

Innovation Districts
Virginia Tech Urban Affairs and Planning

INNOVATION DISTRICTS

OPPORTUNITIES FOR NORTHERN VIRGINIA & HAMPTON ROADS

WRITTEN BY:

Jacqueline Canales, Nathan Domme, Aishanjian Faluke, James Garman, Allen Grace,
Sarah Halvorson-Fried, Zach Krohmal, Yabai Li, Tianjun Lu, Kyle Lukacs, Adam Mawyer, Joseph Onyebuchi,
Wenzhou Pan, Shubha Punase, Kyle Redican, Tara Reel, Nicolas Ruiz, Spencer Shanholtz, Xuyue Wang,
Adam Watson, Jon Wergin, Lauren White

INSTRUCTORS:

Dr. Margaret Cowell and Dr. John Provo

TABLE OF CONTENTS

Summary	1
Background: Why Innovation Districts	3
Project Approach	7
Findings Overview	9
Assets and Opportunities: Northern Virginia	9
Assets and Opportunities: Hampton Roads	21
Future Research	35
Conclusions	36
Appendices	38

List of Tables and Figures

1. Cover page, Interior of Collaborative Space	
2. What is an Innovation District? Site map of Kendall Square Innovation District in Massachusetts	3
3. Historical Context for Innovation Districts: Industrial district, Research Park and Innovation District	4 5
4. Innovation Districts Timeline	
5. Overhead perspective of Cornell's Roosevelt Island Planned Development	6
6. Regional level Research Figure	7
7. Sub-regional level research figure	8
8. Local Level research Figure	8
9. Identified Localities in Northern Virginia	9
10. Opportunity Map for Northern Virginia	10
11. Northern Virginia Military & Anchor Institutions	12
12. Northern Virginia Fiber Network	13
13. Northern Virginia Alternative Transportation Options	14
14. Northern Virginia Cultural Map	15
15. Arlington Opportunity Map	19
16. Alexandria Opportunity Map	20
17. Tysons Corner Opportunity Map	20
18. Identified Localities in Hampton Roads	21
19. Overall Opportunity Map for Hampton Roads	22
20. US & Virginia Beach Metro Area, Total nonfarm selected industry supersector employment, over-the-year percent change, June 2015	23
21. Hampton Roads Transportation Network	26
22. Hampton Roads Higher Education Institutions and Fiber Optics Network	27
23. Hampton Roads Cultural Map	28
24. Incubators in Hampton Roads	29
25. Land Use Map of Ocean View	30
26. Land Use Map of Virginia Beach	31
27. Norfolk & Portsmouth Opportunity Map	33
28. Hampton & Newport News Opportunity Map	34
29. Virginia Beach & Southeast Norfolk Opportunity Map	34
30. Appendix A: Common Data Sources	38

SUMMARY

As a land grant university that strives to “invent the future,” Virginia Tech is committed to transforming knowledge into practice through technological leadership, supporting economic growth, and providing innovative solutions to current and future challenges. One promising approach to further this mission is through innovation districts. Innovation districts are dense concentrations of office, residential, and retail uses, connected by anchor institutions and firms, with the capacity to develop new ideas and bring them to market. This report prepared by Virginia Tech graduate students examines the potential for innovation districts in two Virginia regions – Northern Virginia and Hampton Roads – and presents recommendations and strategies for creating spaces that spur productive, inclusive, and sustainable economic development. Innovation districts bring together universities, companies, entrepreneurs, investors, and local communities to create jobs and new technologies while maximizing the efficiencies gained from operating in a vibrant, compact, and accessible environment.

The analysis presented in this report covers the dynamics, opportunities, and challenges for creating innovation districts in the Northern Virginia and Hampton Roads regions. The research focuses on three different geographic scales (regional, sub-regional, and local) using a variety of methods and sources, including stakeholder interviews, U.S. Census and Patent Office data, spatial analysis, and an academic literature review. The Northern Virginia jurisdictions include those in the Washington–Arlington–Alexandria, DC–VA–MD–WV Metropolitan Statistical Area (MSA). The Hampton Roads jurisdictions include those in the Virginia Beach–Norfolk–Newport News, VA–NC MSA. This report sheds light on innovation districts and their unique role within a broader economic development strategy by analyzing and synthesizing data at the regional, sub-regional, and local levels.

Innovation districts are typified by the colocation of research institutions and firms with skilled workers, and worker amenities that make them attractive places to live, play, and connect. Though “innovation district” is a recent term promoted primarily by the Brookings Institution, the concept is based on established theories of spatial economics and innovation. In “The Rise of Innovation Districts: A New Geography of Innovation in America,” published by the Brookings Institution in 2014, Bruce Katz and Julie Wagner indicate that many burgeoning innovation districts need to restructure their anchor institutions in order to complement the role of the federal government in regional economies. In this report, we explain how local community leaders can act at different scales to improve the functioning of innovation districts, and their impact on the regional economy. This report provides specific implementation strategies

for innovation districts that address opportunities and challenges in Northern Virginia and Hampton Roads.

The Northern Virginia and Hampton Roads regions both have the potential to create successful innovation districts and could benefit economically from doing so. Northern Virginia already has dense clusters of development and many highly educated and skilled workers that have pushed local communities to provide more amenities and placemaking. Hampton Roads has strong physical and institutional infrastructure for defense-related industries, specialized workers with and without degrees, an established shipping and naval presence, and excellent outdoor amenities. Both regions have long histories and diverse communities, which are significant attractions for firms and workers. Local governments may use innovation districts to leverage these assets and effect an outsize impact on the broader economy.

Both regions have historically been shaped by federal initiatives and spending, related to the naval presence in Hampton Roads and the national capital in Northern Virginia. These have sustained significant growth, but are also a serious liability

because of their sensitivity to political decisions. Both regions, but especially Hampton Roads, will be physically threatened by climate change induced sea level rise within the century. Local governments may use IDs to improve their resilience to both threats.

While innovation districts can serve similar roles in both regions, the strategies for creating them must address local challenges. Northern Virginia must provide more affordable workforce housing and should repurpose infrastructure that is vacant and or outdated. A stronger university research presence, especially related to science and medicine, would directly benefit an innovation district in this region. Additionally, it would be helpful to provide incentives for community involvement and inter-community connectivity. The strategies for Hampton Roads include strengthening the region's transit system and developing unique open spaces. Other recommendations suggest ways to integrate veterans into the workforce, as well as transition the economy as a whole toward the private sector. Recommendations include action items for local governments and areas for cooperation between them.



The Rise of Innovation Districts: A New Geography of Innovation in America

BACKGROUND: WHY INNOVATION DISTRICTS?

What is an Innovation District?

Innovation districts are dense concentrations of office, residential, and retail uses, connected by anchor institutions and firms, with the capacity to develop new ideas and bring them to market. They are walkable, mixed-use, compact urban developments that provide healthy live, work and play options at a neighborhood scale. Popular examples of organically created innovation districts include Kendall Square in Boston, MA, which houses MIT, and University City in Philadelphia, Pennsylvania, home to the University of Pennsylvania and Drexel University. Cornell Tech's recent venture at Roosevelt Island in New York City is an innovation district that was created inorganically, but which was carefully designed to include those traits. According to Katz and Wagner, these traits areas attract workers and firms, and facilitate collaboration between research universities, research-oriented hospitals, and companies to cluster, connect, and

network with start-ups, incubators, and accelerators.¹

Innovation districts are a powerful concept for economic development which can be applied to some degree in many local economic development contexts. They aim to combine economic, physical, and networking assets that allow local jurisdictions to harness the potential of innovation for economic development. While innovation districts are a new concept, they are not unfounded. The principles that inform innovation district development are in some cases quite old and have ties to historic phases of urban planning and economic development. Innovation districts are significant because they offer a positive prescription for government to promote economic development within the modern, innovation-driven economy.

¹ Katz, B., & Wagner, J. (2014). The Rise of Innovation Districts: A New Geography of Innovation in America. Brookings Institution–Metropolitan Policy Program.



Virginia Tech University, Economic Development Studio, Fall 2015

HISTORICAL CONTEXT FOR INNOVATION DISTRICTS

Industrial Recruitment (1930s)

Modern economic development can be divided into five distinct phases. Beginning in the 1930s, cities used Euclidean zoning to isolate and protect industry in districts, and used Industrial Recruitment strategies to attract them. This era of “smokestack chasing” viewed industrial recruitment as the primary means to economic development.

Rise of the Political Critique (1960s)

In the midst of national turmoil, manufacturing decline, and failed urban redevelopment, critics began to question the goals of the Industrial Recruitment era. The “Rise of the Political Critique,” era saw developers come under scrutiny while researchers actively questioned the metrics for determining success in economic development. Powerful undercurrents emerged as urban activists and writers, such as Jane Jacobs and Rachel Carson, brought the social and ecological ramifications of economic development to the national forefront. Scholars John Logan and Harvey Molotch described cities as “growth machines,” and stated that com-

petition dictated land use at the expense of the “losers.”²

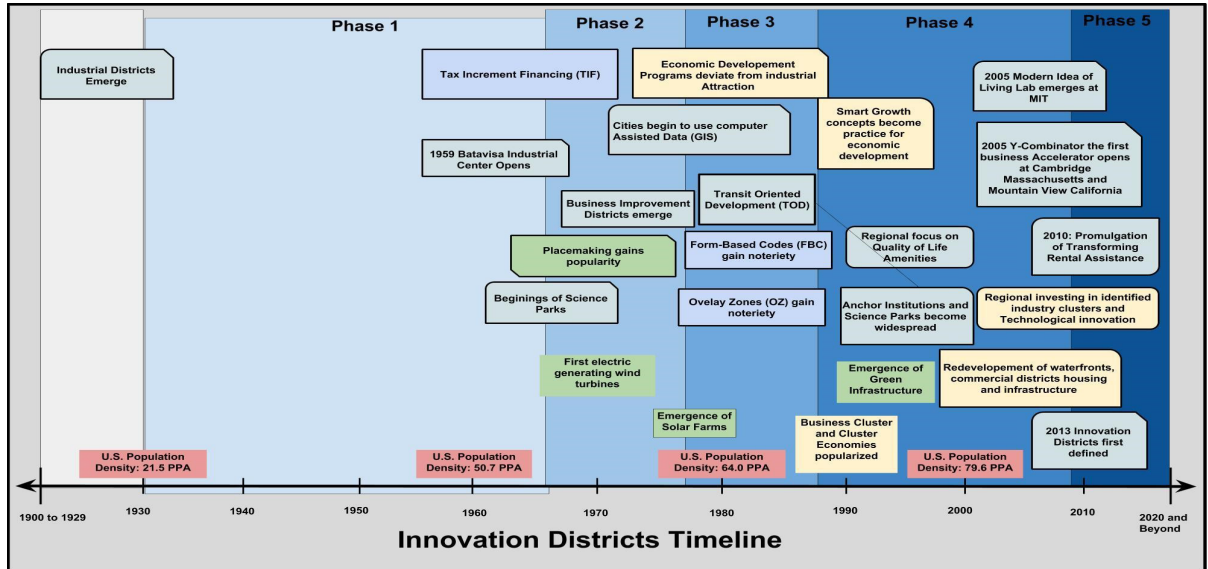
Entrepreneurs and Equity (1970s)

The third phase oversaw the decline of the traditional industrial district. This phase of “Entrepreneurs and Equity” shifted the focus of economic development to supply side economics with business development at the crux. Place-based equity strategies arose as local jurisdictions began to focus resources on cultivating local entrepreneurship rather than luring new companies and corporations to resettle within their jurisdiction. Advocates began giving a voice to those who experienced past inequities during traditional economic development processes.

Sustainability with Justice (1990s)

The 1990s began a renewed phase of environmental stewardship. “Sustainability with Justice” emerged as the economic development field began

² Logan, J., & Molotch, H. (1987). *Urban fortunes. The Political Economy of Place*. Berkeley: University of California.



Virginia Tech University, Economic Development Studio, Fall 2015

to examine the relationships between economy, ecology, and social justice. Planning scholar Scott Campbell asserts that the achievement of sustainability happens when various actors carefully balance these three variables.³ During this time, technology also began its exponential expansion as new economies and markets emerged offering a myriad of innovative services and products. Computer analysis and geographic information science (GIS) are tools that emerged in the previous decades which grew in prominence during this time as well.

Privatization and Interdependence (Today)

Two approaches characterize the current phase: one that relies on market solutions and another that promotes metropolitan or municipal strategies. Economic developers now recognize the importance that cluster development can have on a region's ability to remain competitive. Locating businesses into these clusters can further innovation and increase productivity. The metropolitan approach is designed to curb sprawl and create neighborhoods that are walkable and compact while leveraging local resources and competitive advantages.

The Emergence of Innovation Districts

Innovation districts act as a catalyst to promote economic development that is productive, inclusive, and sustainable. In this way, IDs encapsulate the lessons learned throughout the history of economic development. They promote networking through close spatial ties to active research universities, dedicated financial capital and funding streams, and a highly educated workforce.⁴

Innovation districts began to redefine urban centers and inner-ring suburbs by redeveloping underutilized spaces like brownfield sites. Katz, Vey, and Wagner (2015) credit innovation districts with improving social equity, ecology and local economies within several case studies.⁵ Examples of innovation districts in Philadelphia (University City), Boston (Kendall Square), and New York City (Roosevelt Island) point to expanded economic opportunities for the least fortunate residents, greater environmental stewardship, and a robust economy defined by start-ups specializing in technology, innovation, and solutions to real-world problems. As an economic development tool, inno-

3 Campbell, S. D. (2013). Sustainable development and social justice: Conflicting urgencies and the search for common ground in urban and regional planning. *Michigan Journal of Sustainability*, 1.

4 Florida, R. (2005). *Cities and the creative class*. Routledge.
5 Katz, B., Vey, J.S., & Wagner, J. (2015). One year after: Observations on the rise of innovation districts. Brookings Institution. Retrieved from <http://www.brookings.edu/research/papers/2015/06/24-one-year-innovation-districts-katz-vey-wagner>.



Image by The Brookings Institution

vation districts are a new standard for present-day planning. Creating environments where employees can live, work, and play within an innovation district ‘campus’ promotes collaborative spaces to encourage the spread of ideas and concepts. Rezoning and design of physical environments embrace walkable, livable communities with a transportation network featuring increased transit access, and decreased automobile use.

Though innovation districts are gaining in popularity, there are still doubts about their success. When determining their economic development potential, a region should ponder several considerations. For instance, by attracting talent to the area, will knowledge spillovers occur in the labor market? How exactly do knowledge spillovers occur? What effect would non-compete clauses have on these basic assumptions? Aside from this uncertainty, innovation districts must also be sited properly or risk failure. For example, locating an innovation district far from transit options or in the outer-ring

suburbs of a city would be inefficient. Given this scenario, the districts would constrain regional access, and additional infrastructure would be required for net benefits to occur. Later in this report, opportunity maps explore “hotspots” of areas that already possess the infrastructure and amenities that innovation districts need. One weakness of this approach is the potential lack of or the high price of vacant parcels for innovation district development. However, these locations also take advantage of existing infrastructure, population density, and other factors.

PROJECT APPROACH

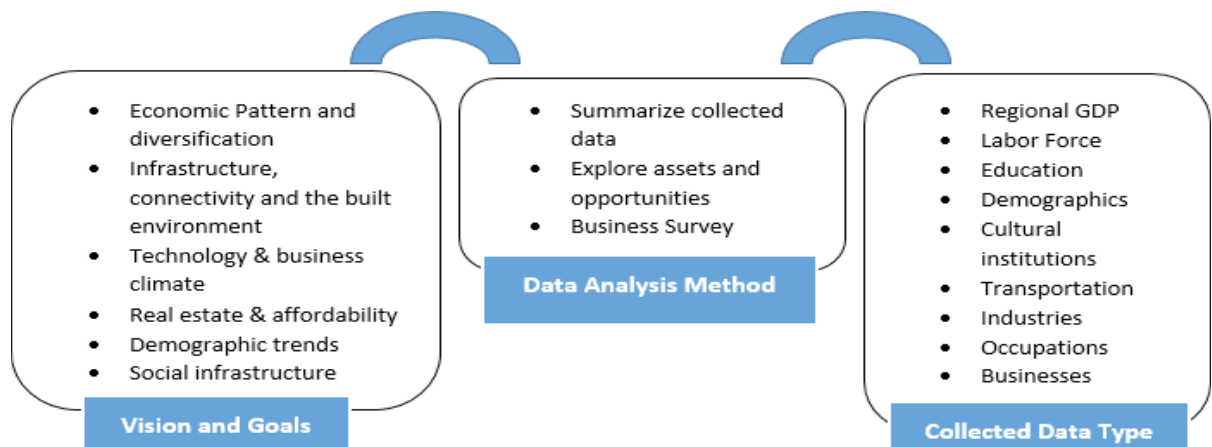
The goal of our research is to examine the potential for innovation districts as a viable economic development strategy in Northern Virginia and Hampton Roads. To accomplish this, we examined data at both the regional and local levels. Our regional analysis allowed us to examine the assets and challenges of both regions, as well as to develop recommendations for economic development strategies in general. Our local analysis enabled us to pinpoint the locations within each region that would be most suitable for innovation districts as a way to enact those strategies. The following sections of the report detail our research methodology, our findings, and our recommendations for region-wide and location-specific actions.

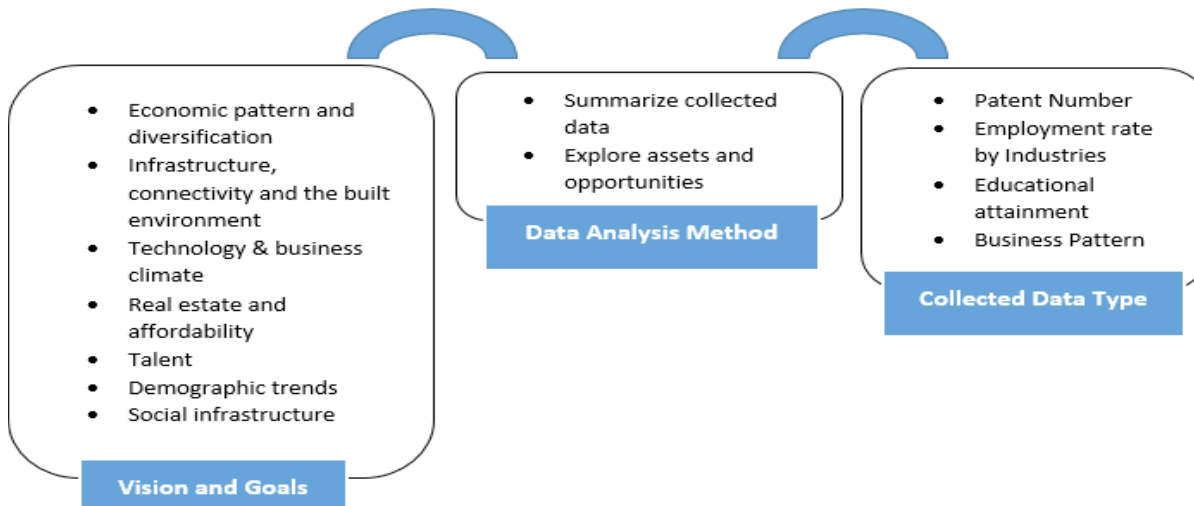
Summary of Methodologies

A mixed methods approach involved statistical summaries of data, an academic literature review, and oral interviews of regional stakeholders. The findings are summarized in the form of ‘assets and opportunities,’ to facilitate decision-making. The local level analysis was performed through spatial analysis, using Geographic Information Systems (GIS), in order to identify and describe areas suitable for innovation districts in Northern Virginia and Hampton Roads. This analysis consisted of two phases: creation of an opportunity map; and detailed analysis of priority areas as identified by the opportunity map in each region. The three charts below breakdown the vision, data analysis method, and the type of data collected from each of

the three tiers of analysis; regional, sub-regional, and local.

Our research derived quantitative data from a wide range of sources including governmental organizations, university research, local news and reports, and GIS systems. Appendix A contains a chart, outlining our primary quantitative source material. We supplemented our findings with qualitative interviews with regional stakeholders. As we are on the forefront of this area of study, we also relied considerably on the research done by Brookings Institution. Based on a review of the literature and case studies, we identified economic, physical, and networking assets as the most salient themes for creating and sustaining innovation districts. Based





Virginia Tech University, Economic Development Studio, Fall 2015

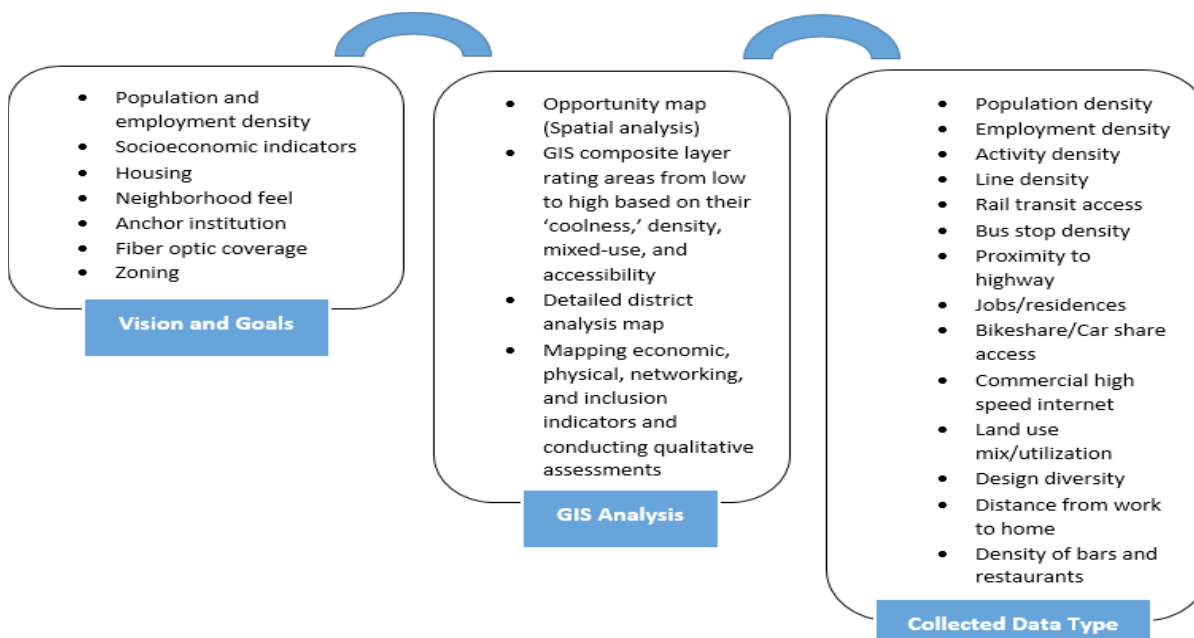
on these three criteria, we created the following six categories to address critical findings:

- 1) Economic Activity & Talent
- 2) Physical & Social Infrastructure
- 3) Technology & Business Affordability
- 4) Global Networks
- 5) Real Estate & Affordability

We analyzed these features at the regional and local levels to provide a comprehensive analysis of the two regions. Following this, we researched best practices and policies from around the United States that have the potential to address regional

challenges and explore the capitalization of assets. Additionally, we considered state-level policies. State government involvement can serve as a catalyst for innovation and regional cooperation, and to alleviate regulatory burdens for start-up businesses.⁶ Furthermore, given the Commonwealth of Virginia which operates according to Dillon's Rule, many problems related to business climate and infrastructure require state-level participation.

⁶ Virginia Initiative for Growth and Opportunity in Each Region. (2015). Our Plan: 3. State government must be a catalyst and partner. Retrieved from Go Virginia's website: <http://www.govirginia.org/our-plan/>



Virginia Tech University, Economic Development Studio, Fall 2015

FINDINGS OVERVIEW

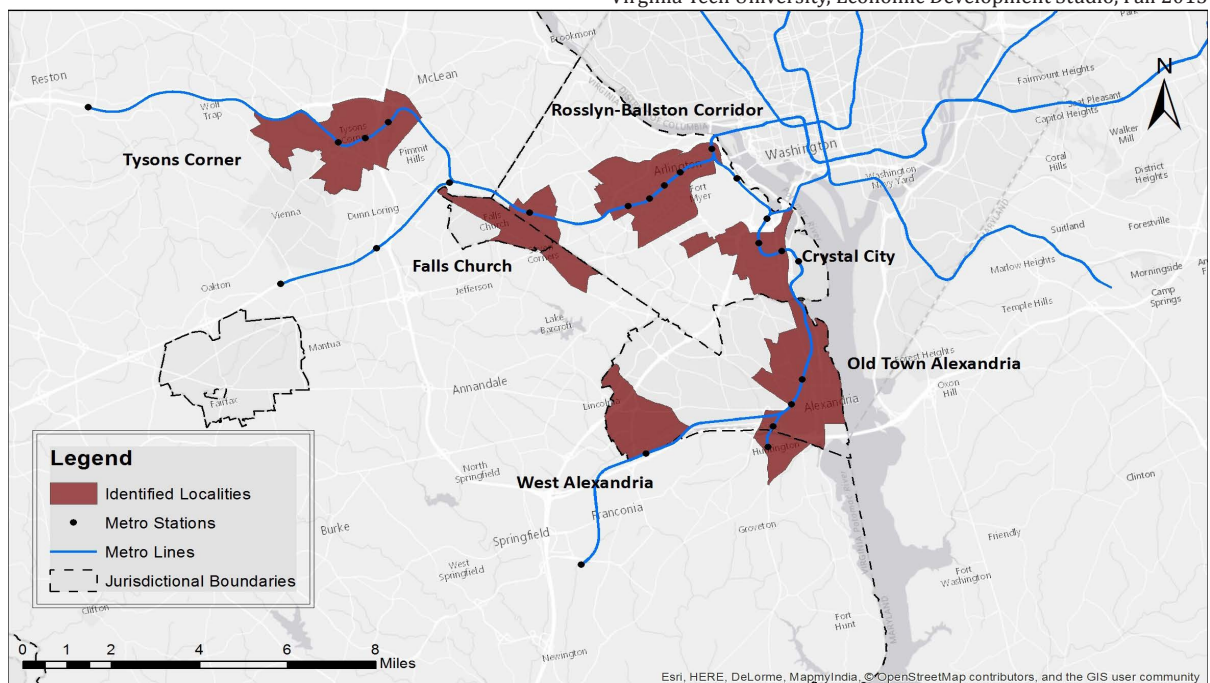
The following two sections identifies existing assets and opportunities within the two regions. They reveal gaps in assets and opportunities that we found to be critically linked to economic development as a goal, and the creation of innovation districts as a strategy. Finally, they present policy and practice recommendations derived from our research.

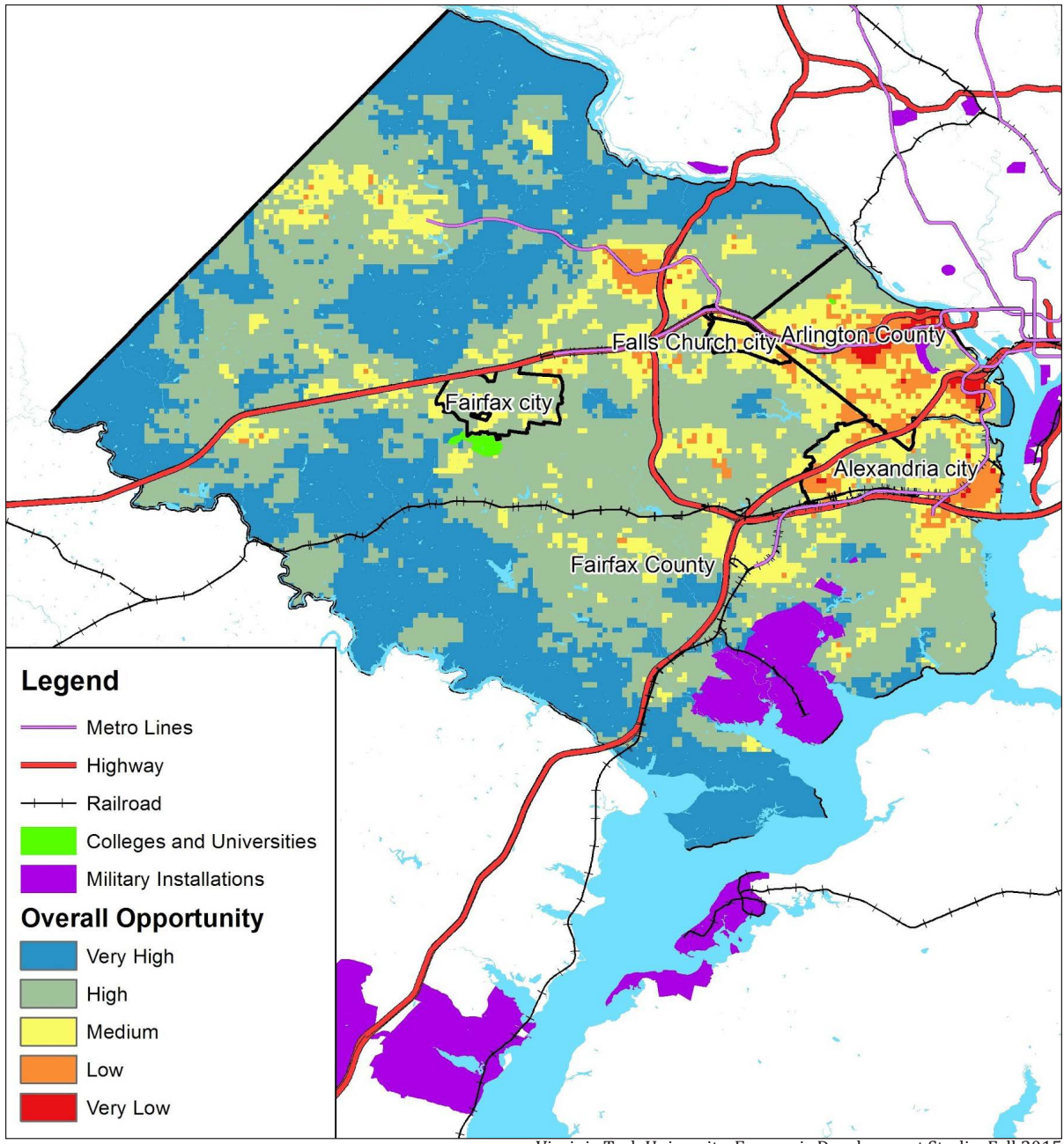
ASSETS AND OPPORTUNITIES: NORTHERN VIRGINIA

To identify potential areas for innovation districts and thus local analysis, we constructed an opportunity map from an index of four characteristics -- density, use mix, accessibility, and “coolness.” The four factors were identified by the Brookings Institution’s innovation district literature as necessary to foster successful innovation districts. We measured each characteristic using two variables. For density we used population and employment density per square mile from U.S. Census block level data. For use mix we used the ratio of employees to residents, and housing density, both from Census block data. For accessibility we used rail transit

station proximity and bus stop density, using local transit authority data. Finally, for “coolness” -- arguably the least obvious characteristic -- we used restaurant density (from Virginia Department of Health data) and the share of the labor force employed in arts, entertainment, recreation, accommodations and food services by Census Block (LEHD data) divided by the regional average. Each of these variables was evenly weighted and then summed to give an overall score. The data is presented below in the form of a heat map, Jenks classification was used to create the 5-tier scale from “very low” to “very high.”

Virginia Tech University, Economic Development Studio, Fall 2015





Virginia Tech University, Economic Development Studio, Fall 2015

Opportunity Map for Northern Virginia
 This opportunity map allowed us to identify locations in Northern Virginia that would be most suitable for innovation districts. Throughout our analysis of assets and opportunities, we refer to these locations.

1. Economic Activity & Talent (Industries, Occupations, and Employment; Education, Anchor Institutions, and Research and Development Activities)

According to the Center for Regional Analysis (CRA) at George Mason University, there are 43 Fortune 500 companies located in the Washington area for reasons other than access to federal markets. These consist of diverse industries like information technology data processing and analysis, hospitality, telecommunication, and civil engineering.

Professional and Scientific Services (18 percent) are the largest employment sector in the Northern Virginia (NoVA) region. Furthermore, this sector as well as the Educational Services sector has shown consistent growth in the past ten years. The growth in these industries indicate that the region has an established base of information technology jobs. However, the Northern Virginia region faces fiscal resiliency issues and would benefit from diversification from federal government employment and contracting.

Northern Virginia is also home to a large concentration of highly educated millennials as well as a high number of educational institutions. Fairfax County and the City of Fairfax have accessed the highest amount of grants and funding through Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) between 2010-2015,⁸ which is reflected in the research and development conducted by George Mason University. Furthermore, Northern Virginia has a strong presence in the data processing and analysis industry which is diversified through the 100 biotech and life sciences companies in the region.⁹ The combination of the educated workforce, educational institutions, and the high number of grants present an attractive opportunity for collaboration and professional development for both

existing and incoming residents. The collaborative opportunities are already showcased in the strong number of patents in the region. Fairfax County holds about 20 percent of Virginia's patents with 3,636 as of 2013.¹⁰

Localities in Northern Virginia are already using planning to stimulate innovation-based economic activity. For instance, according to a representative of Arlington Economic Development, "Arlington uses 'technology zones'" where "if [companies] increase the amount of employees, they receive a partial tax offset."

Recommendations:

1. **Use innovation districts to capitalize on knowledge-based occupation assets and diversify the economy.**
 - a. Knowledge and information based industries are ideal for innovation districts because knowledge can be transferred easily between companies and employees. Innovation districts can foster the knowledge and information based industries and use them for economic growth.¹¹ Innovation districts are also a means to garner a more private sector economic base. Applying innovation districts models in Northern Virginia, charges jurisdictions to think outside of the box and explore opportunities for collaboration between private and public projects and funding instead on reliance on the federal structure. The continued presence and force of the federal government within the region provides opportunity to leverage this asset in growing a stronger private sector. Although there are changes with the federal spending and tax policies that could promote innovation, local government and private businesses should utilize existing resources to garner a more productive business climate.¹²

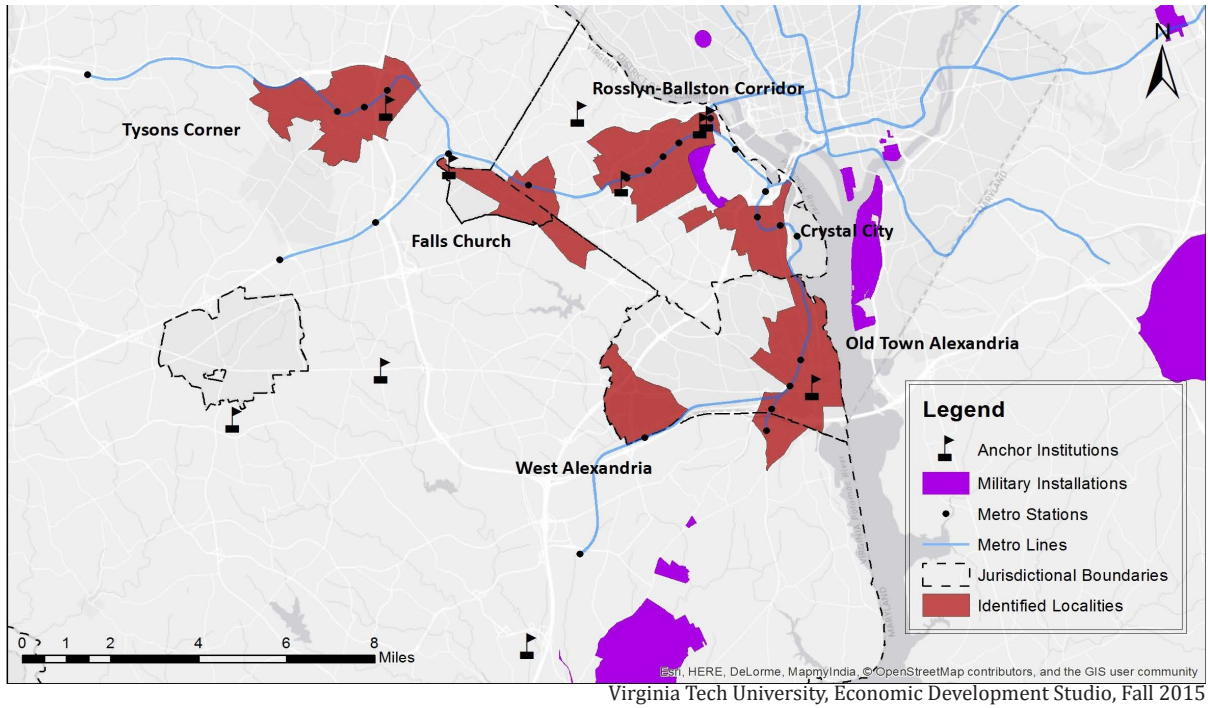
8 Milestone 6.0 (Copy of SBIR/ STTR Funding 2010-2015 pg. 3) no specific sources are indicated don't know how to cite it.

9 Milestone 6.0 pg. 3 same as above

10 Milestone 6.0 pg. 3 same as above

11 Katz & Wagner (2014)

12 Congressional Budget Office (2014). Federal policies and innovation. Retrieved from <https://www.cbo.gov/publication/49487>



2. Establish a strong public university presence

- a. **How to implement it:** There are two possible ways to implement this strategy based around the MIT method and the Cornell method.
 - i. **MIT Method:** Leverage the existing universities in the area to help feed students right into the surrounding workforce and provide them with opportunities for entrepreneurial endeavors. Universities around the NoVA area would be the ones that would be feeding the students. This would require working with universities both in Northern Virginia, such as George Mason and going across the bridge to engage universities like Howard, Georgetown, and George Washington.
 - i. **Cornell Method:** Leverage the existing alumni base of the large Virginia research universities to help create a space for both teaching and innovation in Northern Virginia. Virginia Tech, University of Virginia, Old Dominion University, and Virginia Commonwealth University have alumni in the Northern Virginia area that could be recruited to meet this goal.

- b. **Who is involved:** Local governments, universities (local and state), angel investors, economic development groups.
- c. **Why it is important:** One of the common threads in innovation districts is how they can leverage university investment and talent to build technology and innovation clusters around the district.

3. Establish workforce development centers

- a. **How to implement it:** There are already a number of workforce development centers in Northern Virginia. Implementing this recommendation could be done in two steps:
 - ii. Identify and determine the areas that the current workforce development centers need help expanding into. Please see Appendix B for locations and website information.
 - iii. Identify centers with positive measures of success and try to encourage them to set up a center in the region. Possible nominees would be the National Skills Coalition and the Aspen Institute. Both are already established within Washington, DC.
- b. **Who is involved:** Northern Virginia Community College, Skills Source Group, City of Alexandria: Workforce Development Center

c. **Why it is important:** Workforce Development Centers can help give residents the skills they need to compete in a 21st century economy

4. **Implement community benefits agreements: A Community benefits agreement (CBA) is a contract signed by community groups and a real estate developer that requires the developer to provide specific amenities and/or mitigations to the local community or neighborhood.**

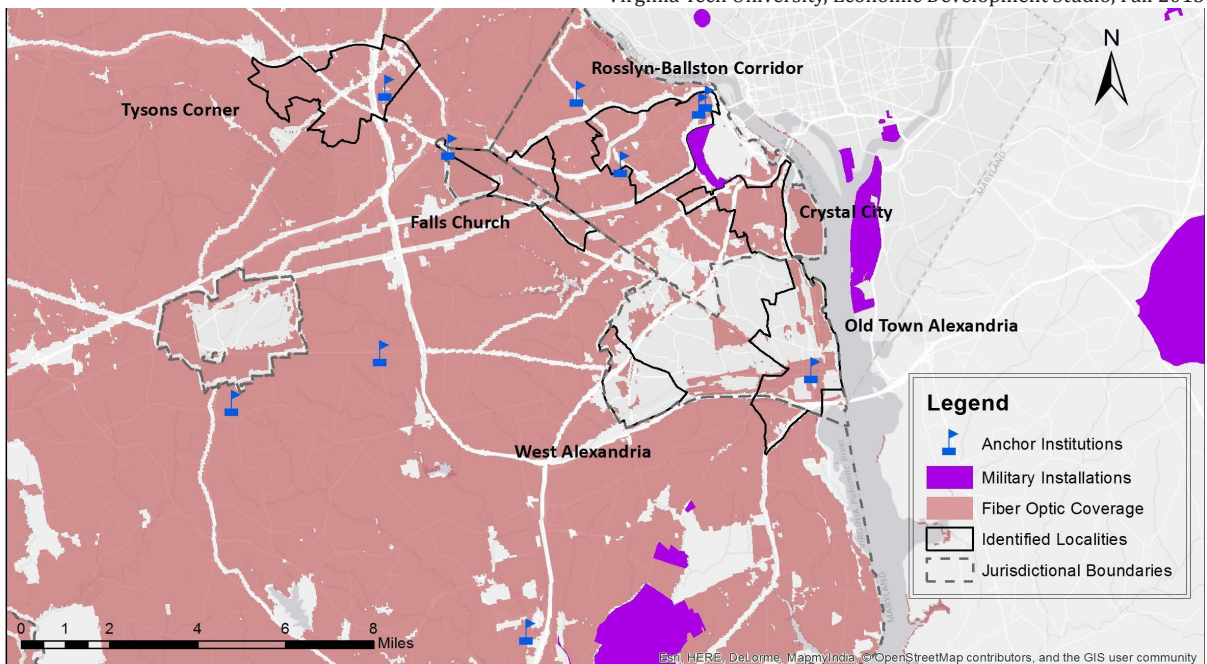
- a. **How to implement it:** A community benefits agreement is a contract between community groups and a developer requiring that developer to provide agreed upon amenities and/or mitigations to the community. Presenting this option to the different community leaders would leverage new developer projects to the help the community. Presenting this as an option these options can consist simply of explaining how the community can benefit and by showing past successful CBAs.
- b. **Who is involved:** Community and city leadership, developers
- c. **Why it is important:** Community benefits tools can maximize returns on local government investment in development, enable

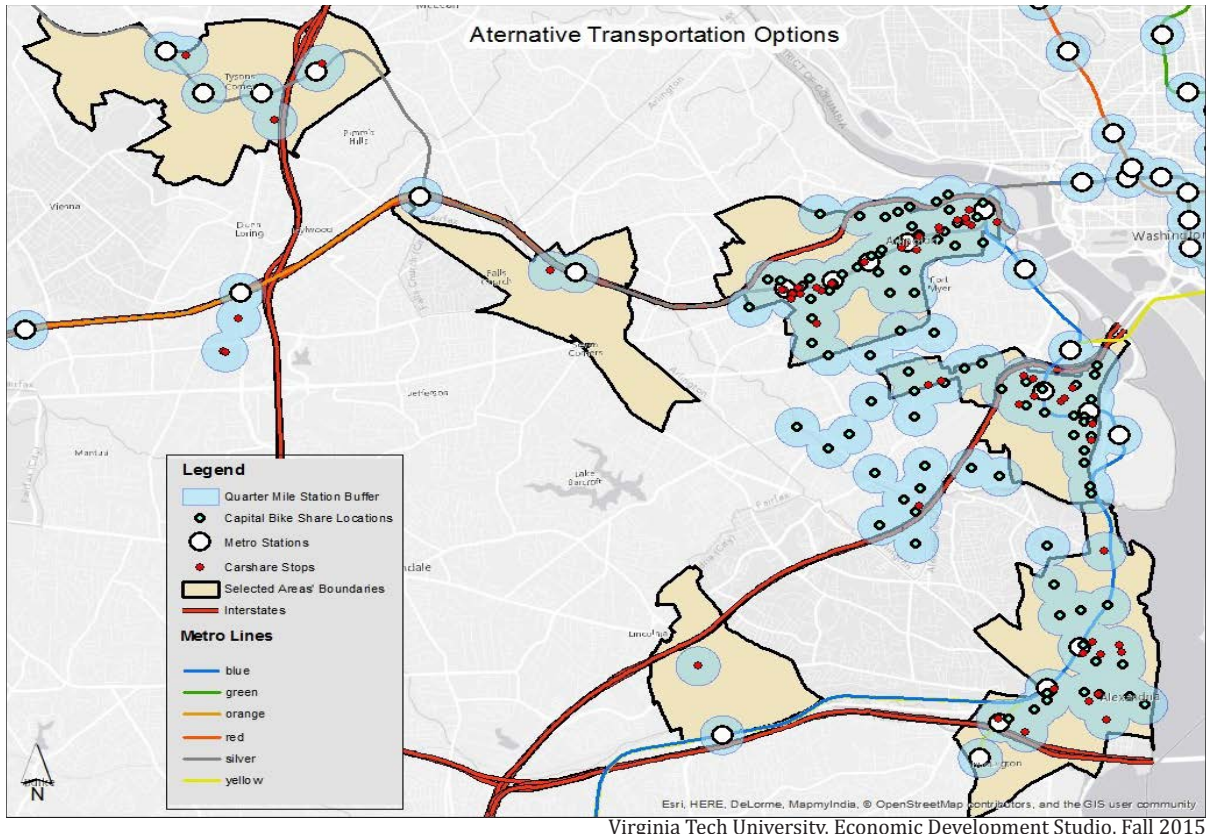
more equitable economic development, and help generate public support for economic development projects. For example, the Los Angeles, California Staples CBA ensured affordable housing and living wages around a sports stadium development.

2. Physical & Social Infrastructure

Robust entrepreneurial and business climates are reliant on the technological infrastructure available and are particularly dependent on fiber optic coverage. Through a spatial analysis of the Northern Virginia region, we present trends and technological advancements in fiber optic coverage. Fiber optic coverage is important to innovation because it provides the infrastructure that allows companies to connect with the global environment. Our findings indicate that Northern Arlington, Southeast Arlington, Falls Church and Tysons Corner have sufficient and expansive fiber optic coverage that appeal to businesses, whereas Old Town and West Alexandria have relatively lower coverage.

Virginia Tech University, Economic Development Studio, Fall 2015





Northern Virginia boasts one of the most diverse and developed transportation networks in the country. Connectivity has been improved tremendously, and has expanded locations suitable for versatile innovation districts across the region. Each location in the region has similar commercial use density and quality of open spaces.

The study areas possess useful highway and airport access, excellent rail transit service, and extensive bus service. Although there are no clear winners, each locality could enhance their existing service to improve access and suitability for an innovation district.

Many of these areas also have good metro access and many multi-family homes, but differ significantly in what they can offer businesses and residents, as well as in cost of living. In particular, the specific areas of North Arlington, South Arlington, and Old Town Alexandria distinguished themselves through diverse transportation modes, such as their superior car share coverage. However, North Arlington scores the least in its access to the

Capital Beltway, in contrast to the other areas. Both South Arlington and Tysons Corner score highly in concentrated commercial uses with limited open space. West and Old Town Alexandria have more dispersed commercial uses along with expansive open spaces.

Northern Virginia has a large selection of open spaces, cultural institutions and other lifestyle amenities. These amenities and institutions are concentrated in certain areas within the region. Arlington County and Old Town Alexandria stand out for their large number and diverse set of cultural institutions. Meanwhile, West Alexandria and Tysons Corner are notable for their lack of cultural amenities. Amenities such as open space attract and retain human capital as well as add to the quality of experience at the neighborhood scale. While east Alexandria has excellent open spaces, areas that have stronger business climates such as South Arlington and Tysons Corner would benefit from more quality open space. Though there are numerous regional parks, few areas have both good local park service and cultural institutions.

Recommendations:

1. Strengthen transit-oriented development

- b. How to implement it:** Create local development interest around transit nodes by using incentives and restrictions.
- c. Who is involved:** Local policymakers, planning offices, and developers.
- d. Why it is important:** Creating development along transit is a conduit to the “live, work, play” lifestyle coveted by urban residents today. Close access to transit provides workers and residents can actually raise housing affordability while maintaining a dense network of firms, retail, and residential opportunities. More transit-oriented development would also help address Northern Virginia’s office vacancy rate, which is “currently 14% ... more than double the 2005 vacancy rate of 6.2%” according to a local real estate professional.

2. Promote multi-modal transit options

- a. How to implement it:** Incorporate urban design within the innovation district such as the complete street philosophy and implement massive transit projects in the center of main streets. Projects such as these could be implemented in a trail or prototype stage

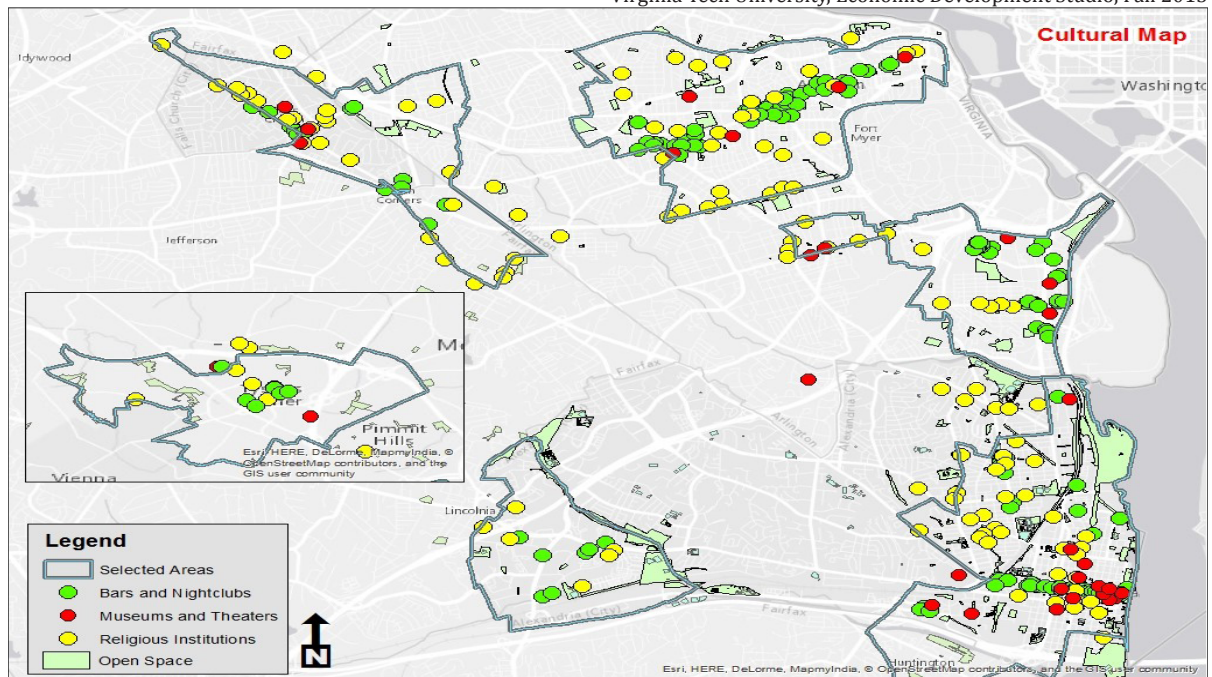
before garnering support for full implementation.

- b. Who is involved:** VDOT, local planners and citizens. Potential for private public partnerships.
- c. Why it is important:** This will create the transit nodes that can be developed around for the TOD within the innovation district.

3. Expand fiber optic network

- a. How to implement it:** Work with stakeholders to design a new network and work on a plan for installation. Access federal grants and bonds for help with funding, and involve the community (commercial and residential) to explain the future benefits.
- b. Who is involved:** local Department of Technology Services, Transportation department (VDOT), Economic Development office, Internet providers
- c. Why it is important:** A well developed fiber optic plan will help to increase the quality and speed of connections that are important for a successful innovation district. Additionally, like Arlington County has done, access to this network can be sold to private companies.

Virginia Tech University, Economic Development Studio, Fall 2015



3. Technology & Business Affordability

Through the synthesis of data analysis within economic development and review of trends in business climate and entrepreneurship, findings indicate that the Northern Virginia region is competitive in business growth and accessing venture capital. The Northern Virginia region ranks high in venture capital funding in the third quarter of 2015, with DC ranking 24th and Virginia among the top 20.¹³ In 2014, the Washington D.C. MSA ranked 9th of all the MSA regions in the country in venture capital funds, with a total amount of \$851.18 million, this figure reflects the high share of startups in technology based sectors within the MSA.¹⁴

Recommendations:

1. **Focus on attracting and growing innovative firms**
 - a. **How to implement it:** Identify growing industries and provide them with incubators and infrastructure needs. Infrastructure needs can consist of everything from quality broadband with reduced costs compared to the typically expensive large Internet Service Providers.
 - b. **Who is involved:** Local government, private companies, and angel investment groups
 - c. **Why it is important:** The greater Washington D.C. area including both sides of D.C. (Maryland and Virginia) have been effective at attracting innovation-focused industries. The area has been called by some the Silicon Valley of security for its rich industry of cyber security. They were able to get this way because “With incubators being set up by UMBC and Montgomery County, start-up, corporate tax credits and relocation incentives being throw out, cybersecurity is definitely hot right now, and we will continue to

see more cyber security tech being built out of this area.”¹⁵ This industry has continued to grow and has helped bring innovation to the region. Continuing to support the cyber security clusters and finding the next major industries for the future will bring more innovation to the area.

4. Global Connection & Networks

Connecting with the global marketplace is a key strategy to spurring growth. Based on data from the Center for Regional Analysis (CRA) at George Mason University, a significant global connection exists at the regional level in the Washington area.¹⁶ Despite fluctuations in economic markets, the federal government keeps the Northern Virginia region oriented to global, political, and economic trends. Underutilization or lack of public and private leadership networks demonstrates areas for improvement in connecting and engaging with the global marketplace. The region also benefits from three major airports: Dulles International, Ronald Reagan, and Baltimore Washington International.

Migration and density are drivers of technological change. In this region, Alexandria has one of the highest rates of international migration. This is important for innovation districts because a high level of diversity in an area can attract other well-educated workers of different nationalities, and promote the area as a place they would want to live. More importantly, high levels of international migration can provide crucial global links for an innovation district.

13 PricewaterhouseCoopers National Venture Capital Association. (2015). MoneyTree™ Report Q3 2015. Data provided by Thomson Reuters. Retrieved from https://www.pwcmoneytree.com/Reports/FullArchive/National_2015-3.pdf

14 Clifford, C. (2015, January). The 100 U.S. Cities Where Businesses Received the Most VC Funding. Entrepreneur. Retrieved from <http://www.entrepreneur.com/article/242159>

15 Bing, Chris. (2015, June). How Cybersecurity Came to Dominate DC Tech. DCInno. Retrieved from <http://dcinno.streetwise.co/2015/06/08/washington-dc-cybersecurity-tech-companies-are-on-the-rise/>

16 CRA, G. M. (2014). Improving the Washington Region's Global Competitiveness.

5. Real Estate & Affordability

Addressing real estate affordability is essential to ensuring an attractive live, work, play district. The Northern Virginia regional real estate market is one of the most expensive in the country and is struggling with two major issues: plummeting availability of affordable homes, especially for millennials; and rising office vacancies in “suburban office parks.”¹⁷ Northern Virginia is also experiencing an increase in the number of firms moving closer to transit-oriented development. Thus, property demands in the area are shifting away from the traditional suburban office park to sites located near transit. Because of the shifting demands, there is a need to repurpose the space in existing office parks.

A household is considered to be cost burdened if the household spends more than 30 percent of its gross income on housing costs. When households are cost burdened they have less income to spend on other items such as food, education, transportation, and amenities. Homeowners have more affordable housing options than renters throughout the Northern Virginia region. Falls Church has the least affordable housing overall; West Alexandria has similarly unaffordable housing for all groups except homeowners with a mortgage. Overall the Northern Virginia Area is extremely expensive, commonly leaving annual income earners making less than \$75k spending 2 to 3 times the expected 30% of monthly income on housing costs (table source?) As expected, those with the lowest incomes have the largest struggles with affordability. Without housing affordability, innovation districts will struggle in retaining and attracting talent as well as supporting industry.

Recommendations:

1. Develop more workforce and student housing

¹⁷ McCAFFREY, S. (2015, October). Candidates: Office-vacancy rate a threat to Arlington’s vitality. INSIDENOVA. Retrieved from http://www.insidenova.com/news/arlington/candidates-of-office-vacancy-rate-a-threat-to-arlington-s-vitality/article_1a7b-3d5a-6b53-11e5-b2d1-03b281027b43.html

a. How to implement it:

- i. Local entities may adopt financing programs for affordable housing construction such as the Arlington Housing Investment Fund (AHIF). AHIF is a revolving loan fund that provides low interest loans to developers who create affordable housing in the County. Since its inception in 1988 the AHIF has created over 7,000 approved affordable units in Arlington County and provided over \$200 million in loans to developers. AHIF is funded through a variety of sources such as developer contributions, general revenue, AHIF loan repayments and Community Development Block Grant (CDBG) and HOME Investment Partnerships funds. This practice is one strategy that other locations could consider.
- ii. Given an innovation district’s proximity to transit, and the high cost of locating near transit options, Transit Oriented Affordable Housing (TOAH) funds should be considered as well. This fund helps finance affordable housing near transit options.

b. Who is involved: Local government, U.S. Department of Housing and Urban Development.

c. Why it is important: The housing market in this region is one of the most expensive in the nation with over one-third of residents considered to be cost burdened.¹⁸ A future innovation district in this area should adopt efficient policies such as a to address housing affordability, in order to attract not only potential employees of the district, but also for service workers.

2. Consider alternative housing options

a. How to implement it: Local governments may encourage the incorporation of so called “micro-units” or “innovation-units” (dwellings roughly 300 square feet in area) into

¹⁸ CRA, G. M. (2013, December).Housing the Region’s Future Workforce 2012-2032 . Retrieved from http://cra.gmu.edu/pdfs/studies_reports_presentations/Housing_the_Regions_Future_Workforce_2012.pdf

the new housing development projects in the area.^{19,20} For locations with significant amount of land zoned for apartment housing, such as Falls Church, the local entities may encourage “micro-units” development using appropriate land use measures, tying affordability requirements to new construction.

- b. **Who is involved:** Local governments, developers
 - c. **Why it is important:** Providing attractive, new housing options specifically designed for millennials could bring talent -- young professionals and students -- to the region.
3. **Repurpose infrastructure by considering alternative uses for vacant spaces**
- a. **How to implement it:** Offices with long-standing vacancies should be remodeled to make spaces that can be multi-purposed. The vacant space can be put to better use by allowing residential, educational, and other uses through overlay zoning and interior remodeling. As stated by Jeffrey Spivak, “taking on such reuse projects demands commitment and creativity. Different stakeholders—from owner to redeveloper, from creditors to the local government—must work together toward a common goal. Adaptive use requires vision, a keen understanding of the local marketplace, and the marketing expertise to find a different category of tenant.”²¹
 - b. **Who is involved:** Local governments, developers
 - c. **Why it is important:** There are large amount of vacant space available. These have the potential to be converted into affordable housing units through redevelopment. This would address both the high office vacancy and housing affordability issues.

19 Acitelli, T. (2015, February 23). What, Exactly, Makes a Home a Micro-Home in Greater Boston? Curbed Boston. Web.
20 Robarts, S. (2015, June 2). Planned Miami district aims to foster innovation and entrepreneurship. Gizmag. Web.
21 Spivak, J. (2010, November). Repurposing Distressed Commercial Assets. Urban Land. Web.

6. Resilience

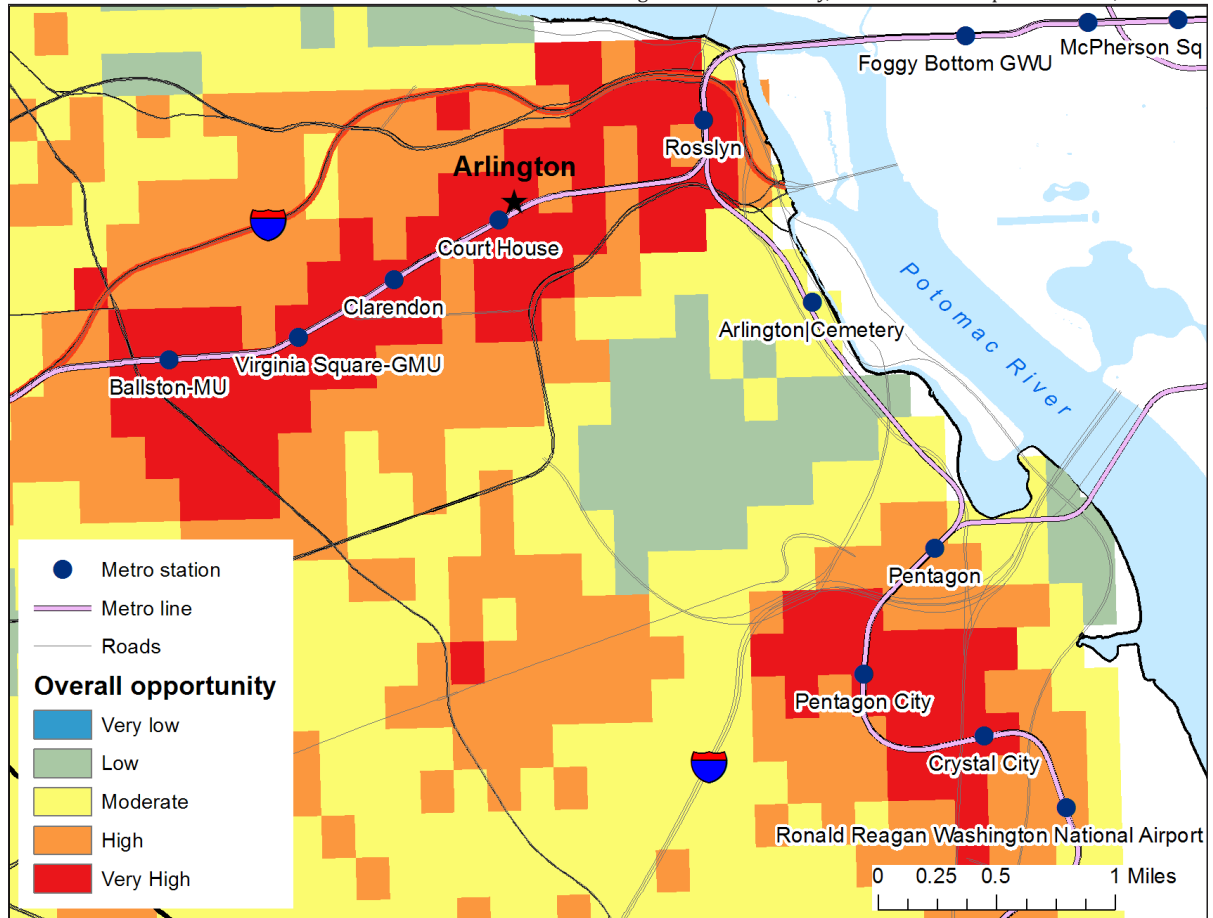
The Northern Virginia region may be exposed to natural and manmade disasters in the coming years and can learn from initiatives started by several academic and governmental institutions. The localities in this region are exposed to environmental and economic threats such as federal budget sequestration, sea level rise, recurrent floods, and the displacement of vulnerable populations during such events. Our analysis indicates that the region as a whole holds high value economic assets that are exposed to such threats. Therefore, a collaboration among local entities, academic institutions, and the public is needed to address future challenges related to natural disasters and to strengthen the resilience of the region.

Several programs in Northern Virginia that are looking into resiliency are Resilient Virginia, and the Chesapeake Crescent Initiative (CCI). Resilient Virginia convenes “leaders from local government, the private sector, academia, and [the] Virginia Sustainable Building Network.”²² The organization aims to set up local offices to launch a Community Resiliency Initiative while acting as the convening force of critical national, state, and local resilience experts in order to disseminate information and resources. The CCI project has selected Alexandria as the second pilot for its “Safe + Smart Cities” program that “provides free services to help localities harden their resiliency and maximize their operational performance through the efficient use of technology.”²³ Governor McAuliffe believes in the program as he has stated, “The CCI pilot project in Alexandria will provide valuable information and unbiased recommendations that can help enhance our communities’ resilience, quality of life, and economic growth through technology and innovation.” Due to Northern Virginia’s vulnerability to climatic change, partnering with or including space and resources for these initiatives within the potential Innovation District is highly recommended.

22 “Resilient Virginia | Accelerating Resiliency Planning for Virginia Communities.” Resilient Virginia Web. 11 Dec. 2015.
23 Alexandria Selected for “Safe + Smart Cities” Pilot Project to Improve Resiliency and Efficiency. Web. 11 Dec. 2015.

OPPORTUNITY MAPS: NORTHERN VIRGINIA

Virginia Tech University, Economic Development Studio, Fall 2015



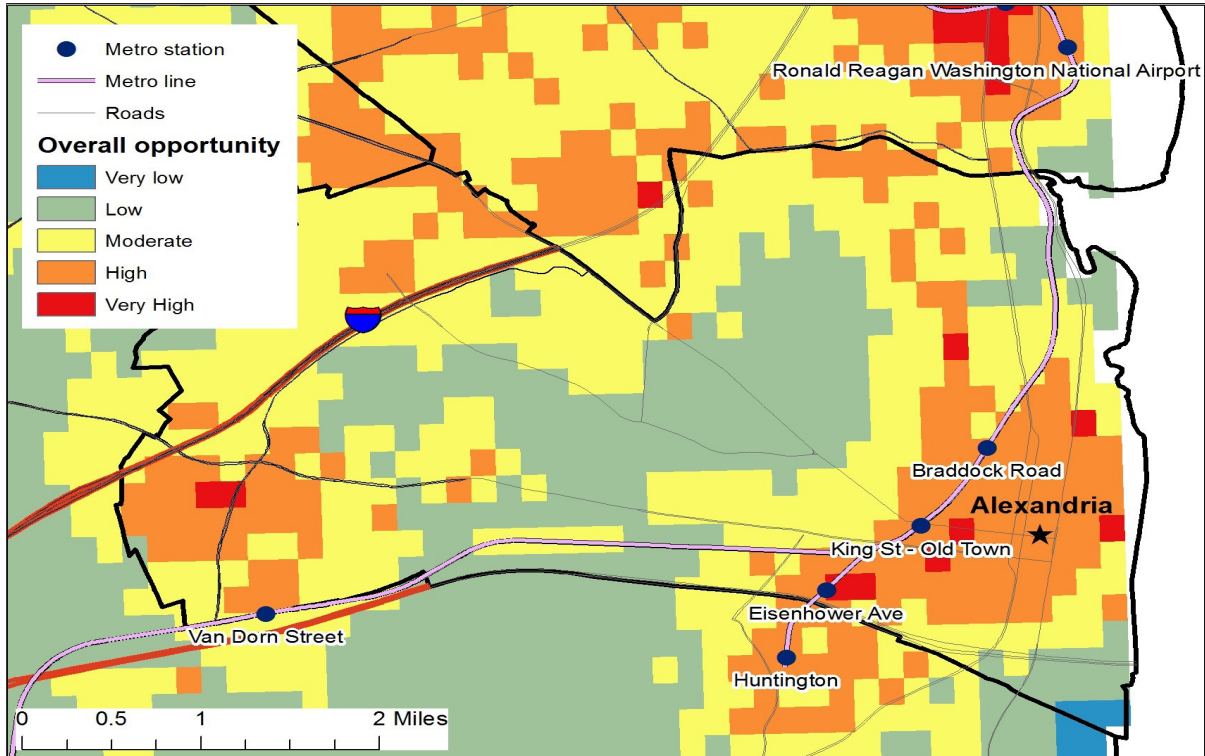
ARLINGTON

The areas shown on this map were the highest scoring areas in the spatial analysis of the Northern Virginia region. Arlington is a dense, walkable County with strong economic, physical, and social assets. It has one of the most educated populations of any County in the US, with 71% of adults having at least a Bachelor's Degree; it also has the highest percentage of educated millennials in the region; it is also the home of Virginia Tech Research Center, a George Mason University campus, major corporations, such as Deloitte, Accenture, Corporate Executive Board, and Opower; and research institutions such as DARPA, the Office of Naval Research, and the Air Force Office of Scientific Research. Finally, it has outstanding physical assets including 11 Metrorail stations, and the ConnectArlington dark fiber network. Housing affordability is one of the

County's greatest weaknesses, although Arlington County has taken steps to address this in its recently approved Affordable Housing Master Plan.

ALEXANDRIA

Alexandria has relatively high population and employment density, particularly in Old Town. The city has 4 Metrorail stations, a new Bus Rapid Transit (BRT) corridor, and higher education campuses including Virginia Tech and George Washington University. Some major employers are the US Patent and Trademark Office, and the Transportation Security Administration. Old Town has a high number of urban amenities including numerous independently owned stores, restaurants, and art galleries. One of Alexandria's greatest weaknesses is its gaps in fiber optic broadband coverage.



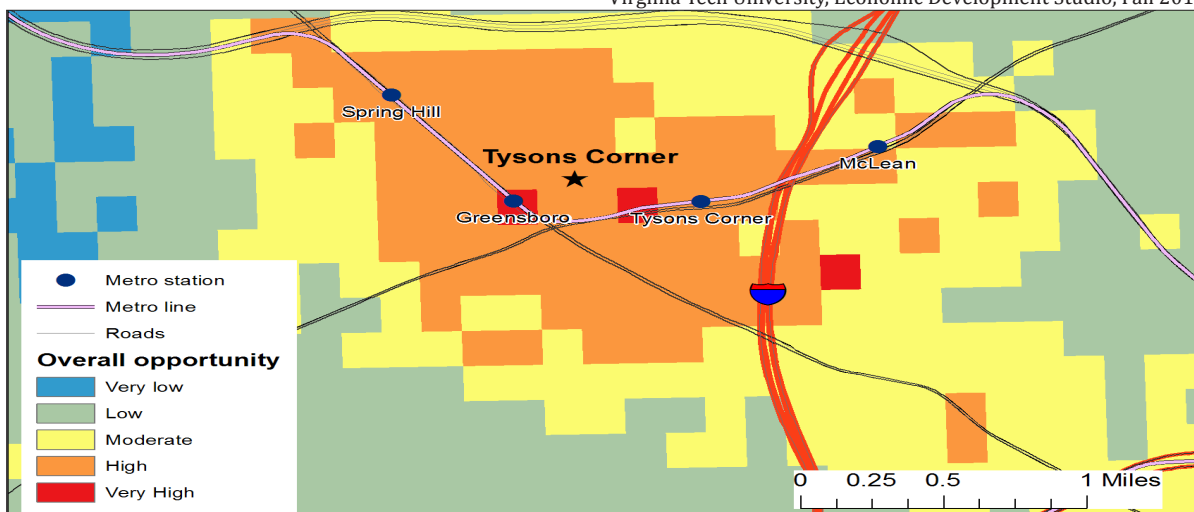
Virginia Tech University, Economic Development Studio, Fall 2015

TYSONS CORNER

Tysons Corner is Virginia's largest office market with 26.4 million square feet of office space. It is Fairfax County's economic engine, and the home to many major corporate or regional headquarters including those for AT&T, Boeing, Booz Allen Hamilton, Capital One, Deloitte, Ernst & Young, IBM, and Hilton Worldwide. With the first phase of Silver Line expansion complete, Tysons now has 4 Metrorail stations. Tysons scored somewhat lower in the spatial analysis because, despite these great economic assets and new above-ground Metrorail

stations, it lacks housing and remains a largely auto-oriented area with relatively poor walkability. However, with the new Comprehensive Plan for a Transit Oriented Development (TOD) around the Silver Line Metro Stations in the Tysons Urban Center, the whole area is targeting to achieve a complete mixed use, walkable, and accessible area, with a better balance between jobs and residential units. This development will make it a more desirable place to attract businesses and a high contender for creating an innovation district.

Virginia Tech University, Economic Development Studio, Fall 2015



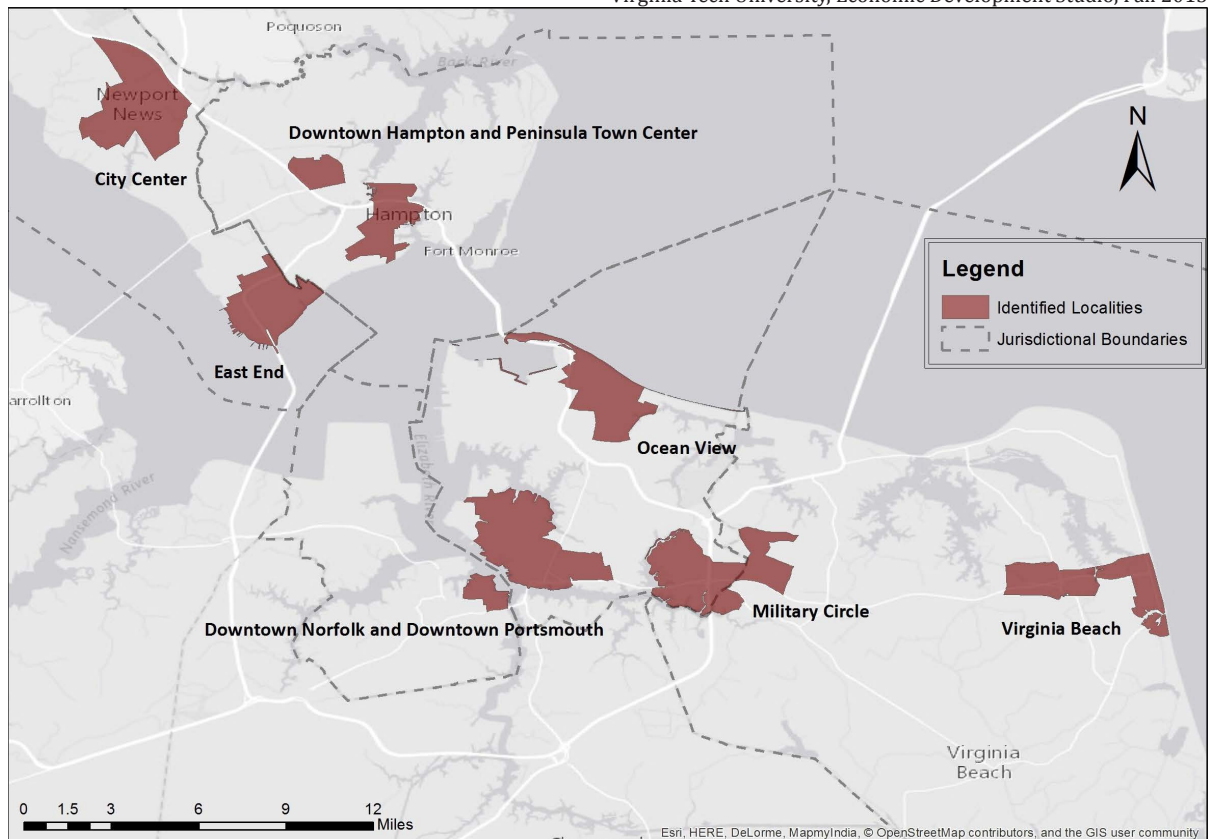
ASSETS AND OPPORTUNITIES: HAMPTON ROADS

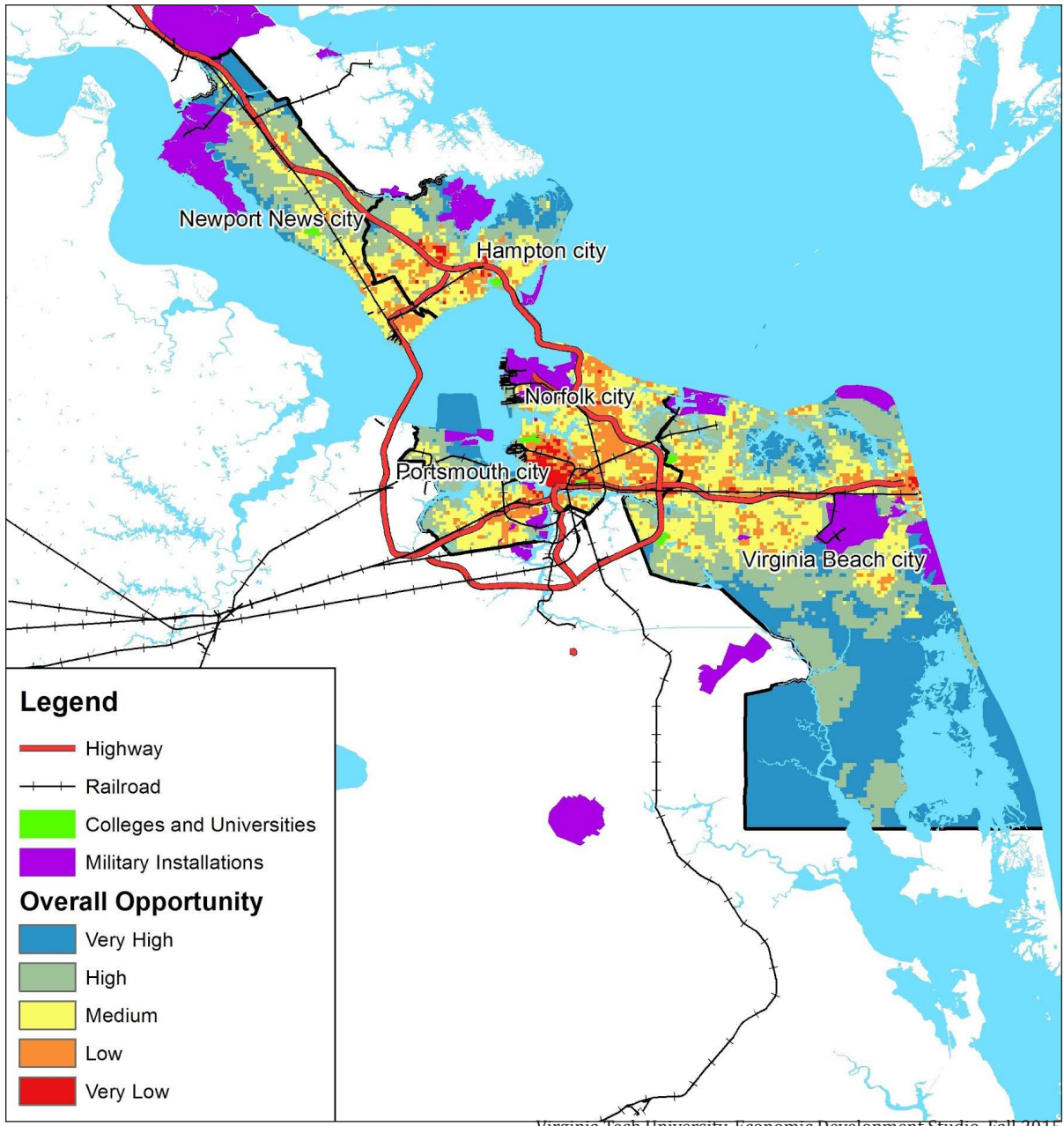
To identify potential areas for innovation districts and thus local analysis, we constructed an opportunity map from an index of four characteristics -- density, use mix, accessibility, and “coolness.” All of these factors have been identified by the Brookings Institution’s innovation district literature.²⁴ We measured each characteristic using two variables. For density we used population and employment density per square mile from U.S. Census block level data. For use mix we used the ratio of employees

to residents, and housing density, both from Census block data. For accessibility we used rail transit station proximity and bus stop density, using local transit authority data. Finally, for “coolness” -- arguably the least obvious characteristic -- we used restaurant density (from Virginia Department of Health data) and the share of the labor force employed in arts, entertainment, recreation, accommodations and food services by Census Block (LEHD data) divided by the regional average. Each of these variables was evenly weighted and then summed to give an overall score. Jenks classification was used to create the 5-tier scale from “very low” to “very high.”

²⁴ Katz, B., & Wagner, J. (2014). *The Rise of Innovation Districts: A New Geography of Innovation in America*. Brookings Institution–Metropolitan Policy Program.

Virginia Tech University, Economic Development Studio, Fall 2015





Virginia Tech University, Economic Development Studio, Fall 2015

This opportunity map allowed us to identify locations in Hampton Roads that would be most suitable for innovation districts. Throughout our analysis of assets and opportunities, we refer to these locations.

1. Economic Activity & Talent (Industries, Occupations, and Employment; Education, Anchor Institutions, and Research and Development Activities)

Hampton Roads's geography makes it a convenient port location and hub for marine transportation infrastructure. Traditionally, trade, manufacturing, transportation, and warehousing industries have dominated the region. However, Hampton Roads is primarily focused on defense-related activities. About 42 percent of regional economic activity will be attributed to Pentagon spending this year; down from a recent peak of 47 percent in 2011. The region seeks to diversify away from defense contract work because sequestration continues to be an economic threat. Compared to the U.S. as a whole, the region has had recent growth in the financial and other service industries as displayed in the graphic below. This could be caused by entrepreneurial growth, as new businesses require financing and other supporting services. The growth in these areas is paving the way for startups and new businesses to establish in the region.

Within the region, Williamsburg, Hampton, and Norfolk have the highest rates of 'Arts and Culture' employment and 'Technology-Knowledge' Occupa-

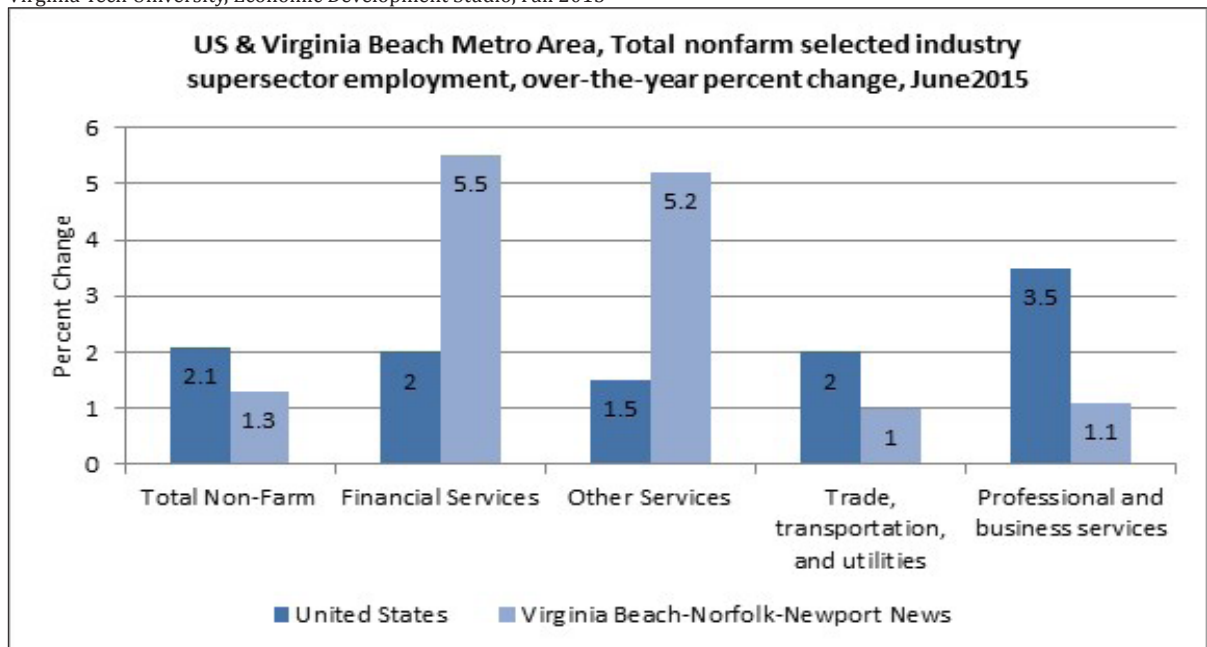
tion Cluster employment. Among them, Hampton also has highest 'High Tech' employment in the region, followed by Portsmouth and Virginia Beach. Overall, the region saw a net decline in new businesses, which could be attributed to higher number of business closings than their creations -- mostly in businesses with less than 20 staff. The businesses with larger staffs (20-499 employees) were able to sustain better in the region.

The Hampton Roads region is highly educated with over 55% of its residents holding a bachelor's degree. City of Hampton also outpaces the rest of the region in terms of its SBIR and STTR grants which reflects the large amount of federal research and development performed in this region.²⁵ Old Dominion University, the College of William and Mary, and Eastern Virginia Medical School all participate in university research.

²⁵ SBIR- The Small Business Innovation Research (SBIR) program is a highly competitive program that encourages domestic small businesses to engage in Federal Research/Research and Development (R/R&D) that has the potential for commercialization.

STTR- The Small Business Technology Transfer (STTR) is another program that expands funding opportunities in the federal innovation research and development (R&D) arena. Central to the program is expansion of the public/private sector partnership to include the joint venture opportunities for small businesses and nonprofit research institutions.

Virginia Tech University, Economic Development Studio, Fall 2015



Specifically, Southern Norfolk possesses the largest concentration of millennials, who are also the most highly educated. Hampton Roads is home to four Fortune 500 companies, "...at least six colleges, scores of military schools, shipyard vocational schools and research labs."²⁶ Its existing industries include government, naval, and health and education.

Recommendations:

1. Establish a strong public university presence

- a. **How to implement it:** There are two possible ways to implement this strategy based around the MIT method and the Cornell method.
 - i. MIT Method: Leverage the existing universities in the area to help feed students right into the surrounding workforce and provide them with opportunities for entrepreneurial endeavors. Universities around the Hampton Roads area would be the ones that would be feeding the students. Universities may include the College of William and Mary, Old Dominion University, Hampton University, or Christopher Newport University.
 - ii. Cornell Method: Leverage the existing alumni base of the large Virginia research universities to help create a space for both teaching and innovation in Hampton Roads.
- b. **Who is involved:** Local governments, universities (local and state), angel investors, economic development groups.
- c. **Why it is important:** One of the common threads in innovation districts is how they can leverage university investment and talent to build technology and innovation clusters around the district. According to a local stakeholder, in order to succeed cities need "access to talent - workforce development and quality school systems."

2. Attract an innovative workforce

- a. **How to implement it:** There are three main ways that the hot spot zones for innovation districts can connect with millennials (talent) to move to the area.
 - i. In Hampton, Norfolk, and Newport News, continue to provide affordable housing for residents. By affordable housing we mean not the overly priced rates for quality apartments or homes that make the wages earned go further. The local government using things like CBAs with developers and property management could help keep the cost of rent low.
 - ii. None of the three areas prime for an innovation district have harnessed new technology to connect with residents. Using the information technology department of their local governments they could create an app that allows for discussion and alerts about what is happening in their communities. The new millennial generation is likely to own smartphones and the use of this could leverage them into helping create more potentials.
 - iii. Continued regional investment in cultural activities. One way that Hampton Roads does a great job with creating culture is through their Summer Concert series. The series goes across Hampton, Newport News, Norfolk and Virginia Beach through partnerships with local radio stations. More events and festivals in the areas help drive culture in the region
- b. **Who is involved:** Local governments, radio stations, regional cultural groups
- c. **Why is it important:** Oklahoma City Example-
 - i. Oklahoma City gives a great example of an emerging area that has been able to capitalize on the talent within the region. Some attribute the attractiveness to the innovative workforce comes from the affordability of housing, the local culture and how they have been able to harness technology. Housing prices have managed to stay in the affordable range in Oklaho-

²⁶ Taylor, R. (2005). The Importance of Regionalism in the Global Economy: Why must we adjust? Future of Hampton Roads

ma City in the key areas. Through local ordinance and CBAs they are able to help create an environment that people want to live. They have heavily invested into cultural activities of festivals, concerts, etc. Finally they are able to interact with the local work force by harnessing technology and the development of a “City Hall Application” that allows for the community to work with the local government to express what they want in their city.

3. Transition veterans

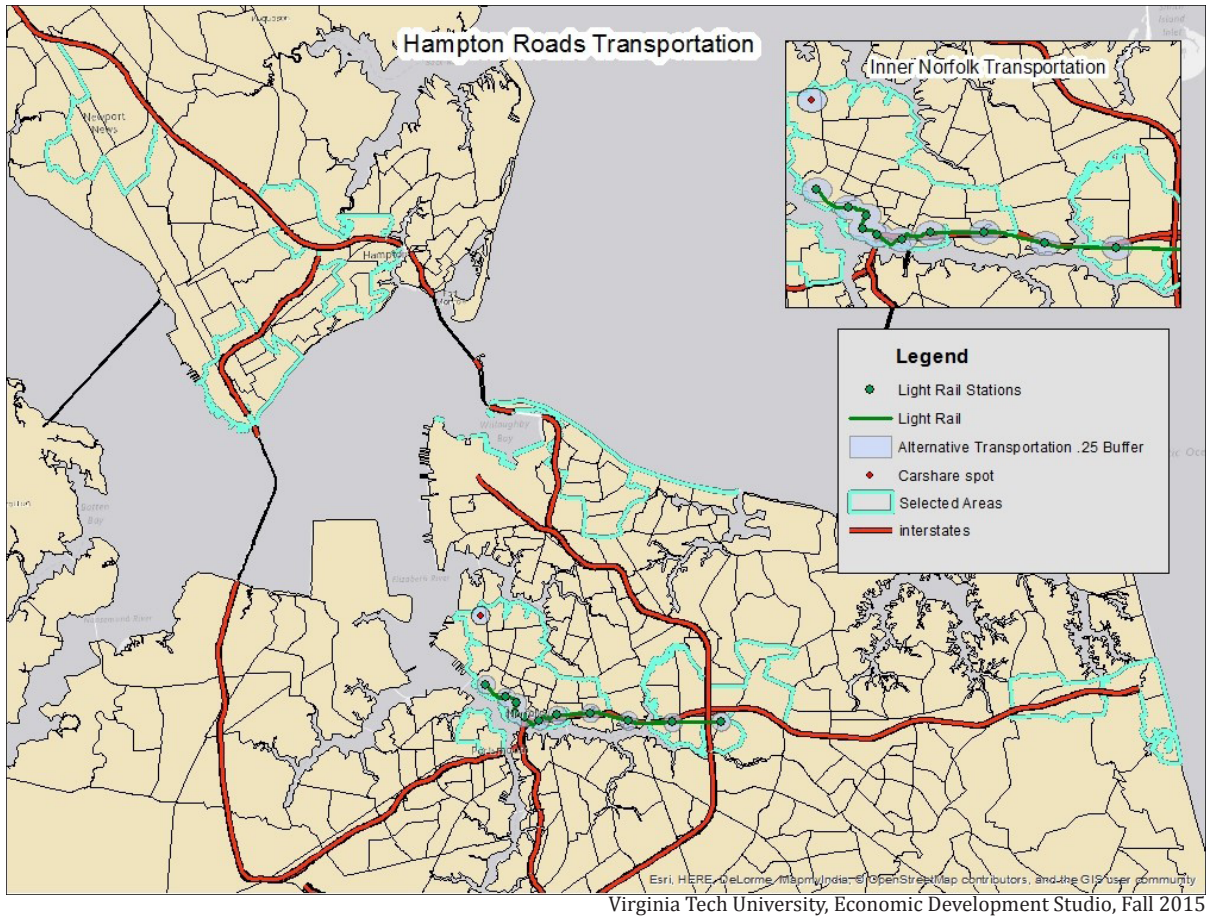
- a. **How to implement it:** There are a number of groups already working on transitioning veterans. There is a twofold way to approach this, through workforce development centers and through direct veteran programs...
 - i. In the Hampton Roads area there are a number of workforce development centers already existing. On the peninsula side the largest WDC is the Peninsula Council for Workforce Development located near City Center in Newport News. This WDC has a couple of co-projects like the Youth Career Cafe and the Peninsula Worklink. These programs and the WDC focus on making sure that the local population has the training and opportunities they need to be productive members of the work force. The Norfolk local government has their own WDC that can help transition veterans. Through support and encouragement of these types of programs veterans can have access to the training and help they need to become full members of the workforce. One option for this would also be to try and bring in successful WDCs.
 - ii. The other way that Hampton Roads can encourage the successful transition of veterans is through programs that directly relate to it. The Commonwealth of Virginia has veteran programs through Elevate Virginia. Benefits in this program have training and placement services, along with partnering with Virginia Community Colleges to offer the skills training needed.

Through continued support and encouragement of these programs, they can successfully transition veterans. Another option for helping fix this would be to partner with the local four year institutions to make sure they have programs that help transition veterans. ODU is one university that already has options for this both on campus and online. If encouragement and support was also coming from the number of other universities in the area, veterans in the area could transition over.

- b. **Who is involved:** Local government, non profits, local colleges (four-year and community colleges)
- c. **Why it is important:** There are a high number of veterans in the Hampton Roads area, and the ability to educate and place them into other jobs could help them find meaningful, well-paid work while utilizing the skills they have gained in the military.

4. Replicate the WPSI model

- a. **How to implement it:** The West Philadelphia Skills Initiative would be a beneficial project to replicate in a number of different areas in Hampton Roads. This was done by a non profit the University district that was attempting to help educate and provide opportunities for the economically disadvantaged in West Philadelphia. They did everything from provide internships for high school graduates, to subsidizing work hours if the individual was becoming educated. Through partnering with local universities and companies they were able to help add talent to the local workforce. In Newport News, Hampton, and Norfolk there are a number of areas that are impoverished. Replication of the WPSI model and helping find job placement or training for necessary skills for many of the locals. They could help add more talent to the region.
- b. **Who is involved:** Local government, non profits, local institutions, local employers
- c. **Why it is important:** Addition of talent to the workforce



Esri, HERE, DeLorme, MapmyIndia, © OpenStreetMap contributors, and the GIS user community
 Virginia Tech University, Economic Development Studio, Fall 2015

2. Infrastructure, Connectivity, and Built Environment

The Hampton Roads MSA is dominated by low-density, auto-dependent development. The region’s roadways have been greatly expanded over the years and there are more projects slated for the next two decades.²⁷ However, Southeast and Southwest Norfolk are both distinguished by their LRT service. Extension of the light rail system to Virginia Beach would improve regional accessibility, and is currently being studied by the city. High usage rates of Norfolk’s Tide Light Rail Transit (LRT) system indicate a trend in support of sustainable development. Its 7.4-mile line also connects important anchor institutions and business hubs, such as Eastern Virginia Medical School, Downtown Norfolk, Norfolk State University, and Newtown Road.

27 “A Transit Vision Plan for Hampton Roads”

Downtown Norfolk and Downtown Portsmouth is also higher in density with the most expansive open spaces. Similarly, Virginia Beach and Ocean View also show higher density and the most extensive open spaces respectively. However, the majority of areas in Hampton Roads are relatively low density, and are dominated by single family residential uses. Asset wise, Newport News has good fiber optic coverage, as well as having heavy industrial, and manufacturing zones. In contrast, Norfolk and Virginia Beach lack these production zones and have poor fiber optic coverage.

The Hampton Roads region enjoys ample park amenities, with multiple highly accessible large natural parks. The region also boasts of a high number of collegiate and cultural capital. Moreover, there is a considerable diversity in the concentration of neighborhood open spaces and cultural institutions at the local level. This is reflected in Downtown Hampton and Peninsula Town Center, Virginia Beach, and Military Circle, which have

diverse cultural institutions. Moreover, Ocean View and Downtown Norfolk and Downtown Portsmouth have the highest amount of open space. For this study, colleges and universities were also considered as valuable cultural institutions, and the findings show their concentration in Downtown Hampton and Peninsula Town Center, Ocean View, Downtown Norfolk and Downtown Portsmouth, Military Circle, and Williamsburg. However, both City Center and East End areas relatively lack in these amenities.

These amenities are important for attracting talent, as regional stakeholders recognize. According to the Hampton Roads Community Foundation, “Hampton Roads is working to create a sense of place that draws people to the region.”

Recommendations:

1. Provide alternative modes of travel

a. How to implement it: Some initiatives regarding the expansion of existing public transit service provided by Hampton Roads Transit (HRT) are already on the way. Transit

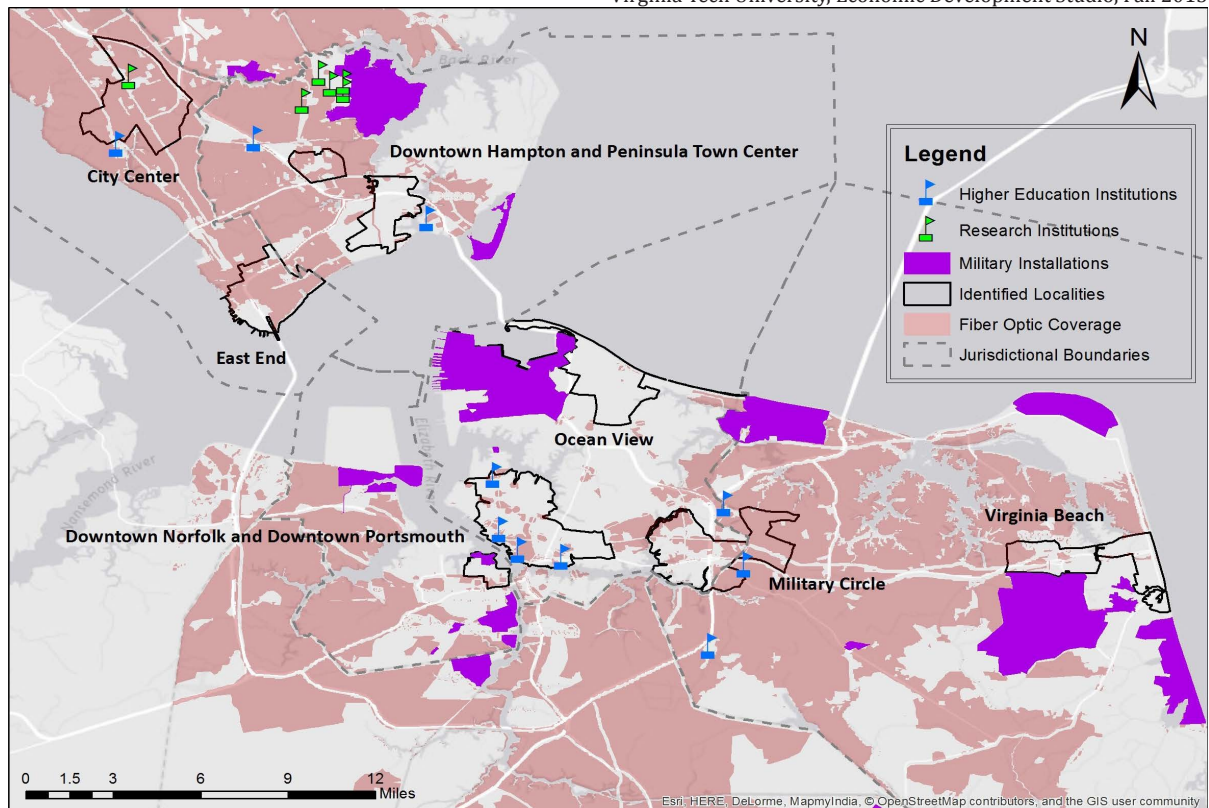
authorities are conducting studies regarding the expansion of light rail transit service to Ocean View and Virginia Beach. Local government, real estate developers, and local transit authorities should work together, prioritizing the connection between residential areas, workplace and service areas, in the context of future expansion.

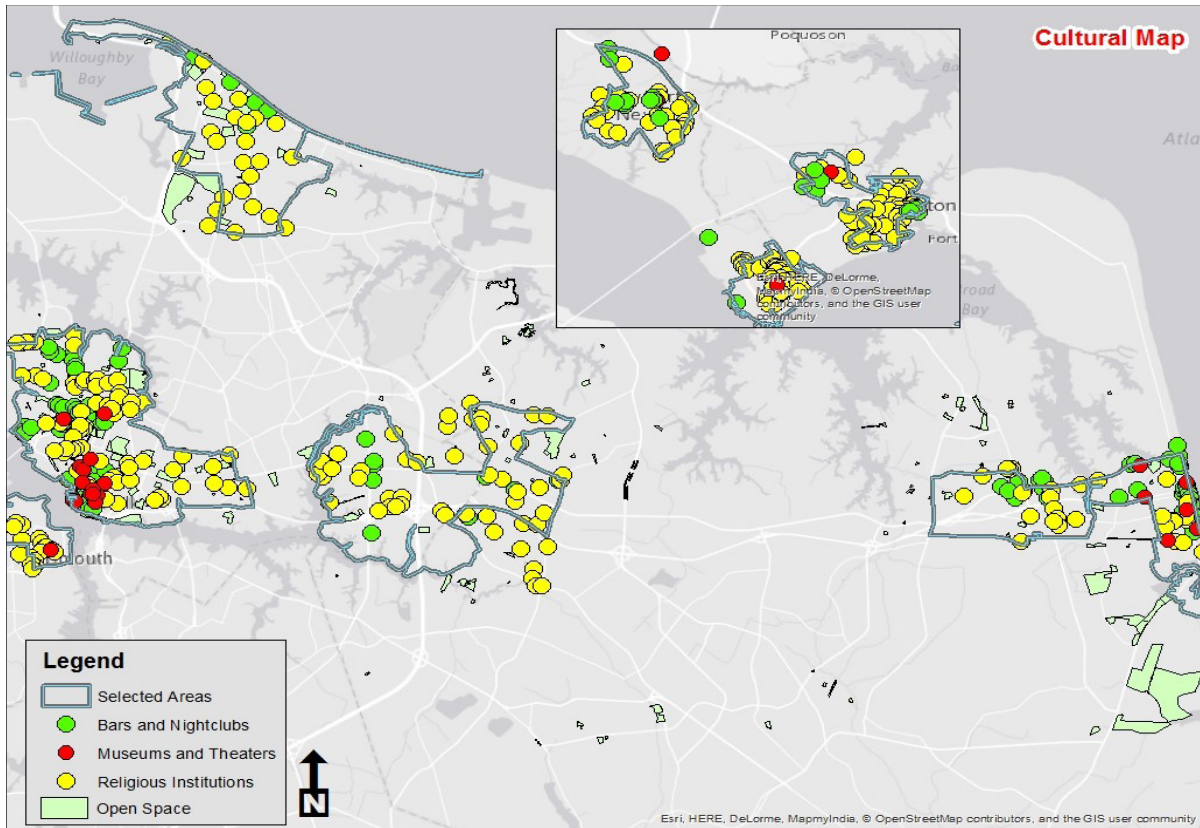
- b. Who is involved:** Hampton Roads Transit (HRT), car sharing companies (such as ZipCar)
- c. Why it is important:** Alternative transportation infrastructure provides residents of future innovation district with sustainable, efficient, and affordable transport options. There’ll be less parking space required, congestion will be alleviated, and low-income residents in surrounding areas will be free from the burden of owning a car.

2. Promote network connectivity

a. How to implement it: Arlington’s “Dark Fiber” initiative may provide best practice guidelines. With this initiative, Arlington

Virginia Tech University, Economic Development Studio, Fall 2015





Virginia Tech University, Economic Development Studio, Fall 2015

county intends to make additional capacity available to the business community for high-speed, and secure data transmission.²⁸ The “Dark Fiber” initiative is a proactive step to support future economic and community development. In our context, it can be considered as an important preliminary action to address future infrastructure needs of a potential innovation district. Local government should invest in making high-speed broadband internet a reality, in collaboration with private internet providers. The same initiatives as Arlington’s “Dark Fiber” can be found in areas that already realized innovation districts, such as Boston and Philadelphia.

- b. Who is involved:** Local Government, Internet providers
- c. Why it is important:** Significant portions of region are not covered by fiber optic

internet. Yet, according to the Brookings Institution, high-speed internet is considered one of the key physical assets that knit an innovation district together and tie it to the broader metro area.²⁹

3. Expand and upgrade existing fiber network

- a. How to implement it:** Attract companies to the city. While most areas have some coverage there are large gaps in areas that would have success as an innovation district. Norfolk for example could look at fiber as a quick fix to a serious weakness they have.
- b. Who is involved:** Companies like google fiber and local government. A company with a big name like Google would be a major seller.
- c. Why it is important:** High end technology will be effective in attracting innovative people.

28 Department of Technology Services of Arlington County. (2015). ConnectArlington Fact Sheet. Retrieved from <http://departments.arlingtonva.us/dts/connectarlington/fact-sheet/>

29 Katz, Bruce & Wagner, Julie. (2014, May). The Rise of Innovation Districts: A New Geography of Innovation District in America. Retrieved from Brookings Institute’s Website: <http://www.brookings.edu/~media/Programs/metro/Images/Innovation/InnovationDistricts1.pdf>

3. BUSINESS CLIMATE & ENTREPRENEURSHIP

The major focus in the Hampton Roads region is on defense-related activities. The region could increase diversification through the creation of economic activities spurred by corporations and local startups. Diversification of the economic base can be achieved through the attraction and retention of technology based institutions and entrepreneurs in the region. Moreover, some recent policies also support the incubation and acceleration of startups in Hampton Roads. In this direction, the emerging partnership between the local governing bodies is a positive step to bolster the region through cost and benefit sharing across the region.³⁰

Recommendations:

1. Fund business incubators and accelerators

- a. **How to implement it:** There are already a number of incubators and accelerators in Hampton Roads. Through supporting these in any ways they need they can help. One of the stronger initiatives for this comes from across the region support. William and Mary has teamed up with the Hampton Roads Partnership, the Hampton Roads Research Partnership, the Hampton Roads Technology Council and the The Hampton Roads Incu-

bator to link the research in federal laboratories and universities. They are helping create innovation through the linking of the local universities with the major research labs (i.e. Jefferson Laboratories). All of these efforts are to support the work of the Hampton Roads Economic Development Alliance in attracting new companies to the region.

2. Incentivize local research

- a. **How to implement it:** William and Mary has teamed up with the Hampton Roads Partnership, the Hampton Roads Research Partnership, the Hampton Roads Technology Council and the The Hampton Roads Incubator to link the research in federal laboratories and universities. They are helping create innovation through the linking of the local universities with the major research labs (i.e. Jefferson Laboratories). All of these efforts are to support the work of the Hampton Roads Economic Development Alliance in attracting new companies to the region. This also helps out with furthering local research.
- b. **Who is involved:** Local governments, non profits, incubators, local universities, regional partnerships
- c. **Why it is important:** Local research was one of the most important parts of the case studied innovation districts and helped them form.

³⁰ Updated Milestone 6, group 1.docx, A

Incubator	Location	Website
Franklin Southampton Incubator	Franklin, Virginia	FranklinSouthamptonVA.com
Hampton technology Incubator	Virginia Beach	TechnologyHamptonRoads.org
James City County Business and Technology Incubator/ College of William and Mary	Williamsburg, VA	Wn.edu/incubator
Newport News Economic Development Applied Research Center	Newport News	ljab.org/arc/
ODU Business Gateway	Norfolk Virginia	odubusinessgateway.com
Virginia Beach Economic Development	Virginia Beach	yesvirginiabeach.com
Virginia Modeling Analysis and Simulation Center	Suffolk	VMASC.odu.edu
Peninsula Technology Incubator	Hampton	ptincubator.org
Hampton University Small Business Incubator	Hampton	hubi.hamptonu.edu

4. REAL ESTATE & AFFORDABILITY

Our findings indicate that the real estate market in the region has continued to see growth in recent years. It also had a negligible impact from the market downturn in the past decade. However, Hampton Roads still reflects the trend of suburban housing preference among the residents. This might be caused by the lack of attractive housing options in the city cores. Although the poly-nucleated urban form does well in affordability for millennials, the region shows an opposite trend in overall affordability.³¹ Findings³² indicate that with its largely suburban development, Hampton Roads real-estate is mostly dominated by single family homes. However, Virginia Beach and Military Circle distinguish themselves with their significant mix of townhomes and apartment homes in the region.³³

31 Updated Milestone 6, group 1.docx

32 10-26_Team 3_Milestone 6, Summary, Mapping Opportunity

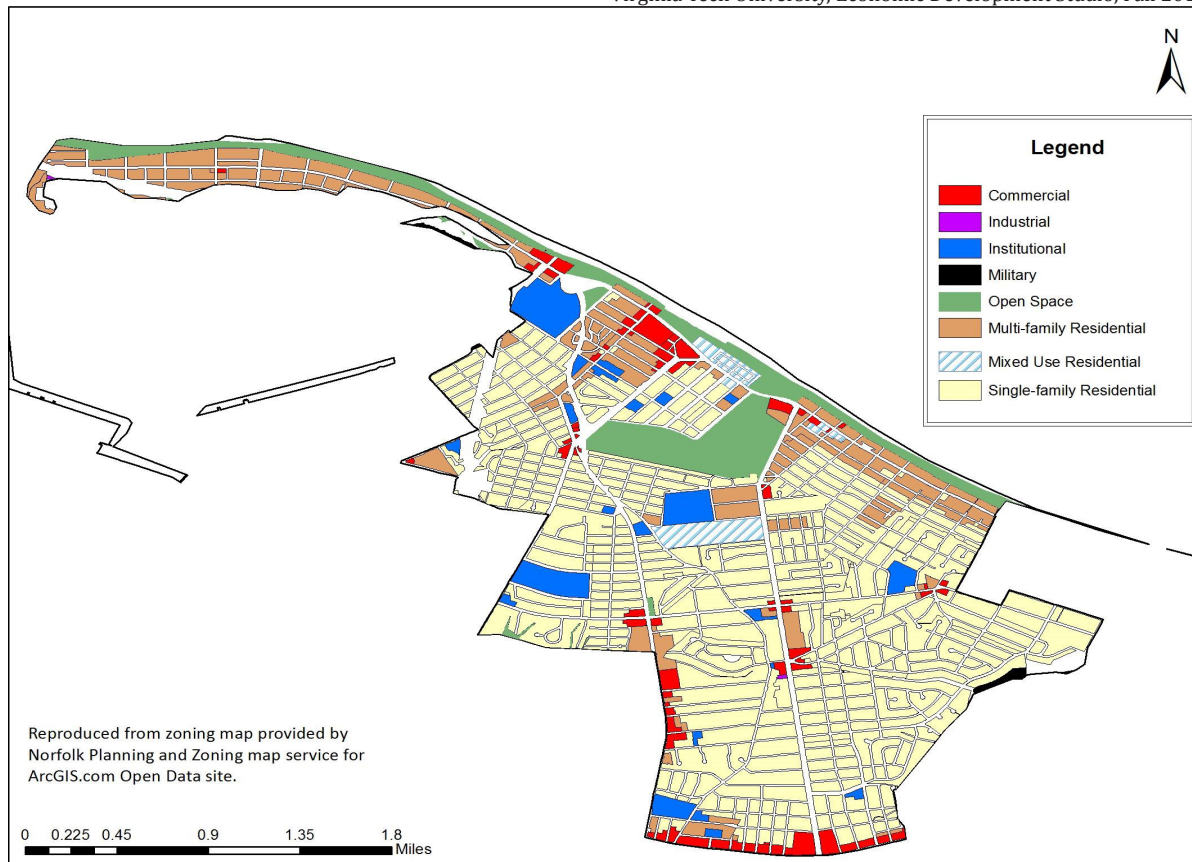
33 Updated Milestone 6, group 1.docx

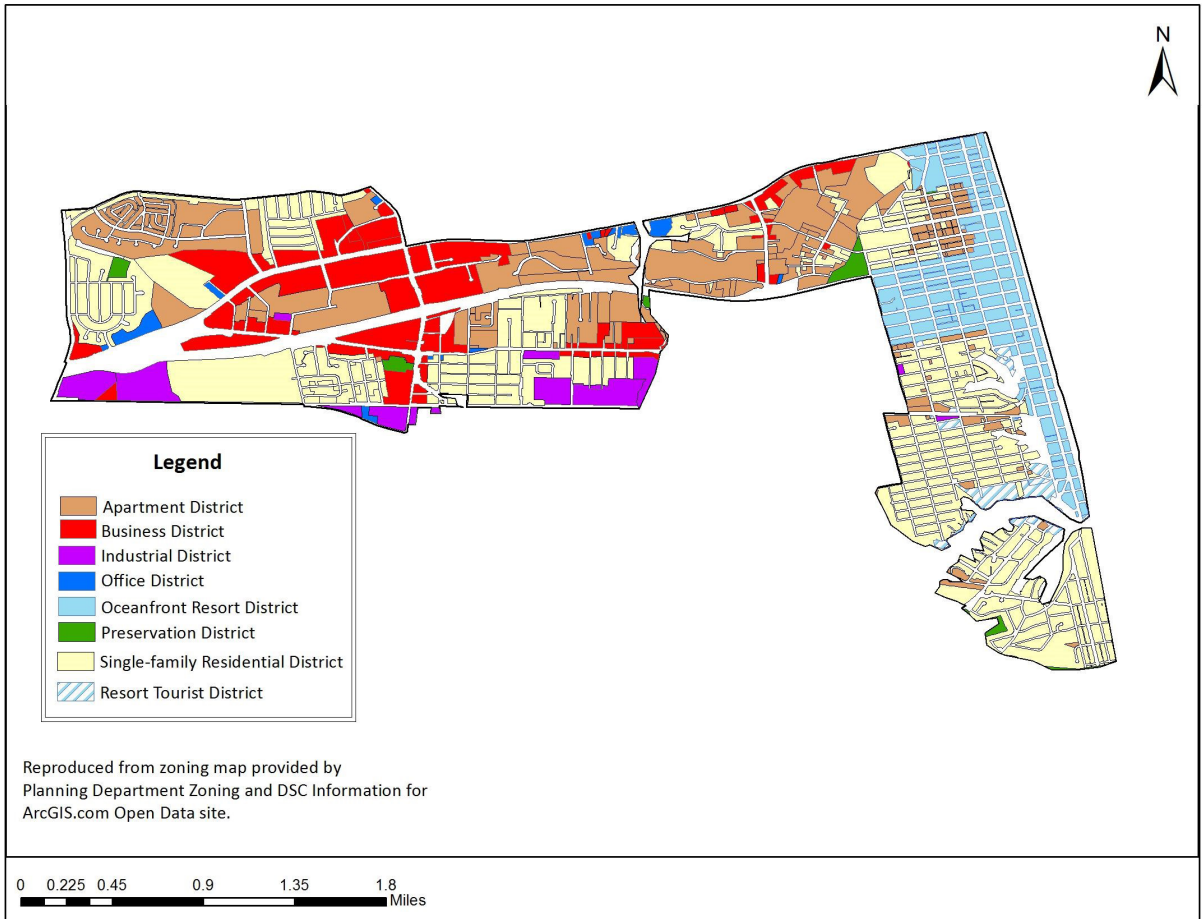
Recommendations:

1. Create housing trust fund and encourage micro-unit development

- a. **How to implement it:** Opportunities to finance affordable housing are limited in the area. Local authorities may examine successfully implemented examples, such as the affordable housing trust fund in Asheville, NC. This revolving loan fund is funded through developer impact fees and repayment of the loans. In Fiscal Year 2015, \$500,000 was allocated toward the fund. Additionally, local government should encourage the incorporation of micro-units into the new development proposals through requiring certain amount of units to be allocated as such, or create land uses specifically assigned to micro-unit housing.
- b. **Who is involved:** Local government
- c. **Why it is important:** Housing Trust Fund is an important way to finance affordable housing projects. Such methods of financing are limited in Hampton Roads region. Mi-

Virginia Tech University, Economic Development Studio, Fall 2015





Virginia Tech University, Economic Development Studio, Fall 2015

cro-units are appealing to Millennials and occupies less space. There are several localities with significant amount of areas zoned as apartment districts. Therefore incorporation of the micro-units into new housing developments are viable in terms of zoning. Along with existing single-family houses and apartments, micro-units will provide a variety of housing options for potential residents of the innovation district.

2. Consider tax incentives for the conversion of vacant office space

- a. **How to implement it:** Hampton Roads should consider tax credits/incentives to vacant office holders who redevelop their offices to improve a prospective tenant's

experience, and thereby making it generally more attractive.³⁴

- b. **Who is involved:** Local government
- c. **Why it is important:** Certain amounts of vacant office space are located in old buildings, which is difficult to reuse or convert into other uses. Tax incentives may boost such a conversion process to occur.

³⁴ JLL.(2015). Office Outlook Q1- 2015. Retrieved from <https://www.jll.com/Documents/research/pdf/JLL-US-Office-Outlook-Q1-2015.pdf>

5. RESILIENCE

The Hampton Roads region will be exposed to natural and manmade disasters in the coming years and can learn from several initiatives started by academic and governmental institutions. The localities in this region are exposed to environmental and economic impacts that include threats such as sea level rise, recurrent floods, and colossal displacement of vulnerable populations during such events.

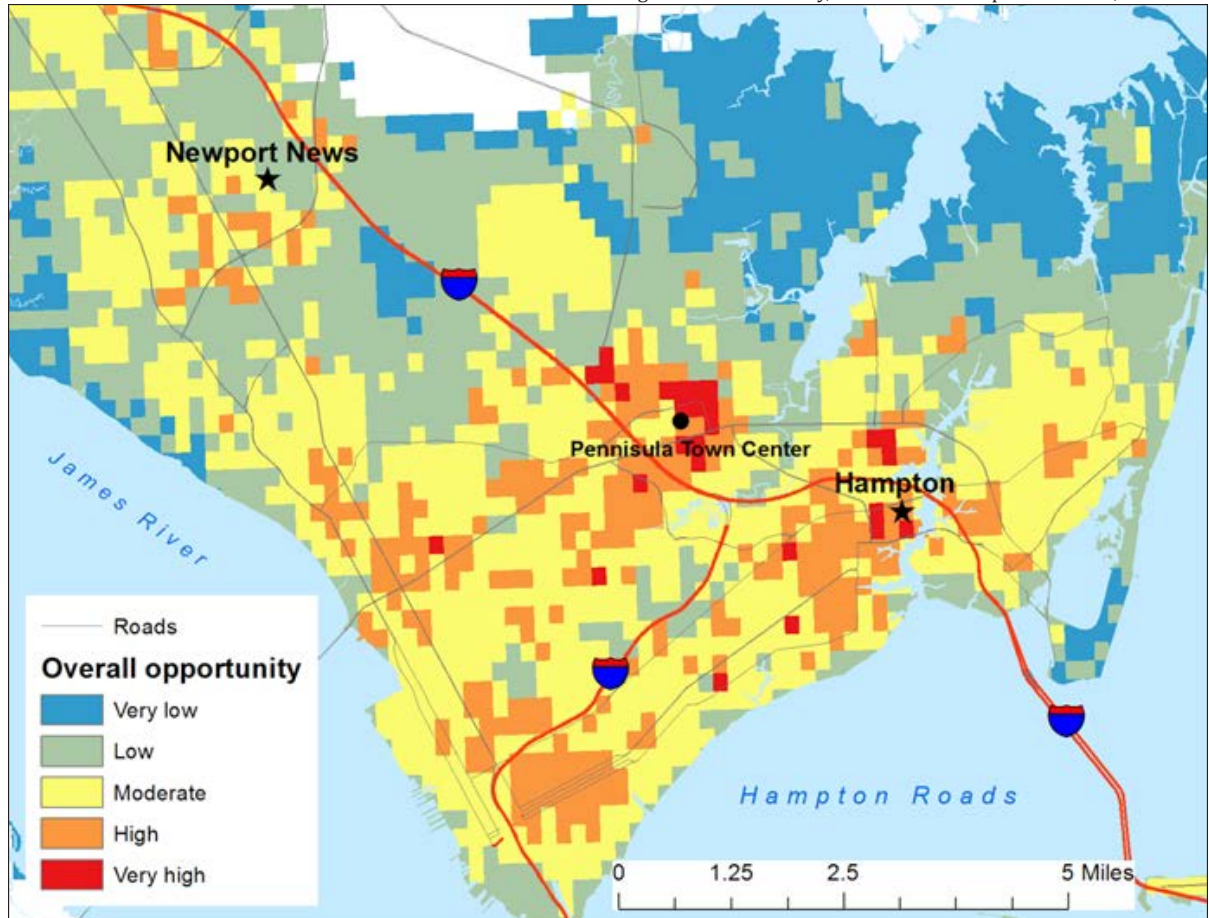
Our analysis indicates that the region as a whole holds high value economic assets that are exposed to such threats. Therefore, a collaboration among local entities, academic institutions, and the public is needed to address future challenges related to natural disasters and to strengthen the resilience

of the region.

Federal agency initiatives such as the Resiliency in Hampton Roads Initiative (ThRIV) and academic initiatives such as ODU Climate Change and Sea Level Rise Initiative regarding the topic of regional resiliency are worth mentioning here. The ThRIV program, realized by a \$ 1 billion grant from U.S Department of Housing and Urban Development (HUD), aims to help communities to recover from disaster losses, and provides technical assistance and training opportunities to such communities. The ODU Climate Change Initiative's goal is to bring universities, experts and the public together to address sea level rise in Hampton Roads. (Norfolk launched "Norfolk Resiliency Strategy" as part of its 100 Resilient Cities Challenge- Christine Morris is Norfolk's Chief Resiliency Officer).

OPPORTUNITY MAPS: HAMPTON ROADS

Virginia Tech University, Economic Development Studio, Fall 2015



NORFOLK & PORTSMOUTH

The area shown on this map was the highest scoring area in the spatial analysis of the Hampton Roads region. It had the highest population density, the highest number of major employers, a highly educated population, the highest level of alternative transportation options, and includes several nearby educational institutions including Old Dominion University, Norfolk State University, and Tidewater Community College. As with other locations in the region, the lack of a high-speed fiber optic network was the greatest weakness.

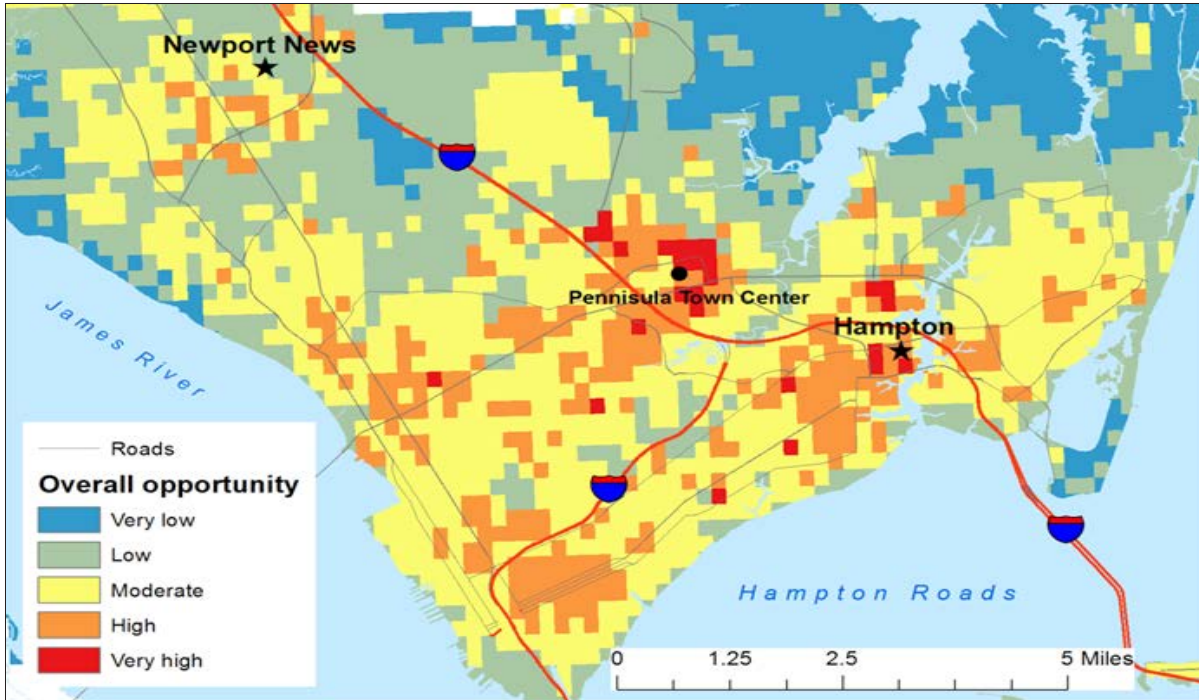
HAMPTON & NEWPORT NEWS

According to the analysis, the highest concentration of “hot” areas are found around the Peninsula Town Center and downtown Hampton.

The Hampton and Newport News locations have many strengths, notably the nearby presence of research and technology organizations, such as Jefferson Lab and the NASA Langley Research Center, as well as higher education institutions such as Virginia Tech, Christopher Newport University, and Hampton University. However, these locations scored lower in our spatial analysis due to their lower population density, generally sprawling land use patterns, and lower level of public transport options.

VIRGINIA BEACH & SOUTHEAST NORFOLK

According to the analysis, the highest concentration of “hot” areas can be found around Easton Forest and Arrowhead off the Hampton Roads Beltway (I-64), the Town Center of Virginia Beach, and downtown Virginia Beach.

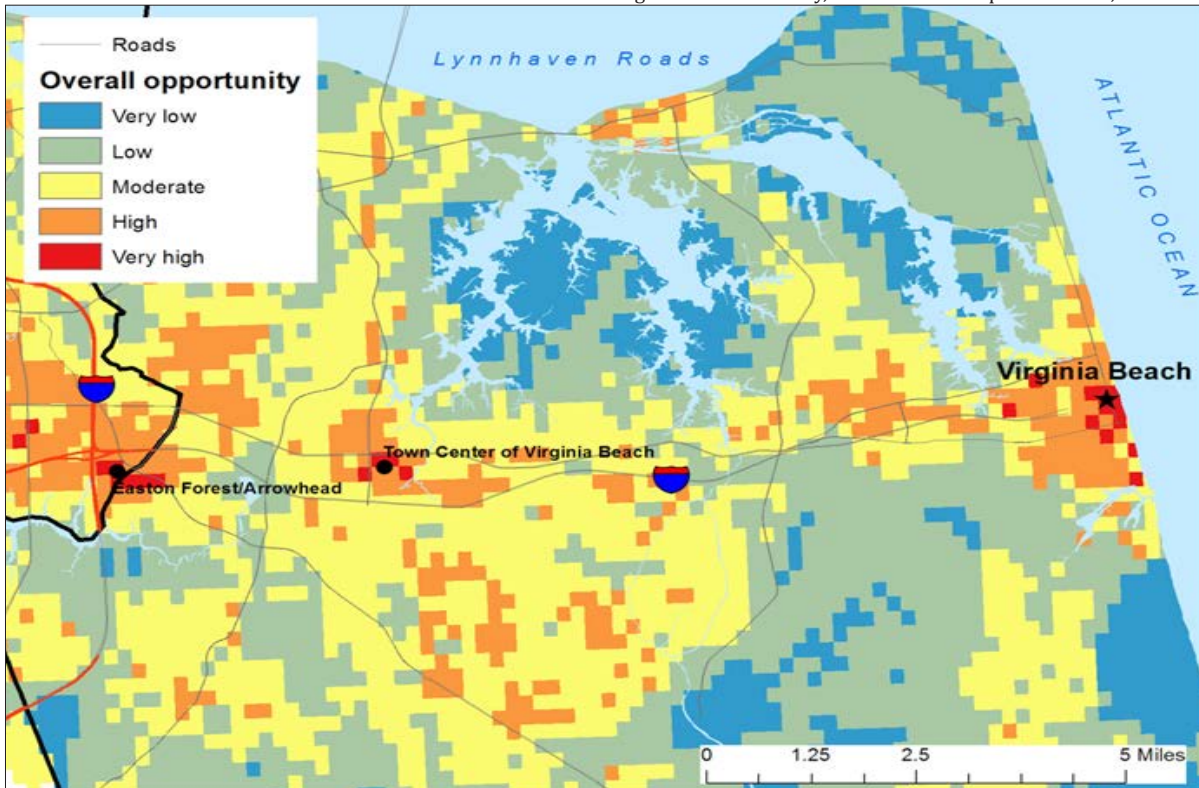


Virginia Tech University, Economic Development Studio, Fall 2015

Virginia Beach has the highest population of Millennials, in addition to a high concentration of restaurants and cultural institutions. There are also areas of higher residential and employment densi-

ty. Although the cost of living through the Hampton Roads region is far lower than it is in Northern Virginia, Virginia Beach is the least affordable location for housing of the areas we analyzed.

Virginia Tech University, Economic Development Studio, Fall 2015



FUTURE RESEARCH

The findings and recommendations listed within this report will hopefully lead to further discussion.

- What is the lifespan of an innovation district?
 - Is an exit strategy needed?
- How do innovation districts tie into Smart Growth ideas?
- Concurrence of Millennial and Senior preferences
- The infrastructure is social, not just physical
- Future of Spatial analysis considerations
 - Distance from affordable housing - how far is too far to commute?
 - Map changes over time- how have the identified localities changed? what are the current trends?
- Application of the model to current innovation districts

CONCLUSIONS

Both the Northern Virginia and Hampton Roads regions are well positioned to cultivate innovation districts in their communities. Northern Virginia's assets in transportation infrastructure, knowledge-based industries, and talented workforce can be leveraged to create a specialized spaces for innovation that impact the regional economy as a whole. Hampton Roads' highly advanced defense research, maritime, and tourism industries can also serve as assets as the region considers new ways to spur economic development. Both regions face an opportunity, with decreasing federal spending, to diversify their industry bases and use their strengths in research, technology, and talent in a new way.

In the post-sequestration economy, the seemingly ubiquitous contractors have lost the ability to rely on the federal government to provide the fiscal opportunities they once depended on.

Both regions face significant challenges in regard to economic development. Hampton Road has a less educated workforce, and is spatially staggered, to make collaboration and travel more difficult. Other problems in Hampton Roads include the significant challenge of rising sea level due to climate change, its lack of fiber networks, and current public transit infrastructure that makes it difficult for new companies to choose to relocate there. Innovation districts can help confront the challenges mentioned above. Northern Virginia on the other hand faces a housing affordability problem, which deters millennials and entrepreneurs from locating, investing, and building their businesses within the region. As the affordable housing stock continues to dwindle, the region faces the serious threat

of losing assets essential to growing an innovative economy. A research university in Northern Virginia has the opportunity to anchor potential innovation districts, stimulating technological innovation in the region.

Innovation Districts can help confront the challenges mentioned above. Affordable housing as part of an innovation district can help attract and retain the talent produces the innovation. Flexible space for innovation can help diversify both regions' economies to rely less on the federal government. Innovation districts can provide a reason to build public transportation, bike sharing, open spaces and address equity issues by providing affordable housing, more public transit, and employment opportunities. Particularly in Hampton Roads, activities within an innovation district, such as collaboration with current research at Old Dominion University, can address the region's issues with sea level rise.

This report recommends several potential locations for innovation districts within both regions and lays out the strategies that would be required for their successful development. It is important to note that different conditions among the various locations identified require different strategies. When choosing the best innovation district location, stakeholders should be mindful of both existing assets and the resources needed to create such assets if they do not exist. The recommendations laid out in the report are as follows:

1. Locations with high percentages of un-affordable housing should invest in housing that innovation district workers will need through strategies such as revolving loan funds, building repurposing, and alternative housing such as micro-units.
2. Residents will face considerable challenges with access to transit and fiber connectivity without significant investment in this physical infrastructure. Therefore, leaders should consider such investment, in addition to strategies such as transit-oriented development and promotion of multi-modal transit options.
3. Amenities like biking and walking paths, open space, artist venues, and restaurants are attractive to the current workforce and regional leaders should consider creating cultural districts, zoning for these uses, and developing this infrastructure.
4. Locations with lower income and lower skilled workers should consider workforce development centers to train residents in STEM industries, and community benefits agreements to ensure economic benefits are evenly distributed.
5. Regional stakeholders need to strike a balance between attracting large corporations and growing small businesses in the area.

Regardless of location, the report recommends that community leaders, government officials, and research institution representatives continue to think of their fates as intertwined. It is up to each region to work together to explore how an innovation district can serve as an opportunity to advance economic prospects, placemaking, and equity. Regional stakeholders also need to create an area with the live-work opportunities that will appeal to young and highly educated workers within the community. Finally, regional leaders need to see innovation districts as not only a tool to attract new talent to the area, but also as a way to improve the well-being of current residents.

As both regions continue to move toward their economic development goals, leaders should continue to collaborate and build strong networks, support entrepreneurship, and invest in key infrastructure. Innovation districts provide an avenue to do just this. For both Northern Virginia and Hampton Roads, innovation districts serve not only as an opportunity to break away from reliance on the federal government by growing and diversifying the local economy, but also as a catalyst to improve overall economic opportunity and well-being.

APPENDICES

	Northern Virginia Region	Hampton Roads Region
Common Data Sources	U.S. Census Bureau; • Bureau of Labor Statistics; • Bureau of Transportation.	
Regional Data Sources	Virginia Business; Inside NOVA; Center for Regional Analysis at George Mason University; Washington Post; Washington Business Journal; Daily Press.	Virginia Business; Center for Transportation-Oriented Design (CTOD); Center for Regional Analysis at George Mason University; Student conducted interviews; Daily Press.
Sub-regional Data Sources	American Community Survey; U.S. Patent And Trademark Office; Pew Research Center; SBIR/STTI.	American Community Survey; U.S. Patent And Trademark Office; Pew Research Center; SBIR/STTI.
Local Data Sources	Virginia Department of Health; Public Transit Agencies; Local GIS data; ArcGIS Open Data; Esri; Virginia Tech Center for Geospatial Information Technology; Virginia ABC Database.	Virginia Department of Health; Public Transit Agencies; Local GIS data; ArcGIS Open Data; Esri; Virginia Tech Center for Geospatial Information Technology; Virginia ABC Database.