

State Council of Higher Education in Virginia
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Accelerating Innovation in Virginia

The Role of Research Universities

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Why does Innovation matter?

- Innovation penetrates all areas of endeavor
- **Artists** fill the blank canvas – through **innovation**
- **Poets** fill the blank page – through **innovation**
- **Research** creates growth – through **innovation**
- Innovation-based economies will provide for freedom, peace, and societal health



Singapore

Silicon Valley



Game-changing start-ups are out there. We just don't know where to look.

WIRED Magazine - Dec, 2009

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- Today's giants have one thing in common: they tried to change the world!
 - Google had an audacious goal: “to organize the world's information”
 - Are today's states and universities moving fast enough to address public needs?

Why is true innovation so hard to recognize?

- **A revolution makes life permanently different – people have trouble imagining change**
- **Innovation is invisible, until it bursts into view!**

CHANGE

March 20, 2009 - 6 miles off of Tonga.



What are the past sources of growth?

- Nobel Laureate (1987) Robert Solow showed that over a 40 year period (1909-1949), almost 2/3 of growth in gross national product (GNP) was due to technological innovation
- His point? Technological and related innovation is the predominant causative factor behind the bulk of U.S. economic growth

What are today's sources of innovation?

“R&D 100 Awards” as an indicator

25 years ago: 70% of awards from Fortune 500 companies

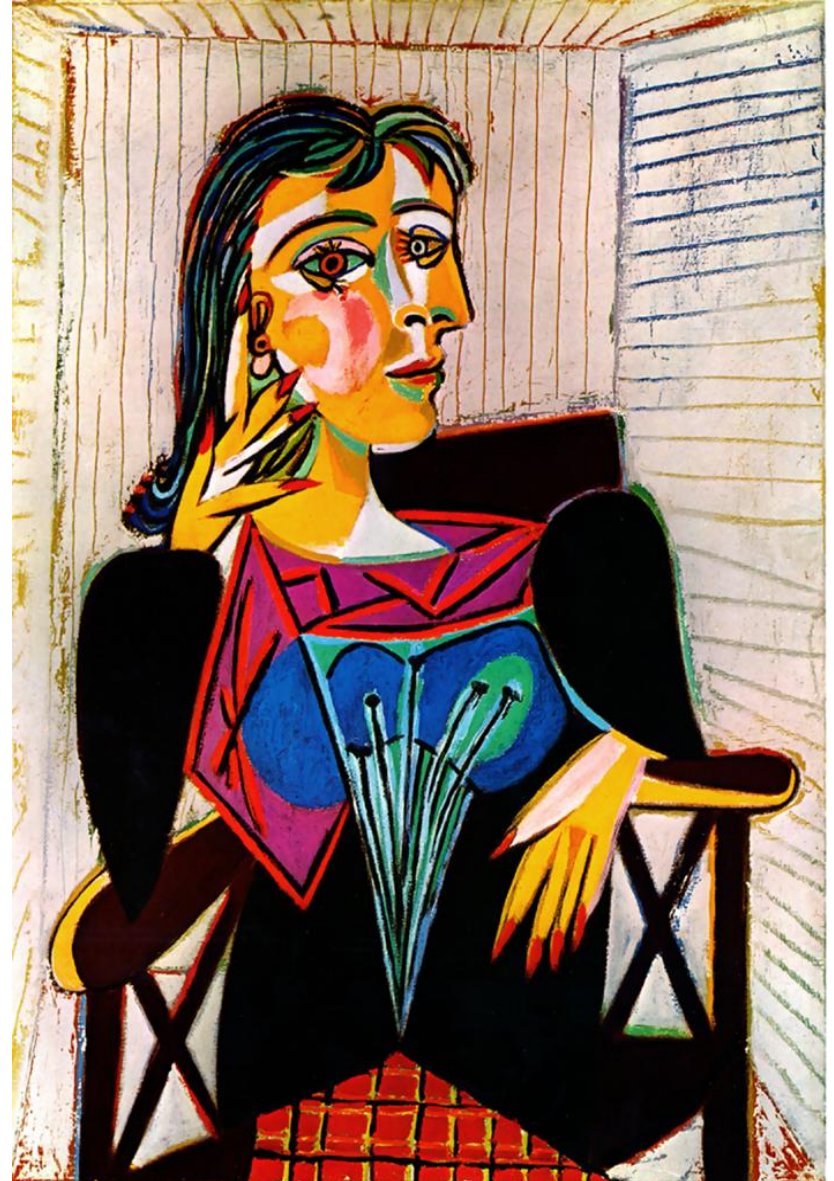
Today: 70% of awards from public organizations, universities

Universities are now a primary pipeline for innovation

R&D Philosophy: *Explore, Discover, Invent*

“Every child is an artist. The problem is how to remain an artist once one grows up.”

Pablo Picasso



Translating knowledge to society

Universities - Leading a state transformation

Virginia will produce more jobs, exports, and health for Virginians via investments in research and innovation challenges.

People ----- Patents ----- Products



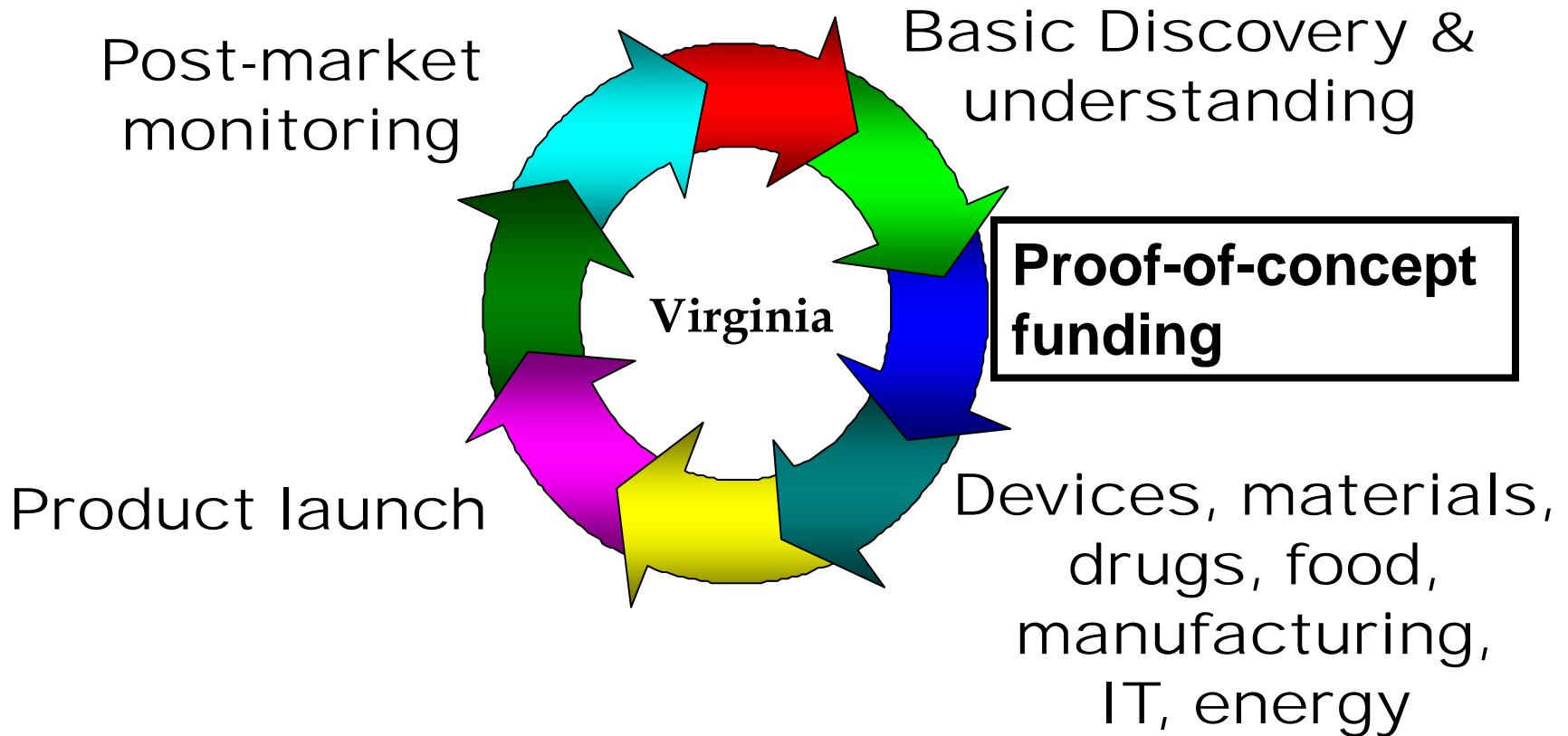
Improving childhood surgery/imaging the heart/treating brain cancer

Producing sufficient and safe foods

Providing affordable and reliable energy sources

Insuring access to next generation information technology

The "Full Circle" of Innovation



Outcomes: Jobs, GDP increases, Health, Security

State Models

Commonwealth Research Commercialization Fund:

- Established in 2000 by General Assembly.
(as the Commonwealth Technology Research Fund)
- Investment areas have changed over time.
The CRCF currently supports:
 - 1) SBIR Matching Funds Program
 - 2) Matching Funds Program
 - 3) Facilities Enhancement Loan Program
 - 4) Commercialization Program
 - 5) Eminent Researcher Recruitment Program

CRCF Funding:

2003: \$8.5M
2004: \$6.4M
2005: \$0
2006: \$0
2007: \$5M
2008: \$1M
2009: \$1M
2010: \$1M
2011: \$6M



The Virginia Tech Corporate Research Center is the proud recipient of the 2010 Outstanding Research/Science Park Award given by the Association of University Research Parks (AURP).



Virginia Tech CRC:

- 140 companies
- Employs 2, 200 people
- 27 buildings
- 956,000 sq.ft. on 120 acres

- Phase II projections
18 buildings
870,00 sq. ft.
3,000 employees
...over the next decade

State Models

Commonwealth Research Initiative:

- More than \$200 million to state universities for the 2006-08 biennium.
- Supported:
 - 1) Growth of focused research groups
 - 2) New academic programs
 - 3) Start-up packages for faculty with targeted expertise
 - 4) Research equipment
 - 5) Graduate students
 - 6) Multi-university collaborations

ICTAS Nanoscale Characterization and Fabrication Laboratory

Established in 2007, the facility is equipped with more than \$10 million in highly specialized equipment, more than half of which was made possible through funding provided by Commonwealth Research Initiative.



Fralin Life Science Institute Virginia Bioinformatics Institute

Targeted CRI investments in Infectious Diseases (host-pathogen environment interactions) provided critical investments enabling significant growth in sponsored research for both institutes.

State Investment in R&D

TABLE 3. State agency expenditures for R&D and basic research, states ranked by all R&D expenditures: FY 2007
(Dollars)

Rank	State	All R&D expenditures	Basic research		Rank	State	All R&D expenditures	Basic research	
			Total	% all R&D expenditures				Total	% all R&D expenditures
	United States	1,225,775,834	269,599,622	22.0					
1	New York	128,361,166	27,400,226	21.3	27	Oklahoma	10,731,050	3,282,165	30.6
2	Ohio	114,086,509	1,722,183	1.5	28	Minnesota	10,529,048	1,765,369	16.8
3	Pennsylvania	103,973,448	63,114,545	60.7	29	North Dakota	9,908,722	4,397,674	44.4
4	Florida	96,968,573	59,857,209	61.7	30	Alaska	9,526,100	0	0.0
5	California	91,842,652	8,300,000	9.0	31	Montana	8,200,230	0	0.0
6	New Jersey	59,747,701	15,508,889	26.0	32	Arkansas	7,658,199	5,576,500	72.8
7	Illinois	41,974,809	441,087	1.1	33	Oregon	7,389,914	0	0.0
8	Indiana	40,534,381	400,000	1.0	34	Alabama	7,340,365	2,820,000	38.4
9	Maryland	40,298,691	5,255,907	13.0	35	Iowa	6,790,053	216,041	3.2
10	North Carolina	37,607,109	2,729,150	7.3	36	Louisiana	6,587,314	0	0.0
11	Michigan	32,849,159	2,540,000	7.7	37	Massachusetts	5,600,189	0	0.0
12	South Carolina	31,493,843	0	0.0	38	South Dakota	5,473,603	120,000	2.2
13	Texas	29,650,947	1,395,035	4.7	39	Georgia	4,886,946	0	0.0
14	Connecticut	29,285,710	12,657,444	43.2	40	Tennessee	4,549,998	0	0.0
15	Maine	27,525,552	85,000	0.3	41	Nebraska	4,043,480	1,247,735	30.9
16	Washington	23,333,431	5,055,450	21.7	42	Mississippi	2,893,892	275,000	9.5
17	Hawaii	22,643,330	163,629	0.7	43	Utah	2,752,228	0	0.0
18	West Virginia	22,179,830	17,512,415	79.0	44	Idaho	2,739,006	1,103,979	40.3
19	Arizona	20,442,635	11,086,318	54.2	45	Delaware	2,611,108	194,100	7.4
20	Wyoming	19,500,357	4,798,060	24.6	46	Puerto Rico	2,326,241	47,468	2.0
21	Missouri	15,567,277	119,940	0.8	47	District of Columbia	2,009,000	0	0.0
22	Virginia	15,486,526	2,099,796	13.6	48	Rhode Island	1,771,949	1,349,465	76.2
23	Wisconsin	12,828,572	100,500	0.8	49	Nevada	1,748,776	180,986	10.3
24	Kentucky	11,960,634	780,900	6.5	50	New Hampshire	1,685,178	168,470	10.0
25	Colorado	11,924,981	2,191,512	18.4	51	Vermont	1,529,805	0	0.0
26	Kansas	11,752,696	1,539,475	13.1	52	New Mexico	672,921	0	0.0

NOTE: State R&D Expenditures survey includes Puerto Rico and District of Columbia.

SOURCE: National Science Foundation/Division of Science Resources Statistics, Survey of FY 2007 State R&D Expenditures.

Ten States Account for More than 60% of State Agencies' FY 2007 R&D Expenditures

A National Perspective

Indicators	Year	State	US
		VA	Average
Financial Research and Development Inputs			
State Agency R&D Expenditures per \$1 Million of Gross Domestic Product	2007	40	89
State Agency R&D Expenditures per Civilian Worker	2007	3.94	8.42
State Agency R&D Expenditures per Individual in S&E Occupation	2007	61	219
Science and Technology in the Economy			
Average Annual Federal SBIR Funding per \$1 Million of Gross Domestic Product	2006-08	252	127
Venture Capital Disbursed per \$1,000 of Gross Domestic Product	2008	1.22	2
Source: SEI 2010 State Data Tool " http://www.nsf.gov/statistics/seind10/c8/c8s7.htm "			

Do state investments in university innovation pay off?

- **Major initiatives produced by such processes:**

- AstraZeneca partnership (\$4M) – top 10 drug company (UVa)**

- Private foundation seed funds (UVa) (\$4 M/year)**

- Rolls-Royce education/research (VA Tech & UVa)**

- Micron and NRI consortium for nanoelectronics**

- **State can leverage outstanding existing research base**

- Invest in regional proof of concept funds (UVa**

- Coulter program produced independently-audited 7-1 ROI)**

- Attract top talent to universities**

- Invest in innovation programs with impact**

Trends Worth Noting

- Linking FDA, federal agencies, universities, co's– for globally-competitive innovation
- Companies Partnering with universities for early pipeline ideas – new VA partnerships
- Federal and state governments committing to fund “PROOF-OF-CONCEPT” research - bills in U.S. Senate and Congress today cite UVa Coulter model outcomes
- Venture Capital seeking projects groomed by these new partnerships – form VC relations!
(UVa – hosts annual UVa Venture Summit with \$15B/year)



WEAVEonline® Assessment Management System

- A web-based program developed by **VCU** staff for VCU's accreditation in 2004
- Incubated at **VCU** for 1 year – 20 subscribers
- Centrieva Corporation – a new **VCU** start-up company in the Greater Richmond Region
- 10 employees and more than 180 subscribers - universities and colleges in the US, Europe, the Caribbean, and the Middle East



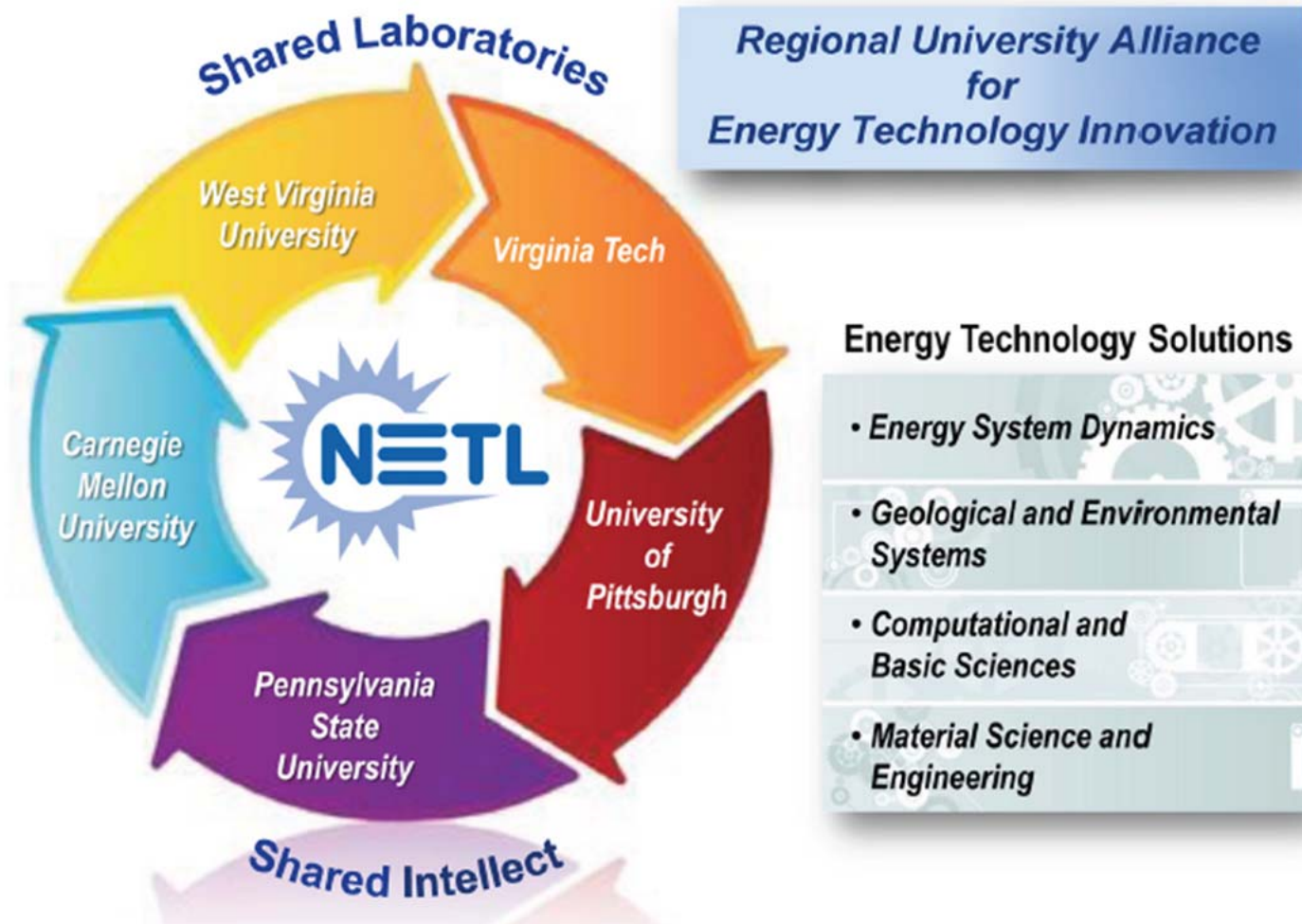
VCU

What new things could the state do to spark innovation and growth?

- Invest in proof-of-concept funds at each research university (proven 7-1 ROI)
- Enhance the Equipment Trust Fund with a new allocation for moving research to market applications
- Enhance support for graduate students at research universities – they are the next generation of innovators
- Recognize that universities are the innovation engines for the economy

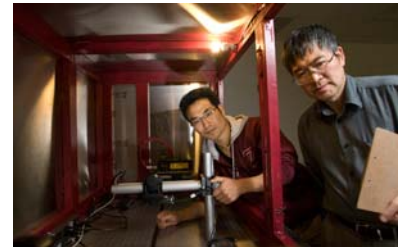
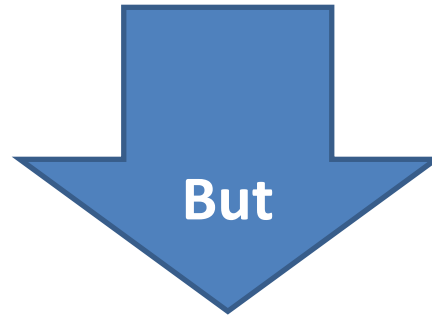
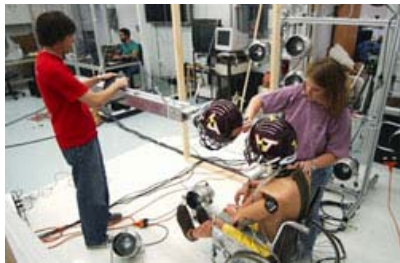
Solving Grand Challenges through Collaboration

Example: National Energy Technology Laboratory Regional University Alliance (NETL-RUA)



Economic Assets: Intellectual Capital

Many consider transfer of a university's intellectual property to be its major contribution to economic development



. . . a more accurate statement would be that a university's **intellectual capital** is its true economic impact.