

WASHINGTON, D.C. MSA IT / TECH SERVICES CLUSTER

Microeconomics of Competitiveness 2008

May 2, 2008

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OVERVIEW OF THE UNITED STATES NATIONAL ECONOMY

The United States remains a global economic, military, and political superpower, with an annual gross domestic product of over \$13 trillion, representing 27% of all world output in current dollars.¹ On a per capita basis, the United States' GDP of \$43,967 ranks behind only Luxembourg, Norway, Brunei, and Singapore in PPP basis.²

This immense wealth has been generated in part by a workforce that has experienced comparatively low unemployment, ranging from a high of nearly 10% of the population in the early 1980s to a stable range of between 4-6% over the last twenty years.³ Multifactor productivity has also increased at a rate of nearly 2% a year since 2000,⁴ resulting in a mature economy that nevertheless is capable of strong growth.

The U.S. economy has also been agile in shifting its economic base up the value chain towards higher-value goods and services. Over the past 30 years, the United States economy has gone from being primarily a manufacturing-based economy to one far more focused on services, especially financial and professional services.⁵ This shift in the base of the economy has been facilitated in part by the country's high innovation capacity. The U.S. still generates more patents per capita than any other country in the world,⁶ which, given the country's large population, gives it an enormously rich basis for innovation and competition. These innovative capabilities have also been rewarded by the world's investors, who have powered the country's main equity benchmark, the S&P 500, to an annualized growth rate of more than 7% a year for

¹ World Development Indicators database, accessed April 2008.

² World Development Indicators database, accessed April 2008.

³ Unemployment Statistics, OECD, www.oecd.org, accessed April 2008.

⁴ Multifactor Productivity, Bureau of Labor Statistics, www.bls.gov, accessed April 2008.

⁵ Team analysis generated by Employment By Industry, Bureau of Economic Analysis, www.bea.gov, accessed April 2008.

⁶ Team analysis generated by Patents By Country, U.S. Patent and Trademark Office, www.uspto.gov, accessed April 2008, and World Development Indicators database, accessed April 2008.

the last 37 years.⁷ While this market has experienced numerous ups and downs, including the moderate declines in the late 1980s following “Black Tuesday” (October 1987) and the more severe contraction in the early part of the 2000s following the collapse of the technology sector, the overall trajectory has been strongly positive.

By virtue of its industrialization and overall wealth, the United States has had a number of positive social outcomes, including expanded access to education, health care, and life expectancy. For all of these metrics, the U.S. is on par or above most of the developed world, and is significantly advanced compared to the developing world.⁸ However, gains from the recent economic expansion have not been shared equally. Instead, over the last 40 years, wealth has become increasingly concentrated in upper-income brackets, while the middle class has become more vulnerable financially.⁹

The rising costs of vital goods like health care and education have exacerbated these disparities. Over the past 35 years, health care expenditures per capita have increased by over 8% a year, nearly double the rates of inflation for all other goods and services (Catlin et al, 2008). In addition, the rise of the average cost of tuition, room and board, and fees at American colleges and universities has outpaced inflation by more than 2 to 1 since 1997.¹⁰ With access to health care and education diminishing, the middle class has steadily weakened, raising serious concerns regarding long-term competitiveness. As individuals begin to believe that they do not share in the benefits of increased productivity, the reduced incentives for work could stall economic growth overall.

⁷ Yahoo Finance, Team analysis.

⁸ World Development Indicators database, accessed April 2008.

⁹ Income by quintiles, U.S. Census Bureau, www.census.gov, accessed April 2008.

¹⁰ Team analysis via The College Board, “Trends in College Pricing 2007,” http://www.collegeboard.com/prod_downloads/about/news_info/trends/trends_pricing_07.pdf, accessed April 2008. The real, inflation-adjusted cost of tuition, room, and board has increased by more than 2.5% at private universities and over 3.5% a year at public universities. Inflation for the same period (1997-2007) has been approximately 2.5% a year according to the Bureau of Labor Statistics’ inflation calculator, found at <http://www.bls.gov/CPI/>.

Another threat to national competitiveness is the increasingly precarious levered position of the United States, particularly in the midst of substantial demographic pressures. Since 1978, the national debt has grown from around \$778 billion to over \$9.3 trillion,¹¹ with the federal government now projected to run a budget deficit of more than \$2 trillion over the next decade.¹² Moreover, the population over 65 is slated to increase from about 13% of the given population currently to over 20% of the population in 2050.¹³ This change in demographics will result in a smaller percentage of the active working population supporting a larger pool of retirees and senior citizens, who will undoubtedly live longer and require more health care and pension payments than any generation in history. Unless addressed promptly and effectively, this entitlement burden will only increase the fiscal strains on the government, likely resulting in reduced services, higher taxes, and a deterioration of national competitiveness.

UNITED STATES BUSINESS ENVIRONMENT (THE NATIONAL DIAMOND)

The United States is considered the most economically competitive nation in the world. (See **Exhibit 1** for a 2007 ranking of the U.S. business environment / national diamond by the *Global Competitiveness Report*). Much of the country's strength comes from its advanced and deep capital markets, which have produced some of the world's most sophisticated financial institutions and ready access to private investment. The U.S. has also benefited from its innovative capabilities, particularly its patents per capita, driven in part by the availability of scientists and researchers. The country's highly sophisticated buying population drives a strong local market for goods and services, which, combined with the willingness of the United States

¹¹ U.S. Treasury's Bureau of the Public Debt, www.treasurydirect.gov, accessed April 2008.

¹² Congressional Budget Office's Budget Projections, www.cbo.gov/budget/data/budproj.shtml, accessed April 2008.

¹³ Projected Population of the United States by Age and Sex, 2000-2050, U.S. Census Bureau, www.census.gov, accessed April 2008.

to be an open trading partner with much of the rest of the world, creates an intense local competitive environment where gaining market share requires differentiation. Strong anti-trust laws and intellectual property protection further highlight and enhance the competitive landscape.

However, the national economy does have some notable weaknesses. Despite a fairly open political system, the country is not immune from corruption, which is particularly problematic for a government-dependent cluster like IT / Tech Services in the Washington, D.C. area. In addition, the quality of education, particularly public education, has suffered in recent times, most dramatically in urban areas, creating further disparities of access and opportunity. Nationally, United States students have lagged students from other OECD countries in math and science, with the U.S. ranking 17th (out of 30) in math and 24th in science education (Glod, 2002). The quality of education is particularly alarming given the emphasis on professional services and higher-value products, many of which, like information technology, require a strong foundation in math and science. The poor quality of primary math and science education could have a negative impact on patenting in years to come, slowly eroding the American edge in innovation.

OVERVIEW OF THE WASHINGTON, DC MSA ECONOMY

Regional Overview

This report focuses on the Washington, D.C. metropolitan statistical area (MSA), which is an economic region but includes several governing institutions. This focus was chosen for several reasons. First, today the political boundaries of the District of Columbia, the State of Maryland, and the Commonwealth of Virginia are relatively arbitrary compared to the boundaries of economic unit and local clusters. Given the extremely open borders between these

political entities, there is no reason to consider the economic delineations the same as the political ones. Second, the MSA is the most coherent definition of an economic area in this region. The Commonwealth of Virginia has extremely different geographies, demographics, and economies. Any competitiveness analysis of that region would be schizophrenic and broad. Even the economic area (EA) around the District of Columbia is too diluted in terms of economy to be able to draw significant cluster analyses. For this analysis, it is the Washington MSA—comprising five counties from Virginia, five counties from Maryland, and the District itself—that is the most appropriate economic unit.

The Washington MSA, with a population of approximately 5.25 million in 2005, is the fourth largest in the United States by gross “regional” product per capita, at \$59,682. Washington is also the fastest growing MSA economy by real income and GRP per capita among the top ten cities within the country (by population).¹⁴ The District itself, given its dense population and urban nature, has the highest per capita income of any “state” or region by a significant margin, (nearly four times the median). Maryland and Virginia are also above the median within the United States.¹⁵ In summary, Washington is a wealthy city within an already wealthy country, and its wealth continues to grow.

Economic Analysis

The economy of the Washington MSA has been fairly diverse. The region is “over-penetrated” in five key traded clusters as defined by the Cluster Mapping Project at the Institute for Strategy and Competitiveness: business services (consulting, employment agencies, service organizations); education / knowledge creation (teaching institutions, development

¹⁴ U.S. Bureau of Economic Analysis, www.bea.gov, accessed April 2008.

¹⁵ Ibid.

organizations); information technology (software, electronic components, computers, communications services); publishing / printing; and transportation / logistics. All five of these clusters, in addition to being over-penetrated, are gaining share in terms of share of U.S. employment. Beyond this core area of strength, Washington has a strong representation in another eight clusters: analytical instruments; communications equipment; distribution services; entertainment; financial services; heavy construction services; hospitality / tourism; and power generation. The MSA has been losing share in several of these large clusters, such as construction services, hospitality services, and distribution services.¹⁶ (**Exhibit 2** illustrates the region's cluster share, growth, and employment in the MSA.)

Despite its diverse foundation, the Washington economy is dominated by business services. This is not a surprise; given the close proximity to the federal government, there is an obvious need for professional services such as law and lobbying. Indeed, the Washington MSA is ranked first among all United States MSAs in terms of employment in many of the sub-clusters for business services.¹⁷

Business services cannot be viewed in a vacuum, and Washington's three premier clusters—business services, information technology, and education / knowledge creation—are synergistic. This “super-clustering” will be addressed further in the next section, but it should be noted that the DC MSA has gradually moved towards employment in these three high-wage, high-skill, high-correlation industries. Indeed, the MSA not only has high employment in typically high-wage clusters, but the MSA's wages in said clusters are actually *higher* than the national average. In the meantime, other lower skill, lower wage clusters—such as construction

¹⁶ Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School, team Analysis.

¹⁷ Ibid.

services—have been exiting the area and have seen decreasing employment, as is apparent by the fact that the region lost share in those clusters over the last 15 years.¹⁸

While the Washington MSA's economy has been very productive, it has not necessarily been very innovative. The most visible standard to gauge this is patenting organizations and patents per employee. From 2000 to 2004, there were 2,038 patents registered among the top 20 patenting organizations in the MSA. This is relatively low compared to other cities of the same size—San Francisco has double the number of patents for its top 20 organizations during the same timeframe. In addition, the DC MSA generated only 5.0 patents per employee in 2004, compared to a national average of 7.3. While this can be partially attributed to its strength in business services, which are generally low-patenting clusters, the MSA is been systematically low in its patenting across most of its clusters.¹⁹ Finally, the nature of the patenting agencies is telling: in Washington DC, most of the major patent creators are parts of the federal government (the navy, health & human services are the top two) or education institutions (Johns Hopkins University, Georgetown University). In contrast, only two of the top patenters in San Francisco are public or non-profit.²⁰ Patenting by public or non-profit organizations is not disadvantageous necessarily, but in order to create a thriving economy there must be ways to transfer the patents, knowledge and innovation to the private sector. It is not certain that such a transfer is occurring in this MSA.

DC MSA Business Environment (Regional Diamond)

(Refer to **Exhibit 3** for detailed data assessments of the regional economy. Selected key information is presented here.)

¹⁸ Ibid.

¹⁹ Ibid.

²⁰ Ibid.

Factor Conditions

Beyond the general beneficial factor conditions experienced by the United States, Washington, D.C. enjoys a number of additional benefits. The MSA is located roughly in the middle of the Atlantic seaboard, with convenient access to both North and South. Given this location, the MSA is situated on or near many transportation routes, with generally solid infrastructure, including two major airports, several rail terminals, ports, and a well-built public transportation system (although infrastructure needs additional investment to meet the demands of local growth, as discussed below). Numerous cultural institutions—national monuments, the Smithsonian Museum, art galleries, architectural landmarks—also provide an attraction and enhance the quality of life. The additional attention and protection as being the nation’s capital also provide for a number of security benefits.

Given these physical resources and political nexus, a number of diverse visitors and inhabitants have come to the area. Indeed, one of the strongest assets for the Washington MSA is its people. The area has a number of highly educated employees and education institutions. The Commonwealth of Virginia has the highest concentration of technology employees of any state, and most are concentrated in the DC MSA.²¹ Furthermore, Washington is the most educated of any MSA, with 46% of the population holding a bachelor’s degree and 21.4% holding a master’s degree.²² In any given year, there are 400,000 students in the area (29% graduate students) at 40 institutions.²³

Despite the human strengths, there are also a few weaknesses. The costs associated with the MSA are also very high—the city has the 6th highest cost of living in the country and is 37.8% more expensive than the rest of the country, effectively eliminating many benefits from

²¹ Virginia Economic Development Partnership. <http://www.yesvirginia.org/>, accessed March 2008.

²² Greater Washington Initiative. <http://www.greaterwashington.org/>, Accessed March 2008.

²³ Ibid.

the city's high average wages.²⁴ Additionally, the MSA suffers from a human capital disparity. While some education institutions within the city are thriving—particularly at a higher education level—others are not. Public education within the District proper is considered the worst in the nation,²⁵ and the district does not have any seats represented in Congress. While this is obviously a large social issue, it is also problematic from an economic perspective: with so many disenfranchised members of the population, the MSA is not reaching its true potential.

Demand Conditions

Not surprisingly, the government is one of the major customers for most industries in the Washington MSA. This has been a boon for many industries, as it has created a steady demand over time. Indeed, after September 11, 2001, the need for high-quality, U.S.-managed services increased significantly as the federal government ramped up its capabilities to assess threats to its sovereignty and safety. In those cases, the government acted as a demanding customer, requiring delivery of cutting-edge products and services.

This demand, however, has not come without trade-offs. The dependence on the U.S. government (or the governments of Virginia, Maryland, and the District) has allowed many firms to become far too vulnerable to unavoidable cyclicalities in government contracting and crowded out private sector demand. These key issues will be addressed in more detail in a later section..

²⁴ Ibid.

²⁵ U.S. Department of Education National Assessment of Education Progress rankings, <http://nces.ed.gov/naep3/>, accessed April 2008.

Context for Strategy & Rivalry

As of 2007, the Washington, D.C. MSA was home to approximately 23 of the *Fortune* 1000 companies as of 2007, which is respectable but not extraordinary for a city of its size.²⁶ What the MSA lacks is a strong base of small to medium enterprises (SMEs) and associated entrepreneurs. This is a critical challenge, addressed later, that the MSA must face.

Related & Supporting Industries

The city has relatively stable employment given the standard need for services and government-related activities. And as mentioned previously, the city has a number of somewhat related clusters that reinforce each other, from business services to hospitality to information technology to communications equipment. However, it is unclear that these firms actually function in a “cluster” with collaboration and competition.

Government

Besides being a major client for many companies, the governments in the Washington MSA are also policymakers that help determine the economic foundation. In general, the governments have provided a significant amount of support. For example, there are 29 R&D institutions for the federal government within the MSA, all helping to provide innovation and patents.²⁷ Additionally, specific tax programs have been initiated by the states and the District to bring more businesses to the area.²⁸ However, it is unclear how well the government R&D by the government is being linked to private firms, particularly given competing government jurisdictions.

²⁶ Greater Washington Initiative (2005). “Information Technology, Communications, and New Media in Greater Washington.” <http://www.greaterwashington.org/>, accessed March 2008.

²⁷ Greater Washington Initiative.

²⁸ Ibid.

In recent years, Virginia's government has maintained macroeconomic stability and strong central leadership, which has helped it set new standards for state government excellence. The Virginia Constitution mandates a balanced budget,²⁹ which forces fiscal discipline. The Commonwealth has also used economic and tax incentive programs to lure businesses into Virginia, such as a \$1,000 corporate tax credit for each new full-time job under the right conditions, and a working retraining tax credit. In addition, Virginia created 57 enterprise zones where businesses receive cash grants for permanent net new jobs created. The Commonwealth extended this concept by creating a number of technology zones, with fee waivers and tax incentives. Finally, Virginia also has a discretionary Governor's Opportunity Fund, which the governor can tap to provide grants to companies choosing between Virginia and other locales.³⁰ The State of Maryland also managed a number of programs to attract businesses, including an R&D tax credit and a state-funded equity fund designed to help seed and early-stage companies receive growth capital.³¹

Institutions for Collaboration

Washington, D.C. has over 6,600 professional organizations, the most for any city in the United States.³² Thus not surprisingly, the city has a number of successful IFCs. For example, the Greater Washington Initiative was ranked one of the Top 10 development organizations by *Site Selection* magazine. However, so many organizations requires coordination for the greater good of the regional economy. As will be discussed later, this collaboration is not yet clear.

²⁹ Virginia Economic Development Partnership.

³⁰ Virginia Economic Development Partnership, "Virginia Guide to Business Incentives 2007-08"

³¹ Maryland Department of Business and Economic Development. <http://www.choosemaryland.org/>, accessed April 2008.

³² Greater Washington Initiative.

ASSESSMENT OF WASHINGTON D.C. MSA IT / TECHNOLOGY SERVICES CLUSTER

Cluster Description

For the purposes of this project, the IT / Technology Services cluster is defined as: data management; networking (and telecom); engineering; computer hardware; database and software design; and management & administration of entire technology systems. Major services provided by this cluster include: management of highly-sensitive information (intelligence); training systems integration; and outsourced data management. The primary products include: databases; information systems (e.g., ERP, knowledge management); computer hardware; computer software; and infrastructure (including telecommunications systems). The major customers for this cluster include: the U.S. federal government (especially the Department of Defense, CIA, and federal procurement); local governments; *Fortune 500* companies; universities; and health systems. Some of the major firms are AOL, Blackboard, Booz Allen Hamilton, CACI International, Computer Sciences Corp, General Dynamics, Grid Point, Network Solutions, Northrop Grumman, and Scitor.³³

Growth of the IT / Tech Services Cluster in D.C. MSA

Beginning in the early 1980s, the U.S. Department of Defense increasingly outsourced a substantial portion of technology-intensive services, primarily in aerospace, to the private sector. Given the ideal location (between Pentagon and Dulles Airport), favorable business environment (transportation, taxes, regulation), and easy access to these large customers, Washington D.C., northern Virginia, and parts of Maryland quickly established a major hub for IT services. In 1985, the Center for Innovative Technology (CIT), a public-private partnership funded by the Virginia government, was created to leverage university research and private capital to seed new

³³ Greater Washington Initiative.

companies and expand the region's tech infrastructure. Also in 1985, the precursor to the internet was handed over to National Science Foundation, facilitating a community of tech innovation and entrepreneurship. During the early 1990s, tech companies in the area expanded and multiplied, providing greater depth and breadth to the local tech cluster. Their growth was further boosted by the national tech economy boomed in the late 1990s. Government applications and demand grew rapidly; this government demand even helped to mitigate the fallout from the Internet bubble in 2000 for the region's IT firms.

As mentioned above, local governments played a large role in triggering investment in the MSA region (usually within their own jurisdictions). The State of Maryland's venture fund invested over \$45 million in 175 companies throughout the state, with 60% of those investments focused on technology companies (Maryland Department of Business and Economic Development, 2008).³⁴ In addition, the Maryland Technology Development Corporation (TEDCO) attracts and pools grants in order to help commercialize technologies developed by local colleges and universities. These investments have been successful in attracting other pools of capital—39 companies that received a total investment from TEDCO of just over \$2 million in 39 companies have attracted over \$60 million in additional downstream funding, generating \$27 of private investment for every \$1 contributed by the state.³⁵

The Virginia government has perhaps been more responsive to embracing technology as a pipeline for future growth. In Virginia, the aforementioned technology zones lure companies to the state.³⁶ In 1998, then Governor Jim Gilmore created a cabinet-level Secretary of Technology as one of his first acts in office. The post was intended to provide both a platform for technology adoption in government as well as a champion for promoting technology in the state overall. This

³⁴ Maryland Department of Business and Economic Development. <http://www.msa.md.gov/msa/mdmanual/12dbed/html/dbed.html>, accessed April 2008.

³⁵ TEDCO. <http://www.marylandtedco.org/>, accessed April 2008.

³⁶ Virginia Economic Development Partnership. <http://www.yesvirginia.org/>.

was less promotion or selection of a cluster as much as acknowledgement that the technology industry was becoming an increasingly important player in Virginia that had to be fostered and developed. IT companies had been instrumental in bringing new jobs to Virginia, helping the state reduce its unemployment to an all-time low (Hsu, 1998).

Much of this work to advance IT / Tech Services continued under Gilmore's successor, Mark Warner. Warner, a former venture capitalist with deep ties to the telecommunications and information technology sectors, populated his government with a number of advisers from the private sector, particularly from the technology industry (Henry, 2002). In parallel, the federal government national security spending saw the start of a three-year surge in public spending in response to the September 11th attacks, with over 70% of \$52.6 billion of local purchases in tech services in 2004.³⁷ At the same time, during the mid-2000s new tech initiatives proposed by IFCs and Virginia and Maryland governments sought to further broaden and diversify the cluster beyond federal government demand.³⁸

Performance of the IT / Tech Services Cluster

The United States is the fourth-largest exporter of IT services in the world, trailing only China, Japan, and Singapore. However, over the last decade, the U.S. has been steadily losing share, with China vastly improving its exports.³⁹ Nevertheless, the IT cluster is still a vital part of the U.S. economy, particularly considering the strong local demand for IT products. Within this cluster, the D.C. MSA ranked 9th in the U.S. in terms of employment share with 3.24% of total U.S. IT sector jobs.⁴⁰ San Jose, with 8.47% of total U.S. jobs, ranked first, followed by Seattle and San Francisco. Washington, D.C.'s growth relative in IT employment relative to

³⁷ U.S. Federal Budget (2005). <http://origin.www.gpoaccess.gov/usbudget/>, accessed April 2008.

³⁸ Greater Washington Initiative.

³⁹ Institute for Strategy and Competitiveness, Harvard Business School.

⁴⁰ Institute for Strategy and Competitiveness, Harvard Business School

other U.S. MSAs has been decent but unremarkable, roughly falling around the median for job growth by the nation's top 10 IT MSAs. (See **Exhibit 4** for competitive data on employment, exports, and growth globally and among MSAs within the U.S.).

Key sub-clusters within the IT / Tech Services Cluster in the D.C. MSA include: computer programming, computer services, online information services, communications services, and management consulting. Each of these sub-clusters was one of the top five regional sub-clusters in the U.S. in terms of employment.⁴¹ (Cluster map and national rankings shown in **Exhibit 5**).

The D.C. MSA software sub-cluster represents 3.35% of total U.S. software employment. This sub-cluster has declined at 2.5% from 1990-2005 largely due to disproportionate job growth in Seattle, San Francisco, and San Jose. Therefore, while the D.C. MSA's employment in this cluster was actually growing, it is nevertheless losing employment share in the software sub-cluster. Computer Programming holds 12.5% of total U.S. employment in this sub-cluster and has grown 0.4% from 1990-2005. The online information services cluster holds 13% of total U.S. employment and has grown 3.7% over the same period, most of which has been driven by the emergence of AOL. The communication services has been the shining star of the DC MSA with 21% of total U.S. communication services employment and gaining 2% over the 15 year period. While there have been some strengths in this cluster, overall, innovation has lagged the U.S. in recent decades. IT cluster patents per 10,000 employees had a 6.5% CAGR from 1990 to 2005, lagging the U.S. growth of 12.3%.⁴²

DC MSA IT / Tech Services Cluster Business Environment (Regional Cluster Diamond)

⁴¹ Cluster Mapping Project, Institute for Strategy and Competitiveness, Harvard Business School.

⁴² Ibid.

(Conditions listed in this section are highlighted only if there is strong variance from the general regional diamond.)

Factor Conditions

The cluster has had strong VC and angel investing presence—it is estimated there are more than 500 VC firms and over 3,500 angel investors in the region. However, the cluster is tightly concentrated around the Northern Virginia area around Washington D.C., without greater penetration into the city of Washington D.C. Despite a relatively strong VC and angel investor base, the region still appears dominated by large software firms and not SMEs. Additionally, many larger private sector firms in the area (such as AOL) are shedding IT human resources talent as jobs are increasingly outsourced internationally, and could face the threat of lost skilled employees.

Demand Conditions

Department of Defense spending has increased since 2001, with a strong correlated growth in the IT spending and 15% of current U.S. defense spending dedicated to firms located in northern Virginia. While the IT cluster's dependence on government demand is strongly rooted in the defense industries, it is also rooted into other federal government agencies in addition to local government demand.

Context for Firm Strategy & Rivalry

The shedding of IT / Tech Services jobs can potentially create opportunities for the emergence of more competitive firms, with the newly unemployed skilled talent offering the potential for new SMEs. However, continuing government demand has skewed competition to large companies at expense of start-ups, soaking up talent, inflating wages and raising barriers to entry. Additionally, successful firms are often sold to the larger incumbents quickly, causing entrepreneurial and managerial skills to leave the area.

Related & Supporting Industries

Many related clusters in the region, such as motor products, aerospace, electronics also recruit engineers to the region, help build and support this cluster. However, given the dedicated service to the government agencies and potential silos, there may be less connection and development within the cluster.

Government

As mentioned above, 29 federal R&D functions exist in the region to support technology development, including the Department of Defense, Homeland Security, NASA, and Department of Education. CIT conducts research for free, expands broadband infrastructure, and funds new ventures. The Virginia government has been dedicated to providing critical resources to strengthen cluster and provide skilled labor, as shown by the initiatives above. Nevertheless, collaboration between Virginia, Maryland and D.C. governments is currently lacking, and rivalry between the government entities for jobs, prestige and companies remains intense and limits the ability for the economic region to fully thrive.

Institutions for Collaboration

Three major tech associates, with total 2,000 member companies, exist in the Washington, D.C. area, in addition to the general economic development agencies. The Northern Virginia Tech Council (NVTC) is the largest of its kind in the country (1,100 members) and is active in providing strong leadership, growing the cluster network, advocating effectively to the government, and seeding tech start-ups to strengthen cluster. NVTC also has an ability to set agenda and priorities in transport, training, and higher education, in addition to leading a strategy for the region to become less government dependent.

STRATEGIC CHALLENGES*Strategic Challenges Facing the Cluster*

Overall, the DC MSA IT / Tech Services cluster is strong and arguably the greatest economic asset located in Virginia. Nevertheless, as suggested by the analysis above, the cluster faces a number of long-term strategic challenges. The greatest challenge is the dependence on government defense-related demand. Overdue technological improvements sought by the Department of Defense to enhance systems and engage in wars in Afghanistan and Iraq have created a strong, but unsustainable, source of demand growth. Currently the cluster is in danger with the expected downturn in defense contracting when a new federal administration comes to office in January 2009. The cluster must find ways to broaden its customer base to remain competitive as that demand inevitably ebbs.

Furthermore, the demand dynamics have drawn entrepreneurs and skilled employees into large consulting or defense services firms, such as Booz Allen Hamilton or Scitor, siphoning off talent from other tech services SMEs. With large firms dominating employment and even policy advocacy, smaller nimble firms have not naturally arisen. Without a vibrant ecosystem of SMEs,

the cluster suffers from a lack of innovation and an inadequate supply of truly related and supporting companies. These problems—demand dependence, untapped entrepreneurial talent, and inadequate SMEs and innovation—are inextricably linked, and must therefore be addressed with a comprehensive solution.

In order to successfully develop and implement such a solution, another challenge must be faced: linkages and coordination within the cluster have not been strengthened. From our field research, it is clear that universities and patenting government agencies can and should be tied more together with the private sector to promote tech transfer and commercialization. While firms rightfully compete for business, local and state governments often view cluster development as a zero-sum game, competing for resources rather than recognizing that the economic unit unavoidably crosses political boundaries and requires collaboration. Equally important: although each individual IFC such as CIT and NVTC has helped the IT / Tech Services cluster coalesce, there is an apparent lack of collaboration between these organizations within Virginia, and with similar organizations in Maryland and the District of Columbia. Leadership from the business community, the public sector, and the IFCs is needed to change this winner-take-all approach to economic development.

Policy Challenges Facing the Governor of Virginia

From the perspective of Virginia Governor Tim Kaine, however, there are a number of economic objectives. The Northern Virginia (NOVA) IT / Tech Services cluster is the “crown jewel” of the Commonwealth, exemplifying how Virginia is a great place to do business while also creating enormous wealth (and a substantial tax base). Continuing to promote and invest in the IT / Tech Services cluster is vitally important to keep momentum going in Virginia. In comparison to NOVA, the rest of the Commonwealth lacks the infrastructure, factor conditions

and dynamism needed to become competitive, drive innovation, and generate growth in this IT / Tech Services cluster. Thus the inequality between the “haves” with the “new economy” in Northern Virginia and the “have nots” with the “old economy” in other parts of the Commonwealth (particularly the southwest) is an important and vexing question of economic and social policy.

Seeking to minimize this inequality without detracting from the success of the NOVA IT / Tech Services cluster is challenging, and requires more than a compelling strategic vision. It requires solid execution and difficult choices about resource allocation, political capital, and shared gains. Former Governor Mark Warner, as a telecom venture capitalist himself, drew attention for his bold initiatives to bring call centers and IT companies to the rural southwest, in effect trying to replicate NOVA in rural Virginia. These ventures ultimately failed, however, with inadequate levels of human talent and local support, raising serious doubts as to whether attempting to replicate the NOVA IT / Tech Services cluster in another location is sensible.⁴³

To date, Governor Kaine has moved away from this strategy, instead capitalizing on the critical acclaim of Virginia’s administration and economic growth and promoting Virginia as the best place to do business in the country (the Commonwealth was recently ranked as the best state for business by *Forbes* and CNBC).⁴⁴ Kaine has also identified a broad range of industry clusters, beyond just IT / Tech Services, to support in the state, including: Aerospace; Automotive; Electronics; Food Processing; Global Logistics; Life Sciences; Modeling & Simulation; Plastics; and Wood Products.⁴⁵ Some of these identified clusters—most notably automotive, plastics, and wood products—are well suited for the industries and economies in other parts of Virginia.

⁴³ Team interviews.

⁴⁴ Virginia Economic Development Partnership website: <http://www.yesvirginia.org>.

⁴⁵ Ibid.

Yet while these are positive steps in the right direction, the governor has not yet answered whether the state can and should cultivate nine different clusters (including IT / Tech Services), nor has he introduced formal plans to leverage the strengths and best practices of the IT / Tech Services cluster to help make these other clusters more innovative and get them off the ground. These unanswered questions are symptomatic of larger questions about collaboration, coordination, and communication facing the IT / Tech Services and the other selected clusters.

POLICY RECOMMENDATIONS

(See **Exhibit 6** for a diagram of the changes recommended to the IT / Tech Services cluster.)

Diversify Away from Defense-Related Demand

In order to protect against the current challenges and risks, the government and IFCs should diversify their demand for IT / Tech Services by spurring demand from other, new departments within the federal government, other state and local governments, and private firms in related industries. Other federal departments, such as Health and Human Services, Transportation, Education and Treasury, could stand to benefit from the capabilities that currently exist in the cluster (e.g., creating new state-of-the-art tracking capabilities for transportation routes). Technological innovations in product development, procurement, logistics and processing systems could represent a major efficiency gains for the government and commercial opportunities for the cluster. Moreover, the cluster could leverage these areas of expertise to provide similar services for state and city governments well outside the MSA, establishing itself as the “national hub of government outsourcing.”

This initiative will help to broaden the products and services offered by the cluster, which in turn will expand the networks of firms in the MSA’s cluster and naturally tap into private

firms that focus on these heavily regulated, government-related industries, such as telecommunications, health care and education and transportation. While the cluster must do more to diversify its customer base and actively seek out these businesses, widening its base of government-related services will immediately help the cluster solidify its linkages across sectors as well as the financial and academic communities, and hedge against reductions in defense spending.

Foster Entrepreneurship in IT / Tech Services

The SME ecosystem is critical to create a cluster with depth, diversity and sustainable growth. In addition to the entrepreneurship cultivated by diversifying away from traditional sources of demand, the state and local governments can further activate the cluster by encouraging the development and growth of SMEs through: funding and collaboration initiatives; providing additional avenues for venture funding and public-private partnerships; increasing technology transfers; and establishing new training and research programs with local universities. The newly formed “DC Development Consortium” (see below) should designate a well-connected local entrepreneur, such as Ted Leonsis (one of the founders of AOL) to lead an incubator that provides funding and management direction for SMEs and works in conjunction with IFCs such as CIT.

Address Infrastructure Needs and Facilitate Greater Collaboration

While overall the DC MSA has some strong infrastructure assets, the current road / rail / public transport infrastructure situation around the Capital Beltway (I-495) and along the Route 66 Corridor (the Western portion of Fairfax County, VA) is a major obstacle to cluster growth. Gridlock and lengthy commutes are deterrents for companies potentially interested to relocate in

the area and be part of the cluster. The unique political situation of the MSA economic unit, which requires consensus among Virginia, Maryland, District, and congressional leaders, also makes any infrastructure projects subject to extensive negotiations and debate. When a new Woodrow Wilson bridge (connecting Virginia and Maryland along the Beltway) was proposed, for example, planning and approvals took more than a decade. More recently, Congress pulled funding for the proposed Metro extension to Dulles Airport, which would have addressed a vital transportation need. Given the new infrastructure needs for the IT / Tech Services cluster (and the entire regional economy), leaders across parties and local boundaries must come together to address the mounting infrastructure problems. If they do not, the business community should come together to speak out and organize to begin its own advocacy to address the issue.

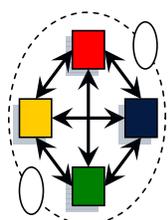
The coordination problems surrounding infrastructure speak to the challenge mentioned above: lack of collaboration. Governments are promoting and/or protecting their local firms in order to win large contracts instead of devising ways to allocate resources efficiently and build a more productive cluster. The governors of Virginia and Maryland, along with the mayor of Washington, should come together and create the “Greater DC Development Consortium,” which would include active participation and advocacy from the highest levels of government, the private sector, academia, and relevant IFCs to enhance collaboration and address investment needs, from infrastructure to education to diversifying demand. As seen in the *Microeconomics of Competitiveness* case on Connecticut, a bipartisan and accountable public-private IFC can yield new forms of coordination and innovation. However, local leaders must be willing to seed some power, authority, and autonomy to this entity, trusting that its activities will indeed increase the overall competitiveness of the region and the IT / Tech Services cluster.

Strategy for the Commonwealth

Governor Kaine must balance investing in the NOVA IT / Tech Services cluster through the policies and resources suggested above with developing other regional clusters within the Commonwealth. While this requires some dexterity, these initiatives do not and should not be entirely independent. In fact, the different business environments and factor conditions in Northern Virginia and other parts of the state should bode well for the development of specialized – but complimentary – clusters.

The DC IT / Tech Services cluster has developed a set of best practices and factor conditions that could be highly valuable to other clusters as they begin to emerge. This is *not* trying to transfer the IT / Tech Services cluster, as seen under Governor Warner, but leveraging the value-added activities of one cluster to increase competitiveness of another. Certainly in announced areas of focus, such as aerospace, life sciences and logistics, this kind of expertise could be highly valuable. Even in “older” clusters such as automotives, the high skills and innovation from the DC MSA IT / Tech Services cluster could benefit from stronger IT systems and better automation / assembly management. Similarly, these kinds of complimentary clusters elsewhere in Virginia can provide the kind of opportunities for diversification and innovation that the IT / Tech Services cluster is currently seeking in new customers outside the government. Governor Kaine has a unique opportunity to create mutually reinforcing linkages between the IT / Tech Services cluster and the other clusters he seeks to promote and thereby improve overall economic performance and begin to reduce the inequality concern.

EXHIBIT 1: Diamond Analysis for the United States



Strengths (Rank/131)

Financial Sophistication	1
Access to VC	1
Patents per capita	1
Laws related to ICT	2
Availability of scientists	6
Overall infrastructure	7

Weaknesses (Rank/131)

Freedom from corruption	18
Quality of primary education	30
Quality of math & science edu.	49

Factor (Input) Conditions

Buyer Education	2
Gov. purchases of adv. prods.	5
Demanding reg. standards	6

Environmental Regulations	19
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Demand Conditions

Intensity of Local Competition	1
Market dominance	1
Board efficacy	3
Anti-trust laws	4
IP Protection	6

Property rights	22
Lack of favoritism in government	27
Absence of trade barriers	28

Context for Firm Strategy & Rivalry

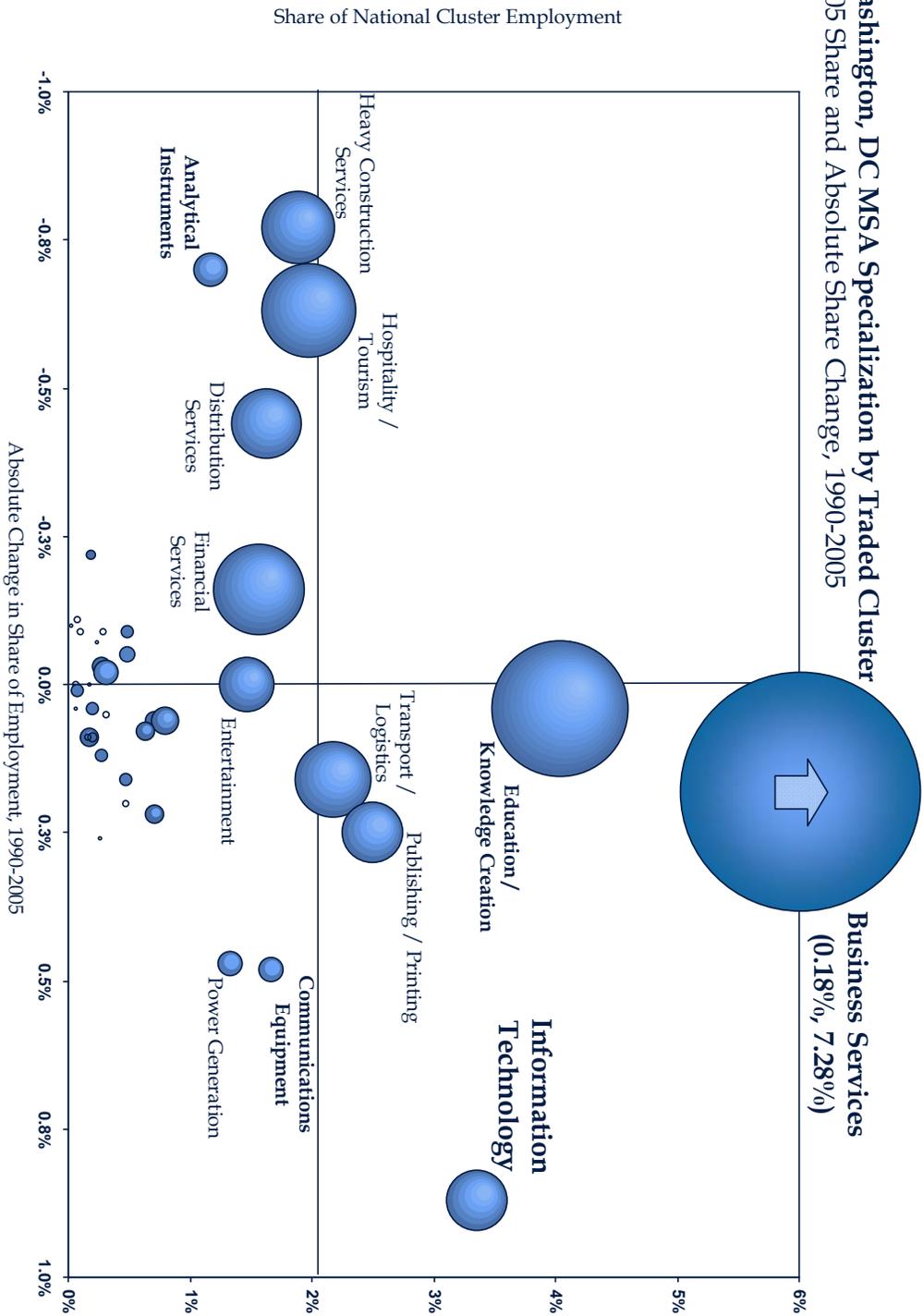
Research and training services	1
Local supplier quantity	3
Availability of process mach.	3
Local supplier quality	5

Related & Supporting Industries

Source: Global Competitiveness Report

EXHIBIT 2: The DC MSA Has a Diversified Economy with Strength in Several High-Skill, High-Wage Clusters...

Washington, DC MSA Specialization by Traded Cluster
 2005 Share and Absolute Share Change, 1990-2005



Source: Institute of Strategy and Competitiveness, Harvard Business School

EXHIBIT 3: Diamond Analysis for DC MSA

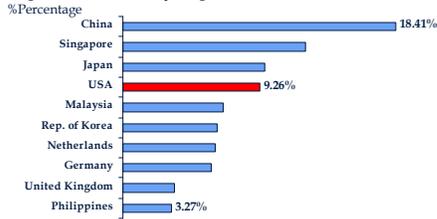
Factor (Input) Conditions	Strengths	Weaknesses
Demand Conditions	<p><i>Physical</i></p> <ul style="list-style-type: none"> • Strong physical infrastructure with ports, airports, and roads • Strong cultural attractions and int'l tourist destination <p><i>Financial</i></p> <ul style="list-style-type: none"> • VC investments of \$1.2B in 2007 <p><i>People / Education</i></p> <ul style="list-style-type: none"> • Large labor force: 4th largest MSA • Highest earning MSA: Median household income of \$74,600 • VA: Highest concentration of tech employees • Most educated MSA: 46% bachelor's degree; 21.4% graduate degree • More than 50 colleges and universities w/400,000 students (29% grad students) 	<p><i>Physical</i></p> <ul style="list-style-type: none"> • High levels of traffic congestion & inadequate funding to address issues <p><i>Financial</i></p> <ul style="list-style-type: none"> • High cost of living MSA: 6th highest in U.S. (137.8 indexed) • Slowing VC spend growth (13% DC, 33% US in 2006-07) <p><i>People / Education</i></p> <ul style="list-style-type: none"> • Poor education: DC public education system ranked 51st of 51 (driving population to suburbs) • Tight labor market: One of lowest unemployment rates, at 3% (results in labor shortages & high costs)
Context for Firm Strategy & Rivalry	<ul style="list-style-type: none"> • Federal government <ul style="list-style-type: none"> - Accounts for 10.4% of jobs - \$55B federal expenditures in area • GRP of about \$360B (highest per capita in US) • Projected need of about 50K tech related jobs 2006-12 	<ul style="list-style-type: none"> • Demand based heavily on government and military needs (crowding out of private sector) • Continued growth in demand from government slowing / in question
Related & Supporting Industries	<ul style="list-style-type: none"> • Home to 23 Fortune 1000 companies (annual revenues of \$194B in 2006) • Relatively stable employment due to federal government and ancillary services 	<ul style="list-style-type: none"> • Loses high-end tech talent (and SMEs) to more entrepreneurial regions • Private sector reputation built on federal contracting, not innovation • Government contracts often politicized, highly restrictive, non-competitive
Government	<ul style="list-style-type: none"> • Strong position in several related industries (motor products, analytical instruments, IT, business services) • 800 defense-related companies 	<ul style="list-style-type: none"> • Many related industries also support government, crowding out private sector growth
Government	<ul style="list-style-type: none"> • Four major government entities to drive development: Federal, DC, VA, and MD • 29 federal R&D functions, including DoD, Homeland Security, NASA, and DOE • Targeted tax incentives by DC, VA, DC for technology companies, among other industries 	<ul style="list-style-type: none"> • Rivalry for contracts and business activity, lack of coordination between DC, VA, and MD creates inefficiencies, sub-optimal productivity (e.g., protracted infrastructure investments)

Sources: ACCRA (CoL), Greater Washington Initiative (2007), US Dept. of Education, Washington Post (2008), Fortune Magazine, Chief Executive Magazine, *Governing Magazine*, *Site Selection* magazine, Office of the Mayor of Washington, D.C., IFC websites.

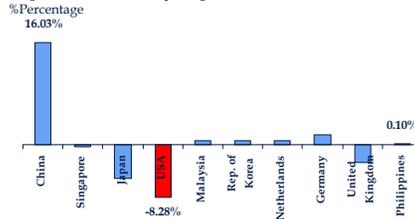
EXHIBIT 4: The DC Cluster Is Internationally Competitive...

The U.S. has an internationally competitive IT cluster, and the DC MSA is one of the most competitive within the U.S.

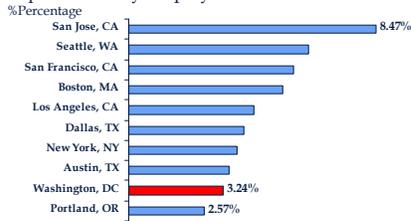
2005 Share of Global IT Exports
Top 10 Countries By Export Share



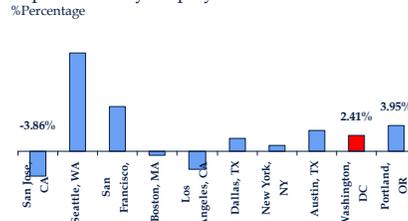
Growth of IT Exports From 1997 to 2005
Top 10 Countries by Export Share



2004 Share of United States IT Employment
Top 10 MSAs by Employment



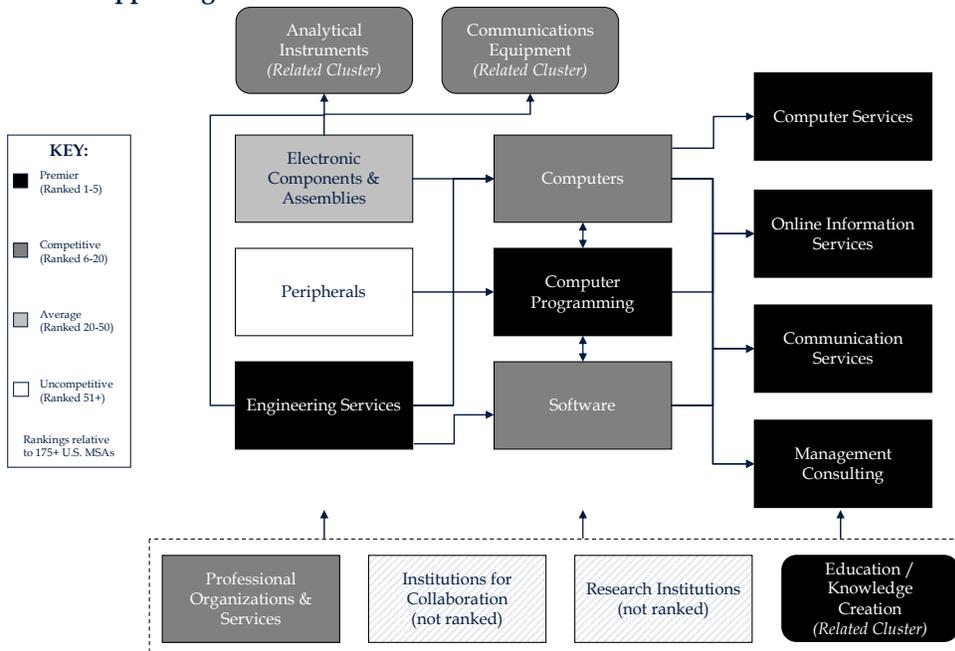
1997-2005 Change in U.S. IT Employment
Top 10 MSAs by Employment



Source: Team Analysis, Institute for Strategy and Competitiveness, Harvard Business School

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EXHIBIT 5: Thus Spawning a Strong and Complex Cluster with Several Related and Supporting Industries...



Source: Team Analysis, Institute for Strategy and Competitiveness, Harvard Business School

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EXHIBIT 6:

Recommendations for the IT / Tech Services Cluster in Virginia

- Build upon successful state and city IT initiatives for broader regional development through leadership of VA and MD Governors and Washington, D.C. Mayor
- Facilitate **Greater Coordination**; Address **Infrastructure** Needs
 - Create “Greater DC Development Consortium,” including senior representation from state / federal government, private sector, academia, and IFCs to enhance collaboration
 - Allocate funding to key areas in need of investment (K-12 education, physical infrastructure)
- Foster **Entrepreneurship** in IT / Tech Services
 - Diversify away from traditional dependence on government-based demand by identifying relevant industries, strengthening linkages
 - Increase patent transfer system from large government entities and universities (e.g., grants clearinghouse from various government entities)
 - Build upon existing new recruiting strategies with incentives aligned to SMEs (e.g., tax breaks, workforce training)
 - Market and expand CIT VC funding programs to boost VC / PE presence to improve IT / Tech Services ecosystem
- **Leverage Existing Strengths** to Create Growth, Activate Clusters Across Commonwealth
 - Focus development in western, more rural region on existing strengths, key clusters (e.g., wood products, furniture, transport / logistics)
 - Leverage technology from NOVA to activate clusters (e.g., government clearinghouse, patent and tech transfers)
 - Develop systems (best practices websites, IFCs, education programs) that disseminate concepts and skills from NOVA IT cluster to the rest of the Commonwealth
- **Address Current Liabilities** on Regional Balance Sheet
 - Education / Human Capital
 - o Address deficient levels of higher education, high-skilled workers through improved K-12 education, local universities, ambitious training programs, incentives for young entrepreneurs to start new businesses
 - Tech Infrastructure
 - o Build out tech infrastructure to make indigenous clusters more competitive, complimentary to NOVA tech cluster
 - Demand and Related & Supporting Industries
 - o Stimulate demand by creating linkages, attracting firms across nation with competitive business environment, new IFCs and desirable quality of life

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