

Catalyzing Innovation Opportunities in Virginia

Growing Innovation Clusters for American Prosperity: National Academies



June 3, 2009

Project Process: Analytical Tasks

Virginia Industry Cluster Analysis

Economic and Innovation Foundations
Benchmarking of Virginia

High-Growth Potential Technologies for Virginia

Best Practices from Successful Technology
Investment Programs

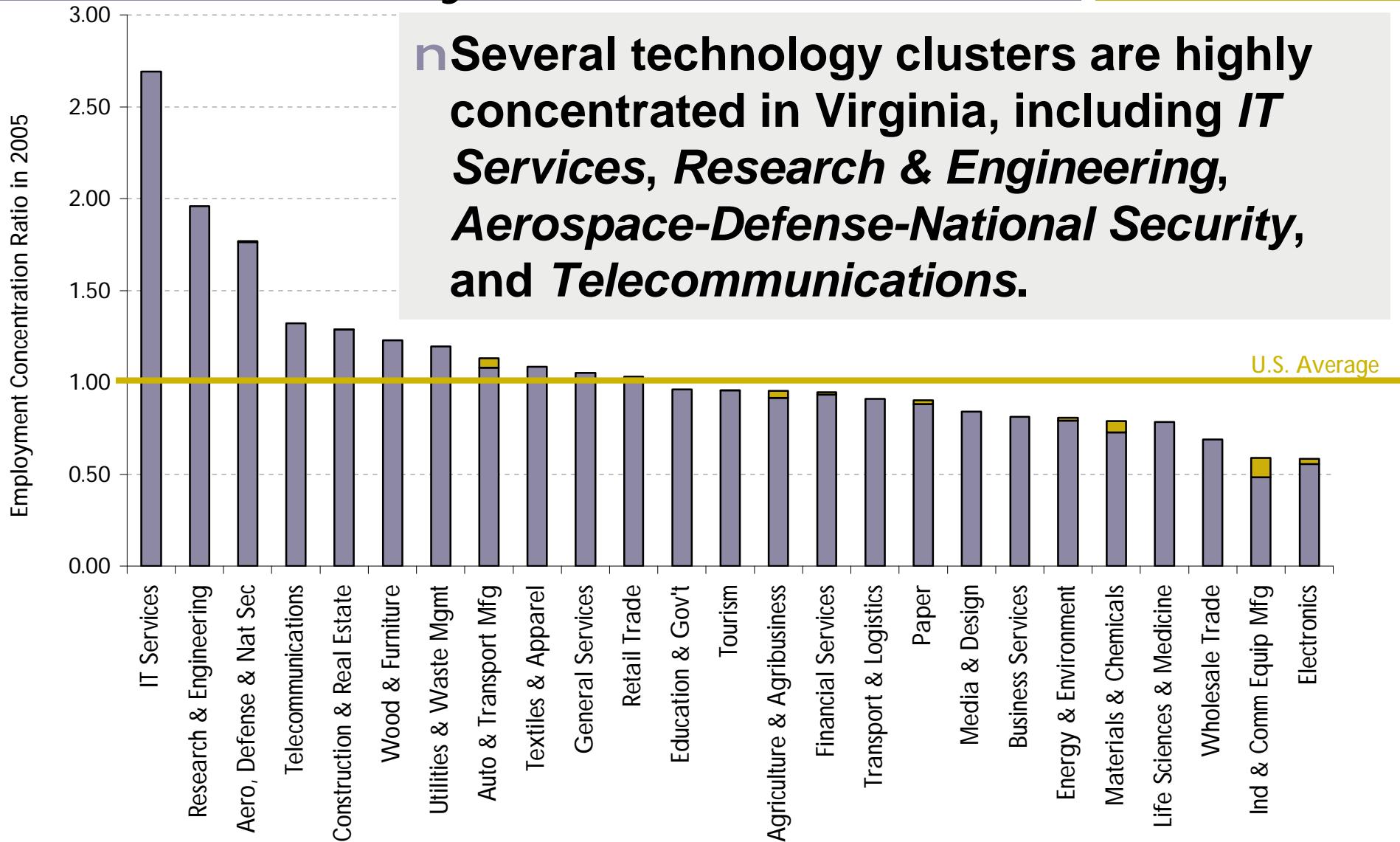
Strategic Inferences for Virginia's Economic
Development

Virginia Industry Cluster Analysis

- **n Like most states, Virginia's economy is dominated by service industries:**
 - ü ***Education & Government***
 - ü ***Retail Trade***
 - ü ***Construction & Real Estate***
 - ü ***Tourism***
 - ü ***General & Business Services.***
- **Several technology and knowledge-based sectors stand out for their high levels of employment:**
 - ü ***Life Sciences & Medicine* (336,535 workers)**
 - ü ***Research & Engineering Services* (161,633 workers)**
 - ü ***IT Services* (140,016 workers)**

Employment Concentration Ratio By Cluster

State-Level
Analysis



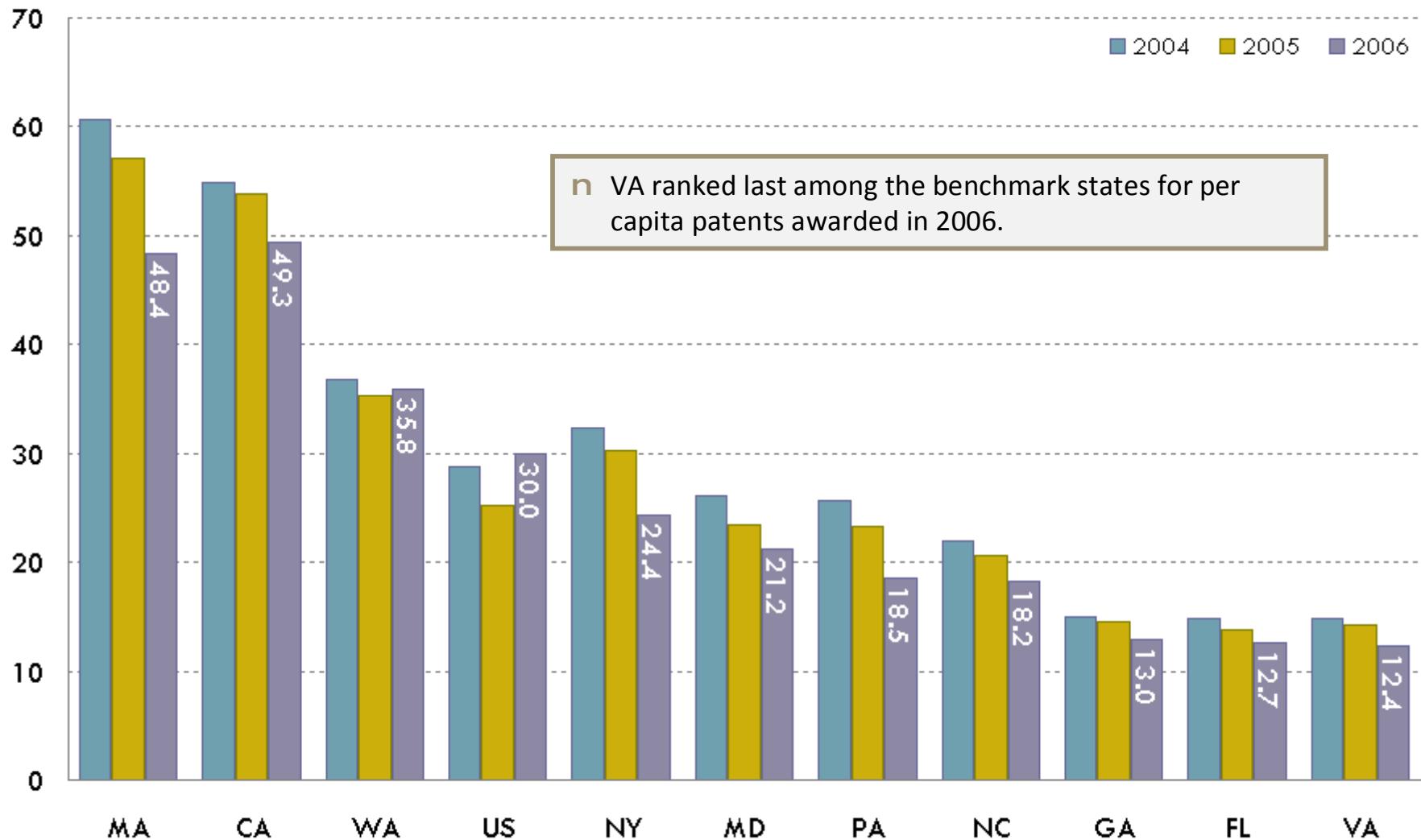
The Employment Concentration Ratio is the industry cluster's share of total employment in the state versus its share in the country. Clusters with a ratio greater than 1.0 are more concentrated in Virginia than in the United States.

Benchmarking Virginia's Innovation Foundations			Summary Results
	Weakness	Average	Strength
Financial Resources	<div>Small business loans (\$)</div> <div>VC investment (\$)</div>		<div>STTR awards (\$)</div> <div>SBIR awards (\$)</div>
Human Resources		<div>Advanced S&E degrees</div>	<div>NAEP Science & Math Scores</div> <div>S&E degrees</div> <div>Labor force growth</div>
Innovation Resources	<div>Patents</div> <div>Academic R&D expenditures (\$)</div> <div>Industrial R&D expenditures (\$)</div>		<div>Federal R&D performance (\$)</div> <div>Academic R&D productivity</div>
Innovation Economy Outcomes	<div>Business Start-Ups</div> <div>Entrepreneurs</div> <div>Exports (\$)</div>	<div>R&D to GSP (\$ ratio)</div>	<div>Tech Fast 500 companies</div> <div>Real GSP growth</div>

Innovation Resources

Patents
per Capita

Patents Issued per 100,000 Population, 2004, 2005, 2006



Source: US Patent & Trademark Office and US Census Bureau

Innovation Economy Outcomes

Entrepreneurs
Per Capita

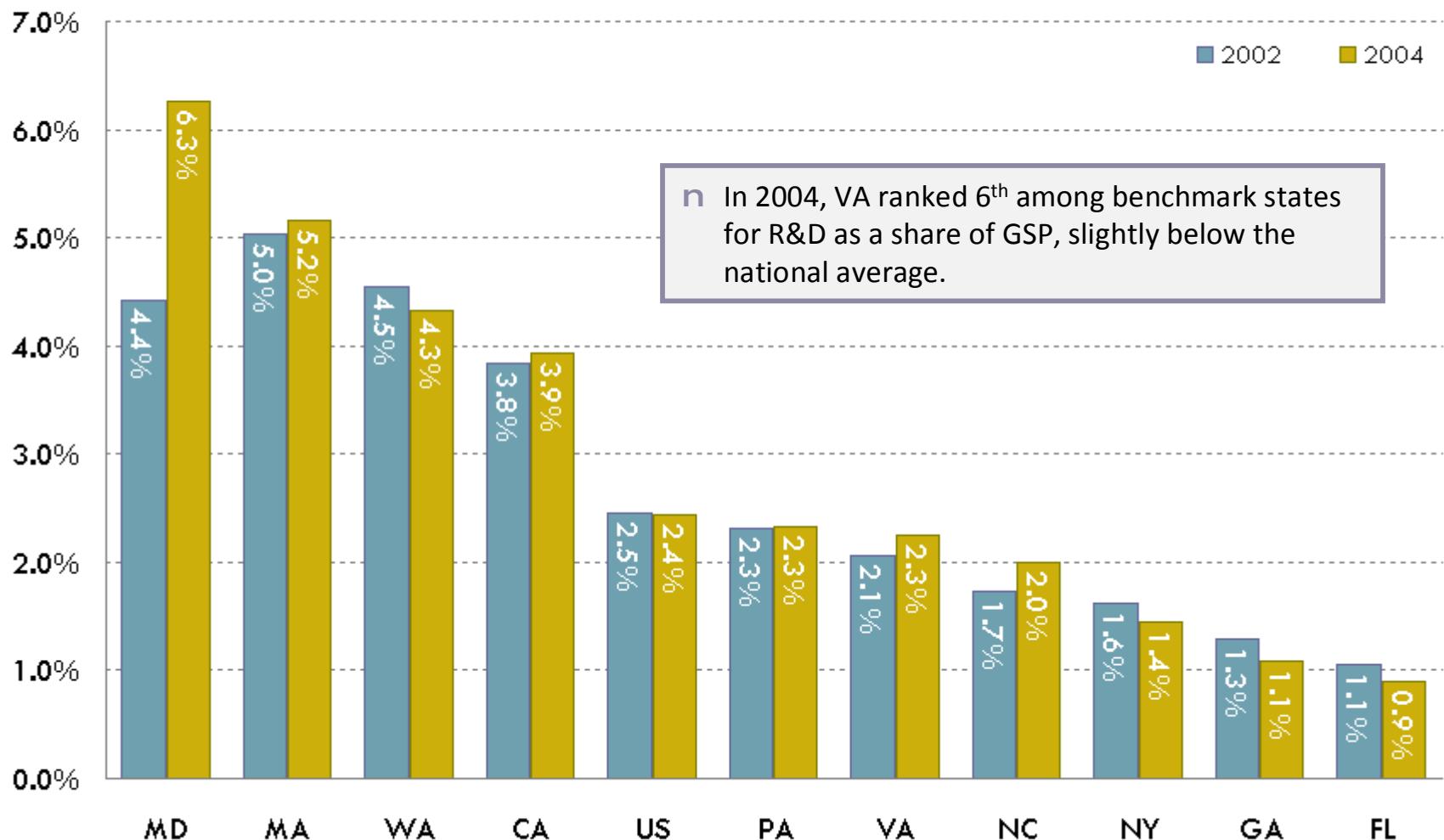
Number of Entrepreneurs per 100,000 Population
in VA and Select States, 2005



Innovation Economy Outcomes

R&D Share of GSP

Total R&D Expenditures as a Share of GSP in VA and Select States,
2002 and 2004

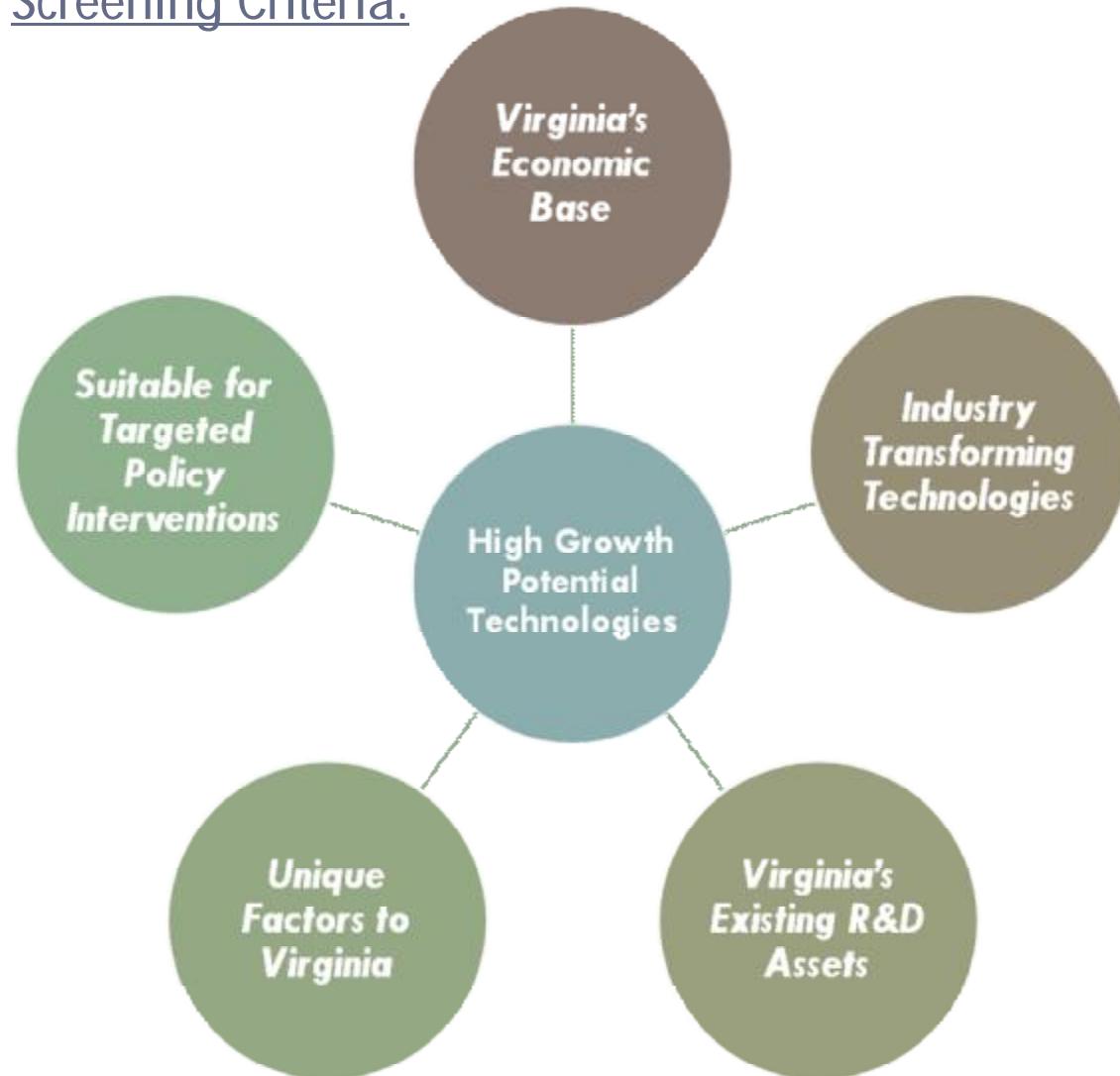


Source: National Science Foundation and US Bureau of Economic Analysis

High Growth Potential Technologies for VA

Resources for R&D and technology development are limited. Determining where scarce resources should be deployed is a critically important task.

Screening Criteria:

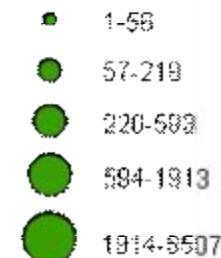


High Growth Potential Technologies

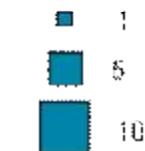
Technology-Based Industry Cluster	High Growth Potential Technologies
Biomedical Sciences and Health Care	Point of Care Diagnostics Computational Technologies
Information Technology Services	Health IT Cybersecurity
Chemicals and Materials	Nanomaterials Biopolymers
Clean Energy and Environment	Fuel Cells and Distributed Hydrogen Carbon Capture and Storage
Transportation and Logistics	Radio Frequency Identification “Smart” Roads

Biomedical Sciences and Health Care

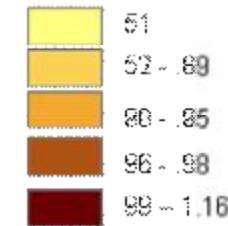
Publications



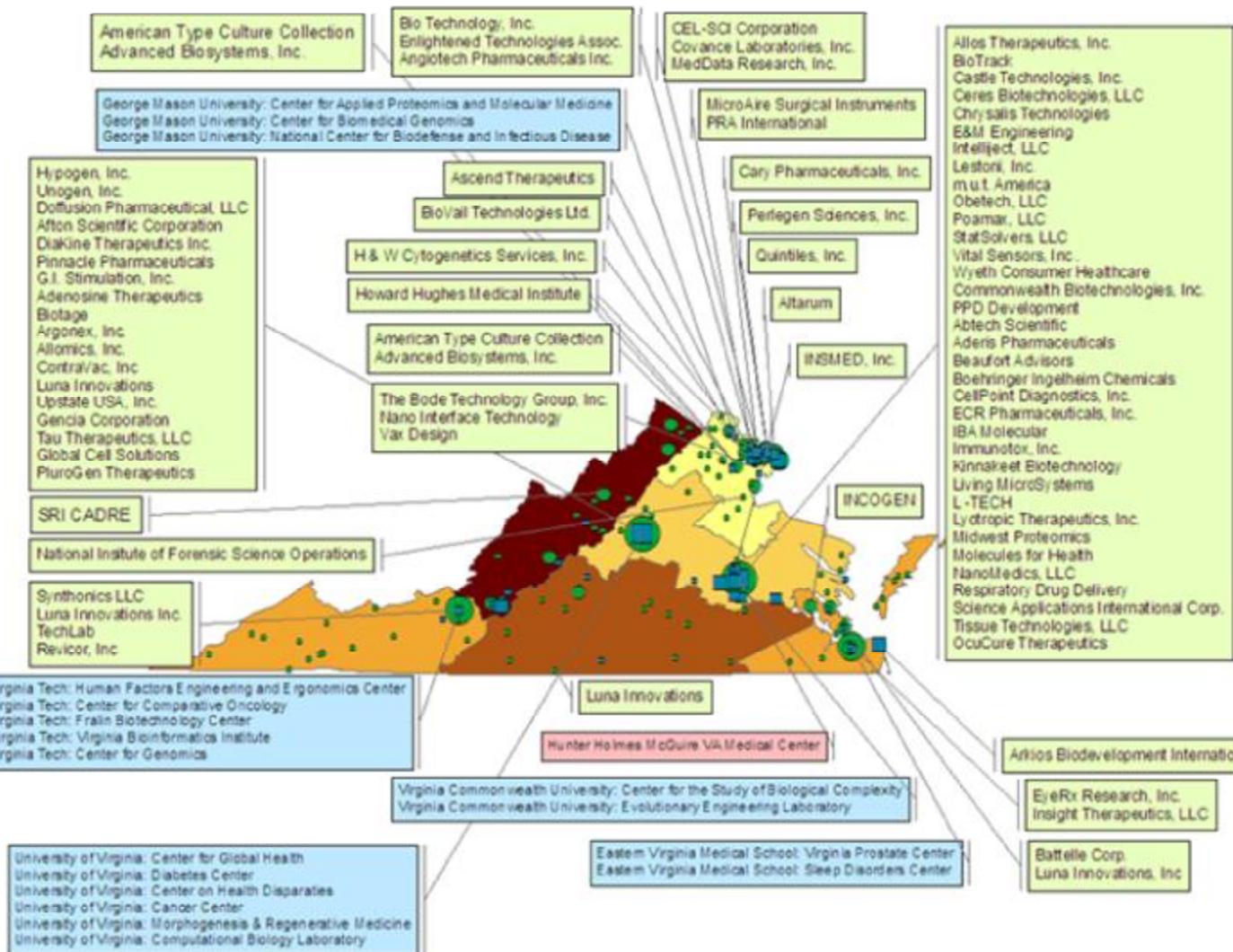
Patents



Employment Concentration



Research Facility



Information Technology Asset Map

Publications

- 1 - 22
- 23 - 76
- 77 - 199
- 200 - 289
- 264 - 974

C3I Research and Development Center

DARPA
Office of Naval Research (ONR)
Air Force Office of Scientific Research (AFOSR)

GBS Laboratories LLC

George Mason University: Center for Distributed and Intelligent Computation
George Mason University: Center for Computational Fluid Dynamics

Patents

- 1
- 10
- 100

University of Virginia: Center for Risk Management of Engineering Systems
University of Virginia: Center for the Management of Information Technology
University of Virginia: Center for Grid Research

Rincon Research Corp
Sophia Wireless Inc

ioWave Inc

Cholabris, LLC

Employment Concentration

- .22
- 23 - .42
- .43 - .60
- .81-1.17
- 1.18-6.38

Virginia Tech: Center for Wireless Telecommunications
Virginia Tech: Center for Human Computer Interactions

General Dynamics Electronic Systems
SAIC
Echostorm

Old Dominion University: The Virginia Modeling, Analysis and Simulation Center (VMASC)

The College of William & Mary: SciClone Cluster

Research Facility

- University
- Private
- Government

Energy and Environment Asset Map

Publications

- 1 - 21
- 22 - 88
- 99 - 340
- 341 - 802
- 803 - 1388

Patents

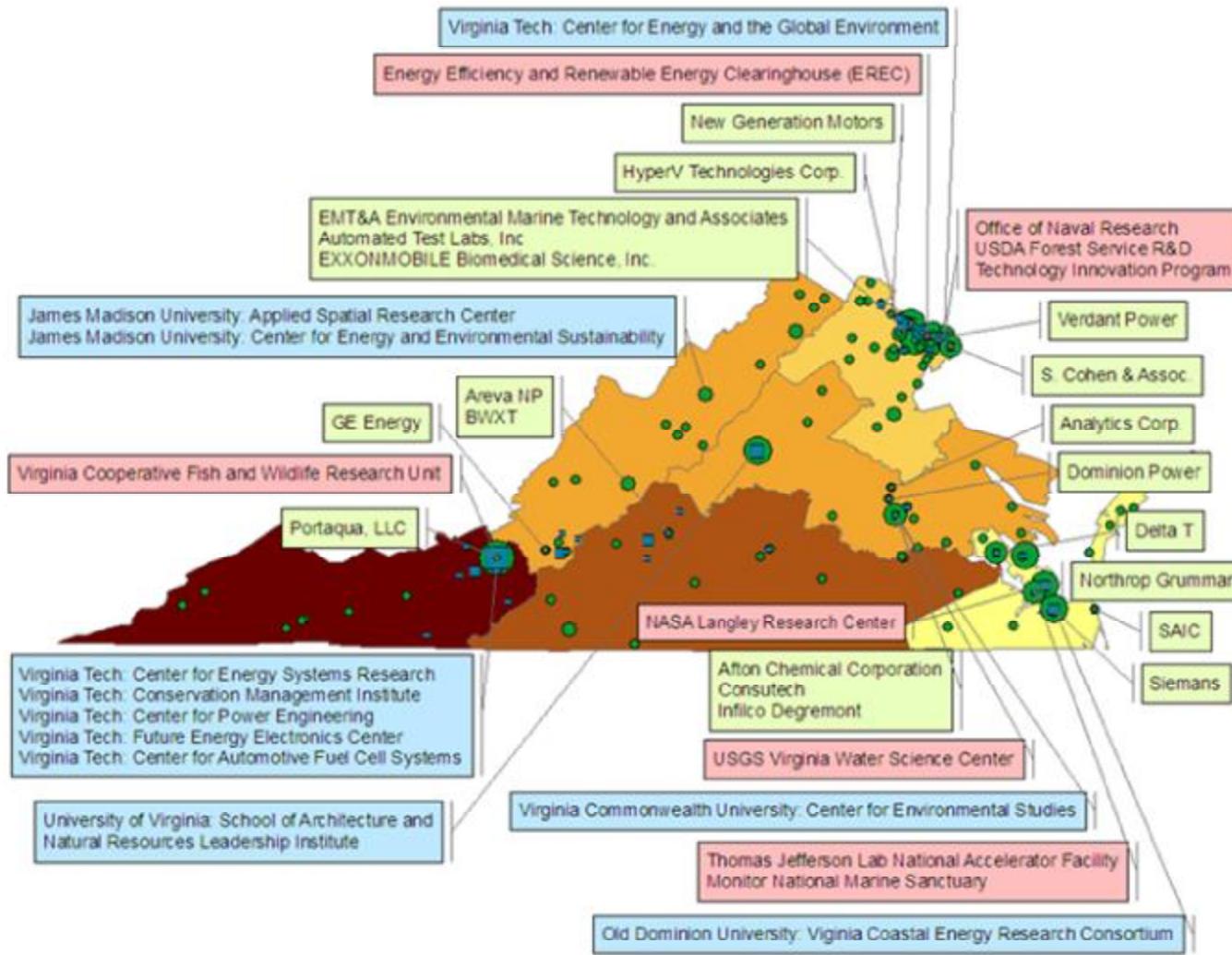
- 1
- 5
- 10

Employment Concentration

- .51
- .52 - .57
- .58 - .87
- .87 - 1.01
- 1.02 - 3.21

Research Facility

- University
- Private
- Government



Case Studies

n Enhancing Research Excellence at Universities

- ü Georgia Research Alliance
- ü University of Texas Eminent Scholars Program
- ü Ohio Third Frontier (Wright Mega-Centers)

n Enhancing Collaboration Across Sectors/Disciplines

- ü NY Centers for Advanced Technology
- ü MD Industrial Partnerships Program
- ü CA Industry-University Coop. Research Program
- ü NC Research Triangle

n Enhancing Entrepreneurship and Access to Capital

- ü MD Venture Fund
- ü GA Advanced Technology Development Fund
- ü PA Ben Franklin Technology Partners

Lessons Learned



- Highlight collaboration as a central component of all programs.
- Utilize industry and technology experts as key players in decision-making.
- Seek to leverage multiple sources of funding.
- Incorporate key economic development objectives and milestones.
- Introduce and maintain strong systems of accountability.
- Include flexibility to allow for corrections and to support longevity.
- Measure innovation progress.

Summary Assessment



Global and national economic realities challenge forward-looking states to expand industries driven by technology and innovation.



Many of Virginia's high-tech industries serve the Federal market. While important, this narrow focus limits the state's diversity and overall ability to provide high value jobs.



Virginia possesses important assets and initiatives related to innovation, but the Commonwealth has not reached its potential.



An initiative to stimulate innovation and catalyze collaboration among industries, universities, laboratories, etc., can transform Virginia into a model innovation economy.

Strategic Focuses for Virginia

Enhancing Research
Excellence at
Universities

Engaging Private Sector
Collaboration Across
Sectors And Disciplines

**Catalyzing
Innovation**

Nurturing
Entrepreneurship and
Access to Capital

Making Smart
Technology Choices

Recommended Approach for Virginia

n Overall Strategic Goal:

Virginia will become a Model Innovation Economy

- *Crafted and directed by business, government and university communities*

n Implementation Mechanism:

Virginia Innovation Alliance (VIA)

- *Public/Private Partnership*
- *A structure to power collaboration*
- *Catalyzes Virginia's assets, addresses liabilities*
- *Introduces a seamless innovation value chain*

VIA Principles and Intent

- **n** Catalyze technology and innovation activities and outcomes
- **n** Leverage additional, sustained private and public resources for R&D
- **n** Gain political support that transcends administrations
- **n** Stimulate increased collaboration among public and private stakeholders
- **n** Support and strengthen existing technology centers of excellence



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Materials and Chemicals Asset Map

Publications

- 1 - 23
- 23 - 88
- 88 - 386
- 386 - 898
- 898 - 1478

George Mason University: Computational Materials Science Center (CMaSC)

Rubbermaid
O'Sullivan Films, Inc.
Trex Company

SYNTERIALS, Inc.

4Wave, Inc.

Materials Modification

James Madison University: Center for Materials Science

Patents

- 1
- 5
- 10

Virginia Tech: Macromolecules and Interfaces Institute
Virginia Tech: Center for Geotechnical Composite Systems
Virginia Tech: Sustainable Engineered Materials Institute
Virginia Tech: Center for Self Assembled Nanostructures and Devices
Virginia Tech: Center for Intelligent Materials Systems and Structures
Virginia Tech: Wood-Based Composites Center

Wako Chemicals USA
DuPont
Tredegar Corporation
NuSil, LLC

Employment Concentration

- .17
- .18 - .40
- .50 - .80
- .81 - 1.93
- 1.94 - 2.82

MCT, Inc.
Wessex Inc.
Tempur-Pedic
Nanasonic, Inc.
Spherosils, LLC

Degussa Goldschmidt Chem

Carlisle Motion Control

Filtrona Fibertec
Honeywell

Applied Research Center

NASA Langley Research Center

Research Facility

- University
- Private
- Government

University of Virginia: Institute for Nanoscale & Quantum Scientific
and Technological Advanced Research (nanoSTAR)
University of Virginia: Center for Electrochemical Science and Engineering (CISE)

Transportation and Logistics Asset Map

Publications

- 1 - 6
- 8 - 27
- 28 - 44
- 45 - 105
- 106 - 323

Center for Advanced Aviation System Development (CAASD)
Turner-Fairbank Highway Research Center

Patents

- 1
- 3
- 5

George Mason University: Center for Air Transportation Systems Research
George Mason University: National ITS Implementation Research Center

Logistics Management Institute

Virginia Commonwealth University: Transportation Safety Training Center

University of Virginia: Center for Transportation Studies

Employment Concentration

- .66
- .87 - .73
- .80 - 1.05
- 1.08 - 1.10
- 1.11 - 1.47

Virginia Tech: Center for Turbomachinery Propulsion & Research
Virginia Tech: Advanced Vehicle Dynamics Laboratory
Virginia Tech: Transportation Institute

Old Dominion University: Center for Advanced Ship Repair and Maintenance

Research Facility

- University
- Private
- Government