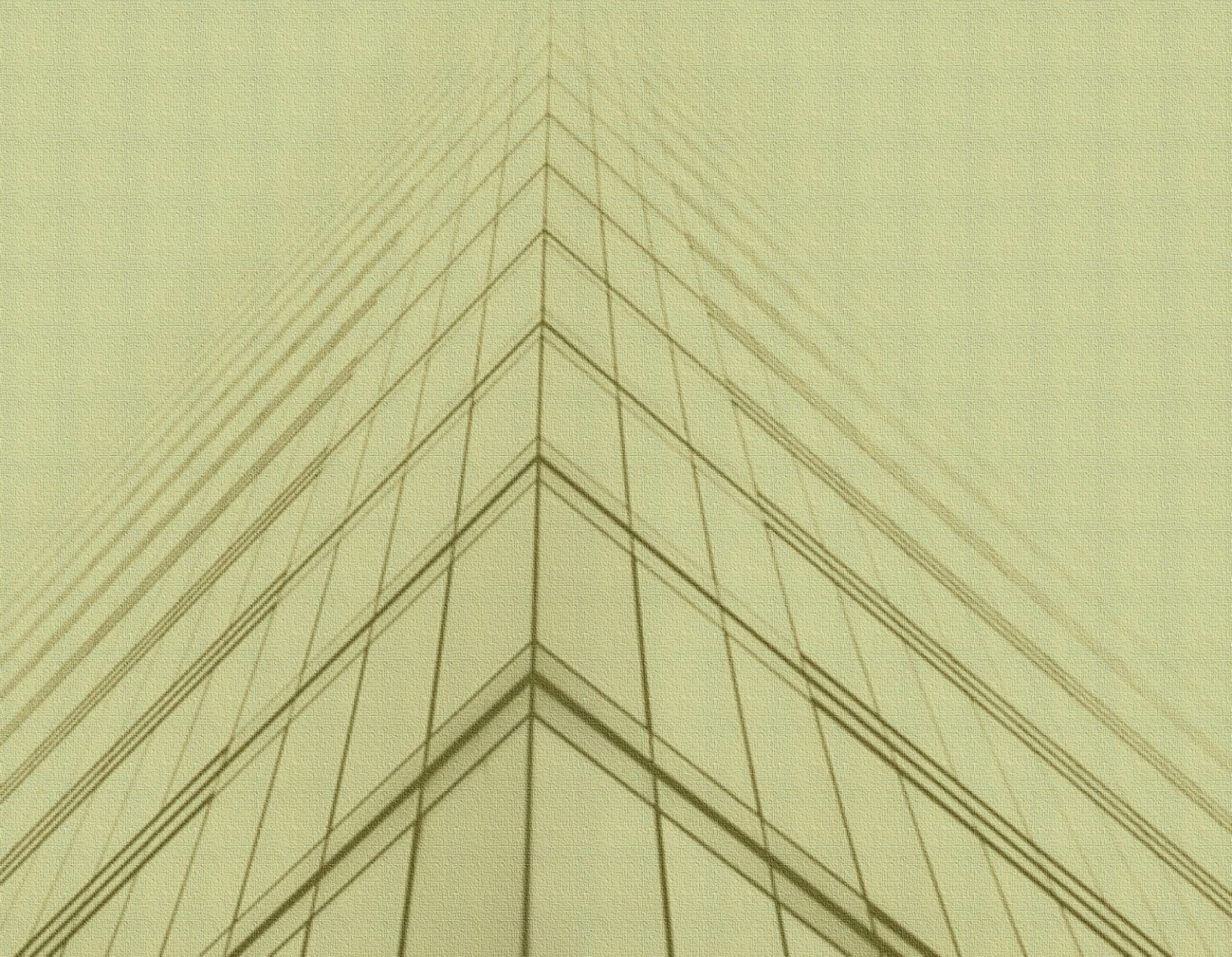


Northern Virginia On the Cusp of Greatness



Jason Shapiro (MBA'19)

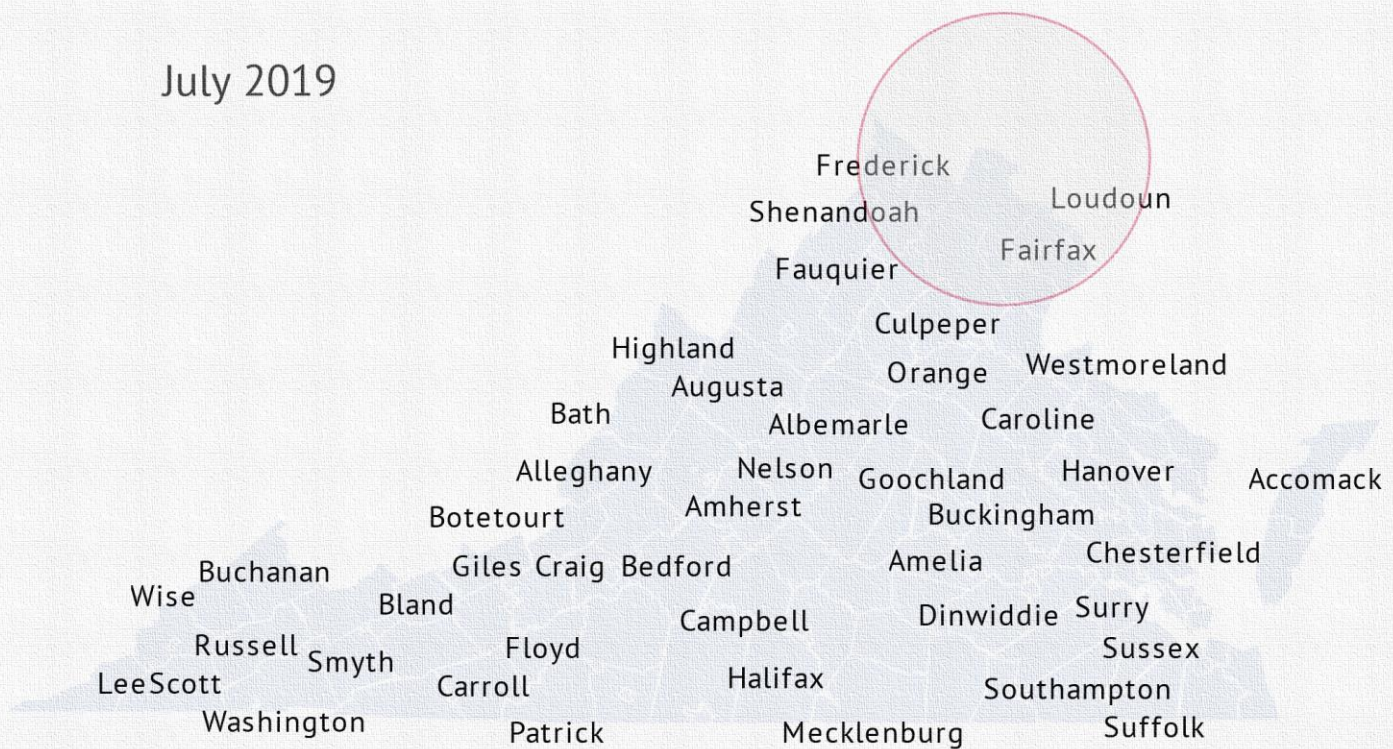
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For nearly 40 years, Northern Virginia has been on the cusp of being the next big entrepreneurial ecosystem, on par with thriving regions like Silicon Valley and greater Boston. In 1983, the Washington Post published, “Virginia Needs High-Tech Brain Pool,” highlighting the growing needs of the burgeoning entrepreneurial community.¹ Mark Warner, then an accomplished entrepreneur and later a U.S. senator, penned an editorial in 1994 titled “A Chance to Become Silicon Valley East.”² In 2000, the Greater Washington Board of Trade hosted a session named “Can Washington Region Really Go from Government Town to Innovative Region?”³

About 40 years have passed since the idea of Northern Virginia becoming a technological hotbed first began, and much has changed—but the conversation still sounds remarkably similar. The region has seen the rise and fall of giants such as AOL and MCI. Its economy has endured a steady shift away from the federal government. Today, optimism is at an all-time high with the announcement of Amazon’s decision to build their “HQ2” at National Landing in Arlington. Will this time be different?

The ecosystem has certain strengths that it is learning to leverage. A disproportionately large number of universities within a central radius enables Northern Virginia to have one of the most educated workforces in the nation. Its proximity to the federal government provides not only access to the world’s largest technology customer, but also a resilient foundation for funding and employment opportunities. Further, a history of innovation and entrepreneurship gives the community momentum to continue.

However, questions remain. The nature of government bureaucracy has never lent itself to taking the risks necessary for high-growth innovation. Hard sciences R&D spending at those same universities lags behind peers, challenging the region’s ability to innovate at a high level. The technology bubble’s burst in the early 2000s halted the region in its tracks, slowing entrepreneurship for almost a decade. Today we find ourselves in the middle of one of the longest expansions in US history, fueled in part by a similar rise of technology and innovation. Will the region be more resilient this time around?

This report is split into three main sections. First is a contextual overview of the Northern Virginia region, economy and technology ecosystem. The second is a history of the regional entrepreneurial ecosystem, starting with the post-World War II time period and ending with the most recent expansion. The third section provides commentary on the current trends and events in the ecosystem. The bulk of the information and context was collected through first person interviews with a variety of the region’s stakeholders. The remainder of the sourcing comes from articles and online resources. Our hope is that this briefing provides insight into the ecosystem as it is today and imagine what it might be tomorrow.

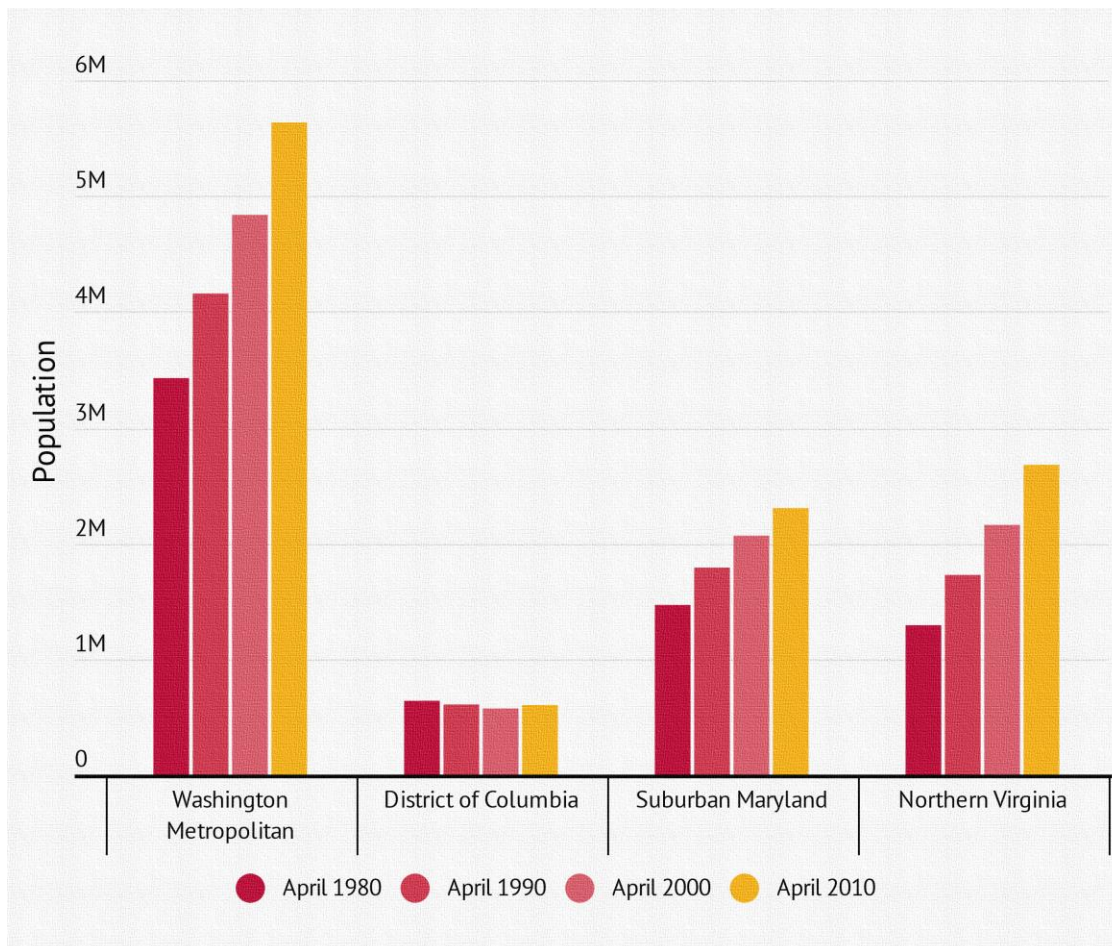
¹ Virginia Needs High-Tech Brain Pool. The Washington Post. 1983.

² Warner, Mark. A Chance to Become Silicon Valley East. The Washington Post. 1994.

³ The Greater Washington Board of Trade: Can Washington Really Go from Government Town to Innovative Region? PR Newswire. 2000.

THE NORTHERN VIRGINIA REGION

Northern Virginia, often referred to as NOVA, is a major metropolitan area across the Potomac River from the District of Columbia (Washington, D.C.), the capital of the United States. With ever expanding boundaries, the region is roughly defined as including the counties of Arlington, Fairfax, Loudon and Prince William and the cities of Alexandria, Falls Church, Manassas and Manassas Park. Home to an estimated 2.9 million residents, Northern Virginia's population has outpaced the growth of D.C. and suburban Maryland, accounting for 60 percent of new residents to the region since 1980.⁴



Source⁵

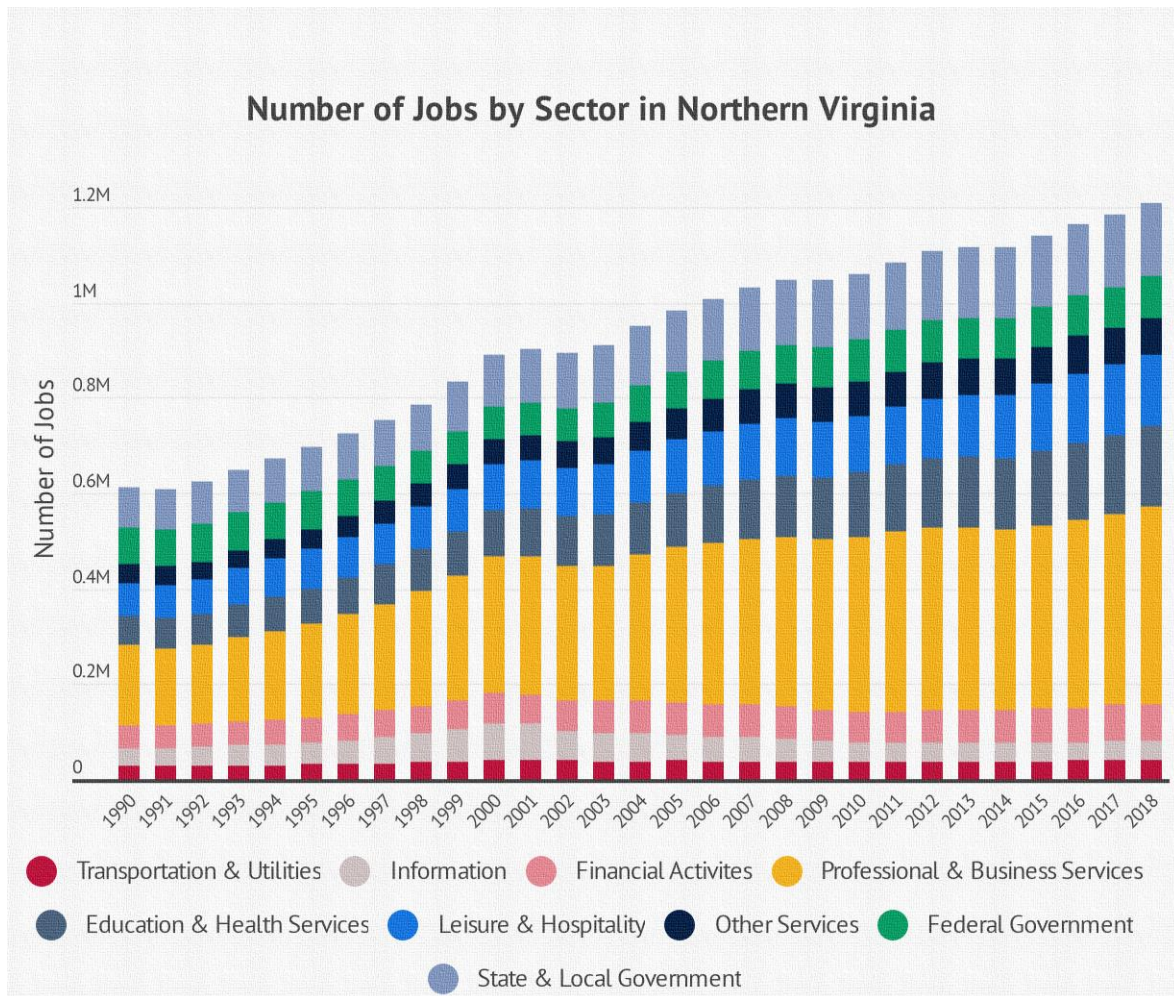
Described as the “economic engine of the state” by former Virginia Governor Bob McDonnell, the region is prosperous, resilient and talented.⁶ Northern Virginia is home to ten Fortune 500 companies, and four Fortune 200 companies, including Freddie Mac (finance), General

⁴ Fuller, Stephen. Data-Population by Sub-State Area. The Stephen S. Fuller Institute for Research on the Washington Region's Economic Future. <https://sfullerinstitute.gmu.edu/research/data/> [Accessed April 17, 2019]

⁵ Census, U.S. Population. 2017.

⁶ Hubler, David. Virginia's New Governor Keeps Focus on Jobs and Technology. Washington Technology. <https://washingtontechnology.com/articles/2010/01/27/mcdonnell-it-companies-virginia.aspx> January 27, 2010.

Dynamics (defense), Capital One (finance), and Northrop Grumman (defense)⁷. The economy is subdivided into a range of industries, with surprisingly only 6 percent of jobs in 2018 belonging directly to the Federal government. Most notably, “Professional & Business Services,” which includes Federal contractors, accounts for 28 percent of jobs, followed by “Education & Health Services” and “Leisure & Hospitality” with 11 percent and 10 percent, respectively.⁸ These jobs are held by one of the most highly skilled labor pools in the country. Approximately 60 percent of residents have earned a bachelor’s degree or higher, doubling the national average of 30 percent.^{9 10}



Source¹¹

⁷ Greater Washington Loses Two Companies on Fortune 500. Washington Business Journal. May 29, 2018. <https://www.bizjournals.com/washington/news/2018/05/29/greater-washington-loses-two-companies-on-fortune.html> [Accessed April 17, 2019].

⁸ Fuller, Stephen. Data-Jobs by Sector and Sub-State Area. The Stephen S. Fuller Institute for Research on the Washington Region's Economic Future. . <https://sfullerinstitute.gmu.edu/research/data/> [Accessed April 17, 2019].

⁹ Northern Virginia Profile. Virginia Economic Development Partnership.

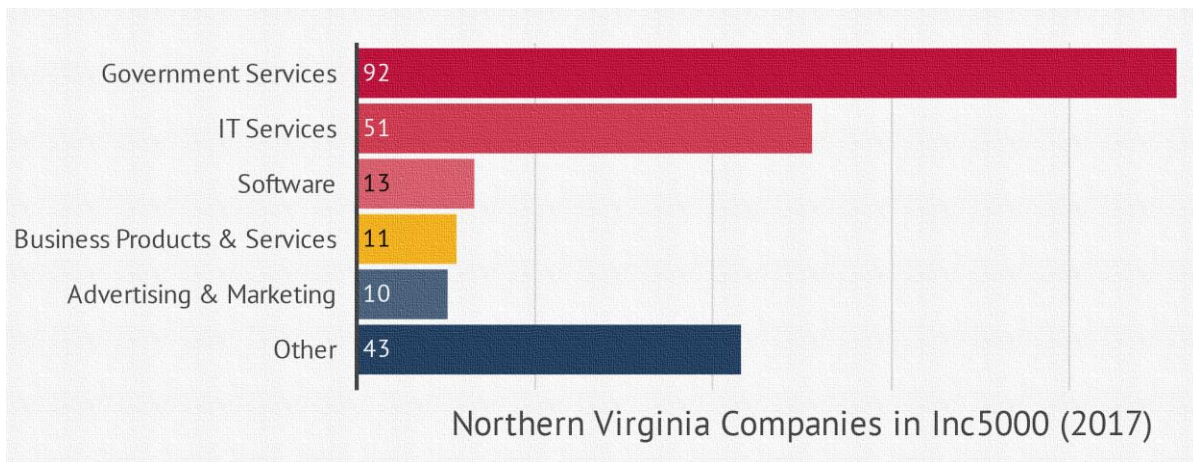
¹⁰ Percentage of The Population Aged 25 and over Who Have Completed a Bachelor's Degree in The U.S. in 2017, by State. US Census Bureau, 2018.

¹¹ Civilian, Non-Farms Jobs by, Northern Virginia. U.S. Bureau of Labor Statistics, 2019.

Despite the small amount of direct employment, the Federal government is the bedrock of the community, serving as a customer to local businesses, a source of talent, a funding source for research and innovation, and an employer. Key local agencies and research organizations of the Federal government include the Department of Defense, Central Intelligence Agency, Transportation Security Administration, the Defense Advanced Research Projects Agency and the National Science Foundation, among others. In 2016, Federal procurement spending in Northern Virginia totaled \$38 billion, which was about 50 percent of spending in the entire D.C. region and 10 percent of the U.S. total.¹² Further, the state of Virginia ranked fourth in federal R&D spending as a percentage of GDP in 2015, with R&D accounting for 1.6 percent of the state’s economy.¹³

THE NOVA TECH SECTOR

The tech and entrepreneurial sector in Northern Virginia is vibrant and growing, driven by both the private and public sector. The Inc5000, a ranking of America’s top 5,000 startups, included 220 from the Northern Virginia Region in 2017.¹⁴ Government services and IT services businesses make up 42 percent and 23 percent of the total, respectively.



Note: Includes all companies from Northern Virginia to be listed on the Inc5000 in the 2007 – 2017 time period. Other includes HR, security, construction, media, health and telecommunications, among others.¹⁵

The public sector has incubated a rapidly growing cybersecurity sector with talent being drawn from those who formerly served in the intelligence community.¹⁶ Most recently, Amazon concluded an extensive search for its “HQ2” (i.e., second headquarters) by committing to Crystal City, Arlington, seen as many as a stamp of approval for the region’s technology capabilities.

¹² Federal Procurement Spending in the Washington Region: 2008 - 2016. Waters, Keith. The Stephen S. Fuller Institute for Research on the Washington Region's Economic Future, 2017.

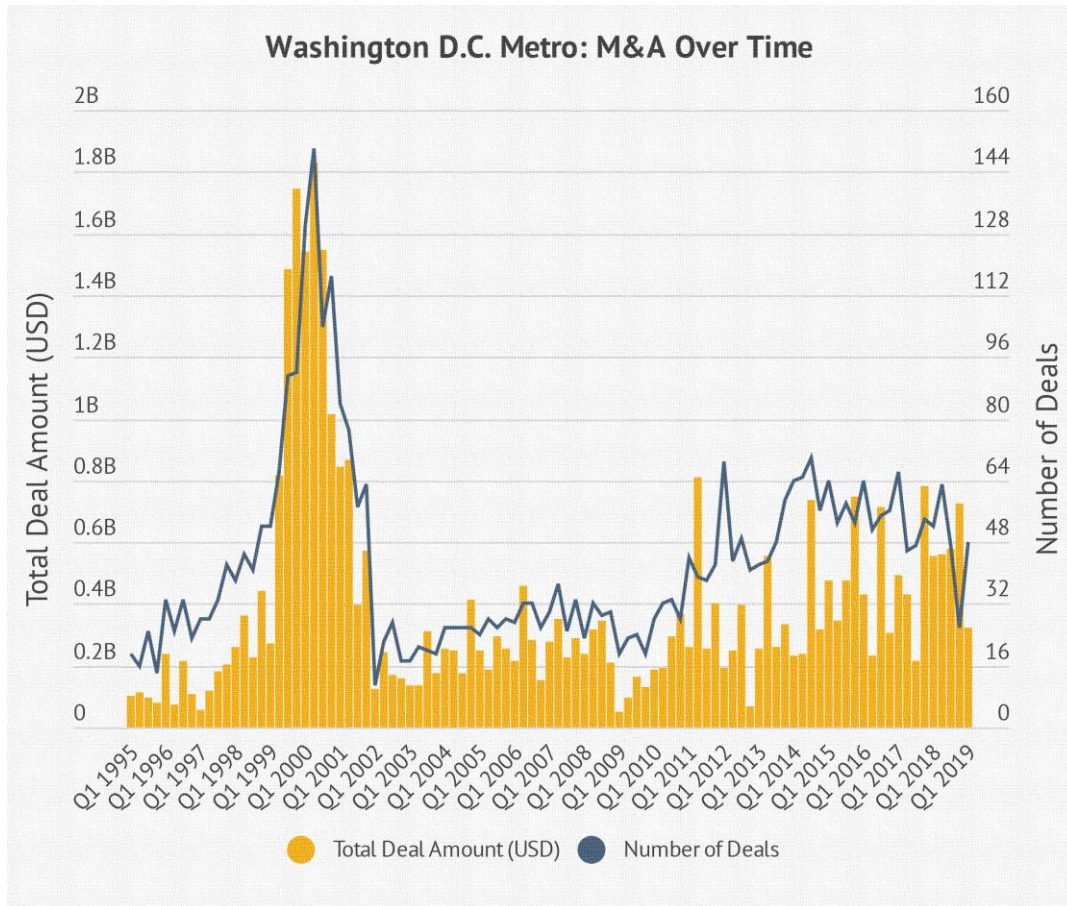
¹³ Innovation and Entrepreneurship. Virginia Performs. http://vaperforms.virginia.gov/economy_landE.cfm [Accessed April 17, 2019].

¹⁴ Inc5000. Inc., 2017.

¹⁵ Inc.com. Inc5000. 2007-2017.

¹⁶ Gordon, Rick. Former Managing Partner, MACH37. April 15, 2019.

Dayna Grayson, partner at New Enterprise Associates (NEA), a Silicon Valley pioneer and a long-standing venture capitalist in the region, noted several of the recent startup success stories for Northern Virginia.¹⁷ In April 2016, Vista Equity Partners announced the acquisition of Cvent, a McLean-based event management cloud software developer.¹⁸ In May 2016, Oracle acquired Opower, an Arlington-based provider of customer engagement and energy efficiency cloud services to utilities.¹⁹ Whereas in the dot-com boom when activity started from nothing, spiked dramatically, and disappeared, the investment activity in the region has been steady for several years now.



Source²⁰

In 2016, Pitchbook released a report that ranked the greater Washington, D.C. region as the eighth largest venture capital ecosystem by metropolitan statistical area (“MSA”) in the country. As the data shows, there are several “giant” MSAs, including San Francisco, San Jose, New York

¹⁷ Grayson, Dayna. Partner, New Enterprise Associates [Accessed April 25, 2019].

¹⁸ Bing, Chris. Cvent Is Acquired for \$1.65 Billion By Vista Equity Partners. DC Inno. April 18, 2016.

<https://www.americaninno.com/dc/cvent-cvt-is-acquired-by-vista-equity-partners-for-1-65-billion/> [Accessed April 30, 2019].

¹⁹ Oracle Buys Opower. Oracle. May 2, 2016. <https://www.oracle.com/corporate/pressrelease/oracle-buys-opower-050216.html> [Accessed April 30, 2019].

²⁰ CBInsights, PwC /. MoneyTree Data Explorer.

[<https://www.pwc.com/us/en/industries/technology/moneytree/explorer.html#/>]

and Boston (with Los Angeles not far behind). Excluding these ecosystems, D.C. is very competitive—ranking second on total VC funds raised and in-line with peers on funds invested and number of VC rounds.

VC Ecosystem, Ranked (\$ in billions)	Total VC Funds Raised since 2006	Total VC Invested since 2010	Total # of VC Rounds since 2010	Total Exit Value since 2010	Average MOIC
San Francisco	\$117.6	\$101.4	9,710	\$90.8	8.6x
San Jose	35.5	43.3	4,152	63.5	8.6x
New York	43.6	33.9	6,174	17.6	7.7x
Boston	41.2	30.7	3,664	28.7	11.3x
Los Angeles	2.7	21.3	3,403	11.2	12.5x
Seattle	7.6	8.4	1,717	6.7	9.3x
Chicago	3.4	8.3	1,348	10.0	8.6x
Washington, D.C.	4.8	8.2	1,416	7.4	9.3x
San Diego	1.5	9.4	1,317	8.7	14.7x
Austin	1.9	6.6	1,376	3.7	6.4x
Philadelphia	3.0	4.8	1,003	5.4	6.6x
Atlanta	1.2	5.0	837	7.8	8.4x

Note: Average MOIC data includes companies that raised at least \$500k in VC funding and completed a full exit from that investment (acquisition or IPO) in the 2006 – 2018 timeframe. Average MOIC for San Francisco and San Jose are assumed the same, due to data availability.^{21 22}

The level of innovation in the region, as evidenced by its patent count, has been reliably stable over time. Virginia still ranks 20th in the number of patents registered with the U.S. Patent Office.²³ Other indications of innovation, as evidenced by R&D spend, show Virginia as middle of the pack in R&D spending. While the federal government has supported that spend over time, following sequestration in 2013, researchers have been forced to find funding from other sources.²⁴

²¹ US Venture Ecosystem. Pitchbook, 2016.

²² Tom, Mikey. Which US Cities Generate the Best VC Returns? 2018. <https://pitchbook.com/news/articles/which-us-cities-generate-the-best-vc-returns> [Accessed April 30, 2019].

²³ Utility Patents Per State Over Time. U.S. Patent and Trademark Office. <https://developer.uspto.gov/visualization/utility-patents-state-over-time> [Accessed April 30, 2019].

²⁴ Research & Development. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/research-and-development/> [Accessed May 3, 2019].

HISTORY OF THE NOVA REGION

POST-WORLD WAR II

THE GROWTH OF THE FEDERAL GOVERNMENT (1945 - 1989)

Following World War II, the federal government rapidly expanded spending, necessitating a geographic expansion from Washington, D.C. across the river into Northern Virginia. Construction on the Pentagon began in Arlington, Virginia on September 11, 1941.²⁵ This movement led to a necessary build-up of residential and commercial activity—primarily in real estate—all to support the federal government.²⁶ A critical connection to the broader region occurred in the early 1970s, when the Washington Metrorail expanded into Arlington.²⁷

One key event of the 1970s planted the seeds for much that was to come: Bill McGowan founded Microwave Communications Incorporated (later to become MCI) in 1968 in Chicago, at that time a central national telecommunications interconnection point. McGowan's new microwave frequencies challenged AT&T, who held a federally sponsored monopoly in the long-distance telephone business. McGowan quickly realized that the success of MCI would depend on the outcome of a series of legal battles with AT&T and, more importantly, the Federal Communications Commission, which was based in Washington, D.C. This led McGowan and MCI to open an office in Northern Virginia, close enough to FCC headquarters so that MCI lawyers could walk there." By 1980, MCI prevailed and became the second company to provide long distance telephone service in the United States.²⁸ Eventually, MCI would replace those same microwave interconnects with fiber and pave the way toward future internet connectivity.²⁹

The earliest signs of a regional focus on technology and innovation also occurred in the early 1980s, with discussion about forming a regional Center for Innovative Technology. The state invested \$30 million for the organization to "serve as a broker of high technology information between private industry, academics and government and to attract advanced-technology companies to the state."³⁰ Prior to this time, however, there was little mention of any focus on innovation in the region. Jim Murray, Founding Partner of Columbia Capital, a venture capital firm in Alexandria, reflected, "It's my impression that there was virtually no technology finance in that part of the world in the 1980s.... I was alert to entrepreneurial activities from the seventies onwards, and I never saw anything."³¹ Murray went on to lead Columbia Capital to become an extremely successful broker and investor in telecommunications licenses.

²⁵ History.com. August 21, 2018. <https://www.history.com/topics/us-government/pentagon> [Accessed April 26, 2019].

²⁶ Center for Regional Analysis. Improving the Washington Region's Global Competitiveness. George Mason University, 2014.

²⁷ Meyer, Heike. Arlington County: A Leader in Technology-Based Economic Development.

²⁸ Ceruzzi, Paul E. Internet Alley: High Technology in Tyson's Corner, 1945-2005. Massachusetts Institute of Technology, 2008.

²⁹ Murray, Jim. Founding Partner of Columbia Capital. April 24, 2019.

³⁰ Virginia Building High-Tech Center. The New York Times. 1984.

³¹ Murray, Jim. Founding Partner of Columbia Capital. April 24, 2019.

Eventually, the organization would evolve into a prominent venture capital fund, providing investment and advice to a region eager to grow.³²

In the late 1980s, another key organization formed that would serve the region—and the broader east coast—throughout the coming decades. The Mid-Atlantic Venture Association (MAVA) was founded to “help build a foundation of entrepreneurial activities” in the region. At that time, MAVA defined its region “as essentially [the] East Coast south of Boston, with a main concentration in Baltimore, Northern Virginia, and Philadelphia.” Contrary to the Center for Innovative Technology, MAVA was formed and supported primarily by private industry, by corporations and investors who would take part in MAVA’s initiatives and events. While the government also supported MAVA, it was not central to its development. Julia Spicer, the organization’s current Executive Director, believes MAVA’s member-first focus is one of the key reasons it has been fundamental to the region’s entrepreneurial growth.³³

THE DOT-COM BOOM: OPTIMISM & A BRIGHT FUTURE? (1989–2002)

As a result of the efforts of organizations like the Center for Innovative Technology and MAVA, the Northern Virginia region began to emerge as a vibrant technology entrepreneurial ecosystem in the early 1990s. A critical mass of activity percolated through the region, and a number of key movements, organizations and businesses formed.

The earliest sign of economic activity was the rise and eventual sale of Legent Corporation, headquartered in Herndon, Virginia. Legent formed in 1989 through the merger of Duquesne Systems and Morino Associates to become a leading provider of systems management software for mainframe computers.³⁴ Six years later in 1995, Legent would be sold to Computer Associates in the “largest software deal in history.”³⁵ Mario Morino, the founder of one of Legent’s predecessor companies, would walk away with \$80 million.³⁶

Morino went on to found and lead several highly notable entrepreneurial movements in the Northern Virginia region—all supported by his eponymous Morino Institute, formed in 1994.³⁷ ³⁸ The first initiative was a partnership with MCI named Potomac KnowledgeWay, created to “help the greater Washington region seize the economic, educational and social opportunities of the communications revolution and become the global center of the knowledge industry.”³⁹ The organization had “three primary initiatives: helping entrepreneurs bring net-centric products

³² The International Directory of Company Histories. Cengage Gale, 2011.

³³ Computer Associates to Acquire Legent Corporation in Largest Software Deal in History. M2 PressWIRE. 1995.

³⁴ The International Directory of Company Histories. Cengage Gale, 2011.

³⁵ Computer Associates to Acquire Legent Corporation in Largest Software Deal in History. M2 PressWIRE. 1995.

³⁶ Behr, Peter. Information, Please -- and More; Mario Morino Helps Fledgling Firms Find Funding, Advice. The Washington Post. 1997.

³⁷ Watson, Tom. Creating a Silicon Valley Around Washington D.C. The New York Times. 1998.

³⁸ Executive Profile: Lennert Leader. Bloomberg.

<https://www.bloomberg.com/research/stocks/private/person.asp?personId=132420&privcapId=142959611&previousCapId=31778&previousTitle=Reuters%20Research%20Inc> [Accessed April 23, 2019].

³⁹ May, John. Managing Partner of New Vantage Group. April 16, 2019.

and services to market faster; promoting a world-class work force; and advancing connectivity and connectedness throughout the greater Washington region.”⁴⁰

As a part of Potomac KnowledgeWay’s first initiative, it partnered with the Center for Innovative Technology, MCI, and The Morino Institute to create Netpreneur in 1997.⁴¹ Responding to a workforce educated in the ways of the “old school” economy, Netpreneur was founded to educate the region about a knowledge- and internet-based form of entrepreneurship, “to share knowledge, make contacts, form partnerships, find resources and respond to the unique challenges of starting a business in the New Economy.” Key to the organization was Net-Invest, “a free online service that match[ed] investors to netpreneurs.”⁴² Tim Meyers, a long-time investor and entrepreneur in the region, described Netpreneur as a driving force for the region in the 1990s.⁴³

A secondary benefit of the Legent sale is that it freed up a successful, local management team to pursue other opportunities. While some retired or left the region, at least two went on to support a second generation of innovative and successful businesses in the ecosystem. Lennert Leader went to AOL, which went public on the NASDAQ in 1992. The organization brought “a lot of talented people” to the region, according to John May, a prominent venture capitalist in the area.⁴⁴ Robert McGovern founded CareerBuilder,⁴⁵ ⁴⁶ an online employment website, which received early investment from NEA and went for a public offering in 1999.⁴⁷ Meyers viewed these organizations as principal reasons why the region developed its early focus on software.⁴⁸ They are also emblematic of the ecosystem’s development and rise during the 1990s.

In addition to software, the region had a major presence in telecommunications, stemming from those early decisions at MCI. The Metropolitan Area Ethernet (MAE) began in the early 1990s through a grant with the National Science Foundation.⁴⁹ This geography would eventually serve as a critical connection point for all of the world’s internet traffic—an estimated 50 percent in the late 90s, increasing to 70 percent two decades later.⁵⁰ ⁵¹ MAE-East would be born, and lived

⁴⁰ McGrane, Sally. Location, Location, Location. Forbes.com. Forbes, April 3, 2000.

<https://www.forbes.com/asap/2000/0403/042.html> [Accessed May 2, 2019].

⁴¹ Ibid.

⁴² Jenks, Randy Barrett and Andrew. Defining the Netplex. Washington Technology. July 14, 1994.

<https://washingtontechnology.com/articles/1994/07/14/defining-the-netplex.aspx> [Accessed May 2, 2019].

⁴³ Meyers, Tim. Senior Advisor, Baker Tilly Virchow Krause. March 31, 2019.

⁴⁴ May, John. Managing Partner of New Vantage Group. April 16, 2019.

⁴⁵ Executive Profile: Lennert Leader. Bloomberg.

<https://www.bloomberg.com/research/stocks/private/person.asp?personId=132420&privcapId=142959611&previousCapId=31778&previousTitle=Reuters%20Research%20Inc> [Accessed April 23, 2019].

⁴⁶ Editor, Gale. The International Directory of Company Histories. Cengage Gale, 2011.

⁴⁷ Ibid.

⁴⁸ Meyers, Tim. Senior Advisor, Baker Tilly Virchow Krause. March 31, 2019.

⁴⁹ McGrane, Sally. Location, Location, Location. Forbes.com. Forbes, April 3, 2000.

<https://www.forbes.com/asap/2000/0403/042.html> [Accessed May 2, 2019].

⁵⁰ Jenks, Randy Barrett and Andrew. Defining the Netplex. Washington Technology. July 14, 1994.

<https://washingtontechnology.com/articles/1994/07/14/defining-the-netplex.aspx> [Accessed May 2, 2019].

⁵¹ Freed, Benjamin. 70 Percent of the World’s Web Traffic Flows Through Loudoun County. Washingtonian.

<https://www.washingtonian.com/2016/09/14/70-percent-worlds-web-traffic-flows-loudoun-county/> [Accessed April 18, 2019].

symbiotically with the region's internet service providers, such as AOL, UUNet, PSI and others.⁵² MAE-West would be founded in San Jose, California, proximate to present-day Silicon Valley.⁵³

While notable companies such as AOL and MCI grew the ecosystem from above, several other organizations helped build it from the ground up—with equal or greater effect. John May alternated between government and private-sector jobs early in his career before settling on the private sector. He founded the Private Investors Network, a group of local angel investors, to pull venture capital south from Maryland in 1991.⁵⁴ He would go on to form several other well-known angel networks, including the Investors' Circle, the Dinner Club and the eMedia Club. These organizations leveraged the recently created wealth of the region to enable entrepreneurs to foster innovation, building on a national trend.⁵⁵ In 1997, angel investing outpaced institutional investing by a factor of two⁵⁶. This, in turn, increased the venture capital presence in the region. “At that time, Carlyle Group was doing startups, NEA was doing work locally. Draper Fischer arrived in 1997, which was a really big deal. They were the first big name Silicon Valley fund to open an office [in greater D.C.],” said Harry Glazer, a co-founder of MindShare.⁵⁷ MindShare was founded in 1997 to be an “exclusive, invitation-only network of chief executive officers from the most promising emerging and high growth technology companies in the Washington, D.C. region.”⁵⁸ “Mindshare was very important for the infrastructure,” noted John May.⁵⁹ Harry Glazer saw an opportunity to connect people in the ecosystem. “Back then, no one knew each other, and they didn't trust each other.”⁶⁰ MindShare served a critical role of forming a community in a location where one did not otherwise exist. Since that time, Glazer has stayed in the region and is the founder and CEO of SPROCKIT, a marketplace connecting high-potential startups to the media, entertainment and tech industry.

Also in the late 1990s, MAVA's annual Capital Connection conference grew into prominence. This pitch event provided a platform for local entrepreneurs at high growth enterprises to tell their story and find investors. The conference quickly became a national event, bringing investors from around the country to syndicate with regional funds. By the late 1990s and early 2000s, the Capital Connection became the standard that other markets sought to emulate. Julia Spicer recalled travelling to Chicago and Austin to lead workshops about “how they did it.” Throughout its 25-year history, it promoted some of the region's most notable success stories—

⁵² Jenks, Randy Barrett and Andrew. Defining the Netplex. Washington Technology. July 14, 1994.

<https://washingtontechnology.com/articles/1994/07/14/defining-the-netplex.aspx> [Accessed May 2, 2019].

⁵³ McGrane, Sally. Location, Location, Location. Forbes.com. Forbes, April 3, 2000.

<https://www.forbes.com/asap/2000/0403/042.html> [Accessed May 2, 2019].

⁵⁴ May, John. Global Entrepreneurship Network. <https://www.genglobal.org/user/john-may> [Accessed April 24, 2019].

⁵⁵ May, John. Managing Partner of New Vantage Group. April 16, 2019.

⁵⁶ Leading Authorities Provide Roadmap for Creating and Financing Early Stage Companies in Washington, DC Region. PR Newswire. 1998.

⁵⁷ Glazer, Harry. Co-Founder & Co-Chair of MindShare and Founder & CEO of SPROCKIT. April 18, 2019.

⁵⁸ About MindShare. MindShare. <https://www.mindsharenetwork.org/about-us/about-mindshare> [Accessed April 24, 2019].

⁵⁹ May, John. Managing Partner of New Vantage Group. April 16, 2019.

⁶⁰ Glazer, Harry. Co-Founder & Co-Chair of MindShare and Founder & CEO of SPROCKIT. April 18, 2019.

from historical companies like UUNet, Oculus Networks, Sylvan Learning and AOL to the more recent BroadSoft and Cvent.⁶¹

The Northern Virginia ecosystem in this period boomed. Ed Albrigo, the current CEO for the Center for Innovative Technology, reflected that they saw “significant wealth creation and available capital” at the time.⁶² The area was consistently discussed as an east coast version of Silicon Valley.⁶³

Unfortunately, the good times would not last.

THE DOT-COM BUST & FINANCIAL CRISIS THE QUIET PERIOD (2002–2013)

Interestingly, the earnings report of a Northern Virginia business was one of the first signals that something was amiss in the national technology market. MicroStrategy, a Tyson’s Corner software company, had to restate its financials in March 2000, causing the stock to drop from \$330 to \$1 and lose \$6 billion of market value.⁶⁴ “The place was decimated by 2001... it was most severe in Northern Virginia,” Harry Glazer said.⁶⁵ Ed Albrigo described it further, “when the bubble burst, you saw the dry up of dot-com startups. You saw venture looking at other regions. Capital was gone, companies were dissolved.”⁶⁶ Tragically, the September 11th terrorist attacks occurred in late 2001, taking the lives of 125 personnel in the Pentagon and leaving the community deeply wounded.⁶⁷ ⁶⁸ By October 2002, the NASDAQ composite had lost 78 percent of its value.

The corporate backbone of the tech ecosystem was also permanently changed during this period. AOL merged with Time Warner in January, 2000.⁶⁹ This began a steady shift of employment and management operations from Northern Virginia to New York City, Time Warner’s headquarters.⁷⁰ WorldCom, the parent of MCI following its acquisition in 1998, would announce its bankruptcy in July, 2002.⁷¹ ⁷² By 2008, CareerBuilder would move its headquarters

⁶¹ Computer Associates to Acquire Legent Corporation in Largest Software Deal in History. M2 PressWIRE. 1995.

⁶² Albrigo, Ed. CEO, Center for Innovative Technology. April 18, 2019.

⁶³ Watson, Tom. Creating a Silicon Valley Around Washington D.C. The New York Times. 1998.

⁶⁴ Ceruzzi, Paul E. Internet Alley: High Technology in Tyson’s Corner, 1945-2005. Massachusetts Institute of Technology, 2008.

⁶⁵ Glazer, Harry. Co-Founder & Co-Chair of MindShare and Founder & CEO of SPROCKIT. April 18, 2019.

⁶⁶ Albrigo, Ed. CEO, Center for Innovative Technology. April 18, 2019.

⁶⁷ First video of 9/11 Pentagon attack released. CNN.com. May 16, 20016.

<http://www.cnn.com/2006/US/05/16/pentagon.video/index.html> [Accessed May 2, 2019].

⁶⁸ Levi, Josh. Vice President of Policy, Northern Virginia Technology Council. May 1, 2019.

⁶⁹ Johnson, Tom. That’s AOL Folks. CNN Money. January 10, 2000.

https://money.cnn.com/2000/01/10/deals/aol_warner/ [Accessed April 24, 2019].

⁷⁰ Goldfarb, Zachary. AOL Moving Executives, Headquarters to New York. The Washington Post. September 18, 2007. <http://www.washingtonpost.com/wp-dyn/content/article/2007/09/17/AR2007091700415.html> [Accessed April 24, 2019].

⁷¹ Shriver Jr., Jube. WorldCom Makes \$30-Billion Offer to Take Over MCI. Los Angeles Times. October 2, 1997. <https://www.latimes.com/archives/la-xpm-1997-oct-02-mn-38328-story.html> [Accessed April 23, 2019].

⁷² Kenton, Will. WorldCom. Investopedia. March 21, 2019. <https://www.investopedia.com/terms/w/worldcom.asp> [Accessed April 24, 2019].

to Chicago.⁷³ According to News Bytes, “it wasn't just the big boys who left home; the smaller siblings like Proxicom and Landmark [did too].”⁷⁴ These departures pulled the foundation out from under the ecosystem, and removed fallback options for potential risk-takers.

Those same entrepreneurs and investors who were once engaged with the ecosystem’s growth in the 1990s had to pivot away from tech to support their families.⁷⁵ Josh Levi, Vice President for Policy at the Northern Virginia Technology Council, recalled a massive shift from dot-com startups to government contracting: “We held an event in December 2001, and we invited seven cabinet agencies to come and talk about the war on terror and the technology they were going to need. We had 700 people show up, twice what they'd typically see at the time. Everyone was taking notes and trying to figure out what they could do to become a government contractor.”⁷⁶

Venture capital declined during this era as well. As fewer and fewer startups were created, investors had fewer reasons to locate an office in Northern Virginia. Further, generational changes at once-leading firms became more challenging. As top partners age, leadership changes become paramount, and some groups were unable to make the transition.

All of these changes set in motion the beginning of a quiet period for the region, marked by two external events that deepened the decline. First was the Base Realignment and Closure Act (BRAC) of 2005. Following the events of September 11th, U.S. Secretary of Defense Donald Rumsfeld directed BRAC to move federal agencies away from the government’s epicenter to thwart potential attacks. Over the next few years, BRAC’s departure caused a spike in vacancy rates from the low single digits to over 20 percent in the region. In what would later prove to be a brilliant strategic move for the region’s economy, Arlington lobbied, and won, to keep the science-related government agencies with an initiative labeled “Save the Brains.”⁷⁷

By 2008, the global financial crisis hit, halting any economic progress in its tracks. By 2013, the United States’ budget sequestration would constrain the region’s economy as the government shrunk its spend and footprint.⁷⁸ These headwinds caused a prolonged quiet period for innovation in the region. They also motivated area leaders to prioritize the urgent need to diversify away from the federal government.

TECH 2.0: NOVA’S REINVENTION (2013–2019)

Sequestration appears to have been a tipping point for the ecosystem. Despite its obvious downsides to a region tethered to federal government spending, it had a positive effect on its evolution. “Northern Virginia was hit really hard with sequestration because we’re a state that does a lot of government-related work,” Ed Albrigo noted. However, this realization led many to understand the need for a change. “Now we’ve seen how this ecosystem must change to a

⁷³ 200 N. La Salle Chosen as CareerBuilder Headquarters. US Fed News. 2008.

⁷⁴ The Touchstones to Rebuild A Corridor. Newsbytes. 2002.

⁷⁵ Glazer, Harry. Co-Founder & Co-Chair of MindShare and Founder & CEO of SPROCKIT. April 18, 2019.

⁷⁶ Levi, Josh. Vice President of Policy, Northern Virginia Technology Council. May 1, 2019.

⁷⁷ Taylor, Tara Palacios and Alex. Arlington Economic Development Corporation. February 28, 2019.

⁷⁸ Ibid.

commercial innovation and product (versus a government services) economy.”⁷⁹ In that vein, there have been several trends that have spurred recent expansion.

The local economic development groups led the first major effort to jump start the region’s diversification. Victor Hoskins was appointed as Director of Arlington Economic Development (AED) in 2015 with a goal to stabilize the economy by growing the region’s tech presence. In particular, he focused on cybersecurity, health IT, clean tech, ed tech and data analytics. To do so, he led AED to be proactive—versus being historically reactive—finding deals with tech companies, sending teams to the South by Southwest conference in Austin and even as far as China to recruit.^{80 81} The results trickled in over time, with the first notable achievement being Nestle moving its headquarters to the area. While a food company was not in one of Victor’s focal sectors, the prominent addition paved the way for more to come, eventually leading to Amazon’s HQ2 announcement. At the same time, economic development offices in Alexandria, Fairfax and Loudon acquired similar deals with Volkswagen, Hilton and others.⁸²

As had occurred in the 1980s and 1990s with organizations like MAVA, Netpreneur and Mindshare, this period also saw the rise of organizations who primarily sought to connect regional stakeholders. MAVA sought to develop a new event targeted at earlier stage companies and created TechBUZZ in 2010. TechBUZZ is held three times per year to provide an “early stage platform for next-generation technology companies and the private capital sources that support them.” The event has cumulatively showcased 450 companies that have raised \$1 billion in funding, and 21 have been acquired. As with the Capital Connection, the initial investment capital has come from both inside and outside the local ecosystem.^{83 84}

The evolution of coworking spaces altered the competitive environment and also improved the region’s trajectory. 1776, a leading entrepreneurial incubator, opened a space in Crystal City in 2015. Several more coworking spaces would soon follow, including WeWork, Eastern Foundry and the Capital Post.⁸⁵ According to Stephanie Landrum, President & CEO of the Alexandria Economic Development Corporation, coworking spaces “enabled a lot more innovation than had traditionally been here” because startups could rent office space cheaply, without the commitment of a lease.⁸⁶

During this period, one sector supported the ecosystem more so than the others: cybersecurity. Rick Gordon, the former Managing Partner of the MACH37 Cyber Accelerator and current Director of the Inova Personalized Health Accelerator, noted that he “started to see the migration of formerly NSA talent into commercial cybersecurity” around 2010. The issue, at

⁷⁹ Albrigo, Ed. CEO, Center for Innovative Technology. April 18, 2019.

⁸⁰ Taylor, Tara Palacios and Alex. Arlington Economic Development Corporation. February 28, 2019.

⁸¹ Rothstein, Ethan. Arlington Confident Despite Gloomy Economic Indicators. ARLnow. April 14, 2015. <https://www.arlnow.com/2015/04/14/arlington-confident-despite-mixed-economic-forecast/> [Accessed April 25, 2019].

⁸² Banister, Jon. Nestlé Move A Rare Corporate HQ Win For Region, But More Could Follow . BisNow. February 3, 2017. <https://www.bisnow.com/washington-dc/news/office/nestle-move-a-rare-corporate-hq-win-for-region-but-more-could-follow-70619> [Accessed April 25, 2019].

⁸³ MAVA. TechBUZZ Is More Than A Day. TechBUZZ. <https://techbuzz.mava.org/about/> [Accessed May 8, 2019].

⁸⁴ Spicer, Julia. Executive Director, Mid-Atlantic Venture Association. May 7, 2019.

⁸⁵ Landrum, Stephanie. President & CEO, Alexandria Economic Development Partnership. April 11, 2019.

⁸⁶ McCanna, Luca. Director of Digital Marketing. March 7, 2019.

that time, was that there “wasn’t an abundance of seed capital.”⁸⁷ As a result, Rick Gordon and others founded MACH37 in 2013. Fueled through a \$2.5 million grant from the Virginia General Assembly and a partnership with the Center for Innovative Technology, MACH37 supports the ecosystem by incubating high-potential cybersecurity businesses, investing capital and providing mentorship to its companies.⁸⁸ To date, it has launched 57 companies, of which 73 percent are still in business and 60 percent have raised follow-on investments.⁸⁹ Today, Rick Gordon believes “we are one or two exits away from having a truly thriving ecosystem in cybersecurity.”⁹⁰ Tom Clute, an investor at the cybersecurity-focused Paladin Capital Group, agrees: “I’ve definitely seen [the] Northern Virginia [cybersecurity industry] grow like crazy in the last ten years. It’s a really, really exciting time to be investing in the space as a local investor.”⁹¹

Ironically, the federal government has driven diversification of the entrepreneurial ecosystem by its recognition of the need to foster external innovation. “The CIA recognized that they were missing out on startups’ creativity,” said Lisbeth Poulos, Chief of Staff for In-Q-Tel, based in Arlington. The government asked private citizens to start In-Q-Tel to help it access the startup community. Today, the organization sits between government, venture capitalists and the startups themselves to foster dialogue. After attending In-Q-Tel’s program, 70 percent of startups have a Federal government contract.⁹² Organizations like Dcode serve a similar mission. Meg Vorland, Dcode’s Chief Strategy Officer, described it in two ways: “First, we are an accelerator program for tech companies looking to enter the government market and, second, we help the government learn to buy tech.”⁹³ Emily McMahon leads the Capital Post, a nonprofit organization that supports the ecosystem by educating and accelerating veteran-owned businesses. Every year, they hold an event called the Muster, which brings the community together to highlight startups, find funding and make connections.⁹⁴

Lastly, and potentially most importantly, the entrepreneur and investor Tim Meyers believes that regional talent stopped migrating around 2018. “The attraction of California is not quite as bright as it once was. A startup’s location is less relevant to capital, and entrepreneurs are beginning to say, ‘Why do I want to move to California, where the cost of living and doing business is so high? There is no reason I can’t keep the company here and import the talent.’”⁹⁵

⁸⁷ Gordon, Rick. Former Managing Partner, MACH37. April 15, 2019.

⁸⁸ Cyber Accelerator Mach37 Rolls Out First Class. Flook, Bill. Washington Business Journal, 2013.

⁸⁹ About Us. MACH37. <https://www.mach37.com/about-1> [Accessed April 25, 2019].

⁹⁰ Gordon, Rick. Former Managing Partner, MACH37. April 15, 2019.

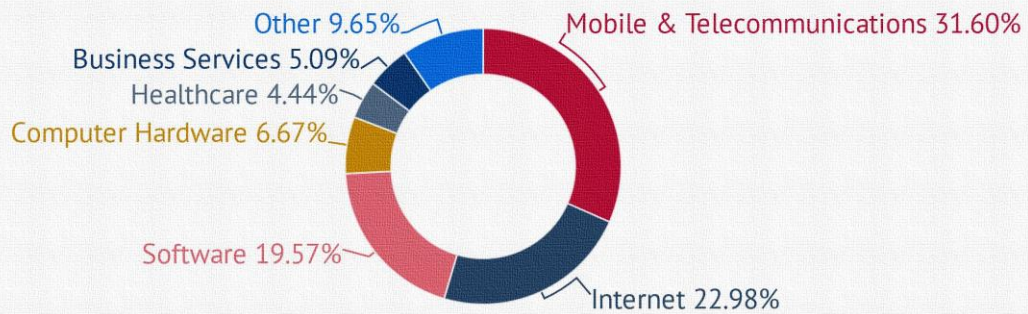
⁹¹ Clute, Tom. Vice President, Paladin Capital Group. May 9, 2019.

⁹² Poulos, Lisbeth. Chief of Staff, In-Q-Tel. May 01, 2019.

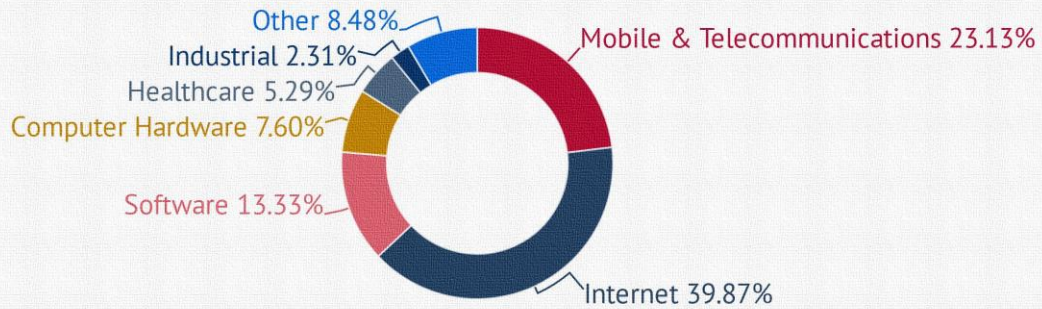
⁹³ Vorland, Meg. Chief Strategy Officer, Dcode. March 29, 2019.

⁹⁴ McMahon, Emily. Executive Director, The Capital Post. March 7, 2019.

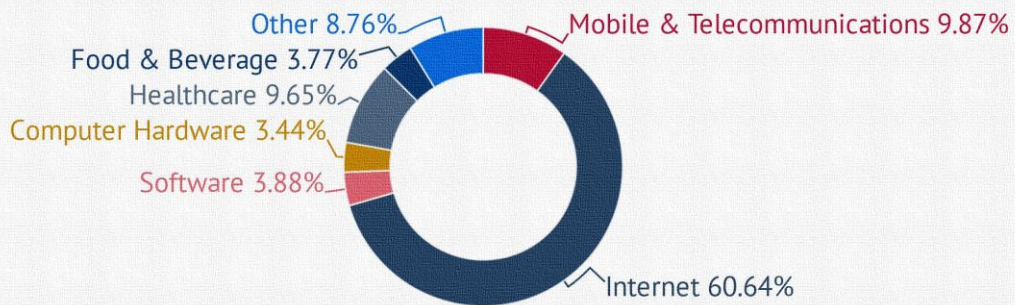
⁹⁵ Meyers, Tim. Senior Advisor, Baker Tilly Virchow Krause. March 31, 2019.



Seed / Early Stage Investment: Dot-Com Boom (1995-2001)



Seed / Early Stage Investment: Quiet Period (2002-2013)



Seed / Early Stage Investment: NOVA's Reinvention (2013-2019)

Source⁹⁶

⁹⁶ CBInsights, PwC /. MoneyTree Data Explorer.
 [https://www.pwc.com/us/en/industries/technology/moneytree/explorer.html#/]

LOOKING TOWARDS THE FUTURE

TALENT IS DESTINY: CAN NOVA BECOME A NET IMPORTER OF TALENT?

As with any complex and interrelated system, the development of an ecosystem cannot be isolated to one factor. In the 2010s, Northern Virginia has seen the convergence of a number of positive trends. The shifts during this period have spurred notable success stories and put the innovation economy on solid footing. Even more promising, the movements happening today, in 2019, may have increased its trajectory even further.

Northern Virginia remains one of the most highly skilled regions in the United States, and, according to the Computing Technology Industry Association, has the third highest concentration of technology workers.⁹⁷ A portion of this is driven by the fact that Virginia, particularly the Dulles Technology Corridor, is the leading data center market in the country, where 70 percent of the internet's traffic passes on a daily basis.^{98 99} One in every 16 jobs in Northern Virginia is in a digital technology occupation.¹⁰⁰

This endowment of human talent is key to understanding the region's entrepreneurial ecosystem. Organizations like the Defense Advanced Research Projects Agency (DARPA) and the National Science Foundation have been in Northern Virginia for years, bolstering its level of innovative talent. According to Stephanie Landrum, "The mindset is that the talent is here, we just need to pivot in order to enable it."¹⁰¹

The pivot is certainly in motion, but not without its share of challenges that have stymied growth. While the rest of the country has grown its tech workforce at 12 percent annually, the D.C. region has only grown at 3 percent. Despite the high concentration of tech workers, a large gap exists between the supply of qualified workers and the demand. In December 2017, there were 35,000 unfilled tech jobs.¹⁰² Ed Albrigo noted that the need was "particularly acute in Northern Virginia." As an example, there are currently "thousands" of unfilled cybersecurity jobs. This sort of undersupply is particularly damaging to early stage ventures, as they must pay more to "compete for a very limited pool of potential employees."¹⁰³

Fortunately, Virginia's state government, through policy action and its public universities, is investing to solve this issue. A five-pronged approach focusing on the entire pipeline of tech talent—from K-12 STEM education, to community college degrees, all the way up to master's

⁹⁷ Innovation Lives Here. Tech-Talent Pipeline. HQNova.com. https://hqnova.com/assets/pdfs/NOVA_Higher-Education.pdf [Accessed April 18, 2019].

⁹⁸ Data Centers. Virginia Economic Development Partnership. <https://www.vedp.org/industry/data-centers> [Accessed April 18, 2019].

⁹⁹ Freed, Benjamin. 70 Percent of the World's Web Traffic Flows Through Loudoun County. Washingtonian. <https://www.washingtonian.com/2016/09/14/70-percent-worlds-web-traffic-flows-loudoun-county/> [Accessed April 18, 2019].

¹⁰⁰ Partnering to Strengthen Tech Talent in the Capital Region. Greater Washington Partnership, 2017.

¹⁰¹ Landrum, Stephanie. President & CEO, Alexandria Economic Development Partnership. April 11, 2019.

¹⁰² Partnering to Strengthen Tech Talent in the Capital Region. Greater Washington Partnership, 2017.

¹⁰³ Albrigo, Ed. CEO, Center for Innovative Technology. April 18, 2019.

degrees — was highlighted repeatedly in the state’s effort to lure Amazon’s HQ2 to Northern Virginia. The most notable initiative is the state’s \$375 million investment into master’s level tech-talent education, particularly at institutions like Virginia Tech and George Mason.¹⁰⁴ Through additional funding, Virginia Tech will be opening a \$1 billion innovation campus in Alexandria which will produce 750 master’s and 150 PhD degrees annually.¹⁰⁵ George Mason University, which has doubled the number of students in tech the last five years, plans to double that number again in the next five years with its expansion of its Arlington campus.¹⁰⁶ ¹⁰⁷ In addition, the state’s flagship school, the University of Virginia, opened up a new facility in Rosslyn in 2018 that is beginning to offer graduate degree programs in business, engineering, computer science and data science. “A lot of the workforce efforts to date simply haven’t been at that level,” Stephanie Landrum noted.

Looking forward, many stakeholders are optimistic about the region’s tech workforce. As evidenced by historical migration trends, Northern Virginia is well-known as a transitory region for college graduates—a good way to spend their 20s, but not to settle.¹⁰⁸ Ed Albrigo noted that, traditionally, those “well-educated college graduates would leave for other parts of the country because they had little interest in the Federal vibe—either directly or through organizations like Lockheed and Northrup Grumman.” He and others believe that Amazon may change that dynamic.¹⁰⁹ Half of HQ2’s 50,000 expected jobs are to be in tech, and the company has noted its talent needs in highly innovative areas like machine learning, UI/UX, data science and software development.¹¹⁰ Many observers believe that this talent will find roles working directly for Amazon, or for one of the many offshoots that are likely to spring up around it.

R&D SPENDING: THE MISSING COMPONENT?

While many stakeholders are optimistic on the future of the ecosystem, the conversation is not complete without a discussion of the region’s R&D spending. Kim McKay, Director of Public Policy at the Virginia Chamber Foundation, noted that, “[The state of] Virginia is at a significant disadvantage in R&D because we have a decentralized system.” While other states direct R&D spending from the top down, Virginia allows its institutions to manage the processes on their own, which leads to inefficiency and overlap.¹¹¹ Josh Levi mentioned that Virginia has

¹⁰⁴ Innovation Lives Here. Tech-Talent Pipeline. HQNova.com. https://hqnova.com/assets/pdfs/NOVA_Higher-Education.pdf [Accessed April 18, 2019].

¹⁰⁵ Landrum, Stephanie. President & CEO, Alexandria Economic Development Partnership. April 11, 2019.

¹⁰⁶ George Mason to support Amazon with large-scale expansion of Arlington Campus. George Mason University. November 13, 2018. <https://www2.gmu.edu/news/572891> [Accessed April 19, 2019].

¹⁰⁷ Talent Pipeline. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/talent-pipeline/> [Accessed April 19, 2019].

¹⁰⁸ Moret, Stephen. President & CEO, Virginia Economic Development Partnership. TomTom Festival-Let’s Talk About Amazon HQ2. April 12, 2019.

¹⁰⁹ Albrigo, Ed. CEO, Center for Innovative Technology. April 18, 2019.

¹¹⁰ Talent Pipeline. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/talent-pipeline/> [Accessed April 19, 2019].

¹¹¹ McKay, Kim. Director of Public Policy, Virginia Chamber Foundation. April 25, 2019.

historically “scored very poorly in industry-sponsored research.” Most institutions have been focused on the Federal government for research funding. However, after sequestration caused a decline in spending, these same institutions have been forced to reevaluate their sources.¹¹²

A review of the statewide ranking data in R&D spend shows a mixed story and highlights the need for the state to diversify its funding sources. Virginia ranks fourth among states in federal R&D obligations, and third in SBIR / STTR awards.¹¹³ Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) awards are offered through a federal government organization that is known as “America’s Seed Fund.” SBIR grants are awarded to organizations that “encourages domestic small businesses to engage in Federal Research and Development that has the potential for commercialization.” STTR awards are similar, yet with the added requirement that the recipient “formally collaborate with a research institution.”¹¹⁴

While these statistics provide an optimistic view of the spending, government programs are not without their critics. Certain stakeholders have coined the term “SBIR mills,” referring to those small businesses who know how to “game the system” and then sell to government contractors. The sort of research that this propagates is not always the same kind of high-growth entrepreneurial innovation that the region’s economy needs.¹¹⁵ Lisbeth Poulos pointed out that the research the government conducts is typically needed, just not always profitable. “They’re not looking at the market, they’re looking at the [federal] need,” she said.¹¹⁶

Other funding sources paint a more negative picture. Virginia ranks 22nd among U.S. states in R&D intensity, a measure of spending “attributable to federal and state government, businesses, higher education institutions, non-profit organizations, and other entities as a percentage of state gross domestic product.” Further, corporate R&D intensity ranks Virginia 28th in the nation. Perhaps most disappointing is the state’s academic science and engineering R&D, which ranked 37th.¹¹⁷

However, reasons exist to be optimistic for the future of the region’s R&D. First, the Virginia Tech Innovation Campus is expected to have 300,000 square feet of R&D facilities.¹¹⁸ In the 2018 session, the Virginia General Assembly allocated \$40 million to fund the creation of CyberX “to serve as an engine for research, innovation, and commercialization of cybersecurity technologies.”¹¹⁹ Josh Levi hopes that these investments will lead to the kind of “collaborative, sustained effort” the state needs to ascend in the rankings and become more competitive. Still, the region is a long way away from having a Stanford, as in Silicon Valley, or an MIT, as in

¹¹² Levi, Josh. Vice President of Policy, Northern Virginia Technology Council. May 1, 2019.

¹¹³ Research & Development. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/research-and-development/> [Accessed May 3, 2019].

¹¹⁴ About SBIR. SBIR / STTR, America’s Seed Fund. <https://www.sbir.gov/about/about-sbir> [Accessed May 3, 2019].

¹¹⁵ Anonymous. March 29, 2019.

¹¹⁶ Poulos, Lisbeth. Chief of Staff, In-Q-Tel. May 1, 2019.

¹¹⁷ Research & Development. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/research-and-development/> [Accessed May 3, 2019].

¹¹⁸ What is the Innovation Campus? Vt.edu. <https://vt.edu/innovationcampus/about.html> [Accessed May 3, 2019].

¹¹⁹ Budget Amendments - HB30 (Committee Approved). LIS. 2018. <https://budget.lis.virginia.gov/amendment/2018/1/HB30/Introduced/CA/252/1h/> [Accessed 2019 3, May].

Boston, as a foundation for regional research and innovation. While positive trends do exist in R&D, this aspect of the ecosystem is one that, unfortunately, is not as bright as the others.

VENTURE INVESTORS: LOCAL CAPITAL—CERTAINLY HELPFUL, BUT NECESSARY?

A range of opinions exist in the ecosystem about its capital network. On one end of the spectrum, stakeholders lament the lack of investment funds in the region. Some mention the need for more seed funding; others say that seed funding is healthy, but highlight the absence of more institutional, growth capital. The opposing side would not claim that the region has an abundance of capital. They argue, instead, that it has a moderate amount—not “enough”, but a strong presence. Phil Herget, former co-managing partner of Columbia Capital, highlighted this point, “The venture talent is here. It’s not deep, deep but it is definitely here.”¹²⁰

The data seems to support his view. Washington, D.C. ranks the sixth MSA in the country for total venture capital funds raised in the 2006 to 2016 period with \$4.8 billion. Giants like San Francisco, San Jose, New York, and Boston all raised more than \$40 billion, with San Francisco raising over \$100 billion. However, of the “non-giant” MSAs, D.C. is near the top, only behind Seattle, which raised \$7.6 billion¹²¹ (6).

Phil Herget is also “a big believer that early stage venture capital investors have to be close to their companies. At Columbia, we were on the ground a lot, and we were willing to do that.” He feels that the region “needs a strong venture community to be based here.” Having those local connections not only allows for easier connectivity between entrepreneurs and investors at key events like board meetings, but also for simple mentorship, support and connections that can be vital to early stage companies.

However, not everyone is convinced. While more capital would certainly benefit the region, others believe we cannot conclude that capital is always vital. Julia Spicer points out that, “Today, there is so much liquidity that it will get to the companies that deserve it. The capital will find you.”¹²² Dayna Grayson believes that “regardless of who’s in the area, venture is a national sport now.”¹²³ What might be occurring is a change of currents. “In the old days,” said Julia Spicer, “you needed to be [within] 100 miles from where you were getting your capital.”¹²⁴ Today, the tides may have turned, to the benefit of mid-sized ecosystems like the Northern Virginia region.

Spicer told the story of an entrepreneur who presented on stage at TechBUZZ in D.C. and was unable to secure local capital. Two months later, on a Silicon Valley funding trip, six of the seven investors he met with knew of his venture—not because they had attended TechBUZZ, but because they tracked the movement of the region through the event. While it would have

¹²⁰ Herget, Phil. Former Co-Managing Partner, Columbia Capital and Current Founder and Manager of Avonlea Capital. May 7, 2019.

¹²¹ Pitchbook. US Venture Ecosystem. 2016.

¹²² Spicer, Julia. Executive Director, Mid-Atlantic Venture Association. May 7, 2019.

¹²³ Grayson, Dayna. Partner, New Enterprise Associates. April 25, 2019.

¹²⁴ Spicer, Julia. Executive Director, Mid-Atlantic Venture Association. May 7, 2019.

been better for him to receive that funding sooner and locally, this story highlights the idea that local capital is beneficial, but it may not be necessary.¹²⁵

In the end, the question of capital's integration into an ecosystem may be a "chicken or egg" dilemma. As the ecosystem grows and more startups prosper, capital will come, like it did in the late 1990s. Alternately, when local capital exists, more financial opportunity and commercial knowledge is readily available for nearby entrepreneurs to scale.

Julia Spicer closed with an encouraging characterization of the region's investment style. "There's a big difference between West and East Coast. I credit the style of our investors to be really prudent." This quality enabled the region to spawn some truly great companies during the last recession.¹²⁶ As we stand at the precipice of another correction, the potential exists that the region will be well-positioned relative to our peers out west.

The capital community has a critical mass of talent and a number of promising new firms gaining momentum. Herget highlighted several names to watch, including NextGen Ventures and Lavrock Ventures.¹²⁷ John Backus, Managing Director of PROOF.VC and long-time D.C.-area investor, added Route 66 Ventures and QED Investors.¹²⁸ Each of these firms, all founded since the great recession, will continue to build the capital community to support the ecosystem of tomorrow.

AMAZON HQ2: A STAMP OF APPROVAL?

Cynics have argued that Amazon chose Northern Virginia for reasons not tied to the ecosystem—Jeff Bezos' preferred to be closer to his DC home, or that Amazon wanted to secure the lucrative JEDI contract.¹²⁹ However, the region has a remarkable number of benefits that justify the decision on its own merit. For one, the vacancies that pervaded the Crystal City locale over the last two decades provide HQ2 with an abundance of immediately available office space and affordable housing. The region's infrastructure will provide easy access to the backbone of the internet, through the Dulles Technology Corridor, and a variety of transportation options, including the D.C. Metro, Amtrak, and two top-30 airports. The tech talent, despite its current undersupply, exhibited enough strength for Amazon—particularly due to the state's significant investments in education. Finally, Northern Virginia was already home to Amazon Web Services, providing easy connectivity to one of Amazon's most promising units.¹³⁰

¹²⁵ Ibid.

¹²⁶ Spicer, Julia. Executive Director, Mid-Atlantic Venture Association. May 7, 2019.

¹²⁷ Herget, Phil. Former Co-Managing Partner, Columbia Capital and Current Founder and Manager of Avonlea Capital. May 7, 2019.

¹²⁸ Backus, John. Managing Partner at PROOF.VC. May 9, 2019.

¹²⁹ Weise, Karen. Amazon and Microsoft Are 2 Finalists for \$10 billion Pentagon Contract. New York Times. April 10, 2019. <https://www.nytimes.com/2019/04/10/technology/amazon-microsoft-jedi-pentagon.html> [Accessed May 8, 2019].

¹³⁰ Wilbert, Tony. Amazon HQ2 Search Shines Spotlight on Crystal City. CoStar. November 5, 2018. <https://product.costar.com/home/news/shared/437894683> [Accessed April 21, 2019].

One success story from this accomplishment is that, for the first time, the region's economic development groups banded together, along with the state, to develop the Amazon proposal. The various parties recognized that this was a "transformational time for Virginia," according to Stephen Moret, the president and CEO of the Virginia Economic Development Partnership. This project came at an ideal time to speed up the region's diversification away from the Federal government. Upon its arrival, HQ2 cannot have more than 10 percent of its jobs focused on the federal government at any one time. "Amazon was a way to achieve all of our goals in one shot," Moret said.¹³¹

A major benefit to the region and its ecosystem is the incentive package offered to Amazon. In many cases, the incentives provided to Amazon are investments in the Northern Virginia economy itself. The state agreed to make \$375 million of investments to bolster its tech talent pipeline and \$195 million to support its transportation infrastructure. If Amazon brings 25,000 jobs with minimum average wages of \$150,000, the company is entitled to receive additional state incentives. Following Amazon's decision to remove HQ2 in New York City, the project is expected to easily surpass that number with 50,000. Importantly, the incentives are post-performance, so Amazon will only receive them after the company has positively impacted the local economy and ecosystem. Arlington County and the City of Alexandria have agreed to supplemental incentive packages, with funding for affordable housing to support the local economy.¹³²

With significant change often comes turmoil, and the HQ2 announcement is not without its risks. A major impending challenge to the ecosystem is that Amazon will pull the talent away from the startup ecosystem and raise the wage level for tech talent in an already stretched environment. "That's why it is so important for the pipeline to be really strong," said Stephanie Landrum. Another possibility is that other companies will not move to the area because of Amazon's preeminence. However, Landrum's Alexandria Economic Development Partnership is pounding the pavement and telling the region's story. "We still have a ton of real estate available," she says. "And, all of the same reasons Amazon came—talent, transit, and affordable housing—are all the same reasons you should come as well."¹³³

1776 came to Arlington in 2015 hoping to be an "early adapter" in the burgeoning tech ecosystem. According to Luca McCanna, the organization's Director of Digital Marketing, Amazon's announcement "validates our hypothesis to be here in the first place."¹³⁴ Harry Glazer put the HQ2 announcement into historical perspective, "the region generally needs one big catalyst. Back [in the 1990s] it was telecom and AOL; today there is Amazon."¹³⁵

¹³¹ Talent Pipeline. Center for Innovative Technology. <https://www.cit.org/initiatives/iems/talent-pipeline/> [Accessed April 19, 2019].

¹³² Why NOVA. HQNova. <https://hqnova.com/info.html> [Accessed April 21, 2019].

¹³³ Landrum, Stephanie. President & CEO, Alexandria Economic Development Partnership. April 11, 2019.

¹³⁴ McCanna, Luca. Director of Digital Marketing. March 7, 2019.

¹³⁵ Glazer, Harry. Co-Founder & Co-Chair of MindShare and Founder & CEO of SPROCKIT. April 18, 2019.

CONCLUSION: THE NOVA ECOSYSTEM MOVING FORWARD

The Northern Virginia entrepreneurial ecosystem is undeniably experiencing an inflection point. For an economy that was already trending upward, the Amazon announcement is accelerating the region's trajectory. Its stakeholders—ranging from entrepreneurs to investors to policymakers—are uniformly optimistic about the future. Josh Levi put it simply, "I am bullish. In fact, I would say I believe it will be transformational in that respect."¹³⁶ Julia Spicer believes Amazon will make Northern Virginia's strengths known, "this has always been a good market, and now we will shine a light on that."¹³⁷

In the 1990s, AOL and MCI brought a foundation of economic activity to the region, and the ecosystem blossomed. The backbone that they provided the region supported entrepreneurial activity through their role as customer and supplier. Further, they provided an employment backstop, a "plan B", to innovators who wanted to take a risk and found a company.

John Backus describes a "virtuous ecosystem" where entrepreneurs become investors, who become advisors, who in turn connect early stage founders with corporations, lawyers and headhunters to guide their journey. At times, D.C. has exhibited these characteristics. MicroStrategy—the "canary in the coalmine" of the dot-com bust—spawned future leaders at Appian, ZoomData and Clarabridge, leading software companies all based in Northern Virginia.¹³⁸

In the 2020s, Amazon can facilitate and accelerate this virtuous cycle. The company can provide a fallback option to founders or to tech leaders considering a move to the region. It can also serve as a risk-taking customer and acquirer of startups. AOL and MCI served many of these roles two decades ago. This time around, the hope is that the region and its 40 years of momentum will hold a deeper foundation.

Questions still remain. How will the ecosystem react to the next economic recession? Will entrepreneurial activity evaporate as quickly as in the early 2000s? Who will take the lead as the next generation of great entrepreneurs and investors? When will the region have its next home grown "home run"?

Despite its ups and downs, few private sector tech economies have developed as quickly as the Northern Virginia region. Starting from essentially nothing in the mid-1980s, the ecosystem has trended upward at a consistent and resilient rate. A preponderance of evidence indicates that will likely continue.

¹³⁶ Levi, Josh. Vice President of Policy, Northern Virginia Technology Council. May 1, 2019.

¹³⁷ Spicer, Julia. Executive Director, Mid-Atlantic Venture Association. May 7, 2019.

¹³⁸ Backus, John. Managing Partner at PROOF.VC. May 9, 2019.

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