

# Assessment of Virginia's Research Assets:

## *Strategic Directions to Advance Innovation-Led Growth Across the Commonwealth*

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# Project Purpose, Objectives and Approach

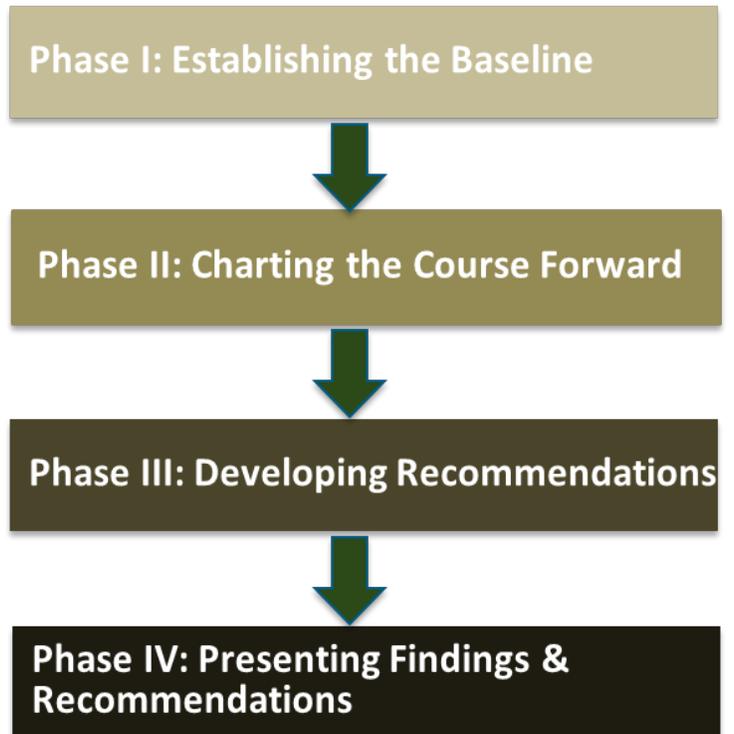
## Legislative Charge for Study:

Develop a cohesive and comprehensive framework through which to encourage collaboration between the Commonwealth's institutions of higher education, private sector industries and economic development entities in order to focus on the complete life cycle of research, development and commercialization.

*The goals of study are to:*

- i. Evaluate Virginia's current capabilities in the commercialization of its academic R&D*
- ii. Assess Virginia's future opportunities and capacities for commercializing the results of its academic R&D*
- iii. Develop recommendations regarding where and how the Commonwealth should direct its resources to accomplish VRIC's mandate*

## **Four phase effort set out by the RFP:**



# Key Findings

Virginia has a sizable base of innovation-led assets, with core technology competencies supporting strategic growth opportunity areas.

But Virginia has not been performing well in innovation-led development through the recent period of economic growth.

Business as usual will not work. Underlying challenges requires Virginia to find a new way forward.

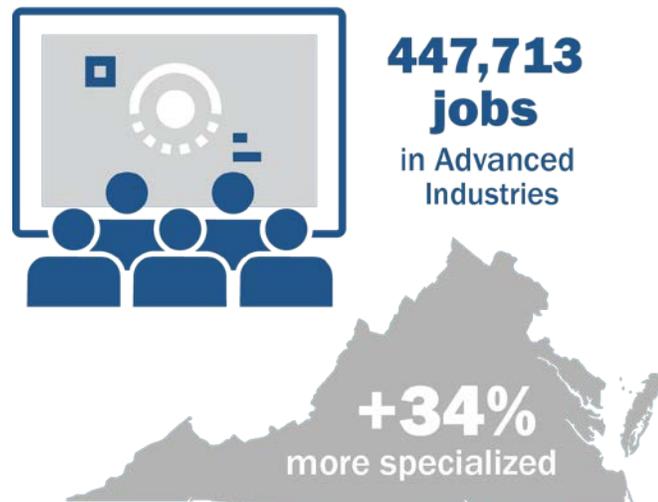
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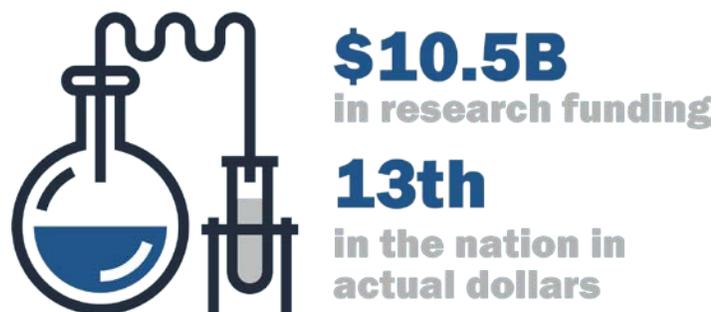
- Addressing low levels and lagging growth of industry research and development to focus on commercializing innovations, with focus on strategic growth opportunity areas
- Strengthening university capacities in technology transfer, commercialization and industry partnerships
- Bridging the disconnect between university research and Virginia-based company innovation
- Shoring up Virginia's entrepreneurial development system to generate more shots on goal and high-growth companies

# Virginia has a sizable base of innovation-led assets

- Advanced Industry Jobs in 2016:



- Total Research Funding From Industry, Universities and Federal Labs in 2015:



Virginia ranks 21<sup>st</sup> in research funding per state GDP

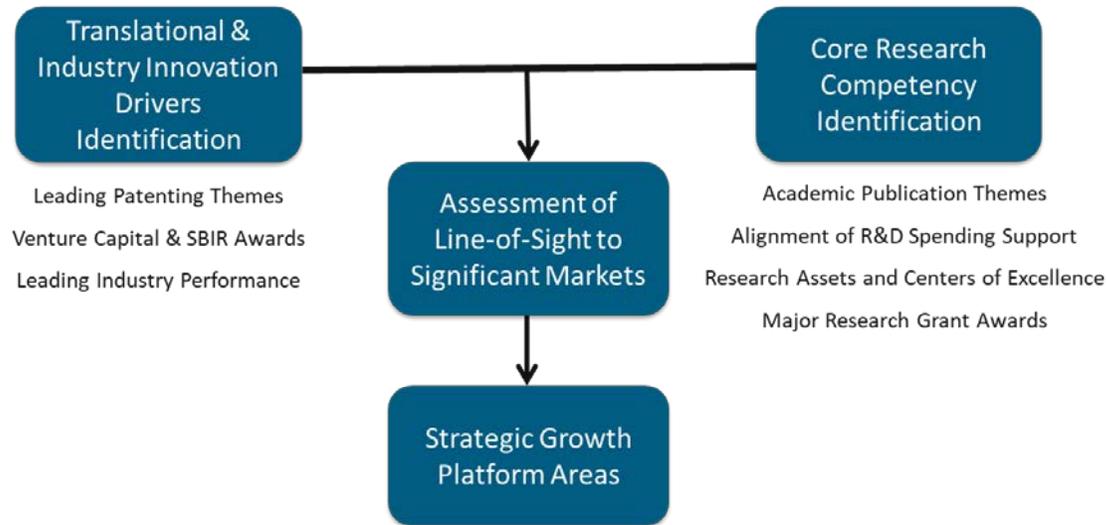
- Entrepreneurial Energy – 2016 Venture Capital Investments:



Virginia ranks 4<sup>th</sup> in venture capital per state GDP

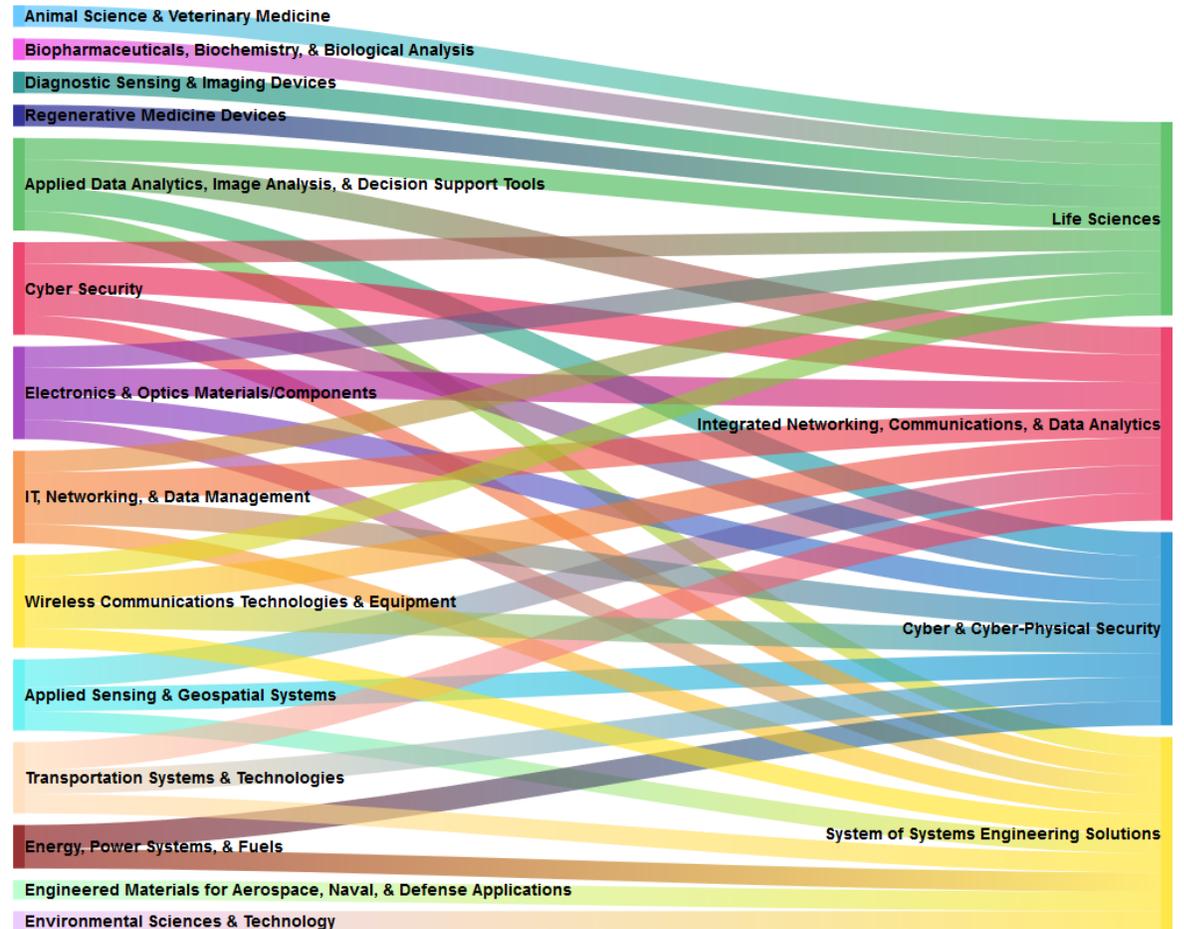
# Significant Strategic Growth Opportunities Identified from Virginia's Sizable Research Assets

## Line-of-Sight Assessment



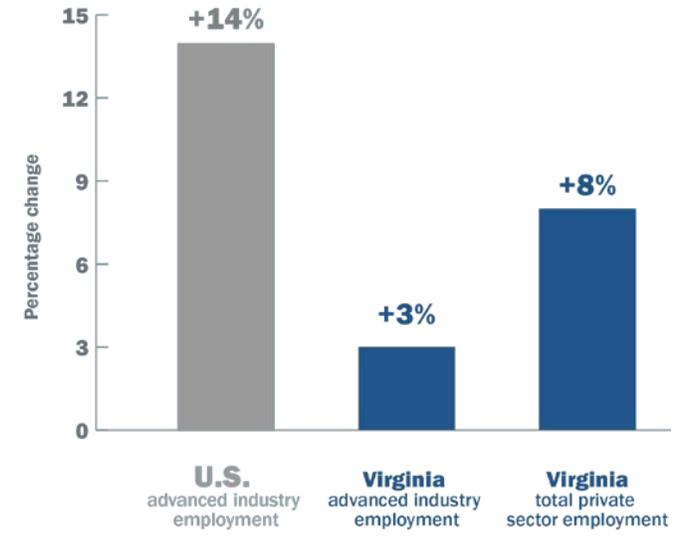
Areas where Virginia **has real, differentiating potential**

## Identified 4 Strategic Growth Opportunities that Leverage Multiple Core Competencies Found in Virginia

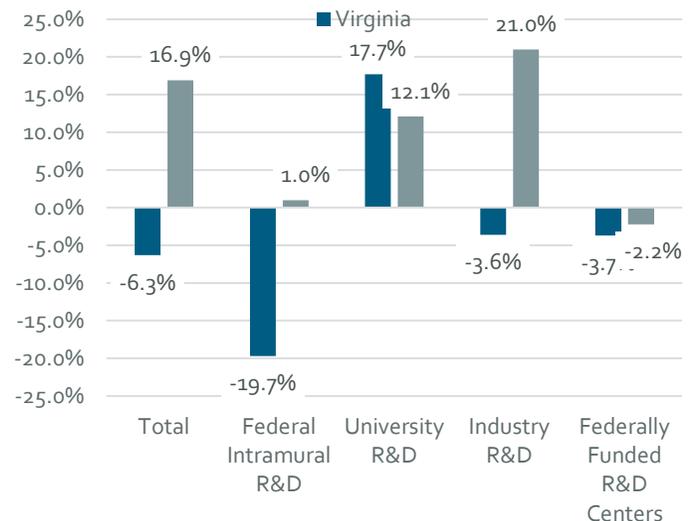


But Virginia has not been performing well in innovation-led development since 2010 economic recovery

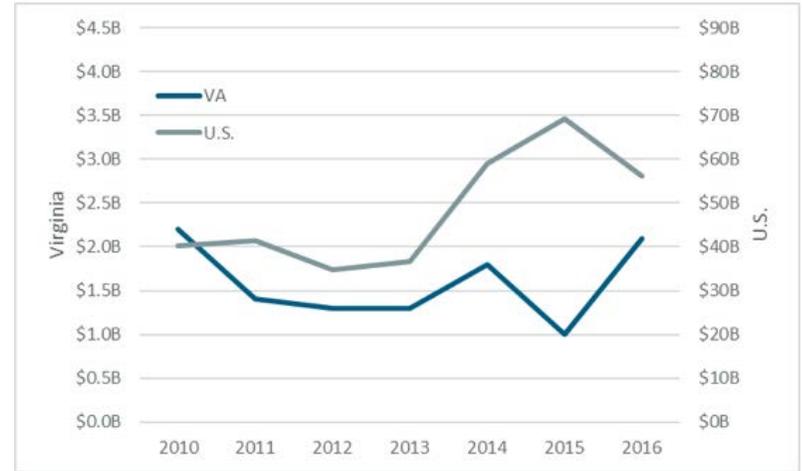
• Lagging Growth in Advanced Industry Jobs from 2010-2016:



• Declining Total Research Funding, 2010-2015:



• Venture Capital Growth Off Pace, 2010-2016

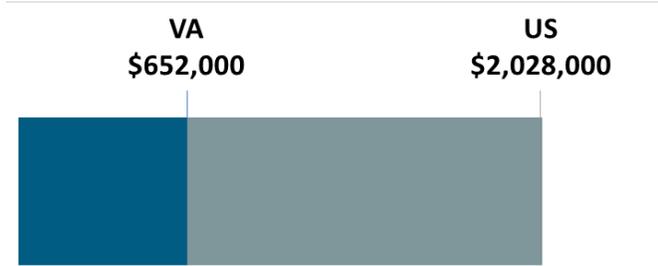


**Challenge:**  
Addressing low levels and lagging growth of industry research and development to focus on commercializing innovations, with focus on strategic growth opportunity areas

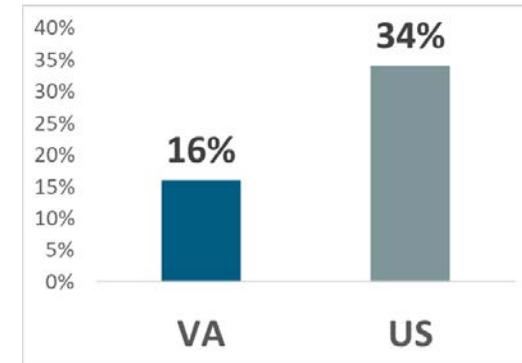
## Situational Assessment:

- Decline in industry research and development in Virginia not simply a reflection of strong dependency on federal R&D contracts, but weakness in company funding of R&D leading to the commercialization of new products and processes

Virginia stands at 1/3<sup>rd</sup> national level company-funded industry R&D in 2015 (per \$1 billion GDP):



Virginia lagging nation in growth of company-funded industry R&D, 2010-2015:



## Strategic Objectives:

- Raise industry R&D activities in commercializing technologies
- Target the four strategic growth opportunities identified through the line-of-sight assessment in Virginia
- Leverage and enhance translational research capacities of universities and federal laboratories to support company-funded research and development activities

# Challenge: Strengthening university capacities in technology transfer, commercialization and industry partnerships

## Situational Assessment: Active Efforts Underway

- Policies at Virginia universities appear fairly consistent with national best practices in terms of how to handle intellectual property, conflict of interest and faculty incentives
- Active technology transfer efforts found across universities, generally measuring up to national averages in key measures for major research universities but some areas lagging
- Plus, recent years have shown continued improvements in many measures of technology transfer activity.

Technology Transfer Metrics for Virginia's Three Largest Research Universities Reporting to AUTM Compared to National Average of All Universities Reporting, Average 2010-2016, Per \$10 million of University Research

Metric (Per \$10 million of university research)	Virginia Three Largest Research Universities	Average for All U.S. Universities Reporting to AUTM
Disclosures	4.41 (3,401 total)	3.72
Patents Issued	0.66 (508)	0.92
Licenses Issued	1.11 (854)	1.04
Gross License Income	\$91,557. (\$70.6 m)	\$351,546
Start-ups	0.13 (101 total)	0.14

### Industry interest from interviews:

- Creating more effective and business-friendly approaches shared across all universities in Virginia to reduce barriers
- Prioritize value creation for Virginia's economic development over revenue maximization

**Challenge:  
Strengthening  
university  
capacities in  
technology  
transfer,  
commercialization  
and industry  
partnerships**

**Situational Assessment: Room for Improvement**

**Assessment of Technology Transfer and Commercialization Policies and Practices:**

- 34 recommendations for improving technology transfer and commercialization, with its main areas of focus on advancing translational research and commercialization practices.
  - Providing more technical and market expertise input into how inventions are assessed before patent decisions are made,
  - Undertaking more invention lead prospecting with proven entrepreneurs walking the halls
  - Increasing the access to proof-of-concept projects for de-risking university technologies
  - Creating more streamlined templates and transparency in deal-terms
  - Better connecting with entrepreneurs, venture investors and other stakeholders as the commercialization process unfolds and new startups are formed.

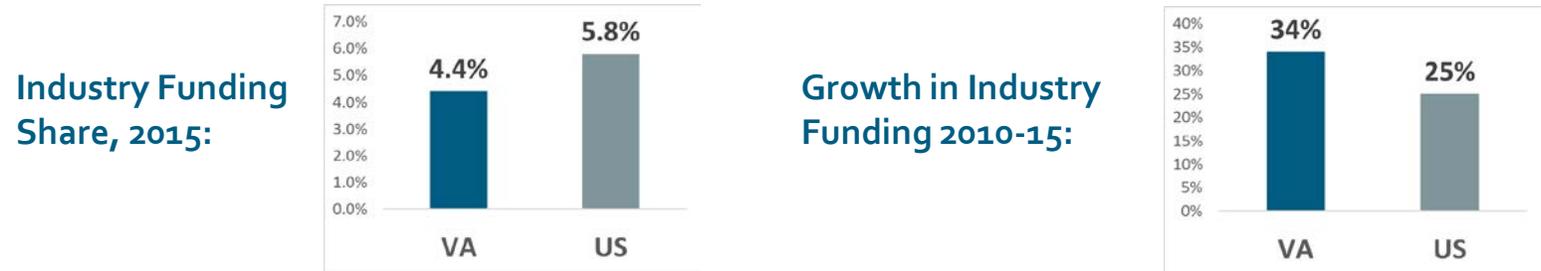
**Strategic Objectives:**

- Promote goal of “value creation” that maximizes efforts to start-up companies, supports growth of existing companies, and attracts outside companies
- Increase funding for de-risking university technologies linked with industry mentored processes
- Maximize the wide-ranging and significant opportunities for increased collaborations in technology transfer practices and resources across Virginia’s universities

# Challenge: Bridging the disconnect between university research and Virginia-based company innovation

## Situational Assessment:

- Lower level of industry funding for university research, but recent growth shows promise:



- A closer examination finds lack of close relationships with Virginia industry in technology transfer and commercialization
  - In university patents developed with industry funding in FY 2017, 35 out of 40 patents involved companies from out-of-state.
  - In citations of university patents, 303 out of 327 industry citations of Virginia university patents were by industry inventors located outside of Virginia.
  - Similarly, for Virginia-based federal laboratories/agencies, 417 industry citations out of 466 were by industry inventors located outside of Virginia.
  - In licensing of university patents, 108 out of 137 licenses issued in FY 2017 going to out-of-state companies.

## Strategic Objectives:

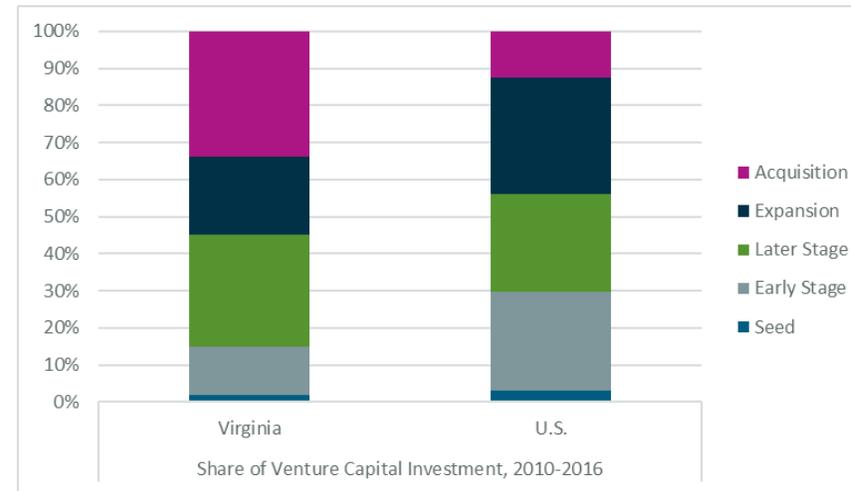
- Facilitate pro-active outreach and high touch, customer service to Virginia companies of university research capacities and technologies.
- Incentivize industry-university applied research projects.

# Challenge: Shoring up Virginia's entrepreneurial development system to generate more shots on goal and high-growth companies

## Situational Assessment:

- The number of companies funded in Virginia receiving formal venture capital has remained relatively flat.
  - The 2010-2016 average of 76 companies had a range from a high of 87 in 2012 and a low of 70 in 2013.
- One of the biggest differences in Virginia from the nation is the low share of venture investment going into early stage rounds of funding.

Venture Capital Investments by Investment Stage, Virginia and U.S., over 2010-2016 period



## Strategic Objectives:

- Recognize entrepreneurial development is a very localized phenomenon, where *local* research and development (R&D) know-how and entrepreneurial culture needs to come together for success.
- Enable regions to have access to key tools – entrepreneurial support services and locally-based seed capital funds – but allow local stakeholders to have key role in governance and oversight.

# Recommended Action Plan Being Considered by VRIC

## Strategic Priorities

Strategy 1: Pursue strategic growth opportunity areas to catalyze stronger advanced industry growth

Strategy 2: Strengthen university technology transfer and commercialization capacity

Strategy 3: Bridge the disconnect between university research and Virginia-based company innovation

Strategy 4: Strengthen Virginia's regionally-based innovation capacities



## Proposed Actions

- **8 Baseline actions** for VRIC to consider in use of current and proposed VRIF resources in 2019-2020 biennium
- **4 Enhanced actions** for the Commonwealth to consider in advancing innovation-led development

**What distinguishes VRIF efforts from other statewide innovation efforts is its focus on:**

- *Raising university translational research and commercialization capacities, connecting it more systematically with market-driven processes and focusing it on value creation for economic development in the Commonwealth.*
- *Focusing on industry and university research collaborations across translational research, applied research, and technology transfer and commercialization.*



## **Innovating Tomorrow's Economic Landscape**

TEconomy Partners is a global leader in research, analysis and strategy for innovation-based economic development. Today we're helping nations, states, regions, universities, and industries blueprint their future and translate knowledge into prosperity.