

Innovation in the Regional Economy

Importance

Nationally, young firms play a central role in the creation of new employment opportunities. High-tech companies are particularly important to job creation: over 9% of average annual net job creation from 1990-2011 is due to high-tech firms younger than 5 years old. All private firms younger than 5 years old created less than 6% of average annual net job creation.

Young, innovative companies have generated the majority of new jobs in Greater Baltimore over the past 5 years. This trend is consistent with similar metropolitan regions and the country as a whole. New technologies, research, and ideas spawn new teams, divisions, and entire companies. Continuing to support and encourage innovation is imperative to sustaining growth in the Greater Baltimore economy.

Also integral to innovation is educating and preparing the next wave of knowledge professionals. Currently, over 55,000 students are enrolled in STEM programs at higher education institutions in Maryland. In addition to education in in-demand fields, 60% of young professionals believe innovation can be learned and 78% of young professionals want to work for innovative companies. Building an innovative economy and workforce creates a virtuous cycle featuring continued attraction of employers and human capital as well as continued innovation.

Increased corporate revenue and employee productivity has been linked to product innovation. Process innovation is linked to real output. This is promising for Greater Baltimore, as the region's economic foundation is built on technology-dependent industries like BioHealth and Cyber Security. Innovation in these industries will improve the efficacy of Greater Baltimore firms and spur the birth and growth of new companies with further innovative ideas.

Net New Jobs Created by Establishment Openings & Expansions in Greater Baltimore



Source: YourEconomy.org, EAGB

60%

of US Net Job Creation occurs in firms 1 to 5 years old
2007

#4

High-tech business formation

33%

of Millennials believe innovation is one of the main purposes of business

Source: Deloitte

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Innovation Clusters

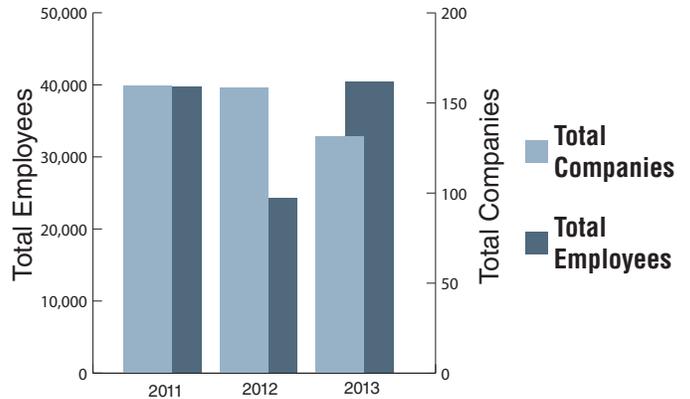
The urban clustering of institutions and organizations gives rise to new and exciting innovations. Known as innovation districts, areas surrounding anchor institutions that include startups, incubators, and accelerators, and encourage networking are responsible for much of the growth in the country's population and economy.

Greater Baltimore is home to a number of pockets of innovation. The areas surrounding research universities and hospitals like Johns Hopkins University and the University of Maryland Medical School are dense with related firms and spin-off companies. Historic waterfront neighborhoods and planned urban communities like Federal Hill and Columbia, respectively, have become bastions of technology innovation.

Each county within Greater Baltimore has recognized the importance of and the need for the clustering of innovation assets, and each has realized this clustering in different ways. In Harford County, Aberdeen Proving Ground provides an anchor. In Baltimore County, clustering occurs around the University of Maryland, Baltimore County and the university-affiliated bwtech@UMBC Research & Technology Park. Fort Meade and the Johns Hopkins University Applied Physics Laboratory serve as an anchor for Howard and Anne Arundel Counties. As a result, Greater Baltimore boasts one of the strongest and most resilient economies in the country.

Innovation districts also attract the world's greatest talent. Human capital is chiefly important to innovation, and the generation of young professionals currently aged 18-35 is actively leading the country in educational attainment and entrepreneurial activity. Greater Baltimore has experienced significant growth in its population of this Millennial generation and has grown faster than the country in this respect, but has been outpaced by competing markets.

Inc. 5,000 Companies in Maryland & Number of Employees at Inc. 5,000 Companies in Maryland



Source: Inc 5,000 2012-2014

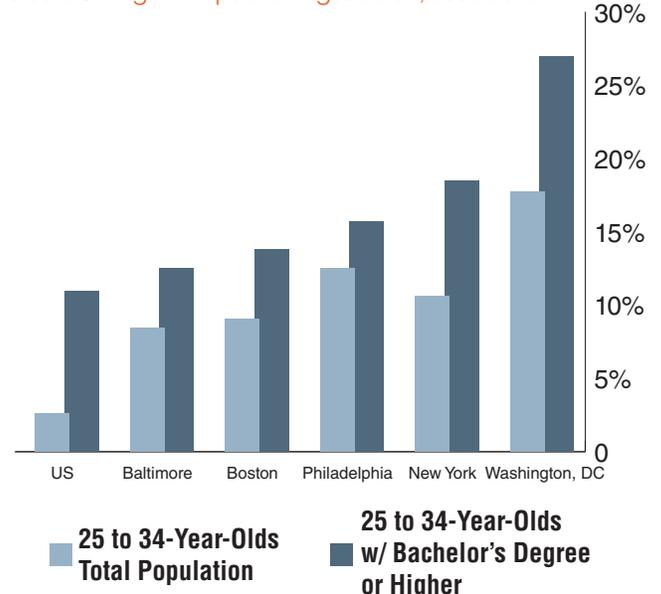
135,000

New establishment openings
in Greater Baltimore
2009-2013

14

Business incubators
in Greater Baltimore

Percent Change in Population Ages 25-34, 2008-2012



Source: US Census Bureau, ACS, EAGB

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Innovation Across Industries

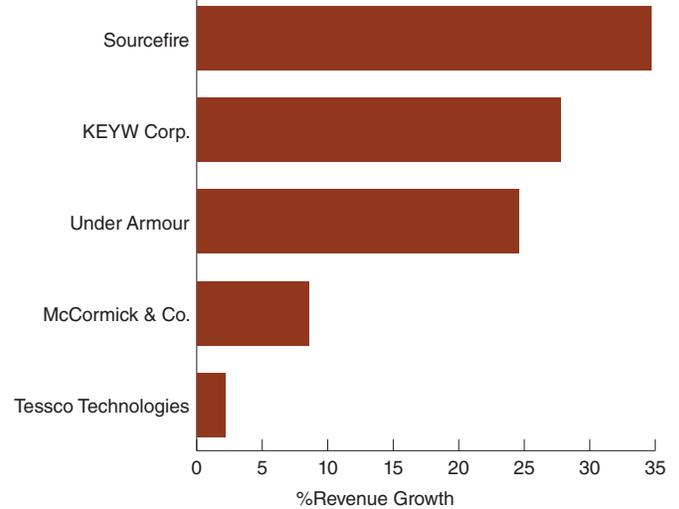
Innovation occurs in many ways across all industries; formulating new products and processes is not limited to the technology sector. Greater Baltimore is home to companies in food products, aviation, manufacturing, and clothing that rely on and excel in product innovation.

McCormick & Co. celebrates changing culinary tastes by forecasting trends in food flavoring. The Baltimore County company adds innovative and international flavors to its product line to help restaurants and families create new menu items. McCormick enlists the help of food innovators, customer feedback, the McCormick Science Institute, and sixteen Technical Innovation Centers to build a healthy and pioneering line of spices.

Middle River Aircraft Systems (MRAS) institutes high-efficiency operations like lean manufacturing processes. The company uses composite materials to craft lighter, quieter, and less expensive airplane parts, which are all created on-site. MRAS also employs 3D printing technology to rapidly build inexpensive, working prototypes of new parts.

Baltimore-based Under Armour is built on innovation. The company was the first to produce an innovative exercise material in response to the challenges faced by college athletes and it hasn't stopped creative production since. Today, Under Armour is working to include wearable technology for more comprehensive workout tracking, creates new athletic shoe designs, and implements 3D printing technology to prototype and fabricate materials that were previously impossible. Under Armour facilitates innovation days around the world in which customers can pitch the company on new product ideas.

Fastest-Growing Public Companies in Greater Baltimore
Select Companies, 2011-2012 Revenue Growth

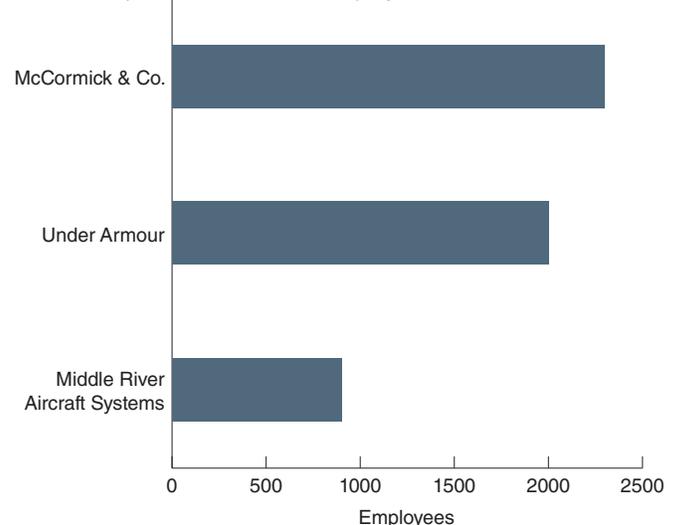


Source: Baltimore Business Journal, 2014



Source: US Chamber of Commerce

Largest Manufacturing Companies in Greater Baltimore
Select Companies, 2013 Local Employees



Source: Baltimore Business Journal, 2014

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Improvement

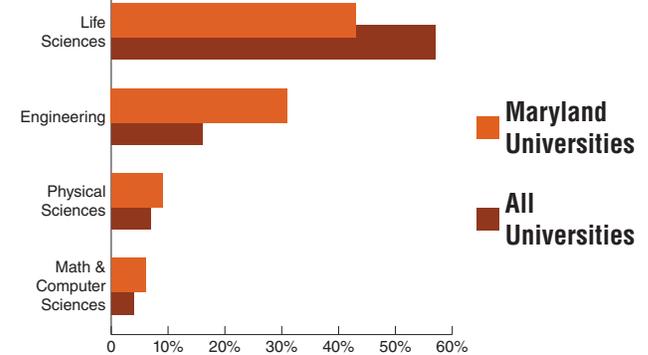
The US Chamber of Commerce ranks the State of Maryland first in the country for Innovation and Entrepreneurship. This ranking is driven by a great deal of research and development expenditures and a high concentration of STEM jobs, yet the State lags in its birthrate of new businesses and commercialization of new technologies. There exists a considerable opportunity to improve Greater Baltimore and Maryland's innovation economies.

Despite the prolific research and development at universities like John Hopkins University and the University of Maryland Baltimore, Greater Baltimore's prominent research institutions tend to commercialize fewer developments and reap less in product royalties than similarly-sized universities elsewhere. Maryland's universities typically spend more of their annual research and development budgets on commercially relevant fields like Computer Sciences and Engineering than the national average. Maryland ranks 21st nationally and records just 5.3 patents per 1,000 people.

While the Baltimore-Washington region tends to lag other large markets like Silicon Valley, Boston, and New York in venture capital investment, it's become clear that the region is rapidly absorbing significant funding from investors. The growth of Cyber Security and the high-tech economy has pushed investment to these fields. The proliferation of government research and technology, top universities, and a young population has led the Baltimore-Washington corridor to grow tech-focused industries, and as a result, the region is receiving more investment attention than in the recent past.

Further, due to the economic downturn, the trend of outsourcing research and development to universities, nonprofits, and small businesses has also led to new investment in and acquisition of Baltimore-based firms.

Percentage of Total Higher Education R&D Expenditures
Select Fields, FY 2012



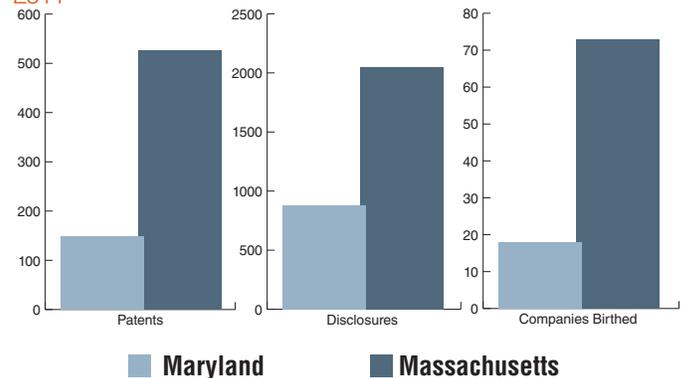
Source: National Science Foundation

331 Members at
Greater Baltimore's
5 largest incubators

Source: Baltimore Business Journal

>>> Google and Johns Hopkins University are teaming up to speed up technology commercialization. Google will help fund joint technology projects at JHU.

Patents, Disclosures, & Companies Birthed
from Academic Research Institutions in Maryland & Massachusetts
2011



Source: Association of University Technology Managers

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Goals

Culture

Organizations in Greater Baltimore should aim to correct the past trend of failing to commercialize research. The considerable amount of federal funding and technology existing in and around the region should position Greater Baltimore to be a leader in new business formation, job creation by young firms, and technology commercialization.

By moving more research to the consumer marketplace, Greater Baltimore universities and federal facilities can realize regular income similar to peer research institutions from around the country.

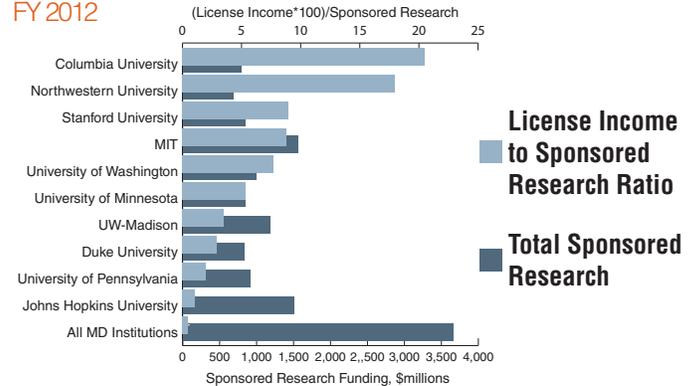
Capital

There must also be a focus on reducing aversion to risk in the foundation and funding of new firms. Closing the gap between risk capital in the Baltimore-Washington corridor and funding in competing markets will require a greater interest in seeking that capital to commercialize research. Greater Baltimore's existing culture of impressive innovation can be adapted to instill a culture of technology transfer and new business formation.

Education

As the next generations of innovators and entrepreneurs reach high schools, universities, and the workforce, they must be adequately prepared for a changing professional environment. Advancements in and adoption of education technology tools is an important first step in ensuring digital literacy. Continued efforts to spur relevant student learning and entrepreneurship are needed to qualify the next generation of business creators. Indeed, the region is well on its way to doing so: Johns Hopkins University and the University of Maryland, College Park rank among the 50 best colleges for entrepreneurs.

License Income and Sponsored Research at Universities
FY 2012



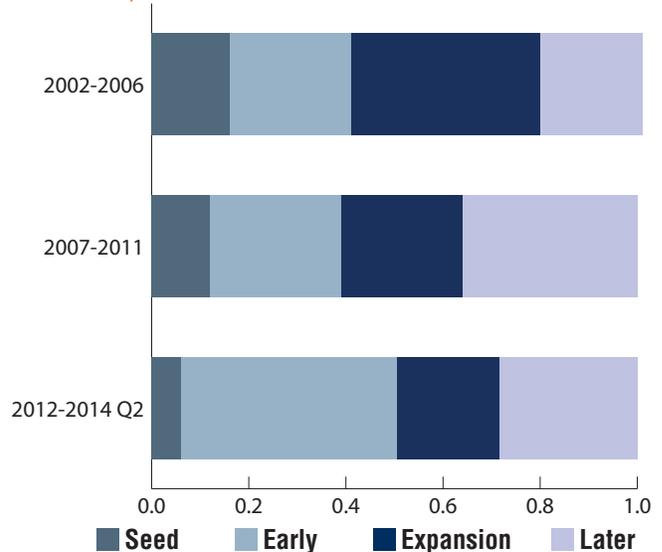
Source: Johns Hopkins University Committee on the Innovation Ecosystem, Association of University Technology Managers

Note: Maryland University information is for FY 2011

TEDCO Application & Funding Trends
2014



Percentage of Venture Capital Deals by Investment Stage
DC/Metroplex



Source: Pricewaterhouse Coopers MoneyTree, EAGB