State Investment in University Research:

Leveraging R&D for Economic Development

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# Shifting Sources of Wealth

## Inherited Assets
- Geography
- Climate
- Natural Resources
- Population

## Created Assets
- Top Universities
- Research Centers
- Talented People
- Entrepreneurial Culture
- Networks
- World-Class Amenities
The Role of Universities

**Highly effective**
- Education & talent creation
- Research & new ideas
- Attraction of firms, entrepreneurs, people, etc.
- Anchor institution & public space
- Extension & technical assistance, outreach
- Faculty acting as consultants
- University-industry collaborations

**Limited**
- Entrepreneurial startups & support
- Technology transfer & commercialization
- Patenting & licensing
University-Industry Relationships

Silicon Forest Survey of High-Tech Firms:
Which of the following types of relationships has your firm had with the Oregon universities?

- Hiring graduates
- Collaborative research projects
- University staff as consultants
- Company staff teaching classes
- Donations to university
- Training programs run by university
- Licensing or patenting of research
- Faculty working part-time in firm
- Being part of research consortia
- Collaboration with research centers
- Utilizing ONAMI user facilities
- Collaborate with Lab 2 Market
- Faculty on the company's board
- PSU's Business Outreach Program
- IC Design & Test Lab

Source: Silicon Forest Survey, 2007
Note: N=112
Industrial Innovation is Changing

Companies are more and more interested in PARTNERING & COLLABORATING with universities

Why?
• Decline in in-house R&D
• External sources of knowledge reduce cost & risks

Examples
• Intel’s “lablets”
• Procter & Gamble
• Virginia Tech College of Science & Oxford Diffraction Inc.
• VT’s Micron Technology Semiconductor Processing Laboratory
R&D Funding in the United States

Federal R&D funding share declines as industry’s rises

Source: National Science Foundation
State R&D Investment Funds

• Most states have dedicated R&D funds

• Evolution of funds
  – 1980s: Small amounts to build research capacity
  – Today: Partnerships, collaboration, industry engagement

• Funds are used for
  – Research: Collaboration, Leverage, Synergies, Social Problems
  – Talent: Eminent scholars, Scholarships
  – Facilities: Centers of Excellence, Laboratories

• HOW states spend money is just as important as how MUCH is spend
WASHINGTON
Life Sciences Discovery Fund ($350 million over 10 years)
Washington’s fund is dedicated to bioscience research that provides economic and health benefits to the state’s residents.

NORTH DAKOTA
Centers of Excellence ($50 million)
North Dakota funds public-private centers of excellence that focus on state strengths such as surface protection, leveraging at least a 2:1 match from the private sector (total, $150 million).

WEST VIRGINIA
Research Challenge Fund ($4 million annually)
Using a unique funding mechanism harnessing lottery revenue, West Virginia makes targeted investments to increase competitiveness for federal and other outside R&D funding.

MARYLAND
Stem Cell Research Fund ($23 million annually)
Recognizing an emerging need in stem cell research, Maryland’s fund focuses its investments on quickly translating new treatments into benefits for patients.

CALIFORNIA
Institutes of Science and Innovation ($400 million)
California’s initiative unites universities and industry partners to address state problems such as climate change, energy and traffic congestion. An additional $800 million was raised from private-sector partners (total, $1.2 billion).

ARIZONA
Science Foundation Arizona ($135 million)
To strategically strengthen the state’s scientific, engineering and medical research programs, Arizona established a public-private non-profit partnership that receives half of its money from the state and half from the private sector (total, $270 million).

OKLAHOMA
Oklahoma Center for the Advancement of Science and Technology ($29 million annually)
Oklahoma is investing millions in nanotechnology research and other fields in order to become the “research capital of the plains.”

FLORIDA
Scripps Florida ($310 million)
As one of many steps taken to establish bioscience excellence, Florida recently built a new facility to house the world-class Scripps Institute.
## How Do States Fund Investments?

<table>
<thead>
<tr>
<th>Type of Funding</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Earmarked Taxes</td>
<td>Arizona: Proposition 301</td>
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<td>West Virginia: Research Challenge Fund</td>
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<td>General Fund Appropriation</td>
<td>Georgia: Georgia Research Alliance</td>
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<td>Kentucky: Bucks for Brains</td>
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<td>Tobacco Settlement Money</td>
<td>Washington: Life Sciences Discovery Fund</td>
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<td>Tax Increment Financing</td>
<td>Kansas: Emerging Industry Investment Act</td>
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<td>Bonds</td>
<td>California: Institute for Regenerative Medicine</td>
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<tr>
<td>Privatizing State Assets</td>
<td>Missouri: MOHELA</td>
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<td>Indiana: Hoosier Lottery</td>
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<td>Foundations</td>
<td>Minnesota: Medica</td>
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<td>Indiana: Lilly Endowment</td>
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<td>Pennsylvania: Heinz Endowment</td>
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<td>Leveraging Industry Support</td>
<td>North Dakota: Roundtable on higher ed</td>
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Maryland

Basic & Translational Research
Stem Cell Research Fund
FY 2007: $15M
FY 2008: $23M

Commercialization & Tech Transfer
• University Technology Development Fund
• TechStart
• Technology Transfer Fund
• Fort Detrick Tech Transfer Initiative

University-Industry Partnerships
• Maryland Industrial Partnership
• $1.35M annually
Georgia Research Alliance
- $30M annually
- $400M since 1990

Eminent Scholars Program
- 57 Scholars
- 18 Centers of Excellence
- $2B leveraged
- 125/4000+ firms/jobs

Venture Lab
- $8M from GRA since 2002
- 66 early-stage companies

Snapshot: GRA’s FY 2006 investment portfolio
- Commercialization: $5,398,000
- Eminent Scholars and their labs: $7,400,000
- Research Infrastructure: $14,082,000
- Total: $26,882,000

Source of Funds: The funding for this program is provided by the State of Georgia.
Investments in Georgia Research Alliance reach across the state!
Kentucky

- Kentucky Postsecondary Education Improvement Act
- Research Challenge Trust Fund or “Bucks for Brains”
  - $350 M
- Kentucky Science & Engineering Foundation
- Kentucky Innovation Act
  - $53M
Arizona

8 big steps to create a bioscience niche

1. Industry Clusters
2. University Research & New American University ($1B/20yrs)
3. Bioscience Road Map
4. Genomics
5. Research Facilities
6. Community Colleges
7. Science Foundation Arizona ($25M)
8. Personalized Medicine

Ongoing: Measuring Results
The Virginia Situation

- Growing economy & high job creation rates
- Reliant on high-tech service industries
- Strong urban-rural divide
- Need to upgrade traditional industries
- Innovation rankings fall short
- Low rates of entrepreneurship
## A Good Start: Commonwealth Research Initiative

<table>
<thead>
<tr>
<th>Initiatives (GF $ in M)</th>
<th>FY 2007</th>
<th>FY 2008</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical Research &amp; Biomaterials Engineering</td>
<td>$19.6</td>
<td>$19.6</td>
<td>$39.2</td>
</tr>
<tr>
<td>Modeling &amp; Simulation</td>
<td>$5.8</td>
<td>$5.8</td>
<td>$11.6</td>
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<tr>
<td>Debt Service for HEETF research supplement</td>
<td>$0.0</td>
<td>$6.0</td>
<td>$6.0</td>
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<tr>
<td>Institute for Advanced Learning &amp; Research</td>
<td>$2.1</td>
<td>$2.4</td>
<td>$4.5</td>
</tr>
<tr>
<td>Research Commercialization*</td>
<td>$5.0</td>
<td>$0.0</td>
<td>$5.0</td>
</tr>
<tr>
<td>Graduate Financial Aid</td>
<td>$5.0</td>
<td>$5.0</td>
<td>$10.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$37.5</strong></td>
<td><strong>$38.8</strong></td>
<td><strong>$76.3</strong></td>
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Source: State Senate Finance Committee  
*Includes $2M for CTRF with 1-to-1 match of non-general funds.
6 Guidelines for R&D Investments

1. Put all the pieces together
2. Make the right bets
3. Invest in collaboration
4. Enlist experts, outside peer reviewers
5. Be consistent while embracing change
6. Measure results
Why Do We Need to Invest?

Canada: $105M to 7 centers of excellence; Quebec: $888M

United Kingdom: $2B for innovation & tech development

Finland: €465 M in R&D projects

Germany: Funding for elite universities

India: 100 incubators

United States: America Competes Act authorizes $43.4B in S&T spending for FY08-10; No national innovation policy; State R&D funds less than 3%

Ireland: Science Foundation invested $700 M between 2000 and 2006

Bahrain: Plans for a $1B Science & Technology Park

Singapore: Doubling R&D budget; $8.9B between 2006 and 2011
Thank You!

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Report is available from National Governors Association:
http://www.nga.org/Files/pdf/0707INNOVATIONINVEST.PDF