick, patent activities of inventors residing in Frederick County offer a window into the activities of these federal labs. Patents are a key measure of the commercialization of research and development (R&D) activities into new intellectual property. Although there are other forms of intellectual property protection through which inventors can protect their product innovations from being replicated, including copyrights, trademarks, and trade secrets, patents are among the most widely used forms of protection of novel R&D-led inventions.

Patents invented by Frederick County residents are growing faster in the County than at either the State or national level. Over the 2010–2016 period, patents awarded to inventors residing in Frederick County rose 39 percent compared with 34 percent across the nation and 25 percent for Maryland (Figure 12). On a per capita basis, Frederick County is not far off the pace of either the nation or Maryland, with 0.47 patents per 1,000 population compared with 0.52 patents for the nation and 0.51 patents for Maryland. If the County continues its strong growth trajectory, it should equal or pass both Maryland and the nation in the years to come.

Figure 12: Growth of Patent Activities of Resident Inventors, 2010–2016, for Frederick County, Maryland, and the United States



Source: U.S. Patent and Trademark Office.

The strength of Frederick County's strong showing in patent activity is evidenced by the federal laboratories associated with Fort Detrick. The Department of Health and Human Services, under which the Frederick National Laboratory for Cancer Research (FNLCR) associated with the National Cancer Institute (NCI) is classified, is by far the largest patent holder of invented patents among Frederick residents, with 129 over the 2010–2016 period. The next highest is the U.S. Army, which has numerous research efforts underway at Fort Detrick in areas such infectious disease, telemedicine, and environmental health, with 25 patents. Complementing the efforts of federal labs are a number of life sciences employers in Frederick County, such

as Thermo Fisher Scientific, Akonni Biosystems, AstraZeneca, and Royer Biomedical. Still other companies taking part in patent activities are found in IT, including Fugue and Metrico Wireless.

A review of the areas of focus represented across the patents generated by residents of Frederick County points to a strong concentration in life sciences, across key areas involving immunology/infectious diseases, biological analysis, drug discovery, and genetic engineering (Table 14). A smaller area of focus is found in IT, involving network communications, data processing, and software applications for business. While not all of the patents invented by residents are for companies located in Frederick County, these patents suggest the knowledge base of inventors living in the County, who have the potential to be the founders and the technology workforce for new companies, expanding companies, and attracted companies to the County advancing new innovations. This strong focus on life sciences and IT points to Frederick County's core technology competencies, specialized areas of expertise where it is best positioned to differentiate and build itself into a world leader in commercialization and innovation-led development.

Table 14: Leading Patent Areas of Patents Invented by Residents of Frederick County

Patent Class Description	Patent Awards and Applications
Immunoglobulins, e.g. monoclonal or polyclonal antibodies	68
Peptides having more than 20 amino acids; Gastrins; Somatostatins; Melanotropins; Derivatives thereof	66
Investigating or analyzing materials by specific methods not covered by groups	61
Mutation or genetic engineering; DNA or RNA concerning genetic engineering, vectors, e.g. plasmids, or their isolation, preparation or purification; Use of hosts therefore	60
Medicinal preparations containing organic active ingredients	60
Medicinal preparations containing antigens or antibodies	43
Measuring or testing processes involving enzymes or micro-organisms (measuring or testing apparatus with condition measuring or sensing means, e.g. colony counters); Compositions therefor; Processes of preparing such compositions	37
Modulated-carrier systems	23
Services or facilities specially adapted for wireless communication networks	19
Enzymes, e.g. ligases (6.); Proenzymes; Compositions thereof	18
Viruses, e.g. bacteriophages; Compositions thereof; Preparation or purification thereof	16
Administration; Management	14
Medicinal preparations containing peptides	14
Measuring for diagnostic purposes (radiation diagnosis; diagnosis by ultrasonic, sonic or infrasonic waves); Identification of persons	14
Electrotherapy; Circuits therefor (takes precedence; electrically conductive preparations for use in therapy or testing in vivo)	12
Network-specific arrangements or communication protocols supporting networked applications	12
Medicinal preparations characterized by special physical form	11
Medicinal preparations containing materials or reaction products thereof with undetermined constitution	11
Finance; Insurance; Tax strategies; Processing of corporate or income taxes	11
Network architectures or network communication protocols for network security (cryptographic mechanisms or cryptographic arrangements for secret or secure communication)	11
Undifferentiated human, animal or plant cells, e.g. cell lines; Tissues; Cultivation or maintenance thereof; Culture media therefor (plant reproduction by tissue culture techniques)	11
Digital computing or data processing equipment or methods, specially adapted for specific applications	11
Preparation of compounds containing saccharide radicals	10

Source: U.S. Patent and Trademark Office.

Along with the position and focus of Frederick County in innovation, it is also important to learn where innovation-led entrepreneurial growth is taking place in Frederick County. Starting with David Birch's work and validated by the Office of Advocacy of the U.S. Small Business Administration (SBA) and further refined by studies commissioned in recent years by the Kauffman Foundation and others, it is clear that technology, innovation, and entrepreneurship drive economic growth. A 2005 report prepared for the SBA's Office of Advocacy comparing regions with strong and weak entrepreneurial activity found that "the most entrepreneurial regions had better local economies from 1990 to 2001 compared to the least entrepreneurial. They had 125 percent higher employment growth, 58 percent higher wage growth and 109

percent higher productivity. This general finding held individually for large, medium and small sized regions but was most pronounced for large regions."[12]

In Frederick County, eight companies received formal venture capital investments from 2012–2016 across two leading areas—software engineering and biotech systems. Venture capital represents formal equity investment by established venture firms in emerging technology companies that offer high-growth potential to generate sizable returns on that equity investment. The venture capital funding tracked by Thomson Reuters Venture One represents high-growth potential emerging companies that have received formal funding from venture capital companies.

While not large in numbers, Frederick County represented a high percentage of Maryland venture capital funding in its two leading areas:

- ***Software Engineering:*** The $221 million invested in Frederick County companies represented **15 percent of statewide total** of $1.5 billion, including investments in Fugue, Regent Education, Welocalize, and Blue Pillar.
- ***Biotech Systems:*** The $28 million invested in Frederick County companies represented **45 percent of the statewide total** of $61 million, led by Akonni Biosystems.

Another source that helps identify innovation-led emerging businesses is the federal Small Business Innovation Research (SBIR) program. The SBIR program encourages small businesses to undertake technology commercialization by requiring federal agencies with extramural R&D budgets that exceed $100 million to allocate 2.5 percent of their R&D budgets to the SBIR program. Each federal agency involved in the SBIR program then issues requests for proposals on topics reflecting their technology needs and interests, and competitively awards SBIR grants based on the technical merits and commercialization potential in a phased approach.

Nine companies in Frederick County received 20 awards from 2012 to 2016. While small in number, these companies reinforce the focus on life sciences as a key area for innovation-led development in the County. Along with Akonni Biosystems, several other emerging life science companies were funded, including Biological Mimetics; DRI Biosciences; Medigen, Inc.; and RoosterBio.

Interviews with the companies involved with Tech Frederick, a consortium of local IT businesses, revealed a harder to see, but no less important source of innovation-led entrepreneurial companies taking root in Frederick County in IT. A distinctive innovation-led development is being advanced in Frederick County by mid-career entrepreneurs, who are older, seasoned professionals with a business concept borne from their work experience. These IT entrepreneurs focus more on software applications to serve niche markets and are less dependent upon federal government business. A typical business model is to bootstrap the business and focus on growth through profitability/positive cash flow. Among these companies are Orases, Property Room, Swift Systems, and Yakabod.

[12] Advanced Research Technologies, LLC, Powell, Ohio, *The Innovation-Entrepreneurship Nexus: A National Assessment of Entrepreneurship and Regional Economic Growth and Development*, April 2005.

Placemaking in Economic Development

Placemaking has become a core element of economic development strategies. Placemaking in the context of economic development can be defined as the utilization of a community's planning, design, community amenities, and public spaces to attract and retain workers and employers. The report of the International Economic Development Council (IEDC), *Place Matters: The Role of Placemaking in Economic Development,* describes the emerging importance of placemaking in economic development:

> In the New Economy, knowledge-sector jobs are faster-growing and more lucrative than professions with more routine functions. Consequently, communities are changing the way they approach economic development. Instead of differentiating themselves primarily by transportation access, low costs, proximity to natural resources, or other traditional competitive advantages, many communities today are attracting multi-generational talent by becoming desirable places to live.[13]

Placemaking is becoming more important because, with the growth of the knowledge economy, access to talent has become increasingly more important. Knowledge workers are mobile and tend to aggregate in amenity-rich environments; and employers, seeking to access this pool of talent, have similarly come to favor high quality-of-life environments. As a result of these changes, the development of a live-work-play (LWP) environment has become a prerequisite for attracting both knowledge workers and innovation-based companies. The IEDC report defines elements of quality places, which include the following:

Elements of Quality Places

- Mixed uses
- Quality public spaces
- Broadband-enabled
- Multiple transportation options
- Multiple housing options
- Preservation of historic structures
- Community heritage
- Arts, culture, and creativity
- Recreation
- Green spaces

Most of these elements are present in the County, not only in the City of Frederick, but in most of its municipalities as well.

Overall, Frederick County has recognized the important role that quality of life and sense of place play in creating a vibrant County. Through its planning efforts, Frederick County is putting placemaking first and has established Primary Growth Areas and Multi-modal Places and Corridors for focused development efforts and is investing in and supporting the development of an LWP environment in the County. For example, the County is investing in the second location of FITCI and developing the Monroe Center in the City of Frederick to assist in developing the required critical mass of activities in the City essential for a vibrant, innovation-driven LWP environment.

Placemaking is especially important for mid-sized cities, like the City of Frederick, which must compete with revitalizing central cities like Washington DC. According to an *Urban Land Institute Magazine* article, "Placemaking for Mid-Sized Cities: Rebuilding Waterfront Parks and 'Bourbonism,'"

> For midsized U.S. cities to compete successfully in the 21st-century global marketplace, it is crucial for governments to think beyond the tired strategy of luring away employers from other locales. Instead, city officials need to focus on land use and placemaking as ways to attract talent, generate new business opportunities, and consolidate economic and

[13] International Economic Development Council, *Place Matters: The Role of Placemaking in Economic Development* 2016.

> community development to enhance their brands, according to speakers at ULI's 2016 Fall Meeting in Dallas. "The reality is that companies don't move that much anymore," said Mary Ellen Wiederwohl, who heads Louisville Forward, an agency that unifies all of the city government's real estate activities into a one-stop shop. "In the age of gigabit internet, you can do jobs from anywhere." Instead, cities should foster job creation—both by existing employers and startups—by becoming distinctive places where talent wants to live and work.[14]

The City of Frederick is already at the forefront of small city "placemaking," recognizing the need for a live-work environment in its 2016 Economic Development Priorities & Work Plan and focusing its economic development efforts on its dual core assets of its historic 50-block downtown LWP environment as well as its Technology Corridor office/industrial assets outside of its downtown area. The City has emerged as one of top locations in the Middle Atlantic region.

Placemaking is similarly relevant for many of the 11 smaller municipalities and rural areas within Frederick County. According to the Project for Public Spaces,

> Many residents of small towns and rural communities care deeply about the future of their towns and they value their uniqueness and strong sense of community. At the same time, many of today's rural communities face urgent challenges: How can they add jobs and support local businesses? How do they create a positive future for their kids? How can they most effectively utilize limited financial, human, and infrastructural resources? As their economies, environments, and demographics continue to change and evolve, developing locally-driven solutions to these challenges is critical to the long-term vitality of these communities.[15]

Frederick County's 11 smaller municipalities and rural communities have many assets to support economic development, offer significant quality-of-life/sense-of-place amenities, and are home to many of the County's employers, especially in manufacturing. To promote broad-based economic prosperity, Frederick County's economic development strategy needs to integrate the development assets in these communities into the plan.

In addition to the issues related to placemaking, suburban/exurban areas like Frederick County need to address the impacts of changing real estate market conditions on the existing built environment. Changes in retail purchasing resulting from the rise of internet shopping as well as changes in real estate preferences favoring urban LWP environments over the traditional office park settings that drove economic development over the past decades are altering the demand for employment space. According to the 2014 NAIOP Research Foundation report, *Preferred Office Locations: Comparing Location Preferences and Performance of Office Space in CBDs, Suburban Vibrant Centers and Suburban Areas*,

> After decades of suburban decentralization that created a multitude of single-use auto-oriented office parks, CBDs are being revived, most successfully in large metro areas with commuter rail transit. Another trend gaining momentum seeks to meet the demand for LWP environments in suburbia, where the large majority of the nation's office inventory is located. Single-use areas formerly devoted to retail centers and office parks are being redeveloped as LWP districts.[16]

[14] https://urbanland.uli.org/planning-design/rose-center-fellows-share-lessons-placemaking/.
[15] https://www.pps.org/article/rural-placemaking-and-main-street.
[16] https://www.naiop.org/preferredofficelocations.

Driven by the change in knowledge worker and innovation company preferences for urban LWP environments, smaller cities—like the City of Frederick—are seeking to create these LWP environments to remain competitive within larger metropolitan area markets. According to the NAIOP report,

> Another trend is gaining momentum to meet the demand for live, work, play (LWP) environments in suburbia, where 77 percent of the nation's office inventory was located as of the first quarter of 2013. This trend is being realized through the redevelopment of existing retail centers and office parks, some of which have become suburban transit-oriented vibrant centers.
>
> Although suburban redevelopment has received more attention, another emerging type of suburban vibrant center is far more common: the smaller cities and towns contained in many metro areas that have withstood the onslaught of highway-oriented development for over 50 years. The core areas of these cities and towns often have the employment density, design features and mix of land uses that can satisfy the demand for LWP places. Both vibrant town centers and suburban mixed-use developments that have achieved critical mass present many features of small CBDs. The demand for these suburban vibrant centers should grow, compared to the demand for typical single-use suburban locations.[17]

In Frederick County, home to the City of Frederick and 11 other municipalities, this transition is underway. All of the stakeholders interviewed identified the combination of quality-of-life and sense-of-place amenities existing in Frederick County, the City of Frederick, and its smaller municipalities as critical County assets. The City of Frederick is considered one of the most vibrant locations within the Washington metro area, and the NAIOP report ranks it as one of six suburban vibrant center/suburban office markets within the Washington metro area. Because office tenants are likely to prefer locating in vibrant suburban LWP environments over traditional suburban office parks, Frederick County needs to assess its zoning and development policies to support the development of downtown (City of Frederick) and suburban mixed-use LWP environments as well as the changing needs of smaller municipalities and rural areas. Furthermore, as discussed in the real estate section above, the availability of high-quality LWP office and wet-lab space was identified as an area of concern that should be addressed in these planning efforts by working with both the City of Frederick and the County's other municipalities that control their own planning and zoning to facilitate the development of both the LWP and wet-lab space.

Summary

Overall, Frederick County is well positioned to promote economic development; however, challenges remain. A summary of the JFI-TEConomy Situational Assessment is included in Table 15. Significant strengths for the County include a strong and growing economy; strong population growth, including growth in millennial and educated workers; a highly educated and skilled workforce; and strong business climate and quality of life. Challenges to address include slow wage growth; weak post-recession performance in some key driver industries, including finance and professional services; an aging population; a tight labor market; affordable housing; and congestion/mass transit access. The County must also address industries like finance and insurance, where employment is declining and future growth is challenged by identifying and targeting new growth sectors. Section 3 of this report identifies the core industry clusters critical to the County's future growth, and Section 4 presents the strategies for the County to capitalize on its assets and promote target industry cluster development.

[17] https://www.naiop.org/preferredofficelocations.

Table 15: Situational Assessment Summary of Frederick County

Situational Focus Area	Strengths	Challenges/Gaps
Overall Economic Performance	Strong employment gains, including healthy bounce-back from recession Local residents benefitting from local job gains Diverse industry base Low unemployment Competitive wages for higher skilled workers	Slow wage and salary growth Slow recovery in some core industries
Demographic Changes	Growing population Adding millennials, though low base Gaining population from migration, both in-state and international Gaining educated workers—especially from in-State migration	Aging population
Workforce Characteristics	High labor force participation Well-educated resident workforce High concentration in creative class and construction, maintenance, and natural resource occupations	Workforce shortages for local employers across high, middle, and low skills Concerns about retention of local students who go outside of County for college Workforce shortages for local employers across high, middle, and low skills
Business Climate and Quality of Life	Strong road and available freight rail infrastructure Regionally competitive tax structure Competitive cost of living Strong public schools Access to outdoors	Affordable housing Congestion Lack of mass transit Lack of incentives to compete Need for increased flexibility in permitting to support changing building development and agricultural needs

Source: JFI-TEConomy Analysis.

Section 3: Targeted Industry Cluster Analysis

In today's globally based economy, the key to success for regions is to identify the main business clusters that drive regional employment and growth. A cluster is a geographic concentration of related companies, organizations, and institutions organized around key localized assets. Clusters have been found to increase productivity, stimulate and enable innovation, and facilitate commercialization. Increasingly, State, regional, and local economic development efforts are focused on identifying and supporting local industry clusters. According to data from the Brookings Institution, the performance of core traded industry clusters is the "foundation of economic prosperity" and efforts to promote cluster-based development have become increasingly important among State and local policymakers and economic development practitioners.[18] Frederick County has recognized this and designated four industry clusters for targeted growth: advanced technology, agriculture, biosciences, and manufacturing. The JFI-TEConomy team refined and extended the County's designated target industry clusters using a cluster identification model described below.

The JFI-TEConomy Team has identified six industry clusters on which Frederick County should target its economic development efforts—biosciences; computing and IT; hospitality and tourism; professional, engineering, scientific, and technical services; transportation, distribution, and logistics; and value-added agriculture—and also assesses a seventh industry—manufacturing—where the County has several specialized subsectors and can play a role in the broader State and regional economy. The intent of redefining the designated target industry clusters for Frederick County is not to pick corporate winners and losers, but to think strategically about where the County is positioned for and has the best opportunities for economic growth and to inform OED on how to focus and deploy its resources to generate the maximum County benefit on its investment.

Overview of Industry Cluster Analysis

From an economic development perspective, industry cluster analysis attempts to understand the interrelationships (both existing and potential) among firms and to what extent these industry clusters can be supported, enhanced, and developed. While the ability to work with true industry clusters allows for significant economies of scale in the development process, it is important to recognize that not all businesses or industries will be part of a group of similar firms and not all groups of firms are able to operate as an industry cluster. However, from an economic development and job opportunity perspective, these firms and groups of firms are often key economic assets in their own right. For this analysis, industry cluster and industry group are used interchangeably.

Starting with the County's four already identified business clusters, the JFI-TEConomy Team further analyzed the County's economic base to update and deepen the identification of industry clusters to focus the County's economic development efforts. As a first step, wide-ranging industry clusters were identified using a multifaceted approach that involved the following:

- Examining the definition of national clusters from the Harvard/Massachusetts Institute of Technology (MIT) U.S. Cluster Mapping Project;

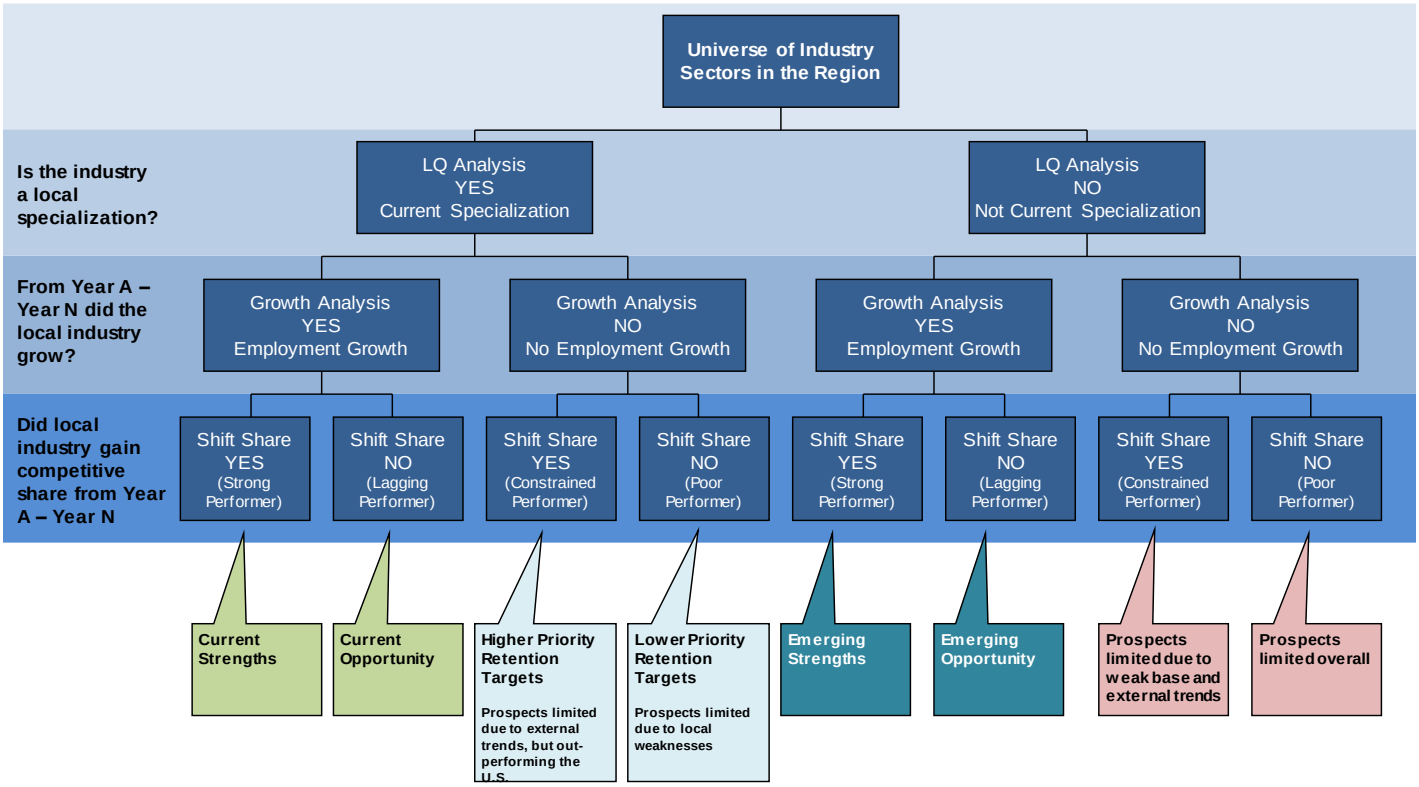
[18] https://www.brookings.edu/research/making-sense-of-clusters-regional-competitiveness-and-economic-development/.

- Refining the Harvard/MIT definitions based on the specific industry structure of Frederick County's industry base using the most detailed industry levels (six-digit North American Industry Classification System [NAICS]) codes that considered:
    - Firm level employment (does the cluster consist of a few or many firms);
    - Markets served (is the cluster dominated by a large customer, like the federal government?);
    - Stakeholder perceptions (the importance of the cluster to the County's economy and current economic development efforts); and
- Considering the presence of regional industry clusters in Maryland and the broad Baltimore and Washington DC regions within which Frederick County exists.

The JFI-TEConomy Team then assessed the performance of a large set of industry clusters through a targeted decision tree format presented in Figure 13. The targeted decision tree assessment uses four criteria:

- ***Relative Concentration of the Industry Cluster.*** This is a measure of how specialized an industry cluster is in a specific geographic area relative to the nation, and so it gauges "competitive advantage" for the industry cluster relative to the nation. The specific measurement of relative concentration is known as a location quotient (LQ). A location quotient is the share of a local area's employment found in a particular industry cluster divided by the share of total industry employment in that industry cluster for the nation. An LQ greater than 1.0 indicates a higher relative concentration, whereas an LQ of less than 1.0 signifies a relative underrepresentation. An LQ greater than 1.20 denotes employment concentration significantly above the national average and is considered specialized.
- ***Job Generation for the Industry Cluster.*** This is a more straightforward measure of whether an industry cluster is gaining or losing jobs in the geographic area.
- ***Relative Growth of the Primary Industry Cluster.*** This third measure of regional trends examines whether a local industry cluster is gaining or losing competitive share compared with the nation. It is measured as the difference between the percentage change in employment in an industry cluster at the local geographic level and the percentage change in employment in that same industry cluster for the nation.
- ***Regional Specialization and Growth.*** The Frederick County economy does not operate in a vacuum. It is part of a larger Maryland and Washington DC metropolitan area and strongly integrated into the Baltimore metropolitan area. Even if an industry is not specialized or growing in the County, the performance of the industry in the region may make it an appropriate target for County economic development efforts.

Figure 13: Industry Cluster Targeting Analysis Decision Tree



Through this decision tree analysis and based on discussions with the Frederick County OED, a refined set of six core industry clusters were identified.[19] The six core industry clusters and their decision tree ranking are presented in Table 16. A seventh industry, ***manufacturing***, is also assessed in this chapter, based on current employers in the County and recent, post-recession gains in employment. Frederick County has historically served as a manufacturing center within the Maryland economy with manufacturing being a core economic development focus for the County. While home to some specialized manufacturing activity, neither Maryland nor the Baltimore/Washington DC metro areas are specialized in manufacturing; and the State and both regions have experienced both long-term (2001–2016) and near-term (2009–2016) declines in manufacturing jobs. While Frederick County has lost manufacturing jobs since 2001, sector employment grew by 3 percent since 2009 and the County has several specialized manufacturing subsectors with growth potential. Moreover, it is also important to note that both the biosciences and value-added agriculture clusters include significant manufacturing components—biosciences in pharmaceutical manufacturing and value-added agriculture in food processing. Within the analysis of the County's manufacturing sector below, the JFI-TEConomy Team identify two manufacturing subsectors, ***construction materials and products*** and ***machinery and equipment***, which, along with pharmaceutical manufacturing and food processing, represent manufacturing sectors where the County possesses a strong base of assets and activity on which to build.

It is also important to note industries where the County is strong, but which were not identified as core target sectors for future growth. These include the construction and finance and insurance sectors, where the County is specialized. In terms of the ***construction sector***, the County has only limited ability to impact the performance of the sector through economic development policies. In terms of *the* ***finance and***

[19] See Appendix A for the definition of each cluster at the six-digit NAICS level.

insurance sector, the County is specialized but has lost employment. As discussed above, changing patterns of development in the County have impacted its competitiveness for the back office operations in this sector. Both industries remain important to the County's economy and represent industries for targeted retention and support efforts, while the six target industry clusters represent key sectors for future employment growth.

Table 16: Decision Tree Assessment of Frederick County Industry Clusters

Frederick County Cluster	Long-Term Performance 2001–2016
Biosciences	Current Strength
Computing and IT	Emerging Strength
Hospitality and Tourism	Emerging Opportunity
Professional, Engineering, Scientific, and Technical Services	Current Strength
Transportation, Distribution, and Logistics	Emerging Opportunity
Value-Added Agriculture	Emerging Strength

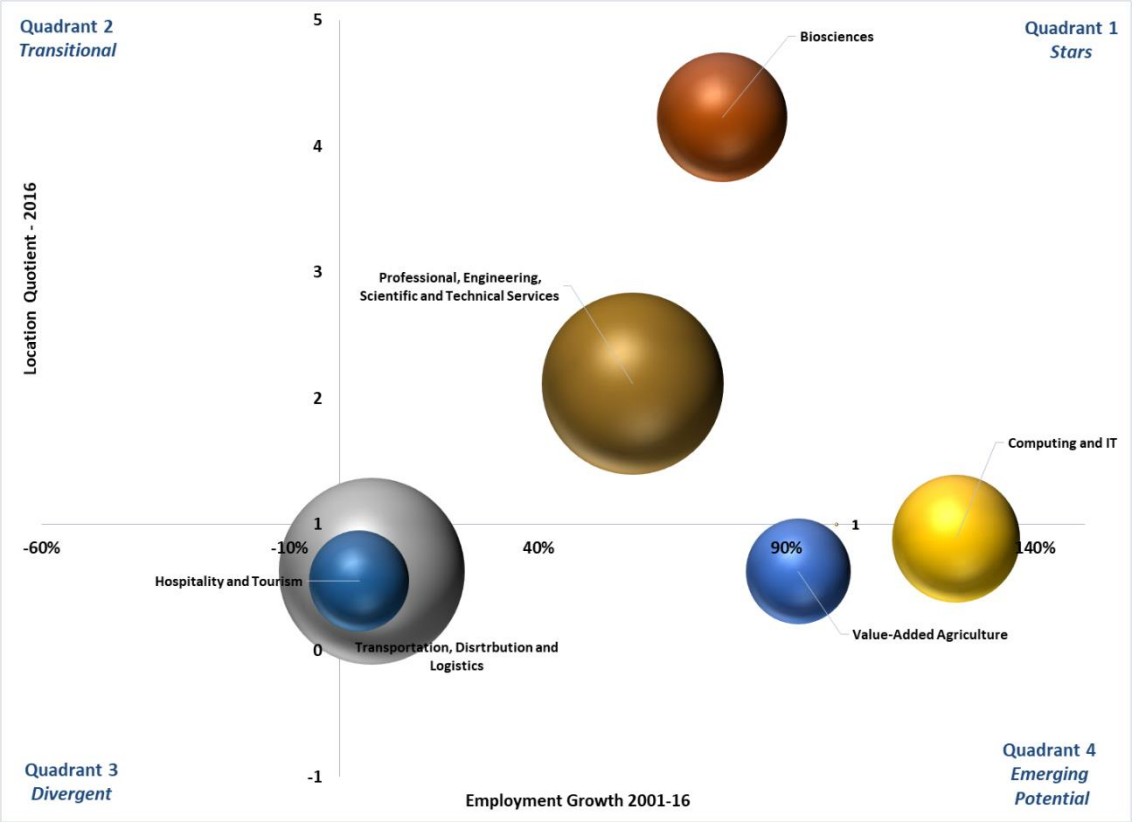
Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

A useful way to summarize and visualize the performance of these six clusters is through the use of bubble charts that present in one graphic higher or lower employment concentration levels (vertical axis), long-term (2001–2016) job growth or decline (horizontal axis), and the 2016 employment size of the cluster (size of bubble for each cluster) (Figure 14). Employment concentration levels are measured through the use of LQs that provide a metric of the level of employment in a region relative to the United States. The bubble charts are divided into four quadrants based upon the axis values with the relative performance in these quadrants represented as follows:

- ***Stars*—**High-performing clusters with above-average concentrations (above 1.00) and positive growth rate over the period examined. These clusters represent strong regional strengths and opportunities for cluster growth.
- ***Transitional*—**Clusters that have an above-average regional concentration, but have declined in employment over the period. These clusters typically revolve around mature industry segments. Often, these clusters, while they have limited growth potential, provide significant regional employment and hence are primary retention targets.
- ***Divergent*—**Clusters that have both below-average regional concentrations and have declined over the period. These clusters have extremely limited prospects for future growth.
- ***Emerging Potential*—**Clusters that experience employment growth over the period being examined, but whose overall concentration in the region is currently below average. Often, through industry and economic development growth strategies, these emerging clusters can expand to levels that increase their regional concentrations to above-average levels.

This targeting analysis focused on ***stars*** and ***emerging potential*** industries as the industries with the strongest growth potential in the County. Two of Frederick County's six target industry clusters are identified as ***stars*** (biosciences and professional, engineering, scientific, and technical services) and the remaining four (computing and IT; hospitality and tourism; transportation, distribution, and logistics; and value-added agriculture) are classified as ***emerging potential*** industries. Each target industry cluster is individually described in more detail below. Outside of these six strong growth prospects, the finance and insurance sector stands out as a key ***transitional*** sector, where County investments in retention efforts should be considered.

Figure 14: Frederick County Cluster Dynamics, 2001–2016



Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Performance of the Six Clusters

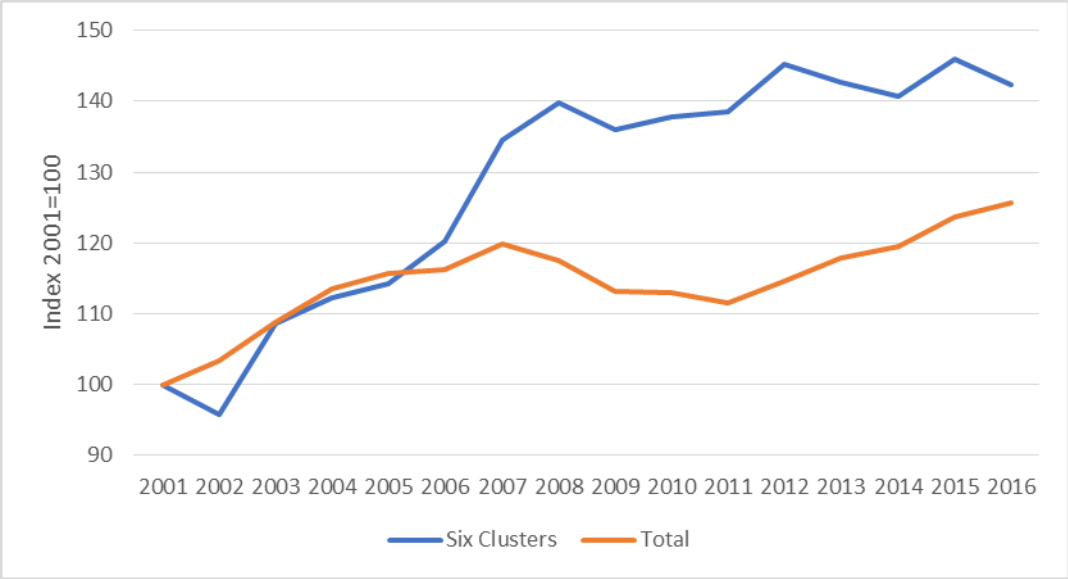
The six identified core clusters have driven the overall growth of the County, increasing from less than 16 percent of County employment in 2001 to 18 percent in 2016, with the total employment of the six clusters increasing by 42 percent since 2001, compared with overall County private sector employment growth of 26 percent. These six clusters accounted for one of every four jobs created in the County over the past two business cycles (Table 17). Figure 15 compares the employment growth of the six clusters with the total County for 2001 to 2016.

Table 17: Employment Growth of Frederick County and Six Core Industry Clusters, 2001–2016

				Change 2001–2016	
Industry	2001	2009	2016	# Change	% Change
Total County Employment	67,068	75,855	84,249	17,181	26%
Six Cluster Share of Total Employment	16%	19%	18%		
Total for Six Clusters	10,456	14,224	14,893	4,437	42%
Biosciences	1,166	1,646	2,060	894	77%
Computing and IT	888	2,096	1,990	1,102	124%
Hospitality and Tourism	1,180	994	1,227	47	4%
Professional, Engineering, Scientific, and Technical Services	2,546	4,952	4,035	1,490	59%
Transportation, Distribution, and Logistics	3,975	3,617	4,233	258	6%
Value-Added Agriculture	701	919	1,348	647	92%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Figure 15: Employment Growth of Six Clusters as Compared with Total County



Biosciences

Biosciences is the third largest of Frederick County's target industry clusters in terms of employment. Table 18 presents an economic summary of the sector, which consists of 53 establishments employing 2,060 workers in activities ranging from manufacturing pharmaceuticals to conducting life sciences research.[20] Maryland is recognized as one of the nation's leading biosciences centers, and ***Frederick County is home to 10 percent of all biosciences jobs in Maryland***. The biosciences sector in Frederick County is classified as a ***current strength***, meaning that it is specialized, growing, and outperforming the nation in terms of growth. Private industry biosciences employment in the County—beyond the employment at the FNLCR associated with the NCI and operated by Leidos Biomedical Research, Inc., which is classified as federal employment—is dominated by three major employers in the sector. AstraZeneca, Thermo Fisher Scientific, and Lonza have a combined employment of nearly 1,600, or more than 75 percent of biosciences industry employment. Still, numerous small and mid-size firms are engaged in a range of biosciences research, testing, product development, and manufacturing. This cluster is highly oriented toward *manufacturing*, with 43 percent of cluster employment classified as manufacturing. Biosciences cluster average annual wages are $84,828, the third highest among the six target industry clusters and well above the County average of $47,409. The presence of Fort Detrick and NCI support the growth of the cluster, with over $40 million in local purchases. The high degree of County, State, and regional specialization in this cluster; strong base of existing employers; and high wages all make this cluster a primary target for Frederick County.

Key specialized subsectors within the biosciences cluster include the following:

- Other biological product manufacturing—LQ of 39.64 (nearly 40 times the national average) and 872 jobs; and
- R&D in biotechnology—LQ of 9.15 and 1,095 jobs.

[20] The JFI-TEConomy analysis is based on the NAICS definitions presented in Appendix A. These definitions may differ from prior County biosciences sector analyses, which identified 80+ companies. It is likely that the difference in firm count is due to differences in definition; and many of the firms identified by the County, which may be either self-identified biosciences companies or in related NAICS sectors, are included in the professional, engineering, scientific, and technical services cluster below.

Table 18: Economic Summary for the Biosciences Sector

Region	2016 Metrics				Growth	
	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	53	2,060	$84,828	4.23	77%	25%
U.S. Performance					22%	12%
Maryland Performance					19%	2%
DC Metro Performance					30%	4%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Computing and IT

The computing and IT cluster is the fourth largest of Frederick County's six target industry clusters in terms of establishments and employment. Table 19 presents an economic summary of the sector, which is made up of 273 business establishments with 1,990 employees engaged in activities ranging from ecommerce to software publishing to wireless communications to computer systems design and programming services. The performance of the sector is far less dependent upon federal procurement than typically found in the Washington DC region. With just $110 million in direct federal IT procurement, Frederick County has a small fraction of that found in surrounding jurisdictions. For example, direct federal IT procurement is almost $3 billion in Montgomery County, $1.5 billion in Prince George's County, and over $1.1 billion in Baltimore County. So, the rise of Frederick County's computing and IT cluster has not relied directly on federal procurement to drive its growth, which differentiates it from the rest of the regional economy.

In its level of industry employment, Frederick County is not currently specialized in this sector, but has experienced long-term (2001–2016) growth stronger than the nation, thus classifying the sector as an ***emerging strength*** industry. While this cluster has experienced strong long-term growth (2001–2016), it is one of two of Frederick County's six target clusters where employment fell in the recovery from the recession.

The computing and IT cluster in Frederick County is made up of a larger number of companies, many of them small to mid-sized. Computing and IT cluster average annual wages at $97,627 are the highest among the six target industry clusters and more than double the County average of $47,409. The State of Maryland and both the Baltimore and Washington DC metro areas are all specialized in the computing and IT cluster, with the combination of high wages and a strong State and regional base of activity making this sector a core target for Frederick County's economic development strategy.

Key specialized or high employment subsectors within the computing and IT cluster include the following:

- Wireless telecommunications carriers—LQ of 2.11 and 181 jobs;
- Computer systems design services—LQ of 1.32 and 871 jobs;
- Custom computer programming services—LQ of 1.12 and 675 jobs; and
- Software publishers—LQ of 0.56 and 139 jobs.

Table 19: Economic Summary for the Computing and IT Sector

Region	2016 Metrics				Growth	
	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	273	1,990	$97,627	0.89	124%	-5%
U.S. Performance					66%	40%
Maryland Performance					49%	14%
DC Metro Performance					35%	7%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Hospitality and Tourism

The hospitality and tourism cluster is made up of businesses engaged in tourism, amusements, and hotels and lodging. Despite Frederick County's importance as an agricultural (wineries and farms), historical, and outdoor tourism destination, the County is not currently specialized in this cluster. Frederick County employment in the hospitality and tourism cluster is growing but not as rapidly as the nation; and this, coupled with the below-average level of specialization, classifies this industry as an ***emerging opportunity*** cluster. Table 20 presents an economic summary of the hospitality and tourism cluster, which is composed of 72 business establishments and 1,227 jobs. Frederick County is home to the Plamondon Companies (an operator of hotels, restaurants, and restaurant management) and Experient (one of the world's leading event management companies), as well as numerous hotels and entertainment/amusement facilities. Hospitality and tourism cluster average annual wages of $31,613 are the lowest of the six target industry clusters. Despite the cluster's low average wages, this industry is an appropriate target for the County based on the substantial tourism amenity resources in the County and is also linked to the success and development of the value-added agriculture cluster described below.

Key specialized or high employment subsectors within the hospitality and tourism cluster include the following:

- Convention and trade show organizers—LQ of 6.97 and 255 jobs;
- Amusement arcades—LQ of 6.88 and 109 jobs;
- Sports teams and clubs—LQ of 1.53 and 93 jobs;
- All other amusement and recreation industries[21]—LQ of 1.25 and 154 jobs; and
- Hotels and motels, except casino hotels—LQ of 0.47 and 521 jobs.

Table 20: Economic Summary for the Hospitality and Tourism Sector

Region	2016 Metrics				Growth	
	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	72	1,227	$31,613	0.55	4%	23%
U.S. Performance					7%	14%
Maryland Performance					8%	18%
DC Metro Performance					3%	9%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

[21] This subsector comprises establishments (except amusement parks and arcades, gambling industries, golf courses and country clubs, skiing facilities, marinas, fitness and recreational sports centers, and bowling centers) primarily engaged in providing recreational and amusement services.

Professional, Engineering, Scientific, and Technical Services

The professional, engineering, scientific, and technical services cluster is the second largest of Frederick County's six target clusters and is made up of firms in the architecture, engineering, management consulting, and physical/social sciences research industries. The related areas of life sciences research is included in the biosciences cluster, and computer services and IT/computer consulting is included in the computing and IT cluster. Table 21 presents an economic summary of the professional, engineering, scientific, and technical services cluster, which is made up of 275 establishments with employment of 4,035 jobs. The cluster is specialized in the County, is growing, and is gaining share nationally, and thus is classified as a ***current strength*** industry.

Despite the County's competitive position in the cluster and presence of both Fort Detrick and NCI, federal professional services procurement significantly lags Montgomery and Prince George's Counties and counties such as Anne Arundel, Harford, and St, Mary's with similarly large federal installations. For example, 2017 federal architectural, engineering, and related services of $38.8 million and management, scientific, and technical consulting services procurement of $76.4 million are well below Montgomery, Prince George's, Anne Arundel, Harford, and Howard Counties. While the mission of Fort Detrick is different than other Maryland federal installations, opportunities exist to both expand procurement related to this facility and attract federal contractors from higher-cost jurisdictions. In targeting these firms, the County should highlight its significant local and out-commuting worker base as well as competitive real estate costs.

This cluster includes many large employers, many of whom are involved in federal contracting. While the professional, engineering, scientific, and technical services cluster has experienced strong long-term growth, expanding by 59 percent since 2001 and outpacing the United States, Maryland, and both the Baltimore and Washington DC metro areas in terms of long-term growth, cluster employment has declined since 2009. Much of this employment decline can be attributed to the loss of a single large employer—Bechtel. If Bechtel is excluded from the analysis, the remaining firms in the cluster added jobs since 2009. With average annual cluster wages of $85,314, the second highest of the six clusters, and a high degree of both local and State/regional specialization in this industry, this sector remains a core target industry for the County.

Key specialized or high employment subsectors within the professional, engineering, scientific, and technical services cluster include the following:

- Other physical and biological research—LQ of 5.73 and 1,809 jobs;
- Administrative management consulting services—LQ of 1.93 and 761 jobs;
- Engineering services—LQ of 1.42 and 930 jobs; and
- Testing laboratories—LQ of 1.32 and 153 jobs.

Table 21: Economic Summary for the Professional, Engineering, Scientific, and Technical Services Sector

	2016 Metrics				Growth	
Region	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	275	4,035	$85,314	2.12	59%	-19%(1)
U.S. Performance					32%	16%
Maryland Performance					40%	17%
DC Metro Performance					33%	2%

(1) The 2009–2016 period was impacted by the relocation of Bechtel. If Bechtel is removed from the 2009 figures, the professional, engineering, scientific, and technical services sector grew by 46 percent.

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Transportation, Distribution, and Logistics

The transportation, distribution, and logistics cluster is the largest of Frederick County's six target industry clusters and is made up of businesses engaged in wholesale trade, trucking, transportation, and distribution and related support industries. Table 22 presents an economic summary of the cluster, which consists of 394 establishments employing 4,233 workers, with average annual wages of $55,563. While the cluster's average annual wages are the third lowest of the six clusters, they are above the County average of $47,409. The County is home to several major distribution facilities, including facilities for Aldi, Costco, and BlueLinx. Frederick County is not specialized in this industry (LQ of 0.63), has experienced long-term employment growth, but is not gaining share nationally; thus, the industry is classified as an ***emerging opportunity*** cluster. However, since 2009, the Frederick County transportation, distribution, and logistics cluster has grown more rapidly than the United States, Maryland, and both comparison regions, indicating interest in this sector.

While the State, Baltimore/Washington comparison regions, and the County are not specialized in the transportation, distribution, and logistics cluster, Frederick County's location, strong highway and rail infrastructure, and competitive labor and real estate costs make the County attractive for this industry. Frederick County has the potential to serve as a regional transportation and logistics hub within the region; and with substantial national investment in local fulfillment and distribution centers, this is a growing sector nationally. One barrier to the development of this cluster may be the lack of available buildable land close to the County's highway infrastructure.

Key specialized or high employment subsectors within the transportation, distribution and logistics cluster include the following:

- Transportation and warehousing—LQ of 0.45 and 1,492 jobs; and
- Wholesale trade—LQ of 0.69 and 2,837 jobs.

Table 22: Economic Summary for the Transportation, Distribution, and Logistics Sector

	2016 Metrics				Growth	
Region	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	394	4,233	$55,563	0.63	6%	17%
U.S. Performance					9%	12%
Maryland Performance					-1%	6%
DC Metro Performance					-9%	3%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

Value-Added Agriculture

The value-added agriculture cluster is a vertically integrated set of activities ranging from farming through the processing of agricultural products into final food products. While not all agricultural products produced by Frederick County's vibrant agricultural sector are processed locally and the County's strong base of food and beverage manufacturers have a national supply chain, Frederick County is developing a large and increasingly integrated value-added agriculture network that extends from farm to table. Table 23 presents an economic summary of the County's value-added agriculture cluster, which consists of 85 establishments, employing 1,348 workers with average annual wages of $43,200. It is important to note that these employment figures are for businesses with paid employees and do not include all farms (many of which are organized as sole proprietorships and not included in the data analyzed) or farm workers (many of

whom are not in "covered" employment). According to the U.S. 2012 Census of Agriculture, there were 1,308 farms in Frederick County selling more than $150 million in agricultural products.[22] More than half of the cluster's employment is in manufacturing—which accounts for 856 jobs, or 63 percent of cluster employment.

Home to a large base of farms and many of the State's best breweries, wineries, and distilleries, Frederick County has emerged as an agricultural tourism location with strong relationships to the hospitality and tourism cluster. The value-added agriculture cluster is classified as an ***emerging strength*** cluster, meaning that it is growing and outperforming the nation in growth (in both the long and near term) but is not yet specialized. Despite being one of only two target clusters where average annual wages are below the County average, this cluster has strong reasons to support its development. At the national level, there is strong support for locally produced agriculture and food products, making this a growing sector nationally. Locally, given the County's rich agricultural heritage and position as the largest farming County in Maryland, a strong premium is made on agricultural and farm preservation. Expanding local value-added production and processing enhances farm incomes and therefore aids preservation.

Key specialized or high employment subsectors within the value-added agriculture cluster include the following:

- Fluid milk manufacturing—LQ of 3.23 and 123 jobs;
- Commercial bakeries—LQ of 3.08 and 2.88 jobs;
- Breweries—LQ of 2.98 and 122 jobs;
- Dairy cattle and milk production—LQ of 2.62 and 198 jobs; and
- Wineries—LQ of 1.16 and 49 jobs.

Table 23: Economic Summary for the Value-Added Agriculture Sector

	2016 Metrics				Growth	
Region	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	85	1,348	$43,200	0.63	92%	47%
U.S. Performance					41%	10%
Maryland Performance					3%	1%
DC Metro Performance					12%	28%

Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

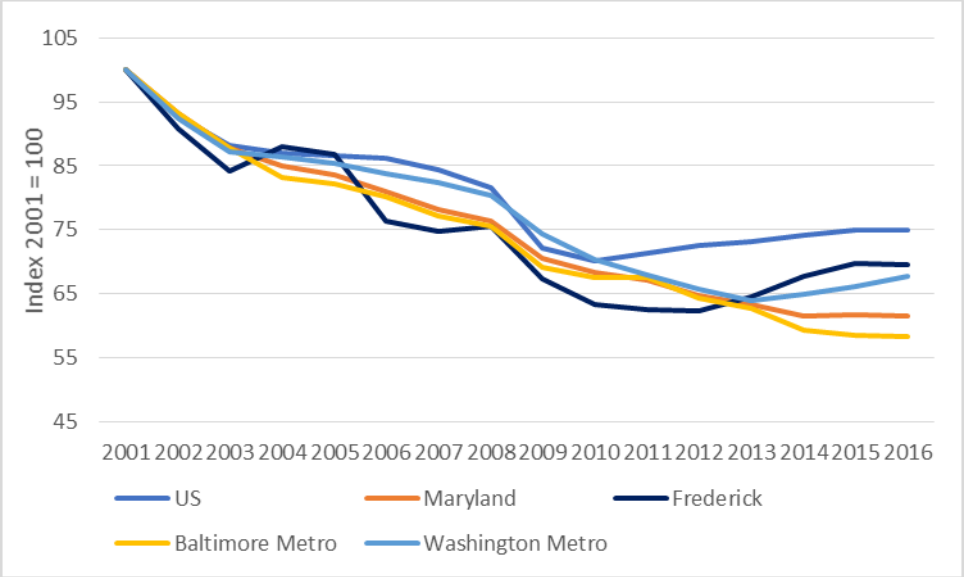
Additional Industry to Target—Manufacturing

In addition to the six clusters analyzed above, the JFI-TEConomy Team analyzed the performance of Frederick County's overall manufacturing sector and identified specific manufacturing areas where the potential exists to retain or grow employment. Manufacturing employment has experienced a long-term decline nationally, in Maryland, in the Baltimore and Washington DC metro area comparison regions, and in Frederick County. However, since 2009, national and Frederick County manufacturing employment has recovered, growing by 4 percent nationally and by 3 percent in Frederick County, while continuing to fall in Maryland and both regional comparison areas (Figure 16 and Table 24); and Frederick County has several specialized areas of manufacturing activity. While Frederick County is not specialized in the overall

[22] Seehttps://www.agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/Maryland/ st24_2_001_001.pdf. Thus, there is a large number of other agricultural-related employment not included in these figures.

manufacturing sector when compared with the nation; the County's recent growth in employment, workforce, and locational assets and in several key specialized subsectors identify it as a core area for focused recruitment activity in the core areas where the County is specialized and for overall retention and support efforts across the sector. Manufacturing activities also represent a critical component of the County's biosciences and value-added agriculture industry clusters.

Figure 16: Manufacturing Employment Growth of Frederick County and Comparison Regions



Frederick County has a low overall level of specialization in manufacturing, with an LQ of 0.60, indicating a concentration of manufacturing employment 60 percent of the national average; but, it has a higher concentration of manufacturing employment than the State or the Baltimore and Washington DC comparison regions. While Maryland and the Baltimore and Washington DC metro area comparison regions are not specialized in manufacturing activity (Maryland's manufacturing LQ is 0.47; the Baltimore metro LQ is 0.48, and the Washington DC metro area has a very low LQ of 0.22), regionally specialized manufacturing subsectors exist within each area. Furthermore, Frederick County has several areas of manufacturing sector specialization and employment growth that represent opportunities for employment growth.

While the low level of County and even lower levels of regional specialization do not make manufacturing a primary target for its economic development efforts, the recent growth within the sector, the County's historical role in this sector, local workforce and real estate assets, and middle-wage/middle-skill employment opportunities in the sector point to it being an appropriate target for focused recruitment efforts in specialized manufacturing subsectors and overall support and retention efforts. In several of the manufacturing subsectors where the County is specialized, targeted development and attraction efforts are warranted. It is also important to note that there is a substantial manufacturing component of both the biosciences and value-added agriculture clusters. Manufacturing accounts for 889 jobs or 43 percent of total employment in the County's biosciences cluster and 856 jobs and 63 percent of jobs in the value-added agriculture cluster. Manufacturing related to the biosciences cluster has grown by 30 percent since 2001, with 5 percent growth since 2009; and manufacturing related to the value-added agriculture cluster has grown by 24 percent since 2001, with 83 percent growth since 2009. ***These two manufacturing-related clusters represent core targets for the County's strategy***.

Overall, Frederick County's manufacturing cluster consists of 176 establishments with 5,200 jobs, 6 percent of total private sector jobs in the County, with average wages of $60,029, well above the County average of $47,409. The County's manufacturing sector can be further broken down into five manufacturing-related subsectors, each focused on a particular product or market where the County appears to have particular strengths. Key selected specialized or high employment subsectors within the manufacturing sector, by major subsector, include the following[23]:

Pharmaceuticals Manufacturing (included in the biosciences cluster):

- Key employers—AstraZeneca and Lonza;
- Pharmaceutical and medicine manufacturing—LQ of 39.64 and 872 jobs;

Construction Materials and Products:

- Key employers—Canam Steel and NVR Building Products;
- Plywood and engineered wood product manufacturing—LQ of 2.13 and 114 jobs;
- Architectural and structural metals manufacturing—LQ of 1.84 and 473 jobs;

Printing:

- Key employers—RR Donnelley and Navistar Direct Marketing;
- Printing and related support activities—LQ of 1.52 and 475 jobs;

Machinery and Equipment:

- Key employers—STULZ Air Technology Systems, Wright Manufacturing, and EDCO;
- Lawn and garden equipment manufacturing—LQ of 9.42 and 112 jobs;
- Air conditioning, refrigeration, and forced air heating—LQ of 4.85 and 287 jobs;
- Construction machinery manufacturing—LQ of 2.97 and 137 jobs;

Food Processing (included in the value-added agriculture cluster)**:**

- Key employers—Bimbo Bakeries, Dairy Maid Dairy, Flying Dog Brewery;
- Dairy product manufacturing—LQ of 1.62 and 159 jobs;
- Bakeries and tortilla manufacturing—LQ of 1.56 and 333 jobs; and
- Beverage manufacturing—LQ of 1.49 and 245 jobs.

Table 24: Economic Summary for the Manufacturing Sector[1]

	2016 Metrics				Growth	
Region	Establishments	Employment	Average Wage	LQ	2001–2016	2009–2016
Frederick County	176	5,200	$60,029	0.60	-30%	3%
U.S. Performance					-25%	4%
Maryland Performance					-38%	-13%
DC Metro Performance					-32%	-9%

(1) Overall manufacturing sector—Includes manufacturing activity occurring in other clusters.
Source: JFI-TEConomy Analysis of IMPLAN QCEW Data.

At a more detailed level, there are several areas of manufacturing activity in which the County is specialized and gaining employment. Two growing and specialized manufacturing subsectors—***pharmaceuticals manufacturing*** and ***food processing—***are parts of the larger, integrated biosciences and value-added

[23] To present the analysis in the most readable format, a mix of four- and six-digit NAICS code industries are utilized.

agriculture clusters and are already recommended targets for the County. The County also has growing and specialized manufacturing subsectors in two areas:

1) ***Construction Materials and Products—***Frederick County serves as a regional manufacturing center for the production of construction materials and architectural products serving the regional construction market. This manufacturing subsector includes 1,245 jobs and, while employment has declined in the long term, subsector employment grew by 33 percent since 2009; and
2) ***Machinery and Equipment—***Frederick County serves as a regional/East Coast manufacturing center for the production of machinery and equipment, ranging from air conditioning equipment to lawn equipment to construction equipment. This manufacturing subsector includes 660 jobs and has experienced both long term (2001-2016) and strong near term (2009-2016) employment growth.

Efforts to promote further development in these two specialized manufacturing subsectors represent a clear opportunity for the County. While the County is also specialized in a fifth manufacturing subsector, ***printing***, this industry has experienced long- and near-term declines in employment with the transition to digital media. Given the small size of this subsector, 475 jobs, and uncertain future, this sector does not represent a strong growth opportunity for the County. Based on the JFI-TEConomy Team's analysis of State and regional manufacturing employment, one other potential manufacturing subsector that may represent a target for future attraction efforts is ***electronics manufacturing***. There are several regional and Maryland areas of specialization in this subsector, and Frederick County had a large base of semiconductor and electronic component manufacturing and electronic instrument manufacturing employment in the pre-recession period. Efforts to bring back firms in this subsector should also be considered.

Relationship of Target Industries to Core Strategy Elements

Section 4 of this report will describe in detail the JFI-TEConomy Team's recommended economic development strategies for Frederick County. These recommendations are divided into four core strategic priority areas:

- ***Workforce***—Creating the supply and pipeline of talent needed by the County's employer community;
- Improving infrastructure and placemaking, consisting of the following:
- ***Infrastructure***—Putting in place the physical infrastructure needed to support business and employment growth; and
- ***Placemaking Strategies***—Creating the sense of place and quality of life desired by residents and employers alike.
- ***Targeting Core Industry Cluster Growth***—Targeting cluster growth through specialized efforts; and
- ***Branding***—Enhancing Frederick County's recognition and stature in regional and national markets.

The importance of each of these economic development organizational themes to each of the clusters, based on the JFI-TEConomy Team's local stakeholder interviews and national knowledge and expertise, is presented in Table 25.

Table 25: Relationship of Target Industry Clusters to Proposed Economic Development Strategy Elements

Target Industry Clusters	Generating, Retaining, and Attracting a Skilled Workforce	Improving Infrastructure and Placemaking		Targeting Advanced Industry Cluster Growth	Branding
		Infrastructure	Placemaking		
Biosciences	★★★	★★★	★★	★★★	★★★
Computing and IT	★★★	★★★	★★★	★★★	★★★
Hospitality and Tourism	★	★★★	★★★	★	★★★
Professional, Engineering, Scientific, and Technical Services	★★★	★★	★★★	★★	★
Transportation, Distribution, and Logistics	★★	★★★	★	★★	★★
Value-Added Agriculture	★	★★	★	★★	★★★
Additional Sector—*Manufacturing*	★★	★★	★	★	★
Symbol Key: ★★★= Critical ★★ = Very Important ★ = Important					

Source: JFI-TEConomy Team.

A primary goal of an economic development strategy is to enhance the economic vitality, income, and tax base of the jurisdiction. While the core goal of the Frederick County Economic Development Strategy is to support the growth of high-skill, high-income jobs in innovation-based sectors, the Frederick County OED recognizes that the County has a diverse population and workforce. A strength of the target industry clusters identified in this report is that, while they focus on the industries based on innovation, knowledge, and technology that are critical to advance the County's economic future, they include a broad mix of industries across skills and income levels that are appropriate for all County residents (Table 26).

Table 26: Alignment of Clusters to County Resident Workforce, by Wages

Income Level	% of FT Employed County Residents Earning	Clusters Ranked/Sorted by Median Wages
< $35,000	21%	Hospitality and Tourism
$35,000 to $74,999	39%	Transportation, Distribution, and Logistics; Value-Added Agriculture; and Manufacturing
$75,000 and above	40%	Biosciences; Computing and IT ; and Professional, Engineering, Scientific, and Technical Services

Source: JFI-TEConomy Analysis of U.S. Census Bureau ACS and IMPLAN QCEW Data.

Section 4: Strategy and Action Recommendations

Over the first two decades of the 21st century, Frederick County has achieved a considerable track-record of economic development success. Fueled by strong growth in employment and population, Frederick County has emerged as an economic hub within the broad Baltimore and Washington DC metro areas with a diverse industry base, anchor institutions, and a high quality of life that can attract workers and their families with strong amenities, such as high-performing K–12 education and easy access to outdoor recreation.

An underappreciated aspect of Frederick County's economic success is the growing diversity of its industry base. Over the past two decades, Frederick County has generated strong gains in IT, biosciences, and value-added agriculture industry clusters that have diversified an economy dominated by more regionally based service industries of construction, engineering and technical services, finance and insurance, and transportation and distribution. Manufacturing also maintains a foothold in the County's economy and offers a unique range of job opportunities for residents, which is not typically found in other parts of the Baltimore and Washington DC metro areas.

The strength of Frederick County's economy is highlighted by its ability to bounce back from the economic shocks of the Great Recession. Despite these economic challenges, Frederick County has fared well in the economic recovery, with higher employment gains and lower unemployment rates than found across both the Baltimore and Washington DC regions and a positive in-migration of population from within the region. While still viewed by many as a bedroom-county that supplies workforce to other parts of the Baltimore and Washington DC metro areas, Frederick County has, in fact, one of the lowest rates of out-commuting of its resident workforce, well below that of Baltimore, Carroll, and Howard Counties and on par with Montgomery County. The next phase of Frederick County's development will be to focus on becoming a regional technology and innovation driver in its own right, especially in the targeted advanced industry clusters of the biosciences and computing and IT.

10-Year Goal for Sustained Diverse and High-Quality Economic Growth

While Frederick County is enjoying healthy economic gains since the recovery took hold in 2009, there are significant opportunities to strengthen Frederick County's economic foundations building upon the County's mix of industry clusters. Of particular importance is sustaining the diversity of the County's industry and employment base, while raising its performance in driving high-quality economic growth over the next 10 years.

High-quality economic growth reflects the ability to have rising standards of living for residents of Frederick County with the growth of better-paying jobs that can support families. This means job growth alone is not a sufficient measure of success, but whether that growth is translating into economic well-being for Frederick County residents. As Michael Porter, a thought leader in competitive strategies for industry and economic development, states in his seminal work, *The Competitive Advantage of Nations*: "The principal goal of a nation [and its regions] is to produce a high and rising standard of living for its citizens."[24]

One broad measure of economic success where Frederick County has lagged in recent years is the level and growth in wages paid to those working in the County. While any job is better than no job, without increasing wages, it is difficult for economic well-being to rise. A more in-depth examination suggests that Frederick County is lagging in wage levels and growth of wages due to its mix of occupations within its

[24] Michael E Porter, "The Competitive Advantage of Nations," *Harvard Business Review*, March–April 1990.

industry clusters, not because it pays lower wages for high-skilled occupations. So, for instance, computer and engineering occupations in Frederick are paid on par or slightly higher than in the Baltimore and Washington DC metro areas.

At the same time, the County is facing new competitive pressures in many of its higher-wage, advanced industry clusters. Advanced industries are characterized by their deep involvement with technology R&D and extensive use of STEM (science, technology, engineering, and math) workers. The Brookings Institution has identified a set of 50 Advanced Industries ranging from manufacturing industries to energy industries to high-tech services from computer services to health applications. About these Advanced Industries, the Brookings report states: "....Their dynamism is going to be a central component of any future revitalized U.S. economy. As such, these industries encompass the country's best shot at supporting innovative, inclusive, and sustainable growth."[25]

Frederick County has several industry clusters composed of advanced industries, including biosciences; computing and IT; and professional, engineering, scientific, and technical services. Historically, the County has competed in these advanced industry clusters based on its location as a lower-cost, high-quality location offering access to a high-quality workforce within the growing and successful Washington DC metropolitan area. ***While the County remains competitive in the region in terms of business costs, Frederick County must maintain a strong focus on growing these advanced industry clusters, particularly biosciences and computing and IT, as a cornerstone of its economic development efforts in order to attract the high-skill jobs in knowledge-based sectors that will generate greater prosperity and higher wages and incomes in the County.*** The County is well positioned to make this transition, with substantial innovation and technology drivers, including Fort Detrick and its tenants, such as the FNLCR associated with the NCI, and a strong base of life sciences, computer/internet, and other technology-related businesses. The County is also investing in this transition: building a second location for FITCI; investing in community college training programs and training centers (the Monroe Center); supporting the development of a higher education center (Center for Research and Education in Science and Technology [CREST]); and investing in quality-of-life amenities.

While advanced industry targets—the biosciences; computing and IT; and professional, engineering, scientific, and technical services—stand out as strong for the County's future growth, Frederick County is also well positioned to capitalize on its success in more traditional activities—hospitality and tourism; transportation, distribution, and logistics; value-added agriculture; and manufacturing—where the County has established a strong track record of success. Supporting the development across these seven core industries will preserve the County's diverse economic base and promote broad-based employment opportunities for all County residents.

Achieving the goal of sustaining industry diversity with an increasing focus on high-quality economic growth means that Frederick County over the next decade needs to focus more on generating its own higher-value economic growth through its economic development activities to support the growth of its industry clusters. By doing so, Frederick County can shed its image as merely an edge-county for the Baltimore and Washington DC metro areas and be widely viewed as a robust technology and innovation hub within the Washington DC metropolitan area in its own right and as the "economic driver/gateway" for western Maryland by 2028.

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[25] Brookings Institution, *America's Advanced Industries: What They Are, Where They Are, And Why They Matter*, Brookings Advanced Industries Project, February 2015.

Organizing Approach and Strategic Priorities for Achieving Higher-Value Economic Growth

In recent years, Frederick County has been putting in place a proactive and thoughtful approach to economic development.[26] The County is focused on the economic development fundamentals of business retention and expansion, home-grown innovation-led start-ups, and emerging companies and business attraction, with a wide range of tools and initiatives underway. A meaningful complement to the mix of efforts underway that can unify and focus the County's efforts in sustaining the diversity of its industry base, while shifting toward generating its own higher-value economic growth, is to pursue cluster-based economic development. As noted in Section 1, clusters are geographic concentrations of businesses that share common markets, technologies, and skill requirements. A strong cluster consists of firms and related economic actors and institutions that derive a productive advantage from their proximity, collaborations, and access to a common pool of resources. For economic development activities, a cluster-based approach can foster a business environment where companies can join forces to communicate their needs to regional service providers, educational institutions, and government agencies. A robust cluster will also allow a growing company to operate as if it were much larger by leveraging cluster resources and capabilities across peer companies and suppliers. The benefits of cluster economics can be realized by companies large and small, new or long established.[27]

Given the significant number of industry clusters found in Frederick County, it is not cost-effective to have full-time specialists for each of the identified industry clusters. Instead, it is recommended that assistance to each of the industry clusters be embedded in a more functional approach to tackling key strategic priorities. The JFI-TEConomy Team analysis points to the fact that all of the industry clusters require assistance in the functional areas of workforce and talent development, placemaking, as well as branding and image marketing. The two clusters that stand out for targeted business development strategies for the County's economic development efforts, involving new complementary approaches to business attraction, formation, and expansion, are the biosciences and computing and IT industry clusters because they can drive higher-quality job creation and can be shaped by intentional economic development approaches. While the diverse clusters identified in this report and indeed all major business areas are important to the County, the biosciences and the computing and IT industry clusters stand out for specific focus in this strategy because they represent strong market opportunities for high-wage, high value-added economic growth.

The results of this updated comprehensive assessment of Frederick County's economic development situation points to four strategic priorities for economic development to sustain Frederick County's diverse base of industry clusters, while also pursuing higher-value economic growth over the next 10 years, including the following:

- Generating, retaining, and attracting a skilled workforce that creates more opportunities for skill upgrading, while advancing increased connectivity of employers and residents, including recent high-school graduates leaving for college.
- Increasing the infrastructure and attractiveness of Frederick County in offering high-value mixed-use, LWP environments that are a growing preference for business locations.
- Growing target industry clusters that serve as the primary focus of the County's business development efforts.

[26] See "Frederick County Office of Economic Development (OED) 2017 Strategic Priorities."

[27] Michael E. Porter, "Clusters and the New Economics of Competition," *Harvard Business Review*, November–December 1998.

- Branding and proactively marketing Frederick County to the region and nation as an economically diverse, growing, and high-quality community in which to live, work, and locate a business.

The County has put in place specific economic development tools, resources, and initiatives that address these strategic priorities, so the actions recommended build upon the base of existing activities. Often, these activities involve partnerships with specialized economic development and industry organizations that have been established in Frederick, such as the Frederick Chamber, FITCI, Tech Frederick, and the newly formed Frederick CREST. The County also collaborates and partners with local economic development agencies found among its municipalities in advancing development, especially around placemaking.

For each of the four strategic priorities, this strategic plan sets out a situational assessment, linkage to ongoing activities, and specific recommended actions for Frederick County's economic development efforts that build upon the base of existing activities.

Strategic Priority: Generating, Retaining, and Attracting a Skilled Workforce

Situational Assessment

States and their local communities are increasingly competing based on their ability to educate, train, recruit, and retain a qualified workforce that meets the needs of industry. Workforce and talent development is a market factor that local economic development efforts can work on in concert with its industry clusters, educational institutions, and other community stakeholders to create a comparative advantage that can differentiate the locality from its competition. And, the bar for ensuring a high-quality workforce is rising as new technologies are deployed into even more routine middle- and low-skilled occupations.

The assessment of population and workforce dynamics, augmented by interviews with employers and economic development stakeholders, suggests that workforce and talent development has been an important driver for economic growth in Frederick County, but is an area of growing concern and need across Frederick County's industry clusters.

In many ways, Frederick County is well positioned in workforce and talent development. Labor force participation in the County is high, unemployment is low, and its well-educated resident workforce is growing, including through attracting a net in-migration of educated workers.

Still, the combination of high labor force participation and low unemployment points to conditions that can lead to shortages in finding qualified workers. Interviews with local employers and economic development stakeholders found that there are, in fact, existing workforce shortages for local employers across high, middle, and low skills.

The mix of skill needs for workforce development is in line with the diversity of the economic base of Frederick County. But, the solutions for addressing high-skilled workforce and talent issues and middle- and lower-skilled needs appear to be different.

In high-skilled workforce development for its advanced industry clusters, Frederick County faces a challenge of attracting top talent and meeting critical skill needs. In the computing and IT industry cluster, software development and coding are critical skill shortage areas for Frederick employers. This shortage of software development and coding skills is a national problem, but Frederick County needs to find its own local solutions. In the life sciences, there is significant demand for scientific talent and for advanced degrees and certifications to fulfill the ongoing educational needs of the existing workforce. Top scientific talent is

typically recruited from national and even international labor markets, and Frederick County is not as well placed for attraction or retention as other large academic medical communities.

But, increasing the connectivity of local employers with Frederick County's highly educated resident population can be an important part of the solution in addressing high-skilled workforce needs. While Frederick County has one of the lowest rates of out-commuting of its resident workforce, well below that of Baltimore, Carroll, and Howard Counties and on par with Montgomery County, still 40 percent of its workforce commutes to jobs across the region, and these commuters are more highly educated than the overall workforce in Frederick. A concern was raised in interviews and supported by the data on out-migration of millennials in Frederick County that many younger workers who attend college outside of Frederick are not returning.

Frederick County is already importing between 35 and 44 percent of its middle- and lower-skilled workforce in clusters that are not advanced industry clusters—manufacturing; value-added agriculture; and transportation, distribution, and logistics. In these industry clusters, it will be important to pursue more integrated regional strategies with neighboring counties to address workforce needs.

Ongoing Activities

Frederick County has a wide range of activities ongoing in workforce and talent development. The Frederick County Workforce Services offers a range of services targeted to middle- and lower-skilled occupations. This includes job placement geared to the unemployed, targeted industry training, and skill upgrading of the existing workforce.

There is a strong partnership effort on targeted industry training and skill upgrading with FCC around middle-skill jobs, including the biosciences and manufacturing positions. But, outside of FCC, there are few technical training providers in Frederick County, which presents challenges to connect workers with training.

Overall, the interviews with local employers and economic development stakeholders suggest that FCC and the two private colleges in the County—Hood College and MSM—are well connected to local employers. All of these higher education institutions have been broadening their offerings in more STEM fields related to the biosciences and computing and IT clusters in recent years. These offerings include new degree and certificate programs in specialized areas, such as biotechnology, bioinformatics, microbiology/immunology, cybersecurity, game programming and development, computer animation, and data sciences. Increasingly, these three higher education institutions can offer a more integrated approach for going from technical certificates to an associate degree to a bachelor's degree to a graduate degree in STEM fields. Still, the total number of graduates in STEM fields each year across these institutions is limited, with 135 STEM graduates reported by FCC in fiscal year (FY) 2016, 58 STEM graduates reported by Hood College in FY 2017, and approximately 45 STEM graduates reported by MSM in FY 2016.

Local employers have been supplementing the pool of graduates that they recruit, especially in engineering, computer science, and graduate-level life sciences, from other nearby higher educational institutions. Frederick County employers expressed the ability to recruit from the higher education systems found in Maryland, such as Frostburg State University and the University of Maryland in Baltimore County, as well as other nearby out-of-state universities, such as West Virginia University and Virginia Tech, but more locally based solutions are needed as Frederick County looks to grow its biosciences and computing and IT industry clusters.

The newly launched Frederick CREST is an effort, still in its early stages, to help in addressing the challenges of more readily connecting with talent and offering educational options for engineering, computer sciences, and advanced life sciences skills. Funded through the Maryland Higher Education Commission as a Regional Higher Education Center, CREST is focused on bringing a range of employer-driven STEM graduate-level academic and research opportunities to the community. It partnered with the University of Maryland College Park to offer a master's in chemical and life sciences program that taps locally based researchers to deliver educational content and to partner on research components of the graduate program. CREST is pursuing the development of a range of other course offerings and is actively recruiting for internship and externship opportunities to better connect local technology employers with advanced STEM students.

Tech Frederick, a consortium of local IT businesses, received an Employment Advancement Right Now (EARN) grant from Maryland's DLLR for addressing industry sector-specific skill shortages. Frederick County Workforce Services offered assistance in helping to develop this grant and provided an example from a prior two-year manufacturing-oriented EARN grant. The focus of Tech Frederick's EARN grant is to update occupational skills and increase employability for unemployed or underemployed IT workers due to outdated skillsets. It is offering customized training tracks in areas such as mobile application development, website development, systems administration, and others, leading to technical certifications in the ASPIRE Training Program.

A more organic and fast-growing effort reaching STEM workers and residents in Frederick County is the rise of "tech meetup" groups facilitated through on-line social networking. By the end of 2017, more than 1,000 participants monthly were involved in in-person discussions/workshops on a range of cutting-edge technology topics, featuring the latest tools and applications in data analytics, big data, and cloud computing. Most participants live in but work outside Frederick County. Increasingly, the tech meetup groups are forming connections to local employers to help host and participate in the meetup groups, and tech meetup now is formally represented on Frederick's Tech Council.

Recommended Actions

Action 1: Create a staffing capacity to support industry cluster-based skill need identification and training approaches as a cornerstone of Frederick's workforce and talent development efforts.

An examination of successful industry clusters suggests that workforce development activities are perhaps the most valuable shared service beyond networking and information sharing. The State of Maryland's efforts in its EARN program involving industry-led sector projects demonstrate the importance of this approach. Since the EARN program began in 2014 focusing on 59 strategic industry-sector specific partnerships, 2,323 or 84 percent of the unemployed or underemployed participants in the program have been hired after completing their training; and 4,400 incumbent workers have completed the training leading to new skills, certifications, or credentials.

Still, the experience of EARN with Tech Frederick suggests the challenges of implementing industry-sector workforce efforts on a volunteer industry basis without any capacity to support the effort. Across all of the diverse base of industry clusters found in Frederick County, a shared capacity is needed to work with groups of employers to pursue efforts for industry-specific workforce and talent development. A common feature would be helping to engage and facilitate meetings of employers in the cluster; providing data collection tools to assess needs; and assisting in preparing applications and improved coordination with local, State, federal, and other sources of funding and support services. One shared capacity that would be very helpful would be to have a web-based survey tool in place that could be customized to learn more specific information on education and workforce needs both from employers in clusters as well as their

workers. It is expected that each industry cluster will have its own unique needs, including improved outreach to potential job candidates that can be supported through such a staff capacity.

Another service that this staffing capacity can serve is to connect Frederick industry clusters with workforce initiatives being undertaken regionally and statewide. Particularly in manufacturing, there are several EARN grantees that are more statewide in nature, plus there are resources through the State's manufacturing extension partnership. One in particular that may be a good fit is the Washington County EARN grant with Volvo Group Trucks, which is likely to broaden its efforts in the years to come.

CREST, in consultation with the local higher education institutions in the County, should be able to work with and offer small planning grants to faculty at FCC, Hood College, and MSM, or other technical education vendors, on curriculum development.

This new staffing capacity should be viewed as a collaboration of Frederick County's economic development agencies and its workforce agency since it serves both missions and creates a new capacity for Frederick County to address the competitiveness of its industry clusters through workforce and talent development.

Action 2: Advance a "Work Where You Live" Project.

Frederick County finds itself well positioned with its large base of highly educated out-commuters to collaborate with local business organizations to raise the awareness by local residents of career opportunities among local employers. The objective would be not only to fill immediate job needs, but also to create stronger relationships and awareness between out-commuting residents with particular skills and companies across the County's industry clusters.

One objective would be to create a talent bank of local residents working outside the County, who would be interested in learning about local career opportunities or networking with peer professionals. Social events could also be planned around peer-to-peer professionals and employers to advance networking and professional development skill building similar to the meetup groups.

Ideally, the Work Where You Live project can help support the efforts of "tech meetups" and other similar type efforts and complement them with additional value-added networking and outreach services.

Over time, the Work Where You Live project can become a trusted third-party talent connector and professional development network that can serve other uses, including helping with trailing spouse work options for those senior scientific, engineering, and management professionals being recruited from outside the region.

This Work Where You Live project will also be an important resource for the branding and image marketing proposed below. In this regard, it can foster connections not only to those currently living in the County, but also to those who would like to relocate to the County but require a job to facilitate their move.

Action 3: Undertake a Frederick Talent Recruitment Project for college juniors and seniors in targeted STEM fields.

Interviews with advanced industry companies in the biosciences and computer/IT fields suggest that each employer is actively seeking ways to connect with young talent from across Maryland's higher education system as well as a few select out-of-state colleges in targeted fields such as computer sciences, engineering, and life sciences.

These individual industry efforts could be complemented with a more broadly organized set of recruitment outreach at the major colleges that shows the breadth and depth of Frederick County's advanced industry

community. If a significant number of employers can be brought together, then it would be possible to work with the career services departments at different colleges to help host the event to invite top students who meet specific criteria set out by companies to meet with a number of Frederick companies interested in offering internship, co-op, and full-time employment opportunities.

An effort could also be made to stay in touch with students graduating from Frederick high schools and FCC who go on to pursue degrees in targeted fields and host them as well with local employers at their schools or in Frederick over school breaks.

A similar type of effort is undertaken by the Birmingham Business Alliance, which helps local companies target top students at colleges and universities around the State of Alabama and hosts interested students to come to Birmingham. As part of this effort, a follow-on activity through the Birmingham effort is to sponsor an OnBoard Birmingham program for young professionals recently recruited to the City to connect with each other, learn about the community, and gain opportunities to be better integrated into the social fabric of the City. This could be undertaken on a small scale in Frederick to welcome new talent to the County.

If resources will permit, it would also be helpful to provide matching grants to smaller employers in Frederick County to participate in student internships, in order to broader the exposure of Frederick employers to students from across Maryland.

This would be a more proactive means for outreach to the STEM talent pool that CREST is seeking to generate for Frederick County employers. If housed at CREST, it could create stronger a connection between CREST and Frederick advanced industry companies, while enabling the added value of CREST in advancing educational and research opportunities to be leveraged.

Strategic Priority: Improving Infrastructure and Placemaking

Situational Assessment

Frederick County is well positioned to participate in the national trend favoring the re-urbanization of talent and jobs in urban LWP environments. Frederick City is considered one of the most vibrant city-suburban office markets within the Washington DC metro region by NAIOP, with its ongoing downtown redevelopment.

The 11 smaller municipalities in the County also have the potential for LWP environments within their downtown areas and more built-up suburban office and mall areas. As the 2014 NAIOP Research Foundation report, *Preferred Office Locations: Comparing Location Preferences and Performance of Office Space in CBDs, Suburban Vibrant Centers and Suburban Areas*, notes: "[A] trend gaining momentum seeks to meet the demand for LWP environments in suburbia, where the large majority of the nation's office inventory is located. Single-use areas formerly devoted to retail centers and office parks are being redeveloped as LWP districts."[28]

Still, Frederick County faces some placemaking challenges, including the following:

- Lack of affordable housing, which is a concern voiced by local industry and economic development stakeholders, particularly around redeveloped downtowns. The evidence is that overall Frederick County is middle of the pack with other jurisdictions in the region, with 25 percent of homeowners and 49 percent of renters being "cost burdened."

[28] https://www.naiop.org/preferredofficelocations.

- Limited in-County and regional mass transit linkages. Overall, only 2.7 percent of the County workforce uses public transit, with a higher share of out-commuters using public transit than residents working in-County (Table 9a). A particular concern is the lack of access in getting around the City of Frederick and in connecting the City of Frederick to other smaller downtown areas across the County.
- Congestion found along both core interstates (I-270 and I-70), which is considered a barrier to development, with the County having among the highest mean travel times to work, despite having a high (59.3 percent) share of workers employed in-County. This reflects the fact that Frederick County's location is a key thoroughfare for western Maryland to the Washington DC metro area.
- The quality of building stock to meet demand by technology businesses, which is a concern voiced in industry and economic development stakeholder interviews. These concerns include the lack of high-quality buildings for IT firms in expanding downtown areas and issues on wide availability of high-speed broadband connections at office sites. The concerns about access to broadband as downtown areas expand is important not only for technology-related businesses, but telecommuting work sites and other intensive data-using applications. Also, a review of commercial real estate offerings shows limited availability of biotech wet-lab space available in the County, which makes it expensive for expanding biosciences firms already in the County and difficult to attract such expanding biosciences firms to the County.

Ongoing Activities

Frederick County has come a long way in its advancement of LWP. The City of Frederick has been a leader in these efforts, and County government is actively partnering with the City of Frederick. Among the complementary actions being taken by the County is the development of the second location of FITCI in the center of downtown, to support the development/attraction/retention of innovation companies in the LWP environment they desire. Similarly, the FCC has located its Monroe Center in the City. Plus, Frederick County has co-located its Frederick County Workforce Services in the facility, and, more generally, has been focused on keeping government employment in the downtown area to generate more critical mass and demand for LWP services.

Frederick County's municipalities are already home to numerous events, art/cultural amenities, and tourism venues that support both the agricultural and tourism sectors in the County. Five of the County's 12 municipalities (including the City of Frederick) are part of the Main Street Maryland comprehensive downtown revitalization program, six have economic development departments or commissions, and most have sustainability plans and tourism promotional activities.

Recommended Actions

Action 4: Support placemaking across the County through planning and zoning policies.

Frederick County needs to review its planning and zoning policies and develop targeted economic development strategies to support placemaking countywide. Changing economic and real estate market conditions are altering the demand for existing space, such as malls and retail centers, and favoring LWP development. While the City of Frederick and many municipal governments control their own planning, development review, and permitting, the County should conduct additional stakeholder engagement with the development community—including both developers and County/City/municipal stakeholders—on the current composition and inventory of space in the County, its alignment to current demands and needs, and the adequacy of existing zoning regulations to support redevelopment and mixed-use LWP development, and develop planning policies to support placemaking efforts countywide.

Action 5: Support placemaking in the City of Frederick.

Frederick County should continue to partner with the City of Frederick to advance placemaking. Further steps to be pursued include the following:

- ***Create "connector" transit options within the City of Frederick linking office parks and downtown:*** Much of the innovation-driven activity occurring in the targeted clusters—biosciences; computer and IT; and professional, engineering, scientific, and technical services—is driven by activities at Fort Detrick. In many cases, the nature of these activities favors more secure, dedicated suburban office buildings over downtown LWP locations. Nevertheless, linkages between the office park locations and the downtown LWP environment could be enhanced. The County and City could partner on a "connector" transit (bus) connection between Fort Detrick, regional office parks, and downtown Frederick. This would improve access and connections between residential (live), employment (work), and downtown amenities (play)—to the benefit of all. Suburban office parks could also support the cost of such connections through the creation of dedicated community benefits charges on current/future leases. This type of connection could also improve transit accessibility in the County.
- ***Work with employers to sponsor home ownership in neighborhoods around downtown:*** Several large employers in Maryland, especially in Baltimore City, have supported Live Where You Work policies that support the purchase of a home in dedicated neighboring communities. These policies have been found to support both neighborhood redevelopment and employee retention. Frederick County should explore the feasibility of establishing such policies with key local employers.
- ***Bring to fruition the planned conference and hotel center in downtown:*** Frederick County is already a successful tourism destination. The development of the hospitality and tourism cluster would be enhanced by the development of the downtown conference center and hotel. Plus, technology-based employers in the County, including the tenants at Fort Detrick, have noted the need for such a resource for their business meetings and outreach events.
- ***Work with developers to advance more options for multitenant, coworking, and telecommuting spaces:*** Frederick County has a large share of both professional and federal out-commuters. Similar exurban Maryland counties, notably in southern Maryland, and Virginia had developed federal telecommuting centers. While the federal program supporting telework centers appears to have been discontinued in 2011, the County should explore the feasibility of including shared-use facilities and/or teleworking centers serving both private and government clients as a component of its targeted downtown placemaking strategy. The location in downtown areas that can offer the higher amenities of LWP opportunities may make these multitenant, coworking, and telecommuting spaces more viable than past efforts found largely at isolated office parks in the County.
- Establish a tenant improvement fund that can coinvest with developers to ensure the availability of high-quality facilities for advanced industry clusters, especially for IT-related capacity improvements and wet-lab space improvements: It is recommended that this tenant improvement fund be structured to recoup County investments over a period of time through lease payments and that the developers maintain the tenant improvements in return for County investments and target advanced industry companies as tenants.

Action 6: Support rural/municipal placemaking and agricultural needs.

There is a substantial role for smaller municipalities and rural areas in Frederick County's placemaking strategy. Value-added agriculture, one of the County's six core target industry clusters, is an inherently rural undertaking. Hospitality and tourism in Frederick County, also one of the six core targeted industries, is also

driven by agricultural, historical, and outdoor amenities in the County. Frederick County's municipalities are already home to numerous events, art/cultural amenities, and tourism venues that support both the agricultural and tourism sectors in the County. Finally, a significant share of the County's manufacturing establishments are located in smaller municipal areas.

To better integrate Frederick County's rural areas and smaller municipalities into this economic development strategy, it would be important to undertake an inventory and asset map of the following:

- Cultural/tourism assets;
- Economic development and workforce development assets; and
- Available office, manufacturing, and logistics spaces and types of tenant improvements in place.

Furthermore, one issue identified in the stakeholder interviews was the need for supportive planning, zoning, and permitting to allow local farmers to move up the value-added agricultural production chain as well as diversify their operations into tourism and hospitality-related events. The County should work with the Agricultural Business Council to address the sufficiency of current planning, zoning, and permitting regulations to support enhanced value-added agricultural production and rural tourism activities.

Action 7: Assess infrastructure/transit needs.

As discussed in Section 2, both traffic congestion and transit access were identified as a barrier to development in the County. Highway congestion on I-70 and I-270 impacts the attractiveness of the County for the targeted transportation, distribution, and logistics cluster, mitigating the County's locational, real estate, and labor cost advantages. Access to transit is considered a core element of "placemaking" and has emerged as a core element in economic development. For example, access to transit was a key selection factor in the Amazon HQ2 competition. While infrastructure/transit planning is normally outside of traditional economic development, it is suggested that, as part of Action 4's review of planning and zoning policies to support countywide placemaking, Frederick County OED should work with the County Planning and Permitting Department, the City of Frederick and other municipal planning departments, and TransIT Services of Frederick County to include the following:

- An assessment of mass transit options in the County; and
- An assessment of and long-term plan to address County and City/Muncipal infrastructure investment needs to reduce congestion and promote local development.

Strategic Priority: Targeting Development Efforts for Industry Cluster Growth

Situational Assessment

While the diversity of Frederick County's industry base is an important economic strength to be sustained through workforce and placemaking, it is also important to have targeted development efforts that leverage opportunities to grow each industry cluster.

From a strategic point of view, not all industry clusters are of equal priority. Given the importance for Frederick County to generate increasing levels of quality jobs to raise its position in the region and to meet the needs of its highly educated residents for career opportunities, the biosciences and computing and IT clusters should be key priorities among the six industry clusters. These two industry clusters stand out because they are related to bringing innovations to market and also involve the employment of many middle- and high-skilled workers, with average wages of nearly $85,000 for biosciences and $98,000 for

computing and IT. A third advanced industry cluster composed of professional, engineering, scientific, and technical services is also found in Frederick County, but it is likely driven more by federal contracting and the supplier needs of the biosciences and computing and IT clusters within the County and broader region and so offers less opportunity to be shaped by economic development efforts.

A closer examination of the biosciences and computing and IT clusters suggests that the recent economic position of these two advanced industry clusters are quite distinct and their development pathways are also highly differentiated. A targeted strategy to grow these two industry clusters, both to strengthen the local entrepreneurial/innovation ecosystem and to promote business attraction, will be quite different.

For the remaining four industry clusters, the strategic planning effort suggests some development initiatives that can help move them forward, but these are set out as more project-oriented efforts than ongoing intensive cluster development efforts being recommended for the biosciences and computing and IT clusters.

Ongoing Activities

There are key resources in Frederick County to advance innovation and entrepreneurial development for the biosciences and computing and IT clusters. One organization that spans both clusters is FITCI, which serves as an incubator and accelerator for new technology-related start-ups, offering office and specialized lab space, business plan assistance, coaching and mentoring from serial entrepreneurs and C-level managers, and access to sources of funding. FITCI also promotes entrepreneurial development and networking within Frederick County. Opened in 2004, FITCI is currently located at the Monocacy Technology Campus, in over 17,000 square feet of space that can support close to 40 clients with 35 offices and 16 biotech wet labs. It is expected to open another similarly sized facility dedicated to computing and IT companies in the downtown area of the City of Frederick, colocated with the Frederick County OED and other economic development organizations. FITCI reports a clear track record of success with 35 current Frederick-based businesses generating 268 direct jobs, $28 million in annual revenues, 76,500 square feet of leased space in the County, and annual direct tax payments of nearly $400,000 to Frederick County.[29]

Tech Frederick is a consortium of IT business owners in Frederick, established in 2009, and promotes collaboration and making Frederick County technology-friendly. It has been a hub for Frederick's entrepreneurial-led computing and IT cluster to network, to benefit from peer-to-peer assistance, and increasingly to drive new IT workforce development efforts in the County.

At the FNLCR, Leidos Biomedical Research, Inc., which serves as the operator of this federally funded R&D center for the NCI, has a staff in place for managing innovation and strategic partnerships. Its Partnership Development Office helps establish cooperative R&D agreements with industry and other collaborators to pursue the advancement of medical R&D.

Recommended Actions

Action 8: Focus biosciences targeted development strategy in Frederick County on outreach marketing and engagement to leverage the assets of Fort Detrick, and particularly the FNLCR, as well as Frederick County's strategic location along the I-270 corridor.

The growth of the biosciences industry cluster in Frederick has been strong and consistent over the long-term period of 2001 to 2016. Overall growth in the period has been 77 percent, well above the 22 percent

[29] See FITCI website for more details on its progress report—http://www.fitci.org/progress-report.

for the nation and 19 percent for Maryland. In the recent years since the economic recovery, strong growth has continued, with gains in Frederick of 25 percent compared with 12 percent for the nation and a mere 2 percent for Maryland. While there have been some notable successes in growing early-stage companies associated with FITCI, particularly Akonni Biosystems, a molecular diagnostic tool developer that has raised over $50 million in venture funding and has over 30 employees, as well as Alizee Pathology, a contract histopathology lab also with over 30 employees, the base of private industry employment in the County is dominated by three large bioscience employers—Astra Zeneca, Lonza, and Thermo Fisher Scientific—which have a combined employment of nearly 1,600 or more than 75 percent of biosciences industry employment.

For Frederick County to continue its strong growth in the biosciences, it should complement its existing focus on supporting new start-ups and on retaining and growing its existing company base, with an additional focus on recruiting emerging and growing biosciences companies to the County. One target for business attraction are biosciences companies that would benefit from a close working relationship with the anchor biosciences government labs at Fort Detrick, particularly with the FNLCR that not only carries out cutting-edge medical research in cancer and AIDS, but also offers a complex of signature facilities and capacities for drug development, first-in-human clinical trials, and applications of nanotechnology in medicine. FNL reports that there is a growing base of collaborative research agreements being entered with companies, but the role of FNL is not to help site these companies in Frederick County. Instead, that is the responsibility of County economic development. There are also likely to be a wide number of emerging biosciences companies involved with innovative cancer- and AIDS-related technologies aligned with the research programs at FNL—including venture-backed and SBIR-supported companies with the resources to support collaborative research efforts that may not know of the full research program and capacities found at FNL since it is focused primarily on serving its government clients at the NCI and National Institute of Allergy and Infectious Diseases (NIAID). Forging a stronger collaboration between the County and FNL's Partnership Development Office can help raise the profile and better conduct outreach marketing to identify likely industry partners among emerging growth companies for cooperative research agreements with FNL, while at the same time being business attraction targets for the County.

An approach that needs to be further refined to realize the economic development potential of FNL to attract existing and emerging biosciences companies to locate in Frederick County would include the following:

- Identify specific areas of research focus of importance to the principal research investigators at FNL and more broadly at NCI and NIAID.
- Assess what existing and emerging companies are advancing new technologies in these areas through examining publications, patents filings, SBIR awards, and venture capital investments.
- Develop a lead prospecting outreach program to companies involved in collaborative research agreements or that are identified as having common interests with principal research investigators at FNL. Need to hone the value proposition involving access to space and incentives as well as broader statewide development incentives.
- Facilitate and provide funding support to hold workshops and other events in collaboration with FNL's strategic partnerships office to raise awareness and advance relationship building with these companies and key principal research investigators.
- Pursue active leads with an alliance marketing effort that draws broader stakeholders, including TEDCO, Department of Commerce, etc.

Another way to recruit emerging and growing biosciences companies is to better market Frederick County's more cost-competitive business locations in concert with local developers to expanding biosciences

companies from across the Washington DC region that are seeking additional space as they move into product production and scale-up operations. This could take advantage of the many business park options that Frederick County can offer as well as access to the County's small business tax credit and new jobs tax credit incentives. Other important development tools for enabling these efforts are some form of offset for tenant improvements for costly wet-lab space and support in job training and recruitment by Frederick County Workforce Services.

Action 9: Focus computing and IT targeted development strategy on assisting the existing base of businesses to scale up and attract more mid-career entrepreneurs to locate in Frederick County.

In contrast to the biosciences cluster, the computing and IT cluster in Frederick County offers a broader employer base of 273 establishments, none of which employ more than 250 workers. This industry cluster is led by a more homegrown, entrepreneurial-led base of companies with a strong software product orientation and focus on applications that serve commercial markets. These companies are not dependent upon government contracting as is much of the industry cluster regionally. Over the years, the computing and IT industry cluster has developed its own distinctive ecosystem, well represented by the companies supporting Tech Frederick, which offers a supportive, collaborative business environment involving more mid-career entrepreneurs who built companies that focus on growth through profitability and positive cash flow. While there are a few notable venture-backed successes located in Frederick County, including Blue Pillar, Fugue, and Regent Education, the total employment base of all IT venture-backed enterprises is 202 jobs or roughly 10 percent of the total industry cluster employment base in Frederick County. Instead, these mid-career entrepreneurs are seeking not to dilute their ownership but to fund their growth through their own cash flow.

The long-term growth of the computing and IT industry cluster in Frederick County has been remarkable. Frederick County grew its computing and IT cluster by 124 percent from 2001 to 2016, a rate of growth more than double that of the United States and triple that of Maryland. Frederick County was on the cusp of having the computing and IT cluster become another industry specialization when the years of economic recovery ushered in a period of stagnation in the growth of the industry cluster. The cluster's employment shrank by 5 percent in Frederick County from 2009 to 2016, even as establishments continued to grow. Across the nation, the economic recovery has been a time of strong job growth in the computing and IT cluster, with growth of 40 percent.

The stagnant period of growth in the computing and IT cluster points to the business model of many companies, which find it hard to scale up by funding growth through cash flow. The expansion of FITCI into a new downtown innovation center focused on growing this cluster makes very good sense, since the County needs more start-up companies.

But, the County should explore other ways of growing this cluster. One way is to determine if an alternative approach to funding company expansion can be advanced based on cash flow, rather than taking equity. This would involve establishing more mezzanine financing vehicles to offer working capital. One example is the traditional Small Business Investment Company (SBIC) model supported by the SBA that offers long-term access to affordable capital and so can allow working capital financing for business expansion on terms that meet how businesses can afford to pay from future cash flow. Under the SBIC model, private investors participate as limited partners of the SBIC and their investments are matched by the SBA $2 to $1. The typical company invested in by an SBIC is a profitable business with sufficient cash flow to pay interest that requires between $250,000 and $10 million in financing to expand its business. There are a number of existing SBICs in Maryland that are actively investing, including Spring Capital Partners in Lutherville, Patriot

Capital in Baltimore, Multiplier Capital in Chevy Chase, Farragut Mezzanine in Chevy Chase, and the RLJ Credit Opportunity Fund in Bethesda. These existing SBICs have a diversified investment focus, based on information from the SBA, but might be potential partners.

A closer examination of how Frederick County can focus on the scale-up of its existing base of computing and IT companies through access to growth capital should be undertaken with key banking and other financial partners. This examination should also assess the value of ongoing tax credits against property taxes for encouraging growth versus targeting access to growth capital.

The scale-up of existing companies in Frederick may also be hampered by the lack of quality buildings near downtown LWP locations with access to high-speed broadband, backup power, and other amenities needed by technology businesses. This concern voiced by existing companies is only expected to become a larger bottleneck to industry cluster growth as the new downtown innovation and technology center, ROOT, successfully assists more start-up companies in the cluster. Now is the time to begin addressing this issue, beginning with an inventory of space and a plan for supporting increased supply to meet future demands.

Another approach for growing Frederick County's computing and IT cluster is to build upon its distinctive focus as a place where mid-career entrepreneurs can have a supportive and cost-effective business environment to move their business ideas forward. This would need to involve a broader marketing campaign around the strength of the County's computing and IT cluster as set out below. It would also be further strengthened by working with Tech Frederick to take a more active role across statewide and regional technology and business organizations to begin laying the foundation for raising an awareness of the County's strengths and unique business base.

Action 10: Pursue project-specific initiatives to support other industry clusters as they are identified.

For the other four industry clusters, the County should pursue specific projects on an opportunistic basis that can help in sustaining the growth of these clusters. Ideas that have been identified through the strategic planning process include the following:

> ***Hospitality and Tourism:*** Frederick County has already developed and implemented a successful tourism marketing effort, implemented by Visit Frederick (The Tourism Council of Frederick County). In implementing its tourism marketing strategy, the County already builds not only on its outdoor and historical amenities and assets, but also on its agricultural and food processing ("farm to table"—"farm to glass") resources. For example, in 2017 the County OED was named the 2017 Tourism Council of Frederick County (TCFC) 'Ambassador of the Year' for the collaborative promotion of the craft beverage industry (part of the County's value-added agriculture cluster) in Frederick County.[30] Frederick County has emerged as a successful location not only for tourism in general, but for tourism related to wineries, breweries, and farm/agricultural amenities. This is supporting the success and development of its value-added agriculture cluster. Thus, in addition to addressing the need for a County hotel and conference center, discussed in *Placemaking* above, the core recommendation related to hospitality and tourism is to continue to pursue an integrated strategy that supports the growth and development of other target industry clusters. Suggested strategy elements could include continued tourism-based marketing focused on value-added agriculture assets—wineries, breweries, and related food processing; working with Frederick

[30] http://www.discoverfrederickmd.com/news/frederick-county-office-of-economic-development-named-tourism-s-ambassador-of-the-year.

County Workforce Services to address ongoing workforce shortages; and continued integration of efforts to link growth in hospitality and tourism to the growing value-added agriculture cluster.

Action Items:

- Continue integrated hospitality and tourism/value-added agriculture efforts;
- Support the development of the hotel/conference center; and
- Work with Frederick County Workforce Services to address cluster workforce needs.

Professional, Engineering, Scientific, and Technology Services: The proposed strategic priority of improving infrastructure and placemaking will be critical to the further development of this sector. Addressing issues related to the availability of high-quality office space as well as creating the LWP environment demanded by these firms will increase the attractiveness of the County to these firms and open opportunities to attract federal contractors from higher-cost jurisdictions. In targeting these firms, the County should highlight its significant local and out-commuting worker base as well as competitive real estate cost. The development of contractor and federal coworking and telecommuting space can also be an important component of the local placemaking strategy. The County can also work with Tech Frederick and the County Chamber of Commerce to create federal contracting working groups to facilitate cooperation between firms in this sector. The growth and performance of this sector will be linked to the County's placemaking strategy. The development of the space required for professional services firms coupled with the County's workforce assets is likely to support growth in this sector.

Action Items:

- Inventory/Market available space;
- Promote LWP space development;
- Market real estate/workforce assets to regional federal contractors/firms; and
- Promote linkages between County federal contractors/firms.

Transportation, Distribution, and Logistics: The key issues related to facilitating the growth and development of the transportation, distribution, and logistics cluster focus on placemaking, infrastructure, and workforce. The County should assess the inventory of available sites with sufficient size and offering highway/rail access and address congestion-related issues. In the area of workforce, the County should work with neighboring counties that provide a major portion of the current workforce as well as inventory the staffing/occupational needs of the sector and sufficiency of the County and regional workforce system to meet cluster needs. The County should market its competitive wages and real estate costs to position itself for the growth in regional warehousing, wholesale, and fulfillment center activities and as a regional logistics hub. To support this marketing effort, the County needs to inventory its available development properties and preserve properties appropriate for transportation, distribution, and logistics development.

Action Items:

- Inventory/Preserve/Market available space; and
- Work with Frederick County Workforce Services and regional workforce systems to identify labor market supply and demand conditions and meet sector needs.

Value-Added Agriculture: Frederick County has implemented strong agricultural preservation policies; however, the success of agricultural preservation depends on the ability of farmers to generate sufficient revenues to compete with alternative uses (i.e., development). Frederick County has benefitted from the transition in demand for locally produced agricultural and food products and is a leader in locally integrated wineries, breweries, and food processing. The County needs to

continue to promote increased linkages between local agriculture and both food processing and the hospitality and tourism cluster. As discussed in *Placemaking* above, the County needs to support zoning and permitting policies that promote alternative uses—events and tourism, local craft food processing—that support local farms moving up the value-added food chain.

Action Items:

- Continue integrated hospitality and tourism/value-added agriculture efforts;
- Continue to promote linkages between and across the agricultural and food processing sectors with dedicated OED staff;
- Work with Frederick County Workforce Services to identify labor market supply and demand conditions and address needs specific to the food processing and agricultural sector; and
- Support zoning and permitting policies to enhance value-added agricultural uses.

Manufacturing: Frederick County has specialized manufacturing activities in the biosciences cluster (pharmaceutical manufacturing) and the value-added agriculture cluster (food processing) as well as specialized and growing clusters of manufacturing activity in the construction materials and products and machinery and equipment sectors. Also, manufacturing accounts for six of the top 37 employers in Frederick County[31] While manufacturing outside of the biosciences and value-added agriculture clusters was not identified as a core target industry cluster for the County, the growth and expansion of manufacturing can be supported by being attentive to the workforce and other policy needs of the County's manufacturing community. The County should continue to capitalize on its competitive wages and real estate costs to position itself as a competitive manufacturing location within the greater Baltimore-Washington region.

Action Items:

- Work with Frederick County Workforce Services to identify labor market supply and demand conditions and address needs specific to manufacturing, including the biosciences-related pharmaceutical manufacturing and value-added agriculture–related-food processing activities;
- Promote dedicated community college training/apprenticeship programs across specialized construction materials, food processing, machinery, and pharmaceutical manufacturing subsectors.
- Inventory/Preserve/Market available space, including for-sale space for smaller manufacturers; and
- Develop manufacturing subcluster-specific marketing activities.

Strategic Priority: Branding and Proactively Marketing to Raise Awareness of Frederick County as a High-Quality Community in which to Live, Work, and Locate a Business

Situational Assessment

The vision of Frederick County as a great place to live, work, and raise a family came through in the interviews with local employers and economic development stakeholders. But, there is a continuing concern in the business community that the image of Frederick County does not measure up to the strength of the local economy. While some continued to feel that Frederick bears a stigma as a rural economy and not technology savvy, the bigger concern is that the image of Frederick as a bedroom

[31] http://www.discoverfrederickmd.com/major-employers.

community not offering high-quality jobs and careers is causing many high-skilled workers to seek jobs outside of the County and is setting limits to local business growth.

This concern is reflected in the data on population and workforce dynamics. Frederick is doing well in attracting a net in-migration of families from across Maryland. Still, almost half of the resident workforce with a bachelor's degree or higher is commuting to jobs outside of the County—well above the overall level of out-commuting—despite the fact that wages for high-skilled occupations in the County are close to or even above levels found across the region. This suggests the lack of awareness that Frederick County is not only a high-quality place to live, but also offers competitive career options.

So, the value of branding and marketing for Frederick goes beyond simply attracting businesses from outside of the County, but also serves as a critical tool for connecting with local residents to seek job opportunities in the County.

Ongoing Activities

Frederick County has been highly successful in marketing itself for tourism. The County has established Visit Frederick (The Tourism Council of Frederick County) as a public-private partnership dedicated to enhancing the economic benefit of tourism for Frederick County's businesses, attractions, local governments, and residents. With over 200 local member businesses, Visit Frederick operates a visitor center and carries out key marketing programs representing the diverse tourism assets in the County. Visit Frederick's successful tourism marketing campaign can serve as a model for marketing the strengths of the County both to its resident workforce as well as to the County and regional business community.

Recommended Actions

Action 11: Advance a branding and image marketing campaign focused on telling local residents, the region, and the nation of the emergence of Frederick County as an economically diverse, growing, and high-quality place to live, work, and locate a business.

In world of economic development, Frederick County is still largely considered a bedroom community and so has an opportunity to better define itself and its value-proposition. While current marketing efforts have been very successful in establishing a Frederick County brand and image for tourism and value-added agriculture, the County's rise in leading advanced industry clusters, such as the biosciences and computing and IT, is not well known. It is important that Frederick County establish a brand and image as a leading center for advanced industries to ensure that its targeted development efforts in these advanced industry clusters produce high-quality economic growth.

Frederick County needs to advance a better awareness of and credibility for its economic development opportunities in advanced industries. This needs to start by building a local awareness of the strengths for a wide range of skills and talent in the County's advanced industry clusters. Internal education and awareness-building efforts are key to a longer-term effort to shape the views by those across the region and the nation. The internal education efforts should be closely aligned with the overall branding campaign, but they also require a distinct set of activities. Efforts such as creating an advanced industry cluster ambassador program to reach schools and civic organizations and holding regular monthly and quarterly events are among the types of activities to be pursued. A key goal is to make meaningful connections between the region's cluster resources and the broader community, especially students and their families, and the overall business community.

While the “Work Where You Live” proposed action is an important one that will benefit from and reinforce branding and image marketing efforts for the County, it is not a sufficient brand to suggest the diverse economic strength and potentials found in Frederick.

The analysis of this strategic assessment of Frederick County’s economy can help in informing the brand, but a branding and image marketing consultant would be needed to formulate how best to convey the value proposition of Frederick County as a place with diverse economy, growing innovation activities, quality LWP locations, and a multitude of career opportunities. The idea of being a gateway, crossroads, hub, etc., may be key themes that can convey the breadth of Frederick County’s economic value.

Action 12: Pursue targeted marketing for key audiences in advanced industry clusters.

Along with establishing a branding and image marketing campaign around Frederick’s position in advanced industry clusters, a critical complement is to have targeted marketing to key audiences involved with advanced industries to raise awareness of the County across the region and the nation.

In the biosciences, a key targeted audience is top scientific talent, particularly in cancer and infectious disease research. This can involve targeted advertisements and earned media articles about the discoveries being made in Frederick County and the top talent living and working in Frederick County. The key assets at Fort Detrick, like all federal labs, do not have a budget to do this type of targeted marketing.

In the computing and IT cluster, Frederick County has organically developed a distinctive value proposition as a place for mid-career entrepreneurs to launch their businesses that is not well known even in Maryland. Of critical importance is marketing the entrepreneurial success stories found in Frederick County as a high-value business location to potential mid-career entrepreneurs. Professional associations and news sources on which mid-career entrepreneurs would focus could best reach them. An initial target are those mid-career professionals already living and working in the broad Baltimore-Washington DC region. It involves celebrating the existing entrepreneurs and telling their stories of success in Frederick County at State and regional technology and industry associations, through regional business news outlets, and at conferences taking place across the Washington DC region. More nationally, Frederick County needs to engage Tech Frederick in identifying national organizations and venues where the County can have a presence and work with its existing base of entrepreneurs to serve as ambassadors.

Strategy Conclusion: Assessment of Current Actions and Summary of Action Plans and Specific Performance Measures

Frederick County in the next 10 years can sustain the diversity of its industry clusters, which offers a wide range of jobs opportunities and bolsters the County's economic resiliency, while continuing to make the transition in driving its own higher-value growth in advanced industry clusters. The strategic action plan sets out four strategic priorities and 12 associated actions to accomplish this development path for Frederick County. It embeds industry cluster development within broader strategic priorities of workforce and talent development, placemaking, and branding and marketing, while prioritizing the targeted development of the County's biosciences and computing and IT clusters.

This concluding section offers important insights into the implementation of the proposed strategy and action recommendations, including the following:

- An assessment of ongoing actions of the County's OED relevant to the strategic priorities informing "go, stop, and change" guidance;
- Summary table of the overall strategy with insights into time frames for each of the actions as well as its cost implications; and
- Specific performance measures of success associated with the overall goal of the strategy and the four strategic priorities.

Assessing Ongoing Actions in Strategic Priority Areas

This strategic plan is best viewed as taking the additional steps for ensuring that Frederick County's economic development measures make the County a leading place in the region and the nation to live and work. The actions set out complement and build upon the ongoing economic development efforts and initiatives that the County has put in place in recent years by unifying and focusing the County's efforts around its industry clusters and their needs as it focuses on strengthening its economic foundations.

The strategy endorses the continuation of the following ongoing activities:

- Targeted cluster development efforts of the OED for advancing business development;
- Workforce Services efforts targeted to middle- and lower-skilled occupations as well as targeted industry training and skill upgrading with the FCC; and
- Expansion of FITCI and creation of the ROOT innovation hub for the County Economic Development in the downtown City of Frederick.

The strategy endorses the cessation of the following ongoing activities:

- Unutilized tax credit programs. These should be replaced by more targeted business development assistance, such as for tenant improvements for ensuring availability of high-quality commercial real estate for the biosciences and computing and IT clusters and growth capital funding for the computing and IT cluster.

The strategy endorses the modification of the following ongoing activities:

- Broadening of CREST's focus to developing curriculum with local higher education institutions to meet industry cluster-based skill requirements and to advancing a Frederick Talent Recruitment Project for college juniors and seniors in targeted STEM fields.

Table 27 summarizes the action plan recommended, offering insights into the time frames for each of the actions as well as its cost implications.

The time frames range from immediate actions to be accomplished in the next year, near-term actions that require one to three years, and longer-term actions that require four to five years to be accomplished.

The cost implications range from limited costs of under $100,000, modest costs of $100,000 to $500,000, and significant costs of more than $500,000.

Table 27: Summary of Recommended Actions by Strategic Priorities, Time Frames, and Cost Implications

Strategic Priority	Recommended Action	Time Frame	Cost Implications
Generating, Retaining, and Attracting a Skilled Workforce	Action 1: Create a staffing capacity to support industry cluster-based skill need identification and training approaches as a cornerstone of Frederick's workforce and talent development efforts.	Immediate	Modest
	Action 2: Advance a "Work Where You Live" Project.	Longer Term	Significant
	Action 3: Undertake a Frederick Talent Recruitment Project for college juniors and seniors in targeted STEM fields.	Longer Term	Modest
Improving Infrastructure and Placemaking	Action 4: Support placemaking across the County through planning and zoning policies.	Near Term	Limited
	Action 5: Support placemaking in the City of Frederick.	Longer Term	Significant
	Action 6: Support rural/municipal placemaking and agricultural needs.	Near Term	Limited
	Action 7: Assess infrastructure/transit needs.	Longer Term	Significant
Targeting Development Efforts for Industry Cluster Growth	Action 8: Focus biosciences targeted development strategy in Frederick County on outreach marketing and engagement to leverage the assets of Fort Detrick, and particularly FNLCR, as well as Frederick County's strategic location along the I-270 corridor.	Near Term	Modest
	Action 9: Focus computing and IT targeted development strategy on assisting the existing base of businesses to scale up and attract more mid-career entrepreneurs to locate in Frederick County.	Longer Term	Significant
	Action 10: Pursue project-specific initiatives to support other industry clusters as they are identified.	Longer Term	Significant
Branding and Pro-actively Marketing to Raise Awareness of Frederick County as a High-Quality Community in which to Live, Work, and Locate a Business	Action 11: Advance a branding and image marketing campaign focused on telling local residents, the region, and the nation of the emergence of Frederick County as an economically diverse, growing, and high-quality place to live, work, and locate a business.	Near Term	Modest
	Action 12: Pursue targeted marketing for key audiences in biosciences and computing and IT clusters.	Longer Term	Modest

Specific Performance Measures and Goals

It is important for any strategy to set meaningful goals that are bold, but realistic. For this strategic plan, Table 28 presents a robust set of performance measures for the overall goal of sustaining industry diversity with an increasing focus on high-quality economic growth and for each of the strategic priorities.

Table 28: Suggested Performance Measures and Goals for Strategy Priorities of Frederick County

Strategic Focus	Goals	Metric/Sources
Overall Strategic Goal: Sustaining industry diversity with an increasing focus on high-quality economic growth	Goal 1: Outpace the broad Baltimore-Washington region and the State in total job growth as well as average wage growth of jobs in Frederick County.	**Metric:** Industry Employment and Wages **Source:** QCEW
	Goal 2: Encourage growth across low-, middle-, and high-skilled occupations to reflect the broad diversity of Frederick County's economic base.	**Metric:** High-/Middle-/Low-Skilled Jobs **Source:** Occupational employment survey
Strategic Priority: Generating, Retraining, and Attracting a Skilled Workforce	Goal 3: Increase share of residents working in the County across educational levels demonstrating the ability of Frederick County's economy to support its local residents.	**Metric:** County Commuting Patterns—In County Employment **Source:** U.S. Census Bureau ACS
	Goal 4: Generate a positive net in-migration of high-educated workers and their families.	**Metric:** County Migration Patterns—Migration by Education **Source:** U.S. Census Bureau ACS
	Goal 5: Generate a positive net in-migration of population between 21 and 35 years old.	**Metric:** County Migration Patterns—Migration 21–35 Age Bracket **Source:** U.S. Census Bureau ACS
	Goal 6: Increase level of recent graduates from Frederick County higher education institutions and other Maryland universities working in the County.	**Metric:** Student Employment Placements **Source:** FCC, MSM, Hood College, Frederick County Workforce Services
Strategic Priority: Improving Infrastructure and Placemaking	Goal 7: Promote employment growth in central business district areas of Frederick County.	**Metric:** CBD Employment **Source:** City of Frederick
Strategic Priority: Targeting Development Efforts for Industry Cluster Growth	Goal 8: Outpace the broad Baltimore-Washington region and the State in job growth as well as average wage growth for the six identified industry clusters in Frederick County.	**Metric:** Industry Employment and Wages **Source:** QCEW
Strategic Priority: Branding and Proactive Marketing	Goal 9: Track number of social media hits about Frederick County's advanced industry development.	**Metric:** Tracking of news media stories, website visits, and other social media data

Appendix A—Targeted Industry Cluster Definitions

Frederick County Targeted Industry Cluster	NAICS Code	NAICS Description
Biosciences	325411	Medicinal and botanical manufacturing
	325412	Pharmaceutical preparation manufacturing
	325413	In-vitro diagnostic substance manufacturing
	325414	Other biological product manufacturing
	339116	Dental laboratories
	541711	Research and development in biotechnology
	621511	Medical laboratories
Computing and IT	454111	Electronic shopping
	454112	Electronic auctions
	511210	Software publishers
	517210	Wireless telecommunications carriers
	518210	Data processing, hosting, and related services
	519130	Internet publishing and broadcasting and web search portals
	541511	Custom computer programming services
	541512	Computer systems design services
	541513	Computer facilities management services
	541519	Other computer related services
Hospitality and Tourism	453920	Art dealers
	487110	Scenic and sightseeing transportation, land
	487210	Scenic and sightseeing transportation, water
	487990	Scenic and sightseeing transportation, other
	532292	Recreational goods rental
	561510	Travel agencies
	561520	Tour operators
	561591	Convention and visitors bureaus
	561599	All other travel arrangement services
	561920	Convention and trade show organizers
	711211	Sports teams and clubs
	711212	Racetracks
	711219	Other spectator sports
	712110	Museums
	712120	Historical sites
	712130	Zoos and botanical gardens
	712190	Nature parks and other similar institutions
	713110	Amusement and theme parks
	713120	Amusement arcades
	713210	Casinos, except casino hotels
	713290	Other gambling industries
	713920	Skiing facilities
	713930	Marinas
	713990	All other amusement and recreation industries
	721110	Hotels and motels, except casino hotels
	721120	Casino hotels
	721191	Bed-and-breakfast inns
	721199	All other traveler accommodation
	721211	RV parks and campgrounds
	721214	Recreational and vacation camps
	721310	Rooming and boarding houses

Frederick County Targeted Industry Cluster	NAICS Code	NAICS Description
Professional, Engineering, Scientific, and Technical Services	541310	Architectural services
	541330	Engineering services
	541340	Drafting services
	541380	Testing laboratories
	541611	Administrative management consulting services
	541612	Human resources consulting services
	541620	Environmental consulting services
	541690	Other technical consulting services
	541712	Other physical and biological research
	541720	Social science and humanities research
Transportation, Distribution, and Logistics	42 (all)	Wholesale trade
	484110	General freight trucking, local
	484121	General freight trucking, long-distance TL
	484122	General freight trucking, long-distance LTL
	484210	Used household and office goods moving
	484220	Other specialized trucking, local
	484230	Other specialized trucking, long-distance
	486110	Pipeline transportation of crude oil
	486210	Pipeline transportation of natural gas
	486910	Refined petroleum product pipeline transportation
	486990	All other pipeline transportation
	488119	Other airport operations
	488190	Other support activities for air transport.
	488210	Support activities for rail transportation
	488490	Other support activities for road transportation
	488510	Freight transportation arrangement
	488991	Packing and crating
	488999	All other support activities for transportation
	492110	Couriers and express delivery services
	492210	Local messengers and local delivery
	493110	General warehousing and storage
	493120	Refrigerated warehousing and storage
	493130	Farm product warehousing and storage
	493190	Other warehousing and storage
	541614	Process and logistics consulting services
	561910	Packaging and labeling services

Frederick County Targeted Industry Cluster	NAICS Code	NAICS Description
Value-Added Agriculture	111110	Soybean farming
	111120	Oilseed, except soybean, farming
	111130	Dry pea and bean farming
	111140	Wheat farming
	111150	Corn farming
	111160	Rice farming
	111191	Oilseed and grain combination farming
	111199	All other grain farming
	111211	Potato farming
	111219	Other vegetable and melon farming
	111310	Orange groves
	111320	Citrus, except orange, groves
	111331	Apple orchards
	111332	Grape vineyards
	111333	Strawberry farming
	111334	Berry, except strawberry, farming
	111335	Tree nut farming
	111336	Fruit and tree nut combination farming
	111339	Other no citrus fruit farming
	111411	Mushroom production
	111419	Other food crops grown under cover
	111421	Nursery and tree production
	111422	Floriculture production
	111910	Tobacco farming
	111920	Cotton farming
	111930	Sugarcane farming
	111940	Hay farming
	111991	Sugar beet farming
	111992	Peanut farming
	111998	All other miscellaneous crop farming
	112111	Beef cattle ranching and farming
	112112	Cattle feedlots
	112120	Dairy cattle and milk production
	112210	Hog and pig farming
	112310	Chicken egg production
	112320	Broilers and meat type chicken production
	112330	Turkey production
	112340	Poultry hatcheries
	112390	Other poultry production
	112410	Sheep farming

Frederick County Targeted Industry Cluster	NAICS Code	NAICS Description
Value-Added Agriculture—Continued	112420	Goat farming
	112511	Finfish farming and fish hatcheries
	112512	Shellfish farming
	112519	Other aquaculture
	112910	Apiculture
	112920	Horses and other equine production
	112930	Fur-bearing animal and rabbit production
	112990	All other animal production
	113110	Timber tract operations
	113210	Forest nursery and gathering forest products
	113310	Logging
	114111	Finfish fishing
	114112	Shellfish fishing
	114119	Other marine fishing
	114210	Hunting and trapping
	115111	Cotton ginning
	115112	Soil preparation, planting, and cultivating
	115113	Crop harvesting, primarily by machine
	115114	Other postharvest crop activities
	115115	Farm labor contractors and crew leaders
	115116	Farm management services
	115210	Support activities for animal production
	115310	Support activities for forestry
	311111	Dog and cat food manufacturing
	311119	Other animal food manufacturing
	311211	Flour milling
	311212	Rice milling
	311213	Malt manufacturing
	311221	Wet corn milling
	311222	Soybean processing
	311223	Other oilseed processing
	311225	Fats and oils refining and blending
	311230	Breakfast cereal manufacturing
	311311	Sugarcane mills
	311312	Cane sugar refining
	311313	Beet sugar manufacturing
	311320	Confectionery manufacturing from cacao beans
	311330	Confectionery mfg. from purchased chocolate
	311340	Nonchocolate confectionery manufacturing
	311411	Frozen fruit and vegetable manufacturing

Frederick County Targeted Industry Cluster	NAICS Code	NAICS Description
Value-Added Agriculture—Continued	311412	Frozen specialty food manufacturing
	311421	Fruit and vegetable canning
	311422	Specialty canning
	311423	Dried and dehydrated food manufacturing
	311511	Fluid milk manufacturing
	311512	Creamery butter manufacturing
	311513	Cheese manufacturing
	311514	Dry, condensed, and evaporated dairy products
	311520	Ice cream and frozen dessert manufacturing
	311611	Animal, except poultry, slaughtering
	311612	Meat processed from carcasses
	311613	Rendering and meat byproduct processing
	311615	Poultry processing
	311711	Seafood canning
	311712	Fresh and frozen seafood processing
	311811	Retail bakeries
	311812	Commercial bakeries
	311813	Frozen cakes and other pastries manufacturing
	311821	Cookie and cracker manufacturing
	311822	Mixes and dough made from purchased flour
	311823	Dry pasta manufacturing
	311830	Tortilla manufacturing
	311911	Roasted nuts and peanut butter manufacturing
	311919	Other snack food manufacturing
	311920	Coffee and tea manufacturing
	311930	Flavoring syrup and concentrate manufacturing
	311941	Mayonnaise, dressing, and sauce manufacturing
	311942	Spice and extract manufacturing
	311991	Perishable prepared food manufacturing
	311999	All other miscellaneous food manufacturing
	312111	Soft drink manufacturing
	312112	Bottled water manufacturing
	312113	Ice manufacturing
	312120	Breweries
	312130	Wineries
	312140	Distilleries
	312210	Tobacco stemming and redrying
	312221	Cigarette manufacturing
	312229	Other tobacco product manufacturing