IT and Emerging Technology in GO Virginia Region 2: Situation, Challenges, and the Road Forward

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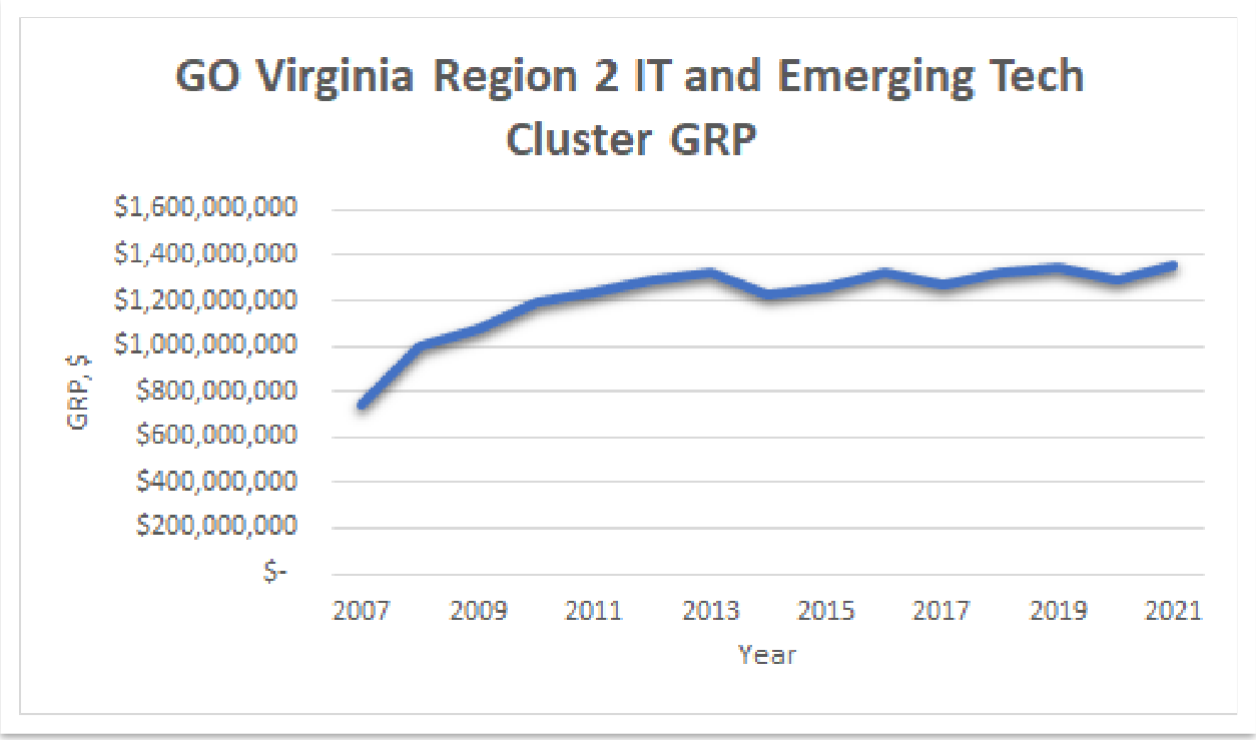
In this short whitepaper, we discuss the present conditions and performance of the IT and emerging technology industries in Region 2. We begin with an overview of the sector, discussing both IT occupations, and IT companies. In section two, we present two key issues: capital and talent, before concluding with a discussion of talent attraction and retention and higher education-based solutions. This document is meant to guide the IT and Emerging Technology GO Virginia Region 2 working group in the identification of additional strategies and programs to improve high wage jobs in that sector.

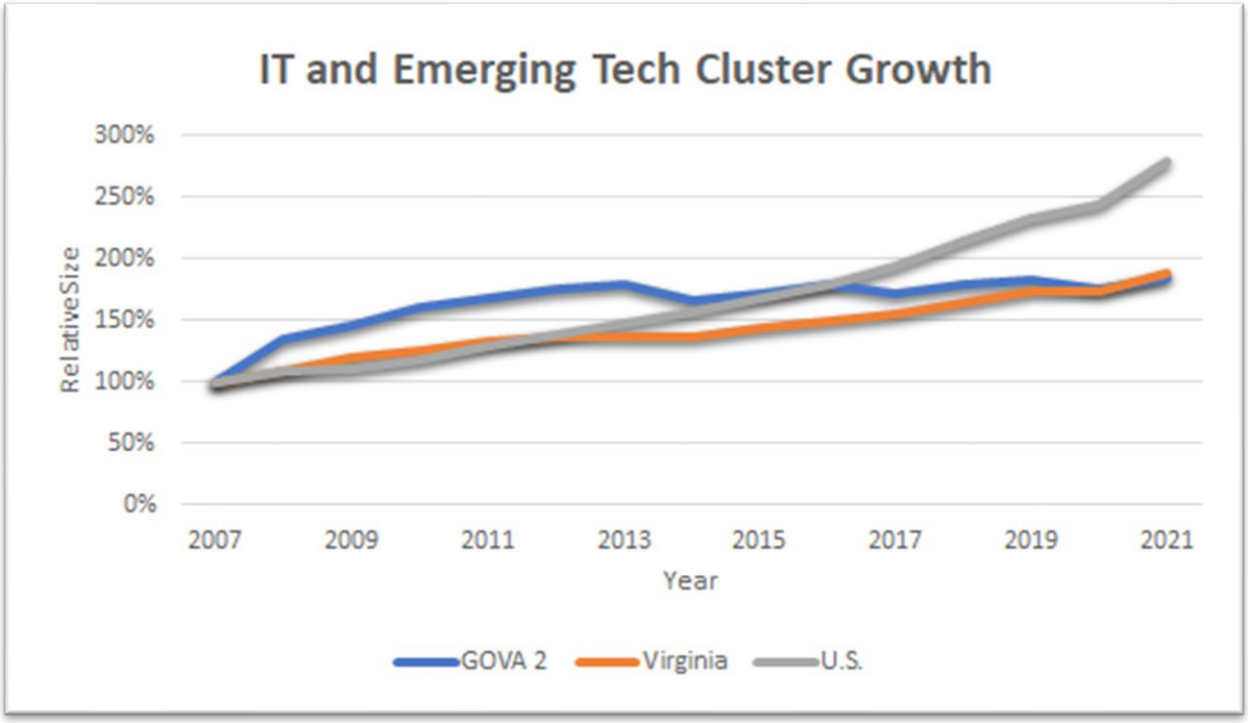
Regional Sector Overview

Region 2's IT Cluster generated $1.1B in earnings and $1.4 B in GRP in 2021[1] . The cluster contributed $3.5M in taxes in 2021[2]. Growth in GRP has slowed but remained fairly consistent through multiple periods of economic volatility, as detailed in the figure below:



[1] EMSI GOVA Region 2 IT Industry Snapshot Report. 2022. EMSI.
[2] EMSI GOVA Region 2 IT Industry Snapshot Report. 2022. EMSI.

Cluster growth generally tracks growth throughout the entire state of Virginia, though both Region 2's cluster growth and Virginia's cluster growth lag that exhibited throughout the United States, as detailed in the figure below:



Occupations, Jobs, and Earnings,

IT jobs are found in a number of sectors. Computer and Mathematical Occupations, Architecture and Engineering Occupations, Production Occupations, Office and Administrative Support Occupations, and Business and Financial Operations Occupations represent the five biggest categories employing IT professionals[3]. This variety suggests that Region 2's IT and Emerging Tech cluster activity supports that of other clusters. With this in mind, our focus on cluster development should consider not just the needs of IT-specific firms, but also the needs of firms in other clusters that utilize Region 2's IT talent.

GO Virginia (GOVA) Region 2 supports over 11,000 jobs in IT; earnings per job are approximately $95,000[4]. Region 2 employment declined by approximately 4% from 2016-

[3] EMSI. 2021.
[4] EMSI Industry Snapshot Report. GOVA Region 2. June 2022

2021, while nationally, cluster employment grew by 17%[5]. However, Region 2 IT employment is expected to grow by 2% from 2021-2026[6,7]. Region 2's projected cluster hiring growth lags that of the United States (11%), the whole of Virginia (7%), and the peer economies of Baltimore-Columbia-Towson (12%), Pittsburgh (7%), and Raleigh-Cary (8%)[8]. Present unemployment is approximately 4,100 in Region 2's IT Cluster[9].

IT jobs in our region see lower earnings than those in other areas. Region 2's earnings per job are approximately $95,000 in the IT cluster, whereas IT jobs in peer economies, such as the Pittsburgh, Baltimore-Columbia-Towson, and Raleigh-Cary MSAs see earnings of approximately $136,000 to $156,000 per job[10]. Region 2's jobs pay less than those in Virginia and the United States, where earnings per job are approximately $149,000 and $164,000[11]. Region 2's low earnings per job in the IT and Emerging Tech cluster may contribute to the region's low cluster specialization (0.57) and correspondingly low cluster workforce availability[12].

Region 2's IT and Emerging Tech cluster has more workers approaching retirement and less diversity than would be expected for the cluster in an area of this size — 2,749 vs. 2,197 employees age 55 or older and 2,090 vs. 3,778 racially-diverse employees[13]. Though Region 2's IT cluster is more diverse than the national average from a gender standpoint, it is still predominantly male (62.9%)[14]. These diversity considerations should be kept in mind when engaging in regional talent recruitment and retention.

Regional variation, major employers, and supply chains

Regional IT and Emerging Tech employers are most concentrated in Montgomery County, Roanoke County, and the City of Lynchburg and are least concentrated in Floyd County, Appomattox County, Craig County, and Alleghany County[15]. The emerging role of remote work may relax hiring constraints and allow these employers to access talent from more remote areas of the region, and beyond.

Figure 3: Map detailing Region 2 IT and Emerging Tech Cluster Jobs

[5] EMSI. Industry Snapshots for GOVA Region 2 and for the United States. 2022. EMSI.
[6] EMSI Industry Snapshot Report. GOVA Region 2. May 2022
[7]EMSI Region 2 Business Case. May 2022.
[8] EMSI; respective reports for each MSA.
[9] EMSI GOVA Region 2 IT Cluster Snapshot Report. June 2022. EMSI.
[10] EMSI Industry Snapshots for Pittsburgh MSA, Baltimore-Columbia-Towson MSA, and Raleigh-Cary MSA. June 2022. EMSI.
[11] EMSI Industry Snapshots for Virginia and the United States. June 2022. EMSI.
[12] EMSI Business Case. 2022. EMSI.
[13] EMSI GOVA Region 2 Industry Snapshot Report. May 2022. EMSI.
[14] EMSI GOVA Region 2 Snapshot Report. May 2022. EMSI.
[15] EMSI.

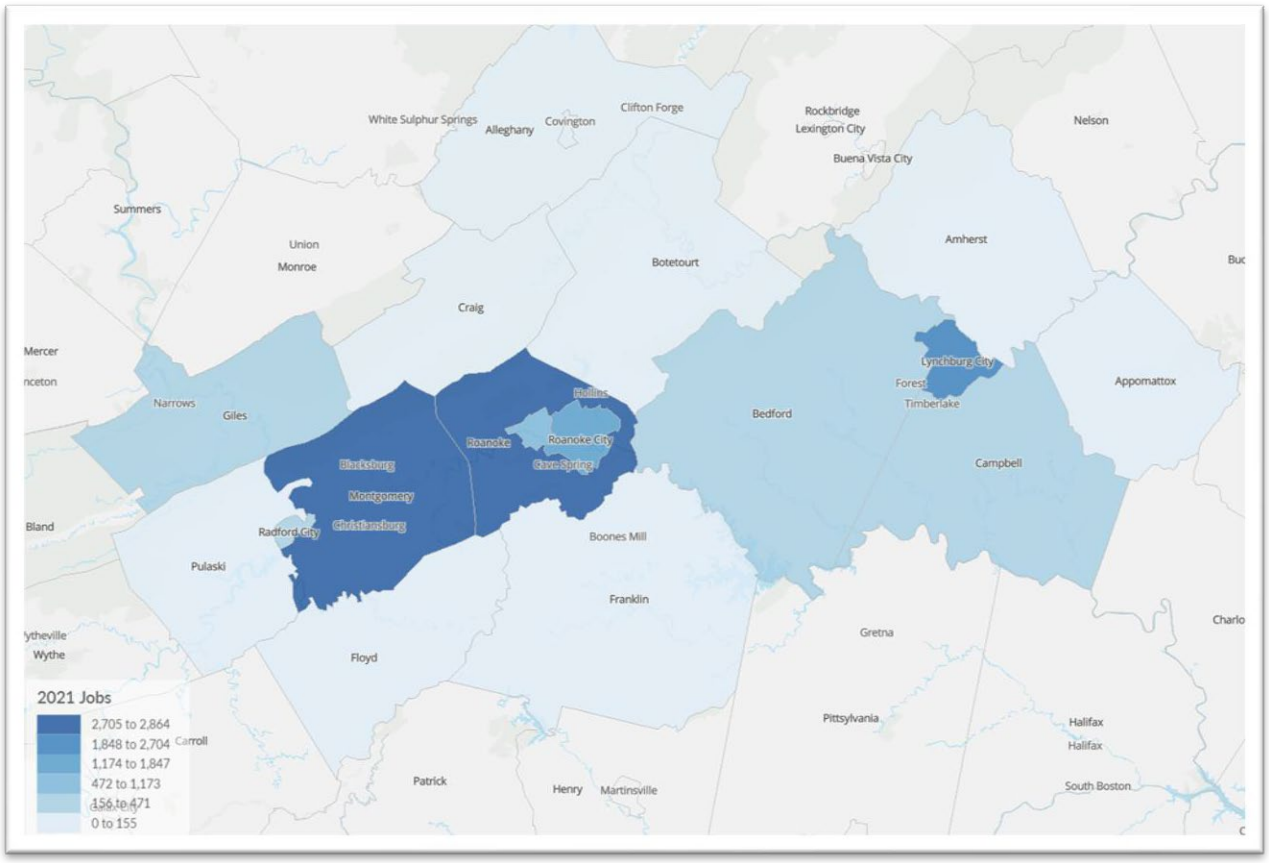
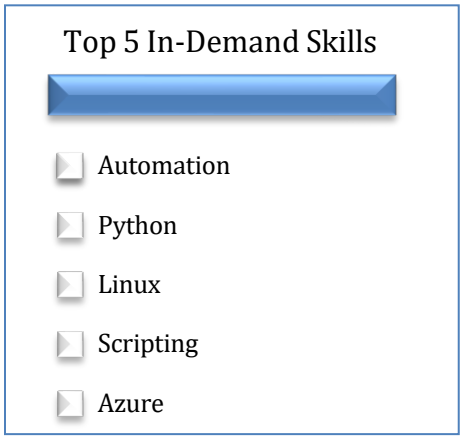


Image source: EMSI GOVA Region 2 IT and Electrical Cluster Industry Snapshot. 2022. EMSI.

Proprietary data suggests the five largest firms in our region in this cluster are AECOM Design (314 employees), GE Digital (300 employees), GE Drives and Controls Inc. (141 employees), Hurt and Proffitt (149 employees), and In Motion US LLC (85 employees)[16].

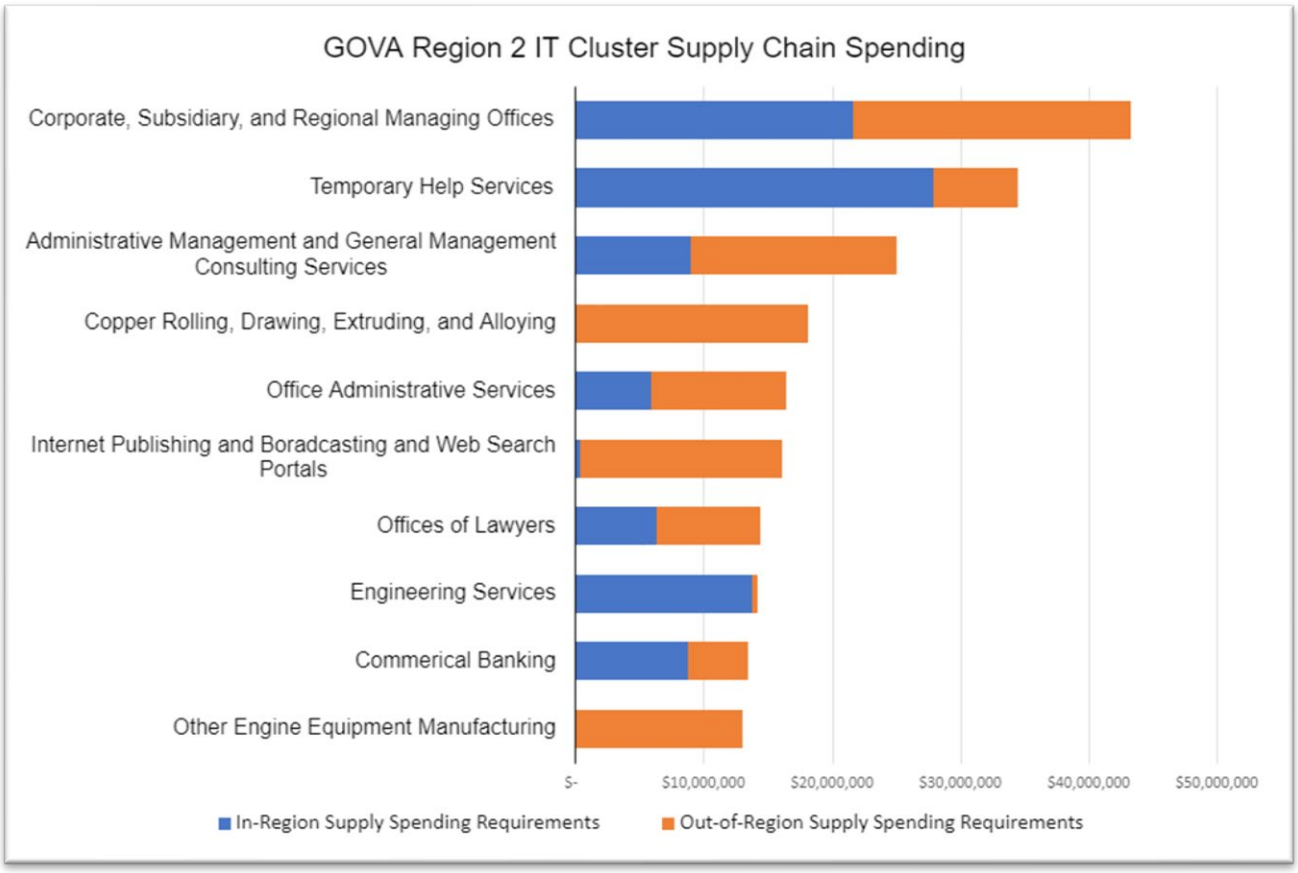
Employers in Region 2's IT cluster posting the most jobs include Leidos, Delta Star, Optical Cable Corporation, Array Information Technology, and Medical Staffing Options[17]. Specific job titles with the most postings include software engineers, cloud and cloud network engineers, Lync engineers, and QuickBooks Bookkeepers[18]. The top 5 skills currently in-demand include automation, Python, Linux, Scripting, and Azure skills, though in-demand skills shift over time[19].

[16] EMSI Business Map, which uses data from DatabaseUSA.com.
[17] EMSI GOVA Region 2 IT Industry Snapshot Report. May 2022. EMSI.
[18] EMSI GOVA Region 2 IT Industry Snapshot Report. May 2022. EMSI.
[19] EMSI Industry Snapshot Report: GOVA Region 2 IT and Electrical Cluster. June 2022. EMSI.



Customer Service Representatives, Computer User Support Specialists, General and Operations Managers, Project Management Specialists, Business Operations Specialists (All other), and Computer and Information Systems Managers are predicted to be among the most numerous occupations through 2026[20].

The majority (approximately 60%) of the IT Cluster's Supply Chain needs are sourced from outside of Region 2. We detail the breakdown of supply chain spending in each cluster in the chart below:



Data Source: EMSI GOVA Region 2 IT Cluster Business Case

Overall, just over 40% of the cluster's supply chain requirements come from within Region 2. Most notable is that approximately 97% of engineering, 81% of Temporary Help, and 65% of commercial banking service needs come from within Region 2[21]. Use of supply

[20] EMSI Business Case 2022.
[21] EMSI Business Case. 2022. EMSI.

chain inputs from both within and outside Region 2 renders the region's IT and Emerging Tech Cluster susceptible to both micro- and macro-economic shocks. This should be kept in mind during periods of economic volatility to prevent supply chain disruption.

Regional Sector Challenges and Solutions

At face value, the lack of IT activity in Region 2's periphery may seem to motivate targeted outreach and intervention to further the spread of IT activity. However, literature details that directing intervention and development to the already-developed areas most likely to support change is an effective industry development strategy; such a strategy has been used in Detroit to support redevelopment and talent attraction[22]. This suggests that efforts to grow IT in Region 2 should focus on increasing specialization in the locations already seeing strong cluster performance, though we caution that concentration of development activity may have equity implications worth considering.

Furthermore, it may be the case that future 'spread' to less centralized regions will occur organically, as during the pandemic, there was a nationwide shift away from intense concentration of IT activity[23]. The exodus of IT and Emerging Tech businesses from more expensive regions may further support cluster spread throughout the region. Areas from which recruitment may be most effective include Chicago-Naperville-Elgin, IL-IN-WI; Carson City, NV; and Russellville, AR; these locations presently exhibit loss in payrolled businesses and earnings per job over $120,000[24]. Region 2's comparatively inexpensive labor may be attractive to businesses looking to relocate. GOVA Region 2 could be very attractive to businesses relocating from these regions in search of more affordable talent.

Access to capital

Access to capital remains a challenge for Region 2's firms[25]. Site development investment in Virginia lags that of surrounding states, some of which exceed Virginia's investment by over an order of magnitude[26]. Similarly, there are "3-5 times more VC investments each in Charlottesville, Chattanooga & Birmingham than Region 2" and "3-11 times more angel investments in peer regions than Region 2"[27]. GOVA Region 2 Councilmember Fourd Kemper explains that our region's lack of C-level networks may complicate efforts to attract

[22] Berglund 2020.
[23] Muro and You 2022.
[24] EMSI Business Recruitment: GOVA Region 2 IT and Electrical Cluster. 2022. EMSI.
[25] GO Virginia Region 2 Entrepreneurship Working Group discussions, as well as conversations with GOVA Region 2 Councilmember Fourd Kemper.
[26] Yancey 2022. 12 potentially transformative items in the rival budgets.
[27] Capital Ecosystem Landscape Report: Go Virginia Region 2. 2019.

capital to our region over others. Investment should be a priority for Region 2's IT and Technology Cluster's continued growth.

However, though grant awards have weakly declined over time (2014-2017), our region does attract substantially more grant funding, notably SBIR and STTR Grants, than its peers[28,29] and Region 2's entrepreneurs remain optimistic about future funding, in spite of perceived current funding shortages[30].

Lack of Talent

One challenge Region 2's IT cluster faces is a shortage of talent. In response, firms have worked to hire students before graduation to secure affordable talent. Literature suggests this to be a valid strategy, as "firms place too much weight on a four-year college degree and, in doing so, ignore other skilled and competent workers without this credential"[31]. At the same time, GOVA Region 2 Councilmember Marty Muscatello has noted that area employers prefer those with graduate degrees, as these workers are more likely to develop monetizable technologies and software. Without ability to retain or attract these professionals, IT firms and startups may have difficulty generating profitable output.

Talent shortages may be explained by lack of on-the-job training stemming from 'shifting goalposts': more and more, companies expect workers to be able to immediately perform at full capacity, whereas in the past, companies may have provided more on-the-job training than they currently do[32]. Providing employees with greater training or potential employees with clear direction regarding desired skills will support talent success[33].

Regional examples of efforts to 'bring talent to the table' include the Roanoke-Blacksburg Technology Council's partnership with employers, hosting of annual events, and providing job-support designed "to grow the region's innovation economy, technology sector, life sciences/biotech, and professional communities"[34].

[28] Capital Ecosystem Landscape Report: Go Virginia Region 2. 2019.
[29] Capital Ecosystem Landscape Report: Go Virginia Region 2. 2019.
[30] Capital Ecosystem Landscape Report: Go Virginia Region 2. 2019.
[31] Parilla and Liu 2019.
[32] Parilla and Liu 2019.
[33] Parilla and Liu 2019.
[34] The Roanoke-Blacksburg Technology Council. 2022.

Talent Attraction and Retention Difficulties

Capital attraction and retention is a major challenge for the region. Research suggests efforts to establish and maintain a 'brand' to be an effective development strategy[35]. Reports on IT in our region suggest a need for continued focus on establishing the amenity values of our region, particularly to continue attracting talent in a post-pandemic economy[36]. For this reason, establishing the area as a livable, affordable region with a plethora of outdoor amenities is vital to attract Tech talent. GOVA Region 2 Councilmember Fourd Kemper details that talent attraction could similarly be improved by addressing the fact that our region fails to command the appeal of other cities like Asheville.

While our region is one that prides itself in offering employers affordable talent, we should consider that this leads to a tradeoff in the form of increased difficulty in attracting employees. Region 2's IT and Emerging Technology cluster salaries are markedly lower than those offered by peer economies. For instance, salaries in Computer Occupations (SOC 15-1200) can be nearly 20% lower than the national average[37], hardly offset by the 3.5% lower cost-of-living the region offers relative to the United States as a whole[38]. With salary considerations potentially overriding amenity values for employees, particularly highly-skilled employees, looking to relocate[39,40], Region 2's amenities and cost of living may be insufficient to attract desired talent to the region.

This is particularly true because while competing peer economies engage in similar branding as low-cost areas to live, they offer salaries that are substantially higher than those in Region 2[41]. For instance, peer economy Pittsburgh, PA aggressively advertises in classic IT hotbeds on the West Coast[42], while also developing niche luxury housing to further recruit high-earning professionals[43]. This suggests that our branding as an area with a low cost of living may not be as strong, or as convincing, as we would like.

Talent recruitment is a pressing issue, as IT workers in our region tend to be older than the national average, meaning "retirement risk is high in [our] area": nearly 3,000 workers are

[35] Cleave et al. 2016.
[36] Yancey 2022.
[37] EMSI Occupation Snapshot Report: Computer Occupations in GOVA Region 2. June 2022. EMSI.
[38] Regional Comparison Report: GOVA Region 2 vs. The United States. June 2022. EMSI.
[39] Lepawsky et al. 2017.
[40] Arntz 2007.
[41] EMSI Industry Snapshots for Pittsburgh MSA, Raleigh-Cary MSA, and Baltimore-Columbia-Towson MSAs. EMSI.
[42] Kendall 2018.
[43] Hendrickson.

over 54, which is substantial, given there are a total of approximately 11,000 workers in this industry group in our area[44].

Universities as a Solution to Talent Concerns

Region 2's heavy university presence is vital to regional talent retention, as literature details that universities present attractive resources and support to companies in the IT sector looking to commercialize technology[45,46,47]. Virginia Tech, for instance, offers extensive support through its Link, License, and Launch Program [48]. This program helps those within or those choosing to partner with the University with commercializing intellectual property navigate contracting, property rights, and other hurdles that may otherwise complicate rollout of technology to the market[49]. University resources in our region can also help with developing "Proof-of-Concepts" for startups[50], an important consideration for those looking to attract potentially risk-averse investors and resources like Virginia Tech's Corporate Research Center offer access to university-affiliated business development consultation, as well as events geared toward business development[51]. In general, policies supporting commercialization and partnership between industry and academia are well-established by the Bayh-Dole Act[52]. Overall, this means that Region 2's strong university presence is a strong resource to be leveraged for cluster success.

Other areas have implemented policies designed to leverage university presence to support emerging business development. University-provision of flexible faculty work policies is one such strategy. Universities may guarantee faculty their positions for 5 years, if they wish to exit academia to engage in startup activity. They may also allow faculty to use part of their contracted time to engage in startup advising, among other activities[53]. Our region could draw from such policies to support IT and Emerging Tech activity in Region 2.

The IT cluster in our region is one that is worthy of investment. The jobs within the IT cluster, as well as jobs outside the cluster that are of an IT-nature are high-quality jobs. IT in our region saw competitive growth during the pandemic, partially due to the rise of remote work, though future growth prospects are less optimistic. Challenges we face include human capital attraction and retention, as well as access to other forms of capital, such as startup, or angel-investing, capital. If we are able to successfully leverage our university connections and amenity values, while also working to overcome the capital-

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[44] EMSI Industry Snapshot Report for GOVA Region 2. June 2022. EMSI.
[45] Huffman and Quigley 2022.
[46] Qian 2010
[47] Bramwell and Wolfe 2008
[48] Resources for Inventors. 2022.
49 Resources for Inventors. 2022.
50 Proof of Concept (POC) Grant Program. 2022.
51 Virginia Tech Corporate Research Center.
52 Bayh-Dole Act. 2022.
53 For Faculty: Best Practices for Start-ups.

retention and acquisition challenges detailed above, we will continue to see our industry blossom into one that not only provides high quality jobs itself, but also supports other industry clusters throughout the region.

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