# Investments at Work:

## Academic & Industry Research Partnerships

November 16, 2016

# Research – Current and Future Direction

- Various initiatives were aligned to foster economic development, jobs, and regional strategies during 2016:
  - GO Virginia
  - Higher Education Research Initiative
  - Virginia Biosciences Health Research Corp.
  - Innovation and Entrepreneurship Investment Authority
  - Global Genomics and Bioinformatics Research Institute (Inova/Universities)
- Initiatives focused on common themes:
  - Innovation
  - Collaboration/Partnerships
  - Commercialization
  - Virginia industries positioned for growth

Virginia Biosciences Health Research Corporation

# Research Efforts of the Past Weren't Sustained

- When the Finance Committee last visited Blacksburg in November 2007, a topic of focus at that meeting was leveraging state investments in university research partnerships.
  - Annual meeting following the successful funding of 2007 Commonwealth Research Initiative which provided $76.3 million for higher education led R&D investment.
- As GF spending was reduced in the Great Recession, dedicated funding for these activities was not sustained.
  - Since then, investments in research partnerships have often been sector specific (*i.e.* unmanned systems) and largely uncoordinated, or
  - They have been university specific (cancer research, bio, brain disorders, etc.).
- Virginia's research universities have continued to lead the way in identifying opportunities for industry partnerships for sponsored research. Over time these Commonwealth investments have lead to:
  - new areas of growth,
  - the development of jobs that are a part of the "New Economy," and
  - moving Virginia to the forefront of the development of these areas of expertise.

# 2016 Research & Economic Development Initiatives

## Biennial GF (in millions)

| Agency/Item | Initiative | GF $ |
|---|---|---|
| HE Research Init. – VA Research Investment Fund | GF incentive for high-performing researchers, **plus** $57.5 million in bond funding for research equipment and lab renovations. Virginia Research Investment Committee & Fund (VRIF) established (HB 1343). | $22.0 |
| Other HE Research | University of Virginia – Focused Ultrasound<br>Virginia Commonwealth University – Cancer Research | $4.0<br>$6.0 |
| Central Accounts | Funding for partnerships between higher education institutions (GMU, ODU, UVA, VCU, VT and CWM) and the Global Genomics and Bioinformatics Research Institute (INOVA).<br>These partnerships are also able to access $20.0 million of the VCBA bonds listed above for the renovation of facilities or laboratory equipment. | $8.0 |
| Cyber Security Init. | Cyber range, cyber public serv. scholarships, & vet. cyber pathway. | $5.8 |
| DHCD | Virginia Growth and Opportunity Fund (GO Virginia) | $35.5 |
| Ec. Development Incentive Payments | Virginia Biosciences Health Research Corporation (VBHRC) – contract with private entities, foundations, and governmental sources to capture and perform research in biosciences and promote biosciences tools. | $7.5 |
| Jefferson Lab | Funding to compete for the US DOE electron ion collider project | $2.4 |
| Tax Credits | Increased cap and expanded eligibility on existing R&D and Angel Investor Tax Credits. | $43.0 |

# Research Commercialization Remains Generally Uncoordinated

- Multiple entities have been established in an effort to provide public investment in research commercialization across a wide swath of industry segments, including:
  - Autonomous Systems
  - Biosciences
  - Cybersecurity
  - Data Analytics
  - Energy

Virginia Biosciences Health Research Corporation

GO VIRGINIA

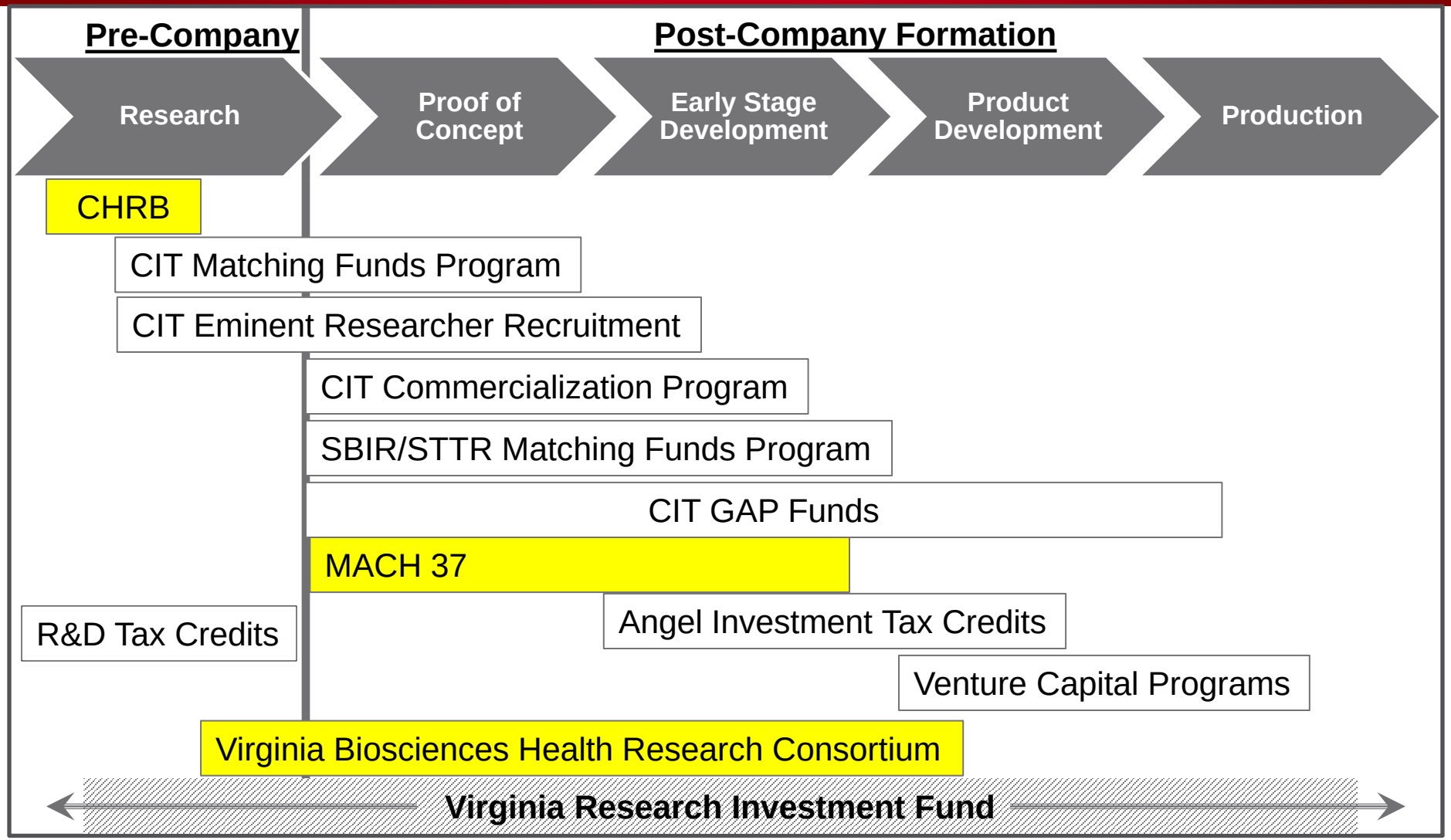
CIT CENTER FOR INNOVATIVE TECHNOLOGY

Commonwealth Health Research Board

- The Virginia Research Investment Committee (VRIC) will oversee funding provided under the Higher Education Research Initiative (HERI) in a process established under Chapter 775 of the 2016 Acts of Assembly (HB 1343) and budget language.
  - This Committee could provide additional guidance to other funding entities and mechanisms in the future.

ADVANCING VIRGINIA THROUGH HIGHER EDUCATION SCHEV

# Multiple State Funding Programs Along the Innovation Continuum




Sector Specific

# Virginia Research Alliance May Improve Collaboration and Direction

- Formed in 2016, the partnership of seven universities focuses on:
  - Innovation-oriented academic scientists and engineers.
  - Shared research infrastructure for use by university and industry partners.
  - Translating research outcomes into products.
- Two areas of focus have been chosen and recommended to VRIC: Cyber and Neuroscience.

# Virginia Tech is a Leader in Many Areas of Research

- **Neuroscience** (includes research in brain disorders and addiction):
  - Partnering with the Commonwealth to create Virginia Tech Carilion Health Sciences and Technology Campus in the Roanoke Innovation Corridor.
  - Additional investments:
    - A new $67 million building that doubles the size of the Virginia Tech Carilion Research Institute.
    - Tech plans to invest $100 million in health sciences and technology by 2025.
  - Partnerships will launch business endeavors, create high-paying jobs, attract top-notch clinicians and faculty and improve the health of people.

- **Unmanned Systems**:
  - More than drone deliveries of burritos, Virginia Tech's leadership in the Mid-Atlantic Aviation Partnership and partnership with Project Wing (Google X) paves the way for the development of unmanned aerial vehicles for commercial use (VT is a leader in all types of unmanned systems).
  - These efforts will create jobs and diversify the Commonwealth's private-sector portfolio.

# Virginia Tech is a Leader in Many Areas of Research

- **Agriculture**:
  - Food chemistry and food sensory research to improve the quality consumer products.
  - Significant public-private partnerships in this area including fermentation sciences.

- **Data Analytics**:
  - In the Biocomplexity Institute, researchers are developing novel analytical and decision-support tools that allow epidemiologists and public health experts to map the movement of a virus through populations.
    - An example is the study of the movement of the Zika virus through South American and North American populations.
  - Ability to analyze social data such as human mobility to address critical global-scale public health concerns.

# Investments at Work / Innovation, Collaboration, and Commercialization

- Virginia Tech is a leader in research partnerships.
  - Two simultaneous tours will provide several examples of research conducted at Virginia Tech in partnership with private sector industries that further multiple university collaborations.
    - **Autonomous Systems**
    - **Agricultural Research**
- Research in these areas is innovative and leads to commercialization.
  - Over $500 million in sponsored research revenues annually.

# Unmanned Systems in Virginia

- Virginia universities offer advanced courses in Unmanned Systems (UMS), cyber security, software design, legal services, science and research, and robotics. Benefits include:
  - skilled workforce with high-tech skills found in the Northern Virginia Technology Corridor,
  - experienced veterans returning to civilian life, and
  - leading edge research performed at our universities and local federal laboratories.

- Virginia provides access to hubs of innovation and to air/land/sea testing areas within close proximity to customers in both the private and public sectors.

# Air, Land, and Sea

# Tour of the Virginia Tech Transportation Institute (VTTI) and Smart Road

- Conducts research to save lives, time, money, and to protect the environment.

  - One of seven research institutes created by Virginia Tech to answer national challenges.
  - VTTI has grown from approximately 15 faculty, staff, and students to become the second largest university-level transportation institute in the U.S. with more than 475 employees.
  - VTTI has more than $36 million in annual sponsored program research expenditures and is conducting more than 270 projects.
  - Annually, VTTI supports an average of more than 125 undergraduate and graduate students and produces more than 140 publications.

# Smart Road

- An active, connected, automated test bed for 16 years.
  - Used more than 2,000 hours annually.

- On March 23, 2000, VTTI officially opened the Smart Road in co-sponsorship with VDOT.

- To date, more than 22,000 hours of groundbreaking public and private research have been logged on this 2.2-mile test bed.

- Virginia's one-time investment of approximately $50.6 million NGF in Transportation Funds yields an almost equivalent amount in annual research revenues.

# Other Virginia Automated Corridors

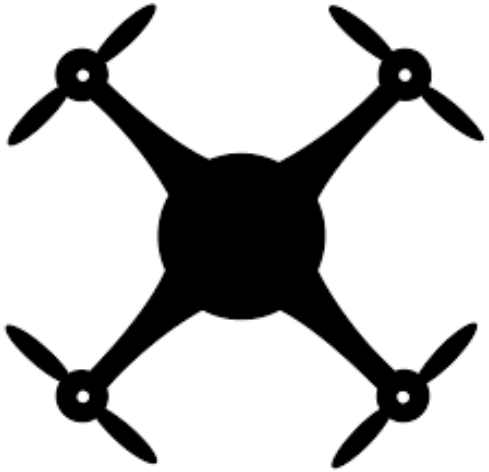
- Automation-friendly road network for government agencies, equipment manufacturers, and suppliers to test and certify their systems.
  - More than 70 miles of urban interstates and rural arterials.
  - Access to dedicated high-occupancy toll (HOT) lanes in conjunction with Transurban.
  - Remote monitoring and data streaming.
  - No bond required for automation testing in Virginia; licensing and insurance provided through the Commonwealth.
- Provides a migration path from test-track to real-world operating environments.

I-66 and I-95

Route 29 & 50

# Mid-Atlantic Aviation Partnership

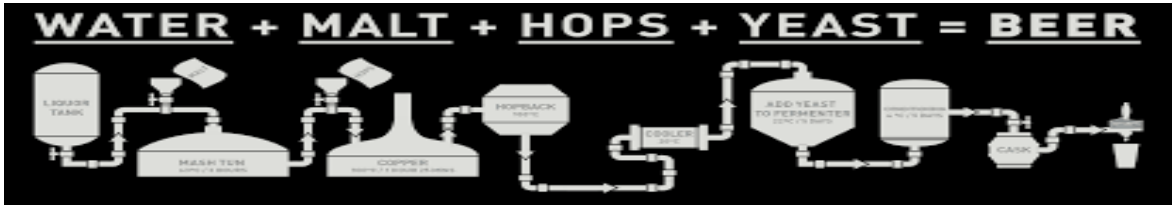
- MAAP's role is to help integrate unmanned aircraft into the National Airspace System.
- One of six FAA-designated UAV test sites in the country.
  - Allows for testing of systems across a wide terrain.
  - Certificate of airspace approved by FAA.
- Original partnership of three states:
  - Virginia, Maryland, and New Jersey.
  - Virginia Tech remains the lead.



- Initial award from FACT Fund of $2.6 million in 2014.
  - Complimentary investment of $5.8 million NGF in large capacity runway at Wallops Island through the Virginia Commercial Spaceflight Authority.
- Virginia's investments in autonomous systems are realizing returns across the Commonwealth.
  - $2.2 million recently awarded from federal Appalachian Regional Commission for the "Let's Fly Wisely" unmanned systems accelerator.

# Tour of HABB1- Collaboration and Commercialization at Work

- Tour and Overview of **Human and Agricultural Biosciences Building** (HABB1).
  - Showcase past investments.
  - Food chemistry and food sensory demonstrations.
  - Highlight public-private partnerships.
    - Pilot tours of VT's partnerships with Deschutes, Devil's Backbone, Diageo, Tyson, and DuPont.
  - Water testing.
    - Recipient of multiple federal grants, including funding for the Flint Water Study.
  - Fermentation Sciences.
    - Farm to glass – hands on demonstration and small tasting.



# Tour of HABB1 (continued)

- Opened in March 2014 at a cost of $53.7 million.
- The 93,860-square-foot building is home to advanced technologies combined with common areas to increase collaboration.
  - Human and Agricultural Biosciences Precinct.
- Includes scientists from the Department of Biological Systems Engineering.
  - Develop new energy sources, improve fresh water delivery systems, find ways to combat addiction, and create new targeted drug delivery systems.
- Includes researchers from the Department of Food Science and Technology.
  - Innovate to improve the world's food supply through pasteurization, fermentation, packaging, emulsion stability, probiotic culture viability, ingredient technology, and product development.

# Looking Forward to the 2017 Session and Beyond

- A strong economy requires innovation and growth in areas that will lead to the jobs of the future.
  - Will newly created GO Virginia, HERI, and/or other programs be able to replicate the successes that have occurred at Virginia Tech and other institutions?
  - Can best practices be replicated in other institutions and communities?
  - Should other funding mechanisms be moved under VRIC?
- Budget reductions have not been proposed for FY 2017 for HERI and GO Virginia, it is unknown for FY 2018.
- Discussions will continue regarding needed legislation and/or regulation for unforeseen issues and “new economy” challenges, including:
  - integration of autonomous vehicles among shared service transportation platforms, or
  - protection of personalized medical data.

# Moving Forward

- Role of the Virginia Research Investment Committee (VRIC) should continue to evolve.
  - Dedicated allocations from disposition of CIT parcel should provide a sustainable funding stream.
- Coordination of investments across research universities should be nurtured.
  - Virginia Research Alliance is a good start.
- Will research funding and GO Virginia efforts come together to make powerful regional investments?