FORWARD

Building the New Economy

"Implementing the InfoComm Revolution in the National Capital Area"

Dear Reader:

In September of 1998, the Potomac KnowledgeWay released its first study on the economic impact of the Information and Communications ("InfoComm") sector in the Greater Washington area. The study, entitled "Toward a New Economy: Merging Heritage with Vision in the Greater Washington Region" showed the InfoComm sector had exceeded the scope of the Federal Government in terms of employment.

Recently, a coalition of government, business and academic interests have come together to update this study. (The attached executive summary details some of the findings). We are pleased to report that this sector has shown tremendous growth over the past two years and has firmly taken hold as the driving force behind the strong economy in the National Capital area.

We wish to thank the many people who contributed to this study, especially the business executives who took the time to share their insights with our survey team.

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"Building the New Economy: Implementing the InfoComm Revolution in the National Capital Area."

A study of the Information and Communications Industries and their role in the region.

Executive Summary
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The full report is posted on the following websites:

District of Columbia
www.dcbiz.dc.gov

George Mason University
www.gmu.edu

Hale and Dorr LLP
www.haledorr.com

PricewaterhouseCoopers LLP
www.pwcglobal.com

State of Maryland
www.choosemaryland.org
www.marylandtedco.org
www.umd.edu

Executive Summary - The New Economy in the National Capital Area

- In 1998, PricewaterhouseCoopers LLP on behalf of the Potomac KnowledgeWay, conducted a study to analyze the Information and Communications Cluster and trends in the Internet related industry segments underlying the development of a New Economy in the National Capital Area. The study was cosponsored by Hale and Dorr LLP, the Greater Washington Initiative, and Virginia's Center for Innovative Technology.
- That study provided the first quantitative confirmation of the growth of this sector and the way in which it was transforming the region in and around Washington D.C. from one focused on the Federal Government to an innovative center of emerging technologies.
- This study revisits the issues identified in 1998, updates the data examined then, and analyzes new trends that, despite the recent downturn, have turned the National Capital Area into one of the top regions in the country for high technology innovation and employment.

Industry Scope: The InfoComm Cluster	The Information and Communication (InfoComm) Cluster includes three industry sectors with complementary and often interdependent products and services: Communications, Content, and Computing/Systems Integration, with Internet services and products embedded in all of them.
Geographic Scope: The National Capital Area	**Washington, D.C.**; the **Maryland counties** of Howard, Prince George's, Montgomery, Anne Arundel, Frederick, Baltimore, Charles and Calvert and the **City** of Baltimore; and the **Northern Virginia counties** of Loudoun, Fairfax, Prince William, Arlington, Fauquier, Stafford, and Spotsylvania, along with the **cities** of Alexandria, Fairfax, Falls Church, Fredericksburg, and Manassas.
Evaluation Scope:	Quantifying current status and qualitatively assessing emerging trends and the impact of the InfoComm economy on the region.
Approach:	**Primary research:** including **fax surveys; interviews** with industry and regional thought leaders; **roundtable** discussions with executives from emerging companies in the region; and **secondary research.**
Sponsors:	**District of Columbia**, *Office of the Deputy Mayor for Planning & Economic Development*; **George Mason University**; **Hale and Dorr LLP**; **PricewaterhouseCoopers LLP**; **State of Maryland**, *Maryland Department of Business and Economic Development, Maryland Technology Development Corporation; and the University of Maryland, College Park.*

Key Takeaways

- The InfoComm Cluster has expanded its strength and importance in the National Capital Area economy, with 9,800 businesses and total employment 60% greater than that of the Federal Government, representing a strong 68% increase since the initial study.
- Despite the growth, we appear to be facing uncertain times. Two significant factors underlying the region's economy have emerged from the study as strengths in such times:
  - The unique role that the Federal Government, through its technology procurements plays in the region. In 1999, Federal technology contracts accounted for $13.5 billion for the Washington Standard Metropolitan Statistical Area (SMSA), representing an increase of 36% over two years.
  - The diversity of the InfoComm Cluster in this region combining key infrastructure and content elements. The companies are primarily dependent on human capital resources, which can be shifted more easily throughout the sectors as market conditions dictate.
- The National Capital Area is leading the evolution of the Bioinformatics industry, building on the strong base of government, academic, and entrepreneurial resources in the region.
- The InfoComm Cluster has depth and breadth of activity but there is not a significant core of major companies with individual strengths that match that of the Federal Government. This is more noticeable as a result of recent mergers and acquisitions.
- Concerns over transportation problems remain, but decisions are within reach on new initiatives for roads, bridges, mass-transit and telecommuting options.
- A critical mass of people and networking facilities now exists in the National Capital Area as a result of the Internet services industry. This has provided the base for development of a growing number of interrelated, competitive technologies in communications and computer systems - including wireless data and optical networking.
- The culture of entrepreneurship has been firmly established, drawing venture capital and other supporting services companies needed to sustain a growing technology economy. Venture capital funding in the area has increased from $777 million in 1998 to over $3 billion in 2000. The prospects for continued venture capital investment in the region will be influenced by the overall state of the capital markets.

The InfoComm Cluster has continued to drive economic development in the National Capital Area.

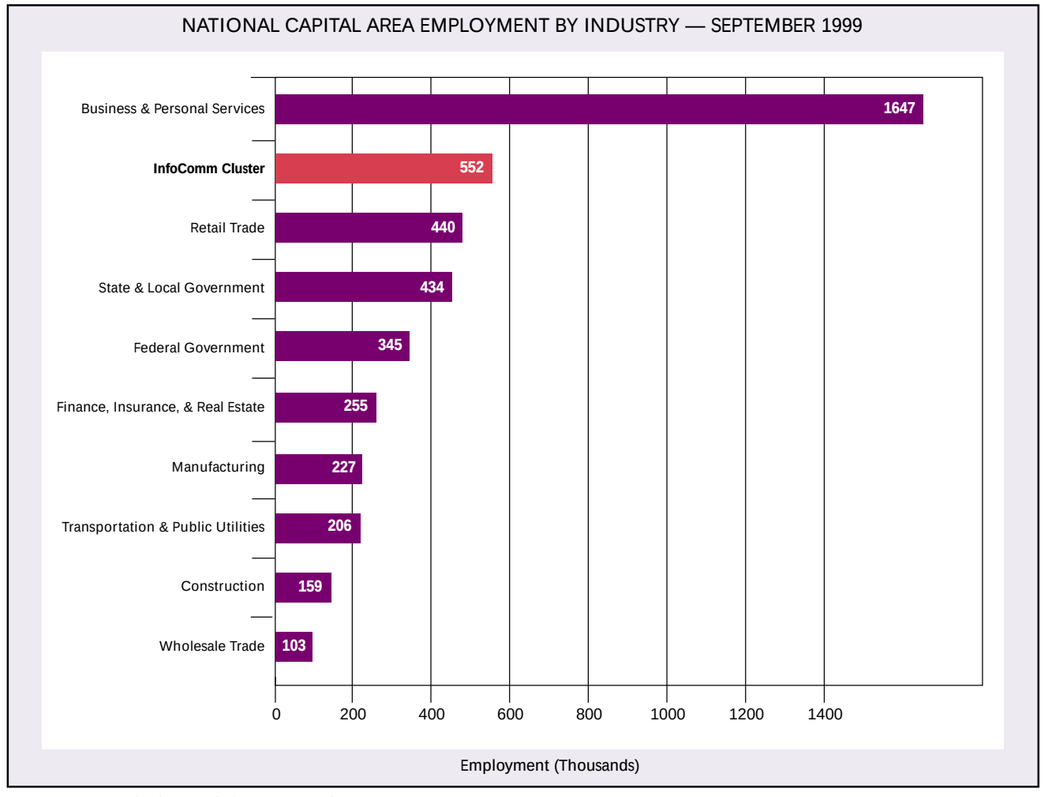
- As high technology industries have expanded globally, the InfoComm Cluster of industries described in the 1998 study have continued to be the key to the region's growth.
- The different components of the InfoComm Cluster have many complementary and often interdependent products and services.
  - The InfoComm value cycle starts with **Content** creation and packaging; this includes the new Bioinformatics sector, which is centered in this region.
  - Different media provide the **Communications** channels for bringing this content to the end users, and new value-added services are customized for end-user needs affecting the system requirements for content delivery.
  - **Computers and Systems Integration** is the hub of the InfoComm value cycle. It enables content creation and communications throughout the value chain, including expanded distribution through the Internet, and provides value-added services.
- The interrelationships of these sectors can be viewed as a value cycle, in which there is a continuum of change among communications technologies, value-added service capabilities, end-user demand, and content requirements. All of these ride on the ever-increasing capabilities of computers and systems integration, and are connected among themselves and beyond by the pervasive reach of the Internet.
- The major strength of the National Capital Area is the region's depth and breadth of activities in all of these sectors.

The InfoComm Cluster consists of Core (Communications and Content) and Enabling (Computers/Systems Integration) industries. Internet services companies span the InfoComm Cluster and merge elements from both Core and Enabling industries.

Core Industries		Enabling Industries
COMMUNICATIONS	**CONTENT**	**COMPUTERS AND SYSTEMS INTEGRATION**
■ Organizations that provide **communications services** and **access** through combinations of point-to-point circuits, interface arrangements, and routing switching, as well as marketing, provisioning, and care. ■ Organizations that manufacture and develop communications equipment.	■ Organizations that **create**, **package or distribute** content (in any format) for commercial purposes. ■ Providers of non-commercial content, such as the Federal Government, have not been included in the quantification of the size of this industry.	■ Organizations that produce **software** and provide **programming** services (outside of integration services). ■ Organizations that develop, implement or maintain software applications. ■ Organizations that provide **integrated services** for specified applications. ■ Organizations that **manufacture** and develop computer **equipment.** ■ This definition does not include pure **resellers** of equipment.
■ Wireline ■ Wireless ■ Satellite ■ Cable ■ Internet Service Providers (ISPs) ■ Equipment	■ Traditional Content/Media (print media and broadcast media) ■ New Content (new media, digital media, and Internet-related content) ■ Biotechnology/ Bioinformatics (biological and genomic data and its management)	■ Software Applications & Development ■ Systems Integration & Consulting ■ Computer Services & Other ■ Hardware
Internet Related Services "e-commerce"		

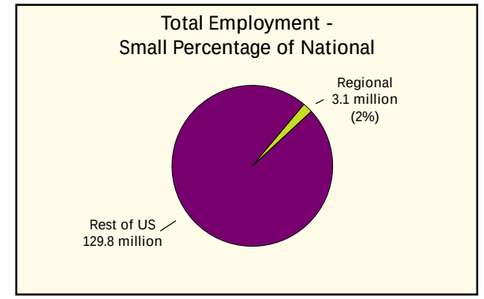
The InfoComm Cluster has emerged as the second largest employer in the National Capital Area, with total employment of 550,000 - 60% more than that of the Federal Government.

This represents significant growth since the initial study. At that time InfoComm employment was just slightly above that of the Federal Government. Since 1998, Federal Government employment remained stable.

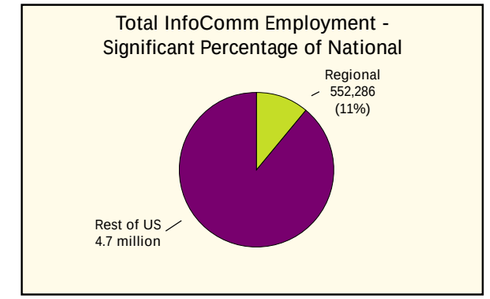


Source: Bureau of Labor Statistics, PwC Database

In relation to total employment, the National Capital Area's InfoComm Cluster employment far exceeds the average nationally.



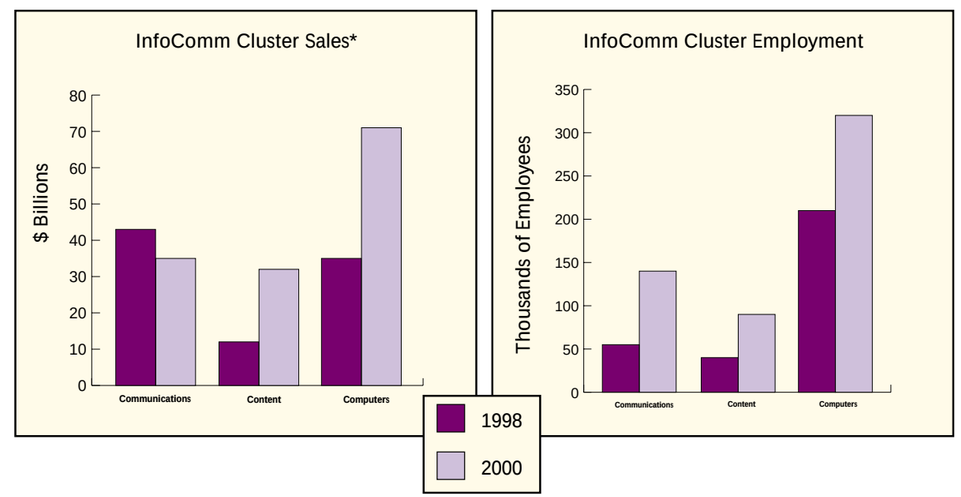
Source: Bureau of Labor Statistics



Source: Bureau of Labor Statistics

The National Capital Area has a broad diversity of employment and sales in all InfoComm sectors.

When compared with the initial study, the Computers/Systems Integration sector now plays a greater role within the InfoComm Cluster, generating twice the sales, and more than twice the number of employees of the other two sectors (Communications and Content).



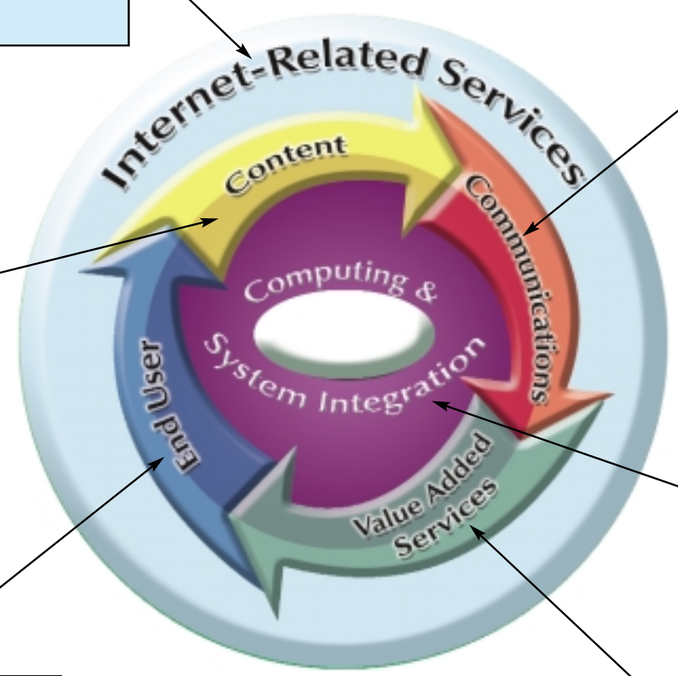
* Regional sales have been calculated on establishments 'headquartered' in the National Capital Area.

The New Economy in the National Capital Area has depth and breadth in all elements of the InfoComm value cycle.

Major Internet Related Services: Major Internet backbone and service providers, such as Network Solutions, are located in the region because of the presence of major Internet switching capabilities and a critical mass of people with relevant skills. These elements exist because this was where the initial development work on the Internet was performed.

Content: The content creators are major players with great depth. This region has a unique set of Federal Government entities and ancillary media that draw from them, as well as developers of innovative content for print, television, and Internet distribution. Included in this is the emerging Bioinformatics industry.

- *Library of Congress*
- *Smithsonian*
- *NIH*
- *Discovery Communications*
- *National Geographic*
- *Washington Post*
- *AOL Time Warner*
- *Gannett*
- *Celera Genomics*
- *C-Span*



End-Users: The broad base of companies within the InfoComm Cluster and other technology sectors are prime users of each other's services. This base is bolstered by the Federal Government - one of the world's largest users of computer and communications systems, software, and services.

Value-Added Services: The National Capital Area has been a center for key innovative industry sub-sectors, including Internet content distribution, caching, and delivery.

Communications: The range and strength of communications companies are built on the presence of key network facilities. They form a hub for communications carriers of traditional voice as well as emerging wireless and Internet services.

- *Concert*
- *Teleglobe*
- *UUNet/WorldCom*
- *Winstar*
- *Teligent*
- *XO Communications*
- *Network Access Solutions*
- *VIA NET.WORKS*
- *Cable and Wireless USA*
- *Aether Systems*
- *INTELSAT*
- *Motient*
- *Loral Cyberstar*
- *Hughes Spaceway*
- *Ciena*
- *Savvis*
- *PSINet*
- *TeleCorp PCS*
- *Orbital Sciences*
- *Talk.com*
- *XM Satellite Radio*

Computers and Systems Integration: Built on base of large-scale Federal Government contracting, the strong computer and systems integration sector is a major reason the area has become one of the top 5 high-tech regions in the country. The evolution of the Internet from this base and the expanded networking capabilities it has engendered provide a multi-layered framework for business growth.

- *OPNET*
- *AMS*
- *Enterworks*
- *USinternetworking*
- *webMethods*
- *Dyncorp*
- *Litton PRC*
- *OTG*
- *Landmark Systems*
- *MainControl*

The heritage of the National Capital Area that created this strong InfoComm Cluster continues to foster its growth.

- Birthplace of the Internet and its development and home to key Internet hubs
- Birthplace of the new Bioinformatics industry
- Center for satellite communications ventures and development
- Center of policy debate and adoption of initial competition in telecommunications
- Location of government funded research with institutions such as the National Aeronautics and Space Administration (NASA) and the National Institutes of Health (NIH)
- Sizeable systems integration businesses, spurred by the Federal Government as a major customer
- Three major airports serve the region, with existing capacity for additional flights. Baltimore-Washington International Airport is currently implementing a $1.8 billion capital expansion plan, while Washington Dulles International Airport has launched a $3.4 billion improvement plan. (Source: BWI Airport, Metropolitan Washington Airports Authority.)

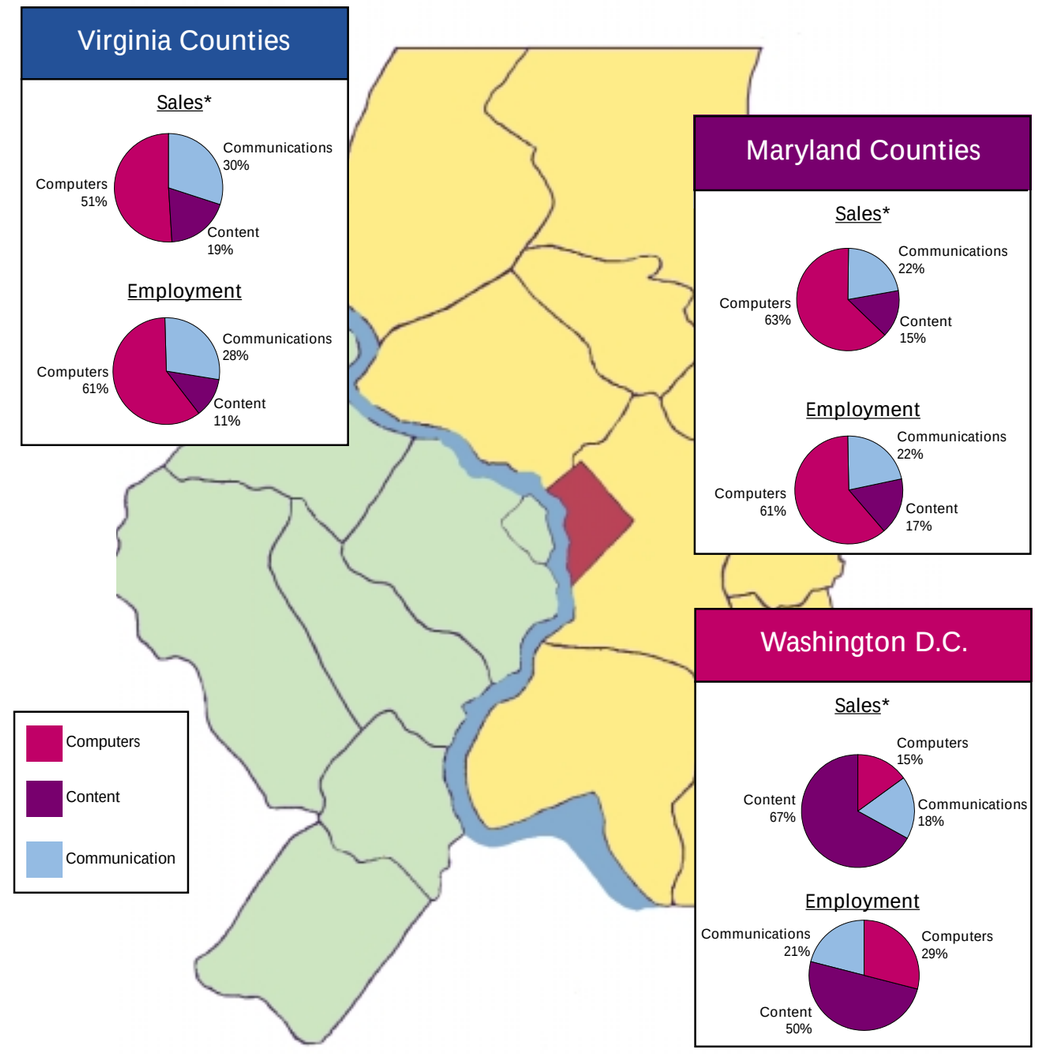
The continued growth and evolution of the InfoComm industries in the National Capital Area are further demonstrated by:

- A strong entrepreneurial community and spirit in the region, driven by major successes of early entrepreneurs that grew to scale in this region
- The development of integrated InfoComm sector industries based on the broad cluster strength in the region
- The continued maturity of opportunities offered by the Internet and related activities
- The successful adaptation of the region's "old economy" companies to new economy realities, as shown in the creation of **StarPower** from the traditional utility company **PEPCO**, and the evolution of **The Washington Post** to new age communication media, as reflected in the creation of WashTech.com and Newsbytes.

All of these elements and others play key roles in keeping the National Capital Area's new economy afloat in the current turbulent marketplace.

- The presence of the Federal Government and its extensive use of local contractors provide a springboard for InfoComm growth over the long-term, despite short-term market fluctuations.
- The local InfoComm industry focuses on enterprise infrastructure more than consumer products provides greater economic stability than may be found in other high-tech centers.

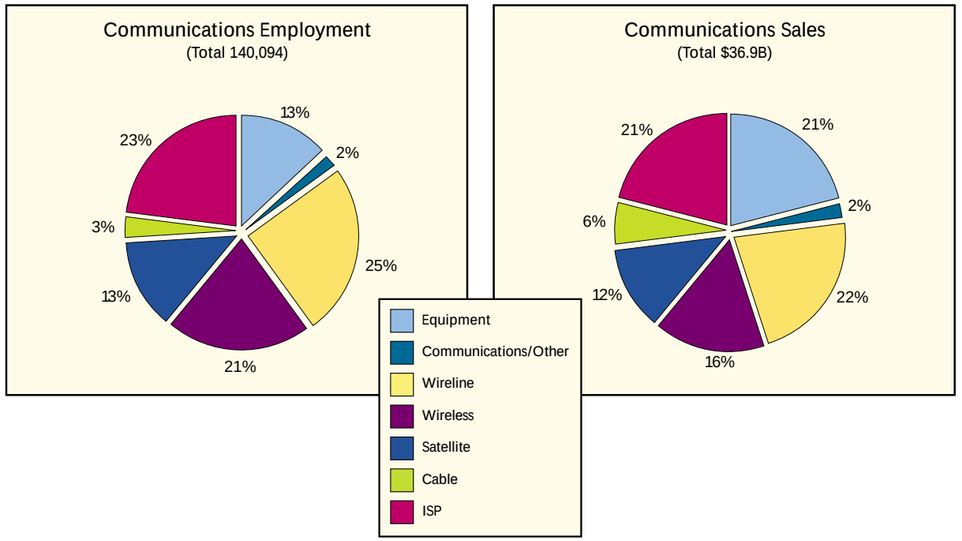
The three jurisdictions show strong performance in all three aspects of the InfoComm Cluster. The Computers/Systems Integration sector dominates in Virginia and Maryland, while content is strongest in the District of Columbia.

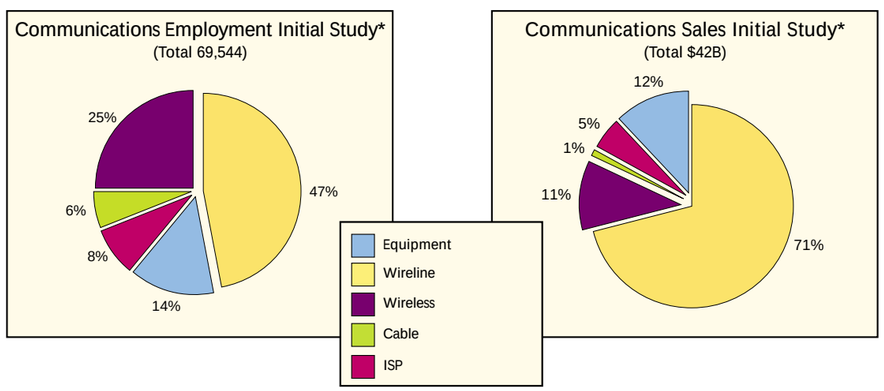


* Regional sales have been calculated on establishments 'headquartered' in the National Capital Area.

Communications: 140,094 people are employed in Communications companies in the region, generating $36.9 billion in sales.

This sector has diversified broadly since the initial study. There has been especially strong growth in the ISP market, as well as the wireless and satellite industries which were broken out separately in this study. The evolution of optical networking has led the growth of the equipment sub-sector in the National Capital Area.*



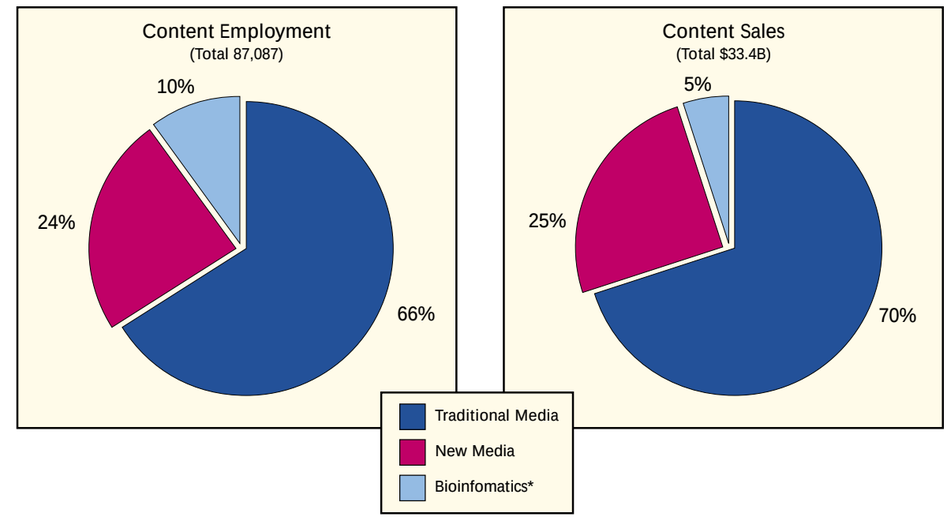


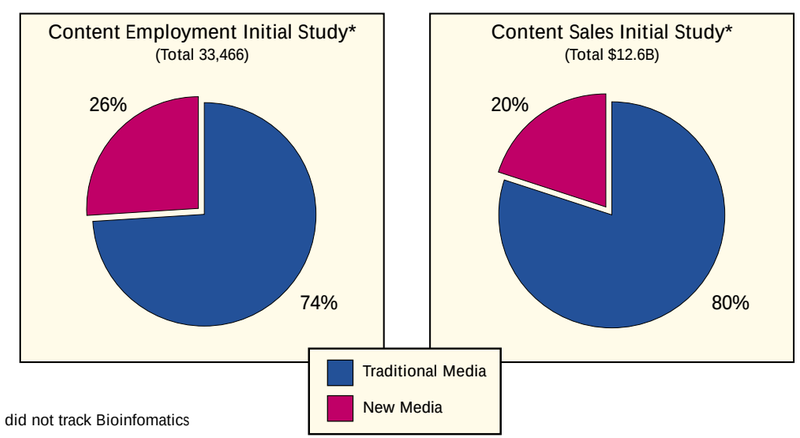
* At the time of the initial study, MCI was headquartered in Washington D.C. and its sales accounted for a significant percentage of the communications sector.

Content: 87,087 people are employed in private sector content companies in the National Capital Area, generating $33.4 billion in sales.

The Content sector has diversified with the emergence of the Bioinformatics sector. In addition, new media businesses, such as Blackboard, Inc. and eMotion, have expanded with the growth of the Internet.

Key to the region's strength is a core of Internet content companies that have developed from the existing media businesses. This foundation in traditional media should enable these companies to survive the "dot-com" shakeout.

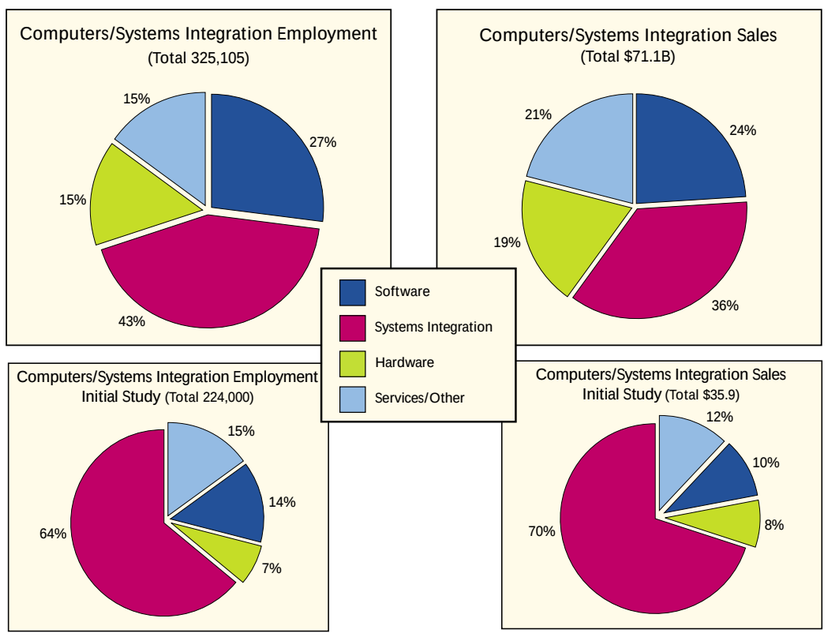




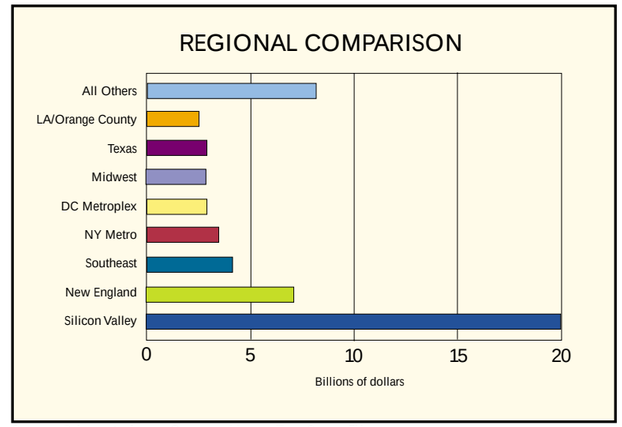
* Initial study did not track Bioinfomatics

Computers and Systems Integration. The largest of the three components in the region employs 325,105 people and generates $71.1 billion in sales. This represents a doubling of sales and a 50% increase in employment since the initial study.

- With the Federal Government and the systems requirements it generates as a springboard, the Computers and Systems Integration industries in the National Capital Area have expanded in core and innovative areas, with approximately 7,690 firms now operating in this sector in the region.
- One side of this business is represented by companies focused on large-scale systems design and implementation, largely for the Federal Government
  - While this includes major companies and other large institutions such as **Litton**, **AMS** and **SAIC**, it also includes a multitude of smaller companies which are subcontractors to them, contributing to a multi-tiered industry structure.
- Another element is the more focused players, which meet a demand for expanded Internet capabilities:
  - These are largely software and infrastructure providers, focused on enterprise rather than consumer applications - a key advantage in the current market environment.

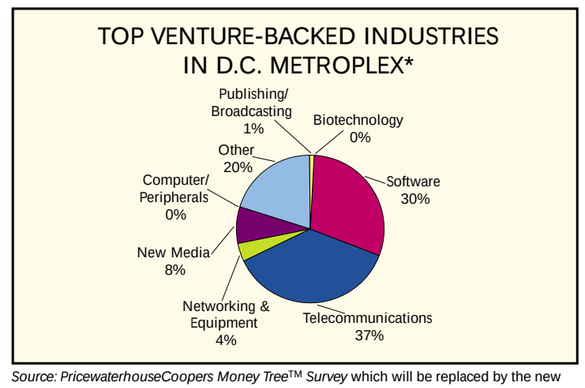


Growth has been fueled in part by a dramatic expansion of IPOs, local venture capital funding, and incubators/accelerators.



Source: PricewaterhouseCoopers Money Tree Survey™

For the first six months of 2000, D.C. Metroplex ranked 5th in venture capital investments among the eighteen regions tracked by the PricewaterhouseCoopers Money Tree Survey. In particular, the National Capital Area is a telecommunications stronghold. In 1999, only Silicon Valley received more venture capital funding for the telecommunications industry.*



Source: PricewaterhouseCoopers Money Tree™ Survey which will be replaced by the new "*PricewaterhouseCoopers Money Tree™ Survey in Partnership with VentureOne.*" All historical data in the Money Tree Survey, including data contained in this report, will be restated with the release of the Q4 2000 results.

In the first nine months of 2000, venture capital investments in the Washington Metroplex area topped $3 billion. That exceeds total funding for all of 1999 by over $1 billion. While Virginia claims over half of local investments, Maryland, and the District of Columbia have slightly increased their share of venture dollars. In the previous New Economy study measuring the first quarter of 1998, 56% of all investments were made in Virginia. That figure has dropped to 51%.*

- Funds raised by IPOs in the local area increased by 120% between 1999 and 2000.
- Incubators and accelerators have formed in the National Capital Area, further supporting this growth:
  - *27 InfoComm incubators are operating in the National Capital Area*
  - *76% of them established since 1998*
  - *10 are in Maryland, 12 in Northern Virginia, and 5 in the District of Columbia*

* In the Money Tree Survey. D.C. Metroplex encompasses the District of Columbia, Maryland, Virginia, and West Virginia.

Comments from InfoComm CEOs in roundtable sessions and individual interviews conducted for the New Economy Study revealed that a strong combination of factors led them to locate their businesses in the National Capital Area:

	PERCENT MENTIONING
PERSONAL CONNECTIONS Many CEOs started out working for the government or other companies in the region and have their roots and networks here.	25%
ACCESS TO CUSTOMERS AND RELATED BUSINESSES The inter-relationships of InfoComm industries lead communications, content, and computer companies to want to be in close proximity to each other.	25%
ACCESS TO HIGH-QUALITY LABOR FORCE The National Capital Area has established a critical mass of well-educated and highly skilled people with experience in key industry sectors.	25%
ATTRACTIVE COSTS OF DOING BUSINESS Those who evaluated this region against other high-tech areas such as Silicon Valley/New York/Boston noted the lower costs of operations in the National Capital Area – especially lower costs for office space and staff, and lower turnover rates.	16%
OVERALL QUALITY OF LIFE Desirable qualities of this region include access to affordable housing, recreational and educational opportunities, and employment opportunities for spouses.	16%
ACCESS TO FEDERAL GOVERNMENT Proximity to the Federal Government is considered extremely important for those building on government content or selling to the government.	12%

These factors combine to provide a unique environment for growth.

When looking in detail at these factors, the high quality of the work force is seen as more of a draw for InfoComm businesses than two years ago.

- *There is a strong base of telecommunications, Internet, biotechnology, and computer companies from which to draw both technical and professional staff.*
  - Telecommunications CEOs emphasized this and noted the additional value of the educational institutions producing "flexible athletes," not just technicians.
  - Biotechnology CEOs were particularly positive about the potential for recruiting from the major research facilities in this region, such as Johns Hopkins and NIH.
- *But the strength of local educational and research institutions is often under-recognized.*
  - CEOs often express concerns that this region's top tier technology universities do not generate spin-off activities as does such institutions "like MIT or Stanford."
  - Yet a wide range of local educational institutions produce highly trained professionals in key technologies.
- *In addition, the National Capital Area has a unique source of local human resources in the staff of Federal Government agencies and institutions like NIH.*
- *There is also an under-appreciated high level of research and development (R&D) spending in the region.*
  - The region's Federal R&D funding exceeds that of California, the largest single state recipient, although the region's total population is less than half of California's.
    - On a total basis, among all States, those in the National Capital Area ranked near the top: Maryland #2 ($8.1 billion), Virginia, #3 ($4.5 billion), D.C. #10 ($2.7 billion).
    - On a per-capita basis, the District ranked #1, Maryland #2, and Virginia #4.
    - Nearly $1.2 billion spent on Federal R&D by local universities in 1999.
  - Maryland's total of $6.4 billion in Federal research conducted in Federal laboratories was #1 among all States and more than twice that of its nearest competitor.
  - **DNA Alley** - *Time Magazine* describes a DNA Alley in Montgomery County, Maryland - the "15 mile stretch of Interstate 270 that runs from Bethesda to Gaithersburg…[now housing] one of the world's largest and smartest collections of genomic firms."
- *Local university presidents and CEOs stressed the need for greater collaboration and affirmation of mutual interest to improve the value derived by both industry and academia in InfoComm developments.*

CEOs also applaud the expansion of the entrepreneurial environment and the resources available for entrepreneurs.

- *During the fall of 2000, networking events for entrepreneurs averaged 125 per month, according to netpreneur.org.*
- *Northern Virginia Technology Council, Indian CEO Council, High Technology Council of Maryland, the D.C. Technology Council, and the Fairfax County Chamber of Commerce are among the organizations sponsoring the greatest number of events.*
- *Outside media are taking notice (Inc. 500, Fortune, national press reporting on the Potomac Index, and AeANet CyberCities reports) and local technology media is growing.*
- *In a January 2001 study on high technology centers, the Brookings Institution noted the strength of the Washington D.C. area as an employment center for the Internet, software, telecommunications and biotechnology industries.*
- *Of the seven top magazines addressing the New Economy in the National Capital Area, four have started within the last two years.*
- *Local general media, such as* The Washington Post, *feature comprehensive coverage of the local InfoComm community.*

LOCAL BUSINESS AND TECHNOLOGY PUBLICATIONS

Journals & Magazines	Web Address	Publisher	Year Started
Washington Business Journal	http://www.bizjournals.com/washington/	Alex Orfinger	1983
Washington Business Forward	http://www.bizforward.com	Jeremy M. Brosowsky	1998
Potomac Tech Journal	http://www.potomactechjournal.com	Yvette Caldwell	2000
Washington Technology	http://www.wtonline.com/	Scott Lewis	1991
Washington Techway	http://www.washtech.com/washtechway/	Cliff Chiet	2000
Baltimore Business Journal	http://www.bizjournals.com/baltimore/	Jim Breiner	1983
Regardies Power	http://www.regardiespower.com/	Renay Regardies	1999

But as the InfoComm Cluster matures, the role of the the Federal Government is being recognized most importantly for its value as a base of business opportunity.

- While other areas such as Silicon Valley have long been touted as "the place" to start a new economy company – having a critical mass of high tech workers, a strong academic base, and solid venture capital interest - the National Capital area has proved to have all of these assets and more.
- The extra value available in the National Capital Area is deep and broad due in part to the heritage and base provided by the presence of the Federal Government.
- Thus, while almost half of those surveyed see the Federal Government as having little direct impact on their business, the other half cite a wide range of benefits that their businesses and the region as a whole derive from the presence of the Federal City. As the New Economy continues to mature, entrepreneurs are increasingly willing to acknowledge the advantages and strengths this provides.

TECHNOLOGY PURCHASES BY THE FEDERAL GOVERNMENT FROM LOCAL FIRMS (WASHINGTON SMSA, NOT INCLUDING BALTIMORE) FOR WORK DONE LOCALLY HAVE GROWN SIGNIFICANTLY:

Technology purchases represent almost 50% of all local Federal Procurement in the Washington SMSA

	1997	1998	1999
Total Federal Procurement in Washington SMSA	$21.7B	$24.7B	$25.7B
Washington SMSA Federal Technology Procurement	$9.9B	$12.2B	$13.5B
Technology - % of Total Local Federal Procurement	45.8%	49.2%	52.5%

Over the period 1990-1999, the Federal Government bought $88.3 billion in technology services and products from Washington area firms, representing 46.8% of total Federal Procurement in the region.

Source: Center for Regional Analysis, GMU

In addition to contracts, the Federal Government provides a range of opportunities and advantages to entrepreneurs starting new businesses. These advantages are critical as overall economic growth is slowing. Comments from our interviews include:

FEDERAL CONTRACTS - DIRECT AND INDIRECT

"The Feds were our angel investors. They were a great source of contracts to the companies we sell to."

— Mike Pollard, CEO, thinkXML

"If it weren't for the U.S. Government, the infrastructure wouldn't be here."

— Pete Snyder, New Media Strategies

"The U.S. Government is the largest customer in the world and has the largest R&D operations in the world."

— Reggie Aggarwal, CEO, Cvent.com

FEDERAL GOVERNMENT AS AN ATTRACTOR FOR STAFF

"Government contracting attracts and produces a trained work force for technology and telecom companies."

— Mark Ein, Founder, Venturehouse Group

GOVERNMENT REPOSITORY OF CONTENT

"The U.S. Government is a fertile source of intellectual capital and government grant dollars."

— Roundtable Participant

ACCESS TO DECISION-MAKERS AND SERVICE PROVIDERS

"Representatives of U.S. and foreign businesses come to call on U.S. regulators (FCC, SEC) and other government officials, and it's easy to arrange meetings with them here."

— Claude Burgio, CEO, SkyOnline

"It's helpful to have access to Hill staff to share understandings about New Economy issues like privacy, tariffs, standards."

— Art Hurtado, CEO, Invertix

"Most companies have representation here and it's possible to exchange and share opinions to make an impact."

— Andrew Czekaj, CEO, Cambridge Asset Advisors

"The Department of Commerce picked us to participate in a technology demonstration center, and the exposure has been great."

— Tim Ogilvie, Chairman, Brivo Systems

In summary, since the initial study of the New Economy, two regional strengths have emerged which were previously lacking — access to start-up support services and access to capital.

In addition, there has been greater recognition of and appreciation for the value, breadth, and depth of the labor force, and quality of life in the region.

Further action is still required, however, to improve regional collaboration and cooperation among the three jurisdictions and between the business and academic communities.

Critical Success Factors for Regional Competitiveness

	Secondary Success Factors	Primary Success Factors
Regional Strengths	◆ Availability of affordable office space ◆ Excellent airports and metro ◆ High quality of life ◆ Access to start-up support services	◆ Entrepreneurial culture and access to strategic partners ◆ Broad/deep core of companies and labor force ◆ Strong local customer base ◆ Access to capital
Regional Weaknesses	◆ Transportation (VA, MD) ◆ Educational and research resources, under recognized	Action Required ◆ Collaboration within the region for infrastructure development ◆ Cooperation among businesses and universities ◆ Cooperation in marketing the image of the region

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