Update/9.25.07

-Nanotechnology Day 2008

-Virginia Liaison Office

-Bonding

-Venture Capital Trends

-Federal R&D Priorities

-Metrics/Benchmarking State R&D Investment

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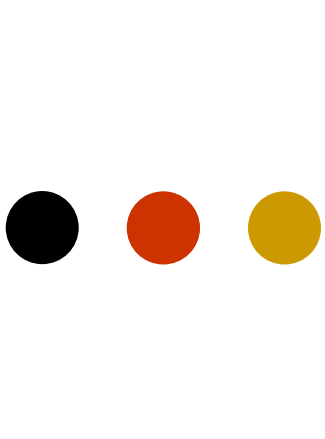
Nanotechnology Day 2008

- One week of space can be reserved in front of police post.
  - Feb. 4th-8th
  - Feb. 11th-15th
  - Feb. 18th-22nd
  - Feb. 25th-29th
- Policy is not to reserve both House and Senate floor space to single organization.

Virginia Liaison Office

- Office of the Governor, reports to the Governor.
- Bipartisan, House and Senate relations.
- Unofficial Motto: “We put Virginia First”
- Letter: Ask federal delegation to work with Virginia Liaison office in bringing Federal R&D funds to the Commonwealth.



State Bonding

Bonds v. Convertible Bonds

- A bond is a debt security, in which the authorized issuer (STATE) owes the holders a debt and is obliged to repay the principal and interest (the coupon) at a later date, termed maturity.
- A convertible bond is a type of bond that can be converted into shares of stock in the issuing company, usually at some pre-announced ratio.
- State would be purchaser, not issuer, of a convertible bond.

Constitutional Bonding Authority: Article X Section 9

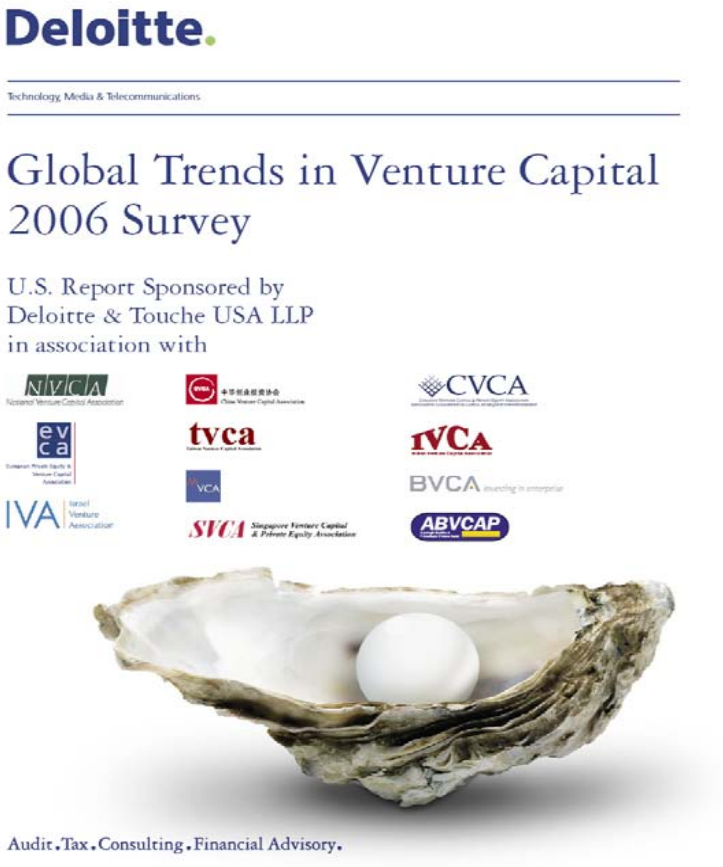
- 9A – Emergency bonds and previous debt obligations (budget shortfalls)
- 9B – General obligation (voter approved)
- 9C – Revenue producing capital projects (must have pledge of net revenues)
- **9D – All bonds made without pledge of full faith and credit of the Commonwealth**

Article X Section 10 (VA. Const.)

- "…nor shall the Commonwealth or any such unit of government subscribe to or become interested in the stock or obligations of any company, association, or corporation for the purpose of aiding in the construction or maintenance of its work;"

Venture Capital Trends

Venture Capital Trends



The 2006 Global Venture Capital Survey, sponsored by Deloitte & Touche LLP in conjunction with the National Venture Capital Association and other venture capital associations, throughout the world was administered to venture capitalists (VCs) in the Americas, Asia Pacific (APAC), Europe, the Middle East, and Africa. There were 505 responses from general partners with assets under management ranging from less than $100 million to greater than $1 billion. The survey was conducted in April and May 2006.

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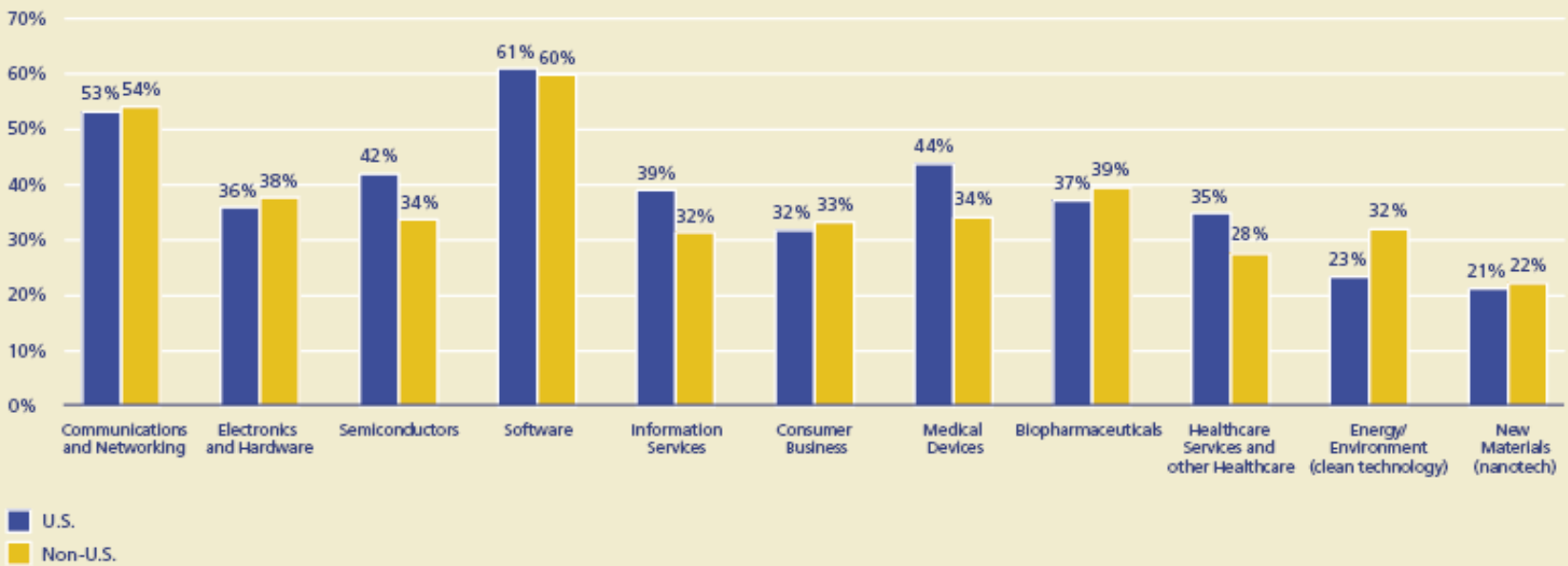
Venture Capital Trends

Figure 20. Current industry investment (all respondents)



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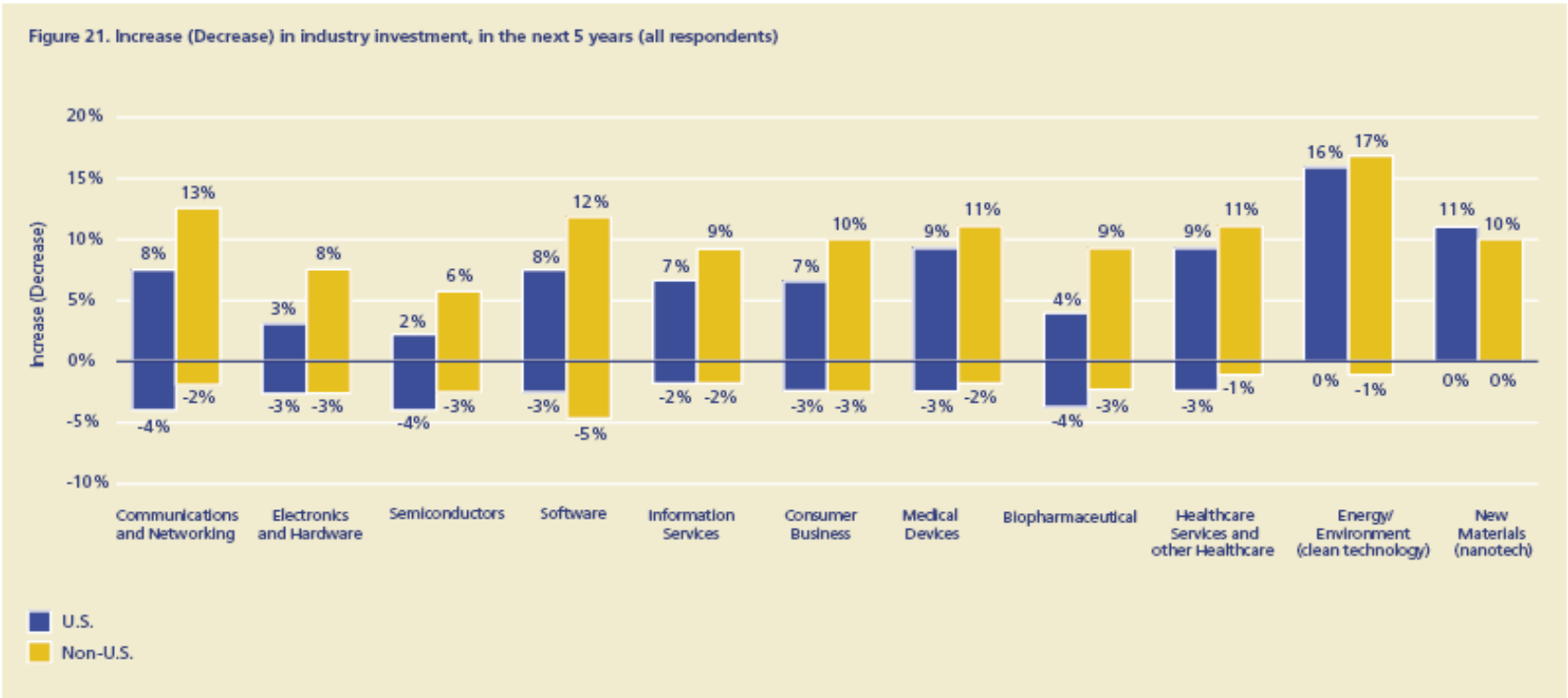
Venture Capital Trends



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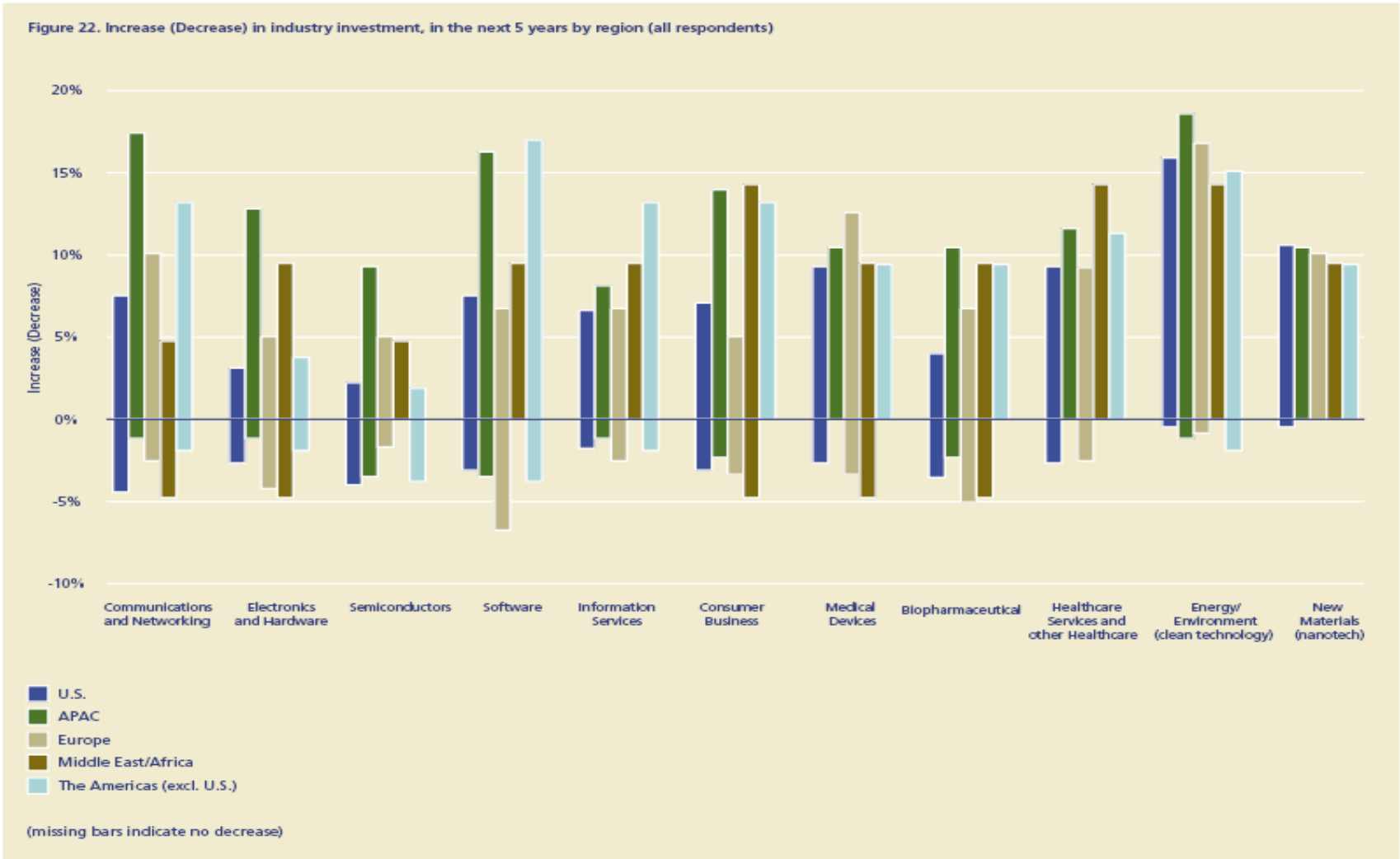
Venture Capital Trends



Federal R&D Priorities

-NSF

-DOD

-DOE

NNI Budget History by Agency

(dollars in millions)

Agency	2001 Actual	2002 Actual	2003 Actual	2004 Actual	2005 Actual
NSF	150	204	221	256	335
DOD	125	224	322	291	352
DOE	88	89	134	202	208
DHHS (NIH)	40	59	78	106	165
DOC(NIST)	33	77	64	77	79
NASA	22	35	36	47	45
EPA	5	6	5	5	7
USDA			1	2	3
DHHS (NIOSH)					3
DOJ	1	1	1	2	2
DHS		2	1	1	1
TOTAL	464	697	863	989	1200

From http://www.nano.gov/

NNI Budget Overview by Agency

Agency	2006 Actual	2007 Estimate*	2008 Proposed
NSF	359.7	373.2	**389.9**
DOD	423.9	417.2**	**374.7**
DOE	231.0	235.2	**331.5**
DHHS (NIH)	191.6	193.8	**202.9**
DOC(NIST)	77.9	84.2	**96.6**
NASA	50.0	25.0	**24.0**
EPA	4.5	8.5	**10.2**
USDA (CSREES)	3.9	3.4	**3.0**
DHHS (NIOSH)	3.8	6.6	**4.6**
USDA/FS	2.3	2.6	**4.6**
DHS	1.5	2.0	**1.0**
DOJ	0.3	1.4	**0.9**
DOT (FHWA)	0.9	0.9	**0.9**
TOTAL	1351.2	1353.9	**1444.8**

Budget increases

* The 2007 Estimates reflect 2007 Budget levels, except for the Departments of Defense and Homeland Security, which are the enacted levels. Several agencies have updated their 2007 Budget levels since the release of the 2007 NNI Budget Supplement.
** 2007 estimate includes about $100 million in Congressional earmarks at DOD that are outside the NNI plan.

From http://www.nano.gov/

Table 3 Planned 2008 Agency Investments by Program Component Area (dollars in millions)								
	Fundamental Phenomena & Processes	Nanomaterials	Nanoscale Devices & Systems	Instr. Research, Metrology, & Standards	Nano-manufacturing	Major Research Facilities & Instr. Acquisition	Societal Dimensions	NNI Total*
NSF	142.7	60.2	51.1	14.5	26.9	31.6	62.9	389.9
DOD	179.1	91.7	70.6	8.3	1.0	23.0	1.0	374.7
DOE	85.4	99.8	13.5	26.7	2.0	100.6	3.5	331.5
DHHS (NIH)	53.3	16.5	114.9	6.7	1.7	0.1	9.7	202.9
DOC (NIST)	27.1	8.0	13.5	26.4	11.1	4.5	6.0	96.6
NASA	1.0	12.0	10.0	0.0	1.0	0.0	0.0	24.0
EPA	0.2	0.2	0.2	0.0	0.0	0.0	9.6	10.2
USDA (CSREES)	0.4	0.8	1.5	0.0	0.1	0.0	0.2	3.0
DHHS (NIOSH)	0.0	0.0	0.0	0.0	0.0	0.0	4.6	4.6
USDA (FS)	1.7	1.5	1.0	0.2	0.2	0.0	0.0	4.6
DHS	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0
DOJ	0.0	0.0	0.1	0.8	0.0	0.0	0.0	0.9
DOT (FHWA)	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.9
TOTAL*	491.8	290.7	277.4	83.6	44.0	159.8	97.5	1,444.8

From http://www.nano.gov/

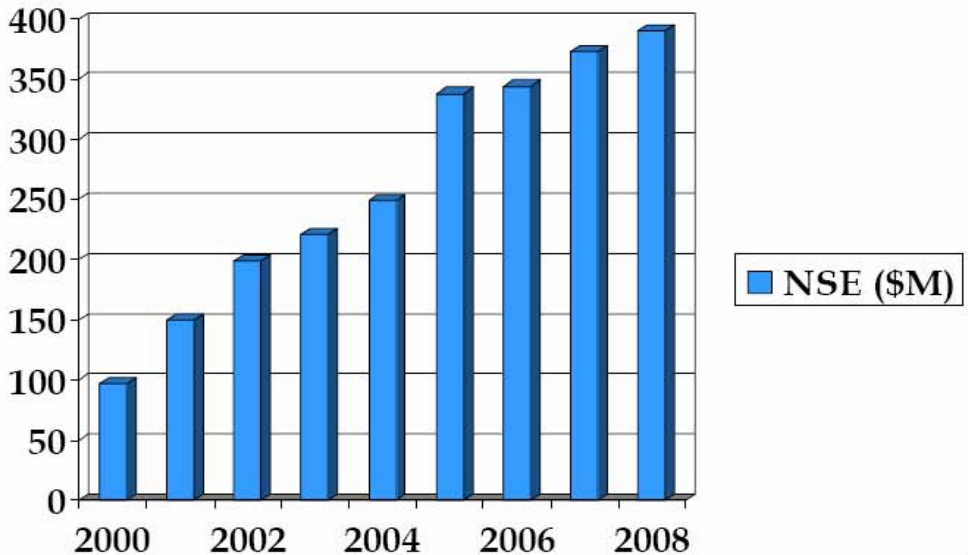
NSF – discovery, innovation and education in Nanoscale Science and Engineering (NSE)

www.nsf.gov/nano , www.nano.gov

FY 2008 Request: $390M ~1/4 of Federal and ~1/12 of World Investment

- **Fundamental research** - seven PCAs with new priorities
- **Establishing the infrastructure** - over 3,000 active projects; 24 large centers, 2 user facilities (NNIN, NCN), multidisciplinary teams
- **Training and education** – over 10,000 students and teachers/yr

Fiscal Year	NSF
2000	$97M
2001	$150M
2002	$199M
2003	$221M
2004	$254M
2005	$338M
2006	$344M
2007	$373M
R 2008	**$390M**



MC Roco, 06/13/07

From http://128.119.56.118/~nnn01/NewFiles/09_Roco_NNI_NSF.pdf

Several Priorities at NSF / NNI (2007 -)

- Systems Nanotechnology
- Measuring tools of systems with atomic resolution
- "On-site" nanomanufacturing
- Nanoinformatics
- Use of nanotechnology for common use resources: water, food, energy, environment
- Basic research on Beyond CMOS, partner with SIA/SRC
- Networking development for EHS, Education, ELSI

From http://128.119.56.118/~nnn01/NewFiles/09_Roco_NNI_NSF.pdf

DoD Nanotechnology

- **Recognized Applications of Nanoscience**
- Ultrasmall, highly parallel, computers with multi-teraflop speed
- Image information processors, e.g., extraction and recognition
- Low-power personal and autonomous communication and computation devices
- high-density information storage devices, e.g., terabit/cm2 nonvolatile memory
- Lasers and detectors for weapons and countermeasures
- Optical (infrared, visible, ultraviolet) sensors for improved surveillance an targeting
- Integrated sensor suites for chemical and biological agent detection
- Catalysts for enhancing and controlling energetic reactions
- Synthesis of new compounds (e.g., narrow-bandgap materials)
- Designer materials with combinations of properties that do not currently exist

From http://www.nanosra.nrl.navy.mil/

DARPA

- New DARPA programs exploiting nanotechnologies are expected in 2007-8
  - Topics under development will emphasize the application of nanotechnology in applications relevant to national defense
    - E.g., quantum computation and nanoelectronic devices

From http://www.aaas.org/spp/rd/07pch24.htm

DOE

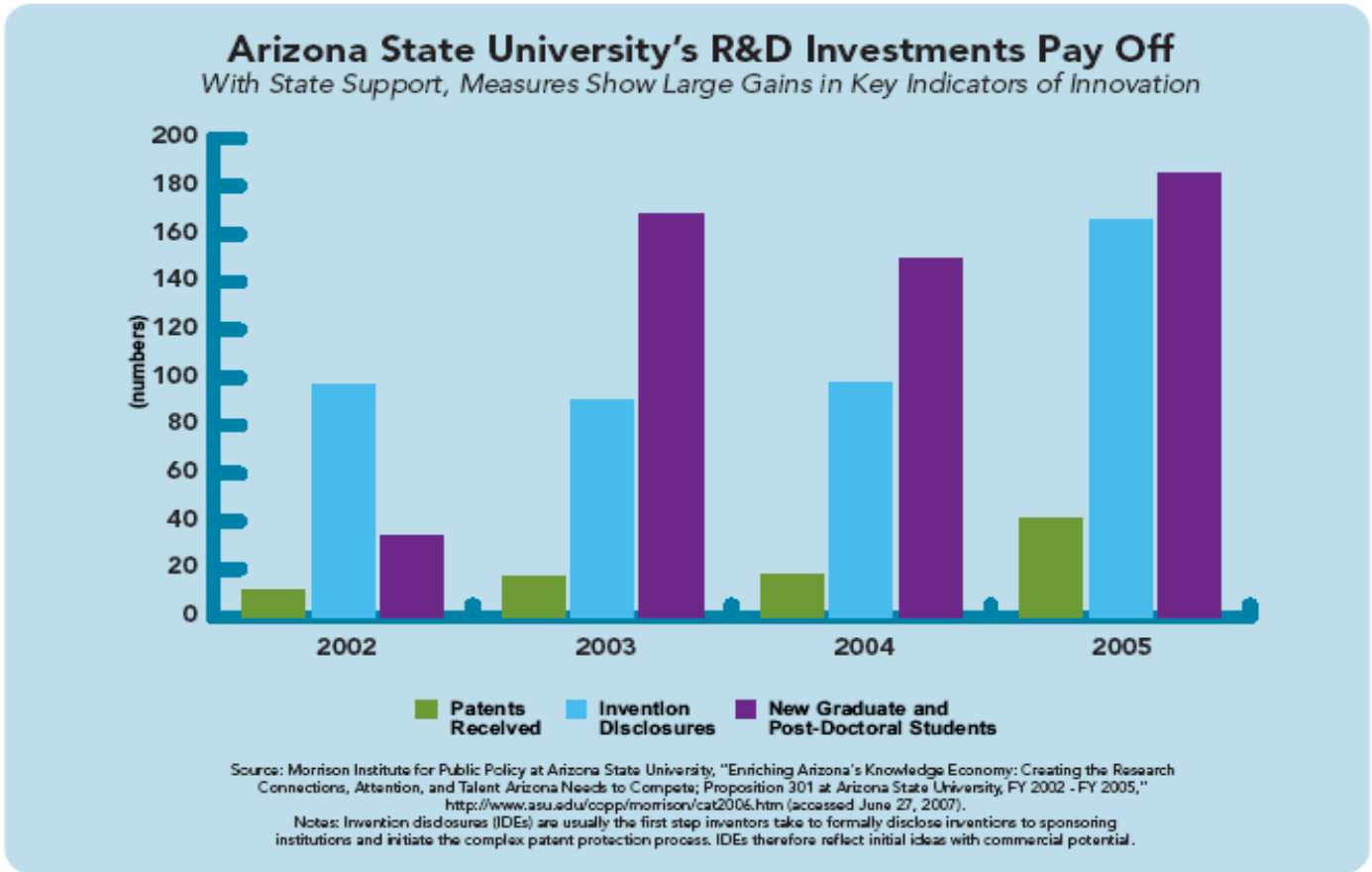
- Several workshop to identify critical areas of research
  - *Basic Research Needs for the Hydrogen Economy*, May 2003
  - *Basic Research Needs for Solar Energy Utilization*, April 2005
  - *Basic Research Needs for Superconductivity*, May 2006
  - *Basic Research Needs for Solid-State Lighting*, May 2006
  - *Basic Research Needs for Advanced Nuclear Energy Systems*, July-August 2006
  - *Basic Research Needs for Clean and Efficient Combustion of 21st Century Fuels*, Oct.-Nov. 2006
  - *Basic Research Needs for Electric Energy Storage*, April 2007
  - *Basic Research Needs for Geoscience*, Feb, 2007

Reports are available at http://www.sc.doe.gov/bes/reports/list.html

Measuring State R&D Investment

Arizona, Maine, Georgia, and Massachusetts

Measuring State R&D Investment- Maine



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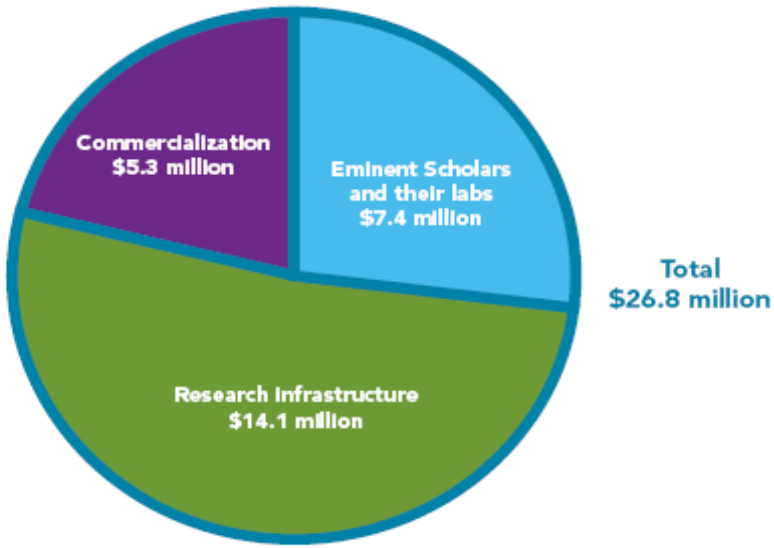
Measuring State R&D Investment- Maine

- Overall, has Maine's public investment in research and development stimulated and sustained consistent, competitive growth in its economy, especially when compared to other states?
- Has Maine's investment in public and private university research and development led to increased research capacity, the development of an educated, technically skilled workforce and increased commercialization of university technologies?
- Are Maine's investments in nonprofit research institutions broadening their impact on Maine's economy?
- Is Maine fostering the growth of research intensive companies, increasing private-sector research and development activity and building a technology-based entrepreneurial community?
- To what extent are these investments increasing the competitiveness of Maine's key strategic technology and industry areas?

Measuring State R&D Investment- Georgia

GEORGIA RESEARCH ALLIANCE INVESTS HEAVILY IN EMINENT SCHOLARS...



...YIELDING THESE DIVIDENDS SO FAR.

54	Scholars recruited
18	New nationally recognized Centers of Research Excellence
$2 billion	Federal and private investment leveraged
100+	Existing corporations served by university partnerships
125	Companies created
4,000+	Jobs created

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Measuring State R&D Investment- Massachusetts

- **10 Industry Clusters (Innovation Index)**
  - Computer and communications hardware
  - Defense manufacturing and instrumentation
  - Health care technology
  - Scientific, technical and management services
  - Software and communications services
  - Postsecondary education
  - Textiles and apparel
  - Business services
  - Diversified industrial support
  - Financial services

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Measuring State R&D Investment- Massachusetts

- Economic Impact (5 indicators):
  - Industry cluster employment and wages
  - Corporate sales, publicly traded companies
  - Occupations and wages
  - Median household income
  - Manufacturing exports
- Innovation Process (8 indicators):
  - New business incorporations and business incubators
  - Initial public offerings and mergers and acquisitions
  - Technology Fast 500 Firms and Inc. 500 Firms
  - Small business innovation research awards
  - Regulatory approval of medical devices and biotechnology drugs
  - Corporate R&D expenditures, publicly traded companies
  - Patent grants, invention disclosures and patent applications
  - Technology licenses and royalties
- Innovation Potential (7 indicators)
  - Investment capital
  - Federal academic and health R&D expenditures
  - Intended college majors of high school seniors and dropout rates
  - Public secondary and higher education expenditures and performance
  - Median price of single-family homes, home ownership rates, and housing starts
  - Educational attainment and engineering degrees awarded
  - Population growth rate and migration

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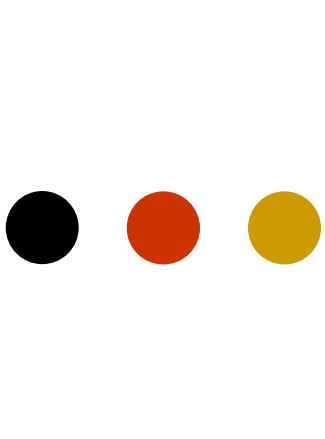
Measuring State R&D Investment

Other Perspectives on Measurement: What's Your Collaboration Quotient?

Collaboration is a necessary element of innovation-based research, but success isn't easily measured. After years of research on the topic, Technology Transfer Society President Donald Siegel has some ideas. He recommends that states consider tracking the following indicators:[41]

- Co-authored articles published between academic and industry scientists
- Creation of new products, processes and firms
- Cross-discipline centers and research
- Impact on industry commercialization
- Industry-sponsored research investments
- Job mobility of scientists
- Presentations and comparable forms of dissemination
- Productivity of universities in technology transfer



Questions?

Open Discussion…