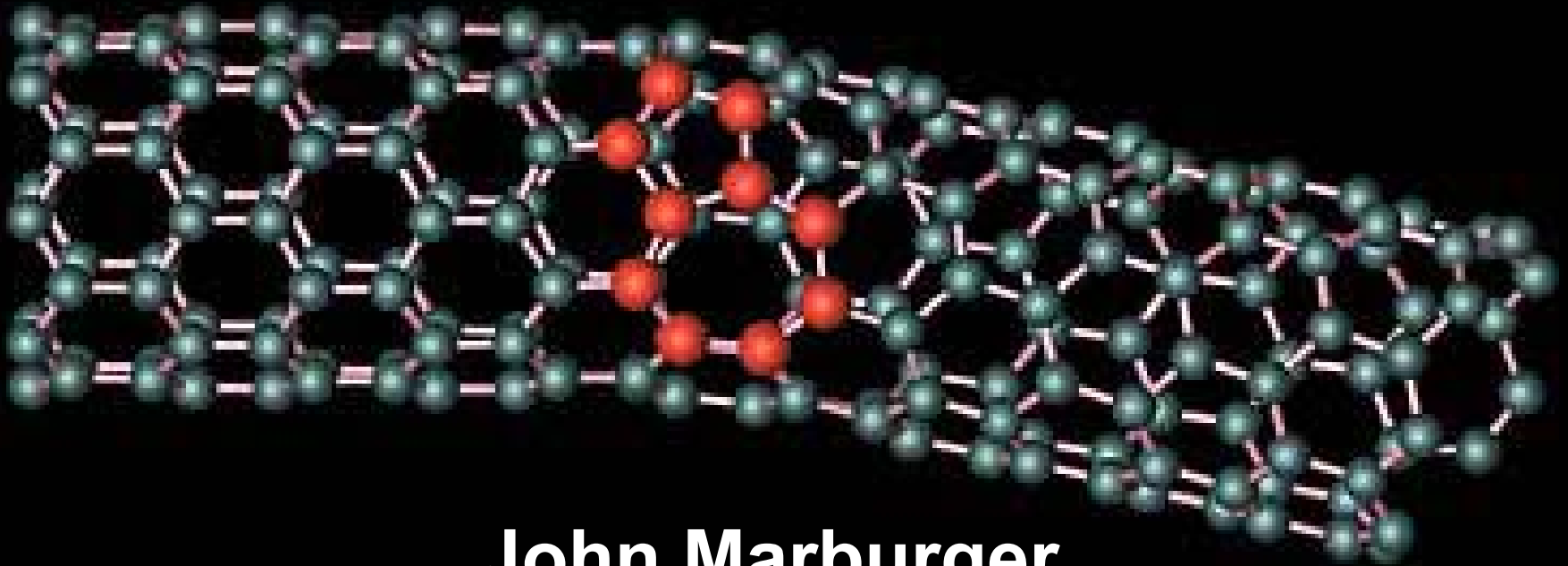


The National Nanotechnology Initiative



John Marburger

Director

Office of Science and Technology Policy

NNI Workshop

June

16, 2005



21st Century Nanotechnology Research & Development Act of 2003

- Signed by the President on December 3, 2003
- Put into law ongoing activities
- Authorized \$3.7 billion in FY2005-FY2008 among 5 agencies
- “Established” a National Nanotechnology Coordination Office
- **Calls for the President to establish or designate a National Nanotechnology Advisory Panel ***
- Calls for periodic planning and reporting by the NSET Subcommittee
- Calls for a triennial review by the National Research Council

*** President Bush designated PCAST as NNAP in July 2004**

One Hundred Eighth Congress
of the
United States of America

AT THE FIRST SESSION

*Began and held at the City of Washington on Tuesday,
the seventh day of January, two thousand and three*

An Act

To authorize appropriations for nanoscience, nanoengineering, and nanotechnology research, and for other purposes.

*Be it enacted by the Senate and House of Representatives of
the United States of America in Congress assembled,*

SECTION 1. SHORT TITLE.

This Act may be cited as the “21st Century Nanotechnology Research and Development Act”.



industry.
(C) make use of existing expertise in nanotechnology in their regions and nationally;
(D) make use of ongoing research and development at the micrometer scale to support their work in nanotechnology; and



NNAP responsibilities under the 21st Century Nanotechnology R&D Act

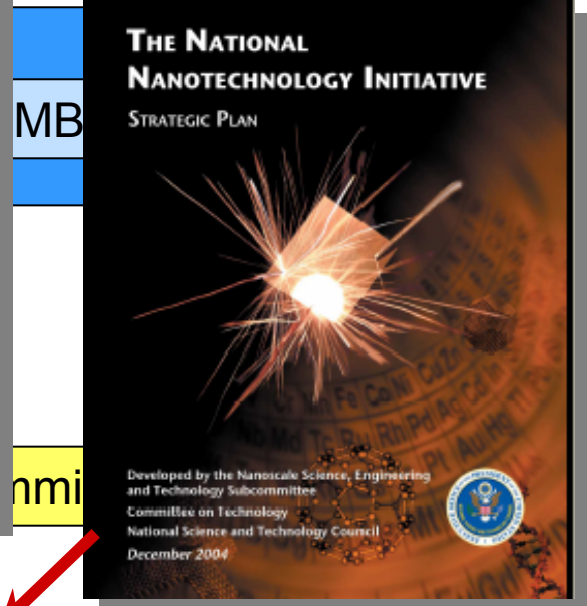
Assess:

- Trends and developments in nanotechnology.
- Progress in implementing the program.
- Need to revise the program.
- Balance among the component areas of the program, including funding levels.
- Whether program component areas, priorities, and technical goals developed by the NSET are helping to maintain US leadership.
- Management, coordination, implementation, and activities of the program.
- Whether social, ethical, legal, environmental, and workforce concerns are adequately addressed by the program.

Report and make recommendations every 2 years

National Research Council Review
 Expected release: 2006

PCAST (NNAP)



Committee on Technology

Subcommittee

NSET Subcommittee

NNCO

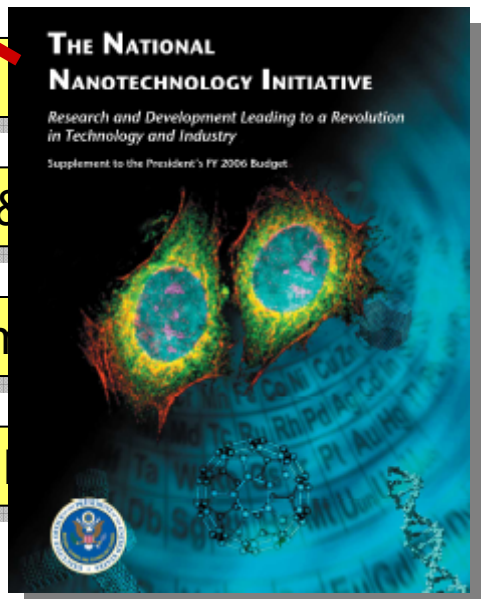
National Academies

[Yellow box]

Innovation &

Nanomanufacturing

Public Awareness



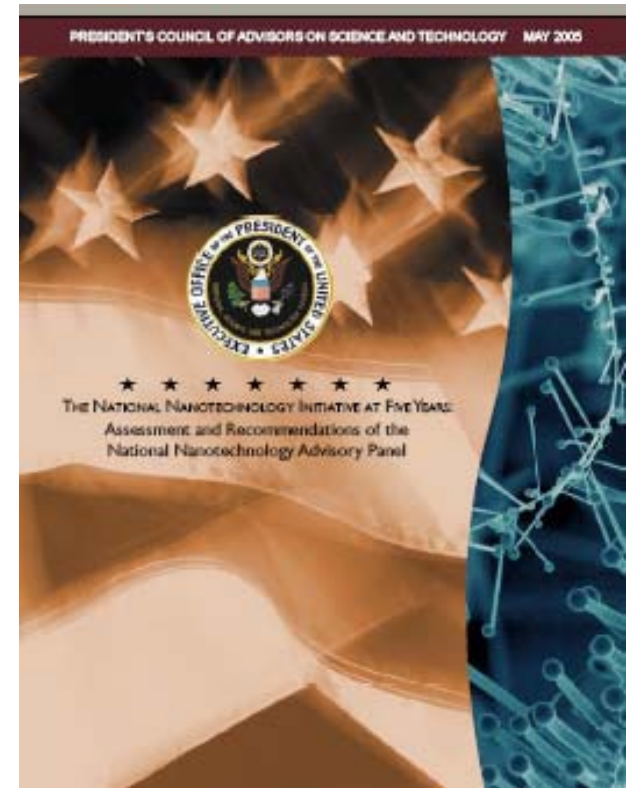
Relationship
 — Formal reporting
 Informal reporting
 - - Administrative or contractual





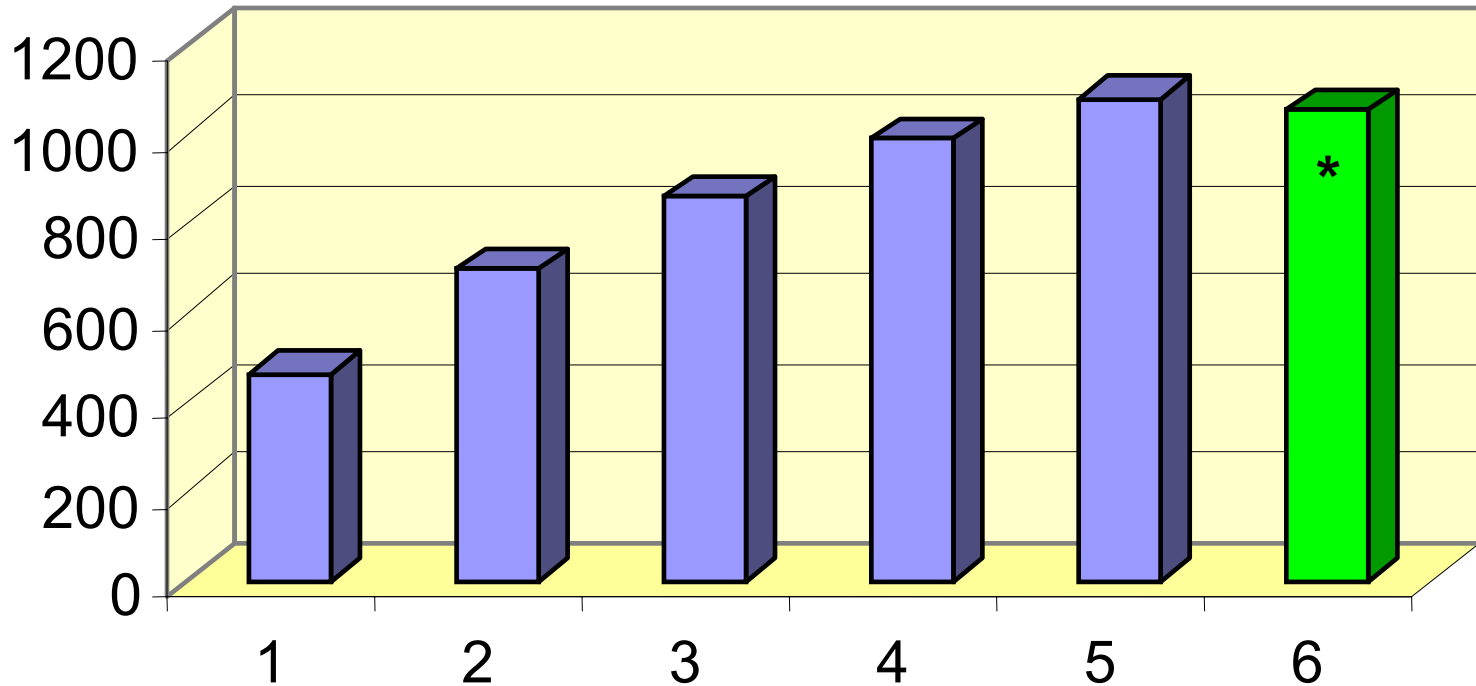
PCAST/NNAP report (May 2005)

- ❖ How are we doing?
- ❖ Is the money well spent and the program well managed?
- ❖ Are we addressing societal concerns and potential risks?
- ❖ How can we do better?





NNI Budget History

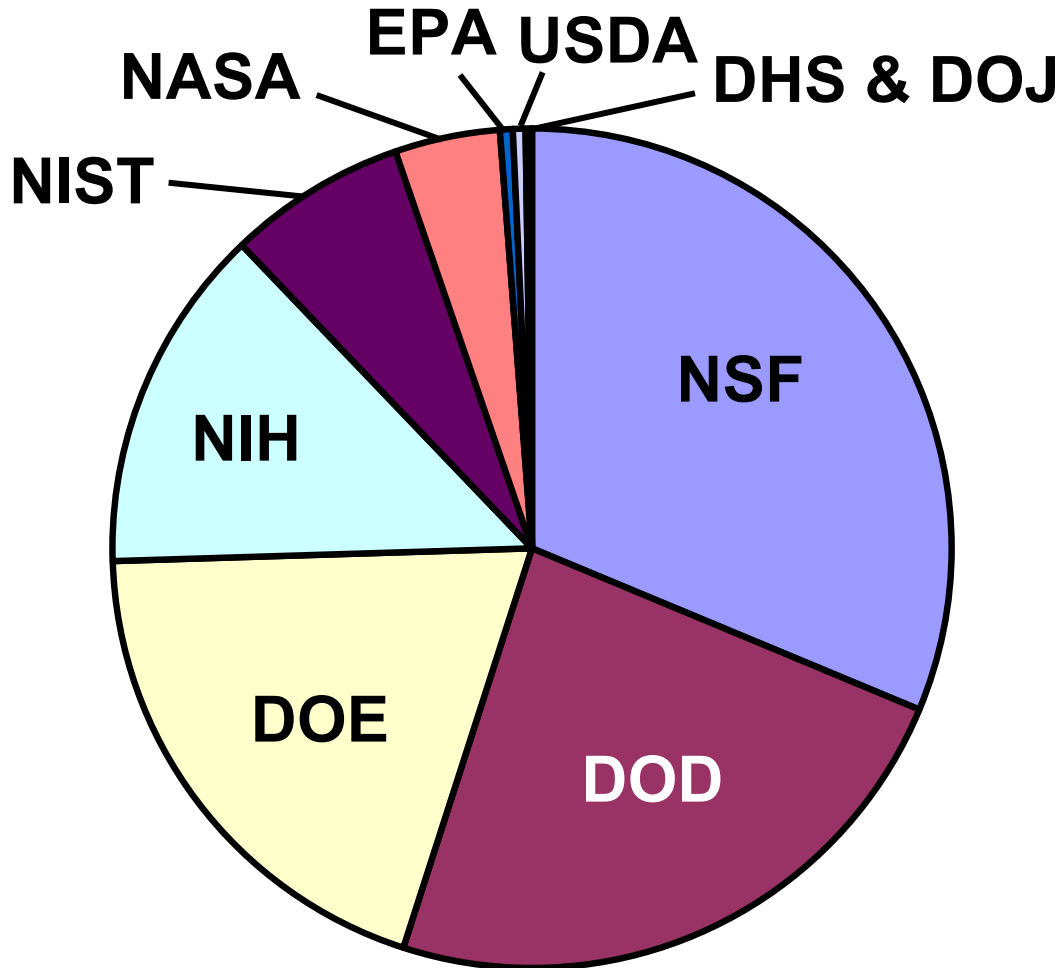


* FY06 is Presidential request, not comparable to enacted budgets.



NNI FY 2006 Budget Request

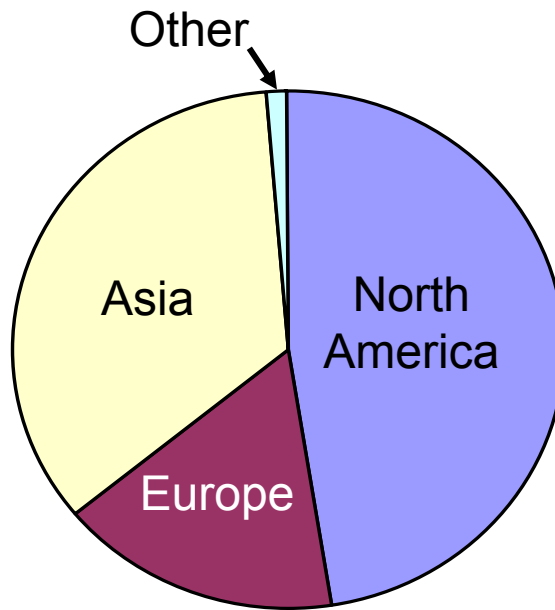
Total = \$1,054 million



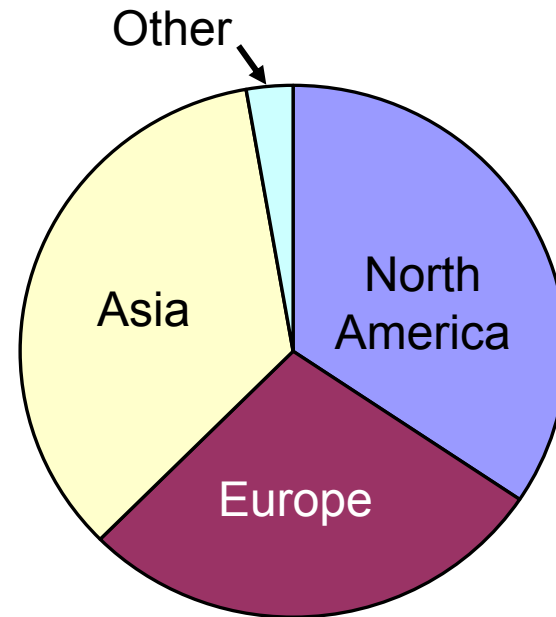


How are we doing?

Global investments in 2004 (Total=\$8.6 billion)



Private (Corp. + VC)
Total = \$4 billion



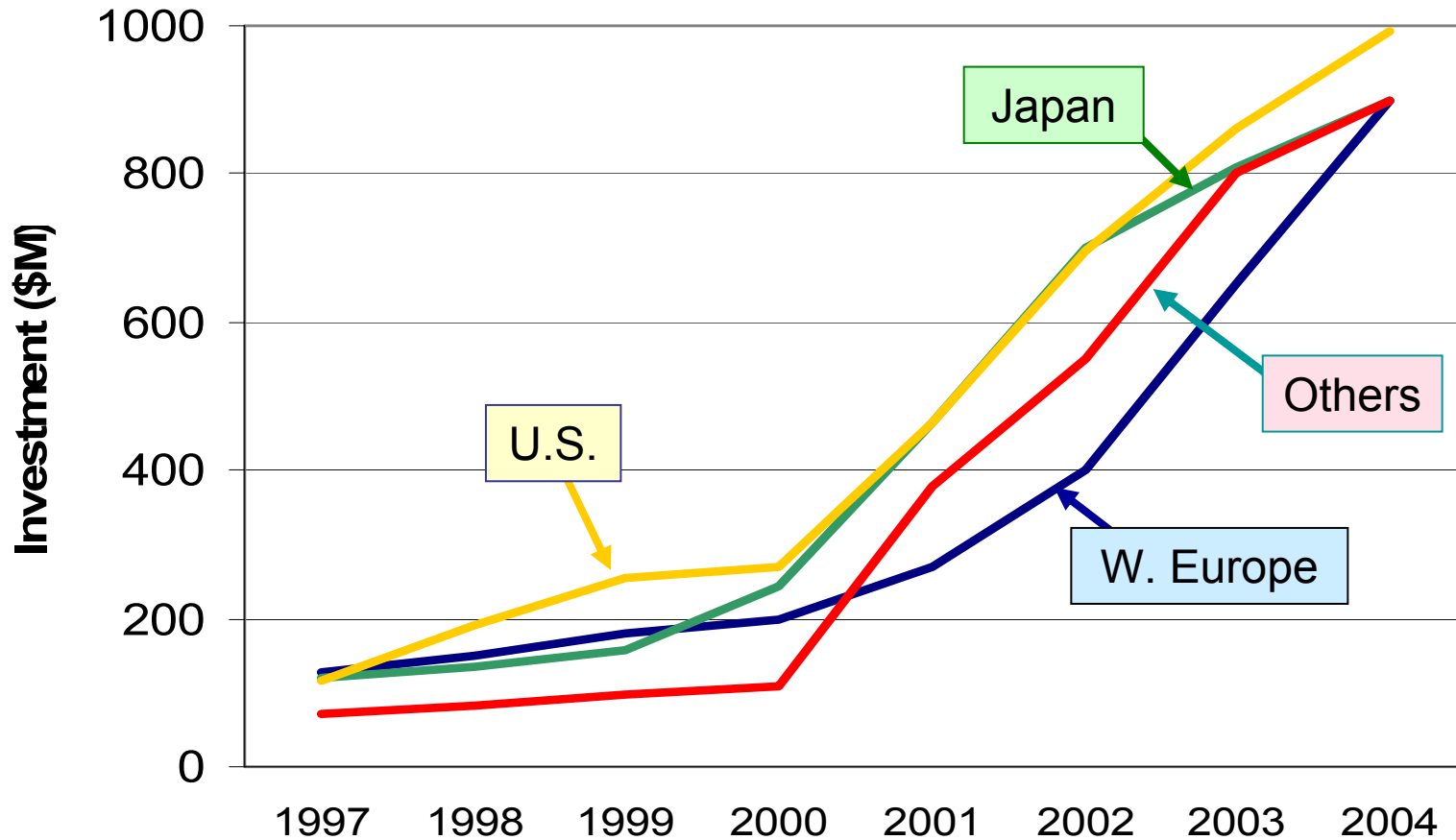
Public (National, regional, state)
Total = \$4.6 billion

Source: Lux Research



How are we doing?

International government spending



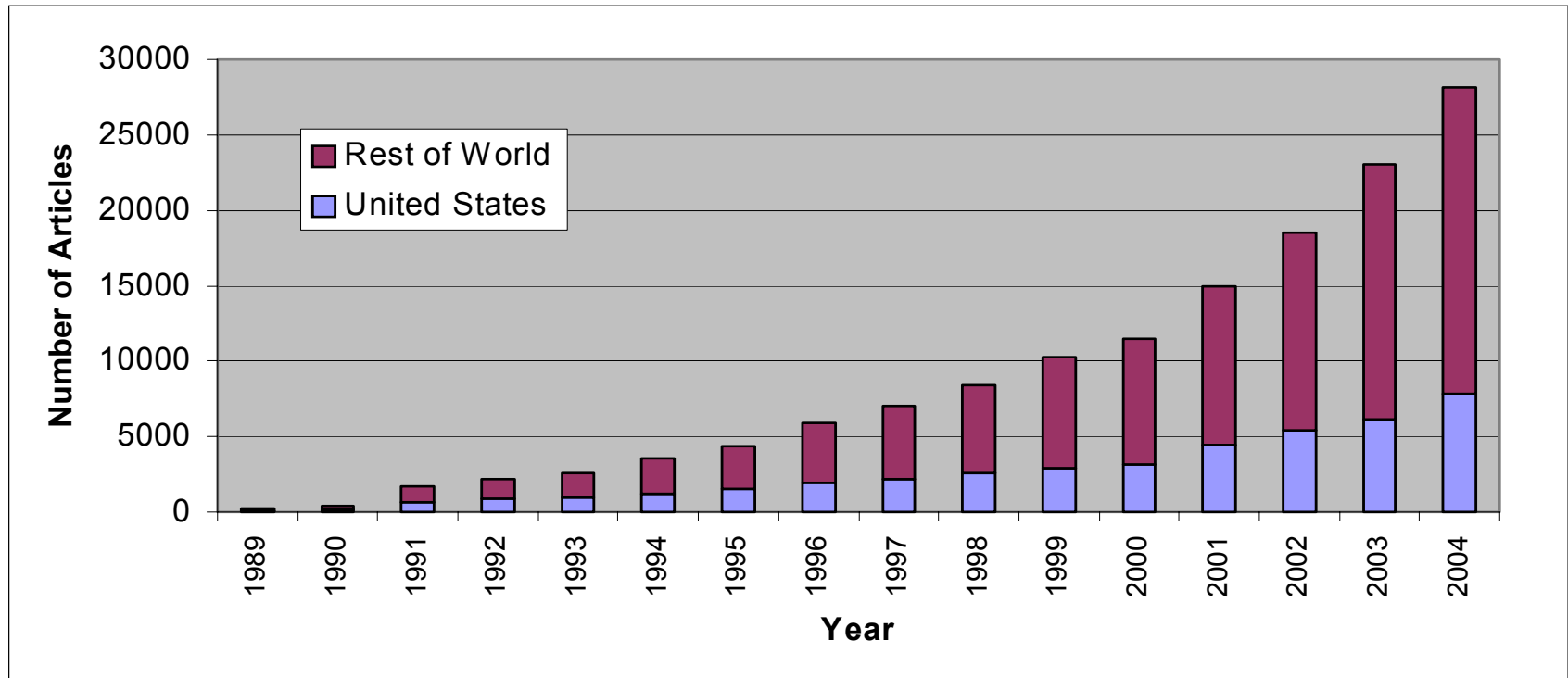
Source: National Science Foundation



How are we doing?

Research output: Publications

★ U.S. fraction of publications mirrors fraction of investment.

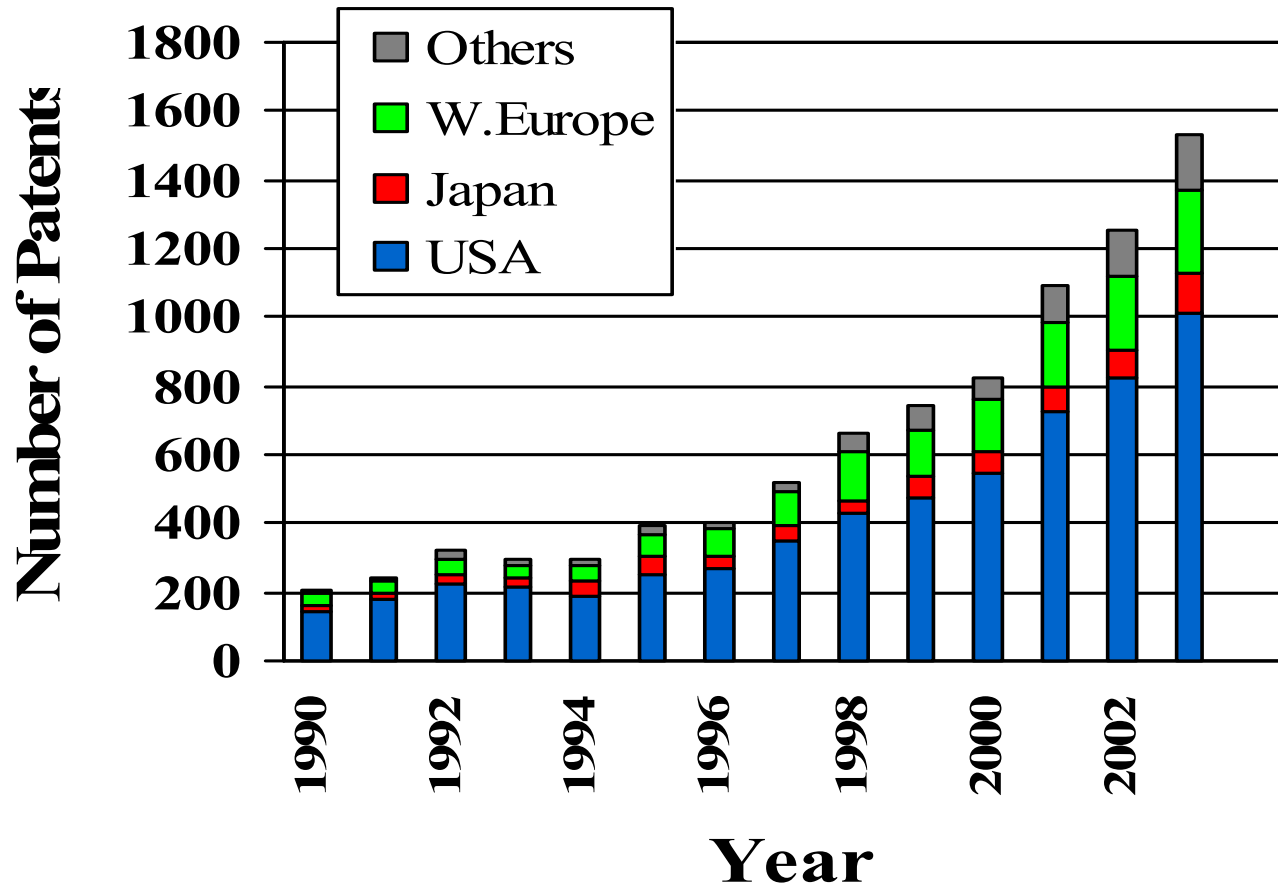


Source: J. Murday, U.S. Naval Research Laboratory; ISI search using “nano*”



How are we doing?

Research output: Patents



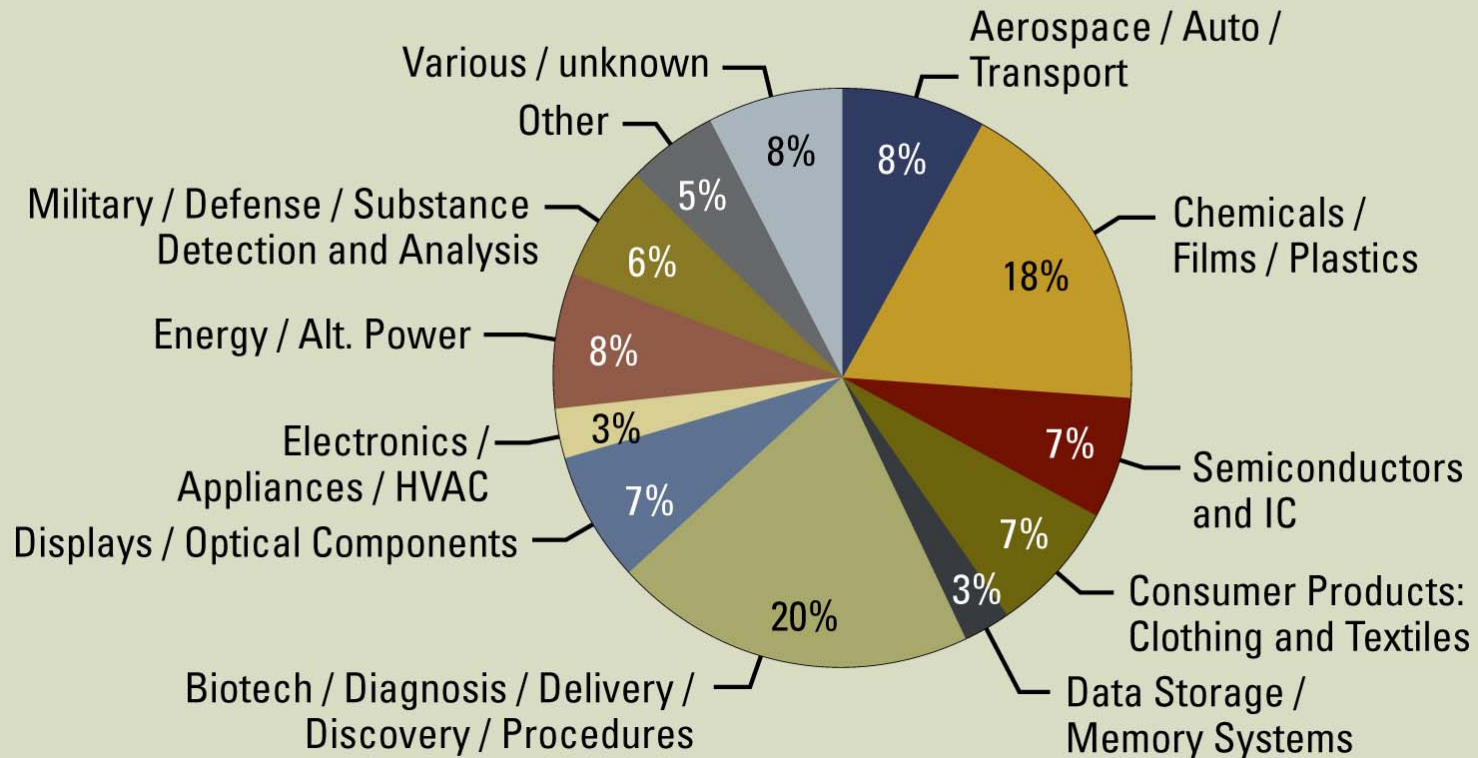
Source: Huang et al. (2004) J. Nanoparticle Research
Nanotechnology keyword search of titles and claims of patents in USPTO database



How are we doing?

Areas of private sector activity in U.S.

Nanotech-Involved Companies: Target Industries



Source: *Small Times Media* (2004)



NNI Vision

A future in which the ability to understand and control matter on the nanoscale leads to a revolution in technology and industry.

Expedite discovery, development, and deployment of nanotechnology for:

- ❖ Economic benefit
- ❖ National & homeland security
- ❖ Improved quality of life



NNI Goals

1. Maintain a world class R&D program aimed at realizing the full potential of nanotechnology
2. Facilitate transfer of R&D results to commercial use and public benefit
3. Develop educational resources, a skilled workforce, and the **supporting infrastructure** and tools to advance nanotechnology
4. Support responsible development of nanotechnology



Areas of investment




(Program Component Areas)

1. Fundamental Nanoscale Phenomena and Processes
2. Nanomaterials
3. Nanoscale Devices and Systems
4. Instrumentation Research, Metrology, and Standards for Nanotechnology
5. Nanomanufacturing
- 6. Major Research Facilities and Instrumentation Acquisition**
7. Societal Dimensions

Relationship of PCAs to Goals

Program Component Areas:	Goal 1: Maintain a world-class research and development program aimed at realizing the full potential of nanotechnology	Goal 2: Facilitate transfer of new technologies into products for economic growth, jobs, and other public benefit	Goal 3: ... supporting infrastructure ...		Goal 4: Support responsible development of nanotechnology
Fundamental Nanoscale Phenomena and Processes	Secondary	Secondary	Primary	Primary	Secondary
Nanomaterials	Secondary	Secondary	Primary	Primary	Secondary
Nanoscale Devices and Systems	Secondary	Primary	Primary	Primary	Secondary
Instrumentation Research, Metrology, and Standards for Nanotechnology	Secondary	Primary	Primary	Primary	Secondary
Nanomanufacturing	Secondary	Primary	Primary	Primary	Secondary
Major research facilities & Instrumentation			Primary	Primary	Secondary
Societal Dimensions	Secondary	Secondary	Primary	Primary	Secondary

Ref: Strategic Plan—p. 17

-  critical to goal
-  primary relevance
-  secondary relevance

Relationship between PCAs and NNI Agency Missions

● Primary
 □ Secondary
 Agencies w/
 nano R&D \$\$

	Fundamental Nanoscale Phenomena and Processes	Nanomaterials	Nanoscale Devices and Systems	Instrumentation Research, Metrology, and Standards for Nanotechnology	Nanomanufacturing	Facilities & Instrumentation	Societal Dimensions
CPSC	□	□	●	●			
DHS	●		●	●			
DOC (BIS)	□	●	●	●	□		
DOC (NIST)	□	□	□	●	●		□
DOC (TA)	□	□	□	□	●		●
DOC (USPTO)		●	●	●	●		
DOD	□	●	●	□	●		□
DOE							□
DOJ			●				
DOS							●
DOT	●	□	●		●		
DOTreas		●	●				
EPA	□	●	●	□	●		●
HHS (FDA)		□	●				●
HHS (NIH)	●	□	●	□	□		□
HHS (NIOSH)		□			□		●
IC	□	●	●		□		□
ITC		●	●		●		●
NASA	□	●	●		□		
NRC			●				
NSF							●
USDA	□	●	●		□		●

*Ref: Strategic Plan
 – p. 18*

NNI Centers and User Facilities

- Defense
- Energy
-
- NIH
- NIOSH
- NSF Centers
- NSF Networks
- NASA
- User Facilities

SNL/LANL
LBNL
ORNL

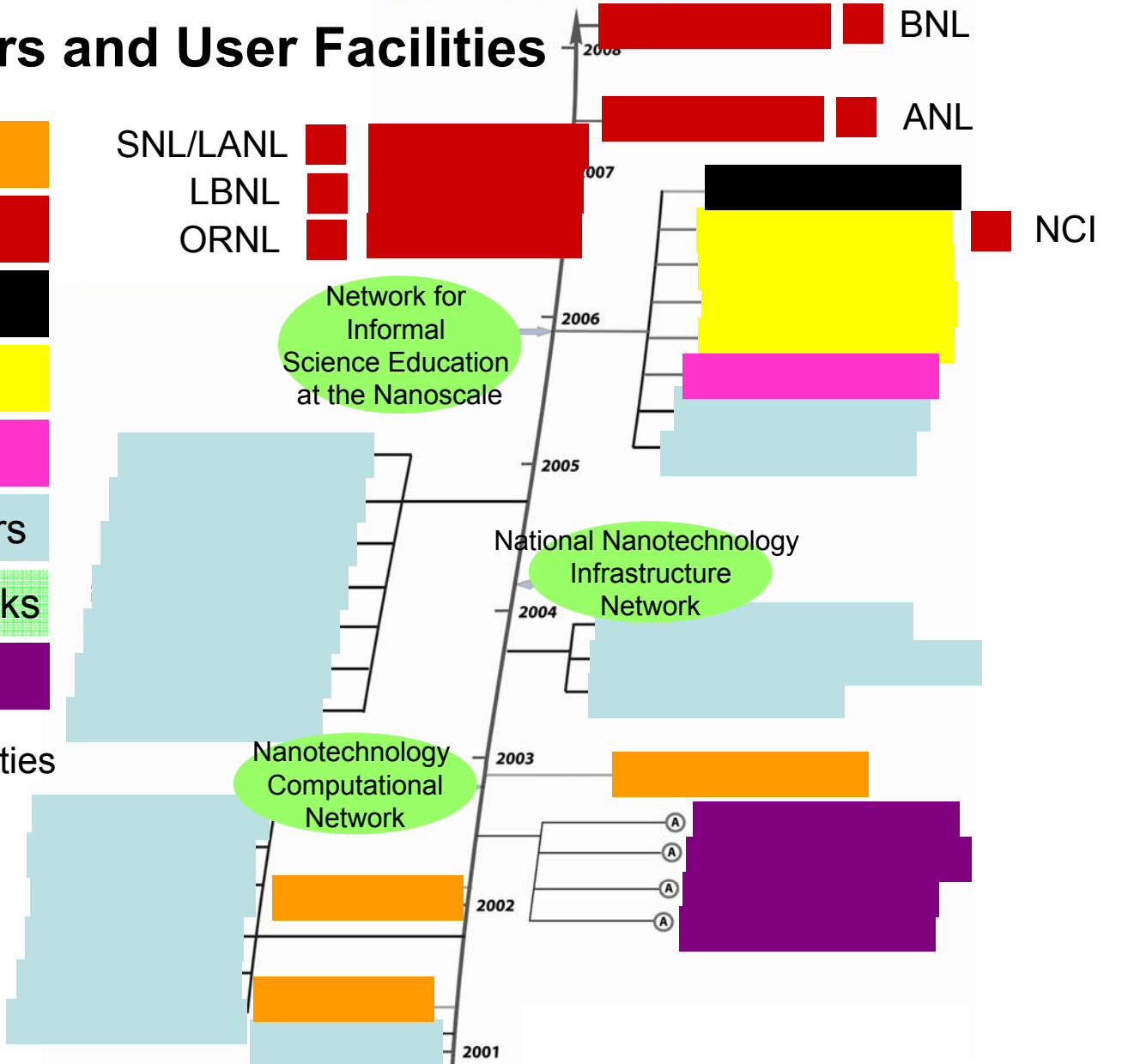
Network for Informal Science Education at the Nanoscale

National Nanotechnology Infrastructure Network

Nanotechnology Computational Network

BNL
ANL

NCI



Funded or planned as of May 2005



How could we do better?

Technology Transfer for Economic Benefit

■ Federal Government Role

- **Fund basic research and infrastructure—this is a critical Government function in the innovation chain.**
- Actively utilize SBIR/STTR programs
- Seek opportunities in which nanotechnology provides advantages in fulfilling needs of mission agencies (i.e., be an early adopter)



How could we do better?

Technology Transfer for Economic Benefit

- Expand Federal-industry interaction
- Increase Federal-State interaction through additional workshops, use of electronic and other communications, **enhanced awareness of R&D user facilities.**



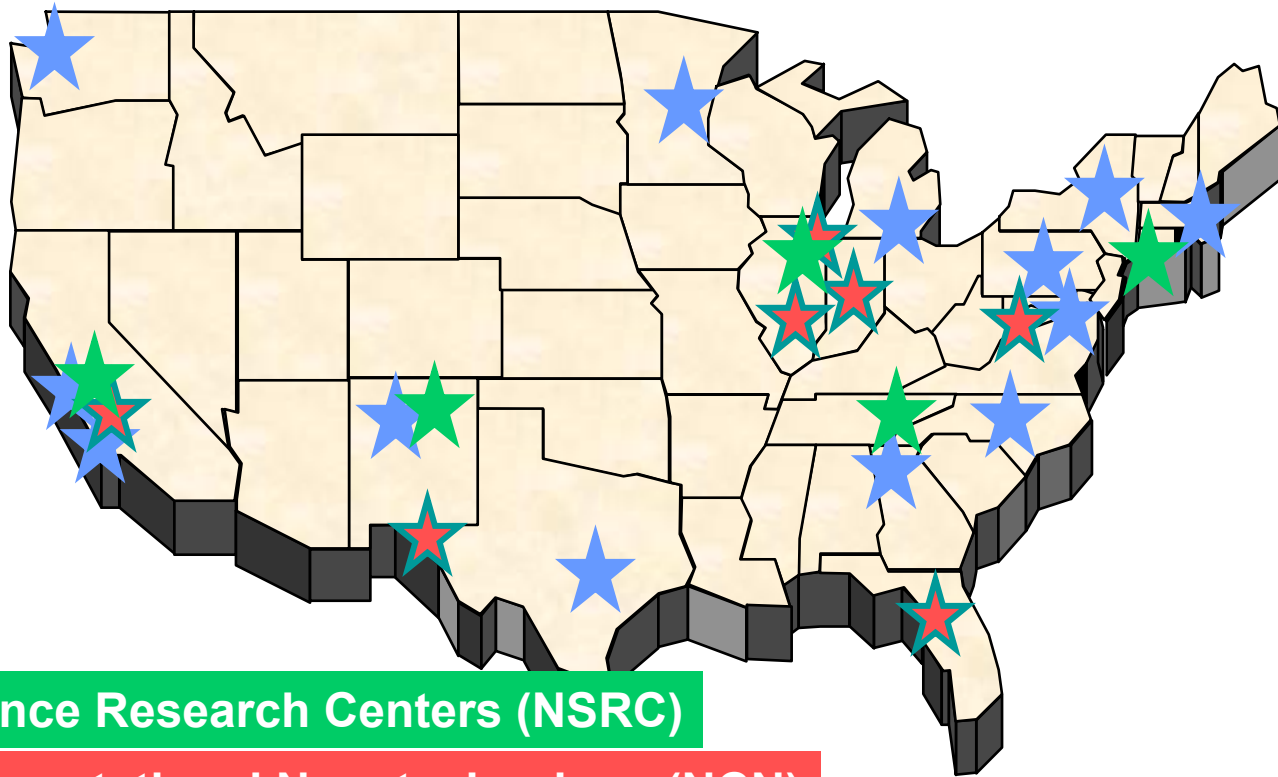
How could we do better?

Program Management

- NSET Subcommittee should continue or expand efforts to:
 - Adjust its makeup of subgroups as needs change.
 - Consider how it can better **share information about available user facilities**, research results, and technologies available for commercialization.
 - Look for ways to streamline grant reporting requirements for maximum benefit and efficiency.
 - Coordinate with other interagency groups (e.g. Working Group on Manufacturing R&D)
 - Involve other agencies, where appropriate (e.g. Departments of Education and Labor)



NNI User Facilities



Nanoscale Science Research Centers (NSRC)

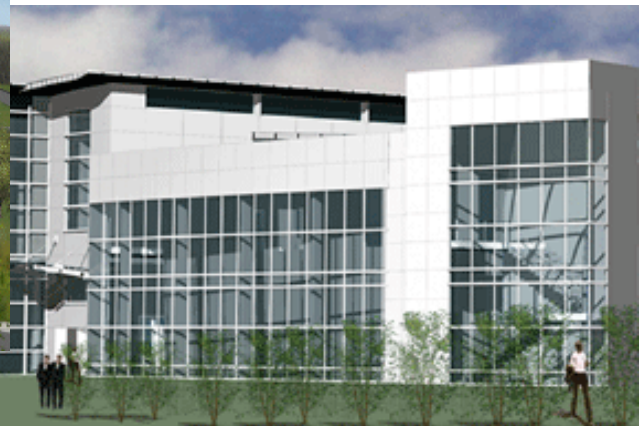
Network for Computational Nanotechnology (NCN)

National Nanotechnology Infrastructure Network (NNIN)



DOE Nanoscale Science Research Centers

State-of-the-art facilities



<http://www.science.doe.gov/bes/NNI.htm>